5

Collecting and Analyzing Information

If you don't know where you are going, you will wind up somewhere else.
—Casey Stengel

This chapter describes the information a municipality collects and analyzes to develop a plan. Communities may vary the type and amount of information they collect depending on their own particular needs and ideas. However, all the steps and items listed should be considered. Many communities do not appreciate the value of well-developed background data. However, this information is critical to analyze current conditions, make projections for the future, and provide the basis for objectives and implementation strategies. This information provides a profile of what the community—its people, their housing, the economy, the land, and public services—was, is, and will be.

5.1 Conduct a Preliminary Assessment

Start with a preliminary assessment. The purpose of the preliminary assessment is to get a sense of the goals and values of the community and to identify issues. This step will help to focus what information is collected and analyzed. This step is not meant to be time-consuming; it is intended to provide a quick overview of the community.

A vision of the future of the community should be discussed. This discussion should be as broad based as possible. It should include local officials, community leaders, interest groups, and residents. The purpose of the discussion is to reach consensus on what the community should be like in five, ten, or twenty years. The discussion should cover physical, social, and economic goals for the community.

The discussion should center next on the community assets that *do* or *will* contribute to the achievement of the vision. For example, for a goal of continued open space, mention programs that exist to advance that goal, such as a local land trust. For the goal of providing equal opportunity for housing, mention special actions that have been taken to provide affordable housing.

Likewise, the discussion should inventory liabilities of the town that might prevent or delay the accomplishment of the vision. Using the two examples above, rapid land subdivision without adequate controls could erode the town's open space. Large minimum lot sizes might prevent the construction of affordable housing. A broad public discussion is a good approach for conducting a quick inventory of assets and liabilities. A map of the town may serve as a good reference and recording device for physical conditions.

The planning commission should assess its own experience with growth and development conditions. Have recent land subdivision applications presented any special problems or opportunities for accomplishing community goals? Does a slowdown in the regional economy indicate any potential problems? Do town highways or schools require improvements to accommodate an influx of new people? An overview of growth trends is useful before defining the planning issues.

As the assets and liabilities of the community are evaluated, identify a set of planning issues. These issues will include the problems and opportunities anticipated in meeting the community's goals. If the ability to address all of these issues is limited—and that usually is the case—prioritize them. The issues selected will be the subject of more detailed analysis in the plan.

EXAMPLE—PLANNING ISSUES

- protecting water quality along a lake shoreline
- increasing the industrial and commercial tax base and evaluating the impact of this action on community services and facilities
- encouraging the active local agricultural economy
- preventing strip development and multiple points of access on a major arterial highway
- determining the location and attributes of a new town center
- providing adequate and affordable housing

It is not always possible for a community to have an organized and well-attended public discussion. If this is so in your community, you can try other means of soliciting comments from the public, such as attitude surveys, informal group discussions, a well-advertised meeting of the local officials, or presentations at a community function or gathering place.

5.2 Identify Information Required

Early on, identify data to be collected and analyzed. Each community will differ in its data needs and sources. Urban areas, with their more complex problems and needs, may want to collect detailed information on housing, traffic, economic conditions, and facilities and services. Rural towns, with limited housing, little industrial or commercial development, and minimal facilities and services, probably will be most concerned with data on land use and natural resources. While all the information that follows should be considered, each community is not expected to include all the items in preparing its plan. Use your preliminary assessment to identify the data you need to collect and analyze.

5.3 Make a Community Profile

5.3.1 History

A description of the setting of the community—how it came to be the way it is, and its social, cultural, economic, and political background—gives a perspective to the current trends and conditions of the community. By analyzing these historic patterns, you can define features and characteristics of the community that are valued today and will be of value in the future. Factors that could alter these patterns in the future should also be examined.

Sources:

Division for Historic Preservation—information of historic and archaelogical sites and buildings
Vermont Historical Society Library—historical information on Vermont
Local Historical Societies—local historical information
Local residents—oral history of the area

5.3.2 Population

Population refers to the number of people who are living in the community and their characteristics. With information on the people of the community, one can better understand the growth trends in the municipality and the region; the demand for future services, facilities, and economic improvements; and environmental conditions. This information affects planning for schools, housing, recreation facilities, population density, economic development, transportation, police and fire protection, and public utilities.

Table 5.l lists social and economic characteristics that could be included in a community profile on population. It also shows a

suggested form for the data, possible analyses, and implications that could be drawn. Not all of this information, of course, is available to each municipality. But at a minimum, data on the number of people in the municipality, region, and state; the trends in population growth; and the age of the population should be collected and studied.

To plan for future land use and public services, estimates should be made of future populations. To make estimates, you will make assumptions on the factors influencing population change. Factors to consider include: rate of growth, both historical and recent; land subdivision and zoning permit application trends; economic trends in the municipality and region; the status of municipal facilities and services; and age characteristics of the population. You can project two or three rates of growth based on different assumptions about the future. All assumptions should be clearly stated.

Sources:

Vermont Department of Health—annual municipal population estimates

Vermont Department of Libraries—population and economic projections, U.S. Census data

Center for Rural Studies, University of Vermont—U.S. Census data

Vermont Department of Taxation—tax return information on income levels

Vermont Department of Employment Security and Training—employment data

Regional planning commissions—U.S. Census data, data collection and analysis

Survey of residents—to update Census data and get information not available from other sources

5.3.3 Housing

In addition to setting out several housing goals, Chapter 117 calls for the inclusion of a housing element in both municipal and regional plans. The regional plan's housing element is to identify "the need for housing for all economic groups in the region and communities," while the municipal plan housing element is to "include a recommended program for addressing low and moderate income persons' housing needs as identified by the regional planning commission in the regional plan." **24 V.S.A. §§4348a(a)(9)**, **4382(a)(10)**. Determining affordable housing needs is covered in Section 5.3.4 of this manual.

Housing refers not only to components of a house, such as a living room, kitchen, bedroom, and bath, but also to the yard space a dwelling has, its relation to adjoining properties, its place in the community, and the services it requires. A large proportion of buildings in a municipality are for housing. A major function of planning is to meet two important community objectives—first, safe, adequate, and affordable shelter for present and future populations and second, suitable density and distribution of housing throughout the community.

The growth and development of housing affects the environment of the municipality and the facilities and services it provides (or intends to provide). Housing built in the absence of adequate

Table 5.1
SOCIAL AND ECONOMIC CHARACTERISTICS

CHARACTERISTIC	DATA FORM AND SOURCE	ANALYSIS	IMPLICATIONS
Number of people in municipality	1900-1990, by decade, U. S. Census 1900-present, Vermont Dept. of Health	percent change; explanation for change; growth trends	impact on land use; ability of municipality to provide facilities and services
Number of people in region	1990-1990, by decade, U.S. Census 1990-present, Vermont Dept. of Health	percent change; reasons for change; growth trends; compare to municipal growth	impact on population growth of municipality
Number of people in state	1900-1990, by decade, U.S. Census 1900-present, Vermont Dept. of Health	percent change; growth trends; compare to municipal and regional growth	impact on population growth of municipality and region
Age and sex of population	pre-school age; school age (elementary and high school); child-bearing age; working age; retirement age/by male and female; present (if available), 1990, 1980, and 1970, U.S. Census	number of dependents (pre-school, school, and retirement age) in relation to working force; family size; number of children of school age; fertility ratio*; trends in age groups (e.g. decline in number of pre-school students)	impact on population growth of municipality; demand for schools, recreational facilities, housing and other facilities and services; potential labor force
Ratio of births to deaths	number of births and number of deaths: present (if available), 1990, 1980, and 1970, Vermont Dept. of Health, municipal reports	compare ratios; compare with age and sex and migration trends	impact on population growth of municipality; services, facilities, land use
Migration, in and out of municipality	number of people moving in and number of people moving out over last five years, (if available), 1980, U.S. Census, Vermont Dept. of Health	compare to regional growth trends; trends in migration into or out of municipality	impact on population growth of municipality; services, facilities, land use
Educational level of residents	number of years of education (elementary, high school, college, vocational) 1990, 1980, 1970, U.S. Census	Increase or decrease in educational attainment; type of education (vocational, etc.)	school facilities needs; demands for services; labor force characteristics
Income level of residents	under $5,000, $5,000-$9,999, $10,000-$14,999, $15,000-24,999, $25,000 and over (or combinations thereof) U.S. Census, Vermont Dept. of Taxes	number of people below the poverty level; economic conditions of municipality; ability to afford average housing prices	demand for housing and community services; labor force characteristics
Occupations	employment status of residents, male/female employment, type of occupation, skills; present, 1990, 1980, 1970 U.S. Census, Vermont Department of Employment and Training	trends in employment in municipality; actual and potential labor force	trends in demand and supply for different types of jobs; influence on population growth and local economy

*Fertility ratio: Number of children under 5 years of age per 1,000 women 15 to 49 years old.

planning for public facilities can overburden services. Poorly located housing can pollute a water supply or destroy an important wildlife habitat. Housing that is inadequate to meet the demand in the community or region can strain adjacent municipalities and prevent people from living close to their jobs.

Communities should inventory existing housing conditions. Table 5.2 sets forth housing characteristics that could be studied and suggests a form for the data, possible analyses, and implications that could be examined.

Municipalities should compare trends in housing supply with the population projections and characteristics. Population characteristics that should be examined include average household size, income levels, and age of residents. Based on this information, determine what type and number of housing units are required for future populations. Also, study trends in population growth and housing supply in the region to determine what the municipal share of the region's housing needs should be. Compare the projections on housing units with trends in housing supply, including the type and price of units. Identify any gaps likely to occur in meeting future housing needs.

Another important consideration in a housing analysis is the pattern of residential development. How is housing distributed throughout the municipality? Where are the identifiable neighborhoods? Where are mixed uses? What type and density of unit is there in each area? In smaller municipalities the study of the housing pattern should consider the distance to community and government services, road conditions, and the suitability of the land for development.

Larger, more rapidly growing municipalities will be concerned not only with the appropriateness of sites for residential development but also with the timing and density of these developments. These patterns will affect the municipality's ability to provide facilities and services, the preservation and enhancement of neighborhoods, and compatibility with adjacent land uses.

Vermont's cities will have more complex housing issues. With limited land available for new housing construction, they may be concerned with maintaining the housing stock, improving blighted areas, regulating land uses, preserving neighborhoods, and administering housing programs.

Sources:

Vermont Department of Health—annual municipal housing estimates

Zoning Administrator—zoning permit trends

Vermont Department of Libraries—U.S. Census data

Vermont Department of Taxes—housing prices, number of houses sold
Vermont Department of Taxes, Division of Property Valuation and Review—tax rates, grand list information, ownership ratios
Agency of Commerce and Community Development, Dept. of Housing and Community Affairs—statewide and labor market area housing statistics and projections, Comprehensive Housing Affordability Strategy, community development guidebook
Center for Rural Studies, University of Vermont—U.S. Census data
Assessor's Office—grand list data (parcels and values)
Clerk's Office—property transfer tax returns (sale prices)
Aerial photographs—housing types and distribution
Windshield surveys—number, type, exterior condition of housing units
Regional planning commissions—Census data, data collection, analysis, and regional plans
Local realtors—local housing market conditions

Table 5.2
HOUSING CHARACTERISTICS

CHARACTERISTIC	DATA FORM AND SOURCE	ANALYSIS	IMPLICATIONS
Number of dwelling units	1970, 1980, 1990 U.S. Census 1990-present, Vermont Department of Health, zoning administrator	percent change; explanation for change; growth trends	impact on land use, ability to provide facilities and services
Type of dwelling units	single-family, duplex, multi-family; condominium units; mobile homes in parks, mobile homes outside parks; 1970, 1980, 1990; present; U.S. Census, zoning administrator	percentage of housing by type; trends in type of housing available	availability of a variety of housing types; impact on land use
Year-round and seasonal dwellings	1970, 1980, 1990, present, U.S. Census Vermont Department of Health, zoning administrator	percentage of housing by occupancy; trends in provision of year-round vs. seasonal dwellings	impact on facilities and services; impact on land use; availability of housing by occupancy
Housing conditions	number of rooms, substandard and standard; 1970, 1980, 1990, present; U.S. Census	percentage of housing by size of unit or substandard condition; trends in substandard housing and unit size	extent of substandard units in need of improvement
Owner-occupied versus rental housing	1970, 1980, 1990, present; U.S. Census, zoning administrator	percentage of housing by occupancy; trends in owner-occupied vs. rental housing	availability of rental vs. owner-occupied units
Vacancy Rate	1970, 1980, 1990, present; U. S. Census	percentage of housing that is vacant; trends in number of vacant units	constraints in housing market; availability of units for rent or sale
Average housing prices	Average sale prices of owner-occupied units; average contract rent prices; 1970, 1980, 1990, present; U.S. Census, multiple listing service	percentage of housing available at different prices; trends in housing prices	affordability of housing; availability of housing at a variety of prices; impact on grand list

5.3.4 Affordable Housing

Communities throughout Vermont are grappling with the issue of affordable housing. As land and building values soar and federal housing assistance diminishes, municipalities are finding it difficult to meet the shelter needs of their residents.

What is affordable housing and why is it a problem? According to the U.S. Department of Housing and Urban Development, "affordable housing is appropriate housing that can be purchased by people for a reasonable percentage of their income. A person with an 'average income' ought to be able to buy 'an average price' new house. Generally speaking, housing is considered affordable when monthly shelter costs do not exceed approximately one-third of a person's monthly income." Efforts to provide affordable housing are targeted to people of moderate income (below 95 percent of area median), low income (below 80 percent of area median), very low income (below 50 percent of area median), and very, very low income (below 30 percent of the area median).

Before municipalities can address the issue of affordable housing, they must define the need within their community. Through surveys and discussions, planners can learn the extent of community concern for affordable housing; they can then target specific groups that have unmet housing needs. Data on population and housing in the community will help planners spot the trends in housing supply and demand. To complete the inventory on housing need, planners should consider population and housing projections for the community. Figure 5.1 provides a form and some questions to assist towns in identifying future housing needs.

The data on housing need should be compared to the trends in housing supply. An inventory of the number of housing units by type should be taken that includes:

- single-family, two-family, and multifamily units
- owner-occupied versus renter-occupied units
- mobile homes and manufactured housing
- seasonal, vacant, and year-round units

Historical data on housing type will also help to determine trends. Planners should inventory rental assistance units, mobile homes and mobile home parks, and other units offering affordable housing. They should collect data on rental prices and house prices. This information should be by housing type if possible. For example, rental price data should include different size housing units. Housing price data should be collected for single family, two family, and multifamily units. In rural communities, also consider the size of the housing lot.

Household income is another important piece of information. List the number of households in selected income brackets. Using this data, municipalities can calculate how much residents in different income brackets can afford to pay for housing based on the U.S. Department of Housing and Urban Development guideline.

Next, compare the data on housing needs (population and household data and projections, and household income) to the data on housing supply. What do the trends show about the availability of affordable housing for present and future households? Which housing needs are not likely to be met? Which housing types will be needed? What events may threaten the availability of affordable housing which currently exists?

Figure 5.1
SAMPLE FORM FOR IDENTIFYING HOUSING NEEDS

	1980	1990	2000	Percent Change Between 1980 & 2000
Total Population				
Total Number of Household				
Number of Households without Children				
Number of Single-Person Households				
Number of Elderly Households (65+)				
Number of School-age Children (Ages 5-17)				
Number of Young Households (Adults Ages 25-34)				

1. The overall population in the community of _____ is:
   a) growing b) leveling off c) declining

2. The number of households is:
   a) growing b) leveling off c) declining

3. The school-age population is:
   a) increasing b) relatively unchanged c) decreasing

4. Majority of households in the community are:
   a) Households with school-age children
   b) Married couples without children
   c) Single person households
   d) Elderly households

5. Majority of new households are:
   a) Households with school-age children
   b) Married couples without children
   c) Single person households
   d) Elderly households

6. How many households are in the 25-34 age group?
   _____

7. By what percentage have the 25-34 households increased since 1980?
   _____

Communities also have a role in providing affordable housing in the region. They should consult their regional planning commission on the distribution of population, households, and affordable housing around the region. They should be aware of the housing needs of the region and should work with neighboring communities to ensure those needs are met.

With this information communities should draw conclusions on the nature and extent of their affordable housing problem.

Sources:

Agency of Commerce and Community Development, Dept. of Housing and Community Affairs—statistics and data, Comprehensive Housing Affordability Strategy, guidebooks

Vermont Housing Finance Agency—Agency data, statewide housing market data

Regional planning commissions—data collection, analysis, and regional plans

Community Action Agencies—data, guidelines

Community Land Trusts—data, guidelines

Local housing agencies and development corporations—data, guidelines

5.3.5 Economy

The term economy, as used in municipal planning, refers to jobs, production, income, resources, and activities in the municipality and in the region. The economy has a direct influence on the well-being of the residents, the community facilities and services, and the environment of the municipality. Economic planning can provide jobs commensurate with the skills and aims of residents; a balanced tax base to meet the needs of the community; protection of economic resources; and necessary services and products. A poorly planned economy can adversely affect the environmental quality of the community; cause over-development and strain municipal facilities; provide excessive or unnecessary services and products; and cause regional dislocations of businesses and industries.

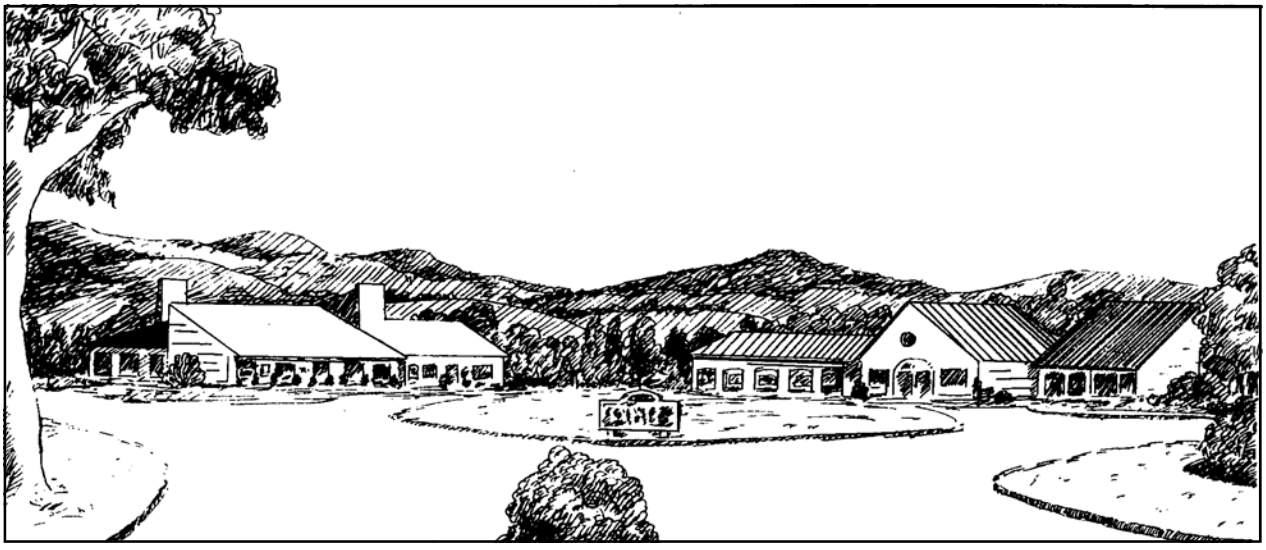
Begin by inventorying the municipality's economic base—its natural resource production, industry, and commerce. Collect information on the number, type, and location of businesses; the number of persons employed in town and the location of their residences; the products created; the taxes contributed; and the facilities and services used.

Analyze the information collected in the inventory by comparison with population trends, labor force characteristics,

regional economic conditions, natural resource production potential, public services, utilities, transportation, and land availability. The analysis should point out problems, opportunities, and needs. These might include the decline of farming, the misuse or contamination of resources, a lack of well-serviced commercial or industrial sites, or an emerging pattern of strip commercial development.

Many small communities will have little or no commercial and industrial activity. Their residents may be occupied in agricultural or forestry production, home occupations, construction, seasonal businesses, or industries outside the community. Economic planning in these communities will focus on protection of natural resources, control of nuisances from home occupations, and farm-related businesses, regional economic trends, off-season activities, and suitability of sites and areas for the introduction of new commerce or industry if desired.

More rapidly growing municipalities may be in the process of developing a commercial or industrial base. They may face declining farm and forest production, growing numbers of commuters to regional employment centers, heavy seasonal activity, rising tax burdens on residents, increasing demands for services, and unsightly strip development. These communities will want to consider the availability of well-serviced and suitably located industrial and commercial sites. They will need to decide the extent to which productive natural resources are to be utilized, what types of industry would be desirable, and how economic growth in the community will affect established businesses and employment centers in the region. They will have to consider the availability of adequate parking facilities and municipal services



for accommodating growth. Finally, they will want to examine how to reinforce existing town centers and what the effect will be on the quality of the environment in the town.

Cities in Vermont face some additional problems. These include competition from shopping centers and industrial parks in nearby towns; incompatible adjacent land uses; nuisances from industries; outdated public facilities; inadequate transportation facilities; poor traffic, parking and circulation; and, in some cases, a deteriorating central business area. These urban areas may need to improve public facilities, streets, and parking facilities; identify areas where design standards are needed; eliminate nuisances; improve blighted areas; and participate in regional planning for economic development.

Sources:

Agency of Administration, Department of Taxes—municipal and county sales and use tax receipts

Agency of Commerce and Community Development, Department of Economic Development—economic development assistance, Directory of Manufacturers, economic forecasts

Agency of Commerce and Community Development, Department of Tourism and Marketing—vacation travel indicators reports

Department of Employment Security and Training—employment and wage information

Department of Agriculture, Food and Markets—agricultural development information

Agency of Natural Resources, Department of Forests, Parks and Recreation—information on forestry and wood products industry

Vermont Department of Libraries—U.S. Census data and economic forecasting

Center for Rural Studies, University of Vermont—U.S. Census data

Vermont Yearbook—listing of commercial and industrial operations, professional offices, and institutions for each municipality (in libraries and bookstores)

Local and regional development corporations—inventories of industrial and commercial buildings and sites, vacancies, potential industrial and commercial expansion

Regional planning commissions—economic data for municipality and region, analysis of regional economic conditions

5.3.6 Fiscal Conditions

It is important to analyze the fiscal condition of the municipality to understand the effects of growth on expenditures and

revenues, its ability to meet planning needs through public expenditures and other fiscal policies, and tax burdens on local residents. A fiscal analysis also provides a basis for recommended capital expenditures.

Data should be collected for the most recent five-year period on the following:

- grand list by sector (residential, vacation, commercial, industrial, agricultural)
- the tax rate
- total revenues and revenues by source (local property taxes, fees and charges, other local sources, and federal and state sources)
- total expenditures and expenditures by type (operating vs. capital, highways, schools, recreation, etc.)
- the total debt and debt by item

Figure 5.2 is an example of a statement of revenue, expenditures and changes in the general fund balance.

Some communities prefer to put these data in constant dollar terms to discount for the effects of inflation. At this stage municipalities should identify any fiscal policies that are in effect, such as tax abatement for farmland or a fixed rate of growth in the tax rate.

In analyzing the data, consider the trends in revenues, such as increased dependence on the local property tax; patterns of expenditures, such as rapid growth in general administrative costs; and trends in the grand list, such as an increasing amount of industry.

Assess the tax burden on local residents and compare it to that of other communities in the region and state. Relate these analyses to trends in growth and development. Are costs rising due to an increase in population? Is the grand list growing fast enough to cover these costs without raising the tax rate? Are fiscal policies, such as increasing fees and charges or lowering taxes on farmland, having the anticipated effects?

Then make projections of the grand list, of operating expenditures, of revenues, and of fixed payments, such as debt. To make these projections, look at factors that will affect the growth of these items. These factors may include: an acceleration in the rate of population growth, the loss of a revenue source, or the location in town of a major new employer. Factor in the municipality's financial policies on indebtedness, tax rate growth, tax collection, fees for governmental services, and tax stabilization.

Figure 5.2

GENERAL FUND
STATEMENT OF REVENUE, EXPENDITURES
AND CHANGES IN FUND BALANCE
For the Year Ending June 30, 20__

REVENUE	BUDGET	ACTUAL
Taxes	$105,500.00	$107,418.71
Green Mountain National Forest	6,500.00	6,579.94
State Aid – Highways	20,000.00	27,378.76
Town Clerk Fees	3,000.00	6,841.00
Interest Income	3,000.00	7,705.79
Licenses – Dog and Liquor	900.00	1,082.00
Rental Income - Building and Equipment	1,800.00	2,775.00
Miscellaneous Income	800.00	887.84
Allocation from surplus	5,000.00	–0–
TOTAL REVENUE	$146,500.00	$160,669.04
EXPENDITURES [See Schedule for Details]		
Highways and Roads		
Construction and Maintenance	$32,500.00	19,979.95
Winter Maintenance	15,000.00	19,499.91
Miscellaneous Expenses	6,500.00	4,034.43
Buildings and Services	22,000.00	18,134.18
Administration	25,500.00	27,299.44
Fire Department	9,500.00	9,080.23
Appropriations to other funds		
Fire Engine	15,000.00	15,000.00
Highway Equipment	4,000.00	4,000.00
Highway Resurface Reserve	4,000.00	4,000.00
Taxes and Assessments	5,000.00	5,833.88
Discretionary Provision	7,500.00	4,736.00
TOTAL EXPENDITURES	$146,5000.00	$131,598.02
EXCESS OVER REVENUE		29,071.02
FUND BALANCE 7/1		27,220.83
FUND BALANCE 6/30		$ 56,291.85

Next, evaluate the municipality's ability to finance operating and capital expenditures, the impact on local residents of these expenditures, the need for changes in fiscal policies, the opportunities to increase the grand list, and the potential for new funding sources.

Sources:

Vermont Agency of Administration, Division of Property Valuation and Review—equalized grand lists, effective tax rates

Municipal reports—annual revenues and expenditures, grand list, tax rate Legislative body—fiscal policies

Municipal departments, boards, or commissions—revenue and expenditure trends and needs

Assessor's Office—grand list information

Regional planning commissions—assistance in fiscal analysis, videotape and workbook on capital budgets and programs

5.4 Prepare a Base Map

Land uses and physical characteristics should be inventoried and analyzed. This information is best displayed on maps. Maps will illustrate the patterns of development, the location of resources, and the physical capability of the land to accommodate development.

The first step in making a land use inventory is to obtain a community base map. It will provide the scale and physical features that will be common to all planning maps. Base maps in Vermont typically range in scale from 1"=1000' to 1"=2000'. They show municipal boundaries, highways, and water bodies; sometimes they include significant features, such as peaks or wetlands. On the map is the name of the municipality, the title and scale of the map, and a north arrow. The names of adjacent municipalities; rivers, streams and lakes; and highway numbers or names are usually labeled on the map. This map will serve as the basis for recording land use information. See Map 5.1 for an example base map.

An excellent source for a base map is the collection of orthophotos that is available in each municipality. These aerial photos are extremely accurate for taking measurements. Many communities have reduced the photos, or tax maps made from the photos, and made a composite map from them. To be as accurate as possible this work should be professionally done, either manually or through computer mapping. Computers have revolutionized mapping and increased its usefulness as an analytic planning tool. There is software available that makes accurate computer mapping relatively easy for non-professionals. See Section 5.8 of this Manual for a discussion on the statewide geographic information system (GIS).

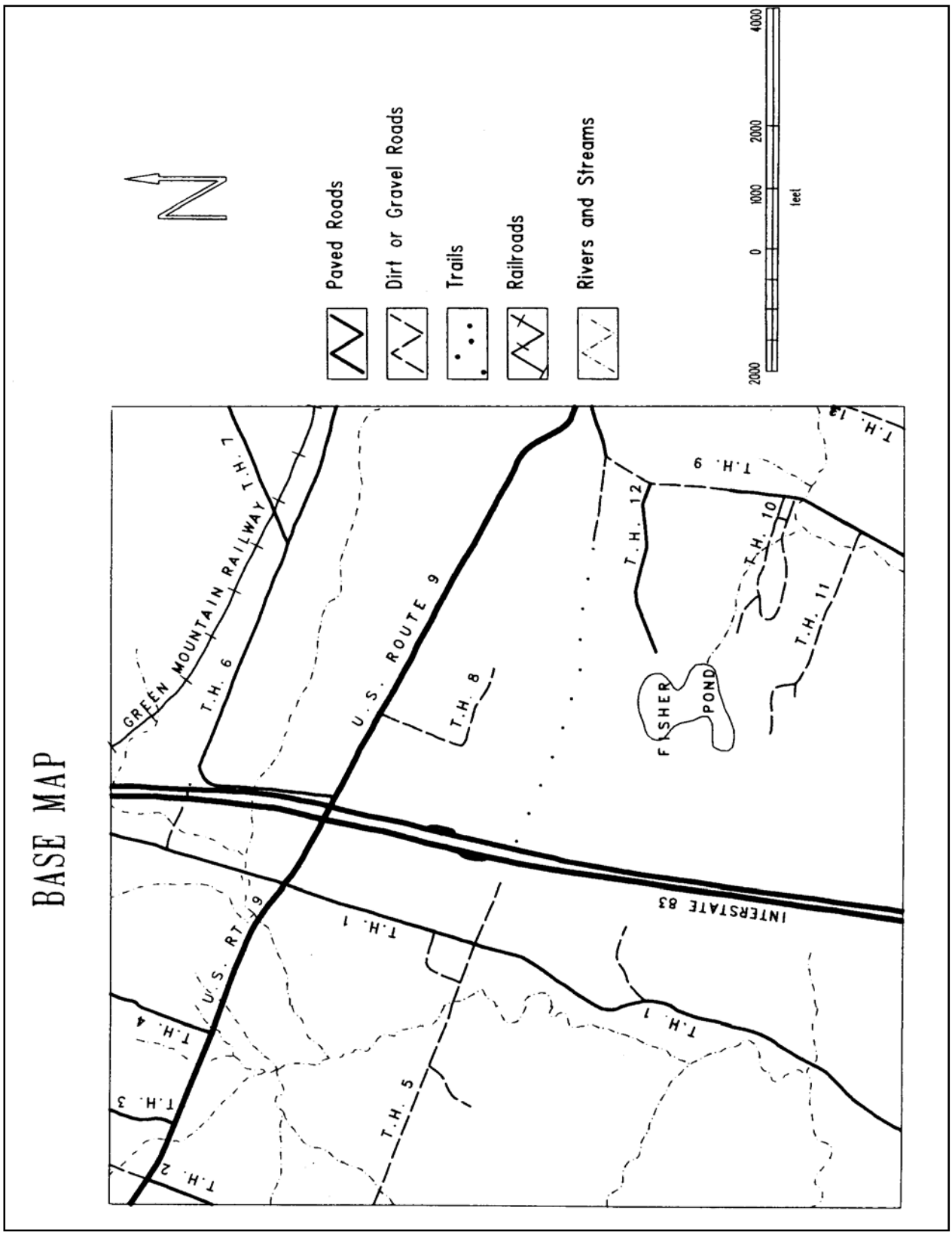
Sources:

Assessor's Office—orthophoto maps, property tax maps

Agency of Administration, Division of Property Valuation and Review, Mapping Division—orthophoto map reproductions

Regional planning commissions—mapping assistance

Map 5.1


BASE MAP
N
Paved Roads
Dirt or Gravel Roads
Trails
Railroads
Rivers and Streams
4000
2000
1000
0
2000
feet
GREEN MOUNTAIN RAILWAY
T.H. 7
T.H. 6
U.S. ROUTE 9
T.H. 8
T.H. 12
T.H. 9
T.H. 10
T.H. 11
T.H. 13
FISHER POND
INTERSTATE 83
T.H. 1
U.S. RT. 9
T.H. 4
T.H. 3
T.H. 2
T.H. 5

5.5 Analyze Physical Conditions

Physical conditions include soils, water resources, topography, and natural areas. These resources have significant implications for the future growth of the community because they indicate opportunities and constraints for development. In addition, they indicate areas that must be protected to avoid hazards to the public health, safety, and welfare and to maintain valuable educational, scientific, scenic, and productive resources.

5.5.1 Soils

The layers of the earth composed of unconsolidated or "surficial" materials are known as *overburden*. The topmost layer of the overburden that supports plant life and that is usually excavated for construction is soil. Soil in many areas is no more than six feet deep, and soil depths of just a few inches are found in many parts of the state.

Soils are classified on the basis of their structure, form, and composition. The most widely known classification system applied to soils is that of the U.S. Soil Conservation Service (SCS). The SCS has produced detailed soil survey maps showing the different soil types on aerial photos for many communities in Vermont (see Map 5.2). For each soil type there is a soil interpretation sheet that describes the properties of the soil and the suitability of the soil for different uses. These maps are very useful for planning purposes, but they do not eliminate the need for onsite investigations of specific locations.

Soils present both opportunities and constraints. Where suitable, they serve as the foundations for structures and highways; they form the natural medium for the growth of plants, and they control runoff and naturally filter and purify wastes. When their physical attributes are unsuitable, they may present severe limitations for land development. To plan for development, one must know where soils are shallow, where the water table is high, and where soils are suitable for onsite sewage disposal.

Following is a list of some analyses of soil conditions that are useful for planning purposes. Each of the analyses can be mapped from the soil surveys and interpretation sheets.

Depth to Bedrock: The depth of soil material over bedrock varies with the location and degree of slope. Soil depth is an important determinant in locating many land uses. A shallow soil over bedrock may present severe limitations and higher development costs for many uses, including housing and commercial development. For other uses, such as recreation, open space, wildlife habitat, and selected agriculture, the depth of soil may not be so critical.

Depth to Seasonal High Water Table: Depth to water table is the highest level of water measured from the soil surface at given times of the year. Development in high water tables should be severely restricted, particularly if septic tanks are used for onsite sewage disposal; otherwise contamination of ground water or surface water could occur. In addition, foundation problems, water filled basements, and possible frost action are further deterrents to development where these conditions exist. In general, development should avoid these areas.

Suitability for Onsite Sewage Disposal: Onsite sewage disposal is a soil absorption system for waste disposal. This system typically consists of two parts, a tank and a distribution system. The characteristics of the soil most important to the functioning of the septic tank system are: permeability, percolation rate, hydraulic conductivity, depth to seasonal high water table, flooding, slope, and depth to bedrock.

The following soil conditions pose severe limitations for onsite sewage disposal:

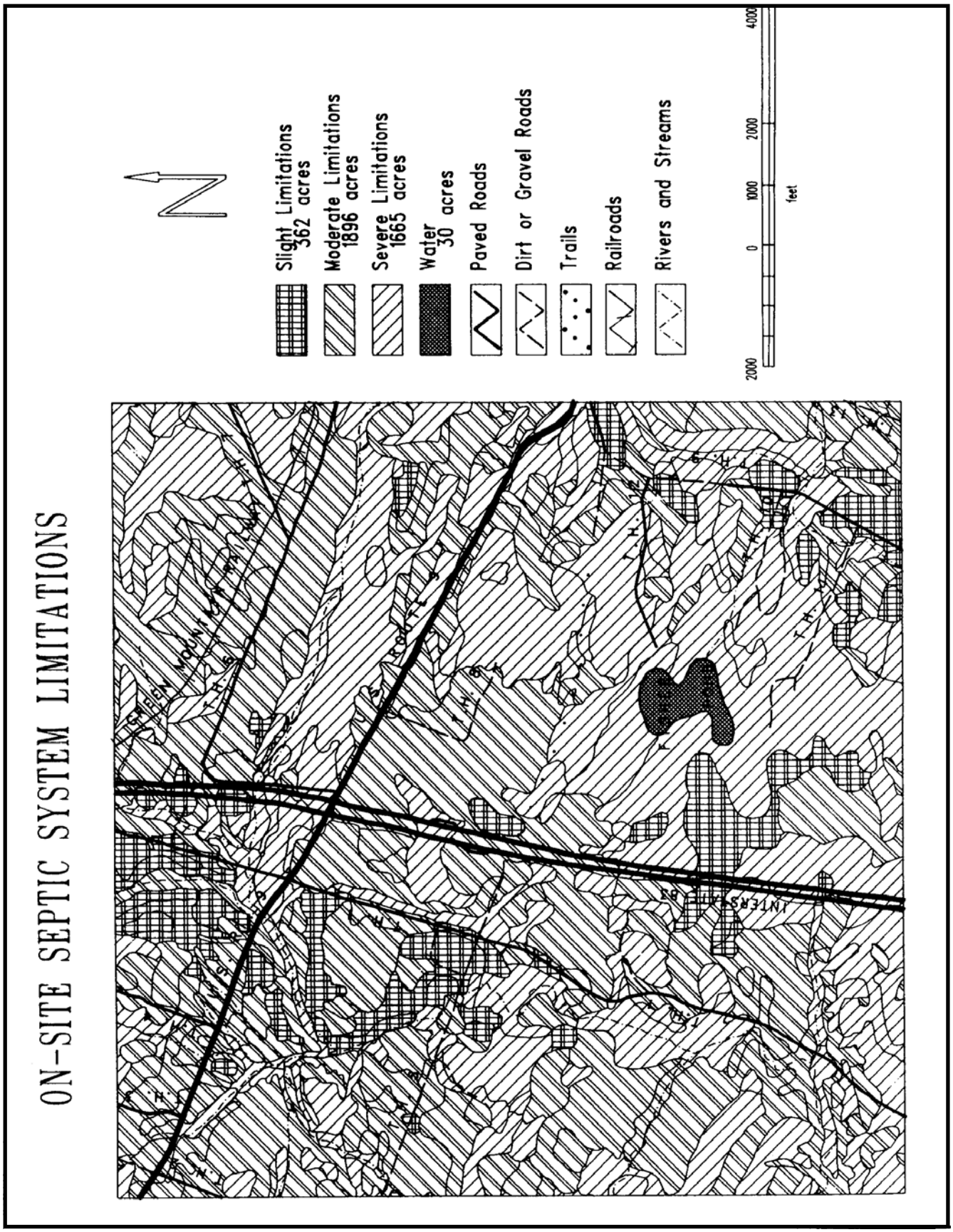
- slow permeability (percolation rates of less than one inch per hour)
- very rapid permeability, especially near streams, lakes, ponds, or water supplies
- seasonal high water table within two feet below the bottom of a trench
- impervious layers and bedrock within four feet of the bottom of a trench
- slopes greater than 15 percent, especially if impervious layers are within four feet of the bottom of the trench

See Map 5.3 for an example of how these limitations can be shown.

Highest and Good Potential Agricultural Soils: The SCS has classified Vermont's soils into four categories with respect to their potential for agriculture—highest, good, low, and limited. SCS recommends that the highest and good categories qualify as primary agricultural soils as defined in Act 250. These classifications only consider physical and chemical soil properties. They do not consider size and location of specific areas, accessibility, and current land use. A list of soils classified as highest and good may be obtained from the SCS.

Forestry Potential: Vermont's soils with potential for forestry have been classified into four categories: site 1, site 2, site 3, and site 4. The Vermont Department of Forests, Parks, and Recreation recommends that sites 1 and 2 be considered as primary forestry

Map 5.3


ON-SITE SEPTIC SYSTEM LIMITATIONS
Slight Limitations
362 acres
Moderate Limitations
1896 acres
Severe Limitations
1665 acres
Water
30 acres
Paved Roads
Dirt or Gravel Roads
Trails
Railroads
Rivers and Streams
2000
0
1000
2000
4000
feet

soils. As is the case with agricultural soils, these classifications only reflect physical and chemical composition of the soils and do not consider location, current land use, and parcel size.

Sources:

Soil Conservation Service Field Offices—soils surveys and technical assistance

Vermont Department of Agriculture, Food and Markets—agricultural soils

Vermont Agency of Natural Resources, Department of Forests, Parks and Recreation—Guide to Productivity Classes for Forestry Soils

Regional planning commissions—data collection and analysis, mapping

5.5.2 Topography

Vermont's topography has influenced its pattern of land use, both historically and in the present. A landscape of hills and valleys has shaped transportation routes, provided the settings for villages, and made available lands for natural resource production.

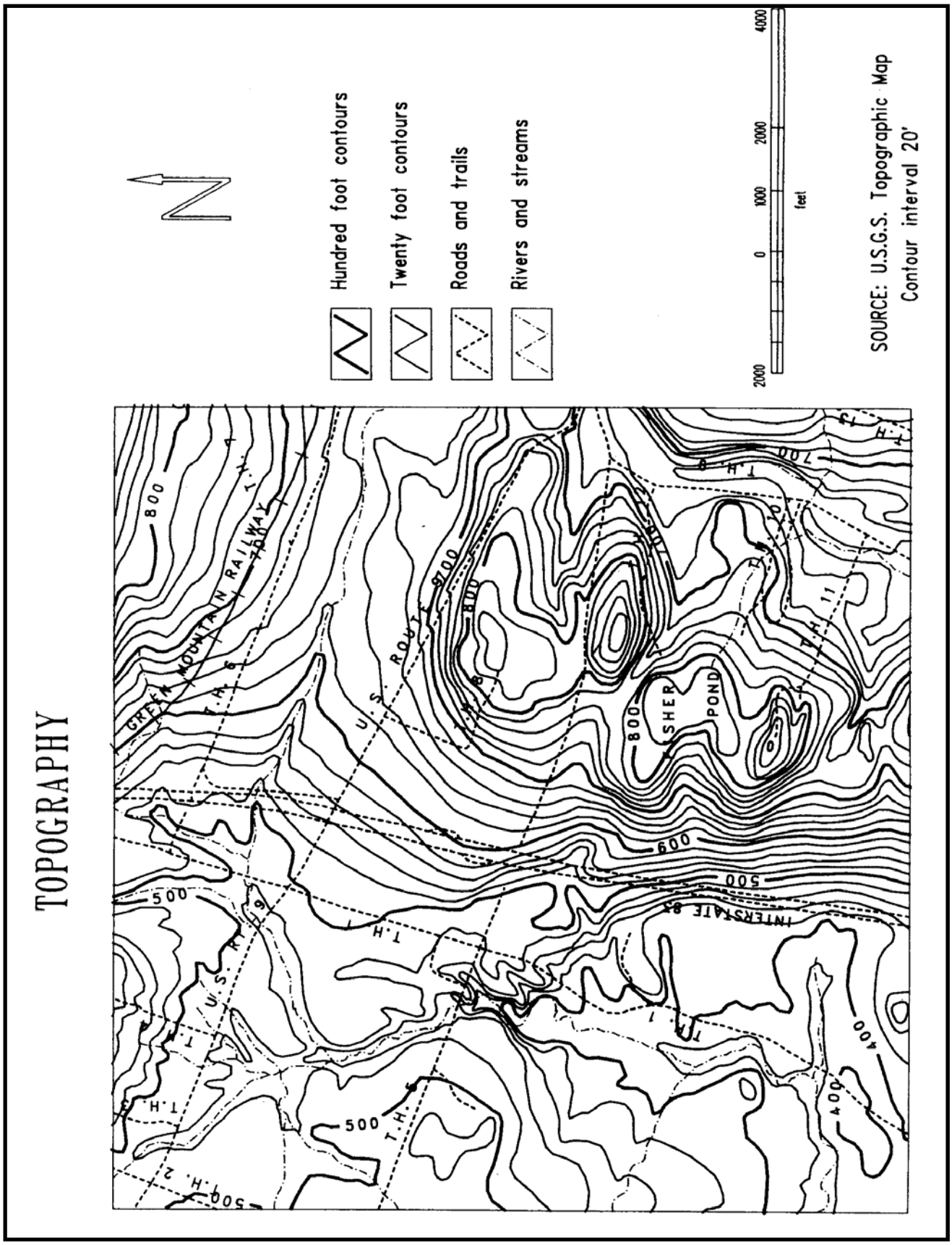
Topographic maps show contour lines, each of which represents a different land elevation. See Map 5.4. The difference between two contour lines is called the contour interval. The size of the contour intervals will vary depending on the purpose of the map. For municipal planning purposes, contour intervals of 10 feet to 20 feet are useful. The United States Geological Survey publishes contour maps at 20 foot contour intervals.

A topographic map shows heights of land (peaks, hilltops, plateaus, and ridgelines), river valleys, streams, low-lying areas, and plains. Steep slopes are also evident where contour lines are close together, indicating a large change in elevation over a small distance.

Topographic information is important for planning future land use, transportation, and public facilities and services. Topography will influence accessibility, will provide natural boundaries between areas, and will often determine land use. For example, steep mountainous areas may only be suitable for recreation, conservation, or forestry management, while valleys and plains may be most appropriate for development, farming, and transportation corridors. Topographic features, such as peaks or gorges, often have symbolic and historic importance to a community and may be highlighted in the plan for special protection.

A topographic map showing contour intervals of 20 feet or less should be prepared at the community base map scale. This map will be a basic reference as the plans for future land use, transportation, and utilities are prepared.

Map 5.4


TOPOGRAPHY
Hundred foot contours
Twenty foot contours
Roads and trails
Rivers and streams
2000
0
1000
2000
4000
feet
SOURCE: U.S.G.S. Topographic Map
Contour interval 20'
GREEN MOUNTAIN RAILWAY
U.S. ROUTE 9
INTERSTATE 91
FISHER POND
T.H. 1
T.H. 2
T.H. 3
T.H. 4
T.H. 5
T.H. 6
T.H. 7
T.H. 8
T.H. 9
T.H. 11
T.H. 13
800
700
600
500
400

In addition, a slope map should be prepared, for the slope condition will help determine the feasibility of differing land uses. The slope is the amount of vertical rise over a horizontal distance. The percent of slope is determined from the number of feet of vertical rise over 100 feet of horizontal distance. From topographic maps the following slope categories can be mapped and their suitability for development determined:

0-3%
Suitable for almost all types of construction, especially larger buildings. Since it is level to nearly level, there may be some drainage problems.

3-8%
Suitable for single family homes on small and medium lots, multifamily housing, secondary and minor roads, and smaller commercial and industrial buildings. These slopes provide a minimum of restrictions.

8-15%
Suitable for single family homes on large lots, as well as low density multifamily housing. Where necessary, terracing, retention ponds, retaining walls and other engineering techniques will be required to prevent runoff and erosion.

15-25%
Construction becomes very costly on these slopes. In addition, rapid runoff and erosion problems are likely. These slopes are unsuitable for some on-site sewage disposal systems; slopes above 20% are especially unsuitable for leachfield systems.

Over 25%
All construction should be avoided on these slopes because of high construction costs and likelihood of environmental damage.

Sources:
U.S. Geological Survey—topographic maps: 15 minute and 7 1/2 minute series
Regional planning commissions—mapping

5.5.3 Water Resources

An understanding of the community's water resources is critical to planning for future land use and community facilities and services. Water resources provide domestic and commercial water supplies and recreation opportunities. They are also unique and fragile areas, which if not properly used, managed, and protected, will cause public harm. For planning purposes, water resources are divided into three categories: (1) surface water, (2) ground water, and (3) wetlands.

SURFACE WATERS

Surface waters include lakes, ponds, reservoirs, rivers, streams, and water contained in pores of soil materials. These waters are valuable as sources of water supply; recreation areas; absorption areas for flood waters; habitats for wildlife, waterfowl, and vegetation; and aesthetic enjoyment. The value of surface waters can be diminished through pollution, alteration, and overuse.

Drainage areas and surface waters of the municipality should be inventoried and mapped. The drainage areas, also known as watersheds, can be determined from topographic maps. This information will indicate the pattern and movement of water. Other surface water should also be identified and labeled on the map. See Map 5.5.

Find out the state water quality classification of waters. Every body of water has been classified by the Vermont Water Resources Board. These water quality classifications establish (1) water quality goals to be attained where actual water quality is lower than the standard or (2) the minimum standard to be maintained where actual water quality is higher.

In its *Vermont Rivers Study* the Vermont Agency of Natural Resources has listed other important resource values for surface water and has provided this information for each drainage area in the state. These resource values include: aquifer protection areas, geologic and hydrologic features, fisheries, endangered species habitats, wildlife habitats, natural areas, historic resources, recreational boating and public access, archaeologic resources, urban river corridors, undeveloped river corridors, and public lands.

Other surface waters of significance in planning that should be inventoried and mapped are defined in the following paragraphs.

Flood Hazard Area: Title **10 V.S.A. chapter 32** defines a flood hazard area as an area that would be statistically likely to be inundated by flood once in every 100 years. If the flood hazard area is improperly used and unprotected, a flood can create a serious threat to the public, private investments can be destroyed, and significant natural resources can be damaged.

Table 5.3
VERMONT WATER QUALITY CLASSIFICATIONS

Class	*Values*	*Uses*
A	high quality waters that have significant ecological value and water quality of a uniformly excellent character	as a source of public water supply with disinfection when necessary and, when compatible, for the enjoyment of water in its natural condition
B	water that consistently exhibits good aesthetic value and provides high quality habitat for aquatic biota, fish, and wildlife	public water supply with filtration and disinfection; irrigation; and other agricultural uses; swimming and recreation
Waste Management Zones	habitat suitable for aquatic biota, fish and wildlife	recreational boating and any recreational or other water uses where contact with the water is minimal and ingestion of the water is not probable; irrigation of crops not used for human consumption without cooking; compatible industrial uses, including sewage treatment discharges

Source: Vermont Water Resource Board

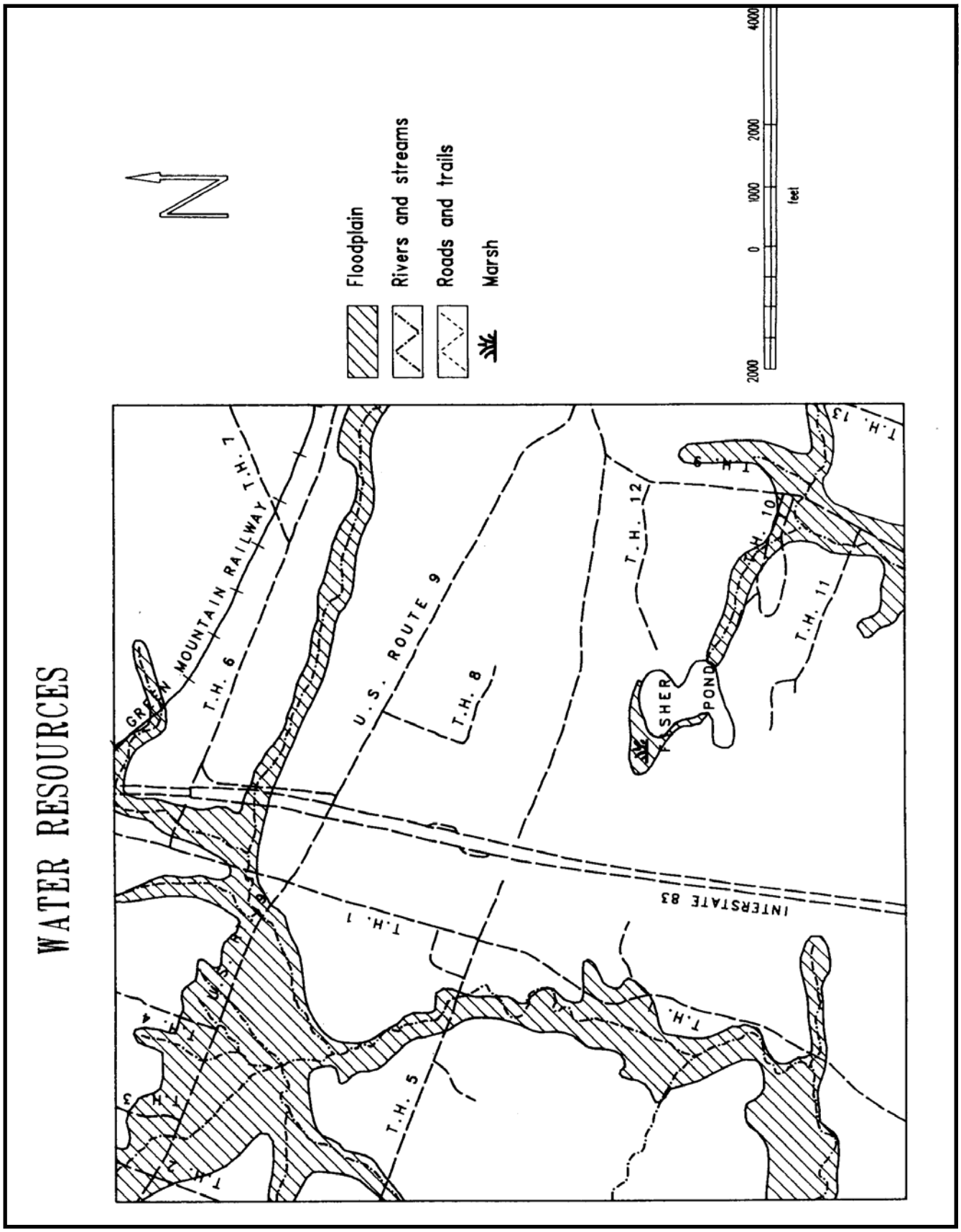
Floodway: Title **10 V.S.A. chapter 32** defines a floodway as the channel of a river or other watercourse and the adjacent land area that must be reserved to discharge the 100-year floods without accumulatively increasing the water surface elevation more than one foot. The floodway is the most hazardous section of a flood hazard area. Developments in a floodway could increase the flood height and velocity and most likely would be damaged in the event of a flood. Flood hazard areas have been designated by both federal and state governments and are often updated. Municipalities should compare these designations to both past and more recent flood records, known high water marks and local observations, and recent developments affecting flood height. Particular attention should be given to minor streams, which are frequently omitted from these designations.

Due to the mountainous nature of Vermont topography, many rivers and streams lie outside of the flood hazard areas recognized by federal floodplain mapping for the National Flood Insurance Program. Current flood hazard mapping is based solely on flood stage elevations, rather than taking the dynamic nature of streams into account.

The majority of Vermont's recent flood damage has occurred along these upland streams. Mountainous or hilly areas tend to have narrow, confined channels through which floodwaters move rapidly and travel downstream more quickly than in flat areas. Even though a building is not located in a valley where a rising river could overflow its banks and slowly inundate the structure, it is not necessarily safe from flood damage.

Much of the damage to private property, roads, and bridges occurs when heavy rainfall causes flash flooding in upland areas. Upland streams may appear small and harmless for most of the

Map 5.5


WATER RESOURCES
N
Floodplain
Rivers and streams
Roads and trails
Marsh
4000
2000
0
1000
2000
feet
GREEN MOUNTAIN RAILWAY
T.H. 7
T.H. 6
U.S. ROUTE 9
T.H. 8
T.H. 12
T.H. 10
T.H. 9
T.H. 13
T.H. 11
FISHER POND
INTERSTATE 83
T.H. 1
T.H. 4
T.H. 3
T.H. 2
T.H. 5
T.H.

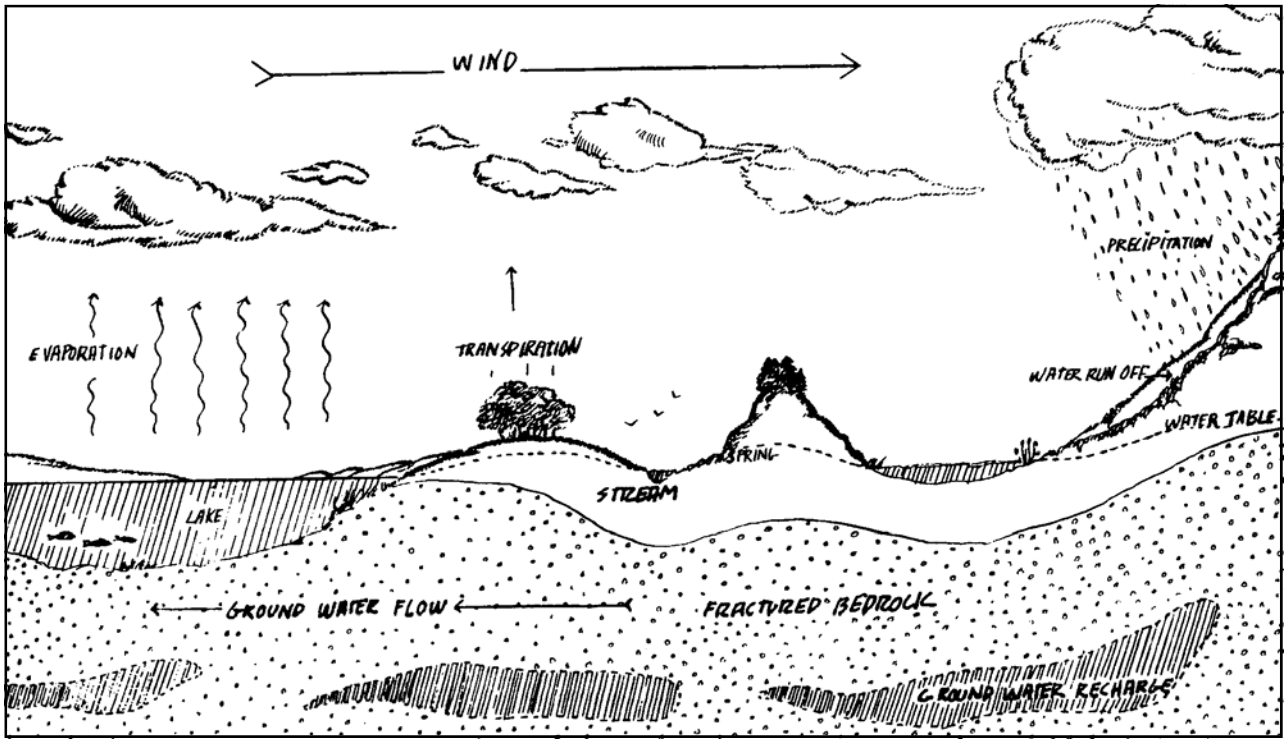
year, but they can become raging torrents when massive amounts of rainfall or snowmelt run down mountainsides. Flash flooding can occur when intense local rains fall on areas with steep slopes or on built-up areas where impervious surfaces, gutters, and storm sewers increase the flow of runoff. (For more information, see: *Community Planning for Flood Hazards*, Published by Vermont Department of Housing & Community Affairs, September 1998).

Shorelands: Shorelands are lands surrounding lakes, ponds, reservoirs, rivers, and streams. Title **10 V.S.A. chapter 49**, defines shorelands as "lands being between the normal mean water mark of a lake, pond or impoundment exceeding 20 acres and a line not less than 500 feet nor more than 1,000 feet from such mean water mark." Municipalities may wish to identify shorelands along small lakes, ponds, and streambanks as well. Shorelands are valuable resources. They can prevent water pollution, preserve wetlands and aquatic wildlife habitats, provide open space and scenic beauty, minimize erosion, and provide public access to public waters.

GROUND WATER

Most ground water is derived from precipitation that has infiltrated and percolated through the soil. After reaching the water table, ground water moves toward points of discharge, such as surface waters, springs, and wells. The pumping of wells changes the natural ground water flow and draws water from all directions, creating recharge areas. Water within the recharge area may come

Figure 5.3



from precipitation on upslope areas, from saturated gravel deposits, or from water-filled bedrock fractures. Every activity within that recharge area can directly affect the quantity and quality of the ground water supply. Landfill leachate, leaking gasoline, road salt, sewage, industrial wastes, and other materials can all contaminate the ground water. The quantity of water that actually reaches the water table may be reduced by an increase in impervious cover, including buildings, roads, and parking lots.

Ground water is a finite and vulnerable resource. It is the source of most Vermonters' drinking water. Population growth and the deterioration in the quality of surface waters will both increase the demand for potable ground water.

The ground water recharge areas—that is, the land surface from which the ground water supply for public systems is coming—should be identified and mapped. These areas, known as Wellhead Protection Areas or Source Protection Areas, can help locate potential threats to water supply and assess what protection is feasible. The mapping of these areas is highly technical and requires the assistance of a hydrogeologist. It involves site-specific investigations of the well or spring and an analysis of the surrounding geology. Wellhead Protection Areas of community water systems have been or are being mapped by the Resource Management Section of the Water Supply Division of the Vermont Department of Environmental Conservation.

WETLANDS

According to **10 V.S.A. §902**, wetlands are "those areas of the state that are inundated by surface or ground water with a frequency sufficient to support significant vegetation or aquatic life that depend on saturated or seasonally saturated soil conditions for growth and reproduction." Wetlands may include marshes, swamps, sloughs, potholes, fens, river and lake overflows, mud flats, bogs, and ponds, but they do not include areas on which food or crops are grown. Wetlands are important because they:

- provide temporary water storage for flood waters
- contribute to the quality of surface and ground water by chemical action
- control the effects of erosion and runoff
- provide spawning, feeding, and habitat for aquatic life
- provide wildlife, waterfowl, and vegetative habitat
- provide stopover habitat for migratory birds
- provide habitat for threatened and endangered species
- provide resources for education and research in natural sciences
- provide recreation values and
- contribute to community open space and scenic beauty

Important wetlands have been mapped. These areas should be included on the community's water resources map. See Map 5.5. Wetland areas and their characteristics can be obtained by referring to the National Wetlands Inventory Maps. The Vermont Department of Environmental Conservation has also adopted rules to protect wetland values and functions.

Sources:

Vermont Water Resources Board—water quality classifications

Vermont Agency of Natural Resources, Planning Division—*Vermont Rivers Study*

Vermont Agency of Natural Resources, Department of Environmental Conservation—river basin plans, lakes and ponds data, rivers and streams information, flood hazard maps and National Flood Insurance Program, wellhead protection areas for community water supplies, state geologist, National Wetlands Inventory Maps, well completion reports, groundwater protection handbook for local officials

Vermont Agency of Commerce and Community Development, Department of Housing and Community Affairs—Federal Flood Program information

Regional planning commissions—data collection and mapping

Municipal Offices—Federal Emergency Management Agency Flood Boundary and Floodway maps under National Flood Insurance Program

5.5.4 Natural Areas

In most communities there are places that are quite unusual because of their wildlife, plants, or geological features. Often remote, quiet, or beautiful, such places have been known and frequented for generations by local townspeople and outside visitors alike. Our increasing ecological awareness and the accelerating pace of land development during the last decade have made these natural areas more critical than ever before. The preservation of rare and irreplaceable natural areas must now be addressed in the municipal plan. **24 V.S.A. §4382(a)(5)**.

In general, a natural area can be described as an area of land or water that, in contrast to the normally encountered landscape of a region, retains or has reestablished its natural character (although it need not be undisturbed) and retains unusual or significant flora, fauna, geological, or similar features of scientific or educational interest.

There are essentially three types of natural areas:

- *geological features,* such as cliffs, glacial landforms, and mineral or fossil deposits
- *hydrological features*, such as bogs, marshes, swamps, and ponds
- *biological features,* such as rare plants or animals, exemplary natural communities, and critical habitat, including nesting sites

Municipalities should identify natural areas within their boundaries and assess their importance. For each area information should be collected on:

- the location, size, and ownership of the parcel
- the frequency of occurrence of the feature
- its recognized significance, fragility, and diversity
- the potential for recreational, educational, and research uses
- the threat to its integrity both now and in the future
- its management

Municipalities might rank the natural areas by priority for protective action.

Sources:

Vermont Agency of Natural Resources, Department of Fish and Wildlife—significant habitat maps, wetlands maps

Vermont Agency of Natural Resources, Nongame and Natural Heritage Program—database of rare plants, animals and exemplary natural communities

Vermont Agency of Natural Resources, Department of Forests, Parks and Recreation—State Natural Areas Registry

The Nature Conservancy, Vermont Field Office—natural areas inventories

Vermont Natural Resources Council—statewide natural areas survey

Regional planning commissions—data collection, analysis, and mapping

Local hunters, trappers, birders, and fishermen—habitat information

Local fish and game clubs—habitat information

5.5.5 A Summary of Physical Capability for Development

The preceding information, summarized on one map, will show the capability of land areas to accommodate development. It is recommended that information on slopes, depth to seasonal high water table, depth to bedrock, flood hazard areas, major wetlands,

Table 5.4
PHYSICAL CAPABILITY FOR DEVELOPMENT[1]

CONDITION	POTENTIAL FOR DEVELOPMENT	MODERATE LIMITATIONS FOR DEVELOPMENT	SEVERE LIMITATIONS FOR DEVELOPMENT
Slopes			
1-15%	✔		
15-25%		✔	
>25%			✔
Depth to Seasonal High Water			
>47 inches	✔		
12”-48”		✔	
0-20”			✔
Depth to Bedrock			
>48 inches	✔		
21”-48”		✔	
0-20”			✔
Flood Hazard Areas			✔
Major Wetlands			✔
Aquifer Protection Areas			✔
Natural Areas			✔
Shorelines			✔

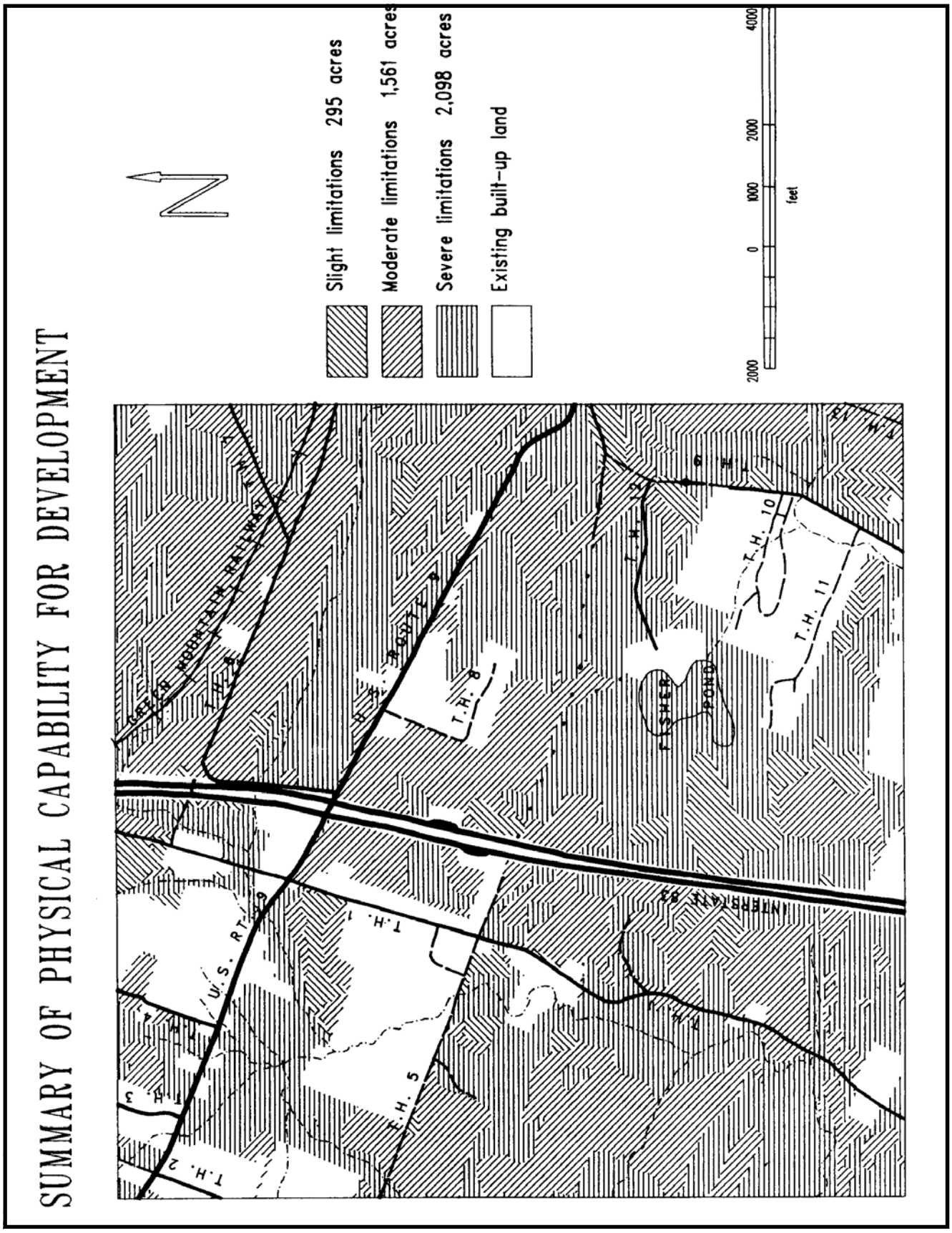
1. Note: This table is presented for purposes of example. Communities should design their own table based on conditions and features of concern to them.

aquifer protection areas, natural areas, and shorelines be included on this map. These are the physical features that will have the greatest significance for future land use.

Table 5.4 provides one way to summarize the physical capability for development. Each community will want to select and categorize the features that, in its view, are important for determining land capability.

Using the table, prepare a map with three categories: (1) potential for development, (2) moderate limitations for development, and (3) severe limitations for development. Each section of the soils, slope, water resources, and natural areas maps that fits under one of the three categories should be colored or depicted in the same way on this summary map. See Map 5.6. The summary map will now be ready to compare with land use information described in the next section.

Map 5.6


SUMMARY OF PHYSICAL CAPABILITY FOR DEVELOPMENT
Slight limitations 295 acres
Moderate limitations 1,561 acres
Severe limitations 2,098 acres
Existing built-up land
2000
0
1000
2000
4000
feet
T.H. 1
T.H. 2
T.H. 3
T.H. 4
T.H. 5
T.H. 6
T.H. 7
T.H. 8
T.H. 9
T.H. 10
T.H. 11
T.H. 12
U.S. RT. 5
GREEN MOUNTAIN RAILWAY
INTERSTATE 91
FISHER POND

5.6 Analyze Existing Land Use and Special Features

This section describes land conditions in the community that have been brought about by human activity. Decisions to build roads, clear land for farming, to locate community spaces and activities in a town center, and to set aside park land have determined the character of the municipality. To plan for the future it is important to identify and recognize historic land use decisions made by settlers of the community and to understand the importance of these decisions to the community today.

5.6.1 Pattern of Development

A survey of existing land uses in the community will illustrate the pattern of development. The survey should locate the different land uses and illustrate their relationship to each other and to the natural environment. This information will be important for planning for the future growth areas of the community. Chapter 117 now requires that a land use plan be included as part of the municipal plan. **24 V.S.A. §4382(a)(2)**.

To start the survey, first determine the types of land uses that you want to show. These land use types may include: permanent residences, seasonal residences, commercial and industrial uses, public buildings, parks and recreation areas, institutions, and agricultural, mining, and forestry operations. These general categories can be further subdivided. For example, residences can be broken down into single family, two family, or multifamily or by the number of units per acre. Commercial uses could include retail, services, office, and recreational. Public buildings could include schools, libraries, town halls, museums, and water and sewer treatment facilities. The extent to which the different land use types are divided will depend on existing land use patterns in the community and the community's particular planning needs.

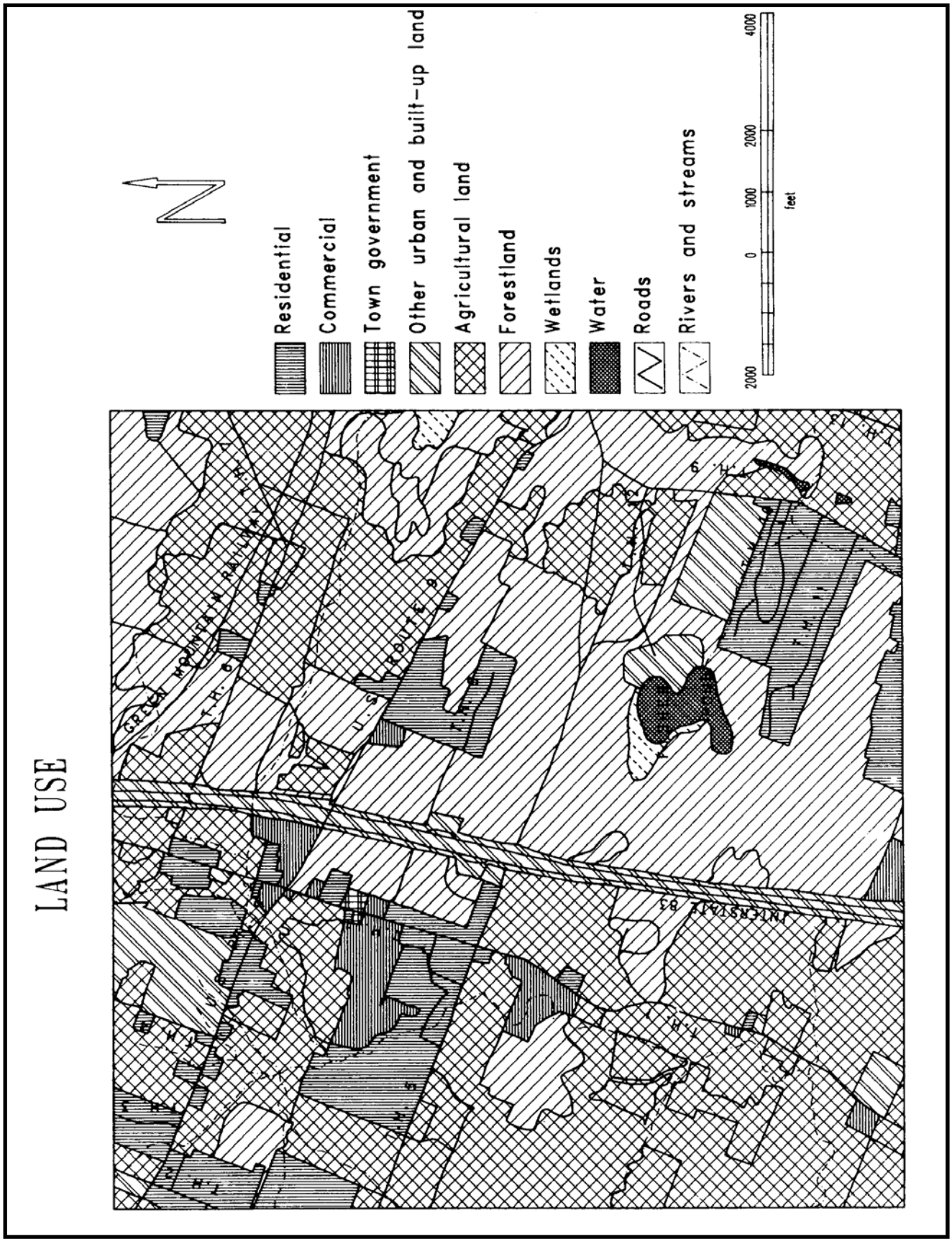
If available, a property tax map is very useful. These maps portray subdivided lands, large land holdings, and other land ownership patterns. They help one to locate residential, commercial, industrial, institutional, agricultural, forested, and vacant properties.

If a property tax map is not available, obtain the most recent aerial photographs of the community. Use the photos in conjunction with local building permit data, subdivision approvals, and surveys taken along town roads ("windshield surveys"). This information should provide a good, up-to-date inventory.

Once the existing land use information is collected and mapped, the community is able to see:

- where land is committed to development
- where further development is likely to occur
- what type of development has taken place and where

Map 5.7


LAND USE
N
Residential
Commercial
Town government
Other urban and built-up land
Agricultural land
Forestland
Wetlands
Water
Roads
Rivers and streams
2000
0
1000
2000
4000
feet
GREEN MOUNTAIN RAILROAD
U.S. ROUTE 9
INTERSTATE 91

- what land is still undeveloped
- where incompatible land uses are encroaching on each other
- where coherence and order in the land use pattern exists or doesn't exist
- where links or connections need to be made among land uses
- where land use patterns are emerging that are inconsistent with the community's vision of its future
- where regional trends are affecting the community's land use pattern

See Map 5.7 for an example of a land use map.

Communities that have adopted plans and bylaws may wish to study their impact on the pattern of development. This study can determine the effectiveness of the bylaws in carrying out the goals and policies of the plan and meeting changing conditions and needs.

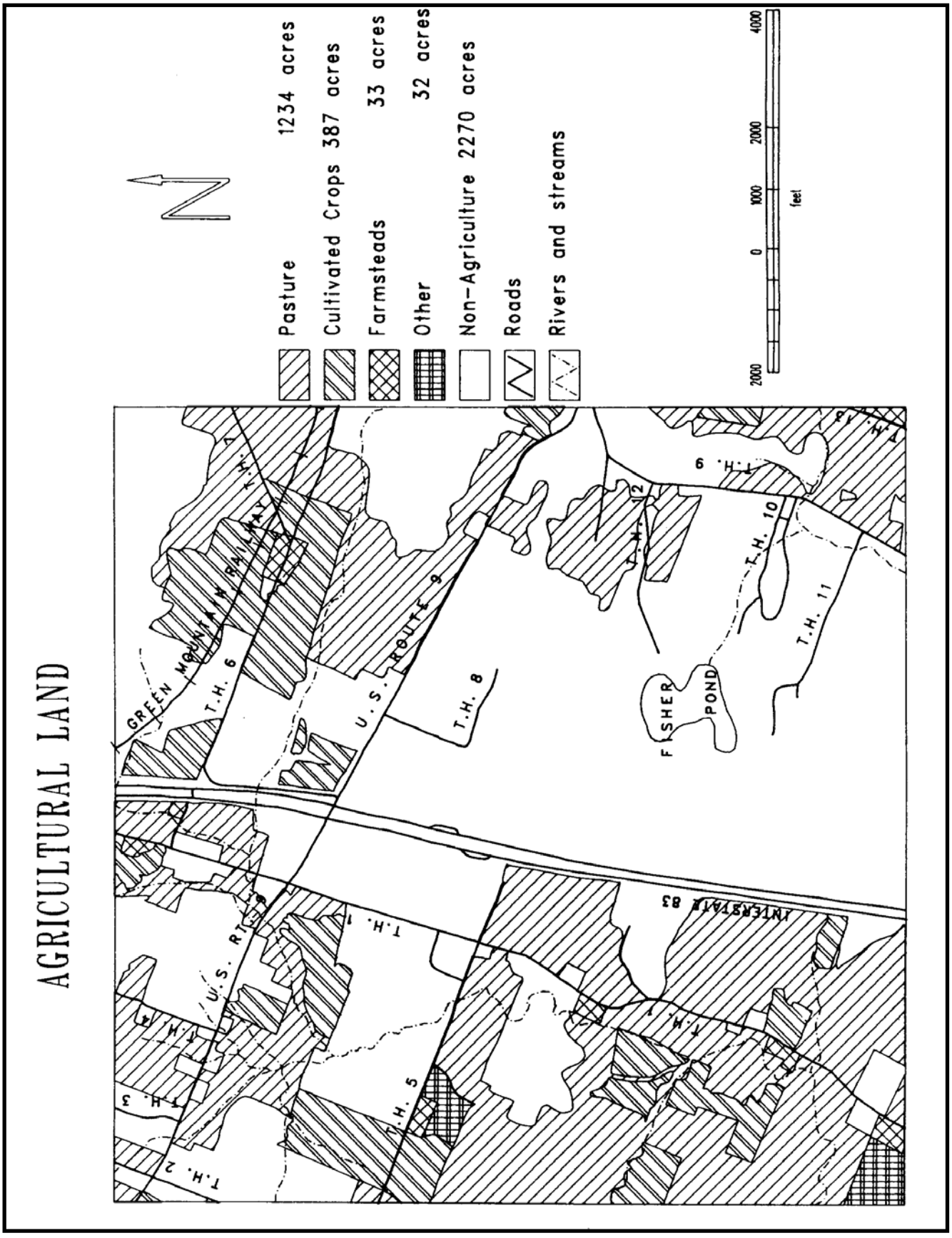
Sources:
Assessor's Office—orthophoto maps, property tax maps
Windshield surveys—land use along roads
Soil Conservation Service—color infrared aerial photography
Regional planning commissions—surveys and mapping
Zoning administrator—zoning permit trends
Planning commission—land subdivision trends

5.6.2 Resource Production

The future of open land is important to the community, and to the State of Vermont. Open land makes an important contribution to the state's economy. Agriculture and forestry provide many jobs and create products for export to other regions. Tourism and recreation, including hunting and fishing, attract thousands of visitors and millions of dollars to the state annually. Each of these activities relies upon Vermont's open land resource. Indirectly, many businesses and other investors are attracted to Vermont each year by the appeal of open land.

Open land, farmland, and natural areas are essential to Vermont's quality of life. Land-based activities such as logging, farming, hunting, and fishing are central to the state's cultural heritage and tradition. The state's aesthetic or visual image is a function of the patchwork impression conveyed by its diversity of field and forest. Open land provides residents and visitors with an opportunity for quiet and spiritual enrichment. Its open land is what makes Vermont unique.

Map 5.8


AGRICULTURAL LAND
N
Pasture 1234 acres
Cultivated Crops 387 acres
Farmsteads 33 acres
Other 32 acres
Non-Agriculture 2270 acres
Roads
Rivers and streams
2000 0 1000 2000 4000
feet
GREEN MOUNTAIN RAILWAY
T.H. 6
U.S. ROUTE 9
T.H. 8
T.H. 12
T.H. 9
T.H. 10
T.H. 11
FISHER POND
INTERSTATE 83
U.S. RT. 7
T.H. 1
T.H. 4
T.H. 3
T.H. 2
T.H. 5

The state's open land inventory is threatened by two related economic factors. First, the future of the state's principal land-based activities— forestry and agriculture—is clouded by policy decisions and market conditions, both national and international. The livelihood of farmers and foresters has suffered because of these external forces.

Second, subdivision and incompatible development threaten open land. When farming fails to provide an adequate income, landowners often sell their land to others, who put it to new uses. To the new owner, the productive or resource value of land may not represent its highest economic potential. When a farm field can generate more profit from houses than from corn, then—if the market conditions are right—that field is likely to be converted to a residential neighborhood.

INVENTORY

How should the community address open land conversion? The community must first reach a consensus around the issue. It must agree on the types of open land to be protected, the uses of those lands, and their priority for protection.

The community must also consider the economic implications of land conservation for landowners, for prospective homebuyers, for other local taxpayers, and for the community at large. Any municipal intervention in the land conversion process will affect one or more of these groups.

Lands used for natural resource production—farmland, productive woodland, and earth resource extraction areas, such as mines and gravel pits—should be inventoried and mapped. These economic activities depend on (1) the productive capability of the land, (2) the availability of enough land to be economical for production and (3) adjoining land uses. These resource lands require special treatment.

Parcels of land used for resource production should be identified. Other parcels with the potential for resource production because of their size, physical qualities, and undeveloped character should also be determined. For agricultural parcels, the land use should indicate cropland, pasture, orchard and bush fruits, confined feeding operations (poultry, rabbits, etc.), and greenhouses. See Map 5.8 for an example agricultural lands map. Forest land can be characterized by broadleaved (deciduous), coniferous, and mixed coniferous/broadleaved. Resource extraction areas may include sand and gravel, granite, marble, limestone, asbestos, slate, copper, talc, and kaolin.

The municipality should evaluate the potential for continued resource use on these parcels. This evaluation should consider the following four factors:

- the viability of the parcel given its productive capabilities and the parcel size
- the stability of the ownership (Is the land proposed for subdivision? Is the property in the state current use taxation program?)
- the location of the parcel (Is it in an area that is highly accessible or served by sewer and water?)
- public policy in effect (How is it zoned?)

A useful process for evaluating farmland potential is the Land Evaluation and Site Assessment (LESA) process, developed by the Soil Conservation Service in the 1970's to evaluate agricultural lands. It was later adapted for evaluating forest lands (the Forest LESA or FLESA) by the Vermont Department of Forests, Parks and Recreation. The LESA is a point system that evaluates the productivity of the land based on its soil type and other non-soil characteristics that influence the potential of the land. For agricultural lands these factors include the location of a field, accessibility to a road, distance to a nearby farm, size and use of a field, or land use on nearby properties. For forest lands, the site assessment criteria focus on economic and social factors which make them important, such as parcel size, proximity to urban centers, adjacent land use and scenic value. The relative importance of each of these factors is rated usually by a LESA committee drawn from community residents. By combining these

Figure 5.4

LAND EVALUATION AND SITE ASSESSMENT OF FARMLAND

RANKING OF TEST PARCELS

PROPERTY	SITE ASSESSMENT FACTORS									LAND EVALUATION SCORE	SITE ASSESSMENT SCORE	TOTAL SCORE
	1	2	3	4	5	6	7	8	9	MAX=100	MAX=200	MAX=300
Smith-1	12	30	5	20	10	10	21	0	20	57	128	185
Smith-2	8	30	0	20	10	10	21	14	20	63	133	196
Robinson	12	30	5	20	10	5	30	30	30	46	152	198
Kielman	30	30	15	16	10	10	30	14	20	50	175	225
Batten	8	0	0	20	7	10	12	14	0	55	71	126
Squires	12	30	0	20	7	10	0	14	20	64	113	177
Woodlot	12	0	0	0	0	0	0	20	0	5	42	47
Village	4	21	0	20	7	0	12	0	0	57	64	121

site assessment and land evaluation values for each parcel, the municipality can rank the various parcels. See Figure 5.4. Several towns and regions have used this process to identify important agricultural and forest areas. Communities can obtain assistance on this process from the SCS District Conservationist Office or the Vermont Department of Forests, Parks and Recreation.

In 1988 the Vermont legislature called for the Commissioner of Agriculture to develop agricultural land planning guidelines. These guidelines were meant to assist regional and municipal planning commissions in establishing "specific criteria for identifying agricultural lands within that region or municipality." **6 V.S.A. §8**.

Sources:

Soil Conservation Service—soils data, farm plans, Land Evaluation and Site Assessment process

Vermont Agency of Natural Resources, State Geologist—earth resources data

Vermont Agency of Natural Resources, Department of Forests, Parks, and Recreation—information on forestry management and productivity classes, county foresters

Vermont Department of Agriculture, Food and Markets—agricultural development potential, Act 250 reviews

Vermont Agency of Administration, Property Valuation and Review Division, Current Use Advisory Board—participation in state current use taxation and farmland taxation programs

University of Vermont, Extension Service—County Extension Agents—farming conditions

Assessor's Office—farm and forestry parcels, participation in state current use taxation and farmland taxation programs

Regional planning commissions—data collection, analysis, and mapping

Vermont Land Trust, local land trusts, local conservation commissions—assistance in inventorying and prioritizing farmland, protection techniques

5.6.3 Special Features

Special land use features that reflect the cultural development and character of the municipality include historic sites, buildings, and districts; significant views and vistas; scenic roads, and outdoor recreation areas. Communities need to identify and map these features. See Map 5.9. Chapter 117 now requires that a municipal plan consider the preservation of these resources. **24 V.S.A. §4382(a)(5)**.

HISTORIC RESOURCES

Communities should survey their historic resources. A complete list of criteria for identifying historic resources may obtained from the Vermont Division for Historic Preservation. They suggest the following categories of historic resources.

- noteworthy examples of architectural styles, periods, or methods of construction
- districts or groups of buildings that physically and spatially create a significant historic environment
- sites that represent historic community or regional development patterns (e.g., county seats or concentrations around transportation facilities)
- commercial structures and sites, business districts of architectural merit
- transportation facilities of historical or architectural merit
- structures that are important in the history of industry, technology, and civil engineering
- buildings by great architects or master builders and important works by minor ones
- architectural curiosities, one-of-a-kind buildings
- sites of prehistoric or historic archaeological importance
- homes of notable persons
- churches that are of outstanding architectural importance, are an important visual component of a village or townscape, or are of outstanding historical significance
- a site that is an area's sole link to a period of its past
- a site that is associated with events that have made a significant contribution to the broad patterns of our history

An analysis of historic resources should take into account the following factors:

- the compatibility of adjacent or nearby land uses with the appearance and use of the historic resource
- the threats to the integrity of the resource, such as: nuisances in the area (odiferous industry, high volume traffic, poor air quality); deterioration of structure, site, or area; poor signage; poor quality of rehabilitation of structures, sites, or areas; proposals to demolish certain structures; proposals for developments on certain sites; inappropriate adaptive use of structures, sites, or areas
- the potential for improvements or use of the resources

If the municipality wants to create a historic district, it should prepare a report analyzing the significance of the structures and the

areas to be designated. According to Chapter 117, **24 V.S.A. §4407(15**), the following areas may be considered for historic districts:

- areas with distinctive design or landscape characteristics
- areas and structures with a particular relationship to the historic and cultural values of the surrounding area
- structures whose architectural features bear a significant relationship to the remainder of the structures or to the surrounding area

Sources:

Agency of Development and Community Affairs, Division for Historic Preservation—state historic sites register, technical assistance Vermont

Historical Society—library for background information

Regional planning commissions—data collection, analysis, and mapping

Local and regional historical societies—inventories, local history

Preservation Trust of Vermont—protection techniques and advice

SIGNIFICANT VIEWS AND VISTAS

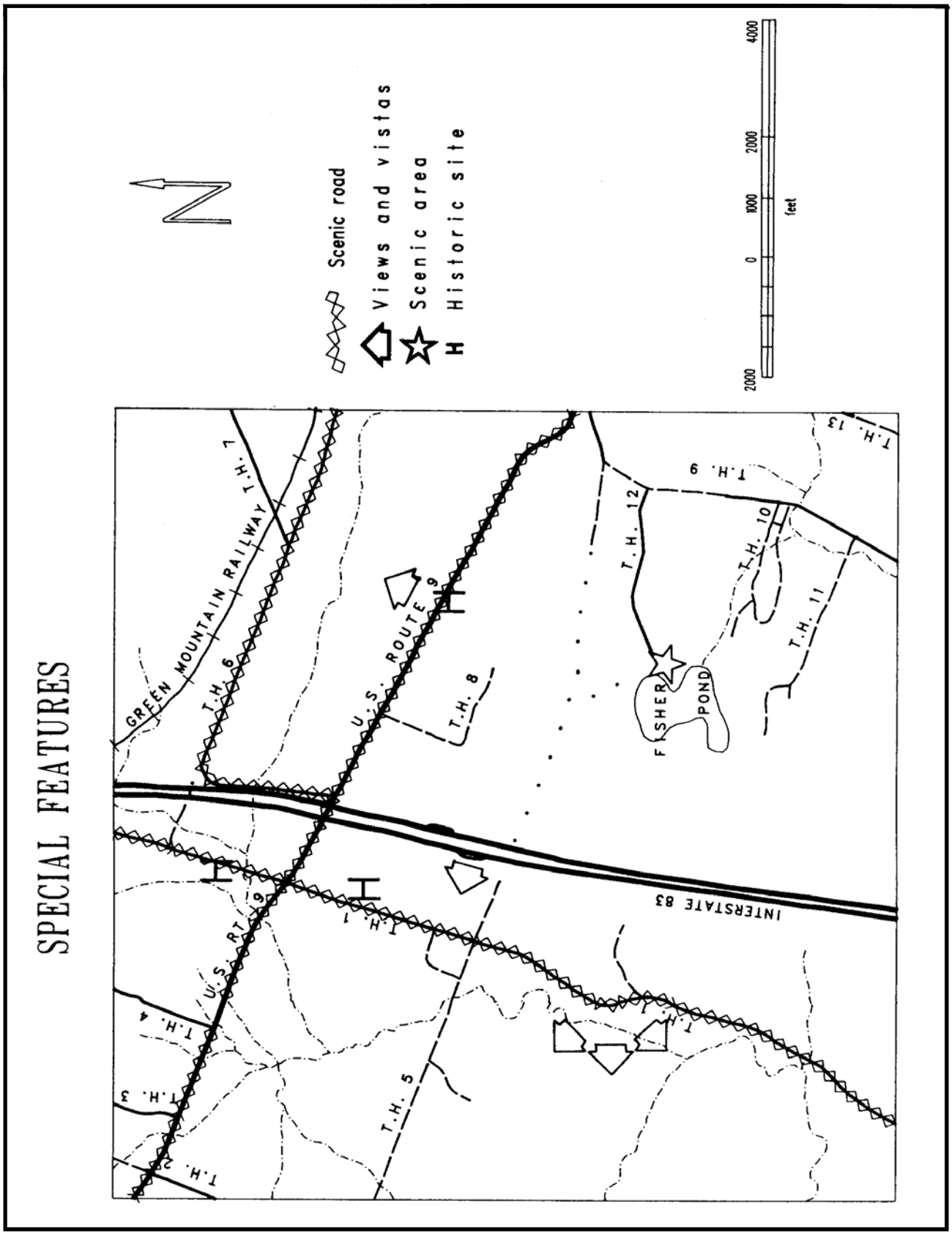
Views and vistas are important features of communities. These features reveal the landscape quality and the setting of the community and are part of the community's identity. They offer aesthetic pleasure to residents and visitors alike. Vermont's scenery is a valuable resource that is integrally linked with the state's economy, as well as our personal well-being.

Communities should take an inventory of significant views and vistas. Identify views and vistas from points along streets and highways, from public recreation areas and trails, from shorelines, and from other areas where public access is available and utilized.

Views and vistas identified during the inventory stage may be ranked according to viewer preference. These criteria for viewer preference may vary from community to community depending on the landscape features of each and the availability of professional help. According to a 1974 Vermont State Planning Office publication, *Vermont Land Capability,* the following components of landscape quality might be considered:

- the diversity or contrast among landscape elements
- the kind and arrangement of man-made structures
- the distance of the view

Map 5.9


SPECIAL FEATURES
N
Scenic road
Views and vistas
Scenic area
Historic site
4000
2000
1000
0
2000
feet
GREEN MOUNTAIN RAILWAY
T.H. 7
T.H. 6
U.S. ROUTE 9
T.H. 8
T.H. 12
T.H. 9
T.H. 13
T.H. 10
T.H. 11
FISHER POND
INTERSTATE 83
T.H. 1
U.S. RT. 9
T.H. 4
T.H. 3
T.H. 2
T.H. 5

The extent of interaction between the land use pattern (farmed areas, villages, etc.) with land form (hills, mountains, valleys, etc.) contributes to the diversity. Generally, a view with more contrast is more pleasing. Some communities rank views by resident preference surveys. Others may wish to use a more complex ranking system such as the one in Table 5.5. This system contains a list of criteria that are divided into five categories—(1) Landform, (2) Water, (3) Vegetation, (4) Land Use, and (5) General. For each of the criteria, high-ranking and low-ranking values are identified.

Table 5.5
CRITERIA FOR RANKING VIEWS AND VISTAS[1]

	RANGE OF VALUES	
Criteria	*High Rank*	*Low Rank*
I. Topographic variation	Extreme variation in elevation	Low to no variation in elevation
II. Water		
• Percentage Water Area	High percentage of water	Low percentage to no water
• Water Body Distribution	Distinct water bodies in foreground, middle ground, and background	One or no visually distinct body of water
III. Vegetation		
• Vegetative Diversity	High diversity in size, density, and location of different species	Low diversity in size, density, and location of different species
• Agricultural Activity	Large area of visible farmed land	Abandoned fields
• Wetland Type	Large undisturbed wetland in foreground or middle ground	Small or undisturbed wetland
IV. Land Use		
• Townscape Architectural Compatibility	High compatibility	Low compatibility
• Rural Architectural Compatibility	Structural development is limited and blends with landscape	Obtrusive and poorly sited development
• Townscape Setting	High visual distinction between built-up and surrounding areas	Little or no distinction between built-up and surrounding areas
• Landscaping	Diverse, healthy, well-maintained landscape	Poorly maintained landscape
• Absence of Detractors	No eyesore visible	Highly prominent eyesores
• Signage	Signs not dominant	Signs dominant and obtrusive
V. General		
• Sense of Enclosure and Boundary	High sense of enclosure on at least two sides of view	Low sense of enclosure
• Length of View	View greater than 5 miles	View less than 2 miles Less than 2 miles visible

1. Adapted from John P. Wargo, Stephen Weisman, *Landscape Quality Within the Lake Champlain Basin*, Lake Champlain Basin Study, Burlington, Vermont, June 1978

The Agency of Natural Resources has published a guidebook, called *Vermont's Scenic Landscapes: A Guide for Growth and Protection*. This illustrated book provides a language and methodology for identifying scenic resources, planning methods to help protect them, and creative design solutions to help soften the visual effects of proposed development on the Vermont landscape.

Sources:

Vermont Agency of Natural Resources, Planning Division—guide for identifying, evaluating and protecting scenic resources

Vermont Council on the Arts—information on design and aesthetic issues

Regional planning commissions—data collection, analysis, and mapping

Landscape architects—data collection, analysis, and mapping

SCENIC ROADS

Scenic roads provide enjoyment of the landscape, whether the landscape is rolling farmland, historic townscapes, or a deep forested ravine. Scenic roads are part of our communities' heritage and are worthy of protection. The State of Vermont, concerned that these roads were disappearing due to road construction and land development patterns, enacted in l977 the Scenic Road Law.

Communities should follow the guidelines adopted under the Scenic Road Law to inventory and analyze their scenic roads. These guidelines, which are voluntary, are incorporated in a field guide entitled, "Designating Scenic Roads." (See bibliography in Appendix E.) According to the guide, a survey is taken by driving each road and inventorying certain elements, including farming patterns, panoramas, leaf tunnel effects, and historic sites. A team decides if a road is "scenic" by the number of scenic elements in each mile. The team then retravels the "scenic" roads to conduct a complete inventory. (Inventory sheets are provided in the guide.) The results of this inventory should be mapped. This process has been designed to be conducted by local planning commissions with the assistance of regional planning commissions.

Sources:

Agency of Transportation, District Transportation Offices—scenic roads programs

Vermont Scenery Preservation Council—scenic roads and byways program

Vermont Local Roads Program, St. Michael's College—local roads programs

Regional planning commissions—scenic roads programs

PUBLIC OUTDOOR RECREATION AREAS

Public outdoor recreation areas are land areas—either publicly or privately owned—where the public can enjoy such outdoor pursuits as hiking, riding, bicycling, boating, swimming, picnicking, and ball games. These areas are considered special features in a community because appropriate sites are limited and because they are open to the public. These areas include trails, fishing, and boat access areas, ski areas, and local, regional, state, and federal recreation areas.

Outdoor recreation areas should be evaluated to determine (1) the potential for continued public access and use and (2) threats to the resource from pollution, overcrowding, incompatible encroachments, economic conditions, or other factors.

Sources:

Vermont Agency of Natural Resources, Recreation Division—
State Recreation Plan: inventory, projections, needs; Vermont Recreation Planning Manual

Regional planning commissions—data collection, analysis, and mapping

Municipal recreation boards or departments—inventory and analysis of conditions

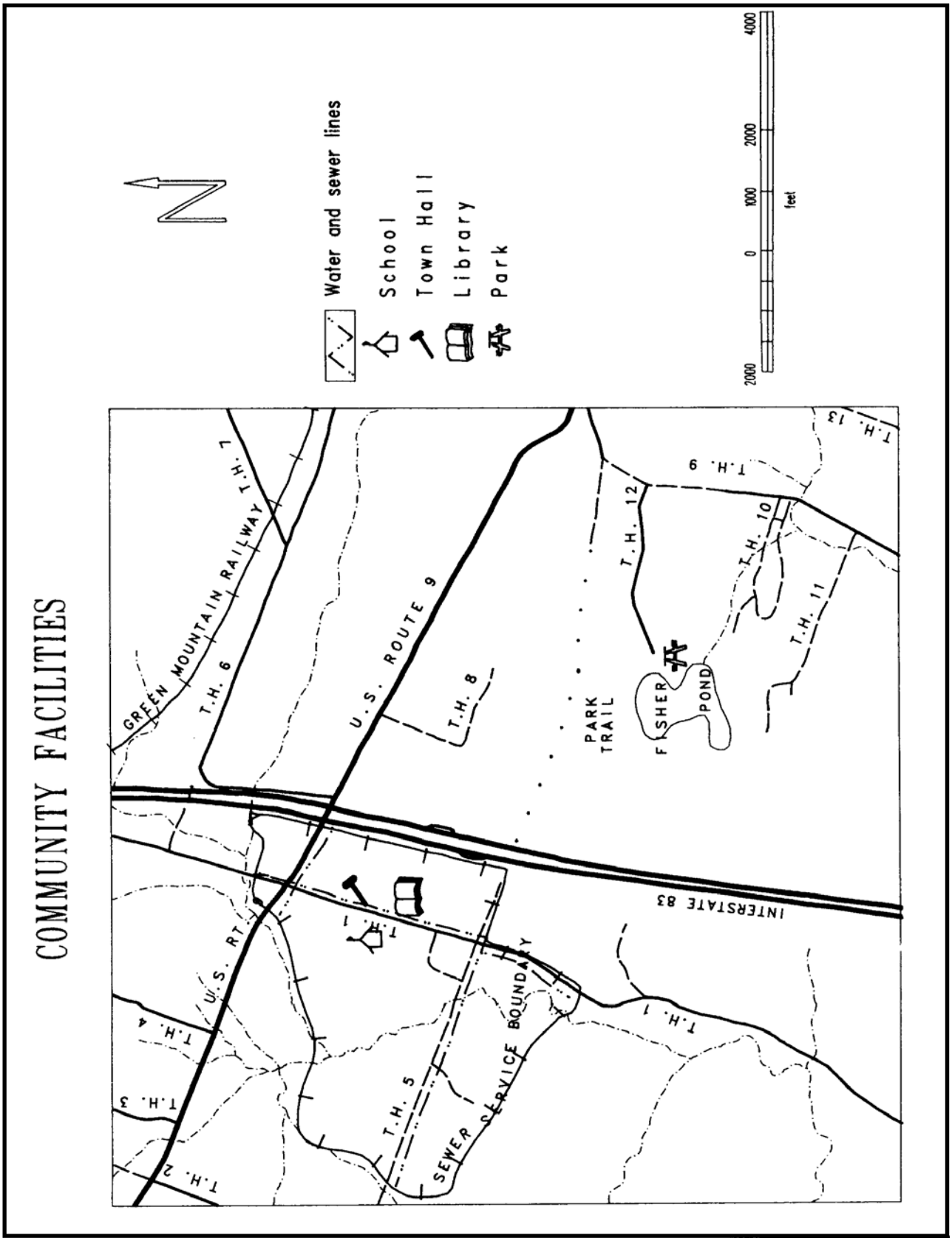
5.7 Analyze Community Facilities and Services

Community facilities and services are provided by the municipality (or available within the municipality) for the health, benefit, safety, and enjoyment of the general public. They include transportation, schools, parks and recreation facilities, libraries, public water supply and waste disposal systems, solid waste management, utilities and energy, police and fire protection, health and human services, and general administrative services. See subsections below on each of these topics.

Chapter 117 now requires that a utility and facility element be included in the municipal plan. **24 V.S.A. §4382(a)(4)**. Several of the above-listed topics are separately addressed under 24 V.S.A. §4382 as specific required elements: transportation, educational facilities and energy. A community may elect to incorporate any or all of them under the utilities and facilities section along with the other public services.

Community facilities and services have a significant effect on the municipality's ability to grow in an orderly and healthy way. Adequate, well-maintained, and efficient services will enable homes, businesses, and public places to be accessible and have safe water supplies, sanitary waste disposal, and necessary governmental services.

Map 5.10


COMMUNITY FACILITIES
N
Water and sewer lines
School
Town Hall
Library
Park
4000
2000
1000
0
2000
feet
GREEN MOUNTAIN RAILWAY
T.H. 7
T.H. 6
U.S. ROUTE 9
T.H. 8
T.H. 12
T.H. 9
T.H. 13
T.H. 10
T.H. 11
PARK TRAIL
FISHER POND
INTERSTATE 83
T.H. 1
U.S. RT.
T.H. 4
T.H. 3
T.H. 2
T.H. 5
SEWER SERVICE BOUNDARY

Careful planning is essential for community facilities and services if they are to meet local health, safety, and welfare needs and community goals for future growth. If the facilities are at capacity, further development may strain them, causing financial burdens and environmental problems. If facilities are inadequate, they may prevent the municipality from adequately meeting existing needs and accommodating desirable growth. If they are oversized and underutilized, they may encourage unplanned growth.

Facilities and services are major users of land. Consider the land required by schools, transportation corridors, recreation areas, watersheds, reservoirs, treatment plants, hospitals, firehouses, and public buildings. Therefore, communities must consider the space these facilities will need in determining future land use.

Take inventory of all community facilities and services and important facilities and services available to the municipality elsewhere in the region. The inventory should include all community facilities and services owned and operated by public agencies; federal, state, and local bodies; and entities such as town and village school districts, fire precincts and other special-purpose districts. Routes, sites, buildings, and service areas should be accurately located and identified on a map. The map will help to indicate which parts of the town are not as well serviced as others. See Map 5.10 as an example.

Evaluate these facilities and services in terms of their quality; ability to deliver services; capacity to meet future needs based on population, economic, and land use trends; their effect on orderly and efficient municipal and regional development; and other standards the municipality and region may set. An evaluation should consider not only the needs of permanent residents, businesses, and industries, but also, where applicable, the needs of seasonal residents and transients.

5.7.1 Transportation

Transportation planning is vital to a community. Not only is it one of the required elements of a municipal plan (**24 V.S.A. §4382(a)(3)**), transportation systems have a strong impact on land use development. Transportation facilities provide for the movement of people and goods within the community and provide connections between homes, industries, businesses, schools, parks, government offices, and places beyond the municipality. Transportation facilities include highways, railways, bus routes, water transportation, airports, bikeways, and pedestrian routes.

Due to major federal legislation in 1991, the Intermodal Surface Transportation Efficiency Act (known as ISTEA and its next

generation TEA-21), transportation planning is becoming a decentralized process under the Vermont Agency of Transportation Planning Initiative. This Initiative creates a new state-town-regional partnership in transportation planning and policy development. The local role will be much stronger than it has been previously. Regional planning commissions and municipalities will be more directly involved in decisions about transportation planning that concerns project priorities.

In its beginning stages, the Planning Initiative will support the preparation of thorough transportation plans at the regional level. The Vermont Agency of Transportation will also support those towns with special planning needs and capabilities. Each transportation plan will result in a list of projects or actions that should be undertaken to solve transportation problems and carry out the plan.

The Planning Initiative responds to the state planning goal to move decision making as close as possible to the local level. It contains expanded citizen involvement and provides direct connection for local officials to affect transportation planning and programming decisions. Active participation and concurrence of local officials is essential to the success of this effort.

The philosophy behind this new Initiative is that transportation planning is best done within the context of land-use planning. The hope is that the Initiative will result in viable, implementable transportation actions within a region that best reflect town and regional priorities.

To begin the process of selecting transportation alternatives that make sense, communities should inventory all transportation facilities within the municipality and significant transportation facilities elsewhere in the region. All facilities should be accurately located and identified on a map. See Map 5.11.

HIGHWAYS

Highways should be identified according to both their functional classification (major arterial, minor arterial, collector, local street) and the state's town highway classification system. *The functional classification* illustrates the roles of different highways within the community, whether it is to move people and goods across municipal boundaries on an interstate or to provide access to a residential subdivision. Communities can use these classifications to plan for future land use. The functional classes are shown in Figure 5.5.

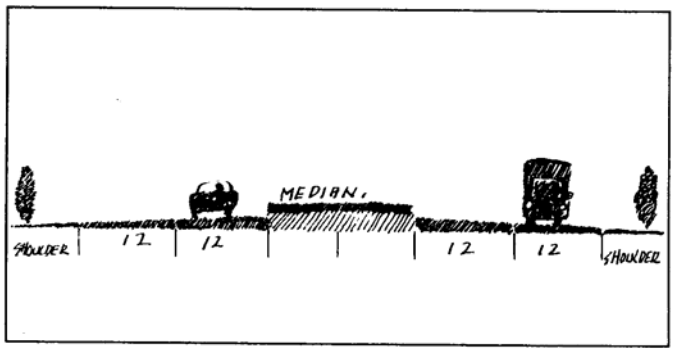
The state classification system, defined in **19 V.S.A. §302**, primarily refers to highway conditions. This system is the basis on which the state allocates highway aid for municipalities. The four classes are:

Figure 5.5

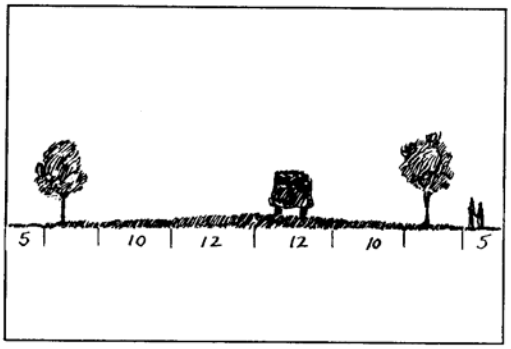
HIGHWAYS

THE FUNCTIONAL CLASSES[1]

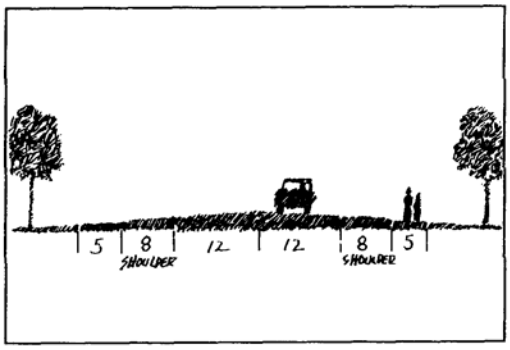
Major Arterials: Major arterials are designed primarily to move traffic. They are not designed to service adjacent land, so they are characterized by access control. They serve large volumes of traffic moving at maximum allowable speeds.



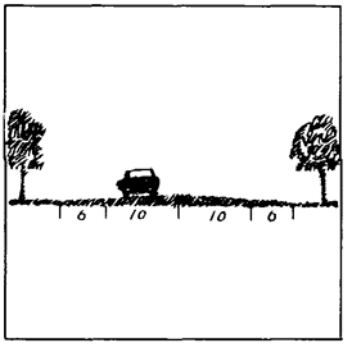
Minor Arterials: Minor arterials bring traffic to and from major arterials and move this traffic within or through the community. Minor arterials connect major traffic generators and usually form an integrated system.



Collectors: Collector roadways carry the major volume of internal traffic with the community and provide a link from residential, industrial, and commercial areas to arterial highways.

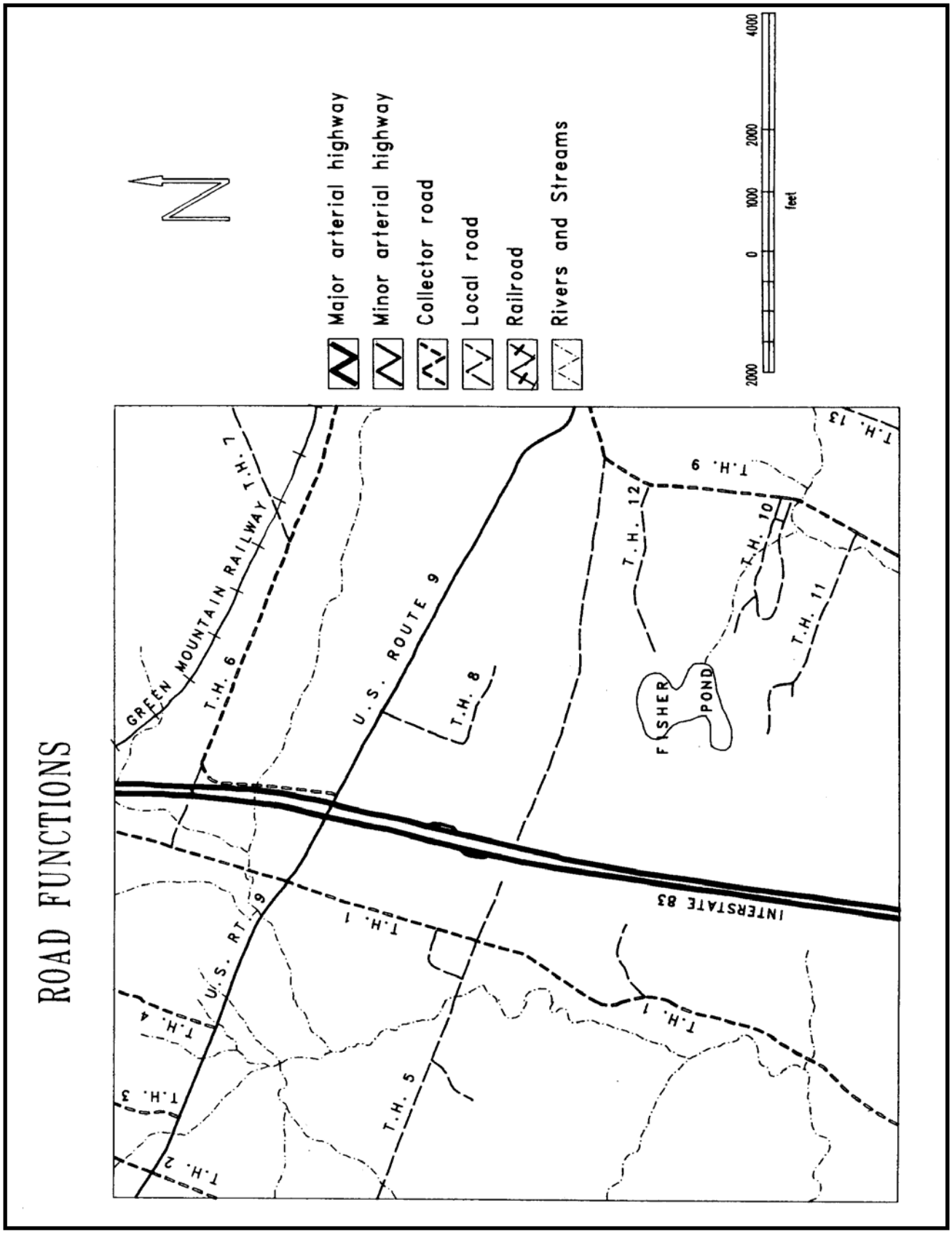


Local Streets: Local streets primarily provide access to adjacent land and provide links to the collector system.



(1) The *Vermont Standards* allow for variation on roadway and shoulder widths from these national standards.

Map 5.11


ROAD FUNCTIONS
Major arterial highway
Minor arterial highway
Collector road
Local road
Railroad
Rivers and Streams
2000
1000
0
1000
2000
4000
feet
GREEN MOUNTAIN RAILWAY
T.H. 7
T.H. 6
U.S. ROUTE 9
T.H. 8
T.H. 12
T.H. 9
T.H. 13
T.H. 10
T.H. 11
FISHER POND
INTERSTATE 83
T.H. 1
U.S. RT. 9
T.H. 4
T.H. 3
T.H. 2
T.H. 5

Class 1: Highways, designated by the Transportation Board, that are extensions of a state highway route and carry a state highway route number

Class 2: Highways, designated by the selectmen and approved by the Transportation Board, that secure trunk lines of improved highways from town to town (formerly a state aid road)

Class 3: Highways, designated by the selectmen after consultation with a representative of the Transportation Board, that are:

- a traveled town highway other than Class 1 or 2
- a town highway that is negotiable under normal conditions all seasons of the year by a standard manufactured pleasure car
- a town highway with sufficient surface and base, adequate drainage, and width sufficient to permit winter maintenance

Class 4: Highways, designated by the selectmen, that are untraveled town highways, trails and pent roads, town highways with gates denying public access, and all town highways not classified as Class 1, 2, or 3 highways.

Evaluate town highways for their safety conditions, surface conditions, capacity to handle traffic, and their actual traffic volumes on the average and at peak periods. Consider the service they provide to land uses within the municipality and their service to the region. The Vermont Local Roads Program, located at St. Michaels College in Colchester, provides technical assistance to Vermont municipalities on a wide variety of highways-related issues.

RAIL FACILITIES

Many communities contain active railroad lines and freight yards. These facilities offer opportunities for rail siding use by industry, agriculture, and passenger rail service. Structures, presently or formerly related to rail use, such as railroad stations and warehouses, may have historic or architectural value. They can be adapted to such uses as bus and taxi depots, business offices, warehouses, retail shops, restaurants, community centers, and farmers' markets. Communities with railroad beds that are not being utilized could consider other uses for these facilities, including bikeways and trails. If there is any opportunity for future rail use of these beds, however, they should be protected from incompatible uses. Communities should inventory, map, and study all rail facilities for the opportunities they offer as well

as for their current conditions and functions.

BUS SERVICE

Any municipality with bus services should identify the services and map the routes and stops. The available facilities should be compared to the present and potential need for bus service. These needs could include service to senior citizens, the handicapped, and those without auto transportation; commuter service from central points in the community to employment centers; long distance service; transportation to recreation facilities; and delivery service of food, medicine, and other essential commodities for the ill or otherwise homebound. Bus service available elsewhere in the region could be extended or connected to the municipality. In examining the need for bus service, keep in mind opportunities to expand the use of school buses, conserve energy, and economize on fuel costs.

WATER TRANSPORTATION

Water transportation may include ferry boats, barges, and excursion boats. Communities located on bodies of water where transportation routes exist should identify these routes and port facilities. Communities should evaluate these facilities for their effect on the traffic volume and circulation in the surrounding area, the opportunities for industrial usage, and their attraction for the vacationing public. Their land requirements for parking, loading and unloading, and maintenance and storage should also be considered.

AIR TRANSPORTATION

Airports that serve local residents, businesses, and industries should be identified, whether they are located within the municipality or elsewhere in the region. Air transportation facilities should be evaluated for their current conditions; their impact on the surrounding communities' land use, noise, and air quality; their accessibility to ground transportation; their proximity to regional industrial and commercial centers; their level of service; and the opportunities they provide for recreation. Private airports used primarily by the owners should also be identified because they can affect adjoining land uses. Flight paths for all airports should be identified and mapped. Land use patterns and potential developments within the flight paths could be affected by potential noise and safety problems.

PARKING FACILITIES

Many municipalities have municipal or private parking facilities, including on-street parking, lots, and garages, in their

central business districts. These facilities should be identified and mapped. They should be evaluated in terms of their adequacy to meet present and anticipated parking needs, their effect on traffic circulation, the surrounding land uses they service, and the availability of land or highway rights-of-way for additional parking facilities.

BIKEWAYS AND WALKING TRAILS

Bikeways and walking trails are important not only for recreation but also for commuting to work, shopping, or visiting. Any existing bikeways should be identified and mapped. For safety, consider potential bikeway routes both within and separate from existing highway rights-of-way. Walking routes used by residents but not necessarily developed should be identified.

SIDEWALKS

Sidewalks provide safe routes for pedestrians in neighborhoods, commercial and industrial areas, and community centers. Communities should map all sidewalks and evaluate their conditions. Sidewalks that need improvements or extensions should be identified. Areas not served by sidewalks but needing them should also be identified.

TRAFFIC

Traffic circulation and control is an important part of transportation planning. The volume of traffic is directly related to the amount of activity in a municipality and its region; as growth and land development increase, so will traffic volumes. The increase in traffic can have a noticeable effect on day-to-day life in a community; it influences travel patterns, increases maintenance costs and alters real estate values. Severe traffic congestion can seriously diminish the quality of life.

Traffic management is an issue that should be anticipated and addressed in the local planning process. Existing traffic conditions should be identified and analyzed, particularly where congestion or safety problems exist or are projected. Close connection with the Vermont Agency of Transportation Planning Division and your regional planning commission is important to the transportation planning process.

Evaluate traffic conditions by examining the growth in traffic volume—both the average daily traffic volume and peak hour traffic volume. Compare the volume to the capacity of the roadway. This comparison will indicate the severity of the traffic problem. If professional assistance is obtained, the level of service of the roadway or an intersection can be measured. By studying

accident data, you can identify further problems or needs.

Projections of traffic volumes will indicate whether problems may arise in the future. Project future traffic volumes by extending volumes based on the trends of the past five years or by factoring in recent development trends if they are different from the five-year trend. Consider whether land uses are changing as well.

Traffic analysis is useful for identifying existing and projected roadway and intersection improvement needs. However, it is complicated and, for a thorough study, requires the assistance of a traffic engineer. While professional assistance is invaluable, local officials should familiarize themselves with the basic concepts.

Every road segment and intersection has a theoretical maximum capacity, expressed in terms of vehicles per hour. Capacity is a function of many factors, including the roadway's width, slope, pavement type, turning angle, speed limit, and access characteristics. At 100 percent capacity, the roadway does not move traffic.

For any given road segment or intersection, the municipality can obtain a count or estimate of traffic volumes. (See Figure 5.6.) These counts are made manually or, more often, through the use of electronic traffic counting devices, and are expressed in terms of vehicles per hour or average daily traffic. The Vermont Agency of Transportation maintains many permanent traffic counters at key locations around the state, as well as temporary counters that are systematically moved from location to location. On occasion, the agency installs counters in particular locations to make a site-specific study. The data from this comprehensive monitoring program can be used to estimate traffic volumes and to project future traffic volumes.

By knowing the capacity of a road segment or intersection, and by knowing its current or projected traffic volume, the community can evaluate its adequacy and performance. This evaluation is based upon the ratio of traffic volume to roadway capacity (v/c). It is expressed in terms of level of service (LOS). In essence, the road segment or intersection is assigned a level of service grade, from LOS A (free flow) to LOS E (failure), based upon the ratio of volume to capacity. In Vermont, a Level of Service C condition is the desired standard for roadway performance at normal high-use periods.

Sources:

Vermont Agency of Transportation, Planning Division, Montpelier—traffic data, highway sufficiency ratings, state five year plan for capital improvements, accident statistics, bikeways information

Vermont Agency of Transportation, District Transportation Offices—highway classifications, local road and bridge conditions, state aid

Vermont Agency of Transportation, Rail, Air and Public Transportation Office—airport, railroad and public transit

information
Vermont Local Roads Program, St. Michael's College, Colchester—maintenance and capital improvements planning information
Vermont Transit—bus routes and stops
Local and regional bus services—bus routes and stops
Regional planning commissions—data collection and analysis, regional transportation facilities, regional plans

TRAFFIC CALMING

There are many ways to handle roadway design, traffic congestion, vehicular speeds, bicycle and pedestrian safety. Understanding and planning for the type of facility desired is important. In addition to traditional roadway design (width, slope, and other geometric characteristics), there is a toolbox of practices and designs commonly referred to as "traffic calming" techniques.

Traffic calming is used to enhance the safety and human experience in neighborhoods, along main streets, country roads, etc.. Traffic calming assumes that speed and "ease of vehicular movement" are not the only design criteria in roadway design. These

- street width reduction through bump-outs, bulb-outs, neckdowns, etc.
- street trees to soften the edge and protect the pedestrian
- landscaped median strips
- roundabouts, mini-roundabouts
- streetside parking
- sidewalks, bike lanes
- rumble strips, elevated speed table
- change in pavement color and texture, signage
- community gateway

Sources:
Agency of Transportation, Planning Division, Montpelier—design and engineering guidelines, transportation planning
Local Roads Program, St. Michael's College, Colchester—techniques and maintenance information
Conservation Law Foundation, Montpelier—publication 1998: *Take Back Your Streets*
Regional planning commissions—design practices, transportation and community planning

practices and techniques include the following designs:

5.7.2 Education

An educational facilities plan is one of the required elements of a municipal plan. **24 V.S.A. §4382(a)(6)**. An inventory of educational

facilities should include the location and size of existing school sites and buildings, school recreation facilities, enrollment trends, capacity of facilities, and school transportation vehicles and routes. Schools located outside the municipality or local school district but attended by residents, such as vocational schools and colleges, should also be inventoried. These facilities should be evaluated. Are the buildings in good physical condition? Is there sufficient space to meet existing needs? How will the population projections affect enrollments? Can the projected number of students be accommodated by existing programs and facilities? The commission should work with the school board on the answers to these questions.

Planning decisions on the location, type, and amount of future growth can have significant implications for educational services. What are the plans for improvements to school facilities and services? Will the improvements meet the projected needs from the anticipated growth? Because schools represent a large portion of local expenditures, many communities have found they have had to closely coordinate planning decisions with the school board to avoid adverse fiscal impacts on the municipality.

Sources:

Vermont Department of Education—statistical information, building and site requirements and standards for schools

School supervisory districts—enrollment trends, capacity of facilities, staffing, and expenditures

Local school boards—school policies, plans, and programs

5.7.3 Recreation

An inventory and survey should be done of all existing park and recreation areas, facilities, programs, and organizations in the community. Other important recreational opportunities available in the region for use by residents should be included as well. Provide a description of how areas and facilities are used, their present condition, and their location on a map. An inventory could include:

- public parks
- recreation facilities and programs (beaches, improved fields, tennis courts, and instructional programs)
- school facilities and programs (playgrounds, auditoriums, craftsrooms, athletic fields, and skating rinks)
- private, commercial, and voluntary agencies, facilities, and programs (golf courses, ski areas, bowling alleys, snowmobile trails, and so on)

Committees, agencies, organizations, and individuals

responsible for operating and maintaining recreation facilities and programs could also be identified. Facilities and programs should be evaluated for their present conditions, their ability to meet present and anticipated needs, the opportunities they offer for expansion, and the advantages and disadvantages of their location in the community. In determining future recreation needs, consider the population projections, the adequacy of existing facilities for use by all age groups, the availability of recreational opportunities in the region, the distribution of recreational facilities and programs in the municipality, the users (local, regional, tourist) being planned for, the preferences of the public, and community standards for recreation. Municipalities that require the dedication of recreation land or fees in their subdivision regulations should evaluate the effectiveness of this device. Is it producing the necessary land and improvements? Are the results serving the needs of the new residents who have paid the fee? Does the fee reflect the additional costs of recreation services for the new residents?

Sources:

Vermont Agency of Natural Resources, Department of Forests, Parks and Recreation—recreation planning assistance, Vermont Recreation Plan, recreation planning manual

Municipal recreation boards and departments—local recreation facilities, programs, and needs

Other local or regional groups, (4-H, Little League, Vermont Association of Snowmobile Travelers, Vermont Ski Areas Association, Green Mountain Club)

Regional planning commissions—regional recreation facilities, data collection, and analysis

5.7.4 Libraries

All library facilities, including those in schools and museums, should be identified. Librarians should be consulted as to the adequacy of the facilities for book storage, seating, and library-related functions (such as book fairs) and the conditions of the buildings. The location of any library should be evaluated in terms of its accessibility to patrons (including school children, senior citizens, and handicapped people), and the noise and traffic associated with adjacent land uses.

Sources:

Vermont Department of Libraries—general information and assistance, standards

Local and regional libraries—data on existing facilities, needs

Schools—data on existing school library facilities, needs

5.7.5 Water Supply

If a community has an existing public water system, it should identify and map the service area, facilities, and water supply source. It should also inventory privately operated community water systems in the area. The capacity of the systems should be compared to the number of users and the anticipated demands from future users. Conditions of the facilities should be evaluated. Consideration should be given to the present quality of the water supply source and any anticipated threats to its purity. All communities should determine which areas, if any, need a better water supply—where individual wells are contaminated, for example, or where an adequate water supply source is unavailable. These areas could include residential, industrial, commercial, and agricultural centers.

Sources:

Vermont Agency of Natural Resources, Water Supply Division—information on drinking water standards, public water systems, aquifer protection areas, and well log data

Vermont Agency of Natural Resources, Public Facilities Division—assistance on planning for water system improvements, cost estimates

Local public works department—municipal water supply system information

5.7.6 Sewage Disposal

Any publicly owned and operated sewage disposal facilities, including the extent of their service areas, should be identified and mapped. Privately operated community systems should also be inventoried. Compare the capacity of the systems to the present number of users and the anticipated demand for new users.

Evaluate the condition of facilities. There may be problems with the system of treatment for sewage, combined storm water runoff and sewage disposal, or pollution of watersheds. Most rural areas use individual onsite sewage disposal systems. Any problems with this method of disposal, such as contamination of surface or ground water, should be identified. The effectiveness of any local health regulations in ensuring safe and adequate onsite sewage disposal should be evaluated.

Administration procedures for municipal sewage systems should be identified and analyzed. Some communities have adopted policies limiting the extension of sewer lines to sewer service areas and allocating excess sewage treatment capacity to

different land uses. Most communities operating these facilities assess user fees. The effectiveness of these policies and procedures should be evaluated. Is the sewer line extension policy consistent with land use plans? Are the capacity allocations consistent with growth projections? Are some land uses demanding more capacity than anticipated? Are the fees covering the costs of hook-ups and operation and maintenance of the plant? Communities that do not have these policies and procedures should consider them.

Sources:

Vermont Agency of Natural Resources, Public Facilities Division, Operations and Management Section—technical assistance, compliance monitoring, financial management, training for public systems; compliance monitoring for private discharges

Natural Resource Conservation Districts, Onsite Sewage Program—information on individual onsite disposal systems

Local public works department—municipal sewage disposal system information

5.7.7 Solid Waste Management

Municipalities have the authority and responsibility to manage the solid waste generated within the municipality. **24 V.S.A §2202a**. In Vermont, solid waste is disposed in landfills, but may undergo treatment, such as incineration or composting, before disposal. Open dumping is prohibited, as is landfilling of hazardous materials. Future needs for disposal are based on population, economic and land use trends, and opportunities for regional programs. The solid waste management system includes collection and recycling, as well as treatment and disposal. The present system, including all facets, should be inventoried and characterized.

In 1987, the Vermont Legislature passed Act 78 to address the state's solid waste issues. The Act requires that twenty year solid waste management plans, consistent with the state solid waste plan, be prepared. The State has set a goal to reduce and divert 40% of solid waste currently going to landfills by such means as recycling and waste reduction. The preferred methods of handling solid waste are, in order of priority: reduction in the amount of waste generated; reuse and recycling of materials; processing of waste to reduce volume before disposal; and land disposal of residuals. As of 1992, waste must be disposed in lined landfills.

Siting of facilities for the processing or disposal of waste is a complex process that needs to take into consideration environ-

mental conditions, location in a community, impact on adjacent land uses, and potential for reclamation to other uses. Because of the complexity and because of cost factors, most communities have joined together with other communities, either through a solid waste district or through some other kind of contractual relation, to identify sites and to establish waste management policies. Solid waste management facility siting must take into account state prohibited areas, technical criteria, such as environmental impacts, and social criteria, such as impact on adjacent land uses. Siting processes must include early and sustained public participation.

Sources:

Vermont Agency of Natural Resources, Department of Environmental Conservation Waste Management Division—technical assistance on planning, information on existing facilities,

Regional planning commissions—data collection, analysis, and regional facilities planning

Solid waste management districts—data collection, analysis, and regional facilities planning

5.7.8 Gas, Electricity, Cable, Telephone Service, and Towers

A community should be aware of the services now provided within its boundaries by gas, electricity, cable, telephone, and tower companies. The layout of gas, electrical, and telephone service lines, and location of transmission towers should be identified. These services should be evaluated for their effect on land use and aesthetics—both in terms of the land they use (consider substations and electrical transmission lines), the land use patterns that result, and their impact on adjacent land uses. The availability of these services within the municipality can influence the location of an industry (such as tourism), a major commercial development, or a residential subdivision.

Sources:

Department of Public Service—identification of utility service areas, transmission and generation facilities

Gas, electric, cable, and telephone companies—location of facilities, capacity information, future plans

Regional planning commissions—regional tower locations

5.7.9 Energy

The energy element of the municipal plan requires that an

analysis be made of energy resources, needs, scarcities, costs and problems within the municipality. This analysis should include an inventory of types of energy currently used in the municipality—fossil fuels and renewable resources—and major providers of each, as well as an inventory of any potential energy resources (especially renewable energy and recovery resources), whose development the town may support in the future. **24 V.S.A. §4382 (a)(9)**.

A look at current and future energy needs and uses, also known as "demand," involves focusing on four sectors: municipal uses, residential uses, commercial and industrial uses, and transportation. A general assessment of the municipality's energy profile could include the following:

Municipal uses: an inventory of municipal departments or buildings, types of energy used (electricity, oil, natural gas, propane, wood, etc.), and the estimated annual energy use (in units, such as Kwh, gals., Btu's, cords), along with associated annual cost

Residential uses: information on the primary kinds of residential housing in the municipality (single family, 2 family, multifamily housing, mobile homes and manufactured units, seasonal/vacation residences) and types of energy uses within these housing units, such as space heating, water heating, lighting, refrigerators

Commercial and industrial uses: general information about the major businesses in the town, how they use energy, what types of energy they use, and the provider or source of this energy

Transportation: general information about (1) municipal vehicles and school buses, including how many there are, fuel efficiency, use and driving patterns, and (2) commuter and general traffic, including amount and driving patterns

Sources:

Department of Public Service—information on developing an energy plan, fuel dealers and suppliers, energy consultants

Local providers of energy services—information about types, supplies, delivery systems, costs.

Vendors, contractors, realtors—information about current standards and practices for energy efficiency

Regional planning—data collection, analysis, regional energy plans

5.7.10 Public Safety and Emergency Services

Throughout the planning process, municipalities should address public safety issues such as adequate police protection, fire and emergency medical service response and dispatching services. It should be noted that ensuring public safety and the protection of persons and property is a very basic responsibility of all elected officials.

Although public safety is not thought of as a traditional land use issue, the increasing pressures on municipalities caused by population growth, traffic, commercial and residential development all pose significant concerns for local planners as well as police and fire officials.

The trust which the citizens place in municipalities as part of the social compact must be reflected in government agencies' ability to plan for the protection of persons and property as development pressures change the complexion of the state's towns and cities.

An inventory should be made of the number of full or part-time employees or volunteers; the number of cars, trucks, buildings and other facilities; the number of calls, and any regional or state facilities or staff available and utilized for police, rescue, and fire protection within the municipality. These resources should be evaluated for their ability to meet present and anticipated demand for services and the adequacy of the equipment and buildings used. Opportunities for improvements to the present protection system—such as a regional police protection program and expansion of mutual aid for fire companies—should be identified.

For those communities with police departments, adequate protection must be viewed as a significant piece of the growth puzzle. For those municipalities which receive their primary police protection from the state, the Commissioner of Public Safety and the Director of the Vermont State Police are available to provide information, statistics, briefings, and otherwise assist town officials wrestling with growth management issues.

Besides information and expertise which can be provided by the Department of Public Safety, the Vermont State Police currently offers a program called Contractual Outpost Patrols. The program's goal is to improve police protection available to towns covered by troopers through a state /local partnership. Information on this and all other Vermont State Police programs may be obtained by contacting the Department of Public Safety in

Waterbury.

Sources:

Department of Public Safety and the Vermont State Police—available services, demand information

Local police, fire, and rescue departments—inventory of personnel and equipment, demand, needs

Fire insurance underwriting companies—rating of fire protection services and equipment

5.7.11 Health and Human Services

A wide range of state and local, public and private, profit and non-profit health and human services may be available to residents in the municipality to help them and their families achieve and maintain as much independence and self-sufficiency as possible.

Identify the resources available for health care (including hospitals, medical and dental offices, mental health clinics, day treatment centers, nursing homes, residential care facilities and homes, visiting nurses, offices of the State Department of Health, etc.).

Identify the resources available for child care (including licensed child care centers and registered child care homes and those programs using space in the public schools).

Identify the resources available for helping people with their financial, social and emotional problems (including community action agencies, youth service bureaus, parent child centers, offices of the State Welfare Department and the State Department of Social and Rehabilitation Services, police, the courts, etc.).

Identify the regional and state resources present in the municipality for serving people with special needs (including group homes and correctional facilities, etc.).

Also consider the present and anticipated needs for all these services in the community and the opportunities, existing and proposed, available to residents in the community and region for expanded care.

Sources:

Vermont Department of Health—health care programs and services

Vermont Agency of Human Services: Central Office Planning Division, State Department of Social Welfare, State Department of Social and Rehabilitation Services, State Office of Economic Opportunity, State Department of Corrections—child care and social services

Local health officer—information on health issues and health regulations

Community action agencies and other local agencies—social services

5.7.l2 Administrative Services

Buildings used for municipal government purposes, including town halls and clerk's offices, and municipal employees, such as clerks and their assistants, zoning administrators, and municipal managers, should be identified. Are these facilities and services adequate to meet present and future needs? Consider also the conditions of the buildings, administrative needs, and new services that may be increasingly required. These may include the addition of full-time assessors, increased inspections by registered engineers of subdivisions, or new sewage treatment plant operators. Opportunities to coordinate facilities and services with adjacent municipalities should also be explored.

Sources:

Clerk's or manager's office—existing facilities, employees, conditions, demand, needs

Other local departments, committees—existing facilities, employees, conditions, demand, needs

Vermont League of Cities and Towns—general municipal data

5.8 Using GIS

To help communities better analyze physical conditions, land use, and community facilities and services, the Legislature authorized in 1988 the development of a statewide geographic information system (GIS). **3 V.S.A. §20**.

GIS is a tool which can be used, through the power of computer mapping and information management, to assist in the analysis of a variety of local, regional and statewide issues—issues ranging from the routing of a highway, to developing a greenway system, to finding the best site for an industrial park. The type of data incorporated into the GIS may relate to natural, socio-economic, or man-made characteristics.

The strength of GIS is its ability to create distinct map "layers" for different types of information, and then to combine them in any way desired or needed. Each layer consists of geographic, or "spatial", data linked to descriptive, or "tabular", information. In combining layers, GIS uses known earth coordinates to make sure each layer lines up correctly with the others.

The advantage of using GIS is that local, regional and state agencies can share data relatively easily. GIS can mathematically transform map features from one scale or projection to another to allow map layers from different sources to be used together. GIS can produce maps at any size, depicting an entire community or only a selected area using information from different scales. GIS is

also an efficient way to keep geographic information up to date. Once information is entered into a GIS system, it is simple to change the data on the computer and produce an updated product. Chapter 117 requires that data gathered for municipal planning purposes that is relevant to GIS must be compatible with, useful to, and shared with that system. **24 V.S.A. §4325(4)**.

The Vermont Center for Geographic Information coordinates the collection and recording of geographic data, verifies that the data meets certain standards and disseminates it to the regional planning commissions and other users. In their role as "regional service centers", the regional planning commissions (RPCs) are a critical link in the system. In addition to developing GIS applications for their own purposes, the RPCs are available to provide for the needs of communities within their jurisdictions that lack GIS capability. Communities can also contract with private consultants to obtain GIS services. For communities that do want to develop their own GIS capabilities, there is available easy-to-use mapping software, such as the Vermont Town Menu System.

For more information on GIS, contact either your regional planning commission or the Vermont Center for Geographic Information.

5.9 Summarize Data Collection and Analysis

Communities now will have assembled and examined information on their population, housing, local economy, fiscal condition, physical conditions, land use, and community facilities and services. The next step is to consolidate this information according to the issues that will be addressed in the plan.

5.9.1 Identify Needs and Options for Land Use

To identify potential locations for future development, communities will need to look at their population and housing projections, economic conditions and community facilities and services needs and then project future land use. A land use plan and map is required to be included in the municipal plan. Land uses which should be projected include residences, commercial and industrial uses, agricultural and forestry operations, recreation areas, and community buildings. Communities should review the land requirements of these uses and locate potential areas to accommodate them.

The summary map of physical constraints to development and the existing land use maps should be compared and analyzed. This comparison will help to illustrate where problems may emerge

because of land development on areas with severe limitations for this purpose and what the capability of undeveloped areas is to handle future growth. It will also enable the community to locate areas where development will need to be carefully controlled because of the presence of unique and fragile resources, resource production activities, and features of special interest to the community.

In addition to considering the physical capability of the land to accommodate the development, communities will want to consider:

- the availability of adequate community facilities and services in these locations
- the interrelationship and compatibility of the proposed land uses
- the need to prevent overcrowding of land and buildings
- the need to ameliorate undesirable conditions
- the impact on special resources, productive lands, and significant features
- the consistency with the overall goals for the future of the community

For example, a community may identify a site that has excellent physical capabilities for moderate-density residential development. However, the road network may not serve this area and it may be remote from the town center. If the community wishes to encourage moderate density development around the center, perhaps it should find alternative sites that are closer. If it finds an appropriate site that has moderate-to-severe soil limitations for onsite sewage disposal, the community may want to look at the possibility of connecting the site to the municipal sewer system.

Another community may see the need to expand its commercial services but may not wish to create a pattern of strip development along a major artery. After examining the soils, topography, land use maps, and traffic data, it may locate a site contiguous to the highway where a commercial area could be located with minimal curb cuts. Establishing commercial uses in this location may be preferable to a strip commercial pattern spread out up and down the highway.

5.9.2 Identify Needs and Options for Community Facilities and Services

From the analyses of community facilities and services it will be possible to prepare a list of needs. These needs may include highway improvements, alternate transportation systems, additional

recreation land, new school buses, street lighting, expansion of library facilities, new water filtration plant, new sewer lines, and additional personnel. What options does the community have to meet these needs?

These options may include potential sites, alternative designs, intermunicipal sharing, and financing alternatives. If the community will be unable to meet the needs when they are anticipated due to fiscal constraints or the time required to implement improvements, options which will phase growth could be considered.

5.9.3 Identify Needs and Options for Community Development

From the analysis of housing and economic development trends, land use, and public services, communities will be able to identify community development needs. Examples of these needs include:

- upgrading of local services, such as streets, sidewalks, and lighting in a low-to-moderate income neighborhood
- rehabilitation of structures and infill development in a commercial center
- location and land improvements for a new industrial area
- identification of sites for senior citizen housing

Many of these needs require financial assistance, such as bonding, grants, loans, and general fund allocations. Others can be accomplished through controls and incentives, such as zoning and subdivision regulations. Options for meeting these needs should be identified.

5.9.4 Identify Needs for Environmental Resources

The population and economic trends and the analysis of land use and physical conditions will help to define natural, historical and aesthetic resource needs that must be addressed. These needs might include:

- upgrading water quality within a stream
- protecting a natural area or an aquifer recharge area from encroaching development
- maintaining agricultural districts where farming is the primary land use
- encouraging sound forestry management in productive timber zones
- securing public access along a shoreline
- maintaining the quality of a village historic district
- protecting important scenic vistas

Options to meet these needs should be identified. They will include regulatory, financial, or incentive approaches.

Communities that have completed the steps in this chapter will now be ready to prepare the plan. They will have collected background information, analyzed the information, and identified their needs and options for the future. The next chapter describes how this information will be used to develop goals, plans, and implementation strategies.