

IV. NATURAL RESOURCES

4.1 Physiography

The Town of Sandgate is located entirely within the structurally complex Taconic Mountain physiographic province. The bedrock in this area consists largely of metamorphosed sedimentary rocks: slate, shale, and phyllite, as well as some limestone, dolomite, marble, quartzite, and schist. The subsurface caves and enlarged bedrock fractures that occur in the area have resulted from naturally acidic water dissolving carbonate bedrock. Evidence of the Pleistocene glaciation can be seen in the till deposits -- unsorted mixtures of glacial sediments ranging in size from clays to large boulders -- that cover much of the town.

The town's topography is characterized by an irregular pattern of steeply sloping mountains and ridges separated by numerous stream valleys and hollows (Figure 4.1). Over 19,000 of the town's 27,039 acres lie at slopes in excess of 20 percent; the only substantial areas of moderately level ground occur in the valleys of the Green River and Terry Brook. Overall relief is considerable, ranging from an elevation of about 670 feet above sea level along the Green River near Arlington to over 3,300 feet on Bear Mountain in the northeastern part of town. Other prominent summits in Sandgate include Moffit Mountain, Egg Mountain, Swearing Hill, and Minister Hill.

A particularly significant geological feature in Sandgate is the rugged ridge that traverses the town from the southwest to the northeast and divides the drainage basin of the Green River from those of Terry Brook and Chunks Brook. This ridge is crossed by only one road, thus forming a very real physical barrier between east and west Sandgate. The one road that does connect the two sides of town passes through "The Notch," a spectacular switchback passage winding through steep rock walls.

Physical characteristics of the land are important in determining locations that are best suited for development. Siting developments on steep slopes or on soils that are too shallow, wet, or unstable can cause severe problems: roads will be difficult and costly to maintain, septic systems can fail and contaminate water supplies, erosion will result in soil loss and degrade aquatic environments, and so on. Conversely, when development is directed to appropriate locations, communities can grow and prosper while minimizing environmental damage and the need for inordinate expenditures of public funds. In Sandgate, areas well-suited to development are largely confined to valley areas along the Green River and some of its tributaries and in West Sandgate. These areas are characterized by moderate slopes and relatively deep soils that can supply adequate quantities of clean ground water while supporting sanitary wastewater disposal systems.

The U.S.D.A. Natural Resource Conservation Service has completed a comprehensive soil survey that covers the Town of Sandgate. This survey allows planners and landowners to determine whether soils in a particular area are best suited for residential development, agriculture, forestry, sand and gravel extraction, or some other activity. This information should be a basic element in future land use planning activities in Sandgate and is now available at the Bennington County Regional Commission's GIS facility, allowing for rapid interpretations of soil data in conjunction with other geographic attributes.

4.2 Water Resources

Sandgate contains a variety of surface water features (Figure 4.2). The most prominent of these are the numerous streams that cascade down the town's hollows and valleys. The Green River and its tributaries drain the east side of town, while Terry Brook and Chunks Brook drain most of the west side of town. These three streams, in turn, all flow into the Batten Kill. A small area in the northwestern part of Sandgate drains toward White Creek in Rupert and New York State. Because White Creek, like the Batten Kill, is a tributary of the Hudson River, the entire Town of Sandgate lies within the Hudson River drainage basin.

These streams serve a number of important functions. In addition to supplying clean water to larger waterways, they serve as important fisheries (the Green River supports populations of native brook and brown trout), provide a critical habitat component for many wildlife species, afford opportunities for swimming and other recreational activities, and are critical to the area's aesthetic appeal. These functions will be preserved if the streams, streambanks, and riparian vegetation are maintained in a free-flowing and unpolluted state. The Town of Sandgate has recognized the need to protect these resources, and has passed special regulations as part of the municipal zoning bylaw that place restrictions on certain activities that occur within 100 feet of a stream. The town should also encourage development planning that maintains green space along streams, and should seek opportunities for ensuring public access to streams in appropriate locations.

Because of its rugged topography, Sandgate is not home to any large lakes. There are a number of small ponds, however, and one impoundment known as Lake Madeleine which, at 20 acres, is the largest waterbody in town. Three of the town's larger ponds -- Lake Madeleine, Barbos Lake, and Hopper Pond -- are relatively inaccessible to the public, being located in a remote area on the private lands of the Carthusian Monastery on Mt. Equinox. Some ponds do offer such recreational benefits as fishing (especially in private stocked ponds) and swimming. Moreover, all of the ponds serve as important wildlife habitat and scenic resources.

Planning for the protection of water resources must consider not only activities that occur on or immediately adjacent to the waterbody, but also activities that occur within the watershed. For example, building construction or logging activities can add sediments and other contaminants to streams or drainageways that flow into a pond. These materials can degrade water quality and accelerate eutrophication in the pond. The Vermont Agency of Natural Resources has published a manual, Planning for Lake Water Quality Protection, that is intended to assist communities in planning for lakes and ponds. Persons undertaking activities that could affect pond water quality should consider the recommendations contained in that manual in addition to any local zoning regulations. Special attention should be given to ponds that lie at high elevations (above 1,800 feet) because these waterbodies support especially fragile ecosystems that thrive only in a relatively narrow range of water quality conditions.

Another important surface water feature, found principally along stream valleys in Sandgate, are wetlands. Wetlands are lands transitional between aquatic and terrestrial systems where the water table is usually at or near the surface or the land is covered by shallow water. Benefits provided by wetlands include: flood and storm water control, maintenance of surface and ground water quality, open space and aesthetic appreciation, fish and wildlife habitat, and sources of nutrients for freshwater food chains. Because many wetlands lie in the same lowlands where most of the town's future growth is likely to occur, special attention must be given to the protection of these

natural areas. The Vermont Wetland Rules and certain federal regulatory programs afford a level of protection to wetlands, but local monitoring is needed for these programs to be effective. In addition, the town may wish to inventory wetlands and identify those that are particularly important.

Most existing residences, as well as future development, depend on an adequate supply of clean ground water. This water is obtained principally from individual on-site wells. Historically, the low density of development in Sandgate has limited the potential for contamination of these wells. Future protection of these water supplies will depend upon strict adherence to local and state health regulations. Water conservation, including the use of low-flow fixtures, should also be encouraged. Although there are currently no public water supply systems in Sandgate, it is possible that at some future time a small system will be needed to serve a concentration of homes, most likely along the Green River or in West Sandgate. The town may wish to evaluate potential sources for such a system(s), and take steps to ensure that the recharge areas for these sources are protected from contamination.

4.3 Forest Lands

The vast majority of land in Sandgate is covered by forests. This was not always the case, however, as early settlers cleared large areas for agriculture and settlement. With time, the economic viability of farming on Sandgate's marginal lands declined, as did the demand for wood products. Consequently, the town's population dwindled and the forests began reclaiming the once cleared landscape. Today, forests of mixed hardwoods (principally maple, beech, and yellow birch) cover most of the town. Oak stands occur on some south-facing slopes and on hill tops with shallow soils. Coniferous and mixed forests are found at higher elevations and on poor soils. The town also contains a large number of white birch trees, found mainly in areas that are in transition from open field to mature mixed hardwood forest. A generalized forest soil productivity map (Figure 4.3) shows that the best forest soils are found along the Green River and the poorest are found at high elevations and on steep slopes.

While Sandgate does contain some high quality timber stands, there are extensive areas covered by forests of relatively poor quality. This situation is largely attributable to past logging practices that removed only the best trees and left the poorer ones. New logging practices are designed to improve the quality of timber stands. Effective logging can encourage the growth of a variety of economically valuable tree species and also provide improved habitat for many wildlife species. Economic factors play a strong role in promoting particular forest management practices. The energy crisis of the 1970s, for example, encouraged people to remove poor quality trees for use as firewood.

Forests help to prevent soil erosion and flooding, contribute to air and water quality, and provide valuable timber, wildlife, recreational, and aesthetic resources. Timber harvesting is a particularly important economic activity in Sandgate. Proper management will ensure a continuing yield of valuable forest products well into the future. Several lumber companies own and manage large parcels of timber land in Sandgate. In addition, numerous individuals and foundations own land that is enrolled in Vermont's current use program (some of the lumber company lands are also enrolled in this program); a current forest management plan is required for all of these parcels. There are 35 parcels in Sandgate, containing 12,894 acres of land, in this important program.

A number of other uses are also of great importance in Sandgate's forests. The town's forests contains some of the most popular deer hunting land in the region, important black bear habitat, a considerable number of hunting camps, and support other

recreational pursuits. Obviously, the extensive network of trails and logging roads that exist in the forests are critical to many of these activities.

The greatest threat to Sandgate's forests is the fragmentation of large parcels of forest land. Such land subdivision is caused by factors ranging from a landowner's inability to pay property taxes to speculative real estate development. Fragmentation replaces large contiguous tracts of forest land with multiple small parcels which are far more difficult to effectively manage for timber production, wildlife habitat, or recreational use.

There are a number of possible ways to preserve Sandgate's forest lands and the values that they serve. The current use program, mentioned earlier, provides property tax relief to landowners who keep their forest lands undeveloped and well managed. The foregone municipal tax revenues are replaced by payments from the state. The level of state funding for this program in future years is uncertain, however, particularly during recessionary times. Local zoning regulations are another tool that can be used to protect forest lands. Much of Sandgate is zoned "Forest" permitting only forestry, recreational uses and facilities, agriculture, and dwellings on large lots. Dwellings are not permitted on land lying above the 1,800 foot elevation contour. Land may also be preserved through the acquisition of development rights or conservation easements by organizations such as the Vermont Land Trust. Another method of protecting forest lands now available to Sandgate is acquisition (with the town's consent) of land from willing sellers by the United States Forest Service. Forest Service ownership does convey certain important benefits: coordinated and comprehensive multiple use forest management and assured public access, for example.

One tool that can help towns evaluate the value of parcels of forest land is the Forest Land Evaluation and Site Assessment (FLESA) process. This process allows towns to assess the value of discrete units of forest land for timber productivity, wildlife habitat, recreation, and other uses. The Bennington County Regional has developed a regional resource inventory and FLESA of lands in the Taconic Range. This information will aid towns in long-range forest planning.

4.4 Agricultural Lands

At one time, there were numerous farms in Sandgate, and much of the land was cleared for pasture and cropland. Agricultural activity rapidly declined as growth in the fertile lands of the midwestern United States and improved transportation made farming in areas like Sandgate a losing proposition. Some of the better soils in town still are farmed, however, and these operations convey considerable benefits to the town. In addition to serving as a livelihood for some residents, the open fields provide valuable wildlife habitat and scenic vistas. The town should also strive to preserve its most productive soils, even if they are not currently being farmed, for some future time when local farming may once again become economically important or necessary.

The town should inventory its most important agricultural lands by completing a Land Evaluation and Site Assessment (LESA) which measures the agricultural potential of a parcel of land.

As in the case of forests, a number of techniques are available to help towns preserve agricultural lands. Zoning regulations that permit only compatible types and densities of development and "clustering" provisions that allow subdivisions to be concentrated on one section of a parcel while the best agricultural soils are left undeveloped are effective regulatory measures. Vermont's current use program provides property tax relief to agricultural landowners as well as to forest landowners.

4.5 Wildlife Habitat

The importance of Sandgate's waters, forests, and fields to populations of fish and wildlife have already been noted. Particular mention should be made of the Green River as an important fishery and of the numerous winter deer ranges (Figure 4.4) that provide crucial shelter and browse for deer during the winter months. The Vermont Department of Fish and Wildlife has determined that important seasonal black bear habitat exists east of the Green River in Sandgate. Many other wildlife species, both game and nongame animals, thrive in the town and contribute to the rural character and quality of life that residents enjoy.

The most important factor in maintaining viable populations of these animals is the protection of their habitats. Information on the nature and location of important habitats should be maintained and should be readily accessible to the public. The presence of such areas should be considered when determining the appropriateness of public land ownership. Development and logging activities should be planned so as to avoid damage to deer yards, aquatic environments, and other important wildlife habitats. Specific measures that can be taken to minimize adverse impacts on wildlife include: the maintenance or provision of natural buffers between developed areas and wildlife habitat, the maintenance of vegetated corridors along streams, shorelines, and between similar but separate habitat areas, and utilization of construction practices that minimize environmental disturbances.

4.6 Air Quality

The quality of the air in Sandgate is generally excellent, and efforts should be made to ensure that it remains clear and clean. There are a number of things that could impact air quality in the area. The increasing cost of disposing of solid waste may have the undesired effect of encouraging the burning of refuse, an activity that can produce unpleasant local air pollution. Such "backyard burning" is, in fact, illegal under state law and should be discouraged. Although Sandgate is not home to any industrial facilities that pollute the air, airborne contaminants emanating from distant sources can affect air quality locally. Sulfur dioxide emissions from coal-burning power plants and resulting air quality degradation and acid deposition in downwind mountainous areas is one well documented example of such a situation that could pose a very real threat to Sandgate. The town should work with the Bennington County Regional Commission and other interested parties to present air quality concerns at state and interstate environmental reviews.

4.7 Earth Resources

There have never been extensive earth resource extraction activities in Sandgate. There are, however, a number of small sand and gravel deposits that provide materials for construction projects in the area. These deposits are important and should remain available for use in years to come. The town should identify important deposits and ensure that new developments do not render these resources inaccessible.

Consideration must also be given to the fact that extraction operations can be damaging to the environment if carried out improperly. Extraction methods must consider both immediate environmental concerns and the use of the site after completion of the sand and gravel mining. The zoning bylaws contain special regulations designed to minimize the environmental impacts of earth products removal, and to assure restoration of sites once work is completed. These regulations should be strictly enforced.

4.8 Policies and Recommendations

1. Growth should be directed to areas where physical conditions are most capable of supporting such development. Growth should be restricted in areas of high elevation, steep slopes, or poor soils where environmental damage is likely to occur as a result of development. Special attention must be given to the need to prevent soil erosion, contamination of surface and ground water, and damage to natural ecological communities.
2. The town should use soil data and other geographic information in land use planning; effective use of such information can be facilitated through the use of automated geographic information system technology.
3. The natural characteristics and values of Sandgate's streams, ponds, and wetlands should be preserved. The municipal zoning bylaws regulate uses within designated buffer areas adjacent to these resources.
4. The municipal subdivision and health ordinances, and the regulations of the Vermont Agency of Natural Resources, must be strictly enforced to protect individual water supplies. The town may want to evaluate potential sources for a possible small public water supply system at some future time.
5. An effort should be made to ensure continued public access to streams, forests, trails, and other important natural resources and recreation areas.
6. Developments in important forest, agricultural, or wildlife habitat areas should be planned so as to preserve those resources.
7. The town should pursue and support policies and programs that discourage the fragmentation of important forest areas.
8. Silvicultural practices should promote growth of high quality timber stands and the establishment or protection of important wildlife habitat. Such practices should also minimize soil erosion and impacts on roads, streams, and the natural appearance of mountain and ridge tops.
9. The Board of Selectmen must carefully consider each proposal for transfers of land from private ownership to the United States Forest Service.
10. The town should make use of a FLESA program and the BCRC's Taconic Range forest study and resource inventory to aid in long-range forest planning and decision-making regarding Forest Service land ownership.
11. A land evaluation and site assessment should be completed to serve as an inventory of Sandgate's agricultural lands.
12. The town should remain aware of potential threats to local air quality, and work with appropriate organizations to ensure that Sandgate's air remains clear and clean.

13. Important sand and gravel resources should remain available for economic extraction and use. Local regulations designed to ensure that extraction operations are environmentally sound and that sites are properly restored should be strictly enforced.