

HINESBURG GREENSPACE PLAN

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1. OVERVIEW

INTRODUCTION

Greenspace in the form of forested hills, tree-lined roads, rolling farmlands, lakes and streams defines the rural character that makes Hinesburg such a special place to its residents. Greenspace includes all the elements of the town's landscape, both land and water, that are valued for their natural resources, ecosystem services, agricultural or forest production, recreational opportunities, scenic views, and other public benefits.

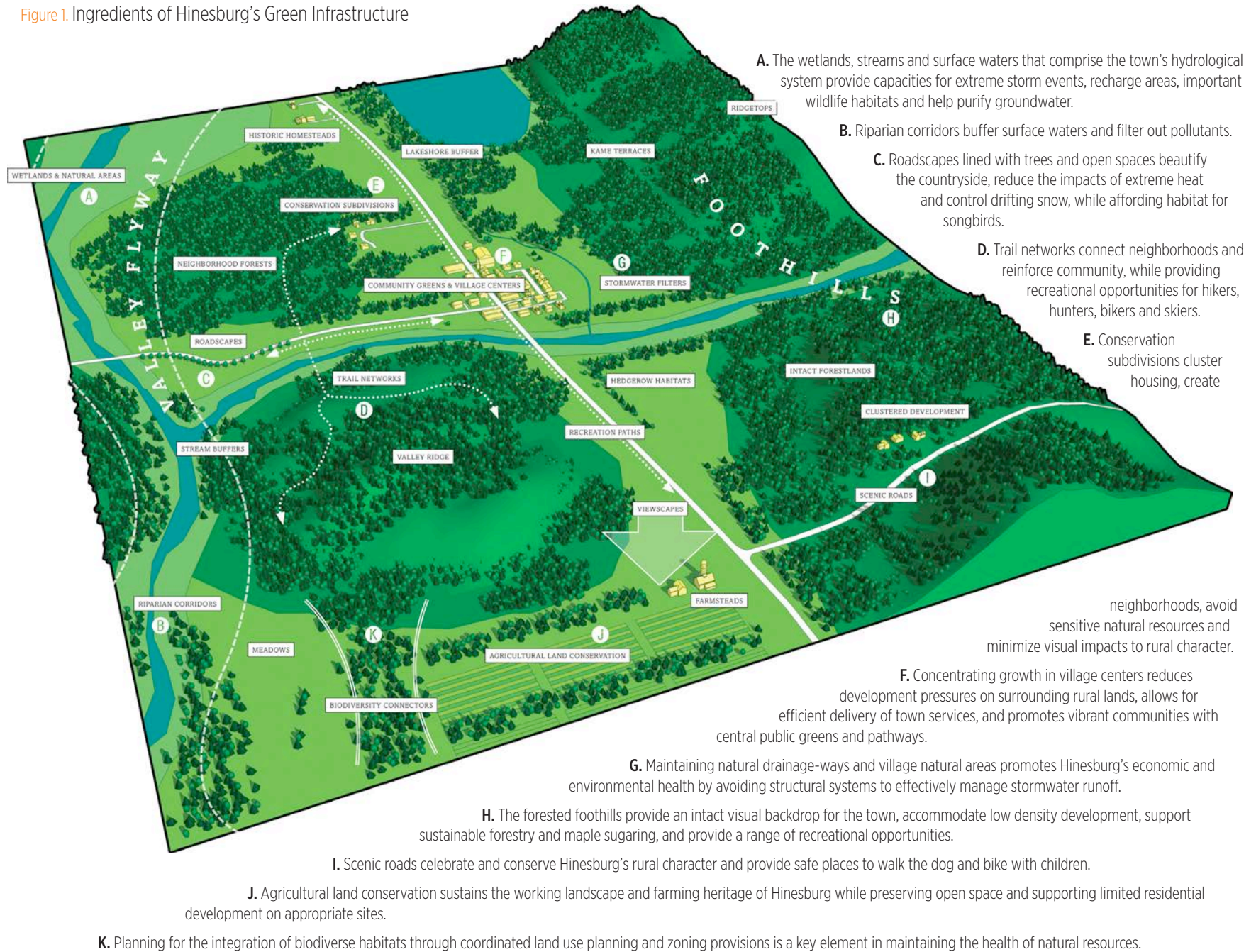
Hinesburg's greenspace is also "green infrastructure" that provide services and benefits that are as critical to the town as those provided by transportation, communication, and water and sewer infrastructure including:

- ✿ **Public Health and Safety.** Greenspace protects people and property from natural hazards like flooding, water supply contamination and property loss.
- ✿ **Natural Resource Protection.** Greenspace provides the habitat needed to sustain plant and animal communities.
- ✿ **Working Lands.** Greenspace includes working farm and forest lands that provide natural resource based commodities and support the rural economy.
- ✿ **Outdoor Recreation.** Greenspace provides places for people to engage in all types of active and passive outdoor recreation, which is an essential component of the rural lifestyle enjoyed by many town residents.
- ✿ **Community Character.** Greenspace contributes to our town's sense of place and rural character, which is composed of features like scenic views, special places, and historic and cultural landscapes.

Hinesburg residents have long supported maintaining and protecting the town's rural character. They have recognized that planning for and managing greenspace is essential for sustaining the future environmental and economic health of the town and the quality of life it affords. The benefits of implementing this Greenspace Plan include:

1. **Maintaining Hinesburg's Rural Character.** Greenspace preservation is necessary to maintain and enhance the rural small town character and environment of Hinesburg.
2. **Improving Water Quality and Supply.** Healthy watersheds help to control pollution from stormwater runoff, lessen flood hazards, protect drinking water, and provide critical habitat for fish and wildlife.
3. **Preserving Wildlife Habitat.** The protection of aquatic and other wildlife habitat helps to maintain biodiversity and the overall health of the local ecosystem.
4. **Reducing Public Costs.** The tax returns to the town from greenspace is generally greater than the service and facility outlays they require.
5. **Supporting Healthy Lifestyles.** Properly managed greenspace offers residents a wide variety of recreational opportunities.
6. **Supporting the Local Economy.** Agriculture and forestry are important economic enterprises in Hinesburg and support a variety of the town's other businesses.
7. **Reducing Greenhouse Gas Emissions.** Forests and wetlands "sequester" carbon, which helps mitigate global climate change.

Figure 1. Ingredients of Hinesburg's Green Infrastructure



The Conservation Commission envisions that this Greenspace Plan will be used to:

- ✿ Identify valued natural resources deserving protection.
- ✿ Educate the public about the benefits derived from and threats posed to its natural resources.
- ✿ Recommend voluntary and regulatory measures based on current scientific knowledge that will help protect the town's rural character and its valued resources.
- ✿ Encourage stewardship activities and best management practices.

PLANNING EFFORTS

Before the Town Plan was amended in 2005, the Planning Commission solicited public input through a town-wide survey and at a series of forums. The results of that survey revealed that the residents of Hinesburg value the rural areas and scenic beauty of Hinesburg, as well as access to areas that provide opportunities for recreation. The top recommendations from the forums included:

- ✿ Consider planning for biodiversity and ecological integrity.
- ✿ Encourage resource "connectivity" for forestry, agriculture, and wildlife.
- ✿ Work with the Vermont and Hinesburg Land Trusts to encourage voluntary protection of agricultural and forest land, including conservation easements.
- ✿ Maintain open space areas to preserve existing natural features and the village "edge."
- ✿ Maintain water quality along waterways by using setbacks, vegetated buffer strips, and good management practices.

Given those results, the Conservation Commission began work on this Greenspace Plan. The Conservation Commission held a public workshop on October 8, 2007 to both introduce the goals and purpose of the plan, and to seek preliminary citizen input to identify those areas inherently valued as important elements of the town's rural character.

About 40 citizens plus guests from local universities and adjacent towns participated in this kick-off event. The results reinforced the need and desire of Hinesburg's citizens to protect their town's natural and scenic resources for future generations.

The Conservation Commission sent out a follow-up survey in January 2008. The purpose of the survey was to seek input on publicly valued lands and prioritize the natural resources deserving protection or management. The survey proved to be an effective tool in gauging public sentiment on several issues related to this effort and demonstrated support for the Conservation Commission's planning efforts.

Public input on the development of priorities for natural resource protection in Hinesburg is critical to the success of the implementation of this plan. The Conservation Commission will facilitate continued dialogue on how best to protect and enhance the town's natural resources even as the town continues to grow and develop. It must be emphasized that the goals expressed in this Greenspace Plan can be realized only through the cooperative efforts of town government and landowners to responsibly guide and balance land development and conservation activities.

The Conservation Commission views this document as an evolving and dynamic plan that will need to be reviewed and amended over time as additional public input, natural resource data, and updated management tools become available.

2. STRATEGY

This chapter recommends regulatory and non-regulatory measures to help protect Hinesburg's rural character and natural resources.



TOP 10 PRIORITIES

Of the many recommendations made in this chapter, the Hinesburg Conservation Commission has identified the following “Top 10” priorities for implementing this Greenspace Plan:

1. **Protecting High Elevations.** Develop performance standards and limit development on ridgelines and hillsides above certain elevations.
2. **Protecting Hillsides and Ridgelines.** Mandate stormwater management and develop building standards for development on hillsides and ridgelines to avoid impacts and blend new structures into the surrounding environment.
3. **Protecting Groundwater Supplies.** Regulate septic systems, stormwater systems, and storage tanks to protect the groundwater supplying private and municipal wells.
4. **Protecting Surface Water Quality.** Develop and implement improved stormwater strategies that include conservation and low impact development (LID) to protect water quality.
5. **Lowering Density in Core Forest Areas.** Reduce allowed development density in identified core forest areas to minimize further parcelization and forest fragmentation.
6. **Educating Youth.** Work with local schools to make agriculture, forest ecosystems and management, the benefits of active use farm and forest land, and the development of a land stewardship ethic a regular part of the K-12 curriculum.
7. **Encouraging Land Conservation.** Conserve significant ecological resources through voluntary means, such as public land acquisitions and easements, whenever possible.
8. **Mapping and Protecting Vernal Pools.** Locate vernal pools, add them to town resource inventory base maps, and revise zoning regulations to require identification and protection of vernal pools.
9. **Encouraging Sustainable Farming.** Maintain and increase land in sustainable farming use in Hinesburg by connecting existing farmers with potential new farmers, encouraging the permanent protection of farm lands, promoting economic development opportunities for working landscapes, etc.
10. **Expanding the Town Trail Network.** Develop a trail corridor acquisition policy that continues to identify critical areas for trail connections and a fund to facilitate the acquisition of easements over private lands as sections of the trail network are proposed or established by the town through regulatory means.

OBJECTIVES AND RECOMMENDATIONS

The objectives and recommendations below are intended to direct and shape Hinesburg's greenspace planning and conservation efforts.



SLOPE AND ELEVATION

1. Identify those ridgelines and hillsides that are significant to the community, and for what reason(s).
 - a. Continue to refine the designation and delineation of Critical or Sensitive Landscapes as potential lands for conservation easements, outright purchase, overlay districts, or as written community standards for inclusion in the Town Plan or as adopted in this Greenspace Plan so as to provide standing in Act 250 and Section 248 proceedings.
 - b. Formally designate Scenic Roads and other important Public Vantage Points and develop corresponding review criteria within zoning to provide parameters for development impacting significant public vistas.
2. Explore and develop the various methods to limit development on, and to minimize the deterioration of, these hillsides and ridgelines; while allowing for future growth that does not unduly impact the health, well-being and rural character of the community.
 - a. Revise the zoning regulations to mandate stormwater control on all development sites, not just via the subdivision process.
 - b. Conduct educational initiatives, such as workshops, and develop "Landowner Tools" (as in "Planning for Conservation" posters and booklets). Consider planning education and design opportunities for local students in grades 6 through 12.
 - c. Consider partnering with a trust, non-profit or development entity to promote demonstration projects to illustrate how development can occur without impacting these sensitive landscapes and resources.
 - d. Develop performance standards and zoning restrictions for scenic areas and sensitive landscapes, to include ridgelines and hillsides of greater than certain specified elevations. Research the issue of appropriate slopes for development (the current benchmark of 20% is steeper than many towns allow). Erosion impacts increase exponentially with an increase in slope. A 40-foot wide level space on a 15% slope requires 16 feet of "toe" to meet the slope while the same area on a 20% slope requires 25 feet, around 50% more disturbed surface.
 - e. Ensure protection of these critical resources and scenic assets via innovative regulatory options and explore incentives for same.
 - f. Develop site plan review criteria to address these visually sensitive landscapes with specific aesthetic criteria.
 - g. Explore some form of transfer of development rights to slow growth in these areas.
 - h. Adopt building standards for new structures so that they will, as much as possible, visually blend into the surrounding environment. Such standards could include limitations on building heights, nature and color of exterior materials, use of non-reflective window glass, limitations on exterior lighting, etc.



WATER

3. Protect groundwater quality and quantity in private and municipal wells.

- a. Coordinate with the state on: wellhead protection; private water supply protection; septic system regulations; health (non-regulated wastewater) regulations; recharge protection; and local stormwater regulations.
- b. Coordinate with the Vermont League of Cities and Towns and other municipalities for assistance in adopting model regulations.
- c. Develop a voluntary water recharge program utilizing rain barrels and water gardens.
- d. Identify and monitor salt storage sites, and review snow-dump sites.

4. Assess and monitor groundwater supply.

- a. Work with the State to create and maintain a groundwater GIS-supported database that includes: an inventory of wells/aquifers; an inventory of recharge areas; and an inventory of municipal underground storage tanks.

5. Provide support and outreach concerning groundwater, water conservation, and rules governing well users.

- a. Encourage groundwater monitoring for contaminants.

- b. Promote agricultural best management practice efforts.
- c. Develop a homeowner information packet to support well testing and drinking-water quality awareness.
- d. Investigate the impact of water softening salts on groundwater.
- e. Broaden outreach on wells, water laws, and water issues.
- f. Promote water conservation – recycling and reuse.

6. Protect surface water quality.

- a. Adopt land use and management strategies to minimize non-point source pollution.
- b. Promote the “Blue Certification Program” that helps people bring their home property to “watershed friendly” status.
- c. Work with the state and the Vermont League of Cities and Towns to develop and implement improved stormwater strategies that include conservation and low impact development (LID) stormwater management practices..
- d. Promote conservation of riparian corridors through River Corridor mapping and require protection through ordinances.
- e. Encourage landowners and developers to implement best management and conservation practices through incentive programs.
- f. Work with state officials to develop a performance-based approach to manage wastewater within the Shoreline District of Lake Iroquois
- g. Work with state, non-governmental organizations, and neighborhood associations to facilitate efforts to control the introduction, spread, and impact of non-native invasive species.

7. Assess and monitor surface water quality.

- a. Conduct comprehensive assessments of surface water quality in Lake Iroquois, Sunset Lake and the LaPlatte River.
- b. Work with state, non-governmental organizations, and neighborhood associations to facilitate compilation of available surface water

assessments and monitoring data. Make this information readily accessible to the public.

- c. Provide and encourage routine surface water quality monitoring.
- d. Identify specific watershed, shoreline, and riparian management strategies, actions, and projects for implementation.

8. Provide support and outreach about surface water bodies, and the rules governing them.

- a. Develop and/or support educational programs that engage the public through outreach and public meetings to foster improved understanding of the importance of surface water quality.
- b. Encourage landowners and developers to implement management and conservation development practices through incentive programs.



FOREST

9. Maintain and enhance the health and function of existing core forest areas and the connections between them, important forest natural communities, forest features, and native tree species.

- a. Reduce allowed development density in identified core forest areas to minimize further parcelization and forest fragmentation, with a focus on keeping the largest parcels intact. Consider the creation of a Forest

Conservation District in the eastern part of town where the largest blocks of core forest exist.

- b. Incorporate criteria into rural zoning standards, for all new development, that seek to protect important forest natural communities, forest features, and native trees, as described in this section, that may be impacted by such development.
- c. Explore additional and more inclusive tax abatement measures and other methods to mitigate property tax burdens, especially for landowners with large forest tracts (100+ acres) or lands with important forest natural communities, forest features, or stands of native trees.
- d. Concentrate any additional development in core forest areas along existing roads, avoiding cutting new roads into core areas and protecting known wildlife corridors.
- e. Identify, map, protect, and monitor other active wildlife corridors that connect core forest areas and other forest patches. Restrict subdivision in these corridors to maintain their function.
- f. Hire a consultant to assess the condition of the identified core forest areas. Prioritize the conservation of properties in these core areas based on condition, parcel size, and proximity to other conserved lands.
- g. Work with state and regional partners to create a plan for dealing with invasive species.
- h. Encourage landowners to contact the Chittenden County Forester to learn about how to create a management plan for their forest, and about programs that can give them financial and technical assistance.
- i. Participate in Act 250 review to ensure that projects affecting important forests receive local consideration.

10. Promote the sustainable use of Hinesburg's forests, particularly in support of a local forest-based economy, recreation, and education.

- a. Encourage forest landowners to consult with the Chittenden County Forester and connect them with programs and a forester if they do not already have one.
- b. Encourage broader participation in the Current Use Program as well as the Stewardship Program, Forest Legacy Program, Vermont Urban and Community Forestry Program and others.
- c. Target support toward large forest landowners who still have the option of earning significant income from their forests.
- d. Help landowners with long-range and estate planning.
- e. Help match aspiring foresters with interested landowners.
- f. Foster and encourage support and communication networks among small, neighboring forestland owners who together own larger tracks of unfragmented forest or smaller connected patches. Explore innovative opportunities for landowners to coordinate their forest management plans and activities, especially those that might not be economically viable if each landowner was working alone.
- g. Work with state and regional partners to create an annual Forest Symposium for forest landowners and interested Hinesburg residents that provides educational opportunities and access to technical assistance.

11. Foster a forest stewardship ethic among Hinesburg's residents.

- a. Work to provide all Hinesburg residents with regular opportunities to enjoy, learn about, and care for Hinesburg's forests.
- b. Conduct projects and community gatherings in forests on town land.
- c. Use Town Forests as demonstration sites to model sustainable forest management practices for forest managers, landowners and residents.
- d. Promote educational opportunities for schoolchildren that include central themes of forest ecosystems, a land stewardship ethic, and

the benefits of active and careful forest management and timber harvesting. Use Hinesburg's forests as outdoor classrooms.

- e. Support the Youth Conservation Corps and related programs that offer alternative natural resource management training and education.

12. Maintain connections between Hinesburg's forests and those in neighboring towns.

- a. Identify, map and protect connections between Hinesburg's forests and those in neighboring towns.
- b. Partner with the state, Chittenden and Addison County Regional Planning Commissions, and neighboring towns to develop and implement a regional forest conservation plan.
- c. Encourage private landowners whose land is part of the same core forest area to work together across town lines to coordinate their forest management goals and strategies, such as in the model that is being tried on Sherman Hollow Road. Make landowners aware of potential partner organizations (Hinesburg Land Trust, County Foresters, Vermont Land Trust, etc.).

13. Identify and conserve significant forest communities throughout Hinesburg.

- a. Hire a consultant to work with the town and private landowners to inventory and map the natural communities in town, including significant natural communities, degraded, but potentially significant natural communities, and known or likely locations of rare, threatened and endangered species.
- b. Approach forest landowners with known significant natural communities about enrolling their land in the Current Use Program to reduce property holding costs.
- c. Work with landowners to conserve private lands that contain significant natural communities and/or known rare, threatened, or endangered species.



WILDLIFE

14. Maintain wildlife populations and ecological resources of the Town through responsible and informed growth.
 - a. Revise subdivision regulations to require applicants to identify all wetlands, including vernal pools, and the required buffer areas on the property if they will be impacted by the proposed development.
 - b. Maintain a wooded corridor at least 100 feet wide along the edges of wetlands and along each side of a stream (measured perpendicular from the top of the bank) to protect the health and function of wetlands (including both Class 2 and Class 3 wetlands), streams, rivers, riparian areas and other aquatic habitats. The wooded strip will serve to enhance the health of the stream/river/wetland and as a travel corridor for animals moving from one area to another.
 - c. Protect large, unbroken forest stands (50+ acres) wherever possible.
 - d. Locate vernal pools and add them to town resource inventory base maps. It is important that woodlands surrounding vernal pools be protected to a distance of 500 feet.
 - e. Work with the Vermont Department of Fish and Wildlife to identify deer wintering areas and identify which of those currently mapped are still significant. Minimize development impact on these areas.
 - f. Encourage scheduling the harvesting of grasslands, including those in active hay or alfalfa production, until after mid-July to avoid interfering

with nesting bird populations. Balance agricultural and wildlife needs by focusing efforts on fields with low agricultural productivity and/or quality.

- g. Identify and protect wildlife corridors that connect larger habitat blocks, especially those that allow animals to cross paved roads.
- h. Resist paving dirt roads. Paved roads will have higher traffic levels and higher traffic speeds than dirt roads, which makes road crossing more dangerous for wildlife.
- i. Along important riparian areas, install culverts that comply with *Guidelines for the Design of Stream/Road Crossings for Passage of Aquatic Organisms in Vermont*.

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15. Promote an appreciation among Hinesburg residents for the importance of sustaining our natural environment and its inhabitants.

- a. Support education and recreation in Hinesburg related to enjoying, learning about, caring for, and connecting with local wildlife.
- b. Prioritize wildlife habitats for protection, based on a number of factors including the site conditions, significance, location, and sensitivity.

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16. Conserve our significant ecological resources, whenever possible, through voluntary means, such as public land acquisitions and easements.

- a. Encourage protection of localized habitat features, such as vernal pools and mast stands, critical for the survival of some species.
- b. Prioritize the conservation of large patches of contiguous forest.
- c. Strongly discourage development in key linkage areas.
- d. Maintain and/or increase populations of rare, threatened, and endangered species.
- e. Protect and/or enhance the condition of significant natural communities.
- f. Encourage continued participation in the Current Use Program to protect forested habitats.



AGRICULTURE

17. Maintain and increase land in sustainable farming use in Hinesburg.

- a. Encourage the permanent protection of existing farms and viable tracts of former farmland with good soils, especially those near active farms or conserved lands, by assisting in the acquisition of conservation easements, development rights, or other means to compensate farmers for the development value of their land.
- b. Encourage implementation of area-based zoning in rural districts with significantly reduced densities to better protect farmland from fragmentation and parcelization.
- c. Provide adequate buffer zones between farmland and new developments to avoid future conflicts over the noise and odors sometimes associated with farming activities.
- d. Inventory and create a map of existing, active (and recently active) farms, productivity of agricultural soils, and parcel size. Rank conservation priority based on these three factors, as well as proximity to other active farms and conserved lands.
- e. Talk with active farming families about future plans for their land. Offer support with estate, retirement, and transfer by connecting them with appropriate services, such as the UVM Cooperative Extension program or Hinesburg Land Trust.

- f. Help connect farm families with potential new farmers if no one in the family is planning to take over.
- g. Continue to support and encourage of the state's Current Use Program (the continued valuation of farmland based on the value of its use for farming, rather than on its fair market value).
- h. Consider adding other incentives to the town's Tax Stabilization "piggy back" contracts, beyond the 50% discount already offered on the state's Current Use assessment, by reducing the minimum qualifying acreage, simplifying and reducing income requirements, and otherwise encouraging more landowners involved in agricultural activities to participate in the program.
- i. Collaborate with other towns to help foster and support economic development for the working landscape and a regional network of local, sustainable farms.
- j. Actively participate in state proceedings to ensure that important agricultural resources are protected. Work with the Agency of Natural Resources to ensure that local resource protection regulations complement state permitting requirements (i.e., Act 250 review), as well as the Lake Champlain Basin Program and the state "Clean and Clear" initiatives and standards.
- k. Consider the establishment of a land evaluation system, such as the Agricultural Land Evaluation and Site Assessment (LESA) program developed by the NRCS, which quantifies the merits of retaining in agricultural use parcels proposed for conversion to more intensive, urban purposes.

18. Promote appreciation and understanding between Hinesburg residents and farmers.

- a. Maintain a guide of local Hinesburg agricultural products, including a map of active farms, and use it to educate and encourage residents to buy directly from local farms. For example, the Buy Local group has done a Buy Local guide, and the Lions Club a "Taste of Hinesburg" slide show showing local farms and producers.

- b. Support the farmers' market and CSAs.
- c. Support the fall Harvest Festival and community harvest dinner/celebration serving foods made with ingredients from local farms. Use as a way to celebrate and support local farms and educate residents about agriculture in Hinesburg
- d. Coordinate a "Farm Open House", modeled after the statewide Sugarmakers' Open House.
- e. Work with local schools and farms to make learning about the history, economics, and science of agriculture in Hinesburg a regular part of the K-12 curriculum.
- f. Enact a right-to-small farm ordinance, which would require that purchasers of residences in the Agricultural or Rural Districts be notified, at the time of sale, about the potential noises, odors, etc., customarily associated with small-scale agriculture, and that they must accept such conditions as a natural part of living in a rural community. This might be in the form of a disclosure, which says there may be noise, odors, and other customary occurrences with agricultural operations.

19. Encourage farming practices that protect wildlife habitat, water quality, and soil productivity.

- a. Promote delayed mowing in hay fields (especially fields with low or marginal quality/production) and other practices to protect nesting, grassland birds.
- b. Connect farmers with state and non-profit wildlife conservation and education organizations that can offer technical and financial assistance for protecting the ecological values of their land.
- c. Encourage stream restoration and planting of riparian buffers on farms.
- d. Monitor the use of Best Management Practices, as promoted by the Vermont Agency of Agriculture, to preserve and enhance our water quality.



RECREATION

20. Monitor the impacts that the various recreational activities have on the natural attributes of greenspaces.

- a. Create and maintain management plans that address permitted recreational activities for current public lands and those acquired in the future as well as for private lands where public easements are acquired.
- b. Support the efforts of the Lake Iroquois Association, Lewis Creek and LaPlatte watershed organizations, Audubon Society, etc. to limit and control the impact of invasive species.
- c. Work to establish guidelines and or regulations that address the impacts of motorized recreation on private and public lands and waters

21. Establish a town trail corridor acquisition policy and fund.

- a. Develop a trail corridor acquisition policy and fund to further the goals set forth in this plan. The policy should include preserving important existing or potential corridors, whenever and wherever they may be impacted by proposed developments.
- b. Use funds, where applicable, to acquire easements over private lands as sections of the trail network are proposed or established by the town.

- c. Continue to identify critical areas for trail connections and, where possible, incorporate them into the Hinesburg Trail Committee's planning map.

22. Establish a trail classification system.

- a. Grant the Hinesburg Trail Committee authority to determine the appropriate non-motorized uses for each trail that is created in order to avoid "road blocks". "Road blocks" are created when different sections of trails only allow certain types of use, without consideration given to what types of uses are allowed by adjoining trails. For example, if a trail is open to mountain bike use on either end, bike access should not be restricted in the middle.
- b. Consider a three-level trail use classification as described below. Trails would be classified at Level 2 or 3 only after the trail is inspected and the Hinesburg Trail Committee determines that it is appropriate for, and would not be damaged by, these other uses.

Level 1. Foot traffic only (includes walking, running, cross-country skiing, and snowshoeing).

Level 2. Foot traffic plus mountain biking.

Level 3. Foot traffic, mountain biking plus horseback riding.

23. Maintain the town trail system.

- a. Develop maps of trails on public lands or private lands with public easements and make them available to the public.
- b. Develop and implement trail management plans.



SCENIC VIEWS

- 24. Explore and analyze aesthetic and scenic/cultural resources in order to understand the nature of the resources and the extent to which the community wishes to protect them.
 - a. Further discussion and analyses of the review and management of growth and development in identified scenic or visually sensitive areas to include ridgelines, highly sensitive landscapes (including highly visible locations and areas with steep slopes over 15%), wetlands, farmland, historic structures, etc.
 - b. Consider partnering with a trust, non-profit, or development entity to promote demonstration projects to illustrate how development can impact sensitive landscapes and resources and how to avoid or minimize such impact.
- 25. Identify and inventory such resources and establish methods by which the community can protect those resources.
 - a. Develop development review standards for scenic areas and sensitive landscapes to include scenic roads, shorelines, ridgelines, and agricultural open spaces.
 - b. Adopt night sky and 'farm-friendly' noise ordinances.
 - c. Adopt a town-wide "Green Infrastructure" Map as an official map, which integrates and connects trail networks, important habitats and

ecologically diverse areas, open spaces, hydrological systems and sensitive landscapes.

- d. Conduct an inventory of old and historic buildings and other structures, including homes, farm buildings, stone walls, cemeteries, bridges, mills, etc.



IMPLEMENTATION

The critical part of any greenspace plan is how the plan translates into action. This section outlines a range of actions and initiatives that can help ensure Hinesburg continues to cultivate a sustainable quality of life and environment for future generations. These actions and initiatives take the form of:

1. **Regulatory Options.** These can be implemented through town planning and zoning measures.
2. **Non-regulatory Options.** These can include land conservation and the purchase of open space.
3. **Landowner Options.** Steps that landowners can undertake to promote conservation and natural resource protection.

There are a variety of tools and techniques to maintain or enhance Hinesburg's greenspace. Like many other complex land use problems, it is unlikely that only one technique will adequately protect environmental resources or meet the needs of the community. Rather, a combination of techniques should be carefully evaluated and implemented to meet the environmental and political needs of Hinesburg.



REGULATORY OPTIONS

2013 CHANGES TO RURAL ZONING

The 2005 Town Plan set the long-recognized need for improved regulatory options to ensure that development would protect rural character as a top priority. At the same time that it directed the Conservation Commission to develop this Greenspace Plan, it directed the Planning Commission to develop revised zoning for the rural areas of town.

The Planning Commission undertook a multi-year project to explore options that included various types of area-based zoning, overlay zoning districts and transfer of development rights. The options were evaluated with the goals of simplifying and streamlining the permitting process, ensuring that all landowners would be treated equally, and making the regulations more objective, precise and consistent in the determination of the appropriate density and siting of residential development. The Planning Commission held public forums and meetings, and discussed and revised the rural zoning proposal.

Ultimately, the town adopted revised regulations in 2013 following votes in favor of the proposal by the Selectboard and town voters. The key elements of the 2013 zoning changes were:

- ✿ **Expanded Uses.** Various farm/forest based operations that were not previously allowed in rural zoning districts were allowed such as agritourism, diversified agriculture or event hosting.
- ✿ **Improved Design Standards.** The new regulations included more specific standards to guide the siting of development in a manner that limits impact on important natural or cultural resource areas. There are more and better maps and definitions, which clarify and expedite the permitting process. The regulations more clearly state what resource areas must be considered and identify where they are located.
- ✿ **New Density Standards.** Under the 2013 regulations, density (the number of homes that can be developed) is clearly established based on the type of road that provides access to a property. Parcels smaller than 12 acres cannot be further subdivided. New residential lots may be as small as ½ acre in size, which allows more than to remain in larger tracts and set aside as greenspace or working lands.

While the Conservation Commission worked closely with the Planning Commission on the effort to revise the rural zoning regulations, not all the provisions the Conservation Commission recommended were included in the adopted regulations. The Conservation Commission continues to advocate for the following revisions and refinements of the 2013 zoning regulations:

- ✿ **Unbuildable Land.** At one time, the zoning proposed to base density on the amount of buildable land rather than total acreage. The Conservation Commission recommends reinstating that provision, which was not part of the adopted zoning regulations. This would mean that the density on a 20-acre parcel with 5 acres of unbuildable land such as wetlands, would be based on the 15

buildable acres rather than the entire 20 acres. Such a provision would recognize that not all land is equally well-suited for development and set the allowed density accordingly.

- ✿ **Density Reduction.** The average density in the rural districts today is approximately 1 house per 30 acres. The 2013 zoning allows that to be increased to between 1 house per 10 acres to 1 house per 15 acres, depending on the type of road access. The Conservation Commission recommends lowering those densities to between 1 house per 12 acres and 1 house per 20 acres, depending on the type of access. It should be recognized that density can always be increased at a later date, but once Hinesburg loses its rural character, that can never be restored.
- ✿ **Ridgelines and Hilltops.** Highly visible ridgelines and hilltops should be listed as a secondary resource in the rural regulations. Under the 2013 zoning, the impact of development on secondary resources must be considered and limited to the extent practical. Ridgelines and hilltops not only have aesthetic value, but as demonstrated in this plan, development in these areas is directly linked to water quality and flooding issues downslope. The effort to identify these resources was initiated as part of this greenspace plan. That data is available for use and could be expanded upon as discussed in this plan.

PLANNED UNIT DEVELOPMENTS

Greater use of planned unit developments (PUDs) in the agricultural and rural districts should be encouraged. PUDs offer a flexible design approach that focuses development within a parcel of land to the most appropriate areas in order to preserve areas of ecological significance and community character. The portion of the parcel that is not developed is restricted by a

conservation easement or used for common space and generally owned by the developer or the homeowners association.

Planning for conservation involves the creative management and preservation of important natural and cultural resources through efficient and careful use. By carefully placing home sites, the town can protect streams and water quality, provide continuous habitat for plants and animals, preserve agricultural lands and rural atmosphere, provide access to nature and recreational areas, protect home values, and reduce costs of municipal services. This helps to ensure that large areas of important resources, such as farmland, forestland, and scenic views, are maintained.

The town should continue to include, and improve upon, specific development standards in its subdivision regulations that address resource-specific concerns, such as protecting wildlife habitat, steep slopes, and visual corridors. Restrictions may require modifying the location and size of the development areas; protecting part of the land through conservation easements and/or clustering; limiting the removal of trees, especially along scenic roads; providing setbacks, buffers, and screening; and limiting road widths or requiring recreational paths and shared access.

SUBDIVISION REGULATIONS

Subdivision regulations, currently in effect in Hinesburg, control the division of land and ensure that design of lots, new roadways and utilities will be laid out in an efficient and safe manner. These regulations also enhance the “livability” of neighborhoods by providing for walking paths, retention of existing vegetation, street trees, vegetated cul-de-sac turnarounds, common spaces within a subdivision, and appropriately-sized roadways that are pedestrian-friendly and well integrated with existing

topography. Subdivision regulations can also ensure that public improvements are available when it is time to build on the lots.

BUFFER ZONES

Zoning bylaws should impose specific, minimum setback distances or “buffers” from certain land uses to minimize potential impacts including:

- ✿ Riparian buffers
- ✿ Agricultural buffers
- ✿ Habitat connections

The term “buffer,” used in an ecological sense, refers to any strip of natural vegetation that interfaces an area in need of protection from developed areas. We commonly think of riparian buffers as strips of vegetation along streams or other bodies of water, but backyards, farms, and heavily managed forestland can all benefit from buffer strips as well. Riparian buffers protect water quality, but all buffers serve as wildlife habitat and in many cases as wildlife travel corridors.

Habitat fragmentation is one of the most pressing problems for wildlife today, and the presence of buffer strips or corridors that connect small pieces of suitable habitat may make it possible



for many species to hang on in man-dominated environments. Connectors that link several small patches of habitat enable animals that need larger home ranges, such as bobcats, to persist. Corridors that are wide enough can function as habitat for smaller species. Finally, a longer-term conservation benefit of buffer strips or travel corridors is that by allowing movement of animals from one area of suitable habitat to another they prevent genetic isolation of small populations.

The Conservation Commission recommends that buffer zones be required to mitigate impacts to important resources, as described below. At a bare minimum, a 50-foot buffer should be established for all new development adjacent to wetlands, streams, shoreland, wildlife corridors, and farmland/forestland; but different widths for different resources should be determined. It should be recognized that buffer strips need to come in many different widths – there is no one-size-fits-all formula. A larger buffer will be needed to obtain maximum benefit if:

- ✿ The riparian land is sloped and runoff is directed here.
- ✿ The land above is sloped (the steeper the slope, the wider a buffer should be).
- ✿ Land use is intensive (crops, construction, development).
- ✿ Soils are erodible.
- ✿ The land is floodplain.
- ✿ The stream naturally meanders.
- ✿ The land drains a large area.
- ✿ More privacy is desired.

A 100-foot buffer may be adequate between a new housing development and a farm field, but a 500-foot buffer may be required to protect salamanders around a vernal pool. One hundred feet might be an adequate minimum buffer width along

a stream, but the Vermont Fish and Wildlife Department requires 300-foot buffers around deer wintering areas. Figure 2 illustrates the ecological benefits and services associated with buffers of varying widths.

Riparian Buffers. Buffers along streams and other bodies of water serve a number of important functions related to water quality. From a physical standpoint a strip of native vegetation protects against erosion of the stream bank, thus stabilizing the bank and the streambed. Riparian buffers filter sediments and help to remove pollutants that would otherwise move from our highways, backyards, farms, etc. into streams, and in the case of trees, provides shade that keeps streams cooler. Bank stabilization, filtering, and shading are important for all streams, and in fact may be more important for small streams than large ones. Mowed lawn to the edge of a stream or pond maintains vegetative cover, but it does not provide the other filtering benefits of native vegetation implied in a real riparian buffer.

Wildlife benefited by riparian buffers fall into two distinct categories. Fish, turtles, amphibians, and aquatic insects all benefit from the improved water quality, streambed stability, and the cooler stream environment that comes from a buffer strip that protects the stream and its inhabitants from pollutants, silt, and direct sunlight. A human benefit that accrues from a well-buffered stream or river is that these are good fishing areas.

Birds and mammals also take advantage of riparian buffers and are conspicuous members of this community. Those that prey on fish, frogs, and salamanders, such as otters, mink, kingfishers, and herons, all benefit from higher prey populations. Others, such as warbling vireos and short-tailed weasels, select riparian woodlands as preferred habitat because of foraging opportunities found in moist forested sites. Many other birds and mammals simply take advantage of protective cover and use riparian buffers as corridors that link one part of their home

range with another or as avenues for dispersal of young animals. The list of candidate species here is very long, but includes white-tailed deer, black bears, bobcats, and fishers. Connectivity of habitat patches is especially important for animals with large home ranges.

Less conspicuous animals that also benefit from buffers include a number of amphibians, which breed or hibernate in the water, but spend the rest of their year in surrounding terrestrial habitat. Wood turtles wander as far as 500 feet from water in riparian woodlands. Spotted salamanders, wood frogs, and red efts (stage of eastern newt) all range at least 300 feet from wetlands. Roads, parking lots, playgrounds, broad open lawns, and clearcuts represent difficult barriers for these animals to cross. Loss of terrestrial woodlands or loss of access to these woodlands will cause these species to disappear as surely as if the wetlands themselves were destroyed.

Agricultural Buffers. Balancing the need to continue agricultural practices and the desire to develop land for non-agricultural purposes can be challenging. Open space buffers between active agricultural areas and other uses, such as residential

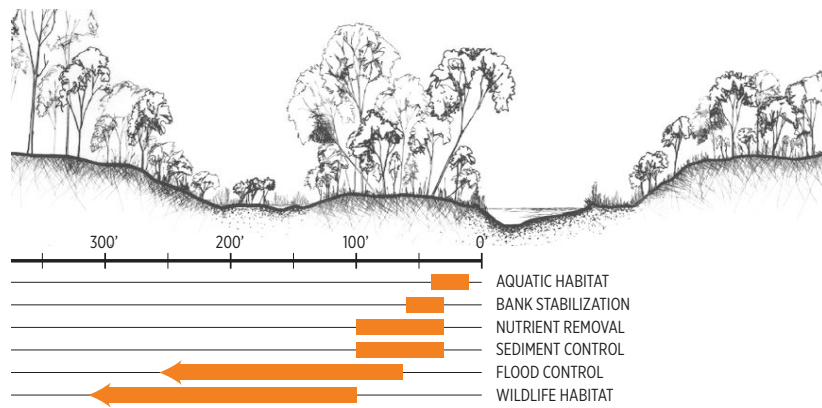
development, can help reduce land use conflicts, particularly where residential and agricultural conflicts are occurring with greater frequency. The use of buffers can aid in easing land use conflicts and improving the relationship of agricultural uses and new residents.

Buffers are generally imposed on residential developments, rather than on farming operations, principally because the farm was probably the first use in place. Buffers should be sufficiently wide to protect the farming operation from lawn fertilizers, playing children, and other conflicts.

Buffers are most effective if a “no-disturb” zone is provided between residential properties and farmland. This requirement should be tied to subdivision, site plan or conditional use review, or planned unit development approval. It should also be required that the buffer be described in the property deed to alert potential buyers of the need to honor the no disturb area. It should be noted that Hinesburg has incorporated agricultural buffers into its subdivision regulations.

Habitat Connections. Although riparian buffers get much of the attention on this topic, buffers are important in other areas as well such as uplands or ridgelines. Housing developments can be separated with buffer strips of native vegetation from other developments, roads, or farms. Farm fields may represent difficult barriers for small animals, but they can be crossed using buffer strips or hedgerows or even brushy fencerows that separate different farm fields. In all of these cases, buffers function as travel lanes or corridors, which are important in maintaining wildlife populations in areas with growing human populations. Buffers can also provide recreational opportunities such as hiking or equestrian trails.

Figure 2. Effect of Riparian Buffer Width on Benefits Provided



DEVELOPMENT REVIEW STANDARDS

Permitting standards should be established or, where appropriate, enhanced for natural, scenic, and cultural resources in addition to district-specific rules. Such standards can be imposed through conditional use review, site plan review, and/or through subdivision review.

A detailed plan showing existing and proposed site features and conformance with design standards would be submitted for review and possible modification in accordance with criteria set out in the bylaw. Site plan/design review assures that, in addition to health and safety issues, proposed structures and site work are well integrated into the context of the neighborhood and the unique characteristics of the site itself. This includes design that is sensitive to the landscape characteristics of the property (i.e. tree cutting and clearing restrictions) as well as site design and management (i.e. bio-retention options and designation of building envelopes).

Public spaces may be acquired as a part of site plan and subdivision approval. In addition, privately owned but protected (by conservation easements, etc.) greenspace areas or set-asides may be established as part of private subdivisions as they are approved during the subdivision review process. For open areas and forested areas that are to be retained as part of an approved subdivision plan by either a private landowner or, preferably, by a homeowners' association, a maintenance plan should be put in place to ensure that the land will be kept in a natural condition and stay available for agricultural, recreational, or forestry use. In its review of subdivisions, the Development Review Board should require land management plans that identify the entity that will carry out the plans and which may include simple annual reports to help ensure such plans are being implemented.

ADMINISTRATION AND ENFORCEMENT

The town should conduct vigorous on-site supervision during construction at all times, and particularly where sensitive terrain or scenic locales are involved. It should hold developers to their conditions of approval, when applicable, and require performance bonds and levy fines and penalties for violations.

TOWN PLAN

The Town Plan should reference this Greenspace Plan as a guiding element in policy and decision-making by both the Planning Commission and the Development Review Board. The Planning Commission and the Select Board, where appropriate, should work to implement the goals of this plan.

NON-REGULATORY OPTIONS

Non-regulatory options for implementing this plan include:

- ✿ Conservation easements
- ✿ Mapping
- ✿ Tax incentives
- ✿ Management practices
- ✿ Conservation fund
- ✿ Land trusts
- ✿ Education
- ✿ Photographic survey
- ✿ Consultant list

CONSERVATION EASEMENTS

The town should utilize the Hinesburg Conservation Fund to acquire fee title and conservation easements at sites with significant conservation value. Acquisitions and easements are used most effectively on lands with limited development potential. Possible assistance may be obtained from the Hinesburg Land Trust, the Vermont Land Trust, the Vermont Housing and Conservation Trust, and The Nature Conservancy.

A conservation easement is a restriction placed by the owner on a piece of property to protect its resources (natural or man-made) for public benefit. The restriction constitutes a voluntary, legally binding agreement between the landowner and a governmental agency or charitable organization. Whether the easement is donated or sold, the landowner continues to own the property, but gives up certain rights (such as to subdivide or commercially develop the property) to the easement holder. If the owner desires, the easement can restrict or permit certain public uses of the land.

A conservation easement is usually instituted to protect natural and historic features, open space, wildlife, and/or to encourage good forestry and agricultural practices. It outlines the provisions for that protection and typically runs with the property deed for a specified period, often in perpetuity. The holder is responsible for monitoring and enforcing the restrictions as agreed upon. The property owner continues his or her responsibilities, such as upkeep and taxes, and is free to sell the land or pass it on to their heirs. Future owners are bound by the easement's terms. If an easement is granted in perpetuity as a charitable gift, some federal income tax advantages usually accrue. If the easement lowers the market value of the land by restricting development, it can also lower property and estate taxes when the land is passed on to the next generation.

As the town implements the Greenspace Plan and continues to acquire additional public lands, it will be necessary to review how this land will be managed. The town should develop specific land management plans for these new conservation areas and/or parklands as they are acquired and developed. Cooperation with other parties, such as with farmers and other landowners, the Hinesburg Land Trust, the Nature Conservancy, the Vermont Land Trust, the County Forester, and the Vermont Heritage Program should be encouraged. In some circumstances, the Town may enter into management contracts with, or even transfer publicly protected lands to, appropriate conservation or parkland management organizations.

There are more than 3,700 acres of protected private and public farmland and forests in Hinesburg comprising 14% of the total land area of the town.

MAPPING

The town should maintain and regularly update spatial coverage of all resources outlined in this plan. Some of this data should be

updated through fieldwork activities (e.g., GPS recreational trails) or by adapting maps when new material is prepared by outside sources (e.g., state agencies, private development projects, etc.). This listing should be consulted at the outset of any new development project to determine if any sensitive species, habitats, or corridors would be impacted.

TAX INCENTIVES

The town should continue to promote the Use Value Appraisal (“Current Use”) Program that allows owners who practice long-term farm- and forestland management to have their land appraised for taxation purposes at its current use, rather than fair market value. It should also expand the application of its “piggy back” contract, in whatever ways possible, to include more of the smaller, part-time ‘farmers’ in the community.

MANAGEMENT PRACTICES

At minimum, the town should monitor farms and logging operations to ensure that they follow the state’s accepted agricultural and forestry practices as a means to limit erosion, siltation, and flooding. The town should encourage individual landowners to adopt the practices listed below through the distribution of educational materials, and direct communication with town staff:

- ✿ Maintain large blocks of forest.
- ✿ Maintain clusters of forest patches.
- ✿ Maintain distribution of forest patches across the whole landscape.
- ✿ Allow re-growth of connections between forest patches.
- ✿ Plan for ecosystem sustainability in logging operations.
- ✿ Provide wooded connections between forest patches and riparian corridors and wetlands.

- ✿ Allow unused fields to grow into shrub and tree vegetation.
- ✿ Protect rare and uncommon plant and animal species.
- ✿ Allow native plants to reclaim buffer areas along streams, rivers, and wetlands.
- ✿ Cluster housing on fewer acres when developing large parcels.
- ✿ Limit fragmentation of existing patches of natural vegetation when siting houses, driveways, roads, and utility corridors.
- ✿ Do not mow or bush-hog non-agricultural fields until late summer to allow nesting animals to breed.
- ✿ Keep lawn areas to a minimum.

CONSERVATION FUND

The town should continue to allocate town monies for outright purchase of sensitive lands. Continue funding on a yearly budgeting basis for town acquisition of farmland, forestland or sensitive areas for conservation. Alternatively, the town could build a specific program of acquisition and protection into a 20-year Capital Improvement Plan, with a commitment to the costs attached; and augment the fund by additional annual contributions from the budget, to be voted on at Town Meeting.

LAND TRUSTS

The town should continue to work with local, regional and state trusts, such as the Hinesburg Land Trust and the Vermont Land Trust (VLT), to identify and protect sensitive lands through a variety of initiatives and programs. The Conservation Commission should work in partnership with these organizations to secure funding and to ensure long-term monitoring and stewardship of conserved parcels.



One program that the town should use to help preserve its scenic and natural resources is the “VLT Community Project.” Through the Community Project, VLT seeks to conserve land that communities have identified as an important component of the local landscape. Another VLT program the town should continue to consider is the “Working Forest Project.” Through this program VLT seeks to conserve large tracts of well-managed forestland for their timber production capabilities, biological attributes and the multiple recreational benefits these lands often provide.

EDUCATION

Educational methods are important for promoting appropriate and environmentally sensitive development and redevelopment options, from land planning and residential development guidelines in electronic and/or booklet form, to public relations and conservation planning initiatives such as tree planting and shoreline stabilization programs. The town should develop activities such as community walks, photographic exhibitions, and slide presentations to inform citizens of the importance of farmland, scenic vistas, and wildlife habitat to their community’s quality of life, and to encourage voluntary protection of important areas.

Additional methods for increasing public awareness of the scenic and natural landscape include but are not limited to:

- ✿ Create displays to circulate between local libraries, schools, Town Hall, and other public spaces.
- ✿ Provide a thorough introduction to the “Greenspace of Hinesburg” for the public, and for all new appointees to municipal boards and commissions.
- ✿ Develop a scenic locales driving and cycling tour of Hinesburg to increase public awareness of the dimensions and variety of the town. Provide a map/ brochure to be available to the public in the town office.
- ✿ Establish an annual road running race, bicycle race, and/ or walking tour that “tours” the town’s scenic high points.

CONSULTANT LIST

The town should identify consultants (architects, landscape architects, planners, hydrologists, foresters, etc.) who would be willing to offer free (or sponsored) consulting services to homeowners/landowners, and develop a list of contacts available at the town office or handed out to developers/homebuilders at site plan review.

LANDOWNER OPTIONS

The landowner has a role to play in maintaining Hinesburg’s green infrastructure. In order for the green infrastructure to function effectively in a community, every land and homeowner has a stake in its management.

Whether it is one home or one acre, there are a number of activities, projects and practices that property owners can consider. They may range from simple steps such as reducing the number of times you mow your lawn, or turning it into a natural meadow, to more ambitious undertaking, such as restoring an orchard or planting a new one.



An overview of some basic environmental management practices include a number of options that can save the homeowner money, limit maintenance time and reduce their overall environmental footprint:

- ✿ Every landowner has a role in managing stormwater productively and effectively by employing techniques such as rain barrels, rain gardens, vegetated swales and by maintaining stream and wetland buffers as well as existing wooded areas. The vegetated swale, for example, provides filtration functions while slowing and absorbing runoff, reducing the potential for soil erosion and the consequent polluting of our streams and lakes, which affects water clarity and impacts aquatic habitats.
- ✿ Reducing impervious paving is another way in which to protect the integrity of the landscape. Siting homes so they share a driveway and are served by the least amount of driveway possible are two ways in which to do this - another way is by avoiding asphalt altogether. There are more pervious paving options such as gravel mixes that maintain a more porous profile and edible landscaping
- ✿ Green lawns have become an 'American' landscape staple, influenced originally by the well-ordered and rigid

aesthetics of Louis XIV's Versailles. But it is time for us to give up this very harmful and obsolete vision of having huge expanses of perfectly weedless and uniformly green lawns. Instead, we can and should reduce lawns areas with lawn alternatives such as natural meadows or other more natural and indigenous landscape design initiatives. Letting lawns adapt to natural moisture regimes and eliminating use of chemical fertilizers and herbicides is a viable and much healthier option.

- ✿ Energy conservation measures such as siting homes to take advantage of the sun and finding exposures that avoid excessive wind exposure will reduce heat loss and energy bills. Those existing homes that are exposed to the winter winds can employ shelterbelts and windbreaks to buffer climate extremes. Properly placed deciduous trees can shade windows in summer to minimize interior heat gain, and the need for air conditioning during extended warm periods.
- ✿ Even small lot owners can create wildlife habitats from butterfly gardens to songbird havens by maintaining plant associations and microhabitats that nurture native plant and animal communities.
- ✿ Woodlot management to promote a diverse, habitat rich forest environment counters global warming and yields sustainable harvest even on small woodlots. Collaborating with adjacent landowners to collectively manage contiguous forestlands is another option. There are examples of this approach as promoted by the Vermont Family Forests Program, which includes support for ecological forestry practices
- ✿ Trail systems shared by neighbors is another way to cultivate community connectivity and at the same time afford neighborhood recreational opportunities. Often

subdivisions and land developments have set aside common lands where these networks can be established.

- ✿ Outdoor lighting needs to be used and placed judiciously to eliminate off site light pollution and to protect the visibility of the night sky, an often overlooked aesthetic and natural resource. Outdoor lighting can be solar powered as proven by the fixtures employed at the Hinesburg Town Hall parking area. Proper shielding, limited use, and operation by motion sensors or timers are all ways in which we can reduce energy use and promote appropriate nighttime lighting.

LAND CONSERVATION

There are many ways landowners can conserve their land.

“This project means a lot to me and my family. We did not want to see all of our property developed. I don’t think people can appreciate land unless they can be out on it...We have never posted our land. We hope you can enjoy it as much as we have.” – Wayne Bissonette, The Burlington Free Press 3/2/08

Below is a brief summary of some of the most commonly used conservation techniques. Each has the potential to protect all or part of a property while still meeting the landowner’s financial needs.

Outright Gift. Land can be protected through an outright donation to a land trust or charitable organization with the stipulation that it be protected in a certain way. Conditions permitting or restricting specific uses may be attached by the landowner. When a conservation organization receives commercial or residential property, it does so with the understanding that proceeds from its sale will be used to support the recipient’s conservation work. An outright gift is often the preferred strategy for those who own highly appreciated real estate or who do not wish to pass land on to heirs. The gift can result in an income tax deduction. Land can

also be donated for conservation purposes as an outright gift in a will, which may result in an estate tax reduction.

Undivided Partial Interest Gift. When a single, large land gift is divided into several smaller gifts through the donation of a sequence of fractional interests (undivided partial interests) over several years, the arrangement is known as an undivided partial interest gift. This permits the donor to adjust the size and number of charitable deductions and to carry forward the excess of the tax deduction allowed in a single year for up to five years. With this type of gift, a new or updated appraisal is necessary with each successive donation. The recipient acts as co-owner of the property with the donor until full ownership of the land has been transferred.

Reserved Life Estate. With a reserved life estate, a land donor can reserve the right to use his or her property for life, or for the life of designated individual(s), and donate the remaining interest. Upon the death of the donor or of the designated individual(s), the full title and property control transfers to the recipient. Donating a remainder interest can also have income and estate tax benefits.

Charitable Gift Annuity. To establish this type of annuity, land is transferred to a charity that agrees to make annuity payments





to one or two beneficiaries for the remainder of their lives. The arrangement can qualify the donor for a charitable income tax deduction at the time of the gift. This method is often preferred for donors of highly-appreciated property who would otherwise incur significant capital gains tax.

Charitable Remainder Unitrust. Combining several conservation instruments, a charitable remainder unitrust usually involves four steps. First, a conservation easement is placed on the

land to protect it. Then the land is donated to a conservation organization, which sells it. At step three, the organization invests the proceeds to pay an annuity to the donor. Finally, when the owner dies, the investments pass to the organization to support its work. A charitable remainder unitrust is also a good method for donating land with a highly appreciated value.

Bargain Sale. A bargain sale involves the sale of land to a conservation organization for a price deliberately set below market value. By reducing the price, the bargain sale can reduce capital gains taxes and may also entitle the seller to a charitable income tax deduction based on the difference between the sale price and fair market value.

Installment Sale. The seller accepts payments in a series rather than in one lump sum. An installment sale permits the spread of income from a land sale over a longer period and allows the purchasing land trust to buy the land using smaller, incremental outlays of money (which may facilitate fundraising).

Option to Purchase. A landowner may offer an option to purchase when the receiving organization does not have enough funds on hand. The landowner and trust agree to a price. While the option, which is limited to a specific time period, is in effect the land cannot be sold to another buyer, but the recipient is not obligated to buy the land.

Right of First Refusal. This option permits a landowner to grant a land trust the opportunity to match and preempt any bona fide offer from another party. The land trust is under no obligation to purchase.

3. ASSESSMENT

This chapter inventories Hinesburg's greenspace features. It identifies the risks that development poses to those resources and describes steps that can be taken to mitigate those risks. This chapter also considers the benefits and services that greenspace features provide our community including:

- ✿ **Public Health and Safety.** Greenspace protects people and property from natural hazards like flooding, water supply contamination and property loss.
- ✿ **Natural Resource Protection.** Greenspace provides the habitat needed to sustain plant and animal communities.
- ✿ **Working Lands.** Greenspace includes working farm and forest lands that provide natural resource based commodities and support the rural economy.
- ✿ **Outdoor Recreation.** Greenspace provides places for people to engage in all types of active and passive outdoor recreation, which is an essential component of the rural lifestyle enjoyed by many town residents.
- ✿ **Community Character.** Greenspace contributes to our town's sense of place and rural character, which is composed of features like scenic views, special places, and historic and cultural landscapes.

ELEVATION AND SLOPE

INVENTORY

Greenspace features related to elevation and slope include:

- ✿ Moderately steep slopes (15-25%)
- ✿ Severely steep slopes (>25%)
- ✿ High elevations (>1,500 feet)
- ✿ Highly visible ridgelines and hillsides
- ✿ Areas with high scenic value and scenic vantage points

LANDSCAPE CONTEXT

Route 116 in Hinesburg marks a transition between the Champlain Valley to the west and the foothills of the Green Mountains to the east.

The western part of town is more diverse in its topography, geology, soils, and current forest cover types. The difference between the eastern and western portions of town is also evident in the underlying geology. The Hinesburg thrust fault runs in a north/south direction just east of Route 116, dividing the town.

To the east is the hill section, consisting of dense metamorphic schist with a thin soil cover. The valley portion of Hinesburg west of Route 116 has carbonated limestone and dolomite bedrock, evident on the small hills rising above the valley. The harder rock makes up the hills and ridges and the softer rock has been eroded away creating the valley. Glacial sediment deposition has placed a thin layer of hard pack gravelly till in the hills, while the valleys were filled with sand and gravels, as well as lake bottom silts and clays (when the area was formerly under an inland sea).

TOPOGRAPHY

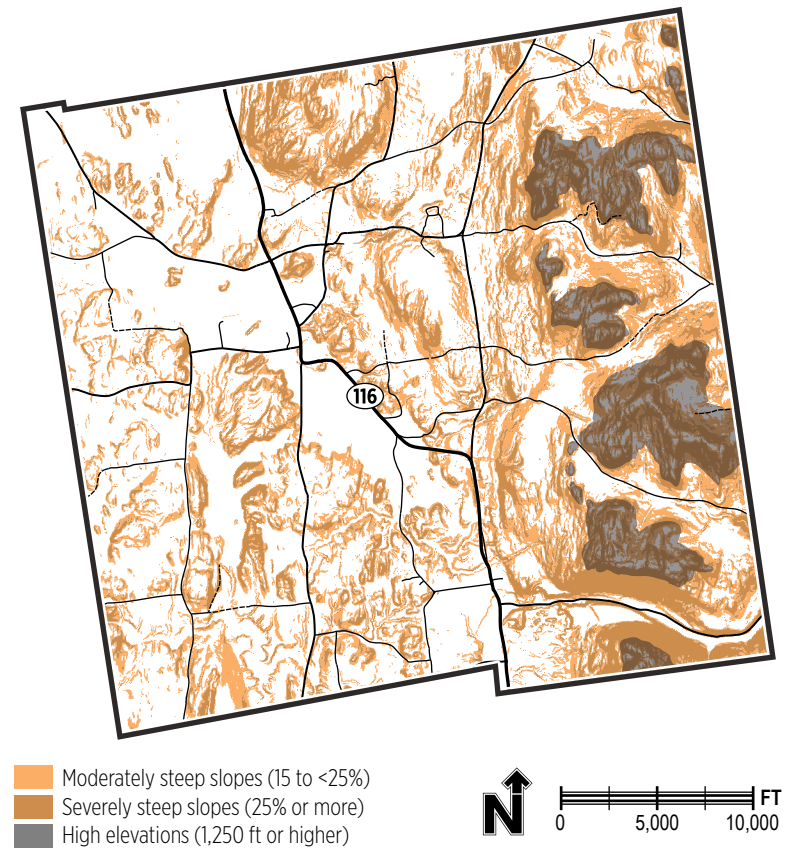
The average elevation of the valley floor west of Route 116 in Hinesburg is approximately 400 feet above sea level. Small hills rise up from the valley floor to elevations around 600 feet above sea level. The hillsides are moderately to severely steep as shown in Figure 3.

A significant change in terrain occurs just east of Route 116 and the land climbs quickly to elevations of 1,400 feet or more about sea level. Much of this land is steeply sloped as shown in Figure 3.

SCENIC VALUE AND VANTAGE POINTS

While some initial public input and GIS analysis was undertaken as part of the greenspace planning process, Hinesburg has yet to complete a thorough inventory and assessment of scenic resources, including highly visible ridgelines and hillsides. These efforts are described in greater detail in the appendices, but it must be recognized that the scenic areas and features identified to-date are preliminary and further assessment is needed to fully define greenspace with high scenic resource value in Hinesburg.

Figure 3. Steep Slopes and High Elevations



BENEFITS AND SERVICES

Greenspace features related to topography provide the following benefits and services:

	PUBLIC HEALTH AND SAFETY	NATURAL RESOURCE PROTECTION	WORKING LANDS	OUTDOOR RECREATION	COMMUNITY CHARACTER
Moderately steep slopes (15-25%)	●	○	○	○	○
Severely steep slopes (>25%)	●	○	○	○	○
High elevations (>1,250 feet)	●	●	○	○	○
Highly visible ridgelines and hillsides	○	○	○	○	●
Areas with high scenic value and scenic vantage points	○	○	○	○	●

RISKS

Steep slopes and high elevation land once considered “undevelopable” are now potential building sites due to modern construction, sewage disposal and transportation technologies. Such development poses risks including:

1. Public Safety. Development on steep slopes or high elevation land requires steep and/or long driveways. Soils on steep slopes and at high elevations are often shallow, unstable and prone to erosion if disturbed. Constructing steep and/or long driveways requires extensive clearing, grading and soil disturbance, which if not properly done can cause downslope flooding and erosion including damage to public roads and drainage infrastructure. Steep and/or long driveways are more dangerous, and make access by emergency and service vehicles more difficult. In winter and early spring, steep and/or long driveways become particularly hazardous and potentially inaccessible.

2. Water Quality. Headwater streams, with many small braided channels, are found throughout high elevation areas. Soils on steep slopes and at high elevations are often shallow, unstable and prone to erosion if disturbed. Poor soils and shallow depth to bedrock pose challenges to soil-based wastewater treatment. Development on steep slopes requires clearing and disturbance of a larger area in order to create a level building site, and provide access and infrastructure. Clearing, grading and soil disturbance, if not properly done, can result in water quality degradation due to erosion and stream sedimentation. Septic systems, if not properly functioning, can also result harmful bacteria entering nearby streams. Sediment and other pollutants that enter the headwater streams are carried downstream and contribute to impaired water quality in major streams and rivers.

3. Wildlife Habitat. Steep slopes and high elevation areas are generally forested as they were unsuitable for farming, and until recently they remained undeveloped. As a result, these areas have become important wildlife habitat for deep-wood species such as black bear. When forest areas become fragmented by development, those species that require large, undisturbed forest habitats cannot thrive.

4. Public Services. Steep slopes or high elevation land is difficult to access and/or remote. Houses located in such areas place a greater financial burden on the entire community by disproportionately increasing costs for services such as road maintenance and school busing.

5. Aesthetics. Development on ridgelines or high elevation areas can be highly visible and out of context. Forested ridgelines and hillsides form the visual background for most of the town’s scenic views. Clearing wooded ridgelines and hillsides to create building sites that offer excellent views

usually results in the development being highly visible from many locations, creating a “tear” in the fabric of the scenic landscape that detracts from the town’s rural character.

Steps that can be taken to mitigate the risks posed by development on steep slopes, high elevation areas, and highly visible ridgelines and hillsides include:

- ✿ Locating and clustering development on the least constrained/sensitive and most easily accessed portion of the site.
- ✿ Using proper erosion control measures and stormwater management techniques.
- ✿ Selecting building types better suited to sloped sites (small footprint, building into the slope, varying floor elevation to follow slope, etc.).
- ✿ Locating and designing structures so that they do not become a focal point within or block significant scenic views.
- ✿ Locating and designing structures so that they remain below the top of a ridgeline and are not “skylined.”
- ✿ Locating building sites closer to existing roads, which limits forest fragmentation and the length of driveways.
- ✿ Designing driveways to the minimum standards necessary to provide adequate emergency access in all seasons.
- ✿ Using materials and colors that blend structures into the surrounding natural landscape, including use of low-reflectivity glass and matte-finished materials to reduce reflection and glare.
- ✿ Limiting tree clearing on building sites in forested areas (often views can be created through selective clearing of narrow view corridors or trimming to open up views under the canopy).

WATER

INVENTORY

Water-related greenspace features include:

- ✿ Groundwater recharge areas
- ✿ Source protection areas
- ✿ Rivers and streams
- ✿ Lakes and ponds
- ✿ Wetlands
- ✿ Floodplains and river corridors
- ✿ Shorelands
- ✿ Riparian buffers

GROUNDWATER RECHARGE AND PROTECTION AREAS

Nearly all Hinesburg residents depend on groundwater as their drinking water source. There is limited information available about the location, quantity and quality of the town’s groundwater resources. The Vermont Division of Water Supply maintains some information about groundwater wells, but that data is not organized and formatted in a manner conducive to the type of comprehensive inventory and assessment that is needed. Knowing the number, use, location and yield of wells within town is critical to preventing a reduction in quality and quantity of water within existing and new wells.

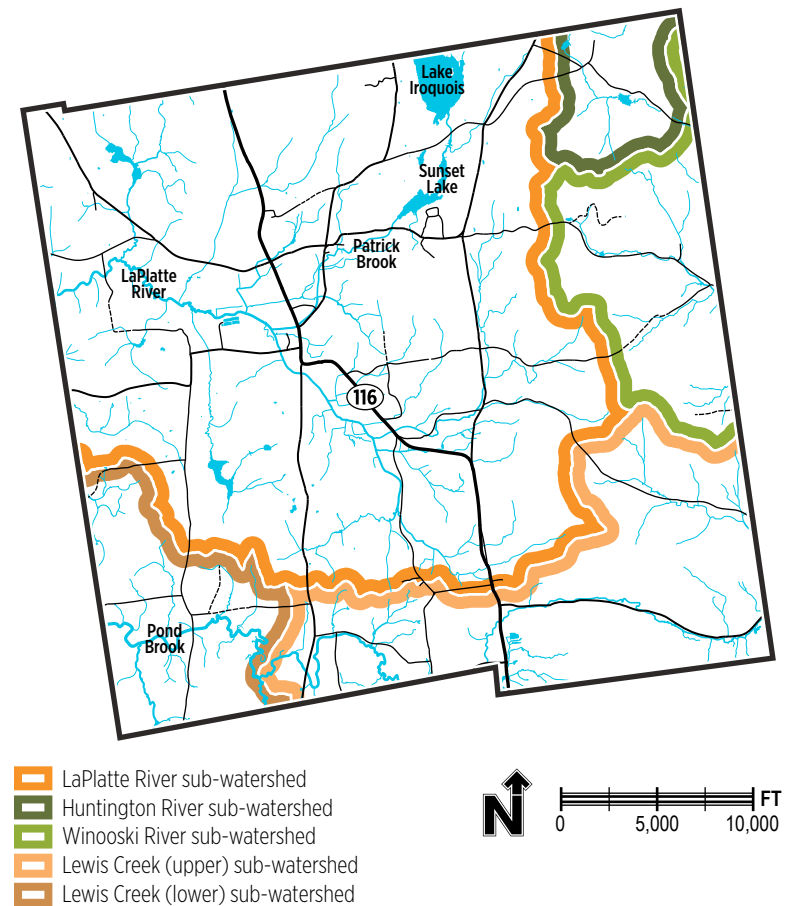
Ridgelines and hillsides generally serve as groundwater recharge areas. There, precipitation can easily infiltrate into bedrock that is exposed or covered with a shallow layer of highly permeable soil. However, water quality along the ridgelines can be poor, with high levels of sulfur, minerals, or radioactive compounds (uranium or radium).

The chance for finding groundwater for drinking water varies and is largely unpredictable. On the eastern side of town, well water yield tends to be low and wells often have to be quite deep (500 to 1,000 feet). On the west and south sides of Hinesburg, well water yield tends to be somewhat better.

There are several public water systems that provide water to multiple users or connections (including the systems that serve the town center, Lyman Meadows, Orchard Commons, the former Saputo Cheese site, and Hinesburg Country Store). State and federal regulations require these water systems to have a delineated Source Protection Area (SPA), which identifies the recharge areas for the water source, and a Source Protection Plan (SPP) to prevent contamination. Four of the water systems listed above have SPAs and SPPs.

The wells providing water to the town center well and the former Saputo Cheese site have been drilled through old lake bottom clay to a sand and gravel layer at the interface with bedrock. They both have high yields of greater than 150 gallons per minute. The source water for these wells is from the same hillside east of Route 116.

Figure 4. Watersheds and Surface Waters



RIVERS AND STREAMS

All water that runs off roofs, driveways, lawns and other non-absorptive surfaces in Hinesburg drains to Lake Champlain via the LaPlatte River, Lewis Creek and Winooski River watersheds. Sub-watersheds within Hinesburg include Lewis Creek, the

Huntington River and the Johnny Brook drainages. Figure 4 shows the network of rivers and streams within these sub-watersheds. The major rivers and streams are further described below.

1. LaPlatte River. With its headwaters in the eastern hills of Hinesburg, the 18.6-mile LaPlatte River flows northwest draining portions of Charlotte, Shelburne, Williston, Richmond, and St. George. The LaPlatte River drainage (53 square miles) is the largest sub-watershed draining to Shelburne Bay. Tributaries within Hinesburg include Patrick Brook, which drains Lake Iroquois and Sunset Lake. The LaPlatte River drains at least 60% of the total area of Hinesburg. Approximately 45% of the LaPlatte's watershed area and 38% of the river's main stem is located in Hinesburg.

Agricultural and forest lands and large wetland complexes dominate the land cover types within the Hinesburg portion of the drainage area. Developed lands, including transportation infrastructure, constitute a relatively small portion of the total land cover. The major wetlands in the drainage area are those north of Lake Iroquois, between lake Iroquois and Sunset lake, and the Carse, Ketchum, and Taproot wetlands west of the village. A large area of formerly converted wetlands in the LaPlatte Headwaters Town Forest is being returned to its former wetland status.

2. Patrick Brook. Patrick Brook originates at Lake Iroquois, flows through Sunset Lake and extends to the LaPlatte River. Over its 2-mile length, the brook drains a watershed of about 7 square miles. Together with Lake Iroquois and Lower Pond, Patrick Brook is an important part of Hinesburg's mill-town heritage, having provided power and water to over 30 mills along its length from the mid-to-late 19th century. Some of the stone works, including the present dam above

Iroquois Manufacturing and the diversion canal alongside Commerce Park are evidence of that era. As a consequence, however, Patrick Brook has been substantially altered by land development, channel alterations, diversions, and streambank erosion. Steps have been taken in the valley portions to allow the brook to regain its natural sinuous channel formations and studies are underway to determine the best management approaches for the diversion canal that, while severely impacting the natural attributes of the brook, does constitute a resource for the village as a firefighting water supply and water feature.

3. Lewis Creek. Originating in the foothills of Starksboro, the Lewis Creek mainstem is about 33 miles in length and drains numerous unnamed tributaries and pond-wetland complexes, including Bristol Pond and Monkton Pond, before emptying directly into Lake Champlain at Hawkins Bay in Ferrisburgh. Overall, the Lewis Creek Watershed (80 square miles) drains portions of Bristol, Ferrisburgh, Monkton, and Starksboro within Addison County, and Charlotte, Hinesburg, and Huntington within Chittenden County. Seventy-seven percent of the watershed area lies within Addison County.

Hollow Brook and Pond Brook are the largest tributaries to Lewis Creek within Hinesburg. Hollow Brook originates in the eastern foothills but then doubles back westward to drain the steep-sided area around Hollow Road, which is thought to be the pre-glacial drainage of the Huntington River. Pond Brook drains the shallow valley and large wetland complex extending northward from Bristol Pond through Monkton. Approximately 26% of Hinesburg (10.3 square miles) is within the Lewis Creek watershed. That area consists mostly of forest and agriculture uses. Conservation efforts have protected more than one-third of the streambanks and riparian corridor of the Lewis Creek in Hinesburg.

4. Winooski River. The northeastern foothills area of Hinesburg drains to the Winooski River watershed (1,063 square miles) via the Huntington River (67 square miles) and Johnny Brook sub-watersheds. Approximately 13% of Hinesburg is within these sub-watersheds. The area drained within the town (5.3 square miles) is largely forest, but includes agricultural lands, developed lands and numerous beaver ponds and wetlands. Development density within these drainages is relatively low but is concentrated along roadways that are typically located in close proximity to stream corridors. Within Hinesburg, the Huntington River sub-watershed (3.8 square miles) drains areas along Sherman Hollow, Texas, Hayden Hill East, and part of Lincoln Roads. Johnny Brook (1.5 square miles) drains portions of Sherman Hollow, Palmer, and Swamp Roads.

LAKES AND PONDS

Figure 4 shows the major lakes and ponds located in Hinesburg and they are further described below:

1. Lake Iroquois. The Lake Iroquois sub-watershed drains portions of Williston, Richmond, Hinesburg, and St. George. A section of the lake shoreline lies within Hinesburg. Formerly known as Hinesburg Pond, Lake Iroquois (247 acres) in its present extent was formed in 1867 when Pond Brook at the southern end of the lake was dammed as part of a coordinated effort to regulate water flow for use by the many industries arising along Patrick Brook in Hinesburg. Underlying springs and surface drainage feed the lake.

Land cover within the watershed is largely forested, although wetlands are an important component. The wide variety of landforms, soils, and habitats found throughout Lake Iroquois support a wide diversity of vegetation and wildlife. As a consequence, the Lake Iroquois watershed is

considered a highly valued component of a regional wildlife corridor network extending to the east and northeast. The forestlands immediately to the east of Lake Iroquois include a state designated deer wintering area. Rare, threatened, or endangered aquatic and wetland plant species reside along the southern and eastern margins of the lake. The spotted salamander, a species of special concern, has been reported within the watershed as well.

Development of the Lake Iroquois shoreline for both seasonal and year-round homes is concentrated mostly in the Hinesburg portion, with almost 100 camps and residences located on small private roads and the vast majority of them on lots that were created before zoning, subdivision or wastewater regulations were adopted. They are primarily served by septic systems, many of which could fail given their age and small leach fields. Many of these septic systems were not designed for year-round use.

There has been more recent residential development on the western hillsides within the watershed in St. George, Williston and Hinesburg, primarily on 3- to 10-acre lots with engineered wastewater systems. This has resulted in decreased forest cover and increased impervious surface area. The interior of the eastern portion of the watershed, which includes Richmond, remains sparsely developed.

A public beach, trail network (1.3 miles), and state-managed boat launch provide recreational access to Lake Iroquois. The Lake Iroquois Recreational District, which was established in 1958 in order to provide a “safe, orderly and healthful” swimming and recreational opportunity for the residents of the four towns within the lake watershed, collaboratively manages the beach, trail network and 150 acres of conserved lands. No other public trails are linked to the Lake Iroquois watershed at this time.

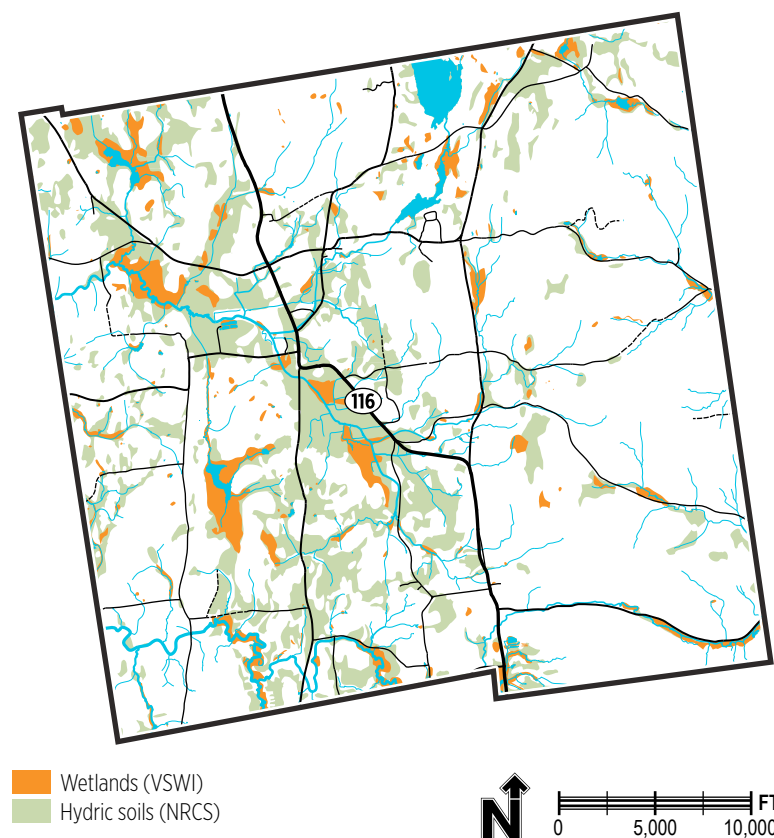
Recently, the Lake Iroquois Association was formed to maintain and enhance healthy ecosystems and appropriate public uses of Lake Iroquois and those aspects of its watershed which impact on the health and well-being of the lake. The portion of the Lake Iroquois watershed within Williston has been designated a Surface Water Protection Area. To date, Hinesburg does not have a similar designation.

2. Sunset Lake. Sunset Lake (45 acres), also known as Lower Pond, was created in the mid-19th century when Patrick Brook was dammed as part of a larger effort to regulate stream flow. Iroquois Manufacturing in Hinesburg currently owns and regulates the dam that creates Sunset Lake. The watershed that drains to Sunset Lake extends north and northwest to the Richmond town line and includes Lake Iroquois. As an extremely shallow pond, its maximum water depth is less than 6 feet.

Housing density along the shoreline is moderately high, although less dense than on the Hinesburg portion of Lake Iroquois, with significant stretches of undisturbed shoreline still existing within the large wetland located along the northern margin of the lake. Land use/land cover within the larger watershed is largely forested residential lots. The majority of all residential development is fairly recent and, with the exception of Sunny Acres, has wastewater systems approved by the state.

A wide variety of vegetation and wildlife occupy the Sunset Lake watershed on a seasonal or annual basis. At least two rare or threatened plant species are well represented in the wetland complex north of the lake through which Pond Brook flows. There is no public trail network within the watershed or public access to the lake.

Figure 5. Wetlands and Hydric Soils



WETLANDS

Wetlands are shown in Figure 5 and were discussed in conjunction with the rivers, streams, lakes and ponds above.

FLOODPLAINS AND RIVER CORRIDORS

Floodplains and river corridors are discussed in greater detail in the *Hinesburg Town Plan*.

SHORELANDS AND RIPARIAN BUFFERS

As discussed in relation to the lakes and ponds above, much of Hinesburg's shorelands are developed.

BENEFITS AND SERVICES

Water-related greenspace features provide the following benefits and services:

	PUBLIC HEALTH AND SAFETY	NATURAL RESOURCE PROTECTION	WORKING LANDS	OUTDOOR RECREATION	COMMUNITY CHARACTER
Groundwater recharge areas	●	○	○	○	○
Source protection areas	●	○	○	○	○
Rivers and streams	●	●	○	●	●
Lakes and ponds	●	●	○	●	●
Wetlands	○	●	○	○	○
Floodplains and river corridors	●	●	○	○	○
Shorelands and riparian buffers	●	●	○	●	○

GROUNDWATER

Groundwater is constantly recharged by precipitation percolating through the soil to the water table. It is stored in aquifers at many different depths, from shallow water table level aquifers to deep fractured bedrock aquifers. Replenishment of groundwater from rain or surface water tends to be gradual.

Recharge areas for groundwater are typically located at higher elevations, while discharge points (lakes, ponds, wetlands,

streams, springs, or wells) are typically at lower elevations. After recharging the water table, groundwater will recharge deeper aquifers and move toward these points of discharge. This movement is generally very slow. An aquifer's flow rate depends upon how water is stored within bedrock fractures and how well the fractures are connected.

Land use has a significant impact on groundwater recharge. As land is developed, more precipitation is diverted from recharge areas and runs off into surface waters as stormwater. Impervious surfaces, such as roadways and rooftops, are major barriers impeding recharge. The removal of forest cover, filling in wetlands, or installing drainage tiles also contribute to the reduction of groundwater recharge.

The natural quality of groundwater is usually quite high due to filtration through the soil, but groundwater is susceptible to contamination. Contamination is usually the result of human activity, one of the most common being improperly functioning septic systems. Groundwater is also used as a receiving media for discharge of other wastes (runoff from developed land, runoff from agricultural land, leachate from landfills, etc.). Groundwater may also become polluted by such things as leaking fuel storage tanks, mining activity, salt storage and application, lawn chemical applications, motor vehicles, and underground injection wells. There is not a comprehensive list of permitted discharges and potential contamination sources in Hinesburg.

Groundwater also has naturally occurring contaminants, most of which are simply nuisance compounds (sulfur, iron, manganese), but some of which pose health risks (arsenic, uranium and radium). Generally water can be treated to remove these contaminants, but homeowners often do not test for many of these compounds.

SURFACE WATER

Surface waters are the result of the rapid runoff that is not absorbed after a storm and a much slower release of groundwater recharge from springs. Surface waters are essential components of landscape providing critical fish and wildlife habitat, offering recreational opportunities, contributing to groundwater recharge, and providing floodwater control. The quality of stormwater runoff determines the fate of our surface waters and degraded water quality threatens all of the benefits and services surface water provide. The preservation of surface water resources for present and future generations is consistently rated among the highest priorities of Hinesburg residents.

The significance of Hinesburg's major surface waters is briefly summarized below:

1. **LaPlatte River.** The LaPlatte River drainage (53 square miles) is the largest sub-watershed draining to Shelburne Bay, which itself is an important aesthetic and recreational resource and the source of water for the Champlain Water District that serves over 65,000 customers and major corporate entities in the Burlington area. The LaPlatte River receives the effluent from Hinesburg's wastewater treatment facilities.
2. **Lake Iroquois.** Lake Iroquois is an important component of the LaPlatte River watershed, serving as a year-round water source to Sunset Lake and the LaPlatte River. Lake Iroquois is a valued fish and wildlife habitat, supporting a large diversity of species, including several rare or threatened species, with its eastern and western watersheds serving as important components of a larger multi-town wildlife corridor complex. Lake Iroquois is an aesthetic resource, offering scenic views to the public throughout the year from Oak Hill/Pond Road along the western shore of the

lake. Lake Iroquois is an important year-round recreational resource to the four towns within the watershed.

3. **Sunset Lake.** Sunset Lake is a locally important aesthetic and recreational resource. Sunset Lake's watershed offers valued wildlife habitat and supports several rare and threatened plants.

4. **Lewis Creek.** Lewis Creek is an aesthetically important feature of the landscape. It provides important fisheries and wildlife habitat for a wide variety of species, serves as a key wildlife corridor between the Green Mountain foothills and the Champlain Valley lowlands, and offers a wide variety of recreational opportunities.

5. **Huntington River and Johnny Brook.** The Huntington River and Johnny Brook drainages within Hinesburg are locally and regionally valued features of the landscape, provide important wildlife habitat, contribute to a larger and important wildlife corridor complex extending across town boundaries, and offer a variety of private and commercial recreational opportunities.

RISKS

SURFACE WATER

There are two basic risks to our surface waters. The presence of water has traditionally attracted development, whether industrial, recreational or agricultural, and it continues to do so today. This is reflected in the value of lake-side properties, the increase in value of land that has streams, the desire of farmers to take advantage of the fertile soils and water supplies in our riparian areas, and the remnants of the industrial age, such as dams, the village canal, and several remaining businesses. The other risk is simply a result of how we manage the water that leaves our individual properties, no matter how disconnected that property appears to be from visible surface waters.

There are six specific risks that threaten surface water quality:

1. Nutrient Enrichment. Phosphorus, nitrogen and organic materials are essential substances for growth of aquatic plants and algae. In low concentrations, phosphorus and nitrogen individually, or in combination, typically limit the productivity of freshwater communities. In excessive concentrations, these nutrients can accelerate eutrophication, stimulate algal blooms, promote nuisance aquatic plant growth, alter natural fish and wildlife communities, and degrade recreational and aesthetic values.

Both phosphorus and nitrogen can reach surface waters in various chemical forms from sewage outfalls, stormwater runoff from agricultural or developed lands where they may originate with fertilizers, manure spread on the soil, pet wastes, inadequate septic systems, stream bank erosion, contaminated ground water, or directly from wildlife. Evidence suggests that algal growth is often greatest when algae are exposed to phosphorus and nitrogen in combination.

2. Sedimentation. Sediment is fine particulate matter originating from soils. Excessive sediment in surface waters represents not only a loss of productive soils but also a significant threat to aquatic habitat, biota and other uses of surface waters. At high concentrations, sediment can stress fish, smother bottom dwelling organisms, deplete dissolved oxygen, increase stream bank erosion, and diminish recreational and aesthetic uses of waterways. Sources of sediment contamination in surface waters can often be traced to specific land use practices, including runoff from agricultural and developed areas, gravel roads, eroding stream banks, and construction sites.

3. Pathogens. Pathogens are any disease-causing organism, including bacteria, viruses, and protozoa. Of most concern

are those pathogens that come from fecal matter of humans and other warm-blooded animals. These pathogens can cause gastrointestinal problems and pose a serious health risk to people with weakened immune systems. The most likely source of human waste is from wastewater treatment facilities and septic systems that are not operating properly. Sources of animal waste can be from agricultural operations not properly implementing best management practices (BMPs) regarding the handling of manure, managing surface runoff from barnyards and pastures, or controlling livestock access to surface waters. Pet wastes in surface runoff are also a significant source of contamination in developed areas.

4. Flow Alterations. Channelization or in-stream modifications, road and bridge work, flow changes, and channel instability can result in the physical alteration of the form, structure, and course of a waterway. Channel adjustments in response to these disturbances can impact human investments near streams, such as roads, bridges and culverts, railroads, agricultural lands, and residential and commercial structures. Traditional stream management activities can contribute to ever-increasing channel instability. Land management practices that inadequately protect against encroachments can directly or indirectly lead to greater channel instability, as well as to increased transport of sediment and nutrients into adjacent surface waters. Protection of river corridors from the encroachments that would lead to channel adjustment is much more cost-effective than restoration of rivers that have become unstable. Implementation of a comprehensive river corridor and watershed protection strategy is necessary to maintain a stable, functioning, fluvial system.

5. Thermal Modification. Temperature is a primary regulator of biological activity. An increase in water temperature

can thus adversely impact fish and other populations by increasing their rate of metabolism while, at the same time, reducing the amount of dissolved oxygen in the water. It may also make fish more susceptible to disease or parasites. A common cause of thermal modification of shallow surface waters is the removal of shade-providing vegetation along shorelines. Wastewater outfalls can also modify the temperature of the receiving waterway.

6. Aquatic Invasive Species. Many aquatic and wetland invasive species, such as Eurasian watermilfoil, phragmites, purple loosestrife, and others can seriously impair the recreational use of a water body, out-compete native species, and significantly alter habitat value and ecological communities.

FOREST

INVENTORY

Hinesburg has a diverse mosaic of native forest types made up of both large and small connected parcels that support sustainable recreational and economic uses, viable wildlife populations, and sources of clean water. Hinesburg's forests contribute to the town's natural and cultural identity, and are a key component of what make Hinesburg enjoyable for residents and visitors alike. The forests in Hinesburg consist almost entirely of regrowth on former agricultural lands, or heavily, and frequently poorly, managed remnants of the original forests. Hinesburg has no virgin forest, although small portions of older growth still exist.

Forest-related greenspace features include:

- ✿ Core forest areas
- ✿ Small forest areas
- ✿ Connecting habitat
- ✿ Public and conserved forests
- ✿ Current use lands

CORE FOREST AREAS

Hinesburg's large core forest areas support breeding populations of species such as black bear, interior-nesting songbirds, such as the wood thrush, and many other species of wildlife. These core forest areas were identified and mapped through the Vermont Biodiversity Project conducted through the University of Vermont. The majority of Hinesburg's core forest areas are in the foothills of the Green Mountains on the eastern side of Route 116, although a few smaller core forest areas have been identified on the western side of town.

1. Eastern Foothills Core Forest Area. This core forest area represents the transition into the Green Mountain

biophysical region, which is at a higher elevation and has a shorter growing season than the Champlain Valley. This core forest area at the top of the LaPlatte River, Huntington River, and Lewis Creek watersheds contains many small, first-order streams. This forest is growing on stony soils that are derived from nutrient-poor bedrock and glacial till. The primary forest type growing in this area is Northern Hardwood Forests dominated by American beech, yellow birch, and maple species. Softwood inclusions are common, and there are pockets of unusual communities on hill and ridge tops, cliffs, rock outcrops, and in wet areas. This area has a low presence of invasive species compared to forest fragments in the Champlain Valley.

This core forest area represents the best base for the future of Hinesburg's forest products economy because of its size and sugaring and timber potential and can be divided into four subareas, divided by low traffic dirt roads:

- ✿ **Texas Hill.** This area between Sherman Hollow Road and Texas Hill Road is comprised of several privately owned parcels in Hinesburg and is part of the larger forest block that contains the Sleepy Hollow Ski Area, Green Mountain Audubon Center, Birds of Vermont Museum, and other properties in Huntington. There are several deer wintering areas that have been mapped in this core forest area. A group of landowners from Huntington and Hinesburg who own property in this core forest area are jointly planning for the future of the forests in this block. This example of neighbors coming together across town lines could be used as a model for planning for the future of other forest blocks in Hinesburg.
- ✿ **Hayden Hill-West.** This area between Hayden Hill Road and Lincoln Hill Road contains the 837-acre Hinesburg Town Forest, as well as several large, privately owned parcels. It is part of a large forest block in Huntington, although

Economou Road and development along this road cuts into the block.

- ✿ **Hayden Hill-East.** This area between Texas Hill Road and Hayden Hill Road is comprised of several relatively large, privately owned parcels as well as many smaller lots (~10 acres) along Texas Hill Road. Data from the Wildlife Crossing Project identified a critical crossing/linkage on Texas Hill Road that connects this core area with the Texas Hill core forest area.
- ✿ **Lincoln Hill.** This area between Lincoln Hill Road and Hinesburg Hollow Road includes the state-owned Fred Johnson Wildlife Management Area and a few large private parcels (e.g., Carse Land Company). There is a significant red pine woodland community in this area, as well as large connecting forest habitat south of Hinesburg Hollow Road. Deer wintering areas have been mapped in this area.

2. Place Road Core Forest Area. This core forest area between Route 116, Place Road and Pond Road is part of a large forest block that continues into St. George. The forest is directly on the transition along Route 116 between the valley and foothills. There is increased potential for rare or unusual natural communities and species in this area because of the different bedrock types and soils that appear along this transition defined by the Hinesburg Thrust Fault. The entire core area has been mapped as a deer wintering area, due to the significant presence of coniferous and mixed forest types. This core area contains no conserved lands at this time and is comprised of privately-owned parcels, the majority of which average 88 acres in size.

Presently, this area is zoned for development. While the purpose statement in the zoning for this district states that "Development that preserves significant natural resources

is encouraged,” the wording suggests that the whole district is “an area with existing or potential access to public sewer and water facilities and access to major transportation routes.” A new district should be created to protect this interior core forest.

3. Buck Hill Core Forest Area. This forest area between Buck Hill Road, North Road, Route 116 and Mechanicsville Road is relatively small, but is notable because of its proximity to the village and position along the transition between the valley and foothills. It is also connected to the conserved Russell Farm, which contains a network of walking trails that are open to the public.

Buck Hill, or High Rock, is a cliff in the center of this area that supports a community of red oak, white pine, blueberries, and other plants common to a Dry Oak Forest. There is evidence that ravens are nesting in the pine trees along the cliff or on the cliff itself, and that other wildlife are using the connected ridge as a travel corridor. Valley Clayplain Forests have also been mapped in lower elevation areas just west of Buck Hill. Valley Clayplain Forests are a rare natural community in Hinesburg and the state. The area should be field-checked to determine the current condition of these forests.

4. LaPlatte Headwaters/Lewis Creek Core Forest Area. Despite its small size, this forest area north of Lewis Creek Road between Gilman Road and Baldwin Road is important because it is the only contiguous forest area in Hinesburg’s western valley, which is dominated by open, agricultural land and smaller, forest fragments. Although the parcels that comprise this area are relatively small compared to those in the eastern foothills core areas, a high percentage of them are conserved including state, Hinesburg Land Trust, and privately conserved land, as well as the new LaPlatte

Headwaters Town Forest. An established and well-used network of public and private trails are found through this area and on lands connected to it.

Due to the diverse bedrock, surface geology, and soils in this part of town, the forest types in this area are known to be diverse. There are some significant natural communities, including the Valley Clayplain Forest, and rare plants and wildlife species, including the federally-endangered Indiana Bat. Most of the area has been mapped as a deer wintering area that connects to another wintering area south of Lewis Creek Road. This area encompasses a large portion of the headwaters of the LaPlatte River, as well as some small tributaries of Lewis Creek, so it is of critical importance in protecting downstream water quality. In addition, this area is just to the west of an identified wildlife crossing that links this core area and other habitats in the valley with the larger core forest areas in the eastern foothills of town.

SMALLER FOREST AREAS

The part of town west of Route 116 is comprised of many smaller forest areas embedded in a matrix of open land. Collectively, these forest areas make up a significant percentage of the land cover in this part of town. As noted elsewhere, these smaller areas of forest serve important functions and are still ecologically important despite their small size.

Since the physical landscape (geology, soils, and hydrology) is more diverse and the climate is milder, it is likely that there is also a greater diversity of different forest types and natural communities in the western part of town. This is the case on the conserved Bissonette Farm, which contains a high diversity of natural communities including some that are of statewide significance, such as Transition Hardwood Limestone Talus Woodlands, a Red/Silver Maple-Green Ash Swamp, and Valley

Clayplain Forests. Many of the natural communities found in the western part of town, such as Clayplain Forests, are restricted to the Champlain Valley and are rare in the state. These small forest areas also likely provide important habitat refuges and linkages or corridors for wildlife living in the Champlain Valley and/or traveling between the valley and the Green Mountains.

A complete map of all the natural communities in Hinesburg does not yet exist, although some smaller areas such as the Hinesburg Town Forest and the LaPlatte Headwaters Town Forest have been mapped. Knowing which natural communities are present in Hinesburg, along with their location and current condition, could inform land management and long-range planning for private landowners and the town. It would also allow individuals, the town, and conservation organizations to prioritize the protection and conservation of natural communities that are significant because of their high quality, rarity, and/or large size within the town and the state.

CONNECTING HABITAT

Without safe links between core forest areas and smaller forest fragments, patches of forests become islands in the larger landscape. Connecting habitat, such as riparian corridors, strips of forest cover between developed areas, and hedge or fence rows, can all potentially provide safe corridors for animals and plants to move along. For example, wide-ranging animals, such as bobcat, black bears, and moose, use connecting habitat to get from one core forest area and to move between different habitat types during different seasons. Even smaller animals, such as eastern newts and beavers, use connecting habitat to disperse to new habitats as juveniles, or to travel to breeding sites.

Connecting habitats have been mapped in Hinesburg using data from the Wildlife Crossing Project. These known corridors should be protected and monitored since wildlife may change

their use of the connecting habitats in the future. Other connecting habitats between significant smaller forest fragments in the western valley and road crossings between the core forest areas in the eastern foothills should be identified, monitored, and protected.

PUBLIC AND CONSERVED FOREST LANDS

For a list of public and conserved lands in Hinesburg, see the Conserved Lands Map in the town plan.

CURRENT USE LANDS

The Vermont's Use Value Appraisal (UVA) Program, or Current Use Program is available for owners of forested lands. The Current Use Program contributes to maintaining the health and integrity of Hinesburg's forests by:

- ✿ Requiring a management plan approved by the Chittenden County Forester, which encourages wise use and careful management.
- ✿ Providing tax relief to offset cost of forest property ownership.
- ✿ Requiring that "productive" forest be managed for forest products so as to contribute to local forest economy.

A recent change to the program will allow ecologically significant treatment areas (ESTAs) as defined by the Vermont Department of Forest, Parks and Recreation and the Fish and Wildlife Department to be enrolled, but excluded from management solely for forest products. This change should help to reduce parcelization and fragmentation rates in Hinesburg since more landowners will benefit from the ability to enroll in this tax abatement program. Despite tax abatement that is offered by the program, development pressure and escalating land valuation continue to be issues for many forest and farm landowners.

Forest products that are generated from the management of Hinesburg's forests include, but are not limited to, timber, firewood, pulpwood, chipwood, maple syrup, wild edibles, medicinals, and artisanal products. Many private landowners generate supplemental income from forest products or personally use forest resources from their land (e.g., firewood). Income generated from forest products can be critical for many forest landowners in offsetting the costs of property ownership. However, it is challenging to make the harvest of these products economically viable on small parcels. In addition, the markets for forest products are variable, and cannot always be counted on to provide a regular profit to small landowners or local mills.

There is strong interest among Hinesburg forest landowners to see their land stay in forest uses, despite the many pressures that are acting against them to sell, divide, and convert their land. A 2007 survey of 54 Hinesburg landowners identified the following opportunities for creating a sustainable forest-based economy:

- ✿ Diversify forest uses.
- ✿ Develop new products and markets.
- ✿ Reduce property taxes.
- ✿ Help landowners with long-range planning.
- ✿ Explore ways to lower and control input costs.
- ✿ Help match aspiring foresters with interested landowners.

BENEFITS AND SERVICES

Forest-related greenspace features provide the following benefits and services:

	PUBLIC HEALTH AND SAFETY	NATURAL RESOURCE PROTECTION	WORKING LANDS	OUTDOOR RECREATION	COMMUNITY CHARACTER
Core forest areas	●	●	●	●	●
Small forest areas	○	●	●	●	●
Connecting habitat	○	●	○	○	○
Public and conserved forests	○	●	●	●	●
Current use lands	○	●	●	●	○

Forests contribute to the biodiversity in the town at the landscape, community, species, and genetic levels for plants, animals, and other organisms. They are home to a number of documented rare and threatened plant and animal species, including the federally endangered Indiana Bat. The larger, connected core forest blocks support breeding populations of species such as bobcat, black bear, moose and interior-nesting songbirds. Individuals in these wildlife populations can repopulate other forest patches in the region that are too small to support their own breeding populations.

Forests supply a variety of products for personal use and income generation as described above. Forests also support jobs for those that manage, harvest, and/or process forest materials. They maintain surface water quality, contribute to aquifer recharge, control stormwater runoff, protect air quality, and sequester carbon. They provide a multitude of social, recreational, and educational opportunities that range from pedestrian and motorized recreation to pursuits such as photography, bird watching, hunting, fishing and trapping to contemplation and spiritual renewal. Hinesburg's forests offer

opportunities for the community to come together to care for, learn from, and connect to local ecosystems through projects such as the “Forest to Floor” project.

As our forested ecosystems are significantly altered, smaller forest patches or individual trees often remain as a part of the developed landscape. These smaller patches of forest surrounded by non-forested land cover, as well as individual trees continue to serve important functions such as air purification, carbon sequestration, firewood provision, maple syrup production, stormwater control, water quality protection, soil retention, shade, shelter, and beauty to developed areas.

RISKS

Forest lands face a number of risks, the most significant of which is increased parcelization, conversion, and fragmentation of Hinesburg’s forests. Parcelization leads to:

- ✿ A decrease in the average size of forest parcels owned by landowners and an increase in the number of parcels, which generally leads to a lack of cohesive management within forest blocks, an increase in conversion to non-forested uses, and an eventual increase in forest fragmentation.
- ✿ Loss of habitat, genetic diversity, core areas, and robustness in response to disease and stress.
- ✿ Loss of the economic viability of generating local forest products from small parcels.
- ✿ Increased risk of introduction of invasive species, exotic pests and diseases, and edge habitat parasites and predators.

Additionally, Hinesburg’s forests face increased stresses from invasive species, pests and diseases, and climate change. Non-native, invasive species and pests such as European buckthorn,

Japanese barberry, and Morrow’s honeysuckle, hemlock woolly adelgid, emerald ash borer, Asian long-horned beetle threaten or have the potential to threaten the survival and regeneration of native plant and animal species within Hinesburg and the region. Loss of native species diversity has wide-ranging consequences for forests, wildlife, and people (ex. loss of sugar maple trees threatens Hinesburg and Vermont’s maple sugaring economy).

Another concern is the general loss of forest area, which has a number of effects including:

- ✿ Less air pollution reduction and carbon sequestration.
- ✿ Weakening of Hinesburg’s local and regional forest-based economy (particularly when combined with increased development pressure and escalating land valuation).

Additionally, poor stewardship and forest management can lead to loss of healthy, robust trees and genes, to soil erosion, and to water quality and wildlife habitat degradation.

WILDLIFE HABITAT & ECOLOGICAL AREAS

INVENTORY

This greenspace planning process identified a diversity of Ecological Resource Areas in Hinesburg. Some deserve special recognition and special protection because they are unusual and others deserve protection because of their importance to one or several species of wildlife. Greenspace features include the following types of wildlife habitat and ecological resource areas:

- ❁ Northern hardwood forest
- ❁ Wetlands and riparian areas
- ❁ Valley clayplain forest
- ❁ Large open hay fields (>25 acres)
- ❁ Deer wintering areas
- ❁ Vernal pools
- ❁ Cliffs and steep talus slopes (>175%)
- ❁ Streams and lakes

NORTHERN HARDWOOD FOREST

This is the dominant forest type on the east side of Hinesburg and is composed largely of sugar maple, American beech, yellow birch, and hemlock. All of the familiar large mammals (white-tailed deer, moose, black bear, bobcat, fisher) are found in this habitat type, as are many less familiar songbirds and amphibians. Edge habitat along roads, fields, and house lots is common, but far more valuable from a wildlife perspective is core wildlife habitat. The best examples of core wildlife habitat are on eastern edge of town starting at the Richmond line and extending south to Hollow Road with breaks only at Sherman Hollow, Texas Hill, and Lincoln Hill Roads. Figure 6 represents a list of familiar birds and mammals found in forest interior vs. forest edge habitat.

Figure 6. Woodland Birds and Mammals of Hinesburg

Edge Species

Mammals. Eastern cottontail, coyote, red fox, white-tailed deer, moose, striped skunk, raccoon, meadow jumping mouse.

Birds. Red-tailed hawk, great horned owl, eastern phoebe, least flycatcher, American robin, gray catbird, brown thrasher, yellow warbler, black and white warbler, American redstart, chestnut-sided warbler, common yellowthroat, indigo bunting, song sparrow, brown-headed cowbird.

Interior Species

Mammals. Masked shrew, northern & southern flying squirrels, red-backed vole, woodland jumping mouse, fisher, black bear.

Birds. Broad-winged hawk, barred owl, great crested flycatcher, eastern wood pewee, brown creeper, winter wren, hermit thrush, wood thrush, ovenbird, black-throated blue warbler, black-throated green warbler, Canada warbler, magnolia warbler, scarlet tanager, rose-breasted grosbeak.

Notes: Includes species that are typical of forest edge or forest interior habitat. Many other resident species are not included in this table because they are habitat generalists and not found in just edge or just interior habitat

WETLANDS AND RIPARIAN AREAS

Marshes, swamps, and other wetlands are home to a specialized group of animals that includes beavers, waterfowl, muskrats, mink, and otters (Figure 6). Carse Swamp, a beaver-created wetland along Baldwin Road, is a good example of a large, local wetland of significance. Both the LaPlatte River and Lewis Creek complexes offer extensive riparian wetland habitat.

Development of wetland areas is regulated by the Army Corps of Engineers at the federal level; impacts to areas less than 1 acre require a general permit and impacts to larger areas require an individual project permit. The Vermont Agency of the Natural Resources also regulates significant wetlands (Class 1 & 2 as shown on the Vermont Significant Wetland Inventory). State-level regulations are limited in scope since the majority of wetlands are not depicted on the Vermont Significant Wetland Inventory. Adjacent riparian buffers along streams and wetlands (many of

which serve as natural wildlife corridors) are not protected by federal or state regulations.

Figure 7. Common Wetland Species of Hinesburg

Amphibians
Bullfrog, green frog, leopard frog, spring peeper, gray treefrog, pickerel frog, wood frog, eastern newt, northern dusky salamander, spotted salamander, Jefferson salamander, blue-spotted salamander, northern two-lined salamander, spring salamander
Reptiles
Snapping turtle, painted turtle, wood turtle
Birds
Great blue heron, green heron, American bittern, wood duck, mallard, northern harrier, Virginia rail, belted kingfisher, common yellowthroat, yellow warbler, swamp sparrow, red-winged blackbird, common grackle
Mammals
Star-nosed mole, water shrew, American beaver, muskrat, mink, river otter

VALLEY CLAYPLAIN FOREST

Historically, this was the dominant forest type in the Champlain Valley. Because of the fertile valley soils, clayplain forests have been largely converted to agriculture and development, and remnant clayplain forest patches are seldom more than 10-20 acres in size. The largest areas of clayplain forest in Hinesburg are on the west side of town and continue into Charlotte. Dominant forest species are a variety of oaks, maples, shagbark hickory, American beech, and American elm. The significance of the clayplain forest to wildlife lies in its unique habitat assemblage and its heavy mast (nut) production in the fall.

LARGE OPEN HAY FIELDS

Large mowed fields (≥25 acres) are important habitat for field-nesting birds, such as savannah sparrows, bobolinks, and eastern

meadowlarks. For these fields to be useful to these birds, it is important that they not be mowed until young birds have left the nest in mid-July.

DEER WINTERING AREAS

Deer in northern New England require the shelter of mature softwood stands (principally hemlock and spruce) for protection from cold temperatures, winter winds, and deep snow. Deer yards in Vermont are factored into state-level development review via the Act 250 permitting process. Impacts to deer yards from smaller developments (which are more common in Hinesburg and exempt from Act 250) and forest management remain largely unregulated. Vermont Fish and Wildlife Department has identified several deer wintering areas in Hinesburg, and these need to be conserved if we are to retain our local deer population. It is also important that wintering areas mapped in the 1980s and 1990s be re-examined to determine whether they are still being used as wintering areas or whether they are simply patches of softwoods, such as white pines or red pines, that have little value to deer.

VERNAL POOLS

These temporary ponds serve as required breeding habitat for a number of amphibians, including the spotted salamander, wood frog, and American toad, and others, which would be eaten by predaceous fish and large frogs in permanent ponds. These vernal pool amphibians spend most of the year in the hardwood forests surrounding vernal pools, and it is important to conserve these areas as well. Because vernal pools occur under a forest canopy, they are not easy to detect through aerial photography or satellite imagery, and they are underrepresented on town habitat maps.

CLIFFS AND STEEP TALUS SLOPES

These steep slopes (>60 degrees or 175%) with rocky outcroppings and numerous crevasses represent important den sites for mammals, such as bobcats and porcupines, and nesting sites for birds, such as ravens, peregrine falcons, and turkey vultures. Examples of steep rocky slopes are scattered throughout the east side of Hinesburg – those along the north side of Hollow Road are particularly dramatic.

STREAMS AND LAKES

These areas have intrinsic habitat value, and in many cases have public benefits as well. They also provide connectivity to other habitats in Hinesburg and adjacent towns. All are threatened by development pressure and fragmentation. Some areas, such as pond and lake habitats, are threatened by eutrophication, while others are threatened by invasive species. Finally, inappropriate or incompatible recreation uses threaten sensitive habitats in other areas.

BENEFITS AND SERVICES

Wildlife habitat and ecological resource areas are greenspace features that provide the following benefits and services:

	PUBLIC HEALTH AND SAFETY	NATURAL RESOURCE PROTECTION	WORKING LANDS	OUTDOOR RECREATION	COMMUNITY CHARACTER
Northern hardwood forest	○	●	●	●	○
Wetlands and riparian areas	●	●	○	○	○
Valley clayplain forest	○	●	○	○	○
Large open hay fields (>25 acres)	○	●	●	○	○
Deer wintering areas	○	●	○	○	○
Vernal pools	○	●	○	○	○
Cliffs and steep talus slopes (>175%)	●	●	○	○	●
Streams and lakes	○	●	○	●	●

The Town of Hinesburg has rich ecological resources, including core forestlands, important wildlife habitat, significant wetlands, surface waters, special natural areas, and linkages between them. These areas provide a matrix of habitat types for a diversity of wildlife species. In addition to their habitat value, these areas provide public benefits such as open space, beautiful scenery, and recreational opportunities.

Hinesburg sits in an unusual location with respect to ecological and wildlife resources. The town is almost evenly divided between lake plains to the west of Route 116 and foothills of the Green Mountains to the east of Route 116. As a result, we see representatives of fragmented clayplain forest and farm fields in the west side of town, as well as representatives of larger stands of more typical northern hardwood forest on the east side of town.

We are now seeing development pressure that Hinesburg has not experienced in the past. Chittenden County is growing rapidly and suburban sprawl is spreading in our direction. For this reason, it is important to establish some guidelines for future development in Hinesburg that take wildlife into account.

There are several ecological principles that are important to keep in mind when discussing Hinesburg's wildlife resources. These include:

1. Successional Changes. A well-established rule of ecology is that plant communities on a given piece of land gradually change in orderly progression over time and go from abandoned fields to brush to young woodland to mature forest. Wildlife habitat is frequently described in terms of level of disturbance and time since last disturbance. Disturbance can be natural, e.g., lightning-set fires, hurricanes, and floods, or it can be human-made, e.g., agriculture, logging, and housing development. We refer to habitat that has been recently disturbed as "early successional" and habitat that has not been recently disturbed as "late successional."

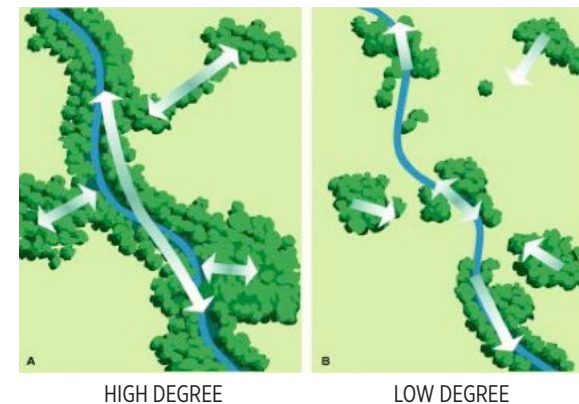
Some species of plants and animals do best in early successional habitat; other species do best in late successional habitat; and still others are generalists and are found in all kinds of habitats. Examples of familiar early successional species include white-tailed deer, ruffed grouse, and woodchuck. Examples of late successional species include fisher, barred owl, and scarlet tanager. Late successional habitat supports more species of plants and animals than early successional habitat, i.e., it has greater diversity, but a mix of early and late successional habitats supports more than either alone.

Probably all of Hinesburg has been impacted by human disturbance at some time since European settlement. Much of the town has been farmed at some time in our history,

and what was not cleared for agriculture was cut for lumber, firewood, or potash. However, farms in the foothills on the east side of town have now been largely abandoned, and this area is reverting to mature hardwood forest. On the west side of town there are areas of mature valley clayplain forest interspersed with the farm fields. Again, because of its greater habitat diversity, Hinesburg has greater potential for plant and animal diversity than most nearby towns.

2. Habitat Fragmentation. One of the most important problems facing wildlife in the populated parts of this country is habitat fragmentation. Habitat fragmentation occurs when large areas of similar habitat are broken up into smaller parcels separated by roads, housing developments, and clear-cut forests.

Figure 8. Degree of Connectivity



Breaking up the landscape into small units impacts wildlife in a number of ways. Species that have large home ranges, such as black bears and bobcats, may not be able survive in a checkerboard landscape because no single habitat unit has sufficient resources to support a viable population. Small habitat patches may reduce populations of animals

(and plants) with small home ranges to such low levels that they disappear. Species that require several habitat types to survive, such as spotted salamanders, may not be able to get from one habitat type to another and thus disappear. Other species may disappear for lack of genetic diversity as they are reduced to small isolated populations on habitat “islands.”

In general, large unbroken areas of wildlife habitat are preferable to small habitat patches. Large areas can accommodate species with large home ranges and species with small home ranges, but small patches can provide suitable habitat only for species with small home ranges.

Another important issue relative to habitat fragmentation is the access it gives predators to nesting birds. Nest predators, which include a broad array of birds and mammals, gain access to nests from corridors and woodland edges. These nest predators generally restrict their activities to a distance of 500 feet from edges. Birds nesting more than 500 feet from an edge in what is referred to as “core habitat” or “forest-interior habitat” have much higher nesting success than those with nests closer than 500 feet to an edge in what is referred to as “edge habitat.” Nesting areas composed of small patches are often all edge habitat, because no part of a small woodland patch is more than 500 feet from an edge or corridor. The same approximate distances from edges seem to apply to parasitism of songbird nests by brown-headed cowbirds. The combination of nest predation and brood parasitism results in forest-interior birds not being able to replace themselves in edge of habitat areas.

RISKS

A certain amount of habitat change and habitat fragmentation is unfortunately inevitable as our human population increases. The challenge in local and regional planning is to accommodate human population increase in a way that will allow native wildlife populations to persist.

The best way to minimize the effects of habitat fragmentation is to plan for corridors that will link habitat units and allow animals to move from one parcel of suitable habitat to another. In this way, animals with large home ranges may still be accommodated and small parcels of suitable habitat remain useful to them. Landscape linkages allow populations of animals with small home ranges not to become isolated and susceptible to local extinction (extirpation). In addition, local populations will not disappear because of lack of gene flow from one population to another.

There is no single simple answer to the question of what constitutes a suitable wildlife corridor. Large animals can cover ground more quickly than small animals. Some animals are swift runners and others are slow crawlers. Small mammals and snakes might find adequate cover in a strip hardly wider than a fencerow, but large mammals, such as moose and bears, might need a wooded strip 100 feet wide to feel safe. Most animals may be able to cross a low-traffic, dirt road with ease, but a heavily traveled highway, such as Route 116, may represent a significant barrier to all but the fastest. We often think of corridors as being important only for mammals, amphibians, and reptiles, but there is good evidence that small birds are reluctant to cross wide-open stretches with no cover for protection from predators. Linkages between areas of wildlife habitat are important, and in general, they should be as short and broad as possible so that animals can move through them quickly and safely.

The following points should be remembered:

- ✿ A mix of different successional stages of habitat results in the most diverse populations of plants and animals. However, late successional habitat (mature forest here in New England) takes the longest time to recreate following disturbance and should be guarded most aggressively.
- ✿ Large habitat areas are more valuable to wildlife than small fragmented patches. Habitat fragmentation should be avoided where possible. Houses within a development should be clustered rather than evenly distributed across the property.
- ✿ The impact of habitat fragmentation can be reduced by planning for linkages between smaller areas of suitable wildlife habitat. The presence of corridors reduces the number of isolated habitat islands on our landscape.
- ✿ The charismatic megafauna that we all love to see should remain wild and not “tamed” and eventually turned into pests. The increase in the sightings and interactions between previously shy animal species and people is not necessarily a sign that those animal populations are actually wild and healthy. While occasionally presented as evidence that there is little need to preserve habitat because these sightings and encounters are becoming more common, it is entirely possible that they are occurring because of major disruptions to their normal routines. Many animals are being forced out of their normal habitat and forced to rely on, or seduced by, civilized food sources and habitat compromised by development for their existence.

AGRICULTURE

INVENTORY

Agriculture-related greenspace features include:

- ✿ Agricultural soils
- ✿ Farms
- ✿ Current use land

Hinesburg’s beginnings as a town are rooted in agriculture. By the mid- to late-1800s, almost all of the town’s western valley and eastern hills had been cleared and were being actively farmed. Those local farms were supplying mills in the village and Mechanicsville with the raw materials to produce flour, cheese, cider, woolen textiles, and other products.

The number of farms in Hinesburg and across the state steadily declined over the 20th century due to a combination of factors, including market conditions, federal price support policies, and widely spreading development. Hinesburg, like many towns in Vermont, is moving toward a service, commercial, and light industrial economy and provides housing for many residents who commute to jobs elsewhere.

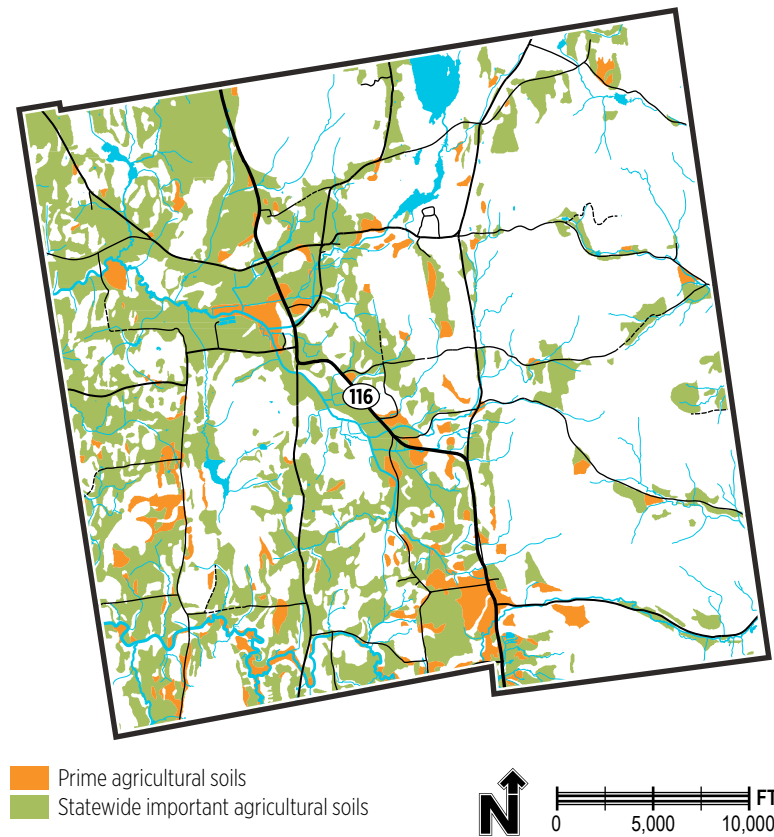
Farms and farming continue to be an important part of our town’s identity, economy, and ecology despite the dramatic changes in our landscape, economy, and culture. In fact, the beginning of the 21st century has seen a farming renaissance in Hinesburg with greater diversification, the creation of smaller and organic operations, and interest from young farmers – both in rejuvenating family farms and in establishing entirely new operations.

AGRICULTURAL SOILS

Not all land is equally well suited for farming. Topography, hydrology, climate and, most important, soils affect the quality

of land for use in producing food, feed, and forage. The Natural Resources Conservation Service (NRCS) has mapped and ranked the quality of soils for farming in Hinesburg as shown in Figure 9. Approximately 8,154 acres, or about 32% of the town, is ranked as prime or statewide agricultural soils.

Figure 9. Agricultural Soils Map



According to the NRCS, prime agricultural soils are suitable for almost any type of farming operation and are essential for intensive agriculture. These soils have the best combination of

physical and chemical characteristics for producing food, feed, and forage crops and have not been converted to other uses. Farmland with prime soils has the soil quality, growing season, and moisture supply needed to economically produce sustained high yields of crops when treated and managed according to acceptable farming methods. Statewide soils, and some of the lesser-ranked soils that have been improved with drainage, are also well suited for the production of food, feed, fiber, forage, and oilseed crops. These soils comprise the bulk of the land that helps support the region's agricultural operations. Together, these two highest categories are considered best suited for general agricultural use.

In Hinesburg, the majority of these productive agricultural soils are located in the valley west of Route 116, which corresponds to the location of most of the existing farms in Hinesburg. Of these productive soils, 1,148 acres (14%) are considered prime agricultural soils. Hinesburg's best agricultural soils will be an even more critical resource for future generations.

FARMS

Farming in Hinesburg has been recently reinvigorated by people relatively new to the local agricultural community who work their own and/or leased lands. According to the 2007 USDA Census of Agriculture, there was a total of 53 farms in the 05461 (Hinesburg) zip code, which was 13 more than counted in 1997 or 2002. The number of large farms (50 acres or more) has remained essentially unchanged at 26. The increase is a result of new smaller operations. Between 2002 and 2007, the number of farm operators who reported farming as their primary occupation increased from 14 to 24.

Figure 10. Number of Farm Operations in Hinesburg by Type

	1989	1997	2004	2009
Dairy	11	8	3	2
Horses	9	8	5	15
Hay and forage	8	6	6	33
Livestock	18	11	7	11
Nursery or horticulture (includes Christmas trees)	10	7	4	3
Maple sugaring	4	7	7	9
Row crops	2	1	1	16
Total	62	48	33	89

Sources: Hinesburg Town Plan, 2005 (Estimates by Holly Russell, Jean Isham, Marshall Delaire, and Wayne Bissonette 1997 and 2004; and research by Bill Marks for 2009). The recent high increase in hay and forage and row crop numbers may in part be due to the more extensive use of tax maps and aerial photos.

By far the largest single agricultural use of land is in the form of hay production and forage (pastureland). The number of parcels providing this important agricultural resource involves at least 33 different property owners. Helping to support this use, the keeping of horses has expanded since 2004. Also supporting the hay and forage uses of farmland are livestock operations, which are mostly commercial and mostly in beef (although we do have some sheep, goats, and even llamas).

Throughout the 20th century, the traditional Holstein dairy farm was the primary type of agricultural operation in town. According to the 2007 Census of Agriculture, only two dairy farms with significant milk sales remain in operation in the 05461 zip code and a third farm sells a limited amount of milk.

The types of agricultural activities occurring in Hinesburg has diversified over the last 20 years. Perhaps the most rapidly growing category of farm operations in Hinesburg, both in number and diversity, is row crops (see table above). In addition

to the relatively recent appearance of organic vegetable farms, at least two vineyards in town have been established.

CURRENT USE PROGRAM

Enrollment in Vermont's Current Use Program, which provides a substantial property tax discount, is one indicator of commitment to current and future use of land for agriculture or forestry. In 1989, of the approximately 26,640 acres in Hinesburg, 9,588 acres were under state farm use contracts (Hinesburg Town Plan, 2005). There were 2,389 acres being actively used for agriculture that were not under any contract. In 2012, 9,030 acres were enrolled in the current use program. The majority of this land is forest land, rather than agricultural land. As of 2008, only about 2,960 acres were in the agricultural current use program.

BENEFITS AND SERVICES

Agriculture-related greenspace features provide the following benefits and services:

	PUBLIC HEALTH AND SAFETY	NATURAL RESOURCE PROTECTION	WORKING LANDS	OUTDOOR RECREATION	COMMUNITY CHARACTER
Agricultural soils	○	○	●	○	○
Farms	○	○	●	○	●
Current use lands	○	○	●	○	○

Hinesburg's farms, from the full-time dairy operation to community supported agriculture (CSA) operations (both small and large), are a local source of fresh, healthy food and agricultural products. These farms contribute to our town and regional economy by providing jobs and helping to sustain local businesses. The fields, meadows, and pastures of Hinesburg's

farms may provide habitat for wildlife, such as grassland birds if not harvested before midsummer, with places to feed and nest; and people in our community with places to hike, hunt, snowmobile, and bird watch. Hinesburg's farms are a vital part of our town's rural character and contribute to its scenic beauty.

Vermont farms are required to operate in compliance with Best Management Practices (BMPs), as formulated by the Vermont Agency of Agriculture, to protect water quality, prevent erosion, and enhance wildlife habitat by absorbing and filtering runoff. Unfortunately, these guidelines are out of date and are insufficient. Larger buffer areas and better protection of riparian habitat are needed beyond what they currently recommend. New energy crops, such as switch-grass and willow, have potential to serve as local alternatives to fossil fuels.

Undeveloped farmland demands little public infrastructure relative to new development. Nationwide, communities have found that farm and open lands have the potential to more than pay for the municipal services they require, while residential taxes on average fail to cover costs generated by residential development.

Hinesburg residents, at a grass roots level, have demonstrated their support for sustaining a viable agricultural community. In 2006, a series of "Community Visit" gatherings was held in Hinesburg, sponsored by the Vermont Council on Rural Development and attended by more than 150 local residents, to determine the most important issues facing Hinesburg's future. Of the four areas identified, two dealt with the need to conserve our farm and forest lands and support our local specialty farms. Four of the seven possible sustainability projects initially considered all dealt with the promotion of local farm/food production, bio-fuel crop and wood production, and a local Farmers' Market.

As demonstrated by the above, our changing agricultural community has become more diverse and adaptable and, as a result, is both transforming and helping to conserve our traditional rural landscape. The scope of farming has been expanded by many newer residents who engage in non-commercial, as well as commercial, pursuits such as gardening, sugaring, and the keeping of poultry, horses, goats, and other livestock.

RISKS

Clearly, farming practices are changing rapidly in Hinesburg. While we have all but lost our dairy farms, we can still encourage the growth of alternative farms, such as organic vegetables, beef and other livestock, and as mentioned above, the growing of certain grasses that may soon become a viable source of energy. For these and other reasons, large areas of farmland have been a primary focus of our past efforts to obtain conservation easements and similar perpetual safeguards to protect against the threats of their fragmentation and eventual destruction by future development. Once farmland has been converted to another use, it can be very difficult to reclaim.

RECREATION

INVENTORY

Recreation-related greenspace features include:

- ❁ Town roads
- ❁ Trails
- ❁ Lakes and ponds

BENEFITS AND SERVICES

Recreation-related greenspace features provide the following benefits and services:

	PUBLIC HEALTH AND SAFETY	NATURAL RESOURCE PROTECTION	WORKING LANDS	OUTDOOR RECREATION	COMMUNITY CHARACTER
Town roads	○	○	○	●	●
Trails	○	○	○	●	●
Lakes and ponds	○	○	○	●	●

TOWN ROADS

Our dirt road network is undoubtedly our most used recreational facility. While everyone traveling our roads enjoys their visual aesthetics, experiencing them other than in a car is unquestionably the most rewarding.

For the most part, the paved roads in our town lack sufficient shoulders and are therefore unsafe for non-motorized vehicles and generally not used except by the more experienced or intrepid bikers and runners. Improvements are recommended to facilitate the use of all our roads and roadsides by pedestrians and non-motorized vehicles, but it is imperative that we evaluate and protect the unique rural experience available to recreational

users of our dirt roads. While there is no quantitative analysis available to use as a basis for comparison, we know that as motor vehicle usage and speeds increase, the experience of recreational users of the roads diminishes.

TRAIL NETWORKS

The most popular recreational feature on our rural lands is our extensive system of trails. In 2004, an ad hoc subcommittee of the Hinesburg Recreation Committee was formed to attempt to create and maintain an interlocking system of trails and dirt roads in Hinesburg for recreation and non-motorized transportation uses.

In February 2007, the Selectboard recognized the importance of this group's activities and created an officially appointed Hinesburg Trails Committee (HTC) to continue these and related efforts, "to assure that Hinesburg is a community where sidewalks, trails, and unpaved roads provide a safe way for residents to travel, to connect with each other, and to enjoy both the village and surrounding rural area by foot, bicycle, and on horseback."

The Fellowship of the Wheel, a chapter of the Vermont Mountain Bike Association, has been collaborating with the HTC and maintains its own network of trails on private lands in town. Similarly, the Vermont Association of Snow Travelers (VAST) maintains access points and trails in its own network of trails, most of which are in greenspaces, for snowmobiling.

The HTC oversees the Hinesburg Area Recreation Trails (HART) system. Maps of trails that are open to the public may be found on the Town web site or at the Town Hall for the following properties: Russell Family Farm, Geprags Park, Gillespie/Copp-Welch conserved land, Fred Johnson Wildlife Management Area, and the Hinesburg Town Forest.

The HTC is working to identify high priority areas for future trail development based on a set of goals and principles. Specific trail priority areas are based on the following goals:

- ✿ Connectivity between dirt roads within close proximity to each other.
- ✿ Connectivity between significant public trail networks within close proximity to each other and connectivity between private trails and nearby public trail networks, in order to provide access to these public trails for area residents.
- ✿ Connectivity between significant tracts of publicly owned land (town and state) within close proximity to each other.
- ✿ Connectivity between any combination of the above within close proximity to each other.
- ✿ Safe pedestrian/bike access to the village center by anyone living within a 1.5-mile radius of the village.

In looking at potential trail locations, the HTC will strive for compatibility among the Town's different uses of our natural areas, including hunting, agricultural and forestry uses (logging, haying, sugaring, etc.), wildlife habitat, water resources management, and protection of environmentally sensitive areas. As it works to create and add to Hinesburg's trail network, the HTC aims to work with landowners to create a system with continuity of connection for the various types of trail users.

LAKES AND PONDS

Surface waters, such as Lake Iroquois and Sunset Lake, in Hinesburg are impacted by recreational activities, including boating and beach activities. Lake associations are already investigating the water quality issues of these surface water bodies.

RISKS

Greenspaces in Hinesburg provide for a wide variety of recreational opportunities. Depending on their impact on natural resources, their appropriateness in greenspace areas vary:

- ✿ Low impact activities that are acceptable in all but the most sensitive areas include cross-country skiing, snowshoeing, bird watching, swimming, hunting, trapping.
- ✿ Those with impacts that have to be mitigated to avoid impacts include hiking, biking, horseback riding, (trail erosion) fishing and non-motorized or electric powered boating (invasive species), motorized boating (invasive species, noise and pollution) and snowmobiling (noise and pollution).
- ✿ The potential impact that ATVs have on the soil and water as well as noise and pollution, makes it very difficult for their use to be compatible with appropriate land management.

Other sports activities, such as golfing, tennis, school and other organized sports, ice skating and hockey, are for the most part not within the purview of this plan because of the "developed" landscape they require, and are generally not appropriate in a rural setting when accommodating more than the immediate family and friends of the resident property owner.

Those activities that are not dispersed, and require or create trails and corridors should be carefully located to avoid sensitive natural features or wildlife habitat, and only located within crucial habitat connection areas if they will not impact wildlife use.

SCENIC VIEWS

INVENTORY

Over the years, both the Planning Commission and the Conservation Commission have attempted to quantify and document Hinesburg's scenic resources. As part of this greenspace planning process, a planning consultant (LandWorks of Middlebury, Vermont) conducted a scenic resource evaluation along major paved roads. Neither this evaluation nor previous attempts have succeeded in quantifying Hinesburg's scenic resources. Such resources are clearly important to the community and Hinesburg's sense of place, but are difficult to address via objective standards or regulations.

Greenspace features with scenic value include:

- ✿ Scenic roads
- ✿ Significant views

BENEFITS AND SERVICES

Greenspace features with scenic value provide the following benefits and services:

	PUBLIC HEALTH AND SAFETY	NATURAL RESOURCE PROTECTION	WORKING LANDS	OUTDOOR RECREATION	COMMUNITY CHARACTER
Scenic roads	○	○	○	●	●
Significant views	○	○	○	○	●

Inherent in the sense of place of any rural community are its aesthetic qualities; that is, those qualities that appeal to our individual senses of sight, sound, and smell. The scenic views and greenspaces that are visible from the road are the ones that we most often experience, and are more likely to be diminished

as land is developed. As previously stated, our roads are our most used publicly owned recreational resource, and are directly impacted by the greenspace attributes of their roadsides.

In conjunction with drafting the 2003 Town Plan Revision, the Hinesburg Planning Commission conducted a town-wide survey to get a sense of the public's attitudes on many local issues. The town's "Scenic Beauty" ranked third (behind "Sense of Community" and "Rural Areas") of all the attributes that its citizens liked most about Hinesburg.

It is important to note that the town conducted a visibility study, or viewshed analysis in 2002, which was later expanded and improved upon in 2005, using GIS mapping techniques to identify highly visible areas when viewed from major roads in the town. While the town has not yet used this data for general planning purposes, the DRB, through its staff, has used this data to help guide it in reviewing specific rural development proposals. It clearly provides some sense of those locations that would be highly visible and therefore sensitive from a visual perspective if subjected to major landscape modifications and development. The map produced from this effort, "Town of Hinesburg Visibility Analysis from Major Roads", should prove to be a useful resource when considering the potential for visual impacts from hillside or ridgeline developments.

As part of the greenspace planning efforts, LandWorks (Middlebury, Vermont) conducted a scenic resource evaluation along major paved roads. This effort utilized an evaluation criteria and ranking methodology. Although the results were interesting, they were not deemed suitable to formally define or identify critical scenic areas, in part because of the essential subjective nature of gauging scenic views – i.e., one consultant's visual evaluation can't speak for the community's scenic values and sensibilities. With that said, some valuable conclusions were reached. Roads that considered to be highly scenic in the

consultant's evaluation either had consistent visual qualities, unique views or landscape character, and were not over-developed. These included Baldwin Road, Hollow Road, Lewis Creek Road, Gilman Road, Isham Road and Shelburne Falls Road. Portions of Route 116, Leavenworth Road and Hollow Road were extensive enough to warrant designation as highly scenic by the consultant

RISKS

When a community's traditional aesthetic assets are threatened or diminished, whether by land use development or adverse human activities, its quality of life suffers. Such threats to our experience as we use our roads include loss of natural and agricultural landscapes (including historic homes, farm buildings, stone walls, old bridges, etc.) the disruption of historic settlement patterns and, for recreational users, noise, dust, pollution and fear of injury. Thus, an assessment and review of how we experience our Hinesburg roads would be helpful to support the community's expressed desire to maintain the visual character of these roads, including the experience of those not traveling in cars. In order to create an effective regulatory review process for aesthetics, we must both determine the extent to which the community wishes to protect these resources and establish a comprehensive inventory of them.

4. RESOURCES

TERMS USED IN THIS PLAN

DEFINITIONS

Aquifer. An aquifer is a geological formation, group of formations or part of a formation either composed of unconsolidated rock, sand, gravel, or other unconsolidated soils, or composed of bedrock with an interconnected series of crevasses, fractures, joints, faults, cleavages, bedding planes, porosity, or other geologic features which allow groundwater to move in the subsurface environment and are capable of storing and yielding groundwater to wells and springs. Aquifers may or may not be connected.

Conservation Easement. The conservation easement is a legal document with a fundamental purpose of permanently protecting the natural condition of property by limiting the type and scope of development that can take place.

Core Wildlife Habitat. Core wildlife habitat is interior or contiguous forest and wetland areas that are removed from roads, house sites, and other similarly developed areas by at least 500 feet, and provide habitat for wildlife species that require or benefit from larger, intact forests that minimize negative impacts from edge environments (e.g., predation, nest parasitism, temperature fluctuation, and desiccation). The size of core wildlife habitat varies from region-to-region and town-to-town as it is dependent upon the identified conservation objectives and values in a particular region or town.

Large habitat blocks (700 acres or more) are delineated as core habitat by the Vermont Fish and Wildlife Department. However, smaller forest areas may be considered 'interior' forests depending on whether their configuration includes a

buffer of at least 500 feet from human disturbances and the types of species involved. Forest areas as small as 2 acres may provide habitat for small songbirds (e.g., scarlet tanager, hermit thrush, black-throated blue warble) or vernal pool amphibians (e.g., spotted salamander), while areas of 25 acres or more may provide habitat for larger species, such as bobcat. The existence of such smaller interior wildlife habitat may be substantiated by a scientific study or field assessment by a qualified expert.

Forest Fragmentation. Forest fragmentation is the conversion of large areas of contiguous native forest to other types of vegetation and/or land use leaving remnant patches of forest that vary in size and isolation.

Greenspace. For the purposes of this plan, "greenspace" is defined as those areas of the town's landscape, both land and water, that are valued for their natural resources, ecosystem services, agricultural or forest production, recreational opportunities, scenic views, or other public benefits. Greenspaces range from undeveloped forest and agricultural lands with no structures, to lakes, streams, wetlands and riparian areas around them, to recreational lands with more intensive trail systems, and finally, to the wider rural nature of our visible landscape which is interspersed with developed areas.

Spatial context and land use are key considerations in classifying greenspace. The size of an area may also be important. Greenspace lands and waters may be actively managed or left in their natural state. They can be publicly or privately owned and may or may not be legally protected.

Regardless of size, ownership status, management, or landscape context, greenspace serves to protect sensitive ecosystems, air and water resources, wildlife habitat, scenic landscapes, and other important features of the natural environment. Examples of greenspace include (but are not limited to) agricultural lands, forestlands, shrub lands, ridgelines, wetlands, undeveloped

shorelines, lakes, ponds, rivers, streams, scenic views, public parks, and preserves.

Low Impact Development. Low Impact Development (LID) is an approach, modeled after nature, where rainfall is managed at the source using uniformly distributed, decentralized, micro-scale controls. LID's goal is to mimic pre-development hydrology by using design techniques that infiltrate, filter, store, evaporate, and/or detain runoff close to its source. Instead of conveying and managing/treating stormwater in large, costly end-of-pipe facilities located at the bottom of drainage areas, LID addresses stormwater through small, cost-effective, landscape features located on-site.

Natural Communities. Natural communities are an interacting assemblage of organisms, their physical environment, and the natural processes that affect them. Natural communities are an integrated way of viewing the landscape that recognizes the connections between plants, animals, and their physical environment. They may be very large, such as the Northern Hardwood Forest in the eastern foothills of Hinesburg, or very small, such as a vernal pool less than an acre in size within the larger forest matrix.

The Department of Fish and Wildlife's Nongame and Natural Heritage Program has already located and mapped some significant natural communities in Hinesburg. Examples of these significant communities include:

- ❁ Mesic Maple-Ash-Hickory-Oak Forest (Hinesburg Limy Cobbles and Wetland)
- ❁ Old growth Red Oak and Red Pine Woodland (Lincoln Hill)
- ❁ Red Pine Woodland (Porcupine Knoll)
- ❁ Valley Clayplain Forest (multiple locations, west side of town)

❁ Red/Silver Maple – Green Ash Swamp (LaPlatte Headwaters Town Forest)

❁ Transition Limestone Talus Woodland (LaPlatte Headwaters Town Forest)

Work has already been done to map the known and potential locations of Valley Clayplain Forest communities throughout Vermont's Champlain Valley. High quality, large Valley Clayplain Forests are very rare in Vermont, since most of the land that would support this forest community has been converted to agricultural use or developed and has stayed in this use up to the present day. Hinesburg may have examples of this rare natural community throughout the western valley, but a field assessment still needs to be conducted to determine the presence and condition of these sites.

Parcelization. Parcelization is the subdivision of forest tracts into smaller ownerships. This phenomenon can have profound impacts on the economics of forestry and lead to reduced forest management, even when land is not physically altered. Land ownership can influence forestland management and investment practices. In addition, per unit costs of forest management practices will increase if economies of scale are lost.

Wetlands. Wetlands are those areas "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." Most wetland types support a unique group of plants and animals, many of which require their wetland habitats to survive.

Wetlands are known by many common names that differ regionally and between disciplines. In Vermont, these names have been applied more consistently in recent years to specific wetland types. The naming of wetlands generally addresses the primary source of nutrients available to the wetland community

(bog vs. fen) and the dominant vegetation present (herbaceous vs. woody), which, in turn, reflects the hydrology of the wetland.

- ✿ **Bogs** are peat-accumulating wetlands that are isolated from mineral-rich water sources by deep peat accumulation and, therefore, receive most of their water and nutrients from precipitation.
- ✿ **Fens** are peat-accumulating open wetlands that receive mineral-rich groundwater.
- ✿ **Emergent wetlands** are typically found along the margins of lakes, ponds or streams, and are inundated throughout most of the growing season. The dominant vegetation is herbaceous, such as water lilies, horsetails, and cattails, which extends above the water surface anywhere from a few centimeters to over two meters.
- ✿ **Marshes** are wetlands dominated by herbaceous plants.
- ✿ **Submerged wetlands** are found along lake, pond or stream margins at intermediate depths between that of emergent communities and open water. The vegetation is herbaceous and always below the water's surface. These wetlands occur in areas that are nearly always inundated.
- ✿ **Swamps** are wetlands dominated by woody plants, whether shrubs or trees. These wetlands may be seasonally or periodically inundated, although the near surface soils are quickly drained following a flood event. Typically, the deeper the water table is below the surface of the soil, the larger the woody vegetation that will be present.

Wetland Restoration. Wetland restoration is the return of a degraded wetland or former wetland to its preexisting naturally functioning condition, or a condition as close to that as possible.

ABBREVIATIONS

ANR. Vermont Agency of Natural Resources

CWP. Community Wildlife Program

DEC. Vermont Department of Environmental Conservation

LIP. Landowner Incentive Program

NNHP. Nongame and Natural Heritage Program

NRCS. Natural Resources Conservation Service

USDA. United States Department of Agriculture

WHIP. Wildlife Habitat Incentives Program

WPRP. Wetlands Protection and Restoration Program

NOTES

GREEN INFRASTRUCTURE

Green infrastructure is an interconnected greenspace network (including natural areas and features, public and private conservation lands, working lands with conservation values, and other protected open spaces) that is planned and managed for its natural resource values and for the associated benefits it confers to human populations. The rationale behind green infrastructure is for a community such as Hinesburg to consider its green spaces, its connective tissue of ecologies and environments, to be an essential municipal investment and management responsibility, integral to its overall health, well-being, safety, and economic vitality. A municipality's green infrastructure supports the working landscape and sustainable living, provides for local recreation and a community sense of place and quality of life.

Green infrastructure:

- ✿ Weaves together conservation lands and working lands—it integrates wildlife corridors, trails, and landscapes;
- ✿ Buffers the built up areas with green spaces and natural geography, allowing the flow of water to rise and fall with the seasons and the storms;
- ✿ Includes beautiful views and indigenous landscapes;
- ✿ Reduces our reliance on costly structures and man-made systems (“gray infrastructure”) for water resource and stormwater management;
- ✿ Reduces the community's susceptibility to fires, floods, and other natural disasters and the dangers and costs associated with them; and,
- ✿ Sustains the ecological dynamics of the community with connective networks of habitats and ecologies.

Green infrastructure should be planned and budgeted for much in the same way as our other capital expenditures for structural infrastructure (roads, sewer, etc.). The green network should be viewed as a system in the same way we consider the wastewater management infrastructure of the town to be a system. There is increasing evidence of cost savings for both landowners and municipalities alike when they adopt the strategies of conservation planning; such as clustered development, strengthened village cores, and conservation of land resource bases for their highest and best uses as green infrastructure.

Community land use planning can readily incorporate the greenspace network, and the landscape's natural patterns and principles as the basis for site planning and resource management. A systematic, inclusive, and open planning process, which this Greenspace Plan advocates, lays the groundwork for Hinesburg residents to make collective and informed decisions about what they value about their geography, their environment, and culture—and how they will go about preserving it.

STEEP SLOPES AND HIGH ELEVATIONS

Ridgelines, along with shorelines and open spaces, are identified as potentially sensitive areas from an aesthetic perspective in the Quechee Analysis adopted as part of Criterion 8 in Vermont's Land Use Law, Act 250, and many communities have incorporated ridgeline and hillside overlays as part of their zoning districts to address and effectively manage development on these sensitive lands. A brief summary of how a few Vermont towns have been attempting to control ridgeline and hillside development are as follows:

- ✿ **Charlotte.** Charlotte prohibits development on slopes >25% and requires conditional use review on slopes between 15% & 25%; paying particular attention to stormwater management and erosion control, and minimizing

impacts on visibility from public vantage points and on public facilities and roads.

- ✿ **Hyde Park.** The town has a delineated 10 acre minimum lot size/maximum density Conservation District which includes “lands with steep slopes, shallow soils, limited road access, and are generally far from public services.”
- ✿ **Middlebury.** The town’s land use regulations include a design review process, which first requires an identification of, among other natural resources, the “scenic features”, including ridgelines and knolls visible from public vantage points. The DRB may also require evaluations and mapping of such scenic vistas to demonstrate that building envelopes, lot lines, roads, driveways, utility corridors, etc, shall be located/ designed to avoid or minimize the impact on the “natural scenic beauty” (see Sect. 572).
- ✿ **Norwich.** The town added a Ridgeline Protection overlay district to its already natural resource ‘friendly’ zoning regulations “to ensure that there is no undue adverse visual impact on the scenic and natural beauty of the site as viewed from town or state highways.” This district includes those areas within 750 feet of designated ridgelines, but excluding areas within 300 feet of a town highway. Additionally, the overlay district requires DRB review of all new development for its potential impact on the town’s other natural resources, including steep slopes and forest cover, similar to the criteria in its subdivision regulations.
- ✿ **Starksboro.** The town has had a “Forestry and Conservation” District in its Zoning Bylaws for more than 20 years “to protect the natural qualities of land that is generally not suitable for development for many reasons, including poor soils, poor access to town roads and other municipal services, steep slopes, and the adverse effect

on the habitat of wildlife and other natural resources.” This district has a maximum density of 1 unit/25 acres, but may be allowed a density bonus.

- ✿ **Warren.** The town has a “Forest Reserve” District in its 2006 amended Land Use Regulations “to protect lands characterized by high elevations, steep slopes, soils unsuitable for on-site septic disposal, intact wildlife habitat, productive forest land, headwater streams and associated water supplies and scenic resources, and to limit development in areas of town with poor access and/or proximity to public services and facilities....”. This district, like Starksboro’s, has a maximum density of 1 unit/25 acres. It contains supplemental guidelines for clearing and landscaping, access roads, location of and materials used for buildings, erosion control, waivers for setbacks, energy conservation and requirements for disclosing subsequent development plans.

Warren has also designated “Primary” and “Secondary” “Conservation Areas”, which provide additional guidelines for lot boundaries, layout, building envelopes, etc. A “Primary Conservation Area” is delineated by certain natural resource overlay district maps or defined by certain characteristics, such as very steep slopes ($\geq 25\%$) or wetlands. “Any adverse impact” on natural resources is prohibited in these areas. “Ridgelines and knolls which are visible from public vantage points” are designated as “Secondary Conservation Areas” unless, e.g., a very steep slope is present. This less stringent category only requires the developer “to avoid to the extent feasible any adverse impacts....” (See sect. 7.3).

Other towns which have created special zoning districts based on elevation include:

- ✿ **Dorset.** The town has a Forest District for all land above 2,000 feet which prohibits year-round residences. As of 2002, it was considering an overlay district to include all visually sensitive lands.
- ✿ **Duxbury.** The town has a similar no-build district for lands >2,500 feet in elevation, and one allowing residences as conditional uses only, on minimum 25 acre lots, between elevations of 1,500 & 2,500 feet.
- ✿ **Elmore.** The town prohibits building at > 1,500 feet. Between 1,300 & 1,500 feet it allows residences as conditional uses only to minimize natural & scenic resource impacts.
- ✿ **Fayston.** The town has a high elevation Forest District prohibiting development.
- ✿ **Fletcher.** The town has a Forest District for most land > 1,000 feet elevation, banning homes.
- ✿ **Pomfret.** The town has a Ridgeline & Hillside Conservation District which requires conditional use approval, to minimize impact on scenic resources, for all lands within 750 feet of any defined ridgeline or hilltop.
- ✿ **Stowe.** The town has a Ridgeline & Hillside Overlay District, covering almost 50% of the Town that protects both scenic & environmentally sensitive areas. It has a sliding scale density provision that is based on steepness of the slope.
- ✿ **Underhill.** The town prohibits development over 1,500 feet in elevation.
- ✿ **Waitsfield.** The town has a Forest District prohibiting homes > 1,700 feet in elevation, and allowing them as conditional uses under 1,700 feet.

- ✿ **Woodstock.** The town has a Scenic Ridgeline District, allowing development as a conditional use, for all land within 500 feet of defined ridgelines and hilltops.

GROUNDWATER

When water is encountered in a well, water will rise in the well boring to a level dependent on the pressure in the aquifer. This is called the static water level. Tapping the groundwater aquifer will result in a change within the aquifer by affecting water quality (introducing oxygen) and quantity (pumping water out of the aquifer). When a well is pumped, the natural flow of groundwater is changed by the well-pump pulling from all directions and increasing the groundwater movement towards the well.

Groundwater sources are rated by the volume of water withdrawn in gallons per minute. As a well is pumped; the static water level in the well drops. The rate at which this level drops depends on the pumping rate, the aquifer's ability to transmit water, and the recharge rate. An efficient withdrawal rate reaches a balance between all of these groundwater components until the pumping rate results in a stable water level. Thus, reaching this equilibrium should allow for a sustainable water yield. Consequently, as more wells are drilled into the same aquifer, interference between wells will occur and may result in an unsustainable withdrawal rate and wells may become dry.

ECOLOGICAL RESOURCE MAPPING

Members of the Conservation Commission, consultants from LandWorks and Stantec, and a biologist from the Vermont Department of Fish and Wildlife, worked together to gather and evaluate existing data on wildlife habitat in Hinesburg. They began by identifying the largest habitat blocks in Hinesburg using the following GIS data layers:

- ✿ Core forest (UVM Spatial Analysis Lab 1992)
- ✿ Wildlife habitat suitability analysis (VT Dept. Fish & Wildlife 2004)
- ✿ Conserved lands (UVM Spatial Analysis Lab 2004)
- ✿ Vermont significant wetland inventory (Dept. Environmental Conservation, Wetlands Section 2007)
- ✿ Hydrology (VCGI)
- ✿ Existing housing (E911 data from VCGI)
- ✿ Roads (VCGI)
- ✿ Land use/land cover (VCGI 2003).

Within this block delineation process, special attention was paid to the presence of rare, threatened and endangered species and significant natural communities tracked by the Department of Fish and Wildlife's Nongame Natural Heritage Program. In some cases, block boundaries were extended to include these critically important elements.

All ecological features used in the delineation process were recorded for each block for use in the mapping database. Reference was also made to the Vermont Biodiversity Project's biological diversity resource areas (BDRAs) data layer as a comparison from our local-level map with a broader-scale statewide look at biodiversity. BDRAs were delineated at a broad, statewide scale showing areas of greatest biological diversity, representative of Vermont's physical landscape, and inclusion of clusters of rare, threatened, and endangered species.

Consultants also delineated important linkages or connecting lands – areas that serve as wildlife corridors where wildlife species cross roads and other lower quality habitat to access larger blocks of higher quality habitat. Linkages were identified using a combination of wildlife crossing values (VT Dept. Fish & Wildlife 2004), 2003 orthophotos, hydrology (VCGI), land use/

land cover (2003 VCGI), and roads (VCGI). Ecological features included in these connecting lands were recorded for each area for use in the database. In many cases, these linkage areas include road crossings and marginal habitat, and they don't provide the quality habitat found in the blocks they connect. However, they are just as important as the bigger habitat blocks since they effectively increase the size of the blocks and allow for gene flow that keeps populations from becoming genetically isolated.

Finally, a public workshop was held on October 8, 2007 to introduce the public to the proposed vision, goals, and purpose for the Greenspace Plan. At this workshop, citizens helped identify those resources in Hinesburg that they believe are most critical or valuable. These areas were incorporated into the habitat blocks and linkages shown on the wildlife habitat map in the Town Plan, and their attributes were included in the mapping database. The result is transparency to the public for why each block was selected, what its ecological functions are, and what community values are present.

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- 62 The effects of roads on populations of small mammals. Oxley, D. J., M. B. Fenton, and G. R. Carmody. Journal of Applied Ecology 11:51-59.

1961

- 63 Hinesburg, Vermont from 1762. Leonard E. Carpenter.

WEBSITES

- 64 Vermont Fish and Wildlife. <http://www.vtfishandwildlife.com>
- 65 Vermont Natural Resources Council. <http://vnrc.org>
- 66 Champlain Valley Clayplain Forest Project. <http://www.clayplain.org>
- 67 Low Impact Development (LID) Center. <http://www.lid-stormwater.net/index.html>.
- 68 American Farmland Trust. <http://www.farmland.org>
- 69 USDA Census of Agriculture. <http://www.agcensus.usda.gov>
- 70 The Farmland Information Center. <http://www.farmland.org>
- 71 The Intervale Center. <http://www.intervale.org/index.shtml>

PARTNERS

REGULATORY OFFICES

Vermont Department of Environmental Conservation Wetlands Section.

This program regulates wetlands in Vermont, maintains NWI maps for the state, and provides technical assistance on wetland identification, delineation, and protection through planning and other mechanisms.

Vermont Fish & Wildlife Department. The F&WD prepares significant habitat maps for each town, provides assistance in assessing the importance of a particular wetland as wildlife habitat, as a significant natural community, or as habitat for rare, threatened, or endangered species, and oversees numerous habitat protection and conservation programs.

WETLAND CONSERVATION ASSISTANCE PROGRAMS

Community Wildlife Program. CWP provides assistance and resources to organizations involved in land use and conservation planning in Vermont. They help regional and municipal planning commissions, town conservation commissions, and non-governmental organizations in their efforts to consider wildlife habitat and other natural resources by providing them with the most up-to-date information on conservation science and help them with the implementation of their land use planning and conservation projects. This assistance can include translating conservation goals that the community has agreed on into language suitable for the Town Plan and, in turn, translating that language into appropriate zoning and subdivision regulations to bring those conservation goals into action. The CWP also assists neighboring communities to coordinate actions and funding to address regional scale conservation goals.

Landowner Incentive Program. LIP is a competitive grant program funded by the U.S. Fish and Wildlife Service and administered by VT's F&WD. The program provides financial incentives to private landowners in return for long-term habitat protection and stewardship of species-at-risk. LIP is a voluntary and non-regulatory program designed to provide technical and financial assistance to private landowners for projects that enhance, protect, or restore habitats that benefit species-at-risk on privately owned lands. LIP offers a variety of tools to landowners including funds for management agreements, technical assistance and conservation easements. Costs are reimbursed at up to 75% and the remaining 25% cost share can be in-kind services and/or other funding. Allows, in some cases, farming and forestry activities to continue.

Wetlands Protection and Restoration Program. WPRP is a voluntary program designed to provide financial and technical assistance to landowners for restoring and protecting wetlands to improve water quality entering Lake Champlain, create wildlife habitat and enhance recreational opportunities. Financial incentives include: payment for purchase of wetland portion of property; payment for wetland easements; payment for incorporating the wetland into an existing easement; fully funded wetland restoration design and implementation; and leverage of other funding sources.

Wildlife Habitat Incentives Program. WHIP is a voluntary program for people who want to develop and improve wildlife habitat primarily on private land. Through WHIP, VT F&WD provides technical assistance and up to 75% cost-share assistance to landowners and others to develop upland, wetland, riparian, and aquatic habitat areas on their property. WHIP agreements between USDA's Natural Resources Conservation Service (NRCS) and the participant generally last from 5 to 10 years from the date the agreement is signed. Eligible lands under the program include: privately owned land; federal land when the primary

benefit is on private or tribal land; state and local government land on a limited basis; and tribal land.

MAPS

Many of the resources identified in this plan are depicted on the maps associated with the Hinesburg Town Plan. See the Town Plan maps for reference. Contact the Hinesburg Planning & Zoning Department for details and online mapping resources.

PUBLIC INPUT

The following are incorporated into this plan:

1. Greenspace Plan Public Forum Summary Report
2. Greenspace Plan Survey Summary Report