

II. NATURAL ENVIRONMENT

Vision Statement

This Plan envisions Burlington as a city where...

...Burlington's natural environment is recognized as a fundamental asset whose protection is essential to our continued health, high quality of life, and future development. Significant public and private investment have improved the quality of our water, air, and soils, and natural filtration systems and processes are used on par with more engineered solutions. Burlington has committed itself to reducing greenhouse gas emissions and improving the quality of our waters. A combination of purchases of land and easements, responsible stewardship, and creative site planning has permanently protected significant natural areas, community forests, wildlife corridors, and important natural systems for the benefit and enjoyment of current and future generations. Natural areas, parklands, and greenbelts join development with conservation throughout the urban fabric of the city.

CITY POLICIES

THE CITY OF BURLINGTON WILL...

- **Work toward a sustainable relationship with the natural environment.**
- **Protect its natural resources from degradation, including: air, water, soils, plant and animal life, agricultural lands, forests, geologic features, and scenic areas.**
- **Maintain or increase the existing ratio of publicly owned or permanently protected natural areas to developed land.**
- **Protect and preserve natural areas and open spaces of local, regional, and statewide significance for the benefit of future generations.**
- **Protect, maintain, and enhance the City's urban forest, including both large patches of woods and wooded corridors/treebelts that provide places of refuge and travel corridors for wildlife and people.**
- **Protect the shorelines and waters of Lake Champlain, the Winooski River, and other water sources from damage and degradation.**
- **Maintain and improve the integrity of natural and recreational systems within the City.**
- **Preserve scenic viewpoints and viewsheds, and insure public access to natural areas where appropriate.**
- **Increase the number and quality of small urban open spaces, especially in underserved neighborhoods of the city.**

- **Guide a higher proportion of future development into the city center and neighborhood activity centers.**
- **Ensure long-term stewardship and appropriate public access to natural areas and open space, including improved opportunities for pedestrian access and interaction throughout the City.**



Green Frog



North Beach Wetland



Lake Champlain Shore



Winooski River Kayakers

INTRODUCTION

Sustainable development in the City of Burlington begins with a respect and understanding of the natural systems that provide us with the resources necessary to function and grow, and that support our outstanding natural surroundings. These include basic functions such as clean air and water, but also include stable and fertile soils and irreplaceable natural communities. These resources and natural systems not only provide drinking water, breathable air, habitats, and agricultural opportunities, but also serve as the cornerstone to enhancing our overall quality of life. They offer numerous recreational opportunities and enhance our competitive advantage for future growth and prosperity.

This section outlines Burlington's policies and priorities for protecting and sustaining its most important environmental and natural features.

An Ecosystem Perspective

Burlington is part of the largest metropolitan area in the Lake Champlain Basin. Located on a peninsula between the Winooski River and Lake Champlain, our urban community is intricately linked with the many facets of the larger basin ecosystem, and beyond. Although much of the land within the city has been altered to provide homes, employment, and recreational opportunities, our relationship and responsibilities to the natural environment are of no less significance. Our physical, emotional, and cultural well-being are inseparably linked to the health of natural systems. Burlington residents have strongly voiced their concern for the city's natural environment and their desire to protect it.

Burlington's physical setting contributes much to our uniqueness. Among the obvious features is the city's relationship to water. Of the 32 miles that make up our political boundary, 25 miles are defined by the Winooski River and Lake Champlain. No point in the city lies more than 1 3/4 miles from either of these two water bodies. When we consider the streams that flow through the city, it's clear that our daily activities have the potential for adversely impacting our own drinking water, healthy aquatic life, and high quality recreational experiences.

Lake Champlain and the Winooski River are two of the region's most valued resources. They provide extensive aquatic habitat, scenic beauty, recreation opportunities, even food, and drinking water. Lake Champlain provides our drinking water as well as that of dozens of other communities within the region. The lake and river are simply elements of a much larger and very complex ecosystem - including the *Lake Champlain Basin*, spanning 8,234 square miles; the 10 million acre *Champlain Adirondack Biosphere Reserve*¹ designated by the United Nations in 1989; and, the 26 million acre *Northern Forest* stretching from eastern Maine to the Tug Hill region of central New



¹ An honorary designation bestowed by the United Nations to encourage social and economic vitality, and preserve and improve environmental health.

York. For these and other reasons, many of our local activities must be considered within a larger regional context.

Stormwater runoff is the most significant source of nonpoint source water pollution in the United States and within the Champlain Basin. Recognizing the importance of improving the water quality of stormwater runoff, Burlington established a Stormwater Program in 2009. The Program is administered by the Department of Public works but entails cross-departmental coordination for development review, parks & public lands maintenance, and transportation infrastructure. The Stormwater Program is also involved in the oversight of the operations and maintenance of the city's combined and separate storm sewer systems.

Burlington's combined sewer system handles wastewater and stormwater, primarily in the Downtown and South End, but also in parts of the New North End. Stormwater runoff entering the combined system is treated and discharges into the lake and river. Large storms, however, can overwhelm the combined sewer system and cause overflows with little treatment into the receiving waters. Emphasis has been placed on capturing stormwater onsite where it falls and either infiltrating it into the ground or slowly releasing it into the combined system. Doing so lessens peak flows and reduces the chances of overflows.

The City's separate storm system serves much of the New North End and small sections of other city neighborhoods. Stormwater flowing through this separate system flows untreated into the lake and the river. As more and more of the city's land area is made impervious, the volume of runoff will increase, carrying motor vehicle oil, road salt, household chemicals, and other toxins directly into the lake and river. To address this, emphasis has been placed on improving onsite water quality by way of infiltration into the ground or by providing filtration of runoff prior to offsite discharge into the separate system. The City has also limited the use of hazardous substances on lawns and green areas.

The long-term effects of increased boating and recreational uses on and along the lake remain unclear. The lake cannot indefinitely neutralize all the toxins, chemicals, and wastes discharged into it. Development up and down the lake will further degrade the quality of the water. Burlington is an active partner with other municipalities in the Lake Champlain Basin working to improve water quality and manage the recreational carrying capacity of this important body of water.

An Economic Asset

The economic, cultural, public safety, and health benefits of balancing community development with environmental protection are increasingly being quantified in economic, as well as social measures that show them to bring significant and diverse values to society. Open space protection is an important component behind successful community development projects, and a major contributor to the character of place that forms the foundation of our economy. Community investment and planning will determine where and how development occurs, how cost effective it is, and whether the most important natural systems are preserved and sustained.

There is a long-held belief that undeveloped land is not economically productive, and that it only really carries its weight in the local tax base after it is developed. Communities are quickly learning the opposite. More and more studies are showing that conserving open land and choosing carefully where development goes is not contrary to economic health, but essential to it. Corporate CEO's say quality of life for employees is the third-most important factor in locating a

business, behind access to domestic markets and availability of skilled labor. Owners of small companies ranked recreation/parks/open space as the highest priority in choosing a new location.

The choice we face is not one of environment and aesthetics versus economics, after all. Instead, the fact is that land conservation is a sound investment. Studies comparing the fiscal impacts of development to those of open space protection have found that open space preservation has a more positive impact on a community's economy than most conventional forms of suburban-style



Burlington Bike Path

development, even when property is preserved through public dollars. Weighing the true costs and benefits of development and open space protection is the key to making the right investment choices, for in the final analysis, the cost of protecting a community's important natural systems and open spaces may seem high, but the cost of not protecting them may be much, much higher.

Urban Ecosystems

The elements of the natural world do not recognize political boundaries, nor can they be compartmentalized, fenced off, and isolated from our day-to-day activities. Rainwater flows off rooftops, over lawns, and down streets along a path towards the lake. The air we breathe flows freely through the mountains, forests, and meadows, across highways, homes, and industry. Much of what we do, no matter where we may happen to be, has the potential for impacting the natural environment.

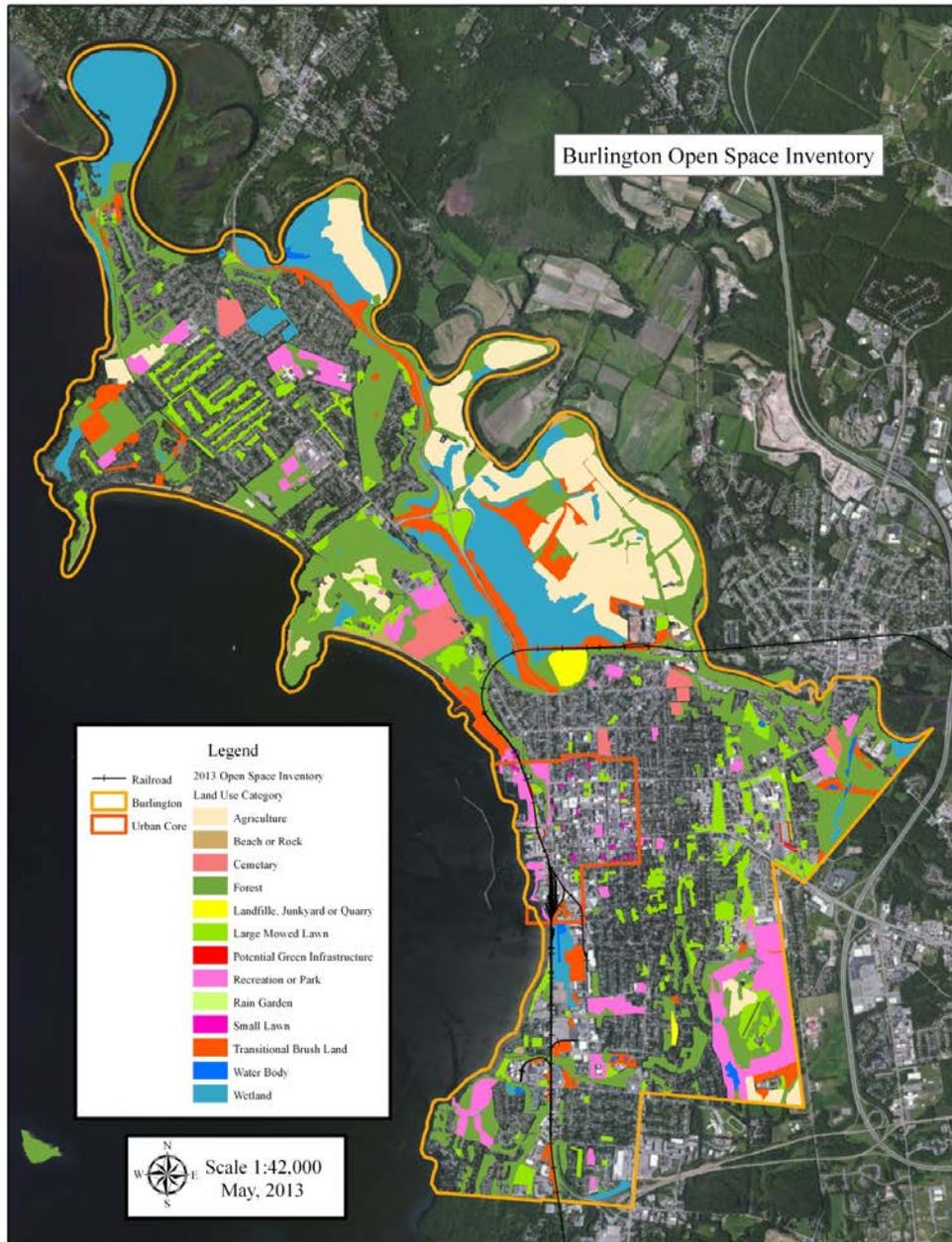
Traditionally, planning for the environment and natural resources has focused on specific issues affecting public health (water quality, toxic reduction, air pollution, etc.) and the protection of individual sites or species. What these approaches often fail to consider is the fact that everything is interconnected. There is little value in protecting the site of an endangered plant population if the water flowing through the habitat is polluted. Typically, too much attention is focused on an individual plant or animal population, and not enough on the conditions that enable their existence or survival - their habitat.

Burlington recognizes its environment and natural landscape as part of an "urban ecosystem." This ecosystem includes not only natural resources, habitats and systems, but also human adaptations and enhancements such as street trees, culverted streams, and stormwater runoff. In order for growth and prosperity to be sustainable over time, future development must minimize its impact on the environment through proper location and site design, energy efficiency, waste reduction, and renewable and durable construction materials. Rivers and streams that serve a wetland, areas of forest cover that connect sustainable forest communities, and travel corridors that link important wildlife habitats all must be considered.

Open Space Protection Plan

In 2000, the city adopted its Open Space Protection Plan. That Plan created an inventory of open spaces within the city and identified several distinct open space categories – wetlands, riparian and littoral zones, and significant natural areas. The Plan also served as the foundation for the

Conservation Legacy Program and associated Conservation Legacy Fund. The Conservation Legacy Program and associated fund enabled the city to play an active role in the acquisition and protection of significant open spaces within our urban ecosystem. The Open Space Protection Plan and its 2013 update identify and categorize open spaces within the city and establish priorities for acquisition and protection of these spaces and also identify opportunities for implementation of open space land uses such as urban agriculture and green infrastructure. Protection, acquisition, access, and facilitation of appropriate land uses are fundamental priorities of the Open Space Protection Plan.



SHORELINES AND WETLANDS

Lands along the Winooski River and Lake Champlain are particularly fragile, and serve as important greenbelts surrounding the city. Vegetation along the shoreline of lakes and ponds, rivers and streams, and wetlands should be protected in order to stabilize the shoreline, filter surface runoff, and provide habitat for wildlife. In order to effectively provide these valuable ecosystem services, the Vermont Fish and Wildlife Department recommends setting aside buffers of naturally growing grasses, shrubs, and trees to protect the health of a stream, wetland, river, or lake. These buffers must be large enough to allow provision of their ecosystem services. City regulations protect these fragile areas with established buffer zones and require Conservation Board review of development proposals that may impact them.



Lake Champlain Shoreline

Shorelines must not be used exclusively for private benefit. Appropriate public access should be encouraged in places that will not harm the ecology of these fragile areas. The City will work to establish public access through easements or acquisition in places that will not harm the natural environment along shorelines.

Wetlands are particularly important for protection. As development adds impervious surface, their role in capturing and treating urban runoff becomes more and more critical. City regulations protect the functions and values of wetlands and their associated buffer zones and require Conservation Board review of development proposals that may impact them.

SIGNIFICANT NATURAL AREAS

Natural areas are discrete areas of particular sensitivity that are recognized for their highly significant natural functions and values. These areas must be protected from the impact of development. Burlington contains 17 natural areas (including 6 urban wilds) as recognized by the Vermont Natural Heritage Program. These areas provide habitat for rare, threatened, or endangered species. Recent map work associated with the 2013 Open Space Protection Plan update establishes the basis for future onsite analysis to identify additional natural areas within the city that may warrant protection. This map identifies up to 22 distinct natural communities that may have been historically present in the city and may continue to exist today. City regulations recognize the importance of these natural areas with established buffer zones and require Conservation Board review of development proposals that may impact them. Where appropriate, the city should work towards improving public access to these natural areas.

STEEP SLOPES

There are many areas throughout the city with steep slopes. Construction, cutting and filling, and loss of vegetation on these sites can erode the slope's stability, degrade water quality, and diminish the city's natural landscape. Burlington has adopted regulations limiting development on these slopes to preserve scenic quality, and prevent unnecessary damage to shorelines or bodies of water from streambank erosion.

THE INTERVALE

The Intervale is a 350-acre area along the Winooski River just one mile from downtown Burlington, of which about half is in the floodplain. This unique land, formed by the meanderings and seasonal flooding of the Winooski River, is presently used for farming and community gardens, conservation and education, and power generation. The Intervale contains Burlington's largest natural areas, best agricultural soil, and largest extent of undeveloped land. Mostly protected by zoning, the Intervale continues to merit special attention.



Intervale Community Farm

The Intervale has an agricultural tradition that stretches back to its first human settlers. These first farmers were Native Americans who grew beans, corn and squash in the area for hundreds of years. American settlers, including Ethan Allen, later farmed the floodplain throughout the 18th and 19th centuries. The farms in the Intervale, however, declined in the last century, and it became a dumping ground in the 1960's and '70's. Dumps, highway construction and wetland drainage threatened the integrity of the Intervale and obscured its agricultural value.

Nevertheless, farming never completely ceased in the Intervale. The area represents the last prime farmland in the city boundaries. Even as the last dairy farms were waning, Burlington residents lobbied to open the area to residents who wanted to grow their own food. To fulfill this demand, Tommy Thompson of "Gardens for All" set up the first community gardens in 1970.

In 1986, the Intervale entered its current era when Will Raap, president of Gardener's Supply Company, decided to locate the headquarters of his national mail order company on the edge of the floodplain. Mr. Raap's vision of a sustainable farming experiment was solidified in 1988 when he formed the Intervale Foundation, a nonprofit organization committed to growing food using sustainable agriculture methods. The Foundation took over the task of acquiring additional acreage in the floodplain, administering an incubator program, managing the Green City Farm, and operating the compost project.

Today, the land is being revitalized, and is home to small incubator farms, community supported agriculture, and a community co-op farm. In addition to serving as the agricultural heart of Burlington, the Intervale is premier wildlife habitat with frequent sightings of deer, fox and mink. The Intervale also functions as an important recreational area for hikers, bikers, boaters, and others.

In 2012, the Intervale Foundation developed a management plan for its land area located in the floodplain to define and protect the areas natural character and agricultural potential. The

objectives of the Plan include enhancing agricultural productivity, protection of wildlife habitat, and management of the resource in the context of the ecological processes that shape it. The City supports these efforts, and will continue to work to protect this important part of the city for the purposes of conservation and open space, wildlife and scenic corridors, agricultural use and passive public recreation.

URBAN AGRICULTURE

Beyond the relatively large scale farmlands of the Intervale, urban agriculture includes smaller enterprises such as market gardens, community garden, and even backyard gardens. Growing interest in the pursuit of these smaller scale urban agricultural activities is reflected in the 2012 Urban Agriculture Task Force report. Map work associated with the 2013 Open Space Protection Plan update depicts prime agricultural soils within the city network of open spaces and provides an analysis neighborhoods currently underserved by community gardens. The city is presently developing regulations to facilitate greater urban agricultural opportunities. The prime agricultural soils information and proximity analysis may be utilized to identify appropriate locations for new or expanded community gardens or other urban agricultural activities.

GREEN INFRASTRUCTURE

Green infrastructure includes urban green spaces that may be utilized as pocket parks to provide refuge from the urban hardscape. It also includes spaces that may be used as areas for integrated stormwater management in the form of rain gardens, infiltration parks, and the like. Capturing stormwater runoff in these urban green spaces is essential to improving water quality and lessening impacts to “gray” infrastructure such as separate and combined sewer systems. Presently, city regulations do little to encourage green infrastructure. Given the clear benefits to water quality and the lessened impacts to “gray” infrastructure, the city should establish incentives for green infrastructure. Mapping information contained within the 2013 Open Space Protection Plan update identifies green areas, particularly within the urban core, that may be appropriate for utilization as green infrastructure.

TRAILS

Trails provide access to open space lands for recreational purposes, transportation alternatives for walkers and bicyclists, and corridors for wildlife movement throughout the city. Analysis in the 2013 Open Space Protection Plan update reveals that Burlington has more than 40 miles of trails; however, much of the trail network exists in disconnected clusters. The city should pursue greater connectivity within its trail network to improve its overall functionality. Information within the Open Space update may be used to identify priority areas for connection and expansion.

FLOODPLAINS AND FLUVIAL EROSION HAZARD AREAS

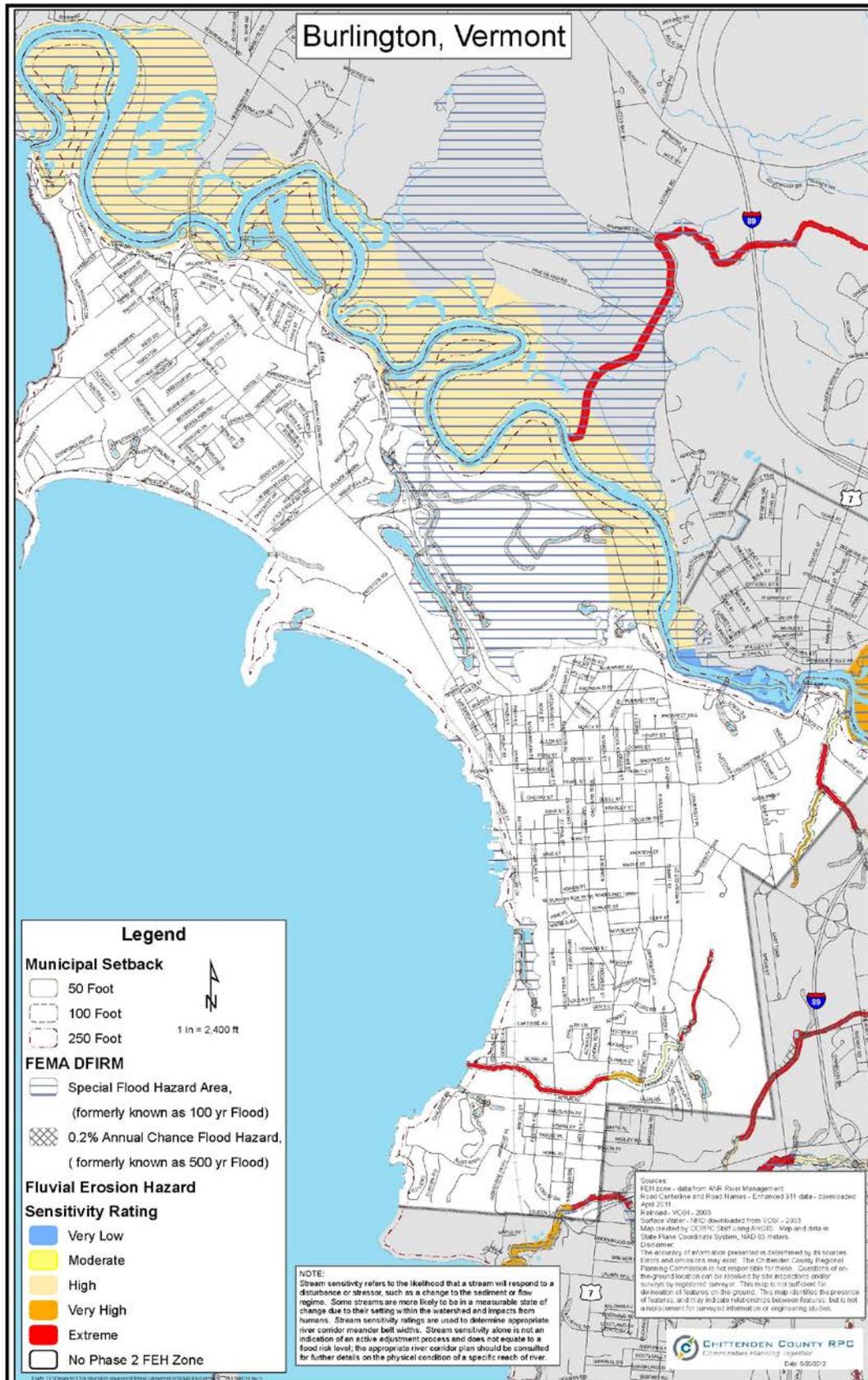
Vermont statutes governing the use of areas likely to be flooded have been developed to protect people as well as natural resources. Burlington has also been a member of the National Flood Insurance Program (NFIP) since the 1980s and has therefore regulated development in the flood hazard areas since then. Two types of areas have been defined, flood hazard areas and floodways.

Flood hazard areas (Title 10 V.S.A., Chapter 32) are areas that have a 1 in 100 chance of being inundated by flood in any given year. They have been designated by both federal and state governments and are often updated. If the flood hazard area is improperly used and unprotected,

a flood can create a serious threat to the public, private investments can be destroyed, and significant natural resources can be damaged. In Burlington, most of the flood hazard areas are located along the Winooski River Valley, which the Intervale is part of. There are very few structures in the Burlington floodplain, except for the mouth of the Winooski River.

A floodway (Title 10 V.S.A., Chapter 32) is the channel of a river or other watercourse and the adjacent land area that must be reserved to discharge the 100-year floods without cumulatively increasing the water surface elevation more than one foot. The floodway is the most hazardous section of a flood hazard area. Developments in a floodway are likely to increase the flood height and velocity and probably would be damaged in the event of a flood.

Floodplains in Burlington are depicted on the map on page 11.



While some flood losses are caused by inundation (i.e. waters rise, fill, and damage low-lying structures), most flood losses in Vermont are caused by “fluvial erosion,” *Fluvial erosion* is erosion caused by rivers and streams, and can range from gradual bank erosion to catastrophic changes in river channel location and dimension during flood events.

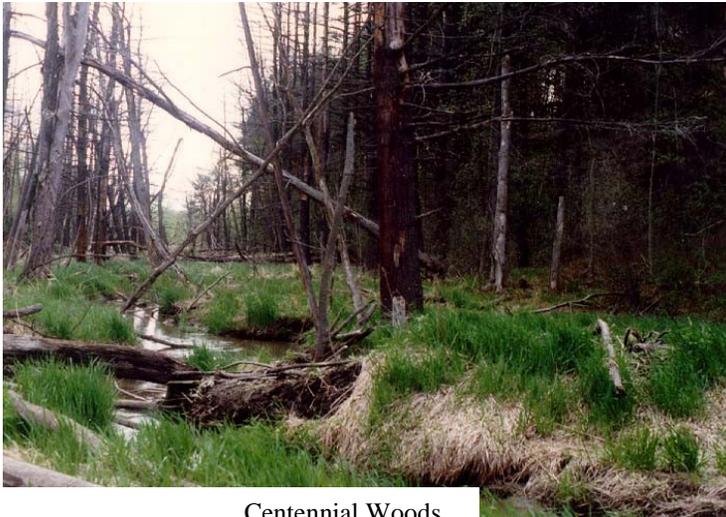
A mapped FEH area includes the stream and the land adjacent to the stream. In Burlington, FEH have been mapped for the Winooski River, Engelsby Brook and Centennial Brook, as seen on the map on page 12. This map identifies the area where stream processes can occur to enable the river to re-establish and maintain stable conditions over time. The area boundaries also attempt to capture the lands most vulnerable to fluvial erosion in the near term as well as the area needed by a river to maintain equilibrium. Mapping of those FEH areas also provides a valuable insight into the location and nature of fluvial erosion hazards, and can be used to support many effective mitigation options. These include:

- using the map to design new investments in the Capital Budget (larger culverts, etc.) to reduce impacts of fluvial erosion on municipal infrastructure; and
- creating a Fluvial Erosion Hazard (FEH) Overlay District similar in scope and detail to Flood Zones wherein new development would be restricted similarly.

Natural Environment Action Plan

Action Item	Lead Agency	Secondary Agencies
Continue to implement the remediation and Interim Stewardship Plan for the Urban Reserve.	CEDO	Planning & Zoning
Investigate design opportunities to utilize permeable surface materials in place of impermeable materials in new development and parking.	Planning & Zoning	Public Works
Continue to identify and map significant natural areas and open spaces, and prioritize areas for long term protection.	Planning & Zoning Parks & Recreation	
Implement measures to treat stormwater runoff from existing development, and require new development to treat stormwater through the use of acceptable best management practices	Public Works	Planning & Zoning
Continue the implementation of the <i>Open Space Protection Plan and its 2014 update.</i>	Planning & Zoning Parks & Recreation	
Identify and map hazardous waste sites and underground storage tanks	Planning & Zoning CEDO	
Use the 2014 Open Space Inventory to guide potential purchases of high priority open spaces and trail connections.	Planning & Zoning	Parks & Recreation
Support conservation organizations, including the Winooski Valley Park District in their conservation efforts and goals to educate the public about the value of wetlands, shorelines, and natural areas	Planning & Zoning	Parks & Recreation

Work with other local, state, and regional groups on watershed policy and planning	Public Works	Planning & Zoning
Collaborate with neighboring communities regarding protection of important natural features and systems.	Planning & Zoning	Parks & Recreation
Develop City policy to minimize the use of road salt on city streets as permitted by safety requirements	Public Works	
Development of source reduction programs.	Public Works	



Centennial Woods



Lake Champlain