

2014 planBTV
Burlington's Municipal Development Plan

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Re-Adopted by the Burlington City Council
March 31, 2014

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.

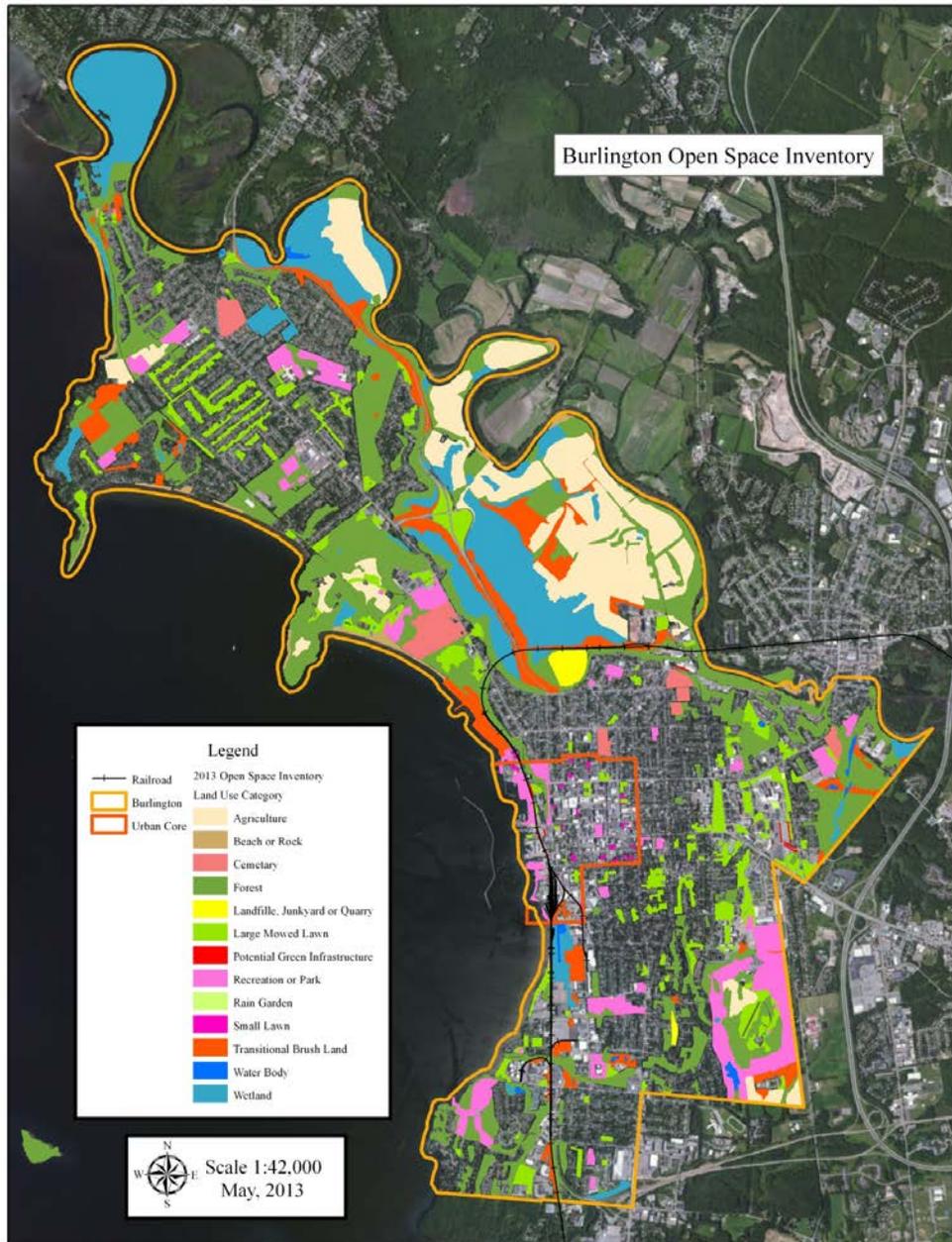
Traditionally, planning for the environment and natural resources has focused on specific issues affecting public health (water quality, toxic reduction, air pollution, etc.) and the protection of individual sites or species. What these approaches often fail to consider is the fact that everything is 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

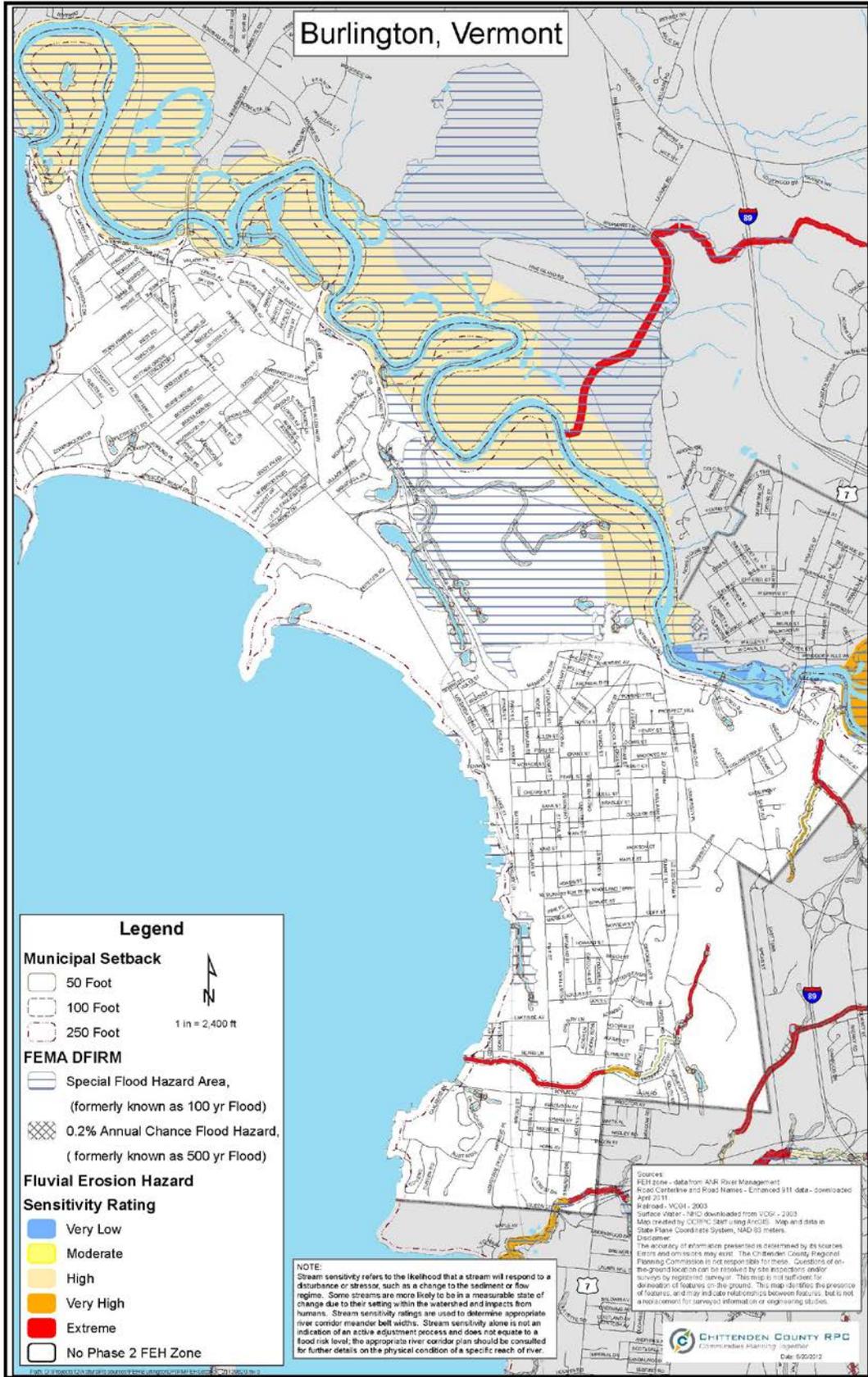
Vermont statutes governing the use of areas likely to be flooded have been developed to protect people as well as natural resources. Burlington has also been a member of the National Flood Insurance Program (NFIP) since the 1980s and has therefore regulated development in the flood hazard areas since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

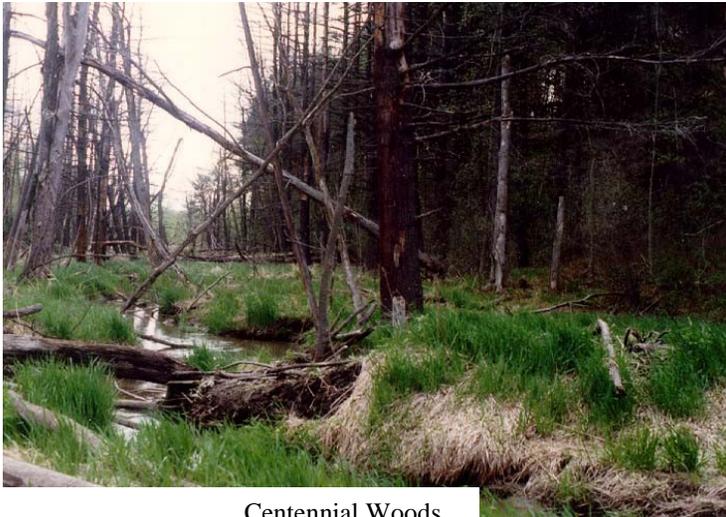
A mapped FEH area includes the stream and the land adjacent to the stream. In Burlington, FEH have been mapped for the Winooski River, Engelsby Brook and Centennial Brook, as seen on the map on page 12. This map identifies the area where stream processes can occur to enable the river to re-establish 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

III. BUILT ENVIRONMENT

Vision Statement

This Plan envisions Burlington as a city where...

...Burlington's built environment reflects a legacy of a rich architectural heritage, moderately scaled buildings, and high quality urban design. The unique design characteristics of each neighborhood have been retained, while new construction and public investment respect the city's historic character and demonstrate high quality architecture while effectively meeting the demand for continued growth. In higher density areas, buildings are closer to the street, with parking underneath or in a nearby structure. All buildings and public facilities are welcoming to people with disabilities. Both new construction and renovations to older buildings illustrate a commitment to sustainable development practices with the use of green building materials and energy efficient design. The streetscape is clean, well maintained and lined with shade trees. Overhead utilities have been relocated underground, and excessive street lighting has been eliminated. Important view corridors and scenic vistas have been retained, and developed areas are complimented by open spaces, parks, and natural areas.

CITY POLICIES

THE CITY OF BURLINGTON WILL...

- **Protect its scenic views and view corridors, and encourage development that compliments Burlington's natural setting.**
- **Retain its moderate scale and urban form in its most densely developed areas, while creating opportunities for increased densities.**
- **Conserve the existing elements and design characteristics of its neighborhoods, and maintain neighborhood proportions of scale and mass.**
- **Retain and enhance Burlington's historic buildings and architectural features.**
- **Encourage new land uses and housing designs that serve changing demographics and benefit from new technologies where appropriate.**
- **Enhance the City's gateways and streetscapes.**
- **Protect, maintain and enhance the City's urban forest.**

- **Enhance the pedestrian experience by improving opportunities for pedestrian access and interaction throughout the city.**
- **Strengthen the City’s role as a cultural and arts center, and support efforts to introduce public art into the city’s built environment.**
- **Ensure people with disabilities have equal access to the built environment.**
- **Ensure building design and public amenities take into account Burlington’s northern climate.**



INTRODUCTION

Burlington's **built environment** - its buildings and structures, and how they relate to the city's landscapes, layout, and history - make Burlington the special place it is. The city has a rich architectural legacy, set within an exceptional natural setting, that provides the foundation to its vital economy, human-scale environment¹, and high quality of life. As Burlington continues to grow, we must conserve and build upon this legacy through careful planning and high quality urban design. The following section outlines Burlington's policies and priorities for maintaining and enhancing the quality of its built environment.

Respecting Our Natural Setting

With Lake Champlain and the Adirondacks to the west, the Green Mountains to the east, and the embrace of the Winooski River along our northern boundary, Burlington is blessed with an outstanding setting. Throughout the city - at the end of streets, from parks, offices, and homes - significant views are provided of the lake, river, mountains, forested and natural areas, and prominent building landmarks. Burlington is in the fortunate position of being able to blend urban amenities with a beautiful natural setting. The City must take full advantage of this setting by identifying and protecting view corridors and important scenic views for all to enjoy - today and tomorrow. A plan for identifying and protecting views of important visual landmarks and landscapes from public vantage points must be undertaken as the City contemplates opportunities for future higher-density development.



Lake Champlain & Adirondacks

Burlington's built environment must be respectful of the city's natural environment. While city ordinances allow for development at particular densities, design review regulations require that development consider the capacity and context of each individual site. The City should amend Article 30 of the *Burlington Zoning Ordinance* to include a definition of "Buildable Area" for the purposes of calculating allowable density in certain parts of the city. The "buildable area" would be limited to only that portion of a property suitable for the construction of structures or other forms of land development, and exclude such areas that are: underwater or subject to flooding, slopes greater than 30%, and lands within the right-of-way of an existing or proposed public street.

¹ "Human-scale" refers to the size, shape, and proportions of the built environment as perceived by, and in relation to, a pedestrian on the street. While different for different people, an object is considered to be of a human-scale when it appears measurable to the observer and its detail can be appreciated in relation to its overall mass. This is in contrast to an object or space that take on an awesome or super-human size due to its size and/or distance to the observer. (Lynch, Kevin. *Site Planning*).

Designated growth centers and activity zones such as the downtown, neighborhood activity centers and institutional campuses would be exempted from such a provision however, as they are places where higher density development is desired and encouraged. Offering density bonuses for the protection of important resources and sites could also be considered. Natural buffers and landscaping, including trees, shrubs and flowerbeds, should be used extensively to ease the transition between the built and natural form of the city. The use of green building materials and energy efficient design will help us to reduce our long-term impact on our environment. (See also the Energy section of this Plan)

A City Built for People

Burlington is a city built for people to experience on foot. Its buildings, streets, and layout are at such a scale that people feel comfortable in the built environment. Most places are within walking distance, buildings do not overwhelm the landscape or the streetscape, throughout much of the city distant views are limited only by topography and vegetation; buildings offer a personal connection to the street. To maintain this scale and character:



- Most buildings in high density areas should be no taller than six to eight stories, and should make the most effective use of the site. Building height is based on its location (both individual site and context) and function.
- Mixed-use development should occur in concentrated areas within walking distance of higher densities.
- In higher density areas, buildings should be closer to the street, with uses and entrances at the street level that invite pedestrian activity. Transitions between high density and low-density areas should be gradual. Access to light and air is maintained, while care is taken not to cast large shadows over nearby buildings and alter wind patterns.
- Buildings and public amenities should be designed with Burlington's northern climate in mind, and embrace all of Burlington's seasons.
- The massing and design of large development projects should be subdivided so that the widths of the facades are compatible with the scale and patterns of their surroundings. Building facades should be articulated along the street, and punctuated with windows, bays, balconies, and other openings.
- Adequate green space and amenities should be provided to encourage people to be outside enjoying the city year round. This includes the creation of rooftop gardens, a system of trails and paths, and a network of publicly conserved open spaces.

- People should be able to move safely and conveniently throughout the city without the need for a car on a network of sidewalks and paths.
- Streets should be easy to cross, with signals, signs, and crosswalks designed to enhance the pedestrian experience.
- Benches, bike racks, trash and recycling containers, public phones, public rest rooms, information kiosks, public art and drinking fountains should be added to popular outdoor gathering spaces.

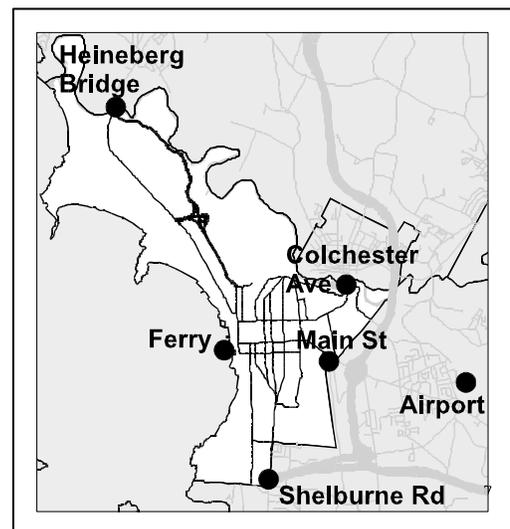
ADDING UP THE DETAILS

Public: The City's public investment in its infrastructure includes thousands of small details: street lighting, manhole covers, catch basins, curb and ramp details, sidewalk paving textures, street trees, utility lines, benches, fire alarm boxes and hydrants, traffic signs and signals, fencing, parking meters, and many more. The cumulative effect of these details, in conjunction with more substantial investments in public buildings and spaces, defines the standard of quality for Burlington's built environment. Public buildings should set an example by defining a new standard for high quality architecture, creative site planning, energy efficiency, and green building techniques, and public projects should receive the same level of review for possible impacts on the built and natural environment that private projects receive.

Private: New construction and building renovation include numerous details that impact the design quality of the city. Gas, water, and electric meters, electrical transformers, heating, ventilating and air conditioning equipment, mailboxes, handicapped access ramps, refuse and recycling facilities and other service features can seriously detract from a building's appearance if not properly located or screened. While the nature and purpose of such equipment imposes certain requirements on their location, these details are often added to a building at the end of the process - leaving few creative options. Whenever possible, these service features should be integrated into building and site design from the beginning so as not to distract from the quality of a building or its site.

GATEWAYS

“You never get a second chance to make a good first impression.” Gateways create a sense of arrival for those entering the city or neighborhood within it, and set the tone for what's to come. This feeling can be created with appropriate signs and landmarks, plantings, burying utility lines, protecting important views, and using distinctive pavement and architectural elements at intersections. Each gateway to the city or its neighborhoods should reflect the particular characteristics of its setting and provide a welcoming introduction. The City should take active steps to enhance the primary gateways into the city.



PUBLIC ART

Public art enhances the overall quality of the built environment. Examples of public art can be found throughout the city. Whether it is a mural on a downtown building wall, a sculpture in a park, or unique architectural details on a building, public art personalizes the city and offers seeds for conversation and contemplation.

Public art also includes performance art. Street musicians, jugglers, dancers, and magicians add vitality, activity, and a sense of community. Diverse offerings of public art should be encouraged and celebrated as distinctive elements of Burlington's quality of life.

CULTURAL FACILITIES

Cultural facilities for the visual and performing arts are an important aspect of Burlington's life and economy. From major events like the Discover Jazz Festival and First Night Burlington, to poetry readings at small coffee houses and paintings displayed in storefronts, the arts provide cultural vitality to the city as well as fulfill a growing economic niche. The Flynn Theater, with a seating capacity of 1,400, contributes over \$7 million to Burlington's economy each year. Memorial Auditorium, operated by the City, provides seating for 2,500 for concerts and sporting events. Several other small facilities are dispersed throughout the city and help make the arts a part of everyday life.

In addition to upgrading and maintaining existing facilities, additional performance and exhibition space will be needed to provide opportunities and affordable venues for artists. Needs include not only additional physical space, but also the associated equipment and infrastructure necessary to ensure the viability of existing and future venues.

Studies have identified the following needs:

- Continued improvements to Memorial Auditorium and the Flynn Theater.
- A small or mid-sized theater (less than 300 seats).
- Dance space for rehearsal and small performances.
- A medium to large multi-exhibit art gallery and exhibition space.
- Small gallery and exhibition spaces in the downtown and on the waterfront

The City should also investigate the best methods for linking important cultural facilities such as Memorial Auditorium, City Hall's Contois Auditorium, and the Flynn Theater along with related land uses such as restaurants and galleries. Improved linkages, whether in the form of a downtown cultural/arts district or simply a centrally located arts information kiosk, would help bolster this important segment of the downtown economy.

BURLINGTON AS AN ACCESSIBLE CITY

To have equal opportunity, all people with disabilities must have equal access to the built environment. Many people think accessibility refers only to wheelchair access. But it also includes access for people with sensory and other mobility impairments. Equal opportunity for people with disabilities means:

- doors that open easily and ramps that are not too steep.
- signs at appropriate heights that are large enough to read
- accessible parking spaces, telephones, and transportation.
- convenient and accessible public rest rooms
- accessibility to the arts and cultural opportunities
- accessibility to the public decision-making process.

Burlington is committed to removing barriers within the built environment that hamper people with disabilities. This Plan proposes that the City establish a “disability-friendly” approach whereby new developments and building renovations, both public and private, are encouraged to go beyond the minimums established by regulation and pursue innovative ways to enhance convenience and accessibility for all residents with disabilities.

A NORTHERN CLIMATE

Burlington is a northern city, with frequent cold spells and large amounts of snow. While this is easy to remember in December or January, it can be forgotten during warm and sunny summer days. It is important that buildings, courtyards, and public amenities (such as bus shelters) be designed to provide refuge from the elements and remain inviting year-round. Protection from wind, cold, rain, snow, and ice should be important design considerations. Building design must also take into account how it may influence the microclimate by casting long shadows or modifying wind patterns. Mature trees can provide summer shade and shelter from winter winds.

Mixed-use districts, and the location of convenience stores and other local services close to residential neighborhoods, can also make life easier during the winter, especially for residents without an automobile. Priority must also be given to ensuring that snow and ice accumulation on sidewalks is cleared promptly.

Most importantly, the City must embrace all four seasons, and design should facilitate the public’s enjoyment of each. Using color, vegetation, natural light, and providing opportunities for shelter and shade, creative design can take advantage of the best that each season has to offer.

Streetscape² Design

One of the most important factors affecting the quality of urban life is the character of city streets. Crucial to a street’s character are such things as building heights and setbacks, the planting of street trees, presence of overhead utilities, quality of street lighting, and the design quality of the “street furniture.”

It is important to establish appropriate setback requirements for buildings. Consistent front and side yard setbacks along a street helps creates a building edge and a well-defined public space. Buildings in commercial and higher density areas should be built

² Streetscape refers to the visual image presented along a street including the combination of buildings, street, parking, trees, signs, furniture, utilities and other hardscape features.

closer to the sidewalk to provide an urban character. Moreover, in industrial and commercial areas, off-street parking should not be allowed directly in front of buildings. In residential areas, front yards, porches, and building facades should be the predominant visual element along the streetscape, and garages and driveways should play a minimal role.

The following approaches will improve the quality of the streetscape:

- New buildings or additions on any given street should be consistent with the predominant setback pattern for that street.
- Especially in downtown and commercial areas, setback requirements should reinforce an urban and pedestrian streetscape by being closer to the sidewalk.
- Street-level store fronts and building entrances should be open and inviting to pedestrians, and service entrances, driveways and garages should be located on side streets or in service alleys.
- The scale and massing of buildings on any given street should be harmonious. This does not mean uniform however. Variations in scale and design are an essential factor in creating a distinctive built environment.
- Street width should be appropriate to the type and character of land uses found along the street.
- Where streets have more pavement than necessary, excess pavement should be replaced by green areas, sidewalks, or other appropriate public amenities.

The City needs to undertake a public design process to identify and outline future design characteristics of the public rights-of-way. This process should serve to help answer the following:

- What is our objective for the City's public rights-of-way?
- How do we want our public rights-of-way to function and to look like?
- What is the design/aesthetic objective we have for a particular street, corridor, gateway, or neighborhood?

The City's *Street Classification System* offers a simple framework to begin working from where function, service, and design objectives for each category are defined and articulated. (see also the *Transportation System Plan* section of this plan)

STREETS AS PUBLIC PLACES

While not all streets can be as inviting and accessible to the public as the Church Street Marketplace, the pattern of streets, paths and pedestrian amenities should make walking safe and easy in all areas of the city. Residential and commercial areas should be active public places where social interactions are encouraged. People should be able to stroll, sit, pass through, look around, walk around, and enjoy neighborhoods, shopping areas, and conservation areas. Increasing pedestrian activity improves business by increasing traffic passing by storefronts, improves public safety by placing more eyes on the street, and benefits our sense of community by facilitating communication and interactions between neighbors, business owners and visitors.

LOCATING UTILITIES



Overhead utilities - including electric, telephone, and cable - present a dominant visual element throughout many parts of the city. This is especially concerning where street trees and other streetscape improvements are desired to make parts of the city more inviting for development and pedestrians or to preserve or enhance important viewsheds.

Many large trees have been radically pruned to accommodate power lines. Indeed, the vistas along many of our city streets are more strongly characterized by the march of utility lines than the promenade of trees. This is particularly unfortunate along streets such as Pearl and College that have important views of Lake Champlain.

While too expensive to accomplish everywhere, there are parts of the city where placing overhead utilities underground, or relocating them behind buildings, must be an important design consideration. In addition to all new development, priority should be given to undergrounding overhead utilities in the Downtown Waterfront, the North Street Commercial District, Riverside Avenue, North Winooski Avenue, streets that offer important view corridors to Lake Champlain, and the main approaches into the city.

STREET TREES

An essential feature of a healthy and attractive urban environment is the presence of trees - along the streets and in public parks and private yards. More than simply an aesthetic amenity, trees in the urban environment stabilize soils, provide a filter for surface runoff and air pollutants, shade summer sun, block winter winds, muffle sounds and provide habitat and refuge to birds and other small animals. The main objectives of Burlington's urban forestry program include maintaining existing public trees (numbering approximately 8,000) and planning for the creation of a sustainable urban forest through the City's tree planting program. (see also the *Community Facilities and Services* section of this Plan)

Sustaining Burlington's urban forest into the future will require a consensus regarding the goals and design objectives for the urban forest, and an understanding of the conditions necessary for a tree to survive in an urban environment. Poor soil conditions, road salt, auto emissions, and overhead and underground utilities all work against street tree survival under urban conditions.

The Department of Parks and Recreation has a *Street Tree Planting Plan* as a component of an *Urban Forest Master Plan*. In addition to inventorying assessing the condition of existing trees, the Plan articulates city-wide objectives for public trees, identifies future planting sites, lists appropriate species for re-planting, establishes site planning guidelines, and explores opportunities and mechanisms for planting on private property to expand possible planting sites within the streetscape. Most importantly, it outlines a plan for maintaining the existing street tree population with annual budget recommendations and proposed work schedules for pruning.

STREET AND SITE LIGHTING

Recent expansions in the use of exterior lighting have resulted in a marked increase in overall lighting levels within the city. While originally intended to reduce energy use and improve security, the use of high-pressure sodium lighting - in combination with new styles of fixtures - has had several unintended results. These include a distortion of natural colors, excess brightness, glare spilling onto adjacent properties, and an obscuring of the night sky known as “sky glow” which affects not only Burlington, but neighboring communities as well.

Recognizing these issues are common in other areas, and pose impacts regionally, the City participated in a site lighting study in cooperation with the Chittenden County Regional Planning Commission. The purposes of the study were to develop information on lighting issues and technology, and to establish a set of lighting guidelines that will help Burlington and other communities in the review of new lighting installations. Issues of particular importance in Burlington include:

- Overall illumination levels are too high.
- Concern about the visual quality and color distorting properties of high-pressure sodium lights.
- Glare from unshielded or misdirected fixtures.
- Improving the quality of outdoor lighting to improve public safety and perceptions of security.
- Unnecessary illumination of building facades.
- Design quality of fixtures and poles.
- Desire for complementary fixture designs in different types of settings and neighborhoods.

Recommendations resulting from this study - including the use of cut-off or shielded fixtures; lower wattage bulbs; color corrected or other acceptable light sources; and fixtures and pole heights which are appropriate for the site and neighborhood - will be evaluated for inclusion in the city’s zoning guidelines and utilized by all city departments in the review of lighting installations. Additionally, there is an inherent conflict between street trees and street lighting, and locations of trees and lighting should be coordinated between Parks & Recreation and BED early in the planning and design stage of a project.

Built Environment Action Plan

Action Item	Lead Agency	Secondary Agencies
Evaluate the options and opportunities for increased development density and building height within the Downtown area, Neighborhood Activity Centers and other city growth centers to enable significant future growth without harming the scale and character of the city and its historic resources and scenic views.	Planning & Zoning	CEDO
Extend the use of floor area ratio (FAR) as a measure of development density beyond the CBD and Transitional Zones.	Planning & Zoning	CEDO
Amend Article 30 of the <i>Burlington Zoning Ordinance</i> to include a definition of "Buildable Area" for the purposes of calculating allowable density in certain parts of the city.	Planning & Zoning	CEDO
Identify important scenic view corridors and points of interest and ensure their protection in the Zoning Ordinance, especially from public places such as primary streets and parks.	Planning & Zoning	Parks & Rec.
Undertake a public design process to identify and outline future design characteristics of the public streetscape.	Public Works Parks & Rec.	Planning & Zoning CEDO
Revise Burlington's Subdivision Ordinance and street design standards to ensure that the width and design of each street fit its function and location.	Public Works	Planning & Zoning
Develop a comprehensive street lighting plan and site design standards.	Planning & Zoning BED	Public Works
Develop conceptual guidelines to define gateways through the use of signs, plantings, architectural landmarks and other design features.	Planning & Zoning	Public Works
Define north/south and east/west mid-block pedestrian pathways connecting the Central Business District and the surrounding neighborhoods.	Planning & Zoning	Public Works
Modify the Zoning Ordinance's Design Review criteria to ensure building development take into account Burlington's northern climate	Planning & Zoning	BED

Develop criteria and guidelines for use of sustainable building technologies.	Planning & Zoning	
Evaluate the feasibility of linking cultural facilities through the use of a downtown cultural /arts district or through a centrally-located arts information kiosk	City Arts	Planning & Zoning
Develop a Percent-For-Arts Ordinance for public buildings.	City Arts	Treasurer's Office

VIII. ENERGY PLAN

Vision Statement

This Plan envisions Burlington as a city where...

...Burlington is a leader in the development and implementation of energy efficiency and renewable energy measures that reduce energy costs, enhance environmental quality, improve security and sustainability, and enhance economic vitality. Key elements of this success are a broad range of energy efficiency programs, public education in resource conservation, publicly-owned alternatively-fueled electric generation, biomass-fueled district energy technologies, energy-efficient green building technologies, and climate-friendly transportation solutions, which includes support for alternative fueled vehicles.

CITY POLICIES

THE CITY OF BURLINGTON WILL:

- **Optimize overall energy efficiency, reduce energy requirements, and minimize the need for new energy resources on a citywide basis.**
- **Continue to aggressively pursue the transition to renewable sources, cogeneration, and district heating.**
- **Improve the energy efficiency of city-owned buildings and facilities.**
- **Reduce transportation energy use by lessening reliance on drive-alone car trips, using more fuel-efficient vehicles, promoting increased transit use, and decreasing vehicle miles traveled.**
- **Educate its citizens regarding energy efficiency, the benefits of public utility ownership, renewable electric generation, and conservation to ensure that citywide resource allocation decisions in years to come will reflect the wishes of an informed citizenry.**
- **Make tangible efforts to reduce greenhouse gas emissions through the implementation of the *Climate Action Plan*.**

INTRODUCTION

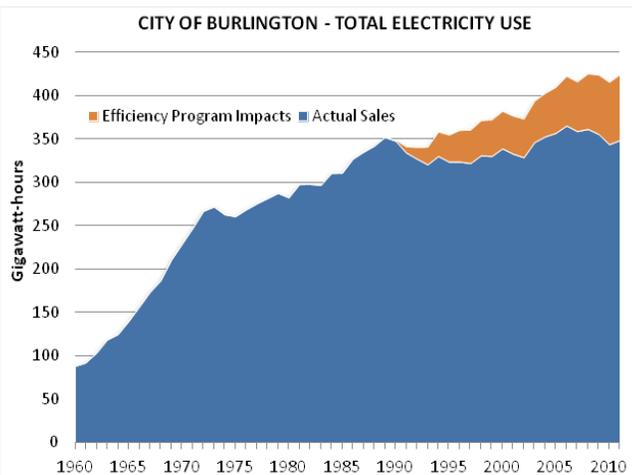
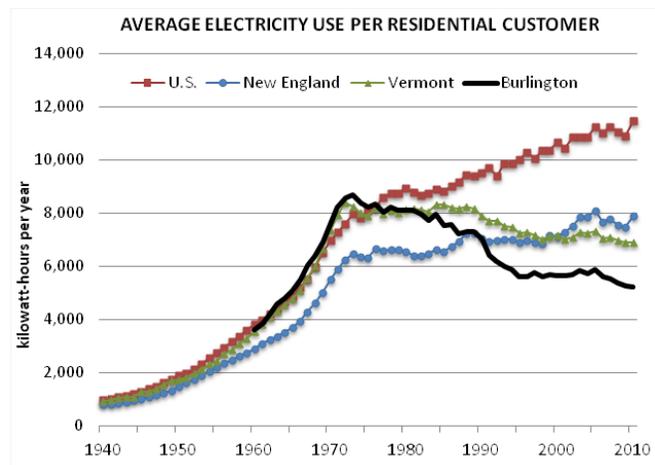
Access to reliable and clean energy, at an affordable price, will be an important factor in defining and facilitating future growth and development in Burlington. This Chapter briefly outlines how energy is used and supplied to the city, discusses some of the most important public policy issues related to energy generation and consumption, and finally proposes a series of strategies to improve efficiency, protect the consumer and the environment, and maintain energy self sufficiency. Much of the information and policy direction for this section comes from ***The Burlington Climate Action Plan*¹** adopted by the City Council in the winter 2014, and included as part of this plan by reference.

Energy Use & Supply

Nearly 85% of city residents rely on natural gas for space heating and domestic hot water use; typically the two largest users of energy in homes. Over 90% of commercial customers rely on natural gas for these purposes as well, however these buildings can use a good deal of electricity for lighting, central air conditioning, ventilation, and office equipment. Statewide energy use among fuels shows a dominance of oil in energy consumption. About 70% of Vermont homes use oil for space heating purposes.

In 1989, approximately 23% of homes and apartments in the city used electric space heating as the sole heating source and through the efforts of energy efficiency programs; residential electric heat use has been reduced down to about 5% of homes with electric heat as the sole heat source. These are typically buildings that do not have access to natural gas due to topography or subsurface conditions that make laying pipeline difficult.

Electricity is a high-quality power source, but to date has been inappropriate for space and hot water heating due to historically higher costs. Natural gas continues to be a more suitable heat source. Recent significant drops in the current and projected costs of natural gas make this unlikely to change in the foreseeable future. Oil on the other hand has seen continued price escalation. If the market for natural gas were to change materially however, this could need re-examination.



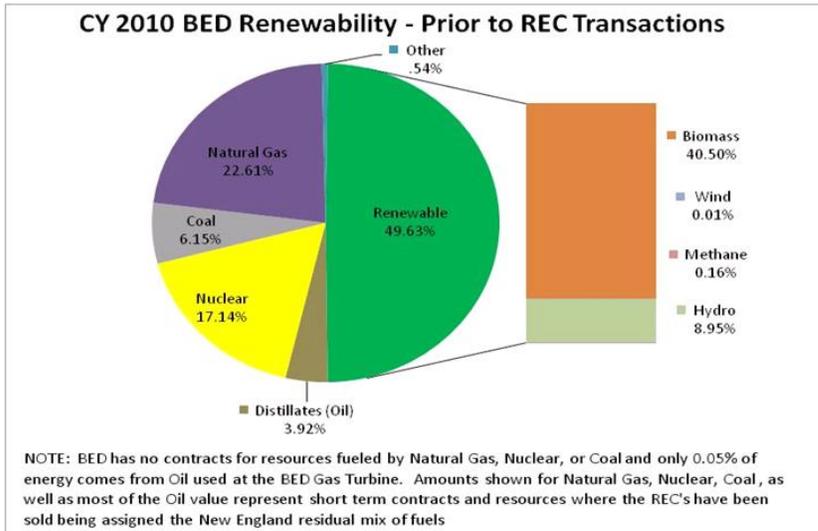
¹ 2014 Climate Action Plan Burlington, Vermont.

Burlington’s energy use priorities focus on developing more effective and economically viable Vermont based renewable energy alternatives including solar, wind and bio-mass energy sources, and a continued emphasis on conservation and efficiency programs. Energy efficiency has been shown to be Vermont’s least expensive future energy supply resource over time, and is consistently becoming a greater environmental imperative. The Burlington Electric Department is owned by all the citizens of Burlington, who have been unequivocally clear that the option for future supply that they prefer above all others is the pursuit of additional cost-effective energy efficiency.

BURLINGTON ELECTRIC

Burlington is fortunate to have a municipally-owned and operated electric company. Burlington Electric (BED) began in 1905, and currently serves about 16,300 residential customers and more than 3,600 commercial customers. BED serves the full range of energy services including generation, transmission, distribution, energy efficiency, and other retail energy services.

Burlington is a recognized world leader in the use of renewable energy and energy conservation. In 2011, Burlington as a whole used 4.7 percent less electricity than it used in 1989. The pie chart below shows the proportion of BED’s 2010 energy sources that came from renewable generation (this chart reflects the source of BED’s power, and does not reflect the change in BED’s emission claims caused by the sale of RECs as discussed below).

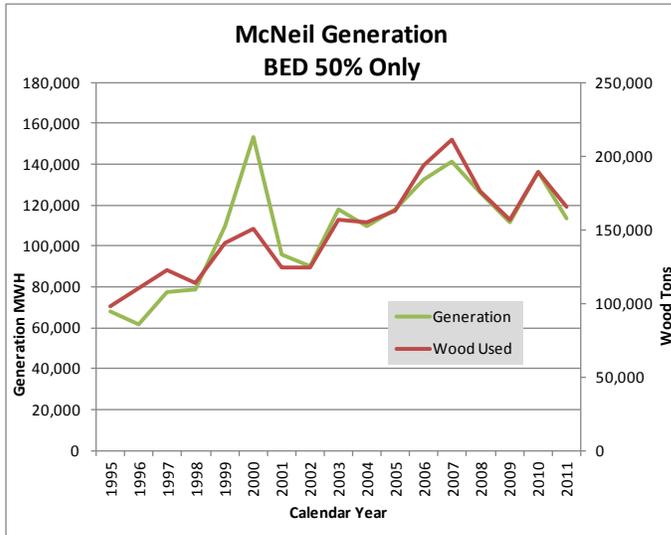


BED owns 50% of the 50-megawatt (MW) McNeil Generating Plant located in the Intervale. McNeil Station is one of the world's largest woodchip-fueled electric generating facilities. In late 2008 a new emission control system (a regenerative selective catalytic reduction or "RSCR" device) was installed which dramatically reduced McNeil’s nitrogen oxide (NOx) emissions. With the installation of this equipment, McNeil qualifies to sell Renewable Energy Credits ("RECs") to other states. When BED sells these RECs, BED loses the ability to claim McNeil as a renewable generating source, but is able to use the revenues from the sale of the



RECs to offset the cost of the emission control equipment and to help control rates. Since late 2008, BED has realized significant value from the sale of McNeil RECs and these revenues have been used to help maintain current rate levels.

The graph below summarizes the annual generation and tons of wood used at the McNeil Station. The difference between tons of wood used and generation in 2000 represents the last year where McNeil used significant amounts of natural gas to generate electricity (though the capability to do so still exists). The drop in output in 2011 is related to periodic maintenance that occurs on a seven year cycle.



In addition, BED owns a 25-MW turbine located next to the Water Treatment Plant on Lake Street. The gas turbine is a black start unit capable of cold-starting the McNeil Station as well as energizing critical load such as the Fletcher Allen Health Center.

BED has recently contracted for the full output from Georgia Mountain Community Wind (GMCW), a proposed 10 MW wind facility in Milton/Georgia, Vermont which went online at the end of 2012. Additionally, BED has signed and received voter approval for a long-term contract with Hydro-Quebec where deliveries will begin in 2015. Lastly, BED has received approval for a modification to its tariff to allow it to increase the benefits customers receive from solar net metering installations in recognition of the higher value of solar renewables to BED. BED continues to seek other power supply options including local generation. BED has the right to purchase (at fair market value) the Winooski One hydro facility on the Winooski River between Burlington and Winooski at the end of its current VEPP contract in March 2013. This facility is capable of producing 7.3-MW of power. Maintaining local energy self-sufficiency is an important component to Burlington’s future sustainability.

In addition to its own generation facilities, BED purchases power from a variety of sources and through the New England Power Grid. In determining where to purchase energy, BED considers the total social and environmental costs in its decision-making process. In 2012, approximately 50% of this power came from renewable sources and this percentage is expected to continue to grow when the new resources mentioned above begin deliveries. When BED’s Integrated Resource Plan (IRP) was filed in 2008, Burlington had a goal of providing 100% of its power from renewable sources. The new 2012 IRP revisited the 100% renewable goal in light of lower natural

gas prices and did support buying short-term renewable power contracts until cheaper long-term renewable sources could be found. BED continues to focus on a goal of 100% renewable supply and is continuing to seek cost effective options. In particular, a third wind contract is under consideration and BED hopes to soon purchase the Winooski One Hydro dam. If those two options work out as expected, BED will reach 100% renewability in 2014.

Advanced Metering Infrastructure (AMI)

The deployment of AMI is a technological advance that will change BED's business and operations in very fundamental ways. These changes will have a profound impact on the community, so BED is committed to working closely with its customers, other Vermont utilities, regulators and legislators to arrive at solutions that provide the best benefit to the Burlington energy consumer.

BED partnered with other Vermont utilities and the Department of Public Service ("DPS") to develop and submit a statewide grant application to the Department of Energy ("DOE") to obtain Smart Grid Investment Grant ("SGIG"), funding. The funds awarded to all participating Vermont utilities totaled \$69 million of a \$138 million project (100% of the requested amount). The DOE awarded BED \$7.15 million for a \$14.3 million total project (again 100% of the requested amount). The full Federal matching funding received by BED reduced BED's direct cost for its Smart Grid projects by 50%. On June 28, 2011, BED sought voter approval to issue Revenue Bonds to obtain matching funds for the projects, which resulted in approval of the bond issuance by 61% of Burlington voters. BED closed on the sale of the Revenue Bonds on October 13, 2011. BED initial phase of advanced meter deployment began on April 23, 2012 and finished in early 2013.

BED's AMI plan centers on its ability to improve system planning/reliability, improve customer service, empower customers to engage in choices regarding their use of energy, and possibly modify their usage to reduce costs. BED has defined a list of service offerings and utility enhancements that will result from the AMI project.

The selected technologies will have the ability to provide immediate customer and societal benefits as well as the potential for future benefits as the systems and service offerings mature. These benefits are derived from the enhanced data collection, communications and process integration capabilities provided or enabled by the proposed AMI Project. Over the longer-term, use of AMI (integrated with a Meter Data Management System) for time-of-use pricing or other pricing options, will allow customers to the option to adjust consumption decisions based on the day-to-day (or potentially even hour-to-hour) price of electricity and its impact on their bills.

With a fully active system, BED can:

- Dispatch crews to outages without waiting for customer calls (while minimizing manual handling of outage information)
- Give customers much greater insight into how they use electricity via a web portal
- Reduce the need to send trucks into the field for move-in and move-out meter readings
- Have much more information to assist in answering customer questions
- Develop more accurate class level load forecasts
- Be able to develop much more personalized energy efficiency programs (including better estimates of potential savings)
- Be much more accurate in our distribution transformer and conductor sizing
- As a side benefit, automate many of the manual functions performed every day, giving staff more time to focus on customer needs and more tools to fix problems

BED believes the following benefits are possible to the consumer as a result of this new technology:

- Expanded integration of distributed renewable energy
- Access to data needed to support time differentiated electric rates in more detail than is currently possible
- Capability to connect power consuming appliances in the home to load control devices if customer's desire
- Opportunity to reduce fossil fuel use by converting fossil energy sources to electric based renewable sources
- Remote access home usage and ultimately remotely control appliances/usage
- Allowed access to third party services to better manage their usage and load control (e.g. Google)

District Heating & Cooling/ Community Energy

BED, in conjunction with the Department of Public Works, continues to study the feasibility of developing district heating and cooling, or now known as "District Energy," within portions of the city. Areas under evaluation begin with the Winooski Avenue corridor all the way to the downtown. Although not under consideration at this time, the concentration of industrial land uses along Pine Street may make this area another attractive location to provide this type of service.

The concept for District Energy is to replace natural gas and fuel oil as heat sources with hot water. Such a plan will utilize excess city water capacity, combined with energy and excess/low cost heat produced by McNeil Station. Energy would be distributed underground to either heat or cool buildings within the district. If feasible, district heating and cooling is expected to provide a viable energy alternative, make use of existing water capacity, diversify the city's energy mix, and make the city a more attractive and competitive location for business.

Energy Efficiency Programs

BED began an ambitious energy efficiency program in 1990. Over \$37 million has been invested by BED since 1991 with about half of this being matched from BED customers. BED has implemented a wide range of programs to reduce overall energy consumption and costs through the city. These included:

- **Smartlight:** leased compact florescent energy saving light bulbs to both residential and commercial consumers. In the near future, this may include other items financed on the electric bill.
- **Heat Exchange:** offers assistance and financial subsidies to convert customers from electric heating to other heating sources. Over time, as legislation in this area evolves, BED will become increasingly more involved in the growth of fossil fuel saving energy efficiency programs as well.
- **Commercial Efficiency programs:** offers a customized menu of energy savings opportunities to the City's commercial electric customers to provide "positive cash flow" financing of demand-side management measures.
- **Energy-Efficiency Standards:** adds additional requirements to those minimum standards adopted at the statewide level for buildings and energy-consuming

equipment in new construction and rehabilitation projects. These go hand in hand with incentive programs to help building owners, architects, developers, and even tenants to achieve higher levels of energy efficiency.

- **PACE:** is an innovative residential energy efficiency and renewable energy financing program that was launched in 2012. It offers residents a way to finance high-level energy efficiency and small-scale renewable energy projects over very long terms, making these projects more affordable.

In 2000, BED was appointed the City's "energy efficiency utility." This designation allows BED to administer funds collected on the electric bill through a statewide "energy efficiency charge." This appointment was renewed in 2011.

Energy Use and Climate Protection

Most climatic scientists now agree that human-caused emissions of greenhouse gases² are having a measurable impact on the earth's climate. While increases in global temperatures are highlighted as one of the primary outcomes of climate change, many impacts that are more serious may result. These include an increase in the frequency and intensity of extreme weather events, rising sea levels, and a northward expansion in the range of tropical diseases and pests. Each poses a significant economic and environmental threat to our region and beyond.

In 1996, Burlington became one of the first cities to join the "Cities for Climate Protection" campaign, organized by what is now referred to as "ICLEI: Local Governments for Sustainability." This led to a 1998 City Council resolution to reduce our emissions to 10% below 1990 levels and the formation of a Climate Protection Task Force. This group, comprised of non-profit, city, and business leaders appointed by then Mayor Peter Clavelle, guided an 18-month analysis and planning process, which ultimately led to the City's first Climate Action Plan (CAP). This plan was adopted by the City Council in May 2000.

In 2008, Burlington began its CAP update and review process with an inventory of Burlington's emissions. This inventory, conducted using ICLEI's Clean Air and Climate Protection (CACAP) software, involved input, not only from key City departments such as Burlington Electric Department (BED), Department of Public Works (DPW), and Department of Planning and Zoning (DPZ), but other organizations such as the Chittenden Solid Waste District (CSWD) and the Regional Planning Commission.

GHG emissions reduction target:

The first short-term target requires leveling off the emissions by 2016 and bring them back to 2010 levels. The second target involves an actual reduction of the 2010 emission levels by 2025:

- Municipal Operations - 20% reduction from 2010 levels by 2025.
- Airport Operations - 10% reduction from 2010 levels by 2025.
- Community-Wide - 10% reduction from 2010 levels by 2025.

² "Greenhouse Gases" are any gas found in the earth's atmosphere that contributes to trapping energy under the atmosphere and causing warming. Such gases include carbon dioxide, methane, ozone, nitrous oxide, chlorofluorocarbons (CFC's) and water vapor.

Recommended actions propose to reduce traffic and air pollution, save money for the City and its residents and businesses, and help protect the environment for future generations. After a lengthy public idea generation and prioritization process, thirty-six strategies have been included in the plan under the following eight categories:

- Compact Mixed-Use Development
- Community-wide Transportation
- Municipal Transportation
- Local Gardens, Farms and Food Production
- Energy Efficiency in Buildings
- Renewable Energy Resources
- Urban Forestry & Carbon Sequestration
- Waste Reduction and Recycling

In addition to reducing greenhouse gas emissions, the recommendations of this Plan will benefit the city in other ways:

- **Cleaner air:** Motor vehicles are the single largest source of urban air pollution. In addition to greenhouse gases, cars emit such carcinogens as butadiene, benzene, and formaldehyde.
- **Improved human health:** Cleaner air will result in healthier people. An estimated 40,000 premature deaths nationally are attributed to motor vehicle emissions.
- **Improved economic vitality:** Improvements in energy efficiency mean tangible cost savings to individuals and businesses. Energy independence keeps local dollars in the local economy and improves the competitiveness of local businesses.
- **A more livable community:** A city with less traffic, cleaner air, more trees, and successful businesses will be a more attractive and livable place to live for current and future generations.

Energy Action Plan

Action Item	Lead Agency	Secondary Agencies
Sponsor forums for architects, developers, contractors, and others to inform them about new city ordinances, regulations, and standards and to provide technical assistance as to how they can incorporate new analytic and production techniques in their work	BED	Public Works
Review vocational curricula to promote energy efficiency and to develop programs to prepare students for employment in new energy-related fields.	BED	Schools
Develop an overall energy budget to manage the city's energy consumption. For electricity, the budget should be based upon local generating capacity if practical.	BED	

Examine the costs and benefits of requiring new development to either pay an energy impact fee or make an offsetting investment in efficiency.	BED	Planning & Zoning
Prepare an evaluation of the citywide potential, constraints and impacts associated with the development of new renewable energy sources - including fuel cell, cogeneration, biomass, solar, geothermal, hydro, wind, and methane.	BED	
Develop guidelines for tree heights and species selection that maximize energy efficiency.	Parks & Recreation	BED
Amend and enforce the municipal code and ordinances with an eye on reducing CO2 loads.	Planning & Zoning	BED
Develop a comprehensive education/outreach program to increase public awareness about the affects of global climate change on public health, the economy and the environment.	BED	Planning & Zoning Public Works Schools
Expand and maintain the City's inventory of street trees and shrubs.	Parks & Recreation	
Fully implement existing utility sponsored efficiency programs (electric and natural gas) in the commercial and industrial sectors.	BED	
Increase energy efficiency in municipal-owned and leased buildings.	Treasurer's Office	BED Public Works Schools
Explore and to obtain the resources necessary to implement the objectives of the municipal buildings and operations plan.	Treasurer's Office	BED Public Works Schools