Chapter 10: Land Use and Infrastructure
INTRODUCTION
This chapter examines the existing patterns of land use and current conditions of the region’s infrastructure. It includes information from the recently completed Franklin County 2012 Regional Transportation Plan and from the Greater Franklin County 2012 Comprehensive Economic Development Strategy (CEDS) Annual Report.

In addition, the Land Use and Infrastructure Chapter synthesizes the findings of the other chapters of this plan. Many of the topics of this plan and the goals for each are interrelated and depend upon strategic land use and infrastructure planning.

In addition to this information, the results of the Goals Survey and the Sustainability Workshops influence the recommendations and strategies of this chapter. The top land use and infrastructure goals identified in the survey are:

**TOP THREE LAND USE GOALS**
1. Prioritize redevelopment of vacant or underutilized structures and properties
2. Locate new businesses in town centers or near transit services
3. Coordinate new development with existing transportation, water and sewer infrastructure

**TOP THREE INFRASTRUCTURE GOALS**
1. Protect and expand “green infrastructure” to reduce flooding, purify air and water and decrease energy use for cooling
2. Improve broadband internet access
3. Maintain or upgrade sewer and water infrastructure

Suggestions from the public workshops for infrastructure improvements include water and sewer upgrades for many towns and region-wide broadband access. Common suggestions for transit infrastructure improvements include county-wide east-west passenger rail, expanded public transit service to Bernardston/Northfield and Conway/Ashfield, and pedestrian and bike paths. Some of the more popular potential projects related to infrastructure identified during the public workshops include county-wide passenger rail, expanding transit services, and food processing infrastructure. This chapter also identifies constraints and barriers to sustainability as it pertains to land use and infrastructure and makes recommendations to increase sustainable development patterns and improve infrastructure.

BACKGROUND
The geographic center of the region is the Connecticut River Valley, which has a broad flat expanse offering unparalleled agricultural soils and beautiful scenic vistas. The Connecticut River bisects the region with the Berkshire foothills to the west, and the Pelham hills and the Quabbin Reservoir to the east. Flowing into the Connecticut River are the Deerfield River to the west and the Millers River to the east. These rivers and the Quabbin Reservoir are the principal water features in the landscape.

The topography of a region often dictates the use of the land. In fact, common land use patterns can be observed throughout Franklin County. In the hilltowns, village centers are often found clustered along rivers, and roads travel along rivers and streams. The steep slopes in many of the hilltowns pose limitations for siting large-scale developments and in some areas can present constraints with respect to transportation access. In many places in the hilltowns, the terrain, floodplains, and exposed bedrock also constrain the potential for installation of community-scale sewer systems.

In the plains of the Connecticut River Valley, although village centers formed along rivers, they also sprung up in agricultural areas. Not surprisingly, this area contains most of the existing large-scale development and most of the land zoned for these purposes. However, the Valley also contains much of the prime farmland in the region, and such
development may impact this resource so vital to the agricultural economy.

**Existing Land Use and Development Patterns**

Franklin County has seen an increase in residential land use over the last 40 years, with forestland and farmland being lost to residential land use. This trend is similar at the statewide level, with residential growth trends steering away from a village center model and spreading diffusely across Massachusetts' landscape. According to the MA Executive Office of Environmental Affairs, from 1950 to 1990, the state's population grew by 28 percent while the amount of developed land in the state grew by 188 percent.

In more recent findings, the 2009 Mass Audubon report, *Losing Ground: Beyond the Footprint*, development patterns and their impact on nature in Massachusetts are analyzed. As shown in Map 10-1, a significant portion of Franklin County lies within Mass Audubon’s “Sprawl Danger Zone”, classified as such based upon the important ecological resources poised to be lost to development should more significant sprawl continue to expand into the region.

Coupled with sprawl is the loss of agricultural lands, which are especially vulnerable to development pressures in part because they are already cleared and leveled and typically have soils suitable for septic systems. *Losing Ground* identifies two towns along the Connecticut River – Deerfield and Hatfield – as among 20 towns and cities in the state with the most acres of agricultural land converted to development. Once converted to residential or other land use, farmland is all but lost to future food production. *Losing Ground* identifies the loss of farmland as a statewide issue.

In general, increases in residential land use in Franklin County has not been concentrated in existing town centers or population centers, but has

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**Map 10-1: Losing Ground: Beyond the Footprint, Mass Audubon, 2009**

*Development Impact Zones in Massachusetts (1999-2005)*

![Map Image](image-url)

- **Sprawl Frontier**
- **Sprawl Danger Zone**
- **Limited Development Zone**
- **At or close to buildout**

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instead been strung along rural roadsides. This pattern is due, at least in part, to large lot zoning as well as the Approval Not Required (ANR) provision of the Subdivision Control Law, Chapter 41 of Massachusetts General Law, which allows land owners to develop land for residential use as long as it meets frontage and access requirements.

The results of this pattern of development over a twenty year period are illustrated in Maps 10-2 and 10-3. Development has spread out along rural roads and outlying areas. The impacts of this type of sprawling residential development can include:

- Loss of farmland and forest.
- Fragmented wildlife habitats.
- Increased costs for municipalities for road maintenance, infrastructure, and services.
- Decline of town centers and loss of community connection.
- More fossil fuel used for transportation.

The most recent land use data available for Franklin County is derived from 2005 MassGIS data. In 2005, MassGIS changed the technology and methodology used to collect land use data. Although exact comparisons to previous years are not possible, due to this change, it is possible to make general statements about land use change. Between 1999 and 2005, farmland decreased by about 11 percent. During the same time, the amount of forest land use stayed nearly the same, while commercial/industrial land increased by about 12 percent.

Franklin County’s total land mass is 463,511 acres. According to 2005 Mass GIS data, about 77 percent (357,910 acres) of Franklin County was forested, nearly 8 percent (36,073 acres) of Franklin County was in agricultural use, about 7% (33,112 acres) was classified as water and wetlands, and approximately 4 percent (18,983 acres) was in residential use. Commercial and industrial (2,178 acres), urban open land (2,072 acres), open land (8,164 acres), recreation (1,717 acres) transportation (2,167 acres), mining and other developed land uses (1,136 acres) made up the remaining land uses in Franklin County.

Population Growth and Development Trends
As stated in the Housing Chapter, population in the County has slowly, but steadily grown over the last 40 years. See page __ for more information. Projections show that the County’s population will undergo a growth rate of seven percent between 2010 and 2035.

Map 10-2: Residential Land Use 1985

Map 10-3: Residential Land Use 2005
With the projected growth rate, approximately 3,500 households will need to secure housing in Franklin County, with at least some housing resulting in new development. Continuing to locate new residential development in outlying rural areas will exacerbate the impacts to towns and to critical natural resources. Alternatives to sprawling residential development include infill and concentrating growth in town centers, near employment centers, and on transit routes where existing infrastructure can support the growth. Diversifying housing stock to include more accessory apartments, multi-family dwellings and mixed use buildings can also help alleviate the pressure to develop more land.

PERMANENTLY PROTECTED LAND
In response to development pressures and concerns about their ability to handle future potential growth, a number of Franklin County communities, including Buckland, Erving, Gill, and Orange have revised their zoning bylaws in recent years to direct growth to areas within their towns with the highest current levels of development and the best infrastructure (water, sewer, roadways) to accommodate new growth. Towns have also worked to encourage other areas to remain undeveloped farmland and forestland. In particular, land conservation organizations in the region, such as the Franklin Land Trust and the Mount Grace Land Conservation Trust, have protected a considerable amount of private farm and forestland in the region through the direct purchases of land.

Because the number of acres of land undergoing permanent protection continues to grow, it is difficult to quantify and/or compare the total amount of acres protected in Franklin County. On the local level, when a town updates its Open Space and Recreation Plan (OSRP), land protected under Conservation Restrictions and Agricultural Preservation Restrictions is updated. But on the regional and state level, data can be several years old.

Farmers face challenges finding affordable land to farm, as development pressures drive up the cost of farmland.

Protecting Farmland and Farm Infrastructure
In 2012, Mount Grace Land Conservation Trust piloted Campaign for Affordable Farms / Red Fire Farm Project, an effort to increase access to affordable whole farms (land and infrastructure). The initiative addresses the urgent need for permanently protected farms – and farm infrastructure – that are affordable to those wanting to farm them. This conservation project will help establish procedures and a range of models, building on the work of Equity Trust, which can be applied to farms throughout the region.

Access to affordable land is currently one of the biggest challenges facing farmers today. In Massachusetts, the Agricultural Preservation Restriction (APR) Program has gone a long way towards permanently protecting farmland. While APRs can dramatically reduce the cost of agricultural land, there has been no equivalent tool in place to ensure that whole farms, including the necessary buildings and infrastructure, are affordable into the future.
Map 10-4 shows all land permanently protected in Franklin County. According to Mass Audubon’s Losing Ground, of Franklin County’s 463,734 acres, nearly 26 percent (or 120,221 acres) are permanently protected. Between 1999 and 2005, 19,169 acres were permanently protected. Map 10-4 also shows the patterns of protection. The eastern part of the county, which includes land in the Quabbin Reservoir, has the highest percentage of permanently protected land in Franklin County. The westernmost part of Franklin County has some significant areas of protection. The Connecticut River Valley has the smallest percentage of permanently protected land in the region, even though it has the largest acreage of valuable agricultural soils.

With the perennial challenge of limited funds available for land protection, often an obstacle to land conservation, prioritizing the most valuable land in terms of sustainability is an approach that can help agencies and organizations focus their efforts. In the Natural Resources Chapter, land was prioritized for protection based on whether it contained one or more of the following types of assets: Undeveloped Agriculturally Suitable Soils, Undeveloped BioMap2 Forest Core, Undeveloped Priority Habitats and BioMap2 Priority Habitats, Undeveloped Aquifer Areas, and Potential Future Water Supply Areas. Permanently protecting land with these types of assets is critical to the sustainability of the region. This Chapter takes into consideration these priority protection areas when making recommendations for potential development areas.

The western part of Franklin County contains some significant areas of protected land, including land in Monroe.
As part of recent Open Space and Recreation Plan updates, the following towns’ data has been updated and validated through assessor’s records and other sources: Buckland (2010), Erving (2009), Gill (2011), Leyden (2010), Montague (2010), Orange (2009), Warwick (2009), and Wendell (2010).

Data for permanently protected land in the remaining towns was obtained from 2005 Mass GIS Protected and Recreational Open Space. Mass GIS notes that “although the initial data collection effort for this data layer has been completed, open space changes continually and this data layer is therefore considered to be under development. Additionally, due to the collaborative nature of this data collection effort, the accuracy and completeness of open space data varies across the state’s municipalities. Attributes, while comprehensive in scope, may be incomplete for many parcels.”
**Existing Infrastructure**

Successful and sustainable growth in the region will depend, in part, upon robust infrastructure. The following section discusses the condition of existing infrastructure and identifies potential challenges to areas identified as priority development.

**Franklin County Residents Say...**

The most common infrastructure needs identified during the public Sustainable Franklin Workshops:

- Water and sewer infrastructure improvements in many towns;
- County-wide broadband access;
- East-west passenger rail; and
- County-wide bike paths.

**Water and Sewer**

Water and sewer infrastructure, as well as the ownership and management of it, varies from town to town in Franklin County. Most Franklin County residents rely on private wells for drinking water and private septic systems for sewer. However, some towns have public water and/or sewer service, typically serving the town center and any industrial or commercial areas. Where water supplies are concerned, there are 17 public water supplies in Franklin County with some towns having more than one. The Town of Deerfield, for example, has two separate water supply districts, each owned and operated by a separate entity and each with different water supply sources. The Town of Gill has only one water supply district, however the water is supplied by the Town of Greenfield. Where public sewer is concerned, there are 11 public sewer districts and/or facilities in Franklin County. For example, the Town of Montague is served by two separate wastewater treatment facilities, one of which is located in Ervingside. Because of the many different ownerships and structures of public water and sewer supplies, there are sometimes challenges in maintaining clear lines of communication between these entities and the municipal governments.

In 2003, the Franklin County Regional Drinking Water Supply Study was completed by the FRCOG. The Study assesses the short- and long-term capacity of 17 community water supplies to support growth in the region. Additional information on the Study, as it pertains to aquifers, is contained in the Natural Resources Chapter. As the Study pertains to drinking water supply infrastructure, it examines 17 public water supplies/districts. The study found that seven of the water supplies/districts may be potentially constrained from supporting additional demand for new water needs such as an incoming high volume water user (e.g. school, industrial use, or food processing facility). The study also found that, of the 17 public water suppliers, only four had working emergency water back up, although seven communities had emergency agreements with other suppliers.

Where demand was concerned, the key finding of the study is that future demand is most influenced by changes in per capita use and population, both of which can be impacted through conservation and planning. Along with working to identify potential drinking water supplies, discussed in the Natural Resources Chapter, the study makes recommendations for demand management and conservation. They include:

- Identifying water conservation measures that could be implemented town-wide.
- Proactively protecting land within recharge areas and sub-watersheds.
- Identifying and repairing faulty water lines.
- Protect aquifer areas that could provide future drinking water supplies.

**Water and Sewer Survey**

A critical part of any plan for sustainable development is determining whether existing infrastructure can support such development. In many cases, towns and/or public water or sewer providers maintain their own records of the condition and location of their infrastructure, often not in digitized form. As such, a survey and digitized mapping project was undertaken as part of the RPSD to update sewer and water infrastructure information and location. The survey...
concentrates on the towns identified as having Priority Development Areas or Emerging Development Areas. Information on additional towns was gathered as time and budget permitted. A summary of water and sewer information for each Priority and Emerging Development Area can be found on Maps 10-5 through 10-13. The Franklin County Public Water and Sewer Survey is anticipated to be completed in 2013.

Each water or sewer district which participated in the survey will receive an updated, digitized map showing the location of the water and/or sewer lines and infrastructure for planning purposes. In order for this information to maintain its usefulness, regular updating of data and maps will be needed at the local and regional level. As such, one of the recommended strategies at the end of this chapter is to seek funding to provide for the regular updating of water and sewer data and mapping.

**Water and Sewer Survey: Key Findings**

- Most water and sewer maps are in paper format, some with hand-drawings, and most departments and districts do not have an up-to-date system-wide map.
- The largest challenge for both water and sewer departments and districts is the age of the infrastructure, and finding funding for maintenance and repairs.
- Inflow and Infiltration (I&I) is an issue for all of the priority towns identified, contributing between 25% - 50% of average daily flow to wastewater treatment facilities.
- Some of the smaller departments and districts are challenged by the increasing complexity of system operations and reporting requirements and regulations.
- There are very few plans for expansion of lines. Sewer and water districts, in particular, are confined by legal boundaries that often already encompass the existing service area.
- Major users are schools, large residential complexes, and industrial businesses.

**Telecommunications and Broadband**

Telecommunications infrastructure includes systems that provide telephone, television and broadband internet services. In many areas of Franklin County, the quality or access to services through the current telecommunications systems are inadequate for present day needs. Issues of reliability, affordability and access have been obstacles for individuals, businesses, and institutions in this region for many years. Fortunately, significant efforts are underway to address this situation and support access equity throughout Western Massachusetts.

There are different types of technologies that may provide broadband service to a home or business, such as through cable television systems, Digital Subscriber Lines (DSL), wireless broadband, and fiber-optic systems. Some residents and businesses may use a satellite broadband connection; however, this technology has limitations. In 13 towns of Franklin County, the local cable television franchise is equipped to transmit broadband services to residences and businesses connected to the system. Twelve of these 13 towns are served by Comcast and one is served by Time Warner. In 22 Franklin County towns, areas of the community may access DSL services transmitted over copper telephone lines. However, access to these services may only be available in limited areas. Of these towns, nine of them only have DSL available within a finite area and no cable television broadband at all.

In addition, there are another four towns with no access to DSL or cable broadband at all. Broadband services may be transmitted by fixed or multi-point wireless facilities (such as through a Wireless Internet Service Provider or mobile cell phone system). For example, the Town of Warwick has created the Warwick Broadband Service, which is a fixed wireless broadband service for subscribing households and businesses.

Even in communities that have one or multiple broadband service systems established, there remain gaps in access to these services. These issues of quality telephone service, access to broadband services, and
advanced infrastructure deployment has been a top priority for community and regional leaders for many years. For the traditional, private-sector business model, one of the greatest barriers for potential service providers was the lack of access to “middle mile” infrastructure that connects unserved areas to the greater global telecommunications network. In 2008, the Massachusetts Broadband Institute (MBI) was established by Governor Deval Patrick and the state legislature for the purpose of tackling the broadband access issue across the Commonwealth.

With state and federal funding, the MBI is constructing the AXIA MassBroadband 123 network, a publicly owned, open access middle mile network throughout western and north-central Massachusetts. This network will deploy over 1,200 miles of fiber-optic cable and connect over 1,200 community anchor institutions (such as town halls, police departments, schools, and medical centers). As of January 2013, 29 service providers have signed on to use the network. The construction of the network will be completed in summer 2013. This network will allow service providers to offer services and connect to “last mile” technologies (such as fiber optic, copper telephone wires, coaxial cable or wireless technologies) to reach homes and businesses throughout the region. These last mile technologies may include existing systems or new systems to be constructed. Some communities are exploring funding their own last mile systems to transmit broadband and other telecommunications services. For example, the Town of Warwick currently operates their own wireless broadband network from the top of Mt. Grace. The Town of Leverett has committed municipal funding and is presently in the process of designing and constructing a “last mile” fiber optic network throughout their community.

To identify the status of broadband access, the MBI has created an online tool to search for broadband access by technology and by location. The online tool also includes the option for residents to take a survey to report on the broadband availability at their address.

Utilities Infrastructure
The infrastructure that delivers energy to our homes and businesses, whether electric, natural gas, oil, or renewable energy, relies upon a complex system of transmission lines or conduit. As more and more alternative energy projects are introduced into the market, grid capacity and aging infrastructure present challenges to the system. The following section describes the utilities available to our towns and some of the current challenges that are being encountered.

Electricity
Electricity infrastructure is made up of an intricate system through which private companies generate and distribute the electricity used in Franklin County. Electricity is transported at high voltages across transmission lines to substations. There, the electricity is transformed to a lower voltage and delivered over distribution lines to homes and businesses. A strong delivery system is vital to our region’s safety, security and economic prosperity. Increasingly complex technology and high-performance products are driving energy demand to new levels and placing an increasing strain on the local electric delivery infrastructure.

In 1998, Massachusetts restructured the energy industry to deregulate power generating facilities. The Commonwealth continues to regulate the transmission and distribution systems provided by the local utility companies. There are two primary transmission and distribution power utilities that serve the region: Western Massachusetts Electric Company (a division of Northeast Utilities) and National Grid. National Grid serves 11 towns and WMECO serves 16 towns in Franklin County. Portions of the Town of Erving are served by both companies.

Impacts from recent storms in the region have helped demonstrate the fragility of the electricity infrastructure and the need for utilities to shore up their emergency preparedness plans. The October 29, 2011 “Halloween Snow Storm” dumped as much as two feet of heavy, wet snow in Western Massachusetts, felling trees and power lines throughout the region. It took up to a week for electricity to be restored in some
areas after the storm hit. Many people, especially those living in rural areas, were particularly hard hit. 

Franklin County is no stranger to power outages. Given the area’s susceptibility to severe ice and snow storms, as well as micro bursts and other wind-related storms, downed trees and power lines frequently occur in the area. This issue is cited in most of the local Hazard Mitigation Plans in Franklin County, with recommendations to encourage undergrounding of power lines whenever possible. While the up front costs for undergrounding power lines can be substantial, the long term savings in maintenance and avoidance of business disruptions can help offset that cost.

**Electric Generation, Transmission, and Distribution**

Two of the greatest challenges to connecting renewable energy sources to the grid are carrying capacity and fluctuating power flows. The “grid,” refers to the electric grid which is a network of transmission lines, substations, transformers and other infrastructure that delivers electricity from the power plant to homes and businesses. The existing electric grid was built in the 1890s and has been improved upon as technology advanced. Although the electric grid is considered an engineering marvel, it is being stretched to its capacity.

In order to produce more electricity from clean, renewable resources and move away from fossil fuel use, the nation needs to build thousands of miles of new transmission lines over the next 20 years to connect more renewable resources to electricity demand centers. A 21st-century “smart grid” will have to balance fluctuating power flows from wind and solar generation, small-scale distributed sources, and plug-in electric vehicles.

**Natural Gas**

Infrastructure to distribute natural gas is available in five Franklin County towns: Deerfield, Greenfield, Montague, Sunderland, and Whately. The system is owned and operated by Berkshire Gas Company, headquartered in Pittsfield, Massachusetts. The natural gas distributed by Berkshire Gas Company is provided through the Tennessee Gas Pipeline Company, which has a system extending from Texas to New England. Investments being made in this national infrastructure are expected to increase future capacity in Western Massachusetts.

Presently, access to the natural gas distribution system is available at two of the industrial parks in Franklin County: the Airport Industrial Park in Turners Falls and the Deerfield Industrial Park in South Deerfield. For customers that do not have access to this infrastructure, there are other fuel distribution companies that deliver to on-site storage containers for natural gas and propane.

**POTENTIAL DEVELOPMENT**

**Priority Development Areas**

As described in previous chapters, there is strong support for locating new housing near jobs and transit services, and to protect farmland and forests. There is also strong support for the redevelopment of Brownfields and vacant or underutilized mill buildings and other properties. As such, this section targets economic development and redevelopment efforts to existing and emerging regional employment centers, referred to as Priority Development Areas. Existing regional employment centers include Deerfield, Greenfield, Orange, Shelburne Falls, and Turners.
Falls. Emerging regional employment or development centers include Bernardston, Northfield, Sunderland, and Millers Falls/Ervingside.

Maps 10-5 through 10-13 show each of these nine areas, with the locations of any capital improvement projects and/or redevelopment/infill projects that have been identified by the municipalities. Important features such as roads, rail, public transit, water and sewer lines, farmland, and Priority Protection Areas are also shown. Potential advantages and constraints are identified for each Priority Development or Emerging Development Area. Although decisions to move forward with any proposed development ultimately lie in the hands of individual municipalities and investors, this section endeavors to illustrate the potential for Franklin County to make strategic investments in infrastructure and support sustainable development and land use patterns.

In addition to the recommendations for the Priority Development Areas and Emerging Development Areas, this plan encourages all towns to direct appropriate development to their town centers and/or population centers, whether residential or commercial, provided that the development is located outside of floodplains. The redevelopment of underused or vacant buildings should be a priority.
The Town of Deerfield has been examining the potential for development and conservation in the South Deerfield Village Center through several planning processes, including a HUD Sustainable Communities funded Complete Streets and Downtown Livability Plan, a market analysis and conceptual site design of the former Oxford Foods site, and an Open Space and Recreation Plan update.

**Redevelopment/Infill Development Projects**

**Routes 5 & 10 Industrial Corridor**: Infill development in the Industrial Corridor could accommodate new or expanded commercial/industrial uses.

**South Deerfield Revitalization**: The goals for South Deerfield Village Center, as articulated in the Complete Streets and Downtown Livability Plan, are to maintain the character of the community, while fostering economic development and improving the livability for its residents.

**Former Oxford Food Site**: This Town-owned, 16-acre property has been cleared of structures and has access to water, sewer, and natural gas infrastructure. The property could accommodate a mix of commercial, industrial and/or housing uses. The Town is seeking a developer for the site.

**Implications Due to Increased Development**

Encouraging infill, new development or redevelopment can spur revitalization, but can also pose concerns in need of being addressed. The following are advantages and challenges that may relate to such projects.

**ADVANTAGES**

- Major employment center, with retail, manufacturing, professional, and distribution sector jobs.
- Community is home to significant tourist attractions and independent educational institutions that bring a high number of visitors to the region.
- Access to I-91 and state routes that connect to other nearby employment centers.
- Located on the Route 116 Scenic Byway.
- Access to public transit in Village Center and along Routes 5 & 10 corridor.
- Access to public water supply infrastructure, through the South Deerfield Water Supply District.
- Access to public sewer infrastructure, and the South Deerfield Wastewater Treatment Plant, which is operating at about 40% capacity.
- Access to natural gas infrastructure, through Baystate Gas Company.
- Access to broadband services, including DSL and cable television broadband, and MassBroadband123.
- Access to sufficient parking and the new park-and-ride lot at the Whately/Deerfield line.
- Access to senior center, library, and public schools.
- Access to recreational amenities such as Mount Sugarloaf State Reservation, and parks.
- Access to fresh food at local farm stands and a specialty grocer.
- Multi-family housing is allowed in some residential zones.
- Accessory apartments are allowed by special permit.

**CHALLENGES**

- Village Center sits upon a large expanse of aquifer, which may be impacted by development.
- There is no backup water supply ready to use in the Village Center, but there are agreements with nearby towns for backup water if needed.
- There are some pedestrian challenges due to disconnected sidewalks.
- Need for more frequent transit services and stops, and evening and weekend transit services.
- Any development should avoid environmentally sensitive sites and prime agricultural soils, where possible.
The Town of Greenfield serves as the regional center for many nearby towns and has experienced significant investment in recent years in its Downtown. The Bank Row Urban Renewal District has had several historic buildings redeveloped into new storefronts and apartments, and the construction of the new John W. Olver Transit Center. There has been the broad adoption of energy efficiency and renewable energy practices in projects.

**Capital Improvement Projects**

**Parking Facility Upgrades:** Planning is underway for the construction of a parking structure to support downtown mixed use development. In addition, the Town is considering applying Low Impact Development techniques to upgrade existing parking lots.

**Downtown Streetscape and Gateway Improvements:** The Town is considering a number of projects to enhance walkability and to improve the gateway entrances to the community.

**Redevelopment/Infill Development Projects**

**Bank Row Urban Renewal District:** While much of the District has been revitalized, the historic First National Bank Building is awaiting redevelopment. The building has been remediated, structurally secured and a new façade constructed. The non-profit owner is interested in selling it or in partnering with other entities to support its redevelopment and return it to productive use.

**Federal Street Commercial Corridor:** Vacant properties, including the former Lunt Silversmith factory complex and the former Trinity School property, are available for redevelopment. Successful reuse of these properties would contribute to the economic vitality of this corridor and the downtown.

**Bendix Site Redevelopment/Eco-Industrial Park:** With existing road, water, sewer, and utility infrastructure, this vacant town-owned property is being redeveloped into a small, multi-parcel industrial park with a potential data connection facility and a 2-acre solar installation.

**Implications Due to Increased Development**

Encouraging infill, new development or redevelopment can spur revitalization, but can also pose concerns in need of being addressed. The following are advantages and challenges that may relate to such projects.

**ADVANTAGES**

- A major employment and population center, with access to jobs in all sectors.
- Access to I-91 and state routes that connect to other employment centers.
- Located on the Mohawk Trail Scenic Byway.
- Access to local and regional public transit services, and pending passenger rail service.
- Access to municipal public water and sewer systems, and to natural gas infrastructure.
- Access to broadband services, including DSL and cable television broadband, and MassBroadband123.
- Pedestrian and bicycle-friendly, with access to walking trails, bike paths, and parks.
- Access to senior center, library, YMCA, Greenfield Community College, public schools, hospital, health clinics, and social services.
- Access to entertainment and cultural attractions, including a cinema, Energy Park bandstand, and small performance spaces.
- Access to local fresh food, with a year-round farmers market, a local food coop, grocery stores, and community gardens.
- Multi-family housing is allowed by special permit in all residential zones; two-family allowed by right in most zones.

**CHALLENGES**

- Need for parking structure to meet needs for additional development.
- Need for transit services in the evening and on weekends.
- Relatively few residential rental properties that are presently vacant and available.
- Limited availability of retail and office space with amenities and full accessibility.
- Infill areas along rivers and the town’s wastewater treatment facility may be impacted by severe flooding events as a result of climate change.
- The Green River is in close proximity to roads and parking lots, making it vulnerable to storm water runoff and road salt.
- Any development should avoid environmentally sensitive sites and prime agricultural soils.
The Town of Orange’s historic downtown is densely settled along the Millers River with a mix of residential, commercial and industrial uses. Both the Open Space and Recreation Plan and the Master Plan envision a downtown bustling with commerce and cultural and recreational activities for residents and visitors to enjoy.

**Capital Improvement Projects**

Downtown Orange Revitalization: There is tremendous interest in having the downtown vacant mill buildings in the downtown redeveloped and the smaller commercial spaces returned to more productive use. Key to revitalization is the upgrade of the wastewater treatment/collection system.

Randall Pond Industrial Park/Airport Sewer Extension: A sewer line extension is needed to expand industrial development adjacent to the industrial park and Orange Airport. (Not shown on map)

**Redevelopment/Infill Development Projects**

- Putnam Hall Block (Chapter 43D site): An historic Town-owned parcel that the community has identified for redevelopment for retail and professional office uses.
- South Main Street Block (Chapter 43D site): Privately-owned commercial and industrial buildings that could accommodate mixed use redevelopment with potential 60,680 sq. ft. build-out.
- West River Street Block (Chapter 43D site): Privately-owned industrial buildings that could accommodate more mixed use redevelopment with a potential build-out of 148,000 sq. ft.
- Orange Innovation Center: Privately-owned, former factory building being converted to a mix of industrial, commercial, office and studio spaces. Center can accommodate further redevelopment.

**Implications Due to Increased Development**

Encouraging infill, new development or redevelopment can spur revitalization, but can also pose concerns in need of being addressed. The following are advantages and challenges that may relate to such projects.

**ADVANTAGES**

- A major population and employment center, with access to jobs in manufacturing as well as other sectors.
- Access to Route 2 and other state routes that connect to other employment centers.
- Located on the Mohawk Trail Scenic Byway and the Route 122 Scenic Byway.
- Access to public transit services, and nearby access to the Orange Municipal Airport, which can accommodate jet traffic.
- Access to municipal public water and sewer systems. A recent upgrade to some sewer pipes has improved the system’s overall efficiency.
- Access to broadband, including DSL and cable television broadband, and MassBroadband 123.
- Pedestrian friendly community, with access to parks and the Millers River at the Riverfront Park.
- Access to amenities such as library, senior center, and public schools.
- Access to performance spaces in the Town Hall auditorium and at Butterfield Park bandstand.
- Access to fresh food at a food co-op and a seasonal farmers market.
- Two-family homes and accessory apartments are allowed by right in nearly all residential zones. Multi-family housing is allowed by right in the Commercial Area Revitalization District and by special permit in all remaining residential zones.

**CHALLENGES**

- Much of the public water supply system’s water mains date back to 1892.
- Potential issues with the backup water supply in periods of high use.
- Wastewater treatment facility operating at 95% capacity.
- Need for more frequent transit services and stops, and evening and weekend transit services.
- Limited availability of retail and professional office space with amenities and full accessibility.
- No full-service grocery store within the Downtown area.
- Expense of redeveloping large mill structures not easily offset by current lease rates.
- Downtown could be vulnerable to increased flooding due to climate change.
- The Millers River is vulnerable to storm water run-off and road salt.
- Any development should avoid environmentally sensitive sites and prime agricultural soils, where possible.
Settled around the Deerfield River, the Village of Shelburne Falls is the shared business district for the Towns of Buckland and Shelburne. It serves as a commercial and social hub for the surrounding less populated towns. This area is a popular destination for tourists in all seasons, with a recognized reputation as an arts community.

Redevelopment/Infill Development Projects

Village Center and Gateway Redevelopment: Vacant and underutilized properties in the Village Center and at the village gateways can be redeveloped for reuse. For example, 69-73 Bridge Street is the site of a demolished building that could be redeveloped for mixed uses. Efforts are underway to encourage the reuse of the historic Sweetheart Inn for community or commercial purposes.

Implications Due to Increased Development

Encouraging infill, new development or redevelopment can spur revitalization, but can also pose concerns in need of being addressed. The following are advantages and challenges that may relate to such projects.

ADVANTAGES

- An employment center, with access to jobs in manufacturing, retail, professional services, and the creative economy.
- Access to Route 2/Mohawk Trail Scenic Byway and other state routes that connect to employment centers.
- Access to public transit that connects Shelburne Falls to Greenfield.
- Access to a public water supply system served by the Shelburne Falls Wastewater Treatment Facility.
- Wastewater Facility and pump station are situated in a way that protects them from flooding.
- Access to broadband services in the Village Center, including DSL, cable television broadband, and MassBroadband123.
- Pedestrian friendly community, with access to parks, bike routes, and the Deerfield River.
- Access to entertainment and cultural attractions, including the Bridge of Flowers, Glacial Potholes, Shelburne Falls Trolley Museum, and a theatre in the Shelburne Town Hall.
- Access to fresh food, with a local food coop, a seasonal farmers market, and a grocer.
- In Shelburne and Buckland Zoning Bylaws, two-family and accessory apartments as well as single to two-family conversions are allowed by right in most zoning districts.
- Multi-family housing is allowed by special permit in most districts.

CHALLENGES

- Public water and sewer lines cross the Deerfield River via existing bridges. This infrastructure has been identified as a potential issue in Hazard Mitigation Plans.
- There are aquifer areas within the Village area that should be protected.
- The Deerfield River could be subject to more frequent flood events as a result of climate change and some potential redevelopment areas lie within its floodplain.
- The Deerfield River is in close proximity to roads and parking lots, making it vulnerable to storm water runoff and road salt.
- Need for more frequent transit services and stops, and evening and weekend transit services.
- Any development should avoid environmentally sensitive sites and prime agricultural soils, where possible.
- Existing dimensional requirements in residential zones may be a barrier to infill and redevelopment.
The Village of Turners Falls in Montague is a regional hub of industrial activity. It is also a champion of planning efforts to revitalize Turners Falls, with an emphasis on arts and culture. Turners Falls serves as a social and commercial center for the Town of Montague and surrounding towns.

**Redevelopment/Infill Development Projects**

**Historic Industrial Canal Area Revitalization:** This area has several properties appropriate for redevelopment, including the Town-owned Strathmore Mill and the privately-owned Grosvenor Cotton Mill/Railroad Salvage Building.

**Streetscape Improvements:** As part of its recently developed Livability Plan, the Town is planning for improvements to enhance the walkability of the Downtown.

**Downtown Revitalization:** The Town is active in encouraging revitalization of Downtown buildings for more productive use, such as the former convenience store for use by Turners Falls RiverCulture.

**Turnpike Road Industrial Park:** Roads, utilities, and a water infrastructure extension are needed to support the creation of a new industrial park at the former town burn dump and public works site.

**Implications Due to Increased Development**

Encouraging infill, new development or redevelopment can spur revitalization, but can also pose concerns in need of being addressed. The following are advantages and challenges that may relate to such projects.

**ADVANTAGES**

- A major employment and population center, with access to jobs in manufacturing, creative economy, and other sectors.
- Access to nearby I-91, Route 2/Mohawk Trail Scenic Byway and other state routes that connect to other employment centers.
- Access to public water supply system through the Turners Falls Water Department, and a public sewer system that is served by the Montague Water Pollution Control Facility.
- Access to natural gas infrastructure through Berkshire Gas Company.
- Access to broadband services, including DSL and cable television broadband, and MassBroadband123.
- Though hilly, much of Turners Falls is walkable and pedestrian and bicycle friendly, and has access to bike-paths, parks and river access.
- Access to senior center, library, public schools.
- Access to entertainment and cultural attractions, including the Shea Theater and Great Falls Discovery Center.
- Access to local fresh food, with a seasonal farmers market and grocery store.
- Two-family housing is allowed by right in the Central Business and Neighborhood Business Districts.
- Multi-family housing by special permit in the Historic Industry District.

**CHALLENGES**

- Approximately 45% of flow into the wastewater treatment plant is due to inflow and infiltration, the result of aged pipes.
- Limited availability of retail and professional office space with amenities and full accessibility.
- Expense of redeveloping large mill structures is not easily offset by current lease rates.
- The Connecticut River is in close proximity to roads and parking lots, making it vulnerable to storm water run-off and road salt.
- In Historic Industrial area, there are significant parking issues and access issues with connecting mill buildings and the business district.
- Senior Center facility is undersized and cannot provide the level of services as needed for the population it serves.
- Need for more frequent transit services and stops, and evening and weekend transit services.
- Any development should avoid environmentally sensitive sites and prime agricultural soils, where possible.

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**Map 10.9: Priority Development Area: Downtown Turners Falls**

18 | LAND USE AND INFRASTRUCTURE

SUSTAINABLE FRANKLIN COUNTY
With the designation of two Chapter 43D sites in the Village Center and with easy access to I-91, the Bernardston Village Center is anticipated to receive additional development. In addition, recent commercial development on Routes 5 & 10 south of the Village Center has begun to attract more visitors to the community and has spurred additional business growth.

**Capital Improvement Project**

**Bernardston Village Center Improvements**: Installation of a wastewater treatment and collection system is needed to support a mix of uses in the Village Center.

**New Development Project**

**Bernardston Chapter 43D Site #2**: A privately-owned, 29 acre parcel zoned for commercial uses has been designated as a site for targeted development. Access to sewer infrastructure would make this site more advantageous for new development.

**Implications due to Increased Development**

Encouraging infill, new development or redevelopment can spur revitalization, but can also pose concerns in need of being addressed. The following are advantages and challenges that may relate to such projects.

**ADVANTAGES**

- Access to I-91 and other state routes that connect to other employment centers.
- Access to public water supply system through Bernardston Fire and Water District.
- Land available and zoned for development in the Village Center.
- Access to broadband services, including DSL and cable television broadband, and MassBroadband123.
- Access to senior center, library, and a park in the Village Center. Nearby access to the public school and farmers market.
- Multi-family housing is allowed by special permit in all residential zones.

**CHALLENGES**

- The Bernardston Fire and Water District is at or near its withdrawal limits for its public water supply.
- There is no public sewer infrastructure serving Bernardston. The Town would need significant water and sewer upgrades to support more infill and redevelopment.
- Public transit is not currently available.
- Pedestrian access to the commercial development south of the village is constrained by distance.
- Limited access to fresh food, with a seasonal farmers market located south of the village, but no local grocer.
- Protecting agricultural land from development will have to be considered.
- High water table challenges septic installations.
- Any development should avoid environmentally sensitive sites and prime agricultural soils, where possible.
The Northfield Village Center is recognized as an important scenic and historic resource in the region. The community is poised to see further development, depending on the future reuse of the former Northfield campus of the Northfield Mount Hermon School.

**Redevelopment/Infill Development Projects**

**Northfield Campus**: The former Northfield campus of the Northfield Mount Hermon (NMH) School is proposed for reuse for educational purposes by a private, non-profit entity that owns the property. The intensity of the proposed reuse for this 217 acre property is not presently known.

**Implications due to Increased Development**
Encouraging infill, new development or redevelopment can spur revitalization, but can also pose concerns in need of being addressed. The following are advantages and challenges that may relate to such projects.

**ADVANTAGES**
- Access to state routes that connect to other employment centers.
- Located on the Connecticut River Scenic Farm Byway.
- Access to public water supply system through the Northfield Water District.
- Access to public sewer system in the village and former NMH School campus, as served by the Northfield Wastewater Treatment Plant.
- Access to broadband services, including DSL and cable television broadband, and MassBroadband123.
- Pedestrian and bicycle friendly community, with access to bike routes, and parks.
- Access to senior center, library and public school.
- Access to local fresh food at a seasonal farmers market and a local grocer.

**CHALLENGES**
- Half of the flow at the Northfield Wastewater Treatment Plant is from inflow and infiltration issues.
- The water main on Main Street is in need of replacement. It is estimated that the Town experiences a water main break on Main Street every two to three years.
- The public water supply for the former NMH School campus, while working well, is old and may require replacement.
- Public transit is not available in town.
- Protecting agricultural land from development will have to be considered.
- Priority and BioMap2 Core Habitats are located downhill from the village center along the Connecticut River and could be impacted by significantly increased density in town.
- Aquifers are located north and west of the proposed infill areas and will have to be considered as part of any development planning.
- Protecting the character of the National Historic District is critical when considering new development.
- Any development should avoid environmentally sensitive sites and prime agricultural soils, where possible.
Emerging Development Area: Millers Falls/Ervingside

Bisected by the Millers River, this village center is comprised of Millers Falls in the Town of Montague and Ervingside in the Town of Erving. While consisting of areas within two separate municipalities, the Village Center shares some infrastructure. The Village Center could benefit from revitalization efforts to foster greater economic activity and community vitality.

Redevelopment/Infill Development Projects

Millers Falls Revitalization: The Town of Montague is active in encouraging reuse of vacant properties, including its recent sale of town-owned properties for commercial and residential redevelopment. The Town is also interested conducting a Slum and Blight Study that would allow greater access to resources and to revitalize the Village Center, including a town-owned parcel adjacent to the former rail yard.

Ervingside Industrial Reuse: Vacant and underutilized industrial properties in Ervingside could be redeveloped and contribute to greater economic vitality in the Village Center. For example, the privately-owned, former International Paper Plant is vacant and available for redevelopment. The Renovation's Supply Mill property is in active use by one anchor tenant and multiple tenants, but can also accommodate more intensive reuse.

Implications Due to Increased Development

Encouraging infill, new development or redevelopment can spur revitalization, but can also pose concerns in need of being addressed. The following are advantages and challenges that may relate to such projects.

Advantages
- Access to Route 2/Mohawk Trail Scenic Byway and state routes that connect to other employment centers.
- Located on the Connecticut River Scenic Farm Byway.
- Access to public transit services.
- Access to east-west freight rail transportation corridor at the former railyard in Millers Falls.
- Access to public water supply systems through the Erving Water Department in Ervingside and the Turners Falls Water Department in Millers Falls.
- Access to public sewer systems throughout the village center, served by POTW#1 in Ervingside.
- Access to broadband, including DSL and cable television broadband, and MassBroadband123.
- Pedestrian and bicycle friendly community, with access to bike routes, and parks.
- Access to library.
- Access to fresh food at a local grocer.

In Erving (Ervingside), two-family and accessory apartments allowed by special permit in the Central Village District and Village Residential District. Multi-family housing is allowed by special permit in the Central Village District.

In Montague (Millers Falls), mixed use with single and 2-family as accessory use is allowed by right and multi-family is allowed by special permit in the Central Business District and the Neighborhood Business District. In the General Business District, single, two-family, and multi-family are allowed by special permit.

Challenges
- Need for more frequent transit services and stops, and evening and weekend transit services.
- Need to retrofit the sewer infrastructure serving the former International Paper Plant, since prospective reuses will not generate as large a volume of wastewater as the paper plant.
- Need resources to rehabilitate vacant and/or substandard commercial and residential buildings.
- Expense of redeveloping large mill structures not easily offset by current lease rates.
- The Millers River is in close proximity to roads and parking lots, making it vulnerable to storm water run-off and road salt.
- Any development should avoid environmentally sensitive sites and prime agricultural soils, where possible.
As stated in the Town of Sunderland’s 2004 Community Development Plan, the vision for the Town is to preserve and protect its rural character, including its farmland and historic areas, while having adequate residential and commercial development that meets the needs of residents. The Town has adopted zoning bylaws that encourage more small business growth and allow for more dense development.

**Capital Improvement Projects**
- North Main Street Improvements: A project is proposed to improve the road surface, drainage system, and pedestrian amenities on a portion of Route 47/North Main Street within the Village Center.
- Access to Outdoor Recreation Amenities: As part of the Connecticut River Scenic Farm Byway, the Village Center is recognized for its significant historic and natural resources. Projects are proposed that would enhance the connection between these scenic resources and the Village Center by creating new bicycle and pedestrian facilities and improving small boat access to the Connecticut River. These projects would attract visitors and enhance residents’ access to outdoor recreation.

**Redevelopment/Infill Development Projects**
- Village Center Development Strategy: To foster sustainable infill development, the Town of Sunderland proposes a strategy plan be created for the Village Center that would guide the manner of residential and commercial development in this historic area.

**Implications Due to Increased Development**
- Encouraging infill, new development or redevelopment can spur revitalization, but can also pose concerns in need of being addressed. The following are advantages and challenges that may relate to such projects.

**ADVANTAGES**
- Access to state routes that connect to other employment centers, and on the Connecticut River Scenic Farm Byway.
- Access to extensive public transit services, and access to a designated park-and-ride lot in the village.
- Access to public water supply system, through Sunderland Water District.
- Access to public sewer system through the Sunderland Sewer District.
- Access to broadband services, including DSL and cable television broadband, and MassBroadband123.
- Pedestrian and bicycle friendly community, with access to parks and the Connecticut River.
- Access to library and public elementary school.
- Access to fresh food at farmstand and a local grocer.
- Planned Unit Development zoning in place

**CHALLENGES**
- Route 47 stormwater infrastructure
- Need to protect active farmland to maintain community character.
GENERAL LAND USE AND INFRASTRUCTURE SITING

Housing Land Use
The Housing Chapter makes recommendations regarding the types of housing that are necessary to meet the needs of Franklin County in the future. In addition to housing type, the sustainable siting of housing should also be considered, particularly in light of climate change. Individual towns will have to determine what measures may need to be taken, such as changes to their zoning bylaws, to help guide the siting of any new development.

In general, avoiding siting any new housing in flood plains and/or flood storage areas is prudent. Any redevelopment of existing structures should take into consideration the real potential for more frequent and severe flooding. Flood proofing and/or modifying existing structures to allow them to handle more extreme flooding events is recommended. Encouraging mixed use development which combines housing with amenities in population centers and/or employment centers is recommended.

Commercial and Industrial Land Use
As discussed earlier in this chapter, there is overwhelming public support for encouraging the redevelopment of vacant or underused mill buildings and other structures. As with housing, given the potential for more extreme flood events due to climate change, towns will need to decide whether it is advisable to promote redevelopment in areas that are prone to flooding. Siting commercial development in close proximity to employment centers is a sustainable strategy. Siting commercial development with a mix of uses including housing will increase options for walking and biking.

Other Land Uses

RENEWABLE ENERGY LAND USE
Siting of wind, solar, and geothermal resources is a topic of discussion in many Franklin County towns currently, as there is an interest in reducing fossil fuel consumption and increasing local, renewable energy generation. No matter where alternative energy facilities are sited, there will be impacts to the use of land. Some of the more common concerns regarding alternative energy siting are the potential disruption of wildlife habitat, the impact on scenic views and ridgelines, impacts to abutters, and to agricultural lands. An optimum balance between land availability and transmission availability is necessary for successful renewable energy generation projects. On the local and regional level, the feasibility of larger scale solar and wind projects is closely tied to access to the grid and the carrying capacity of the existing grid to accommodate the energy produced by them.

Solar Energy
Large-scale solar and photovoltaic (PV) installations could help our region - and our country - reduce our dependency on fossil fuels. Solar energy has many environment benefits but has environmental challenges as well, particularly in siting and land use. According to the U. S. Department of Energy’s SunShot Vision Study, completed in 2012, the environmental benefits of solar energy production include reductions in greenhouse gas emissions and air pollutant emissions. The major environmental impact identified by the same study is the use of land. While some solar and PV installations can be sited on rooftops, parking structures, capped landfills, and former industrial sites, some will inevitably be sited on currently undeveloped land. As with any other development, avoiding areas of food production, high ecological, scenic, cultural, and historic value is prudent.

Clean Energy Results¹, a MA Department of Energy Resources (DOER) December 2012 publication, discusses strategies for siting ground-mounted solar. DOER strongly discourages siting that requires

significant tree cutting, because of the important ecological benefits of trees. DOER encourages siting in industrial and commercial districts, or on vacant and/or disturbed land.

When assessing the potential impacts of proposed solar installations, DOER recommends communities carefully consider other types of development that might take place in a particular location if there was no solar installation, and the potential impacts the alternatives might have in terms of noise, air pollution or landscape.

Ultimately, policy concerning the siting of large-scale solar and PV must be determined by individual towns. Towns throughout Franklin County are working to define their individual approaches to siting large-scale solar installations and, in some cases, towns are rewriting their zoning to include solar bylaws and/or solar overlay districts.

Greenfield has pursued alternative energy sources in the form of solar facility on the capped landfill, constructed in 2012. The facility, which received a 2012 Renewal Award—Brownfields to Brightfields Award by Brownfield Renewal, is projected to produce approximately 2.5 M of electricity per year. According to the Greenfield DPW, this will provide approximately 40 percent of the electricity used by all municipal buildings including the schools. The Town purchases the power from the developer of the project, for $0.01 cents per kilowatt hour which is a savings of approximately $0.08 per kilowatt on the electric bill. This translates into approximately a $235,000 savings per year for the Town in the form of credits on its electric bills.

In late 2012, Greenfield also voted to amend their Bylaws to allow large solar installations by special permit in the town’s rural residential, suburban residential and general commercial and office districts. Land containing prime farmland would not be eligible for large solar installations.

Wind
Like solar and PV, the siting of wind turbines and any related bylaws must be determined by individual towns. Issues to address include protecting ridgelines and scenic views, impacts to wildlife habitat, public health concerns, effects on property values, the availability of adequate wind resources, and the ability to access the grid infrastructure.

A locally-owned wind generation project in the region has been online since 2011. Berkshire East ski resort, located in Charlemont, is the first ski area in the nation to produce 100 percent of its electricity from an on-site, renewable energy source, a 277-foot-tall wind turbine. The turbine eliminates the use of approximately 94,000 gallons of fuel oil annually. Because the turbine is intended to power only Berkshire East, considerations such as connecting to the grid were not obstacles to the project.

Hydropower
Hydropower is a renewable energy source that can also produce regular water supplies and flood controls. Despite the high cost associated with building a hydropower facility, power generation via hydropower facilities is considered quite cost-competitive because facilities tend to have low operation and maintenance costs and relatively long lifecycles. As of 2008, there were 35 hydropower facilities in the Pioneer Valley.
Impacts of hydropower can include impeded fish passage, alteration of flow patterns, and flooding risks associated with dam failures.

While hydropower can be beneficial in terms of being a “clean energy”, there are also drawbacks to this technology. Hydropower infrastructure can inhibit or prevent the passage of migrating fish and can alter the natural systems and habitats in a river.

A significant hydropower facility on the Connecticut River is the Northfield Mountain Pumped Storage Project, completed in 1970, which is located about five miles upstream of the Turners Falls dam. This facility is unusual to the region in that it provides peaking power on demand. During the evening hours, water is pumped from the lower reservoir (the Connecticut River) to the upper reservoir (elevation 1,000 feet) that is located atop Northfield Mountain. Water is then released to the lower reservoir via the turbines to generate electricity during peak demand.

Erosive forces have destabilized many sections of the Connecticut River resulting in slumping and mass wasting of large sections of bank and the loss of trees and other riparian vegetation on the top of the banks. This erosion has been due at least in part to the widely fluctuating water levels associated with the Northfield Mountain Pumped Storage Project.

Currently, no small-scale hydropower projects are under development in the Pioneer Valley. However, the region could examine whether there are opportunities to construct new micro-facilities that do not significantly interfere with wildlife habitats.

**LAND USE AND WATER**

Securing the availability and viability of our drinking water supplies is vital to being able to live sustainably in Franklin County. As noted earlier in this chapter and in the Natural Resources Chapter, the 2003 Franklin County Regional Water Supply Study assessed the short- and long-term capacity of community water supplies to support growth in the region and identified water supply issues and recommendations. It recommends that the region and its individual towns implement measures to sustain its drinking water supply, such as identifying and protecting future water supply sources, adopting best management practices for uses within aquifer recharge areas, and encouraging reductions in water use.

In light of the potential impacts of climate change on drinking water supplies, the Study’s recommendations are even more urgent today than ever. Individual towns – and the region as a whole – have challenging work ahead to identify and protect future drinking water supplies and to plan for back up supplies.

See Chapter 8: Natural Resources for more information on water and aquifers.

**TRANSPORTATION LAND USE**

In order to achieve sustainability, Franklin County’s transportation infrastructure ideally must be able to support existing and future development by providing public transportation options to residents in order to help reduce vehicle miles traveled and carbon emissions. The Transportation Chapter of the RPSD examines existing conditions of transportation infrastructure such as bridges, roads, and rail, as well as existing public transportation and alternative transportation opportunities.

One of the greatest challenges to transportation infrastructure in Franklin County is that the transportation network covers a large geographical area with a relatively sparse population. Many people live in Franklin County because they want to live in a rural setting. Commuting by private automobile is often the only option for transportation that many Franklin County residents have. A significant expansion of public transit routes and schedules would be required to adequately provide public transit options for the majority of Franklin County residents.
In order to support ridership, new development should occur in employment centers and town centers as well as along transit routes. As noted in the Transportation Chapter, Franklin County has established several transportation-related projects that will increase residents’ transportation options and increase the region’s sustainability. They include bikeways, park and ride lots, and the expansion of the public transit system.

A key constraint identified in Chapter 4: Transportation is the ability to achieve more sustainable land use patterns and the infrastructure to support them include the ability to expand public transit including passenger rail.

An additional transportation-related issue in the region is the condition of Franklin County bridges. Sixteen percent of bridges in Franklin County are structurally deficient and fourteen percent are functionally obsolete. Given how dispersed the population is in the region, maintaining the structural integrity of bridges is important to maintaining access to goods and services, and jobs for citizens living in rural areas. See the Transportation Chapter for Recommendations and Strategies that address these and other constraints and issues.

AGRICULTURAL LAND USE
See the Chapter 8: Natural Resources for more information on Agricultural Land Use.

CLIMATE CHANGE IMPACTS ON LAND USE AND INFRASTRUCTURE
The assessment of the potential impacts of climate change is evolving as new data and reports are released. At the time of writing this report, the Federal Advisory Committee Draft Climate Assessment Report was released for public review. Some of the key messages contained in the report specific to rural communities include:

1. Rural communities are highly dependent upon natural resources for their livelihoods. Climate change related impacts are currently affecting rural communities and will shift the locations where rural economic activities (like agriculture, forestry, and recreation) can thrive.
2. Rural communities face particular geographic and demographic obstacles in responding to and preparing for climate change risks. For example, first responders may encounter difficulties reaching disperse populations in rural areas.
3. Responding to additional challenges from climate change impacts will require significant adaptation within rural transportation and infrastructure systems.

The 2011 Massachusetts Climate Change Adaptation Report also assesses the impacts climate change could have on land use patterns and infrastructure throughout Massachusetts and is the basis for much of the information contained in this section. Table 1 shows the key sectors and infrastructure that is vulnerable to climate change.

Significant infrastructure development in the state occurred along the coastline, along rivers and streams, and in floodplains. According to the report, this trend, along with other growth patterns, places much of Massachusetts’ key infrastructure resources in areas that are predicted to experience adverse effects from climate change. The report states that infrastructure design has traditionally relied upon historic weather characteristics to determine the weather conditions that infrastructure assets can withstand. Since future climate patterns are expected to be different, designs based on historic weather patterns could leave infrastructure at risk.

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2 http://ncadac.globalchange.gov/
Although the report focuses on the impact sea level rise will have on coastal communities' infrastructure, it also indicates that infrastructure sited along rivers and streams could also be subject to more extreme flooding events, with longer recovery times and economic disruption. The report identifies specific impacts and vulnerabilities and recommends strategies to protect infrastructure and to encourage sound decision-making where climate change is concerned. The impacts and vulnerabilities are summarized in the following section and some of the strategies are included in the Recommendations and Implementation Strategies section of this chapter.

### Climate Change Impacts on the Built Environment

Impacts to the built infrastructure and buildings were assessed in the report. Some impacts and vulnerabilities of infrastructure include:

- Extreme and more frequent weather events, including flooding, may damage energy infrastructure and delivery equipment such as generation plants, terminals, storage facilities and above-and below-ground wires and pipes.
- Inland transportation infrastructure may be affected by changing precipitation patterns, extreme weather events, and increased temperatures.

### Climate Change Mitigation and Adaptation Related to Land Use and the Built Environment

This sections draws from the 2011 Massachusetts Climate Change Adaptation Report chapter on Key Infrastructure. The report recommends the following strategies:

- **Mapping and Surveys:** Update floodplain mapping, identify at-risk facilities and structures, and determine strategies to protect or move such facilities and structures.
- **No Regrets Actions:** These are actions that make sense regardless of climate change, for example, conserving key resources such as drinking water and flood-proofing structures.

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**Table 1 Massachusetts Climate Change Adaptation Report: Key Infrastructure Sectors Vulnerable to Climate Change**

<table>
<thead>
<tr>
<th>Sector</th>
<th>Infrastructure Involved</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy (Electric, gas, petroleum)</td>
<td>Production, transmission, storage, distribution including power plants, substations,</td>
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<tr>
<td></td>
<td>electric lines, and natural gas systems</td>
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<tr>
<td>Transportation</td>
<td>Roads, highways, bridges, and rail</td>
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<tr>
<td>Water (supply, wastewater, stormwater)</td>
<td>Water sources, pump stations, reservoirs, distribution systems, sewer systems, and</td>
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<tr>
<td></td>
<td>septic systems</td>
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<tr>
<td>Dam safety and control</td>
<td>Dams and dikes</td>
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<tr>
<td>Solid and hazardous waste</td>
<td>Solid waste facilities and hazardous waste storage</td>
</tr>
<tr>
<td>Built infrastructure</td>
<td>Commercial, residential, industrial, institutional, and government buildings</td>
</tr>
<tr>
<td>Telecommunications</td>
<td>Phone, internet, and cable services</td>
</tr>
</tbody>
</table>

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**FRANKLIN COUNTY 2035**
- **Land Use, Design, Site Selection, and Building Standards**: Modify land use and zoning regulations to integrate climate change impacts.
- **Enhance Natural Systems**: To increase resilience of infrastructure, restore wetlands and flood storage capacity of floodplains.
- **Lead Time for Adaptive Construction**: Identify lead times needed for infrastructure replacement and rehabilitation.

Climate change is a global issue that has very real local impacts. Individual communities and their citizens play a critical role in addressing climate change. Some municipalities in the region have incorporated climate change considerations and adaption into all aspects of their plan. An example is Keene, NH, where in 2004 the city council formally adopted their Cities for Climate Protection Campaign: Local Action Plan, a plan to take local actions to address climate change. In 2007, the city followed up with Adapting to Climate Change: Planning a Climate Resilient Community. This plan is designed to focus on three key community systems: the built, natural, and social networks that collectively provide the key services or activities within a community or region.

Within Franklin County, our communities are taking action to reduce green house gas emissions and to encourage renewable energy production through the Green Communities program. Currently, 15 of our 26 towns have achieved Green Community status. Integrating climate change adaptation into all aspects of planning, development, and redevelopment is an important next step that our communities can take to address climate change.

**SUSTAINABLE DEVELOPMENT STRATEGIES**

As the region considers strategies for sustainable development, techniques and strategies such as Green Infrastructure, Smart Growth principles and Low Impact Development strategies can help guide decision-making. These tools can be used at the local level as well.

**Green Infrastructure**

Green infrastructure is a sustainable approach that communities can use to help maintain healthy waters and provide multiple environmental benefits. Green infrastructure uses vegetation and soil to manage rainwater where it falls. By merging natural processes...
into the built environment, green infrastructure provides not only stormwater management, but can also help with flood mitigation, water quality management, and maintaining ground water levels for drinking water supplies. At a time when many of our towns are considering replacing aging traditional infrastructure, green infrastructure should be considered as an alternative or complementary technique.

Green infrastructure can be used by municipalities and by homeowners alike. Some examples include:

- **Downspout disconnection.**
- **Rainwater harvesting for watering gardens.**
- **Bio-swales and rain gardens to capture and infiltrate rain on site.**
- **Permeable pavements.**
- **Green roofs for rainwater retention and cooling.**
- **Urban tree canopy for reducing cooling and heating costs and for rainwater retention.**

While green infrastructure techniques can be used at different scales, policy to encourage green infrastructure at the municipal, regional or watershed level can reap some of the greatest benefits. Adapting municipal stormwater regulations is a key way in which towns and cities are implementing green infrastructure programs. Another way in which municipalities can encourage the use of green infrastructure is to sponsor high-profile pilot projects that introduce different green infrastructure tools and techniques to municipal workers and residents alike. There are many examples of municipalities implementing green infrastructure projects in the region, including in Orange, MA. In Orange, the purpose of the Orange Riverfront Park, which is located on the banks of the Millers River, was to use an alternative to the conventional "pipe and pond" approach to stormwater management. The Low Impact Development (LID) techniques incorporated an ecologically-based approach to stormwater management that created a hydrologically functional landscape that generates less surface runoff and less nonpoint pollution, especially important for development projects adjacent to sensitive resource areas. The project, a former Brownfields site, also created an "outdoor classroom" which showcases several LID stormwater management techniques, including: rain gardens, porous pavers, and bioretention swales. The park will not only help to educate visitors about LID but also provide access to the Millers River, a regionally significant natural resource, and offer visitors a peaceful place to picnic, take a walk, enjoy views of the river, and launch a canoe or kayak.

There are opportunities in many of our Franklin County towns to implement green infrastructure techniques to reduce stormwater runoff and to improve water quality. One way for municipalities to build green infrastructure into their approach for stormwater runoff is encourage the use of green infrastructure in any new or redevelopment projects. For instance, any time a parking lot is slated for repaving, towns can use that as an opportunity to potentially remove curbing and add rain gardens or pervious paving to help treat stormwater on site. Anytime a repair to roads is required, green infrastructure techniques such as permeable pavement and bio-swales can be considered. Green infrastructure

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The Orange Riverfront Park utilizes Low Impact Development techniques to sustainably manage stormwater runoff.
techniques can be particularly valuable in our more populated communities, where there is a greater percentage of impermeable surfaces, fewer trees, and often a close proximity to a river.

**Low Impact Development**

Conventional development often starts by clearing a parcel of most, if not all, trees and vegetation and adding impervious roads to connect homes sited on large lots. Typically, natural features and drainage are disturbed and may be destroyed during the site preparation. Roads are often built with curbs which direct stormwater runoff directly to storm drains. Human-built drainage features – often in the form of detention ponds – are then added back into the site.

Low Impact Development (LID) is a sustainable land development approach that protects critical natural resource areas on the site, maintains natural drainage flow paths, minimizes land clearance, concentrates built environment, and reduces impervious surfaces. The natural features and hydrology of the site are preserved and used instead of the conventional methods of collecting, conveying, and piping away runoff.

**Smart Growth Principles**

Smart Growth, a sustainable development principle, is a term used to describe a set of planning principles that can be melded with the unique conditions of a region to achieve more sustainable development patterns. Smart Growth supports communities that are socially, economically, and environmentally sustainable.

The Massachusetts Executive Office of Energy and Environmental Affairs (EOEEA) offers Smart Growth Toolkit⁴, which includes information, resources and model bylaws related to Smart Growth and LID. Core principles of Smart Growth relating to land use and infrastructure include:

- Efficient use of land and infrastructure.
- Communities focused around human-scale, mixed-use centers with housing choices.
- A balanced, multi-modal transportation system providing increased transportation choice.
- Conservation and enhancement of environmental and cultural resources.
- Vital small towns and rural areas.
- Local, state, and federal policies and programs that support urban investment, compact development and land conservation.
- Well defined community edges, such as agricultural greenbelts, wildlife corridors or greenways permanently preserved as farmland or open space.

In 2012, United States Environmental Protection Agency (EPA) released a guide to applying Smart Growth principles to rural settings. **Essential Smart Growth Fixes for Rural Planning, Zoning, and Development Codes**⁵ provides strategies organized around key issues that rural communities face. It is intended to provide Smart Growth policy options that communities can implement, which can help small towns and rural areas ensure that their development is fiscally sound, environmentally responsible, and socially equitable. It can also help communities ensure that their zoning bylaws support the kind of land use patterns they favor.

**Local Food Production**

Food production, distribution and consumption patterns have gone through a major transformation in the past 50 years. In the 21st century global food economy, most foods travel an average of 1,500 miles from farm to plate. Consumers have grown used to the convenience and vast selection of year-round produce and other foods. But the often huge distances that food often travels is unsustainable in the long run.

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⁵ [www.epa.gov/dced/pdf/rural_essential_fixes_508_030612.pdf](http://www.epa.gov/dced/pdf/rural_essential_fixes_508_030612.pdf)
A revitalized local and regional food system can reduce the number of miles food travels, ease dependence on fossil fuels, and provide a wide array of jobs and development opportunities to Franklin County residents. As towns look at possible future development, the potential for rebuilding food processing infrastructure, reusing mill buildings for food-based businesses, and protecting agricultural land should all be priorities.

Imports of food by airplane have a substantial impact on global warming pollution. In 2005, the import of fruits, nuts, and vegetables into California by plane released more than 70,000 tons of CO$_2$, which is equivalent to more than 12,000 cars on the road.\(^6\)

On the individual level, citizens can help make the regional food system more robust in many different ways. Actions citizens can take include:

- Supporting local farmers’ markets or encouraging the formation of a farmers’ market, if none exists in the area.
- Joining a CSA (Community Supported Agriculture) to support local farmers.
- Selecting local produce and eating what is in season, whenever possible.
- Encourage local grocers, restaurants, and schools to use local foods.
- Avoid buying produce that has been flown in from abroad.
- Encourage businesses and government bodies to adopt procurement policies favoring locally grown foods.
- Support the protection of farmland and farm buildings, keeping it affordable and available to farmers.

\(^6\) Natural Resources Defense Council, 2007
• Locate house sites to maximize access to open space and proximity to views. Conceptual alternatives are explored.
• Site roads, trails, and other infrastructure, avoiding excess impervious surfaces and integrating a natural stormwater management practices.
• Draw in lot lines and establish ownership and management of the preserved open space.
• Incentives such as “bonus lots” can be provided to support town priorities such as open space protection, provision of affordable housing, or recreational amenities.

**TRANSFER OF DEVELOPMENT RIGHTS (TDRs)**
This is a system that assigns development rights to parcels of land and gives landowners the option of using those rights to develop or to sell their land. TDRs are used to promote conservation and protection of land by giving landowners the right to transfer the development rights of one parcel to another parcel. By selling development rights, a landowner gives up the right to develop his/her property, but the buyer could use the rights to develop another piece of land at a greater intensity than would otherwise be permitted. Model Transfer of Development Rights bylaws can be used as a starting point for a community wishing to craft its own TDR bylaws.7 This technique can help direct growth to town centers while protecting farmland and forestland.

**Pending Land Use Regulations**

**AN ACT PROMOTING THE PLANNING AND DEVELOPMENT OF SUSTAINABLE COMMUNITIES**
This streamlined zoning reform (House #3216) proposes changes to the Mass General Law (MGL) c.

40A Zoning Act that would help enable towns to zone for more sustainable land use patterns. Highlights of the bill currently under consideration include:

• **Powers of Cities and Towns**: Explicitly confirms statutory authority for the use of inclusionary zoning, form-based codes, transfer of development rights, site plan review, and natural resource protection zoning.
• **Minor Subdivisions**: Allows cities and towns to replace Approval Not Required (ANR) provisions with regulations for minor subdivisions. ANR developments are almost unregulated, producing sprawling development patterns. Minor subdivisions improve local oversight through a streamlined review process.
• **Consolidated Permitting**: Encourages all decision-making boards to come together at the beginning of a project review and share common information. Each board still retains the authority to make an independent decision in accordance with its own standards.
• **Development Impact Fees**: While standard practice across the United States, impact fees are generally unavailable to Massachusetts communities. This would establish a clear and predictable process for assessing fees to cover eligible impacts such as traffic, stormwater, and water supply.
• **Vested Rights (“grandfathering”)**: Provides reasonable and standardized zoning protections for development projects proposed in building permits, special permits, and subdivision plans.
• **Inclusionary Zoning**: Provides explicit statutory language allowing municipalities to require the creation of affordable housing projects, which can count towards the 10% local requirement under Chapter 40B.
• **Variances**: Benefits property owners by expanding the usefulness of the variance to address a wider array of zoning situations.

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8 Massachusetts Smart Growth Alliance
- **Dispute Resolution**: Enables developers and municipalities to pursue alternative dispute resolution instead of litigation to resolve conflicts.
- **Parks and Playgrounds**: Allows Planning Boards the option to set aside up to 5% of a subdivision as a park or playground for the development.
- **Master Plans**: Makes master planning optional and allows cities and towns greater flexibility to choose the elements of that plan based on local needs.
- **Planning Ahead for Growth Act**: Grants additional tools and incentives to communities that choose to “opt-in” by making four specific zoning changes consistent with the state’s Sustainable Development Principles. These benefits include: broader use of impact fees, development agreements, natural resource protection zoning, shorter vesting periods, the ability to regulate the rate of development, and priority for State infrastructure funding.

**CONSTRAINTS TO SUSTAINABLE LAND USE AND INFRASTRUCTURE**

The public participation process and data analysis conducted for this Plan identified several major constraints that are acting as barriers to improved sustainability in Franklin County. Those barriers as well as other constraints or barriers include:

- Lack of funding and/or financing for redevelopment projects and upgrades to water and sewer infrastructure.
- Local zoning does not always support sustainable land use patterns.
- Climate change may pose significant challenges to infill and redevelopment, especially where infill areas are in close proximity to rivers.
- The initial cost of green infrastructure and LID projects can sometimes be higher, although cost savings are often realized over the long term.
- Information and training is needed for local public works employees on green infrastructure and LID techniques.
- Costs of redeveloping structures, including bringing them into building code compliance and making them accessible, is sometimes cost-prohibitive.
- Not all people want to live in infill areas and may prefer to be in low population areas.
- Private land ownership makes some climate change adaptation strategies, such as reconnecting rivers to their floodplains, more challenging.
- Existing flood plain mapping is out of date (from the 1980s or earlier), may not reflect existing conditions, and does not have a predictive element that allows for climate change.
- Climate change is not a linear process, meaning that impacts will be erratic and unpredictable.
- Aging infrastructure, such as bridges, water and sewer lines, and culverts may be particularly vulnerable to increase flooding.
- Drinking water supplies may be vulnerable to climate change, especially in towns where there is no back-up water supplies and/or where there are high water tables.
- Droughts may also impact private drinking water wells.
- Properties down-stream of high risk dams may encounter issues getting insurance.
- More heat waves may have particular negative impacts on our aging population.
- More droughts may impact agricultural operations and irrigation.
- More droughts may also spur more wildfires.
<table>
<thead>
<tr>
<th>Table 2: Recommendations and Strategies for Land Use and Infrastructure</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Implementation</strong></td>
</tr>
<tr>
<td>In Progress / Ongoing</td>
</tr>
<tr>
<td><strong>Partnering Organization(s)</strong>*</td>
</tr>
</tbody>
</table>

### Integrate climate change mitigation and adaption into all levels of planning

- **Update local land use and zoning regulations to integrate climate change impacts**
  - X
  - 0-5 Years: Towns, FRCOG

- **Encourage towns to promote municipal and homeowner-level energy reduction and efficiency programs**
  - X
  - 0-5 Years: Town Energy Committees, FRCOG, FCRHRA

- **Encourage Green Communities designations to be attained by remaining 11 Franklin County towns**
  - X
  - 0-5 Years: Town Energy Committees, FRCOG, DOER

- **Encourage towns to include climate change impacts and adaptation in all master plans, hazard mitigation plans, and open space and recreation plans**
  - X
  - 0-5 Years: Towns, FRCOG, FEMA, MEMA

### Assess the impact climate change could have on vulnerable areas and infrastructure

- **Update floodplain mapping using predictive modeling to help identify at-risk facilities and structures, and determine strategies to protect or move such facilities and structures**
  - X
  - 0-5 Years: MEMA, FEMA, FRCOG

- **Identify communities for which access to vulnerable populations during major flood events is constrained or restricted**
  - X
  - 0-5 Years: FRCOG, WRHSAC, Town EMDs

- **Assess the ability of the built environment and infrastructure located along rivers to withstand inundation, including wastewater treatment and public water supplies**
  - X
  - 0-5 Years: FRCOG, WRHSAC, Town EMDs and DPWs, Water and Sewer Districts, Town Building Inspectors

- **Encourage the flood proofing of wastewater treatment facilities**
  - X
  - 0-5 Years: FRCOG, WRHSAC, Town EMDs and DPWs, Water and Sewer Districts, Town Building Inspectors

- **Encourage towns to assess all river and stream crossing areas for their ability to sustain more frequent and severe flooding**
  - X
  - 0-5 Years: Towns, MassDOT, Town Con Coms, DCR

*See Page 18 of Chapter 4: Housing Page 17 for a key to the Partnering Organizations abbreviations*
## Table 2: Recommendations and Strategies for Land Use and Infrastructure

<table>
<thead>
<tr>
<th>Recommendation</th>
<th>Partnering Organization(s)</th>
<th>Implementation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Work for the protection and viability of drinking water sources for the region</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seek funding to conduct a regional drinking water supply study</td>
<td>X</td>
<td>FRCOG</td>
</tr>
<tr>
<td>Identifying additional potential community water supply sources</td>
<td>X</td>
<td>FRCOG, Towns, USGS</td>
</tr>
<tr>
<td>Encourage towns and/or water districts to identify ready-to-use alternate or emergency drinking water supplies</td>
<td>X</td>
<td>FRCOG, Town Boards of Health, MEMA, Town Water Districts</td>
</tr>
<tr>
<td>Encourage the adoption of Best Management Practices in all towns with aquifer areas</td>
<td>X</td>
<td>FRCOG, Town Conservation Commissions, DCR</td>
</tr>
<tr>
<td>Encourage water conservation by homeowners, farmers and other business owners, and municipalities, especially in drought conditions</td>
<td>X</td>
<td>Town Energy Committees and Conservation Commissions, Town Water Districts</td>
</tr>
<tr>
<td><strong>Encourage the adoption of sustainable development and redevelopment techniques</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Encourage the adoption of Low Impact Development techniques in local regulations to help protect surface waters from stormwater runoff</td>
<td>X X</td>
<td>FRCOG, Town Planning Boards</td>
</tr>
<tr>
<td>Restore wetlands and flood storage capacity of floodplains</td>
<td>X</td>
<td>FRCOG, Town Conservation Commissions, DCR</td>
</tr>
<tr>
<td>Encourage conservation development, to set aside more undisturbed land to function as green infrastructure</td>
<td>X X</td>
<td>FRCOG, Town Planning Boards</td>
</tr>
<tr>
<td><strong>Promote infill and redevelopment of Priority Development Areas, Emerging Development Areas, and all town centers</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Support the reuse of vacant or underutilized commercial and industrial buildings for mixed use</td>
<td>X X X</td>
<td>Towns, FRCOG, Private Investors, Non-Profits</td>
</tr>
<tr>
<td>Encourage towns to identify priority development and protection areas as part of their master planning process</td>
<td>X</td>
<td>Town Planning Boards</td>
</tr>
<tr>
<td>Allow accessory apartments in single-family homes by right</td>
<td>X</td>
<td>Town Planning Boards</td>
</tr>
<tr>
<td>Recommendations and Strategies for Land Use and Infrastructure</td>
<td>Implementation</td>
<td>Partnering Organization(s)</td>
</tr>
<tr>
<td>---------------------------------------------------------------</td>
<td>----------------</td>
<td>----------------------------</td>
</tr>
<tr>
<td>Encourage towns to modify their zoning for by-right conversion of single to multi-family homes and multi-family homes in town centers with sewer infrastructure</td>
<td>In Progress / Ongoing: X, X</td>
<td>Town Planning Boards</td>
</tr>
<tr>
<td>Promote mixed use development (residential, commercial, light industrial and retail) in town centers</td>
<td>X</td>
<td>FRCOG, Town Planning Boards, Private Investors</td>
</tr>
<tr>
<td>Encourage roof-top and other low-impact siting of alternative energy as part of redevelopment</td>
<td>X</td>
<td>Town Energy Committees and Planning Boards, Private Investors</td>
</tr>
<tr>
<td>Promote the expansion of public transit and/or park and rides in all town and employment centers</td>
<td>X</td>
<td>FRCOG, MassDOT, FRTA, Town Energy Committees</td>
</tr>
<tr>
<td>Support the creation of off-road bike and pedestrian paths that connect town centers with residential areas</td>
<td>X</td>
<td>FRCOG, MassDOT, DCR, Towns</td>
</tr>
<tr>
<td><strong>Encourage the use of green infrastructure techniques at homeowner, municipal, and watershed levels</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Promote education and outreach to homeowners on green infrastructure techniques such as rain gardens, downspout disconnection, and tree planting</td>
<td>X</td>
<td>Town Energy Committees, Open Space and Rec Committees</td>
</tr>
<tr>
<td>Encourage municipalities to implement green infrastructure techniques, including GIS mapping of existing street trees</td>
<td>X</td>
<td>FRCOG, Town Energy Committees</td>
</tr>
<tr>
<td>Encourage towns to provide incentives to homeowners for using green infrastructure techniques</td>
<td>X</td>
<td>Town Energy Committees, Open Space and Rec Committees, Planning Boards, Town DPWs</td>
</tr>
<tr>
<td>Support workshops for public works employees on green infrastructure and GIS mapping</td>
<td>X</td>
<td>Select Boards, FRCOG, Town DPWs</td>
</tr>
<tr>
<td><strong>Advocate for policy that supports sustainable land use patterns</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Encourage state legislators to pass the pending Zoning Act changes: An Act Promoting the Planning and Development Of Sustainable Communities</td>
<td>X</td>
<td>FRCOG, Towns</td>
</tr>
<tr>
<td>Encourage towns to strengthen their floodplain zoning bylaws</td>
<td>X</td>
<td>FRCOG, MEMA</td>
</tr>
<tr>
<td>Encourage towns to protect agricultural lands, important wildlife habitat, and other vital land from development</td>
<td>X</td>
<td>FRCOG, Land Trusts, MDAR, DCR</td>
</tr>
</tbody>
</table>
**BENCHMARKS**

In order to help ensure that the goals of this chapter are implemented, the following benchmarks are suggested as milestones to measure progress toward sustainability. The benchmarks are data-driven and can be evaluated in various contexts over time. To do this, data on the benchmarks will be collected and evaluated by FRCOG staff at regular intervals to establish trends.

**TABLE 3: Land Use and Infrastructure Benchmarks**

<table>
<thead>
<tr>
<th>Performance Measure</th>
<th>Unit of Measurement</th>
<th>Desired Trend</th>
</tr>
</thead>
<tbody>
<tr>
<td>Towns incorporating climate change in planning</td>
<td>Number of towns</td>
<td>Increase</td>
</tr>
<tr>
<td>Emergency drinking water backup supplies</td>
<td>Number of backup supplies</td>
<td>Increase</td>
</tr>
<tr>
<td>Towns using LID and/or green infrastructure</td>
<td>Number of towns</td>
<td>Increase</td>
</tr>
<tr>
<td>Vacant and underutilized buildings/sites</td>
<td>Number of buildings/sites</td>
<td>Decrease</td>
</tr>
<tr>
<td>Town flood plain bylaws updated/adopted</td>
<td>Number of towns’ bylaws</td>
<td>Increase</td>
</tr>
<tr>
<td>Additional drinking water supplies identified</td>
<td>Number of drinking water supplies</td>
<td>Increase</td>
</tr>
<tr>
<td>Town centers revitalized</td>
<td>Number of town centers</td>
<td>Increase</td>
</tr>
<tr>
<td>Towns with stormwater management regulations</td>
<td>Number of towns</td>
<td>Increase</td>
</tr>
<tr>
<td>Towns with mixed use zoning in town centers</td>
<td>Number of towns</td>
<td>Increase</td>
</tr>
<tr>
<td>Towns with Conservation Development or similar bylaws</td>
<td>Percent change</td>
<td>Increase</td>
</tr>
<tr>
<td>Towns with floodplain bylaws</td>
<td>Percent change</td>
<td>Increase</td>
</tr>
</tbody>
</table>