

PIONEER VALLEY SUSTAINABILITY TOOLKIT



Catalyst for Regional Progress

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INTRODUCTION

The Pioneer Valley Planning Commission has produced this new Sustainability Toolkit with several goals in mind:

- To assist communities, by providing technical assistance and resources, to help them in adopting strategies to take action on climate change, promote use of clean energy sources, grow smarter, protect their environments, promote food security, and encourage use of green infrastructure.
- To promote the implementation of the region's key plan: Our Next Future: An Action Plan for Building a Smart, Sustainable and Resilient Pioneer Valley;
- To encourage sustainability in all aspects of life in the Pioneer Valley region.

This overall Sustainability Toolkit consists of five topic-specific toolkits, which include:

- Smart Growth
- Environment
- Climate Action and Clean Energy
- Food Security
- Green Infrastructure

The Toolkit includes a total of 130 fact sheets, plus 52 model bylaws and strategies.

How To Use The Toolkit

1) Explore the Strategies

Communities are encouraged to explore the wide range of sustainability strategies included in the Toolkit, and select strategies that are appropriate to their needs, their community size and character, and their municipal capabilities.

2) Study the Fact Sheets

Read the fact sheets carefully to gain a better understanding of each strategy, their goals, and how they work.

3) Use the Model Bylaw, Ordinances and Policies

The model bylaws, ordinances and policies provided in the toolkit can provide a helpful starting point for developing your own community strategy. But they are intended to be a starting point, and each community must craft its own bylaw or ordinance language that fits the community, and is melded to the existing community Zoning Bylaw/Ordinance or other existing policies.

4) Ask for More Help, If Needed

To complement this toolkit, the Pioneer Valley Planning Commission also offers a number of technical assistance programs, where communities can request help in implementing a strategy from this toolkit, and receive targeted assistance from a professional planner.

For More Information

For further information about any of the strategies in this toolkit, please contact:
Pioneer Valley Planning Commission, Land Use and Environment Section
60 Congress Street, Springfield, MA 01104-3419
Tel. 413-781-6045
www.pvpc.org

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The substance and findings of the work are dedicated to the public. The author and publisher are solely responsible for the accuracy of the statements and interpretations contained in this publication. Such interpretations do not necessarily reflect the views of the Government.

Pioneer Valley Planning Commission Staff Credits:

Timothy Brennan, Executive Director

Christopher Curtis, Chief Planner and Project Manager

Catherine Ratte, Principal Planner

Dillon Sussman, Senior Planner

Larry Smith, Senior Planner

David Elvin, Senior Planner

Patty Gambarini, Senior Planner

Jayne Armington, Senior Planner

Josiah Neiderbach, Planner

Ray Centeno, Graphic/Web Designer

Alexander Train, Planner

Brendan Conboy, Intern

Anne Capra, consultant

Graphic Design:

Alexis Design

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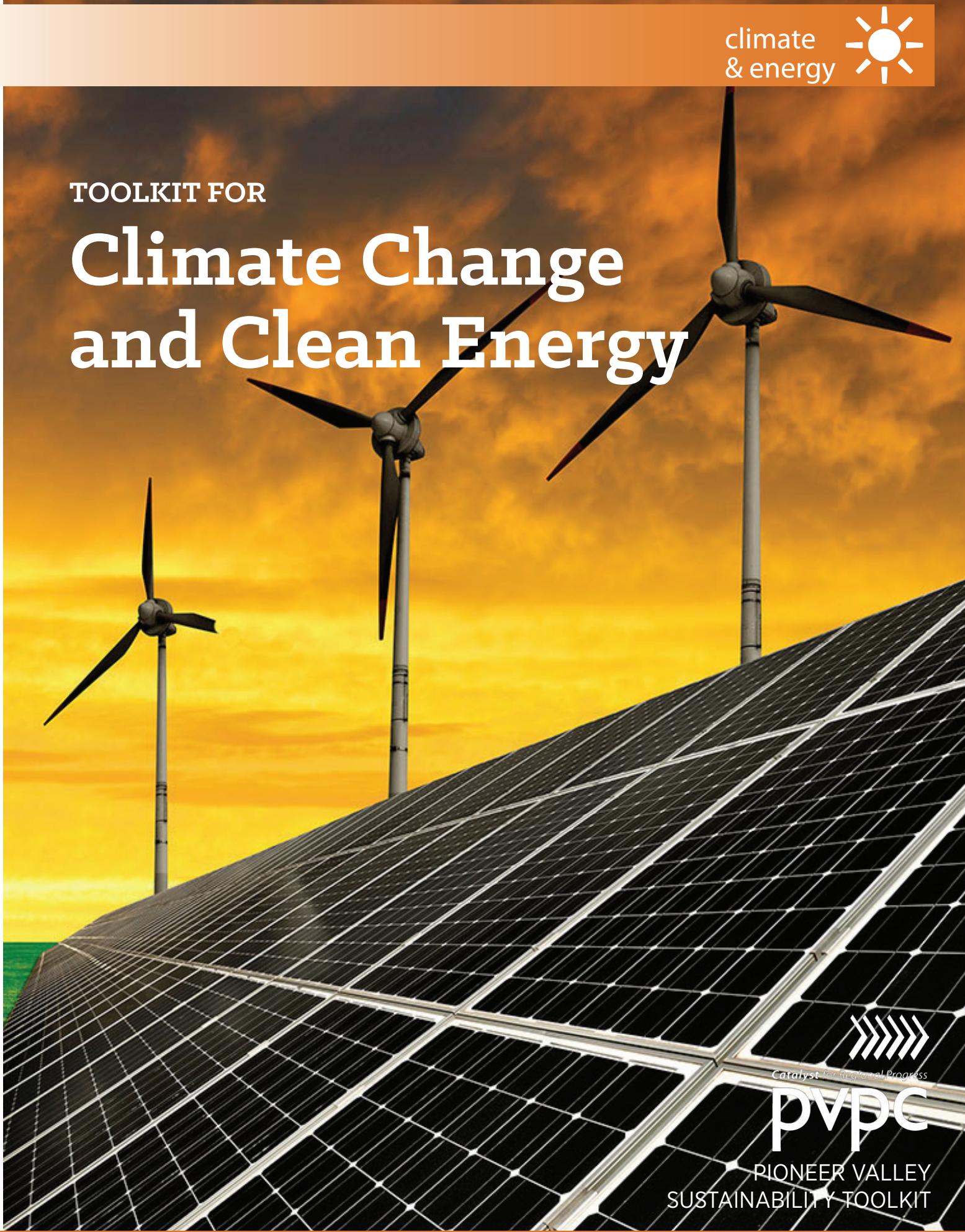
smart
growth 

climate
& energy



TOOLKIT FOR

Climate Change and Clean Energy



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PVDC

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Bike Access Standards

PURPOSE

To reduce vehicle trips and resulting greenhouse gas emissions by requiring bike racks and other bike amenities as part of development projects.

HOW IT WORKS

Communities can require, through either a general bylaw or a bylaw directed at a specified overlay district, that new buildings set aside indoor or outdoor parking for a set number of bicycles based on building square footage or number of tenants.

EXAMPLES OF WHERE STRATEGY HAS BEEN ADOPTED

New York City: BABs: Bicycle Access to Buildings Law

In 2009, New York City approved a Department of City Planning (DCP) initiative which requires secure parking for bicycles in new multi-family residential, commercial and institutional buildings throughout the city. It also applies to building projects where the structure is enlarged by 50 percent or more, and to building conversions to residential use.

This zoning ordinance requires bicycle parking spaces to be enclosed, secure, and accessible to designated users, such as residents, employees. To ensure that the new requirements do not encumber new development, required bicycle parking does not count against the permitted floor area. The following is a brief outline of NYC's bicycle parking requirements as they are illustrative of bicycle parking requirements in general:

- » Residential buildings with more than 10 units must provide secure bike parking for 50% of the units, or one space for every two units.
- » Commercial office buildings must provide one space for every 7,500 square feet.
- » Retail and most other commercial uses, as well as most community facility uses, are required to provide one space for every 10,000 square feet of floor area. Smaller buildings, where three or fewer bicycle spaces are required, can waive the requirement.



- » Universities and hospitals must provide secure bike parking but special provisions would allow these institutions to locate spaces more flexibly in a campus setting.
- » For industrial and semi-industrial uses, religious institutions, and certain other facilities with varied employment densities or unusual space demands, bicycle parking is required but would not count against permitted floor area.
- » Public parking garages are required to provide one (1) bicycle parking space for every ten (10) automobile parking spaces.

New York City: BAOB: Bicycle Access to Office Buildings Law

New York City also passed a law that requires commercial office buildings to allow cyclists to bring bicycles into their offices by elevator, upon request. The law only applies to commercial office buildings with at least one freight elevator. It does not apply to residential buildings.

Cambridge, Massachusetts:

Requires bicycle parking for new development and redevelopment projects through its zoning. Locations and types of bike parking must be shown in building site plans and approved by the Traffic, Parking and Transportation Department and the Community Development Department. The City created user-friendly guidelines to provide clear direction to developers on how to meet the parking requirements.



LINKS TO MODEL BYLAWS OR MORE INFORMATION:

NEW YORK'S BICYCLE ACCESS TO BUILDINGS LAW:

The New York City Council - File #: Int 0871-2008

CAMBRIDGE, MASSACHUSETTS'S BICYCLE PARKING GUIDELINES:

http://www.cambridgema.gov/CityOfCambridge_Content/documents/tpat_BikeParkingBrochure.pdf

BICYCLE PARKING ONLINE, A BICYCLE PARKING BEST PRACTICES RESOURCE FROM THE CAPITAL BIKE & WALK ORGANIZATION IN VICTORIA, BRITISH COLUMBIA (BC), PROVIDES THE MOST COMPREHENSIVE COLLECTION OF MUNICIPAL LEGISLATION REQUIRING BICYCLE PARKING

<http://www.bicycleparkingonline.org/Legislation>

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Carbon Offset & Impact Fee

PURPOSE

New development can burden a city or town with the responsibility for providing new facilities, infrastructure, and services to support the development. To reduce their financial burden, some communities assess impact fees to large developments. Impact fees can be used by the community to pay for necessary improvements, like roads or schools. Likewise, new development can increase a community's carbon footprint. Communities can gather carbon offset fees to pay for projects that will mitigate greenhouse gas emissions or help the community adapt to climate change impacts.

HOW IT WORKS

Impact fees are an increasingly common way to shift some of the burden of growth back on the developer. Impact fees are financial responsibilities that a municipality places upon a developer to provide some or all of the physical improvements (from sewers and streets to parks and schools) necessitated by development and its impacts. Under this system, the developer pays a share that is reasonably proportional to the size of the development. There must be a justifiable connection between the new development and the need for new facilities. These physical improvements include improving transportation systems, updating storm water and sewage systems, upgrades to schools and libraries, or the provision of parks.

In addition to the strain on infrastructure within a community, development can result in greenhouse gasses (GHGs) emissions that can greatly increase a community's overall carbon footprint (a carbon footprint quantifies the total amount of greenhouse gasses emitted by a person, project, or activity). A development directly and indirectly emits GHGs during construction. Sources include producing materials, transporting materials and workers to the site, powering equipment, and the loss of carbon absorbing agriculture or forest land. After construction is complete, a development continues to have GHG emission impacts. Buildings consume electricity and heat—primary sources of GHG emissions. Development also generates traffic—another major source of GHG emissions.

Similar to using money from an impact fee to pay for a new school, the money from a Carbon Offset Fee goes towards mitigating GHG emissions within the community. The long term goal of applying a cost to greenhouse gas emissions is to provide incentives to developers to release as little emissions as possible. For example, a developer could





reduce their project's carbon footprint by minimizing land clearing, constructing energy efficient buildings, and choosing development sites that minimize traffic impacts.

The money generated by carbon offset fees can be used to reduce carbon emissions elsewhere within the community by planting trees, installing bike lanes, insulating houses or installing solar panels. Companies such as the American Carbon Registry, Verified Carbon Standard, or Carbon Trust Standard (to name a few) produce third-party documentation of a development meeting the rules set by a municipality and ensure that carbon offsets meet quality standards. Implementing impact or carbon offset fees can have lasting effects on the sustainability of a community.

EXAMPLES OF WHERE STRATEGY HAS BEEN ADOPTED

United Kingdom: Implementing carbon offset fees is an innovative development in mitigating climate change. In Europe, England's Magna Park Distribution Center is the leading example of a large development using fees to go carbon neutral. The growing town of Milton Keynes where the park is located has established a carbon offset fund that receives money from developments to the park. Developers pay into the fund according to the quantity of carbon emissions generated by their buildings. Since its introduction in 2008, developers have paid over £400,000. These funds have been used to help pay for energy efficiency improvements to 2,500 existing homes. The fund helps



residents benefit directly from development in the area by increasing home values while mitigating the communities overall impact on climate change.



LINKS TO MODEL BYLAWS OR MORE INFORMATION

WATSONVILLE, CALIFORNIA, PROPOSED CARBON IMPACT FEE:

<http://cityofwatsonville.org/permits-plans/climate-action-plan/carbon-fund-ordinance>

AMERICAN CARBON REGISTRY:

<http://www.americancarbonregistry.org/>

CARBON TRUST STANDARD:

<http://www.carbontruststandard.com/pages/home>

INFORMATION ON IMPACT FEES BY STATE:

<http://www.impactfees.com/state-local/state.php>

MILTON KEYNES COUNCIL:

<http://www.milton-keynes.gov.uk/mklowcarbonliving/>

VERIFIED CARBON STANDARD:

<http://www.v-c-s.org/>

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Complete Streets Policy

PURPOSE

To encourage low-carbon modes of transportation, including bicycling and walking, by ensuring that road design accommodates all users and all modes of transportation.

Transportation is one of the biggest contributors of greenhouse gas (GHG) emissions that cause climate change. In the Pioneer Valley, transportation accounts for about 31.8% of GHG—more than any other sector. Well designed roads can encourage low carbon transportation options like bicycling, walking, or use of mass transit.

Complete Streets Policies encourage, or require, road design and construction that adequately accommodates all users, including pedestrians, bicyclists, users of mass transit, people with disabilities, the elderly, motorists, freight providers, emergency responders, and adjacent land users. When correctly implemented, a complete street creates a safe, vibrant, engaging public space for everyone using it. Complete streets also contribute to the mitigation of climate change and the reduction of greenhouse gasses, through the promotion of transportation modes that generate little or no emissions.



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HOW IT WORKS

Complete Streets policies can be adopted in a variety of ways. For example, a Complete Street policy can be an administratively issued directive that guides a Department of Public Works (D.P.W.) to consider all users in their projects. A Complete Streets Policy can be adopted as a standalone bylaw or ordinance. Complete Streets principles can be incorporated into zoning codes—particularly form-based codes. Complete Streets policies can also be part of a comprehensive transportation plan. Some communities choose to adopt detailed guidelines for design, construction, maintenance and repair of roads. These guidelines can include recommended street type classifications, recommended lane widths, intersection configurations, sidewalk requirements, where and what type of bike lanes to use, street furniture requirements, approval processes, etc.

Successful complete streets policies result in projects that reflect a wide variety of community values, such as aesthetics, history, safety, mobility, and the environment.

Because the primary goal of a complete street is to accommodate all users, the first step in creating one is a thorough public outreach effort. The outreach should target various groups, including pedestrians, bicyclists, motorists, senior citizens, families, and users of public transit. Additionally, public safety officials should be consulted to ensure adequate accommodation for emergency vehicles.

Best practices to consider as part of a complete street design include:

- » Bike lanes that provide safe, free-flowing movement for bicyclists
- » Continuous sidewalks with adequate widths and minimal tripping hazards
- » Traffic calming devices (speed bumps, reduced lane widths, medians, etc.)
- » Pedestrian features (crosswalks, crossing signals, street lights, etc.)
- » Street furniture (bus shelters, bike racks, trees, trash cans, public art, newspaper boxes, etc.)
- » Visually attractive methods for distinguishing space for different modes of transportation
- » A well connected street grid with minimal use of cul-de-sacs or dead ends
- » Helpful signage for pedestrians, bicyclists, and motorists (wayfinding, warnings, etc.)

A municipality can use this list of best practices as a starting point for community discussion and to develop street designs that fits its unique context. Illustrations and case studies of best practices can be a useful component of the discussion and preliminary design. Regardless of the particular best practices selected, the chosen features should be designed as a cohesive vision, with various elements complementing each other.



Examples that can be part of a cohesive vision include:

- » Coordinating the locations of bike racks, bike lanes, and signage indicating to motorists the presence of cyclists
- » Incorporating individual bike lanes into an interconnected network
- » Providing multiple features for pedestrians on the same road (traffic calming devices, benches, sidewalks, and pedestrian crossings located near each other)

In addition to being part of a vision, design features should be examined for different road types, including local streets, collectors, and arterials. The design of complete streets for different roads will vary – for example, bicycles and cars may safely share a lane on low speed local roads, whereas major roads with heavy automobile traffic may require dedicated—even protected—bike lanes.

The examples in the next section include examples of several of the various types of documents that can be used for implementation. In addition, because the complete streets concept pertains to a wide variety of aspects of the built environment, officials from a variety of municipal departments should be consulted.



EXAMPLES OF WHERE STRATEGY HAS BEEN ADOPTED

Northampton, MA

Northampton developed a Comprehensive Municipal Transportation Plan in 2005 which outlines a vision for all modes of transportation. The Plan's focus is the listing of 55 action policy actions, grouped by categories including core transportation policies, roadway and intersection policies, traffic calming, sidewalks, bicycle and multi-use travel and facilities, public transit, parking, enforcement, and transportation demand management. In addition, each policy action is assigned a set of municipal departments responsible for its implementation.

Bethlehem, NY

Bethlehem passed a resolution in 2009 to "recognize bicyclists and pedestrians as equally important as motorists in the planning and design of all new street construction and reconstruction." The resolution cites the goal of the Town's Comprehensive Plan to improve mobility of all residents, and lists the benefits of bicycle and pedestrian transportation. The resolution calls for the Highway Superintendant to enforce the resolution.

New York City, NY

The NYC Street Design Manual was published in 2009 and addresses all design components of a street, including suggested materials to use in construction, lighting, and the design of the right of way. The document's comprehensive focus includes the subjects of transportation, community, and environment. It has a variety of recommendations for different stakeholders, including design professionals, property owners, municipal officials, and citizens.



LINKS TO MODEL BYLAWS OR MORE INFORMATION

COMPLETE STREETS MODEL GUIDELINES DEVELOPED BY THE NATIONAL COMPLETE STREETS COALITION:

<http://www.completestreets.org/changing-policy/model-policy/model-state-legislation-options>

MASSACHUSETTS LAW REGARDING ACCOMMODATION FOR BICYCLES AND PEDESTRIAN TRAFFIC:

<http://www.ma legislature.gov/Laws/GeneralLaws/PartI/TitleXIV/Chapter90e/Section2a>

NORTHAMPTON MUNICIPAL TRANSPORTATION PLAN:

<http://www.northamptonma.gov/opd/uploads/listWidget/2552/Northampton%20Transportation%20Plan-policies.pdf>

BETHLEHEM RESOLUTION FOR COMPLETE STREETS:

<http://www.townofbethlehem.org/images/pagelimages/Paths4Bethlehem/CompleteStreetsResolution20090812.pdf>

NEW YORK CITY STREET DESIGN MANUAL:

<http://www.nyc.gov/html/dot/html/about/streetdesignmanual.shtml>

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Springfield, MA 01104-3419

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Energy Performance Scoring

PURPOSE

To reduce the use, impact and expenses of energy in homes and businesses by measuring the performance of buildings.

HOW IT WORKS

Energy performance scores are based on inspections from qualified professionals which test or audit the expected performance of a buildings' energy use. The score serves as a benchmark for home and building owners to compare how their property is performing, and how it could perform with improvements to the structure.

One common energy performance score used by municipalities in Massachusetts is the Home Energy Rating System (HERS), developed by the Residential Energy Services Network (RESNET), which is a national organization of energy-efficiency industries that set national standards for energy efficiency rating systems.

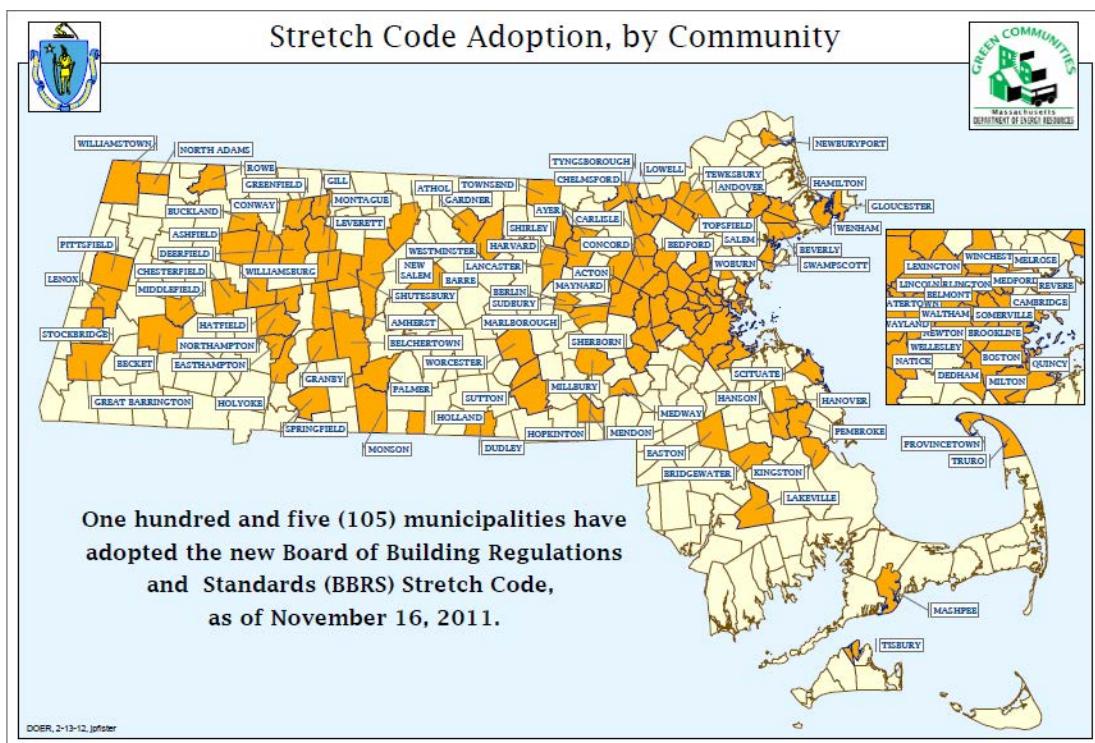
Through a home energy inspection and computer modeling, the HERS rating system compares the energy efficiency of the scored home with the efficiency of that home, had it been built to the standards set in the 2006 state building code. The hypothetical 2006 home score equals 100, and every point difference between the "standard" 2006 home and the scored home represents a percentage change in efficiency. For example, a home that scored 110 is 10% less efficient than the standard, while a home that scores 90 is 10% more efficient than the standard.



EXAMPLES OF WHERE STRATEGY HAS BEEN ADOPTED

The HERS performance score is being used in one hundred and five municipalities, about a third of all cities and towns across Massachusetts, to gauge compliance with the state “Stretch” Building Code, an amendment to the state building code that municipalities can voluntarily adopt as an ordinance or general bylaw. The Stretch Code requires all new homes under 2,000 square feet to have a HERS score of 70, while new homes over 2,000 square feet must have a score of 65. In other words, new homes in towns where the Stretch code has been adopted are 30% to 35% more efficient than the standard.

The stretch code is different from the basic building code because, instead of focusing on prescriptive measures – that is to say, government mandated materials and construction techniques – it relies on homes achieving specific performance scores. Homeowners therefore have more flexibility on what measures they pursue in order to achieve greater energy efficiency.



The Massachusetts Department of Energy Resources (DOER), in collaboration with the US Department of Energy and the Pioneer Valley Planning Commission, has also begun a pilot program called “Home MPG”, where residents of eight communities in the Pioneer Valley will be able to receive an energy performance score for their homes similar to a “Miles Per Gallon” score for vehicles. The Home MPG score is then used to show residents how their homes compare to state energy efficiency trends and targets, and what retrofits they can make in order to improve their score. Towns included in the pilot are Belchertown, East Longmeadow, Hampden, Longmeadow, Monson, Palmer, Springfield and Wilbraham.

LINKS TO MORE INFORMATION

STRETCH CODE:

<http://www.mass.gov/?pageID=eoeahomepage&L=1&LO=Home&sid=Eoea> and search for “stretch code”

RESNET:

<http://www.resnet.us/home-energy-ratings>

HOME MPG:

[http://www1.eere.energy.gov/buildings/betterbuildings/ neighborhoods/massachusetts_sep_profile.html](http://www1.eere.energy.gov/buildings/betterbuildings/neighborhoods/massachusetts_sep_profile.html)

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Fuel Efficient Vehicles Program

PURPOSE

To reduce carbon dioxide emissions from municipal vehicles by purchasing fuel efficient vehicles, which has a positive impact on the environment and saves the municipality money.

HOW IT WORKS

Local governments can adopt a policy that requires the purchasing of fuel efficient vehicles for municipal/school use when new vehicles are needed, and when such vehicles are commercially available and practicable. Local governments can develop and maintain an annual vehicle inventory of fuel inefficient vehicles and a plan for replacing these vehicles with vehicles that meet the fuel efficiency ratings below.

The US Environmental Protection Agency (EPA) maintains a database on vehicle fuel efficiency that is updated occasionally throughout the year, as new models are released. Municipalities that adopt a fuel efficient policy can reference the Massachusetts Department of Energy Resources Green Communities Program for the latest fuel efficiency MPG rating requirements.

Public and quasi-public agencies as well as private companies who offer transportation to consumers or maintain operation fleets—such as public transit authorities, airports, aircraft carriers, shuttle service companies, long-haul trucking companies, car rental agencies—are encouraged to adopt similar pledges and policies in an effort to reduce carbon emissions. An agency or company strategic plan should pledge the following considerations when opting to purchase new vehicles:

- » To purchase vehicles with fuel efficiency ratings;
- » To purchase vehicles equipped with the most advanced emissions control systems available;
- » To purchase vehicles equipped with devices that minimize idling and warm up time automatically; and,
- » When feasible, to purchase vehicles that run on cleaner fuels like compressed natural gas.



EXAMPLES OF ADOPTION

The University of Massachusetts adopted a policy in 2010 to consider the most economical, most fuel efficient, and lowest emission vehicles available in a particular model year that meet the operational needs and policy requirements when purchasing new vehicles. Previous policy language did not include discussion of fuel efficiency and low emission vehicles.

LINKS TO MORE INFORMATION

Massachusetts Fuel Efficient Model Policy

The Massachusetts Department of Energy Resources developed a model Fuel Efficient Vehicle Policy to encourage municipalities to reduce fuel consumption and energy costs. By adopting this policy, the municipality commits to purchasing only fuel efficient vehicles for municipal/school use whenever such vehicles are commercially available and practicable. This model policy was developed as part of the state's Green Communities Program, and adoption of this policy is one of the five requirements to be considered a "green community." Links to the model policy and guidance for complying with the policy are below. Over 70 Massachusetts municipalities adopted and implemented a version of this fuel efficient vehicles policy since 2012.

Massachusetts Model Fuel Efficient Municipal Fleet Policy

A LINK TO THE "GUIDANCE FOR COMPLIANCE WITH GREEN COMMUNITIES ACT CRITERIA 4"

http://www.mass.gov/Eoeea/docs/doer/green_communities/grant_program/GC-Guide-Criterion4-Feb22-2011.pdf

University of Massachusetts Policy

A LINK TO THE UNIVERSITY'S DEPARTMENT VEHICLE PURCHASING GUIDELINES IS PROVIDED BELOW.

<http://www.umass.edu/procurement/policies/motorvehicles.htm>

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Green Builder Programs

PURPOSE

To promote voluntary compliance by homebuilders with green building standards.

HOW IT WORKS

Communities can create voluntary builder certification programs offering incentives – such as priority plan review and guaranteed permitting timelines – to homebuilders who follow green building practices in new residential construction.

EXAMPLES OF WHERE STRATEGY HAS BEEN ADOPTED

Nearby in the Northeast region, the Town of Acton, Massachusetts adopted a zoning by-law (section 5.5B.2.2.d) allowing for a density bonus for buildings achieving LEED certification in their East Acton Village District. The Township of Cranford, NJ adopted a similar measure (Ordinance No. 2005-46), establishing a Green Building Density Incentive program, whereby redevelopers who achieve LEED certification and comply with the specific program requirements may earn a development density bonus from the Township. The Town of Babylon, New York went farther by adopting a local law that requires LEED certification for any new construction of commercial buildings, office buildings, industrial buildings, multiple residence, or senior citizen multiple residence over 4,000 square feet. If certification is achieved, the Town refunds the certification fees paid to USGBC by the developer.

Further away, the City of Austin, Texas created what is now the Austin Energy Green Building program in 1985. The city-run program helps new and established contractors to design and build homes with the health of the occupant, the environment, and energy efficiency at the center of the process. The city provides information, resources, education, and consulting services related to green building to homeowners and developers in the voluntary program. The program is free and benefits the city, developers, and residents in different ways. The city gets a better designed, longer lasting, more energy efficient housing stock and thus a higher assessed value on the housing stock. The developer's project and the developer's company become part of Austin's searchable online directory of green building professionals, and are featured in bimonthly newsletters. The



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homeowners benefit from owning a healthy, easy to maintain, and energy efficient home as well as qualifying for rebates, loans, and energy efficiency improvements.

Also, the City of Mill Valley, California, just north of San Francisco, has developed an incentive system for builders and developers who surpass the minimum environmental and ecological requirements for new construction. The rating system, which all new residential and commercial development must meet, is based on the LEED score, "Build it Green" checklist or "Green Point" checklist depending on size and type of development. All three systems are independent guides to assist in ranking a building's efficiency. The city provides some incentives to developments that exceed these requirements. The incentives include the presentation of a plaque from the city to the developer, allowing the contractor to use the City Green Building logo on promotional material, and featuring the business or project on the city's website.

LINKS TO MODEL BYLAWS OR MORE INFORMATION:

LEED BUILDING CODE INCENTIVES:

<http://www.usgbc.org>ShowFile.aspx?DocumentID=2021>

AUSTIN ENERGY GREEN BUILDING:

<http://www.austinenergy.com/energy%20efficiency/> Programs/Green%20Building/index.htm

MILL VALLEY GREEN BUILDING:

www.millvalleylibrary.org/Index.aspx?page=948

US GREEN BUILDING COUNCIL:

<http://www.usgbc.org/>

BUILT GREEN:

<http://www.builditgreen.org/>

GLOBAL GREEN USA:

<http://www.globalgreen.org/>

US ENVIRONMENTAL PROTECTION AGENCY:

<http://www.epa.gov/greenbuilding/>

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Greenhouse Gas Environmental Impact Statements

PURPOSE

To require new, large-scale developments to identify and evaluate measures to mitigate greenhouse gas emissions, including traffic reduction strategies, carpooling and transit access as part of Site Plan Review process.

HOW IT WORKS

Communities can adopt zoning regulations to require applicants of large developments to calculate, model, or estimate the amount of CO₂ and other Greenhouse Gas (GHG) emissions from a project, including the emissions associated with vehicular traffic, energy consumption, water usage and construction activities. Developers would present the findings to the Planning Board or other similar permit granting authority for review. The permit granting authority either accepts the estimates or makes recommendations for how to reduce the GHG emissions as a requirement for receiving a special permit or building permit.

EXAMPLES OF WHERE STRATEGY HAS BEEN ADOPTED

State regulation enacted through the Massachusetts Environmental Protection Act (MEPA) requires large projects, such as those that are required to submit an Environmental Impact Report (EIR) or Environmental Notification Form (ENR) to the Executive Office of Energy and Environmental Affairs (EOEEA), to also include information on the projects' mobile- and stationary-source greenhouse gas emissions. This applies to emissions associated primarily with energy consumption, vehicle trip generation, and consumption of large quantities of water or wastewater generation. The regulation, known as the "Massachusetts GHG Emission Policy and Protocol" does not require quantification of other emissions categories, such as emissions associated with waste generation, materials consumption, conversion of biomass associated with land clearing, or construction period emissions.



Some Massachusetts communities already require some form of environmental reporting as part of the permitting process, and communities could require developers to submit the state GHG report for review by the local permitting authority. Communities could also require additional reporting requirements to cover land uses not addressed by state policy.

Further away from the region, San Francisco, California provides an example of where this concept has been implemented. The City has a policy to require the Planning Board to consider a development project's "impact on the San Francisco greenhouse gas emissions limits" as part of the City's review under California's GHG emissions policy. The City must determine whether a given project's climate change-related impacts are significant and recommend mitigation of significant effects.

LINKS TO MODEL BYLAWS OR MORE INFORMATION

- » **San Francisco GHG Reduction Ordinance**
http://www.sf-planning.org/ftp/files/MEA/GHG-Reduction_ApxB.pdf
- » **California Governor's Office of Planning and Research. 2008. "CEQA AND CLIMATE CHANGE: Addressing Climate Change Through California Environmental Quality Act (CEQA) Review." Technical Advisory:**
http://www.fire.ca.gov/resource_mgt/resource_mgt_EPRP_Climate/OPR_Technical_Advisory_Publication%20Ready_June%202019%202008%5B1%5D.pdf.
 - a. Interim guidance regarding the steps agencies should take to address climate change in CEQA documents.
- » **Massachusetts Environmental Protection Agency. 2009. "(Revised) MEPA Greenhouse Gas Emissions Policy and Protocol." PDF available at**
<http://www.env.state.ma.us/mepa/ghg.aspx>.
 - b. Revised protocol for MEPA review's requirement for GHG quantification; includes mitigation suggestions.

FOR MORE INFORMATION, PLEASE CONTACT

Pioneer Valley Planning Commission

413-781-6045

60 Congress Street, Floor 1
Springfield, MA 01104-3419

www.pvpc.org



Idling Reduction Campaign & Program

PURPOSE

To educate citizens about air pollution resulting from vehicle idling and to reduce idling behavior.

Exhaust from motor vehicles can cause serious health effects on top of being a key factor of ground-level ozone or smog and a contributor to global warming. Fine particles emitted from diesel and gas engines are lung irritants and can trigger asthma attacks and more serious health conditions. All of these contaminants are produced when motor vehicles idle.

Massachusetts state law (M.G.L. Chapter 90, Section 16A) actually limits vehicle idling to five minutes, but many residents are unaware of this law, as are many local boards of health and local police who are charged with enforcing the state anti-idling law. Federal guidelines recommend that people turn their engines off after 10 seconds of waiting, except in traffic.



HOW IT WORKS

Local governments can take the following steps to implement an anti-idling educational campaign and program using parents of school-age children as a target population. Municipal and school district officials should re-launch the idling reduction campaign every three to five years to account for new populations cycling through the community.



1. The Board of Selectmen or City Council adopts a pledge to reduce unnecessary vehicle idling and/or adopts a municipal anti-idling policy. The Board of Selectmen or City Council then works with town/city staff to publicize local government adoption of pledge or policy through written notices such as emails and flyers to municipal staff and through newspaper articles, community access television, and temporary signs for the general public.
2. The Board of Selectmen or City Council contacts the school superintendent about idling reduction campaign and works with the superintendent to establish an anti-idling implementation committee made up parents, school staff, and municipal officials.
3. The implementation committee develops the program and gathers materials for an anti-idling education campaign and works with municipal or school communications staff to create a contact list for distribution of materials.
 - » Sample materials are provided through the links below.
 - » Consider making this public anti-idling campaign as part of a complete “green team” or “green community” program.
4. The implementation committee contacts local media to ensure widespread local coverage of this important initiative and asks the media to be a partner in the effort.
5. The implementation committee launches an anti-idling education campaign and distributes educational materials to its target audience.
6. Use town/city resources such as inserts in tax bills, and displays at municipal buildings, libraries, and schools to raise awareness of climate change and energy-saving opportunities available to local residents.
7. The implementation committee organizes training sessions for school bus drivers who have not yet received MassDEP's training.
8. The implementation committee works with school or municipal staff as well as elected officials to evaluate the results of the campaign. A final report is created after year one of campaign.

EXAMPLES OF COMMUNITY ADOPTION

The City of Northampton, City of Easthampton, and Town of Amherst banded together to create a model multi-community Idling Reduction campaign. This pilot project focused on changing the idling behavior of parents, municipal staff and bus drivers. The primary focus of this campaign was the school-aged children in the three participating elementary schools. The goal was to educate elementary school children and the children's parents/care-givers, about the negative effects that idling has on air quality and to encourage the children to try to change their parent's idling behavior. Secondary goals included educating municipal officials and their staff about the ill effects of idling and recruiting them as role models for appropriate idling behavior.

The projects in all three communities were resounding successes. They showed that targeted education and outreach efforts delivered to school-aged children and their families via their elementary schools can result in actual behavioral change to reduce unnecessary vehicle idling. The project organizers also believe the emphasis on children combined with the joint environmental and health-related message made the campaign more prominent as it captured both local and statewide media attention.

LINKS TO MORE INFORMATION

The Department of Environmental Protection (MassDEP) created an “Idling Reduction Toolkit” to help municipalities develop and implement idling reduction campaigns. Below are links to some of the toolkit items. If you have questions, need assistance with your idling reduction program, or would like a CD with the toolkit materials, contact MassDEP at 617-292-5648. <http://www.mass.gov/dep/air/>

[Model Municipal Fleet Idling Reduction Policy](#)

[Model Municipal Resolution for Vehicle Idling Reduction Committee](#)

[“Do Your Share For Clean Air” Idling Reduction Fact Sheet](#)

[Massachusetts Fact Sheet on Idling Reduction](#)

[“Organizing Your Idling Reduction Campaign” Suggested Steps](#)

[Sample Pledge Form for Idling Reduction](#)

[Sample Letter to Parents \(from school\) about idling and health effects](#)

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Infill Development Adaptive Reuse

PURPOSE

To promote more compact growth and development in city and town centers and expand economic development opportunities.

Infill development and adaptive reuse reduces commercial and residential sprawl by redirecting investment back to already established urbanized community centers. It is more efficient and environmentally responsible to redevelop older buildings or to develop on existing lots where infrastructure such as water, sewer, and roads already exist, rather than build new construction on outlying greenfield sites.



HOW IT WORKS

To encourage property owners to bring underutilized or vacant parcels of land back into productive use or to discourage demolition or long-term vacancy of obsolete or underutilized buildings, many Massachusetts municipalities have amended the zoning in these areas to allow a wider array of uses, densities, and dimensional requirements.



Some municipalities even renamed these rezoned areas with market-appealing terms to encourage the revitalization of these areas.

A municipality has two zoning options to encourage development or redevelopment.

1. Amend zoning in a designated area to allow for a wider range of uses, higher densities, and reduced setbacks.
2. Establish an overlay district with by-right or special permit approval for compatible residential, commercial uses, or mixed uses.

EXAMPLES OF COMMUNITY IMPLEMENTATION

Palmer— Adaptive Reuse & Infill Development

As part of its overhaul of municipal zoning bylaws, the Town of Palmer created a distinct set of development standards tailored to each of the four village centers in the community. In so doing, Palmer set the stage for new development and redevelopment that is sensitive to the historic layout of the villages and builds upon centuries of vernacular town-building experience. The layout of the Village District Bylaws is unique in the region. The entire bylaw for each village is presented on a single 11x17 page including an intuitive and graphical format detailing standards for land use, dimensions, yards, landscape, and parking. An illustrative photo and map of each village also helps to clearly identify the purpose and extent of the village regulations.



Amherst—Infill Development

Since the early 1970s, Amherst's zoning regulations have reflected the Town's growth management strategy of promoting development within its existing village centers while preserving outlying critical resource areas. Pomeroy Commons, a two-and-a-half story residential project that includes a mix of affordable and market rate units, was developed soon after Amherst re-zoned Pomeroy Village Center in the early 1990s to encourage a denser mix of retail, commercial, office, and residential uses. In Amherst Town Center,



the Boltwood Place mixed use project is currently under construction on the rear of a property already occupied by Judie's, a popular downtown restaurant. This project was made possible by two zoning amendments to the General Business District adopted in 2008-2009 that increased allowable residential density and relaxed the dimensional requirements for mixed use buildings.



Easthampton—Adaptive Reuse & Infill Development

By the end of the 20th century, most of the city's historic manufacturing companies had downsized, closed or relocated leaving ten large vacant or underutilized buildings in the city center with 1.5 million square feet of vacant space. These relics of a traditional manufacturing economy would not be easily reused for the demands of 21st century industry and that the sheer size of the buildings would be hard to fill with just industrial uses. To bring these buildings back to productive use, the City rezoned this 110 acre district from 'Industrial' to 'Mixed-Use/ Mill Industrial' in 1995. One year later, two men expressed interest in redeveloping a vacant industrial building within the Mixed-Use/ Mill Industrial District and successfully obtained special permit approval from the Planning Board. Known as Eastworks, this mill redevelopment project was the first of several redevelopment projects that has brought new jobs, retail and commercial space and housing to Easthampton.



Ware—Infill Development

The Town of Ware established an Infill Development Overlay District in 2006 to encourage development on parcels of land in the downtown area that did not meet minimum dimensional requirements of the Ware Zoning Bylaw. Within the boundaries of the Infill Development Overlay District, a lot with at least 5,000 square feet of area and fifty (50) feet of frontage may serve as the location for a single-family dwelling, two-family dwelling, or mixed use development. The new bylaw established that the lot must be served by town water and sewer and that the proposed building be consistent in architectural style, scale, setbacks, and frontage with abutting structures, and those in the immediate neighborhood.

LINKS TO MORE INFORMATION

TOWN OF AMHERST GENERAL BUSINESS ZONING DISTRICT

<https://www.amherstma.gov/index.aspx?NID=476>

TOWN OF PALMER VILLAGE CENTER ZONING DISTRICTS

http://www.townofpalmer.com/pages/PalmerMA_Planning/Chapter%20171.pdf

TOWN OF WARE INFILL DEVELOPMENT OVERLAY DISTRICT

http://www.townofware.com/Pages/WareMA_Planning/zoningbylaws.doc

CITY OF EASTHAMPTON CHAPTER 40R SMART GROWTH OVERLAY DISTRICT

<http://www.easthampton.org/downloads/Smart%20Growth%20Zoning%20FINAL%2007-09-09.doc>

CITY OF EASTHAMPTON MIXED USE / MILL INDUSTRIAL DISTRICT

<http://www.easthampton.org/downloads/ZONING008102010.pdf>

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Local Climate Neutral Pledges

PURPOSE

To reduce the amount of greenhouse gases (GHG) produced in a community as much as possible and capture or offset the GHGs that are still emitted.

HOW IT WORKS

Greenhouse gasses (GHG) trap solar radiation which gradually increases the overall temperature in the earth's atmosphere in an effect known as "global warming". Carbon dioxide, methane and nitrous oxide are some of the main GHGs that our activities produce. Climate neutral pledges promote greater accountability on GHG emissions in a community and can lead to reductions of these emissions.

A climate neutral pledge works best when it is adopted as one step in a series of actions that cities and towns can choose follow in order to reduce their GHG emissions:

1. Identify and quantify all sources of greenhouse gas emissions.
2. **Adopt a Climate Neutral Pledge** that states emissions reduction goals.
3. Create an action plan that the community can implement to reduce or offset emissions and meet its goals
4. Implement the emission reduction plan through energy efficiency, renewable energy and other change as needed.
5. Review community successes, failures and lessons learned

In neighboring New York State, municipalities join the "Climate Smart Communities" program, where each participating community adopts a model pledge as a resolution of the governing body, and can add their own elements. Communities also agree to: set goals to reduce GHGs; establish a task force; gather data about local GHG emissions and sources; develop a local action plan for reducing GHG emissions; adopt the state's goal of reducing electricity use by 15% by 2015; maximize use of public energy generated from renewable sources; and adopt land use regulations to reduce sprawl and plan for climate changes, amongst other possible steps.



EXAMPLES OF WHERE STRATEGY HAS BEEN ADOPTED

In the United States, the city of Chapel Hill, South Carolina has long strived to reduce its impact on the environment, both within its municipal operations and more generally throughout the community. In 2006 the Town signed onto the Community Carbon Reduction (CRed) pledge, through which they aim to reduce the total carbon emissions attributed to Town municipal operations by at least 60% by 2050.

In New York state, Schenectady, Red Hook and more than 40 other municipalities recently adopted the “Climate Smart Communities Pledge”, a commitment to systematically cut emissions of carbon dioxide and other GHGs. Schenectady has implemented several ambitious green initiatives, including an aggressive energy efficiency performance contract that has prevented emissions of more than 1 million pounds of carbon dioxide, an updated heating system for City Hall, energy conservation LED traffic lights, and a first-of-its-kind Green Homes program.

In Massachusetts, 86 municipalities, 12 of them from the Pioneer Valley, have already pledged to reduce their municipal government energy use by at least 20% in five years through the Green Communities program. These communities usually begin acting on that pledge like Schenectady, by aggressively implementing energy efficiency measures in public buildings, which creates savings both on emissions and on utility bills.

Over 270 American colleges and universities have adopted carbon neutral pledges, as well as a growing list of foreign countries, such as Costa Rica, Ethiopia, Iceland, The Maldives, Monaco, New Zealand, Niue, Norway, Pakistan, and Portugal.



LINKS TO MODEL BYLAWS OR MORE INFORMATION

CLIMATE NEUTRAL NETWORK:

<http://www.unep.org/climateneutral/About/tabid/95/Default.aspx>

NEW YORK STATE SMART COMMUNITIES CLIMATE NEUTRALITY RESOLUTION TEXT:

<http://www.dec.ny.gov/energy/65494.html>

COMMUNITY CARBON REDUCTION (CRED) PLEDGE OF CHAPEL HILL:

<http://sustainability.unc.edu/Initiatives/ClimateChange.aspx>

AMERICAN COLLEGE & UNIVERSITY PRESIDENT'S CLIMATE COMMITMENT:

<http://presidentsclimatecommitment.org/about/commitment>

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Methane Capture From Landfills

PURPOSE

To reduce the amount of harmful methane emissions that escape from decaying organic matter in landfills by capturing the methane and processing it for an alternative fuel resource.



Each day millions of tons of solid municipal waste are disposed of in sanitary landfills around the world. Many landfills produce methane gas as a byproduct of decaying organic matter, such as food and paper. When methane escapes from landfills and enters into the atmosphere it contributes to global climate change. Methane gas is the primary component of natural gas, which can be used for cooking, heating and generating electricity. Capturing methane from landfills can limit global climate change and be used for human needs.



HOW IT WORKS

Methane recovery systems can be installed to reduce the release of methane into the atmosphere from landfills by more than half. A series of vertical wells that are drilled down through layers of decaying matter, horizontal well connectors, and a vacuum system which directs the collected gas to the surface can be used to collect and pipe the methane to a central location.

The gas can be used in two ways. The landfill gas can be processed and made available as an alternative fuel. The quality of the power source is lower than pure methane or natural gas, but the cost to process the product is much lower and needs only minimal processing and minor modifications to be used in most modern combustion equipment. Another option is to create pipeline-quality gas from the landfill gas by processing and purifying the product, since only about one half of the landfill gas can be expected to be useable methane.

EXAMPLES OF WHERE STRATEGY HAS BEEN ADOPTED

North Country, New York

The Development Authority of the North Country (DANC), which receives around 1,000 tons of waste a day from three New York state counties, has a recovery system in place that captures excess methane and pipes it out of the landfill. The Authority has entered into a public-private partnership with Innovative Energy Systems to generate electricity from the captured methane. IES, which owns a total of nine power plants in New York, produces 4.8 megawatts of electricity from the landfill and sells it to the grid. The New York State Energy Research and Development Authority is providing a subsidy to the DANC at a rate of approximately \$22 per megawatt. The Climate Action Reserve also awarded the DANC carbon credits, which are now being sold.

Vancouver, British Columbia

Vancouver has reduced GHG emissions from municipal operations 33% below 1990 levels. The most significant reductions have come from the Vancouver Landfill where the city captures methane gas and burns it to generate enough electricity for 7000 homes. The landfill gas collection system includes 200 vertical extraction wells and 10 horizontal extraction laterals, built at a cost of \$1,750,000. The City selected Maxim Power Corporation to build a power station to burn the gases, and Maxim in turn sells electricity as “green power” at a premium price to B.C. Hydro.



Dartmouth, Massachusetts

The methane from the Crapo Hill Landfill in Dartmouth supplies fuel to a power plant that produces an estimated 3.3 million megawatts of electricity. Greater New Bedford Regional Refuse Management District owns and operates the landfill, which has 41 vertical wells and 20 horizontal extraction wells. The project also receives carbon credits.

LINKS TO MODEL BYLAWS OR MORE INFORMATION

GREEN HOUSE GAS ONLINE HAS A RESOURCE PAGE DEVOTED TO EXPANDING KNOWLEDGE OF METHANE SOURCES, SINKS AND SOLUTIONS, PARTICULARLY LANDFILL PRODUCED METHANE. THE PAGE CAN BE FOUND AT:

<http://www.ghgonline.org/methanelandfill.htm>

THE EPA HAS A VOLUNTARY ASSISTANCE PROGRAM FOR PUBLIC AND PRIVATE ENTITIES TO BECOME ACTIVE IN LANDFILL METHANE GAS CAPTURE. MORE INFORMATION ABOUT THE PROGRAM CAN BE FOUND AT:

<http://www.epa.gov/lmop/>

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Springfield, MA 01104-3419

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Municipal Climate Action Plans

PURPOSE

A municipal climate action plan is an important tool for engaging communities in the work of reducing GHG emissions and adapting to unavoidable local impacts of climate change.

HOW IT WORKS

A municipal climate action plan is an effective tool for guiding local actions to: 1) reduce greenhouse gas (GHG) emissions, and 2) improve a community's ability to withstand the effects of climate change that are now unavoidable, such as more floods, excessive and prolonged heat, and power outrages. A good municipal climate plan typically includes:

- » An inventory of existing GHG emissions produced within the community.
- » GHG reduction targets and timeframes.
- » Strategies to reduce, or mitigate, GHG emissions.
- » Strategies to improve the strength and resiliency of local infrastructure, roads, power systems and social services for heat-vulnerable residents.
- » A prioritized schedule for implementing selected strategies and monitoring progress.

Critical to any municipal climate action plan is the convening and ongoing participation of a task force or advisory committee of stakeholders that includes elected officials, citizens, and business owners. The participation of municipal staff, especially public works and facilities personnel, is especially helpful. You may also wish to include members of regional and state agencies that are involved in climate action planning and have resources to share. If your budget allows, the assistance of an engineering or technical consultant with experience producing climate action plans will be important. Lastly, it is important that the plan have a clear rationale and mission statement. Why is it important for your community to respond to climate change and its related impacts? What will be the consequences if you don't?

GHG EMISSIONS INVENTORIES

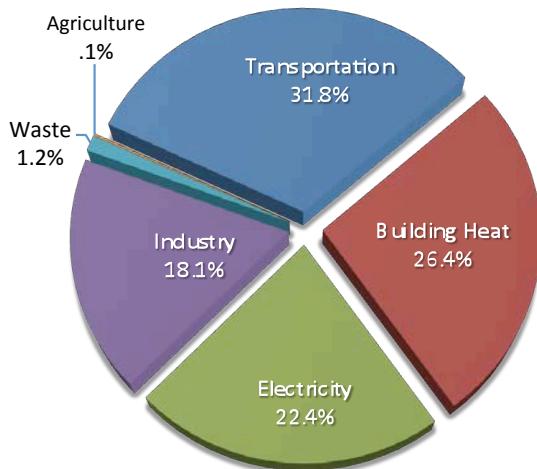
Greenhouse gas (GHG) emissions inventories estimate the quantities of these gases that are emitted within a city or town, as well as by power plants outside the municipality that supply electric power to customers within it. A typical GHG inventory lists energy



consumption from the municipality itself, as well as that of local businesses and households (if that information is available). Energy use is usually summarized in the following categories: electricity, building heat (oil, natural gas or wood/biomass), transportation (gasoline and diesel), agriculture (methane from livestock flatulence), and industry. Municipalities can help “lead by example” by tracking the energy use and emissions of public infrastructure, including water treatment plants, landfill methane off-gassing, power for street lights, and other typical public facilities.

Based on the type and quantities of fuels consumed, as well as the presence (or not) of other GHG-emitting activities, it is possible to estimate the quantities of GHGs that are released within the municipality.

Example GHG Inventory by Sector: Pioneer Valley



Above is the 2010 GHG inventory for the 9.2 million tons of carbon dioxide and equivalent GHG gases emitted in the 43 cities and towns of the Pioneer Valley that year. Similar GHG inventories can be produced for a municipality using data from utility companies, state transportation agencies and other sources.

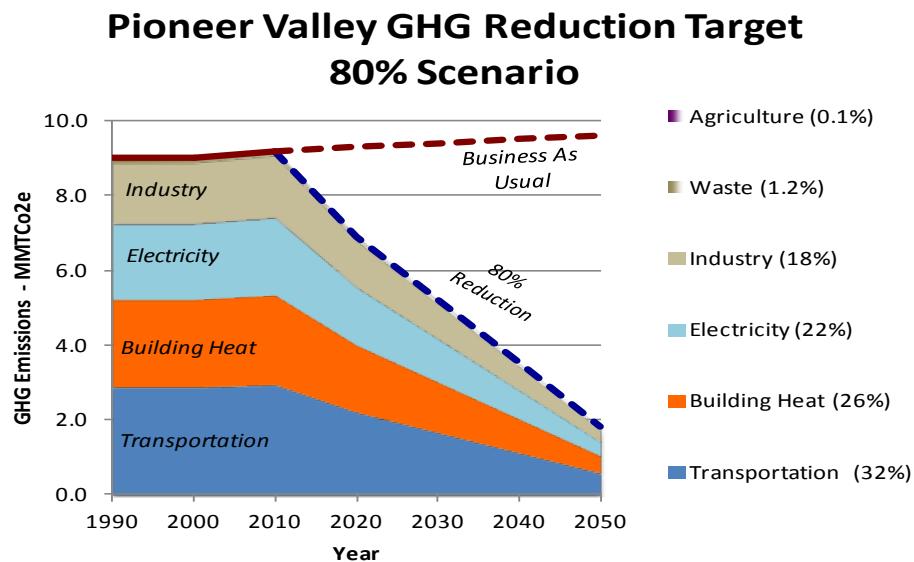


SETTING GHG REDUCTION TARGETS

Setting GHG reduction targets means deciding the amounts by which your municipality wishes to reduce its GHG emissions and by when. It's helpful to imagine more than one scenario for doing this. For example, the [Massachusetts Climate Action Plan](#) sets two incremental target scenarios: a 20% reduction of GHGs (from 1990 emissions levels) by 2020, and an 80% reduction of GHGs by 2050. The [Pioneer Valley Climate Action](#) Plan has adopted this statewide 80% reduction goal for 2050 (see below) and also contemplates a "carbon neutral" scenario of a 100% GHG reduction (no net GHG emissions) by 2050.

Your community may wish to consider the feasibility of these targets, depending on the amount of GHG-emitting activities within your town boundaries, as they are consistent with established statewide goals. However, it may be easier for a small town that is largely residential to make short-term progress toward these goals than an urban area that depends on a heavily GHG-emitting industry for employment. Thus, the stakeholder discussion about setting feasible GHG reduction targets is a critical plan activity; achievable yet inspirational goals are essential to obtain the necessary "buy-in" of leaders and key participants for the long-term success of the plan.

Example GHG Reduction Targets: Pioneer Valley 80% GHG Reduction by 2050



This is an example of a GHG reduction scenario that assumes equal reductions in all sectors by the horizon year (2050). Your community may wish to set other targets and horizon years, based on the amount of commuting by residents, age and size of buildings, and the nature of local industrial facilities (if any).



STRATEGIES TO REDUCE GHG EMISSIONS

There are dozens of ways to reduce GHG emissions. Many are as simple as carpooling; others can require years of engineering work and financing. So it's important not to try to do them all at once, but rather to choose a few to start with on which your community can make some real progress—and get results. Chapter 8 of the [Pioneer Valley Climate Action and Clean Energy Plan](#) offers dozens of possible strategies for reducing GHG emissions that are tailored to communities in Western Massachusetts. Some highlights are offered below.

Short-term GHG reduction strategies

- » Use car sharing (i.e., Zip Car) and carpools
- » Bike, walk and/or ride the bus instead of driving whenever possible
- » Incentives to switch to a more fuel-efficient personal vehicle
- » Install solar photovoltaic and/or solar hot water panels
- » Get a no-cost Mass Save home energy assessment to receive free weather-stripping, LED and compact fluorescent light bulb replacement
- » Plant trees to shade your house and soak up carbon dioxide

Longer-term GHG reduction strategies

- » Promote zoning that allows a greater mix of uses to help reduce distances and the need to drive
- » Encourage green building practices and investments in energy efficiency in homes, commercial buildings and industrial facilities
- » Establish and improve recycling and composting programs
- » Support the production and consumption of local and organic foods to help reduce long distance shipping and the use of petroleum-based fertilizers



STRATEGIES TO IMPROVE RESILIENCY TO UNAVOIDABLE CLIMATE IMPACTS

While GHG mitigation can reduce the future effects of climate change, it will not eliminate the effects of climate-related changes that are already happening. These include severe weather, early winter storms, more frequent flooding and record breaking heat. A Climate Action Plan can help your community decide which strategies are most needed to adapt to these and other climate-related impacts. Chapter 8 of the [Pioneer Valley Climate Action and Clean Energy Plan](#) offers dozens of possible strategies for adapting to climate impacts that are tailored to communities in Western Massachusetts. Example climate adaptation strategies include:

1. Update municipal emergency response and communication plans
2. Change agriculture practices to use less water and help prevent soil degradation and erosion
3. Reduce impervious surfaces and encourage on-site stormwater infiltration
4. Encourage efficient water use and establish back-up municipal water sources
5. Upgrade stormwater systems, inspect dams for safety, and keep buildings out of floodplains and stream channels
6. Use low impact development (LID) and “green infrastructure” landscape management

MONITORING PROGRESS

A climate action plan is never “done.” But once you begin, it’s important to track the progress you’ve made from your starting point. For GHG mitigation, the ongoing monitoring of energy use and GHG emissions is essential, as well as the cost of energy. Monitoring the progress of adaption measures is not as simple, but can be tracked by recording indicators such as the cost and square footage of flood damage, number and severity of road repairs, the number of people using cooling centers, admissions to local hospitals for heat-related illness and injuries, changes in property insurance rates (usually flood insurance), the number of households affected by power outages and their durations, and so on. Collecting all this information is essential to gauging the value of the plan.

A climate action plan should be updated at least every five years – or sooner if needed. Your community may experience a severe weather event that could affect your choice of strategies. Or new information may become available about energy use that will suggest new opportunities for improving efficiency. And so it’s important to be flexible; you can also add new monitoring indicators as you go along.



EXAMPLES OF SUCCESSFUL CLIMATE ACTION PLANS

In Massachusetts, the communities of [Amherst](#), [Northampton](#), [Falmouth](#) and [Marshfield](#) have produced notable municipal climate action planning documents and GHG inventories. Some of these are stand-alone plans; others are supplemental chapters to local comprehensive plans.

Marshfield first created a GHG emissions inventory in 2008 by gathering community energy use data through billing records obtained from the local utility providers NSTAR electric and Bay State Gas. This information included residential, commercial, solid waste and transportation energy usage. Data about the energy use of municipal buildings, vehicles, waste, water treatment, street and traffic lights, as well as solid waste, was collected from the Department of Public Works. Additional information was estimated from national energy surveys, as well as transportation estimates from the Massachusetts Department of Transportation Highway Division. Marshfield then used Clean Air and Climate Protection software provided by ICLEI to estimate existing GHGs and future emissions. The inventory provided the baseline information necessary to [set a municipal GHG reduction target of 20%](#) within five years of the plan's adoption date (2009).

The City of Boston in 2009 adopted a comprehensive [Climate Action Plan](#) with the goal of reducing GHG emissions by 25% by 2020, developing green businesses and workforce skills, engaging all parts of the community in climate leadership, and integrating climate change considerations into all planning decisions. Boston's plan estimates the adverse effects of climate change on the community including: more urban air pollution, longer summer heat waves, rising sea levels, unreliable water quality, loss of revenue from seasonal activities, and changes in agricultural production. The Boston plan presents many strategies to improve energy efficiency in buildings, transportation, and waste management. The plan also proposes new ways to generate more clean energy within the city.



LINKS TO MORE INFORMATION AND EXAMPLES

AMHERST, MASSACHUSETTS CLIMATE ACTION PLAN:
<https://www.amherstma.gov/DocumentCenter/Home/View/612>

CITY OF BOSTON, MASSACHUSETTS CLIMATE ACTION PLAN:
<http://www.cityofboston.gov/climate/bostonsplan/>

INTERNATIONAL COUNCIL FOR LOCAL ENVIRONMENTAL INITIATIVES:
<http://www.iclei.org/>

MARSHFIELD, MASSACHUSETTS GREENHOUSE GAS INVENTORY
<http://marshfieldenergy.org/wordpress/wp-content/uploads/2013/03/GHGIventory-MarshfieldMA.doc>

MARSHFIELD, MASSACHUSETTS ENERGY MANAGEMENT PROJECT
<http://marshfieldenergy.org/projects/>

MASSACHUSETTS CLIMATE CHANGE ADAPTATION REPORT:
<http://www.mass.gov/eea/waste-mgmt-recycling/air-quality/green-house-gas-and-climate-change/climate-change-adaptation/climate-change-adaptation-report.html>

MASSACHUSETTS STATE CLEAN AIR ACT EMISSIONS INVENTORY:
<http://www.mass.gov/eea/agencies/massdep/air/reports/emissions-inventories.html>

PIONEER VALLEY CLIMATE ACTION AND CLEAN ENERGY PLAN
<http://www.pvpc.org/plans/climate-action-and-clean-energy-plan>

U.S. ENVIRONMENTAL PROTECTION AGENCY—HOW TO CREATE A GHG EMISSIONS INVENTORY:
http://www.epa.gov/air/aqmportal/management/emissions_inventory/

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413-781-6045

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Springfield, MA 01104-3419

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Catalyst for Regional Progress

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PIONEER VALLEY
SUSTAINABILITY TOOLKIT

Municipal Renewable Energy Purchase Programs

PURPOSE

To help municipalities buy more power that is generated by solar, wind and other renewable energy sources.

As large energy consumers, municipalities can influence demand for renewable energy by simply buying more of it. Even small communities may spend millions of dollars per year on energy, wielding considerable market influence. Increasing the demand for renewable sources of power is a crucial step toward increasing the energy industry's overall capacity to generate and distribute clean energy to all users—not just municipalities. The eventual benefits for all power users will be lower clean energy costs, decreased greenhouse gas (GHG) pollution, and more jobs in the clean energy economy.

HOW IT WORKS

First, municipal leaders must decide that a certain portion of the energy that their municipality buys should be purchased from renewable generating sources, including wind, solar and hydro power. This decision can be formalized in a resolution, ordinance or bylaw—or it can be a simple administrative action. After this fundamental decision is made, the municipality can solicit requests for competitive proposals from power distributors, electric power aggregators and/or energy service companies (ESCOs). The municipality may benefit from using an experienced energy service consultant to help with the review process, as there are many technical variables and financial incentives involved in deciding what the best deal for an individual town or city may be.

Typically, electric power is where most municipalities will be able to shift to buying more renewable energy.

There are currently very few incentives and technologies available that will help shift away from use of fossil fuels for heating, including the use of natural gas, heating oil, gasoline and diesel fuels. Energy conservation incentives that are available for these





fuel types (see MASS SAVE) and improving the thermal performance of buildings, and/or upgrading heat systems, can have a significant impact on the amount of fuel used. Significantly, if a building becomes tight enough, alternative heating and cooling sources become more viable, including air-source heat pumps (also known as mini-splits).

Once a renewable electricity provider has been selected, the municipality may sign a contract to purchase electric power from the new source of green energy. As demand for renewable electricity has increased in recent years, its cost has become competitive with electricity that is generated using fossil fuels. Further, many electric power aggregation companies now offer price guarantees that ensure that a municipality does not see a disproportionate increase in the cost of renewably generated electricity versus that generated with fossil fuels.

WHERE IS MUNICIPAL RENEWABLE PURCHASING WORKING?

The Commonwealth of Massachusetts Green Power Purchase programs for public buildings has set goals of a 15% total renewable power purchased by 2020 and 30% by 2030. Massachusetts spends about 80% of its annual energy expenditures on procuring energy from outside of the state, but it is steadily replacing imported fossil fuels with renewables.

In 2005, the City of Aspen, Colorado set a goal to purchase 75% of the City government's energy from renewable sources by 2010. The City met this goal in December, 2006, and so set a new goal of powering 100% of city-owned building with renewable sources by 2020. One source of renewable energy is wind power from Holy Cross Energy, and a new wind farm in Nebraska.



The City of Santa Monica, California has also adopted a green power purchase strategy that saved more than 13,000 tons of carbon dioxide from entering the atmosphere. By shifting electricity generation from fossil fuels to renewable energy, Santa Monica led by example and encouraged business and home owners to switch, as well.

Anoka, Minnesota offers a “Green Power Choice” voluntary program to customers of the Anoka Municipal Utility. By participating in the program, customers can support increased reliance on renewable energy sources by purchasing blocks of energy from hydroelectric and wind power sources. Green Power is offered in blocks of 100 kilowatt hours (kWh) for a charge of \$1.75 per block. The cost of green power purchased is added to customers’ regular electric bill every month. For example, if a customer chooses to buy four blocks (400 kWh) of hydropower, an additional \$7.00 is added to their monthly electric bill.



LINKS TO MORE INFORMATION AND MODEL REGULATIONS

MUNICIPAL CLEAN ENERGY TOOL KIT:

<http://www.icleiusa.org/action-center/tools/municipal-clean-energy-toolkit>

MUNICIPAL GREEN POWER PURCHASING PROGRAMS:

<http://www.icleiusa.org/action-center/tools/municipal-clean-energy-toolkit/purchasing>

NATIONAL GRID “GREEN UP” PROVIDERS:

http://www.nationalgridus.com/niagaramohawk/home/energychoice/4_greenup_provider.asp

ASPEN, COLORADO GREEN POWER PROGRAM:

<http://www.aspenpitkin.com/Living-in-the-Valley/Green-Initiatives/Renewable-Energy/>

BOSTON, MASSACHUSETTS GREEN BUILDING STANDARDS:

http://www.cityofboston.gov/images_documents/Article%2037%20Green%20Buildings%20LEED_tcm3-2760.pdf

MASSACHUSETTS GREEN POWER PROGRAM:

http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=MA15R&re=1&ee=1

BELLINGHAM, WASHINGTON GREEN POWER PROGRAM:

<http://www.piersystem.com/go/doc/1264/180215/>

ANOKA, MINNESOTA UTILITY GREEN POWER PROGRAM:

http://anokaelectric.govoffice3.com/index.asp?Type=B_BASIC&SEC=%7B384DB703-5584-499A-AA3C-B102143D31B8%7D

FOR MORE INFORMATION, PLEASE CONTACT

Pioneer Valley Planning Commission

413-781-6045

60 Congress Street, Floor 1

Springfield, MA 01104-3419

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Neighborhood Solarize Programs

PURPOSE

Reduce the start-up costs of installing solar energy systems for residents and small businesses by organizing group purchases to achieve bulk purchase discount pricing.

HOW IT WORKS

As members of Sam's Club and Costco know: buying in bulk saves money. The same is true for installing solar energy systems on your home or business. One important tool for achieving this kind of group purchasing discount power for solar energy is group purchase discount, sometimes known as "solarize," programs. A solarize program encourages property owners to sign up to have a pre-qualified solar vendor install a solar energy system on their building. And the more property owners who sign up, the greater the discount the vendor agrees to give—which can be as much as 20% less than the cost of individual installation.

Solar group purchase discount programs depend on a strong public education and outreach effort to reach potential customers. With numerous state and federal financial and tax incentives available, property owners need time to ask questions and work the numbers to understand how to get the best deal. Programs may focus on a single neighborhood, or on a large city or region. The key is to make the outreach fun! By talking with neighbors and other property owners to learn about the potential benefits of solar energy, people also make social connections within their community.



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EXAMPLES OF SUCCESSFUL “SOLARIZE” PROGRAMS

Solarize Mass, Massachusetts

The Solarize Mass program of the Massachusetts Clean Energy Center is one of the most successful solar energy group purchase programs in the county. Solarize Mass kicked off in 2011, and as of 2014 has yielded nearly 1,000 new solar energy systems being installed on homes and businesses in 25 communities.

The Solarize Mass program depends on local grassroots outreach that is led by local volunteers. It features a tiered pricing structure that increases the savings as more home and business owners in a community sign up. This further encourages neighbor-to-neighbor outreach to increase sign-ups. Property owners can choose to own their own system, or opt for a power-purchase agreement arrangement that requires little or no up-front costs (the installer owns the panels and installment payments are paid from the revenue that they generate by feeding electricity back into the grid).



Portland, Oregon

Oregon has also been a “Solarize” leader, supporting group purchase discount programs throughout the state. Solar Oregon assists through solar education outreach and data management.

In the City of Portland, the “Solarize Portland” program run by several Portland neighborhood associations. Photovoltaic systems are purchased in bulk, and are then installed by a single solar contractor to reduce costs. The program’s first round achieved 120 new residential installations in just six months. This unexpected success spurred more projects in other neighborhoods of Portland and other Oregon cities.

LINKS TO MORE INFORMATION

SOLARIZE MASS:

<http://www.masscec.com/solarizemass>

SOLAR OREGON:

<http://solaroregon.org/residential-solar/solarize-communities>

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60 Congress Street, Floor 1
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Organic Waste Composting Material Reuse

PURPOSE

To reduce energy usage by encouraging composting of organic waste and re-use of building materials.



Commercial composting programs and building material re-use programs are waste diversion strategies that save valuable landfill space, conserve energy, and reduce the emission of greenhouse gas.

Through composting, organic waste is transformed into natural fertilizers for farming and gardening. This process decreases the energy demands of farming by offering a natural alternative to petroleum-based chemical fertilizers. Compost also retains more moisture in soil, reducing the need for irrigation. Additionally, the greenhouse gas produced from composting is completely captured and used for energy, rather than released into the atmosphere as occurs in a landfill.

In a building material re-use program, unwanted but reusable building materials from remodeling projects--including lumber, doors, kitchen appliances, and cabinets--are made available to non-profit organizations, businesses, and individuals for construction projects. Material re-use requires less energy and natural resources than the creation of new products and can minimize the fuel consumption necessary for transporting new products to the marketplace.



HOW IT WORKS

Implementing a Commercial Composting Program

The primary activities that form a commercial composting program are the collection of organic waste from commercial generators (restaurants, school cafeterias, hospitals, and supermarkets), composting the waste at a waste facility, and transporting the finished compost to farms and gardens. Municipalities can assist in these activities through the following actions:

- » Identifying and permitting composting facilities - Assisting in the permitting process can make it easier to recruit organizations to invest in and operate the facility. The permitting process is controlled by the Massachusetts Department of Environmental Protection (DEP). The DEP recommends that new composting facilities be established on active or inactive landfill or transfer station sites, because these facilities already have a “site assignment” permit. Facilities that compost brush do not have a current DEP site assignment. While these sites represent potential sites for a composting facility, they would require the full permitting process to accept food wastes. Any local Board of Health regulations should also be reviewed to ensure that the composting facility meets these requirements.
- » Facilitating participation from waste generators and farmers - Outreach to businesses in order to educate them about the benefits of composting is an important first step to creating a commercial compost program. Outreach should be directed to managers and owners of restaurants and operations managers of schools and hospitals. As per a state ban that started on October 1st, 2014, large food waste producers can no longer send discarded food to the landfill, so these are excellent candidates for participation in the program. Overreliance on a specific large waste generator or compost user can make the program fragile, but working with other communities to expand the system can reduce this risk.
- » Encourage haulers to provide separate organic waste collection - municipalities can encourage and train local commercial waste haulers about organic waste source separation. They can also make haulers aware of waste generators who are interested in participating in a commercial composting program, in order to facilitate the creation of new organic waste hauling routes. Municipalities can also implement bylaws that require businesses to separate organic waste and give haulers a financial incentive to compost by increasing municipal landfill tipping fees.



- » Recruit compost facility investors and owner-operators - In addition to facilitating permitting for composting facilities, municipalities can release requests for proposal to identify potential investor-operators, corporations, or others that may have an interest in operating a composting site. Municipalities can also reach out to existing organizations in the region, such as Amend Organics in Amherst, which operates a full commercial composting program and are involved in collection, composting, and delivery of compost. Municipalities can also help secure funding for a composting program by applying for grant funding from the Massachusetts DEP's Sustainable Materials Recovery Program (SMRP).

Implementing a Building Material Re-Use Program

Most building materials re-use programs maintain a storage facility of used items, where individuals, businesses, and institutions who are involved in building construction can deliver and purchase materials. Items that are commonly part of a re-use program are: windows, hardware, cabinets, fixtures, doors, paint, furniture, computers, office equipment, carpet, and wood. Ways in which municipalities can assist with a re-use program are:

- » Provide a building materials storage facility - finding a physical structure for a re-use program is often the largest challenge and expense to its implementation. Providing municipally-owned space for this purpose, even if only small, can provide a solution to this challenge.
- » Partner with non-profit organizations to run the program - Re-use programs can be run as a joint effort between municipalities and non-profit organizations. Partnering allows the program to tap into an existing volunteer network that can help operate and staff the program.
- » Promote existing re-use programs in the Pioneer Valley - The non-profit Center for EcoTechnology runs the EcoBuilding Bargains store in Springfield, which is the largest program in New England. Encouraging residents, businesses, and non-profits to utilize this existing program is an excellent alternative to starting a new program.



EXAMPLES OF COMMUNITY IMPLEMENTATION

Northampton, MA

The Pioneer Valley's largest commercial composting effort to date, called the Northampton Source Separated Organics (SSO) Program, ran between 1991 and 2002. The program was a collaboration between the City of Northampton and the Center for EcoTechnology, a local non-profit organization. For the first seven years of the program, Smith Vocational High School Farm in Northampton operated a food waste composting facility at their school farm. The program was expanded in 1998 through a CET-provided grant to include large supermarkets (Stop & Shop and Big Y), food processors (e.g. Hot Mama's), small markets (e.g. Serio's and Coopers), restaurants (e.g. La Cazuela and Northampton Brewery), institutions (e.g. Smith College and the Hampshire County Jail), health care facilities (e.g. Cooley Dickinson Hospital), and public schools (e.g. JFK Middle School). Most of the compost was used by the Smith Vocational High School Farm (25-30 tons of food per week), with other area farmers accepting some as well. In 2004, composting at the high school's farm ceased due to changes in school administration, and the program ended without an identifiable backup composting facility. The program was successful while in operation, but also demonstrates the need to have more than one composting facility in order to ensure the resiliency of a composting program.

Amend Organics, Amherst, MA

Amend Organics is an agriculture-based non-profit that offers composting to farmers, commercial food generators, and municipalities in western Massachusetts. The company collects leaves, cow manure, horse bedding, and food scraps to create compost for agricultural use. Beginning its composting operations in 2012, the company has a lease with the New England Small Farming Institute to use the composting facility at the NESFI-operated Book & Plow Farm located on land owned by Amherst College. Amend Organics also runs a food scraps collection program at the Town of Amherst Transfer Station. The program is funded through compostable bags sold through the Amherst Transfer Station for collection of food scraps.

EcoBuilding Bargains, Springfield, MA

EcoBuilding Bargains, located in Springfield, Massachusetts, offers reused and surplus building materials, including cabinets, furniture, doors, tile, lighting fixtures, appliances, and lumber. The 30,000 square foot facility accepts donations from homeowners, contractors, manufacturers, retailers and municipal collection centers. The program,



which is the largest in New England, was created by the Center for EcoTechnology, a non-profit community-based environmental organization started in 1976. The revenue from reselling the donated building materials provides the program enough funding to cover its operational costs. The program started in 2001 in a much smaller facility in Springfield, and was started with just under \$200,000 in grant money from sources including the Massachusetts DEP, US Department of Commerce Economic Development Administration, and private foundations.

LINKS TO MORE INFORMATION

CONSTRUCTING A REGIONAL ORGANIC WASTE MANAGEMENT PROGRAM FOR THE CENTRAL PIONEER VALLEY, CREATED BY THE PIONEER VALLEY PLANNING COMMISSION:

<http://www.northamptonma.gov/DocumentCenter/View/333>

STRATEGIES FOR STARTING A MATERIALS RE-USE PROGRAM, CREATED BY THE UNIVERSITY OF WISCONSIN:

<http://infohouse.p2ric.org/ref/21/20193.pdf>

CENTER FOR ECOTECHNOLOGY'S ECOBUILDING BARGAINS WEBSITE:

<http://ecobuildingbargains.org>

FOR MORE INFORMATION, PLEASE CONTACT

Pioneer Valley Planning Commission

413-781-6045

60 Congress Street, Floor 1

Springfield, MA 01104-3419

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Pedestrian Access

PURPOSE

To reduce greenhouse gas emissions by increasing walking and reducing driving.

Transportation is one of the largest contributors to greenhouse gas (GHG) emissions. In the Pioneer Valley, transportation accounts for about 31.8% of GHG—more than any other sector. Creating a transportation network that provides local residents with safe, convenient access to destinations by walking will reduce these emissions by replacing car trips with increased walking.

Promoting pedestrian access also provide residents with a low-cost alternative to driving, saving them money and reducing traffic congestion. As an easy way to exercise, walking also promotes mental and physical health. Regardless of the destination, every trip begins and ends by walking, meaning that promoting pedestrian access provides benefits to everyone.

HOW IT WORKS

Municipalities can require private development to promote pedestrian access through the use of zoning and subdivision bylaws. In order to encourage walking, the following elements should be included in these regulatory documents. These elements can be included as a new, separate section of the bylaws, or integrated into existing text:

- » Requiring sidewalks as part of all new development, on both sides of the street, so that pedestrians have safe places to walk. Sidewalks should be at least five feet wide with smooth, high-grip surfaces.
- » Limiting the number and width of driveways and curb cuts, in order to minimize the number of locations where pedestrians are at risk of getting struck by cars crossing the sidewalk.
- » Requiring appropriate streetscape design, including guidance about appropriate sidewalk design, street trees, benches, light fixtures, outdoor dining areas, signs, etc.
 - a. Using design guidelines and/or form-based codes to require building development that contributes to a high-quality pedestrian realm. The regulations can encourage or require appropriate building massing, setbacks, and architectural detail including the use of awnings, windows, and varied building materials.



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- b. Allowing for close proximity of different land uses, or mixed-use development, to enable travel between uses that only requires a short, easy walk.
- » Ensuring parking lots are safe for walking, by requiring clearly designated, raised sidewalks from the street to all building entrances, installing speed bumps or other traffic calming measures to reduce motorist speeds, requiring adequate tree cover to shade the parking lot, and providing bike parking.

Designing new subdivisions to encourage pedestrians, including providing a well-connected street grid with short blocks, rather than cul-de-sacs or dead ends, to minimize walking distances, providing sidewalks, requiring street trees, appropriate lighting, minimizing the width of new roads to slow car traffic, and providing traffic calming measures, where appropriate.

- » Specifying that the above items will be reviewed as part of the municipality's site plan review process for new development projects.

Integrating pedestrian features into a municipality's regular construction and maintenance of roads is another effective way to promote pedestrian access. Specific pedestrian features to be included are:

- » Installing traffic signaling at intersections that have pedestrian countdown timers and signals that allow pedestrians a chance to enter the street before motorists, so they are more visible to turning cars.
- » Providing designated mid-block pedestrian street crossings that have clear signage and prominent pavement markings.
- » Installing sidewalk bump outs at pedestrian crossings. Bump outs extend the sidewalk area and reduce the width of crossings, which increases safety and comfort for pedestrians.
- » Providing wayfinding signage that provides pedestrians with the direction, distance and time between popular destinations.
- » Installing traffic calming devices, such as speed bumps, reduced lane widths, and medians, that encourage motorists to drive more slowly.
- » Installing street lights that provide adequate street and sidewalk lighting. Adequate lighting is particularly important at locations with grade changes, potential obstacles in a pedestrian's path, and where auto traffic crosses pedestrian paths. Lighting should minimize glare.
- » Installing street furniture, including bus shelters, bike racks, trees, trash cans, public art, and newspaper boxes that make the street visually interesting, provide opportunities for rest, and provide a sense of separation between roads and sidewalks.

Municipalities can also pass a Complete Streets policy, which promotes design and maintenance of streets and sidewalks that balances the needs of all users, including pedestrians, bicyclists, users of mass transit, people with disabilities, the elderly, motorists, freight providers, emergency responders, and adjacent land users. A Complete Streets policy would be passed by the City Council or Select Board and take one of two forms:

- » A resolution, which is a non-binding, official statement of support for approaching community transportation projects as a way to improve access, public health, and quality of life.
- » An ordinance, which legally changes the municipal code to require the needs of all users to be addressed in new transportation projects.

Both resolutions and ordinances help promote pedestrian access. However, because resolutions do not require action, they are more likely to be neglected than a legally-binding ordinance.

EXAMPLES OF COMMUNITY IMPLEMENTATION

Springfield, MA

In 2014, the City of Springfield completed its first Complete Streets Plan, which recommends a network of roadways throughout the city to receive upgraded accommodations for bicyclists and pedestrians. The plan emphasizes pedestrian access improvements that can have the most impact for the least cost, such as pedestrian crossing pavement markings and wayfinding signage. The plan, developed for the City by the Pioneer Valley Planning Commission and MassBike, was funded through a grant from the Centers for Disease Control. As part of the plan, a sidewalk inventory was conducted that identified all existing sidewalks. The City is currently considering passing a Complete Streets policy in conjunction with completion of the plan. The City has also undertaken various pedestrian access improvements in recent years, such as installing new sidewalk ramps and pedestrian crossing markings on Main Street in downtown.

Northampton, MA

The City of Northampton's zoning ordinance requires all new development to prepare an interior traffic and pedestrian circulation plan that is designed to minimize conflicts and safety problems with motorists, as well as provide safe and adequate pedestrian access through the construction of sidewalks. The ordinance also requires that sidewalks connecting "from the building to the street be clearly delineated through materials and/or markings to distinguish the vehicular route from the non-vehicular route." Sidewalk construction specifications are also included that require sidewalks to be a minimum of six feet in width and located on both sides of the street. In addition to these zoning



requirements, the City incorporated pedestrian access into the street design of Elm Street near Smith College, where there are multiple pedestrian crossings with medians, signage alerting motorists to the crossing, and prominently visible pavement markings. The City is also currently considering adding additional design specifications, such as sidewalk and crosswalk widths in parking lots, for internal pedestrian circulation within new developments.

LINKS TO MODEL BYLAWS OR MORE INFORMATION

THE FEDERAL HIGHWAY ADMINISTRATION'S GUIDE TO DESIGNING SIDEWALKS AND TRAILS FOR ACCESS:

http://www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/sidewalks/

MODEL SIDEWALK REGULATIONS – PIONEER VALLEY PLANNING COMMISSION AND OTHERS:

http://walkbikecny.org/wp-content/uploads/2014/06/20140617_Final_Reference_Manual_a_C.pdf

MASSACHUSETTS DEPARTMENT OF TRANSPORTATION INITIATIVES TO PROMOTE PEDESTRIAN TRANSPORTATION:

<http://www.massdot.state.ma.us/GreenDOT/PedestrianTransportation.aspx>

MASSACHUSETTS DEPARTMENT OF TRANSPORTATION PEDESTRIAN PLAN:

<https://www.massdot.state.ma.us/planning/Main/StatewidePlans/PedestrianPlan.aspx>

FOR MORE INFORMATION, PLEASE CONTACT

Pioneer Valley Planning Commission

413-781-6045

60 Congress Street, Floor 1

Springfield, MA 01104-3419

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Retrofit Municipal Building

PURPOSE

To increase energy efficiency and reduce energy waste in municipal buildings.

Public buildings lose significant amounts of energy through poor insulation of walls, windows, ducts and pipes, as well as poor monitoring and maintenance of building structures. When municipalities improve energy efficiency by retrofitting public buildings, they use less energy over the long-term, reduce pollution, lower the amount of greenhouse gas emissions from their operations, and reduce energy spending.

HOW IT WORKS

Older public buildings are often energy inefficient. They can quickly lose heat in the winter and prove difficult to keep cool in the summer because of a compromised building envelope that allows a large volume of air exchange between the outside and inside of the building. Securing this building envelope with better insulation, window glazing, as well as updating the mechanical systems of a building, such as the boiler, air conditioners, lighting and plumbing will help reduce energy use, cost, carbon dioxide emissions and other pollutants.

A municipality can partner with an Energy Service Company or the local utility company to complete energy audits of buildings. The steps in this process are to agree upon:

- » proposed improvements;
- » timeline for improvements;
- » payback period on improvements; and
- » financing for the work to be completed.

Often the Energy Service Company will guarantee that the energy savings from proposed improvements will at least equal the cost of the proposed improvements, thus allowing the improvements to move forward without any out of pocket expenses for the municipality.





Belchertown Town Hall received energy efficiency upgrades in 2011

EXAMPLES OF WHERE STRATEGY HAS BEEN ADOPTED

Belchertown, Massachusetts authorized the use of either traditional tax-exempt bonds or qualified energy conservation bonds to pay for the installation of roughly \$3.3 million worth of energy upgrades for town and school buildings. The energy services company predicted that the upgrades will save the town \$256,000 annually for a period of 17 years. These savings are based on fuel and electricity prices for 2010.

West Springfield, Massachusetts approved bonding \$3.8 million to fund energy-saving projects for various municipal buildings such as boiler replacements for several of the town's schools. The energy service company guaranteed that the improvements would generate savings, and the contract with the City states that the company will pay the city the difference if it does not.

Toledo, Ohio sold bonds to finance a project with a systems controls company to complete energy efficiency improvements in municipal buildings. The contract with the city's systems control company guaranteed that financial savings from improved efficiency



would pay back the bonds—any shortfalls were covered by the controls company and any savings accrued to the city. This financing system has paid for building improvements of over \$10 million.

Portland, Oregon completed comprehensive retrofits of city buildings that included installing energy efficient lighting and windows. These energy efficiency measures resulted in cost-savings through lower utility bills. Portland has saved over ten percent on annual utility bills, or approximately \$1 million per year, since implementing the program.

LINKS TO MORE INFORMATION:

INFORMATION ON ENERGY SERVICE COMPANIES PROVIDED BY THE NATIONAL ASSOCIATION OF ENERGY SERVICE COMPANIES:

<http://www.naesco.org/>

INFORMATION ON THE FUNDING OPPORTUNITIES THROUGH THE MASSACHUSETTS GREEN COMMUNITIES PROGRAM:

<http://www.mass.gov/?pageID=eoeea&subtopic&L=3&L0=Home&L1=Energy%2c+Utilities%26+Clean+Technologies&L2=Green+Communities&sid=Eoeea>

INFORMATION ON PORTLAND OREGON'S CITY ENERGY CHALLENGE:

http://www.smartcommunities.ncat.org/success/city_energy.shtml

FOR MORE INFORMATION, PLEASE CONTACT

Pioneer Valley Planning Commission

413-781-6045

60 Congress Street, Floor 1

Springfield, MA 01104-3419

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Solar Energy Incentives

PURPOSE

To promote installation of more solar energy capacity in Massachusetts by providing financial and tax incentives.

INCENTIVES FOR SOLAR PV AND SOLAR THERMAL SYSTEMS

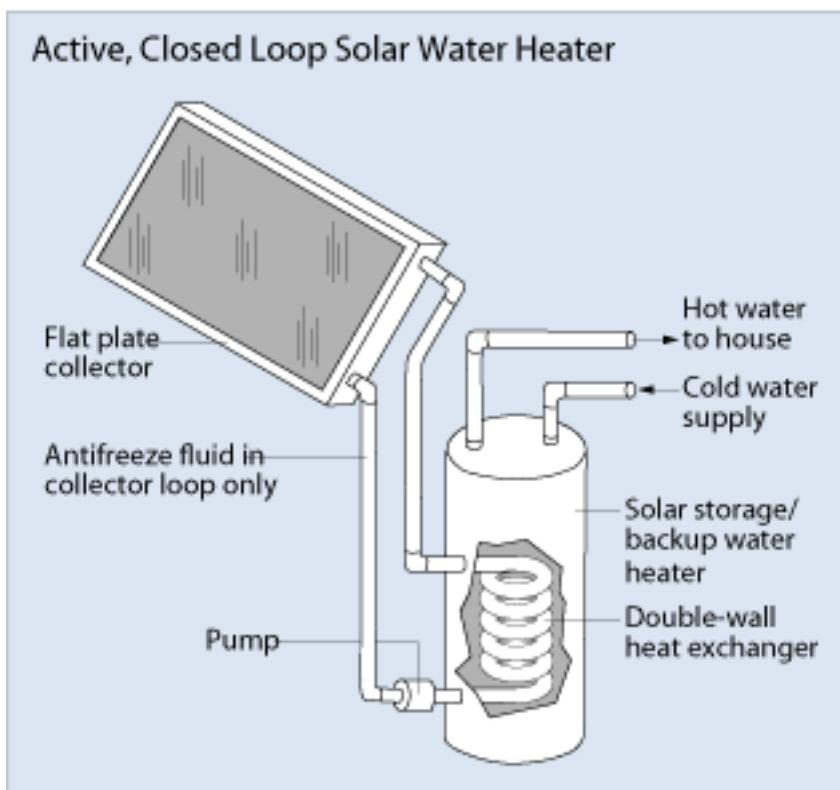
The Commonwealth of Massachusetts offers a variety of financial and tax incentives to help encourage more home owners, businesses and governments to install solar energy systems—namely solar photovoltaic (PV) electric systems and solar thermal hot water heating systems. With the help of these incentives, Massachusetts since 2008 has boosted installed solar electricity capacity to more than 400 megawatts (MW) statewide (enough to power about 38,000 homes under typical conditions) and thousands of building hot water heating systems, which can provide up to 80 percent of a building's hot water needs.



Massachusetts Solar “Carve-Out” Program and Solar Renewable Energy Certificates (SRECs) –

The Commonwealth is creating incentives for solar PV systems through a market-based incentive program to “carve out” a portion of Massachusetts’ electricity market for solar PV. An initial statewide carve-out goal of 400 MW of new solar PV power was reached in 2013, and so in 2014 a new goal of 1,600 MW of new solar PV was set for the year 2020.

The solar carve-out program is driven by an innovative market-based financial product called solar renewable energy certificates, or SRECs. Solar energy system owners receive one SREC from the Commonwealth for each megawatt of solar energy that their system generates. SRECs can then be sold or traded with utilities and other energy system owners. The larger the system, the more SRECs received. In Massachusetts, utility companies are motivated to buy SRECs because they must deliver a certain percentage of the energy (currently 4%) from “green” generate sources, such as solar. If they do not, a penalty is assessed. SRECs are currently valued at about \$280 to \$350 each, and their value fluctuates with the market. The revenue from SRECs is critical to offsetting the currently initial higher start-up costs of new solar energy systems to reduce their payback period, versus that of conventional technologies (though in the long term, solar energy systems still cost less to own and operate than purchasing power from the grid).



Net Metering

Net metering allows owners of renewable energy systems who feed power back into the electrical grid to receive credits on their bills for that power. The practical effect of net metering is dramatic: Any electric utility customer can become an electricity producer, too. They can earn money by generating more than they need when the sun is shining (i.e., “the meter is spinning backwards”) to offset the cost of drawing power from the grid at night or during cloudy times – in many cases, resulting in net annual electricity costs of \$0. In addition, utility customers without a power system of their own can buy green power from any supplier and also receive a credit for it on their bill.

Renewable Energy Income Tax Credit

Massachusetts also offers a tax credit for homeowners who install renewable energy systems. In the first year of installation, the homeowner is eligible for a 15% credit (up to \$1,000) on their state income tax for the net expenditure (including installation costs) for a solar PV system on a primary residence. If the tax credit amount is greater than the owner’s income tax liability, then the excess credit may be carried forward up to three years.

Commonwealth Solar II Program

This program of the Massachusetts Clean Energy Center is targeted to homeowners and businesses with solar PV systems that produce less than 15 kW of power. It provides a rebate of about 25 cents per installed watt, plus additional incentives. Project must be approved before installation through a non-competitive application process.

MORE INFORMATION ABOUT SOLAR ENERGY INCENTIVES

The solar energy needs and generating potential of every property are different. The solar energy market is new and evolving. Like the price of heating oil or natural gas, the price of solar energy can change based on market conditions. Therefore, it is important to get information ahead of time and work with an installer that you trust. Every home solar installation should begin with a free Mass Save energy assessment to understand how much power can be conserved—so unneeded solar panels are not purchased.

CALCULATE SOLAR SAVINGS AND FIND LOCAL SOLAR INSTALLERS:

<http://www.solar-massachusetts.org/>

DATABASE OF STATE INCENTIVES FOR RENEWABLES AND EFFICIENCY:

<http://www.dsireusa.org/solar/incentives/>

APPLICATION TO FOR MASSACHUSETTS SOLAR CARVE-OUT PROGRAM:

<http://www.mass.gov/eea/energy UTILITIES-clean-tech/renewable-energy/solar/rps-solar-carve-out/statement-of-qualification-application.html>



MASSACHUSETTS CLEAN ENERGY CENTER:
<http://www.masscec.com/>



MASSACHUSETTS SOLAR HOT WATER (THERMAL) PROGRAM:
<http://www.masscec.com/programs/commonwealth-solar-hot-water>

COMMONWEALTH SOLAR II PROGRAM
<http://www.masscec.com/solicitations/commonwealth-solar-ii-block-19>

FOR MORE INFORMATION, PLEASE CONTACT

Pioneer Valley Planning Commission

413-781-6045

60 Congress Street, Floor 1

Springfield, MA 01104-3419

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Sustainable Landscaping & Tree Preservation Standards

PURPOSE

To promote landscaping around development that is compatible with the existing environment, and which reduces greenhouse gas emissions by requiring a minimal use of energy and natural resources for growth and maintenance. To mitigate climate change through the planting of new trees, preservation of undeveloped space, and protection of larger and special interest trees in new developments.

Ordinances that protect trees and encourage the planting of native, non-invasive vegetation help to reduce greenhouse gasses and mitigate climate change. Native vegetation requires fewer resources to grow because water and nutrient needs are already in line with that provided by the surrounding weather and climate. Mature trees require less maintenance which also makes them more energy efficient. Additionally, trees and vegetation absorb carbon dioxide and reduce the urban heat island effect.



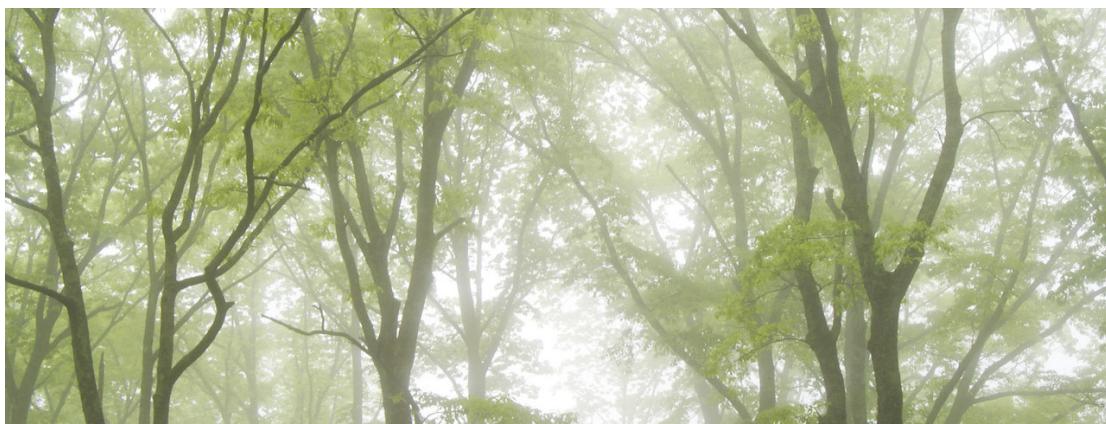
Due to time and cost factors, the construction of new development often involves the clearing and grading of land rather than retention of native vegetation and trees. This large-scale clearing and grading has several negative effects, including increased stormwater runoff, reduced water quality, threatened wildlife habitat, and a decline in aesthetic appeal. Additionally, even when newly planted trees grow to maturity, they often do not provide the same level of structural diversity and other benefits to wildlife that the original tree canopy offered.

HOW IT WORKS

An ordinance can be implemented to control large-scale clearing and grading of vegetation, as well as encourage protection of the tree canopy during the development process. Effective implementation of these regulations consists of several elements:

- » Defining and enacting an ordinance regarding the protection and types of trees and vegetation
- » Setting out a pre-development procedure for protecting trees and vegetation
- » Providing a means for compensatory mitigation where trees and vegetation cannot be retained on-site
- » Verifying and enforcing compliance with regulations after new developments are completed

Municipalities should consult with their staff and residents to determine what specific requirements are to be enacted. The language in the bylaw should carry provisions for the types of vegetation and trees allowed, the maximum number or percentage of trees and vegetation that can be removed, and construction best practices that can help reduce damage to existing trees during development. Other protections may also be put in place targeting trees that are determined to have special significance because of their history, age, or size.



Pre-development requirements establish what a potential developer must submit prior to receiving approval from the municipality. These requirements can be incorporated into the building permit application directly, or as a required accompanying application document such as a landscape protection plan or forest preservation plan. The application or plan should include information about the location of trees and vegetation on site, their size and species, and what actions will be undertaken to ensure their protection. Requiring that this information be provided before development begins allows the municipality to strictly enforce its regulations.

In cases where it is deemed impossible or inappropriate to keep trees and tree cover intact, or when it is deemed acceptable by the municipality to limit the protection of individual trees or tree cover, regulations should provide for an alternative method of compliance. Once again, these alternative methods can be incorporated into the existing building permit application or landscape protection plan, as set forth in the tree ordinance. Alternative compliance methods include planting trees on site after construction has concluded, placement of cash value for trees lost in a municipal account for street tree planting, or addition of other green initiatives that closely match the benefits of keeping the tree cover on site such as green roofing, green walls, rain gardens, or bio swales.

Once the building permit application or landscape protection plan has been approved through either direct compliance or mitigation methods, development can occur. To ensure compliance, post-development monitoring is necessary. The monitoring can incorporate the information collected prior to development and compare it to the post-development conditions existing on-site. Depending on the language in the bylaw, enforcement might be the responsibility of the zoning inspector, building inspector, or a tree board.

EXAMPLES OF WHERE STRATEGY HAS BEEN ADOPTED:

Carroll County, Maryland

The Carroll County Forest Conservation Ordinance requires Forest Stand Delineations and Forest Protection Plans to accompany development applications. In addition, the ordinance requires reforestation activities to accompany any type of land development. Except in agricultural districts, the ordinance specifically requires one acre of forest to be planted for every acre removed. The ordinance also designates priority areas for reforestation, (i.e., stream buffers, wildlife corridors, steep slopes, etc.).

Chapel Hill, North Carolina

The Chapel Hill Tree Protection Ordinance requires applicants for a development permit to submit a Landscape Protection Plan that details how preservation of specimen and rare trees and significant tree stands will occur. In addition, as part of its carbon reduction strategy, the Town is considering revisions to the ordinance that will require no net loss of



the canopy cover and an increase in trees proportional to population growth.

Amesbury, Massachusetts

The Amesbury Tree Ordinance sets out regulations concerning trees along streets and public parks. The ordinance includes a list of approved tree species, regulations for how much pruning and cutting can be performed, and provisions for the establishment of a three-person Town Tree Board. The Tree Board is charged with administering a written plan for the care and maintenance of public trees. The ordinance also includes requirements for a minimum of twenty foot spacing between smaller trees and forty foot spacing between large trees.

Lexington, Massachusetts

Lexington passed a tree ordinance in 2001 which included the creation of a tree committee and provisions requiring the protection of trees during major construction. The ordinance was followed up by additional tree and landscaping protection efforts through a Tree Management Manual, created in 2003 and updated in 2009. The Tree Management Manual covers a variety of topics directed towards the preservation and cultivation of healthy trees, including guidelines for the protection of trees during site construction, priority locations for where trees should be planted so that they will grow successfully, and maintenance specifications.



LINKS TO MODEL BYLAWS OR MORE INFORMATION

CARROLL COUNTY:

http://townhall.townofchapelhill.org/agendas/2007/02/12/4c/4c-2_lumo_excerpt.htm

CHAPEL HILL:

<http://ccgovernment.carr.org/ccg/resmgmt/forconsmanual.pdf>

AMESBURY:

<http://www.mass.gov/dcr/stewardship/forestry/urban/docs/ordames.pdf>

LEXINGTON TREE MANAGEMENT MANUAL:

<http://ci.lexington.ma.us/committees/tree/TreeManualRevised2009%20much%20smaller.pdf>

PVPC HAS DEVELOPED MODEL BYLAW “GREEN DEVELOPMENT PERFORMANCE STANDARDS” WHICH ADDRESS THE CONCEPT OF SUSTAINABLE LANDSCAPING AND TREE PRESERVATION:

http://www.pvpc.org/val_vision/html/toolbox/index.html

FOR MORE INFORMATION, PLEASE CONTACT

Pioneer Valley Planning Commission

413-781-6045

60 Congress Street, Floor 1

Springfield, MA 01104-3419

www.pvpc.org



Catalyst for Regional Progress

PVPC

PIONEER VALLEY
SUSTAINABILITY TOOLKIT

Strategies For Residents & Businesses

PURPOSE

Personal choices directly impact greenhouse gas emissions and the future quality of our environment. Every person has the power to change his or her behavior, reduce greenhouse gas emissions, and slow global climate change.

Simple Steps That Work

The choices we make as individuals can have a significant impact on greenhouse gas emissions. We can choose to conserve resources and reduce emissions—in our homes, in our cars, in the products we buy, etc. Many people think that climate-positive choices require sacrifices. The truth is they often result in a better quality of life and improved financial well-being. Improving the energy efficiency of your home helps slow climate change, but it also improves the comfort of your home and saves you money. Walking or biking whenever possible saves money on gas and improves your health. “Eco” driving habits reduce emissions but also increase the life of your vehicle. Purchasing local, organic foods stimulates your local economy, and the food often tastes better and is more nutritious.

Here are **eight simple steps** any citizen or business can take to reduce their environmental footprint and emissions of carbon dioxide, the leading greenhouse gas contributor to climate change.

1. Increase your energy efficiency
2. Use renewable energy
3. Use alternative transportation
4. Conserve resources
5. Be a smart consumer
6. Respect your environment
7. Get involved! Learn more!



PURPOSE

Improving the energy-efficiency of a home or business can reduce utility bills while also cutting greenhouse gas emissions.

WHAT TO DO:

Investing in the efficient energy performance of your home or business is one of the most important steps an individual can take to reduce his or her carbon footprint. Even if you are considering installing on-site renewable energy generation like solar panels, it is wise to make improvements in energy efficiency first. Every \$1 spent on energy efficiency, saves \$3 to \$5 in renewable energy system costs. Here are some measures you can take to increase your efficiency:

- a. Schedule an energy audit through the MassSave program: Massachusetts utilities check customers' homes, provide simple energy-saving devices such as Compact Fluorescent Lights (CFLs) for FREE, and offer suggestions on improving insulation and energy efficiency. These "retrofit" improvements include a wide range of installation and maintenance technologies such as: installing renewable energy systems, plugging air leaks in siding, using water saving technologies, planting environmental landscaping or switching to CFLs. There are economic incentives for residents and businesses that decide to make large retrofits to their properties. For example, the "HEAT" loan provides up to \$25,000 of subsidized loans to finance energy audit recommendations. Best of all, following those audit recommendations can lead to very large savings on your energy bill. Start today by scheduling an audit at www.MassSave.com or call them at 1-800-666-3303 for WMECO customers, 1-800-632-8300 for National Grid. Contact your municipal utility for more information if they are your provider.
- b. Replace regular light bulbs with compact fluorescent light bulbs (CFLs) or LED bulbs: New fluorescent bulbs use 60% less energy, last for 6 times longer and save approximately \$40 over their lifetime when compared to older incandescent bulbs. Handle them carefully, as they contain small amounts of mercury. Best of all, they are free with a MassSave audit! LED bulbs generally cost more upfront but last significantly longer than CFL lightbulbs. They typically last for more than 20 years!. A single Energy Star rated LED bulb can save \$135 in electricity costs over its lifetime and prevent 1,800 pounds of greenhouse gas emissions, the equivalent of keeping 850 pounds of coal from being burned.
- c. Keep an eye out for efficient appliances: Use the Energy Star rating system as a guide when purchasing electric equipment. It will show you how the product's energy consumption measures up with similar items. Eliminating or replacing



appliances such as old refrigerators commonly used for secondary storage with a new Energy Star rated refrigerator can go a long way to reduce your electric consumption. When shopping for these appliances, it is important to think long term instead of only looking at the up-front costs. Although they might cost more initially, these appliances easily pay for themselves through energy savings on your utility bill.

- d. Monitor your electricity consumption: “You can’t manage what you don’t measure” so Tracking tracking a home or business’ energy usage is the first step in moving toward efficiency. There are a number of appliances that help track where and how much electricity is used within a building. “Watt-hour meters” are small, inexpensive devices that are easily plugged into any home device. They measure how much electricity is being drawn by that particular appliance. There are also slightly more expensive “whole-house meters” that give data about every appliance in your house. Both types help pinpoint which appliances are drawing the most energy. With this information, it is easier to make small changes that reduce your utility bill.

Smart Meters are an innovative way to accurately measure energy consumption in your home or business. These meters take hourly measures of how much energy is used and transmit it wirelessly to the electric utility, providing them with data to help serve your needs better. Across the country, electric utilities are installing these systems for homeowners free of charge. These meters will allow the utility to bill more accurately and provide power at critical parts of the day. These appliances are a gateway to an increasingly more efficient national “Smart Grid” energy system that is the newest innovation within the energy delivery and usage system. WMECO and National Grid are currently installing these systems in communities across Massachusetts. Contact your local provider for more information about installing a smart meter in your home.



LEARN MORE:

MASS SAVE UTILITY PROGRAM AND AUDIT SCHEDULING:

www.MassSave.com

ABOUT ENERGY EFFICIENT APPLIANCES:

<http://www.nrdc.org/air/energy/fappl.asp>

ABOUT ENERGY STAR PRODUCTS:

http://www.energystar.gov/index.cfm?fuseaction=find_a_product.

ENERGY STAR FINANCIAL INCENTIVES:SAVER, US DEPARTMENT OF ENERGY'S HIGH QUALITY WEBSITE ABOUT ENERGY SAVINGS:

<http://www.energysavers.gov/financial/70020.html>

<http://energy.gov/energysaver/energy-saver>

ENERGY STAR HOME ENERGY PERFORMANCE AUDITS:

http://www.energystar.gov/index.cfm?c=home_improvement.hm_improvement_audits

REDUCING GREENHOUSE GAS EMISSIONS - STRATEGIES FOR HOMEOWNERS:

MASSACHUSETTS' RECOMMENDATIONS FOR REDUCING EMISSIONS

<http://www.mass.gov/eea/air-water-climate-change/climate-change/massachusetts-global-warming-solutions-act/how-can-i-reduce-my-emissions.html>

<http://www.mass.gov/dep/air/climate/reduce.htm#homeowners>

LEARN ABOUT SMART METERS:

<http://www.pge.com/myhome/customerservice/smartmeter/>



Catalyst for Regional Progress

PVPC

PIONEER VALLEY
SUSTAINABILITY TOOLKIT

PURPOSE

Using renewable energy in your home or small business is a personal investment towards energy independence, a cleaner environment and climate change mitigation.

WHAT TO DO:

Renewable energy has become more common and cost-efficient effective in recent years. Types of renewable energy systems include solar panels, wind turbines, and microhydropower and heating and cooling systems. Massachusetts consumers can also purchase renewable energy through a utility by signing up through various available programs. These investments and consumer choices can pay for themselves through energy savings, tax breaks, incentives and benefits to the environment.

Ways to use renewable energy include:

- a. Utility purchasing program: The easiest way to consume renewable energy without putting a new system on your property is through your utility's renewable energy purchasing program. Massachusetts utilities such as National Grid allow you to purchase part or all of your electricity from renewable sources through their "Green-Up" program. WMECO also encourages consumers to purchase from renewable energy sources by providing a growing list of renewable energy suppliers on their website. Customers must call the supplier to sign up, and then that company makes all necessary changes with WMECO. While the electricity you directly receive at your home or business will remain unchanged, the utility uses the money you pay for electricity towards paying renewable energy providers; therefore you "consume" renewable energy.
- b. Renewable heating and cooling: Solar water heaters and geothermal heating and cooling systems are two ways to use renewable energy without generating electricity in your home or business. Solar water heaters use the sun's heat to warm up water, reducing the use of oil or natural gas hot water heaters. Geothermal heating and cooling systems function by circulating air through tubes many meters underground. Consistent moderate temperatures within the ground cools the air in the summer and heats it during the winter while using substantially less fuel.
- c. Electric generation system: Homes and businesses can install electrical generation systems such as those that use solar panels or wind turbines. Massachusetts encourages businesses, municipalities and residents to invest in and install energy saving technologies. There is a multitude of ways for Massachusetts residents to benefit both economically and environmentally through state programs such as:



- i. Commonwealth Solar II Program: This program is designed for homeowners and businesses that produce less than 15 kW of solar energy. It provides rebates (minimum of \$.40/watt) to smaller projects to make them more appealing. The project must be approved before installation through a non-competitive application process. For example, a 5 kW system which could provide enough energy for a standard single family house would save the homeowner \$2,000 through this program alone.
- ii. Renewable Energy Income Tax Credit: Homeowners installing renewable energy systems are eligible for a 15% credit -- up to \$1,000 -- against the state income tax for the total installed cost of the system. If the credit amount is greater than a resident's income tax liability, the excess credit amount may be carried over and used within three years.
- iii. Net Metering : Many forms of distributed renewable energy do not produce a consistent amount of energy throughout the course of a day or year. For example, solar photovoltaic panels do not produce electricity at night. To provide consistent power, users of distributed renewable energy generators can either store excess power in batteries or connect to the electric grid. Typically, an electric company customer with a grid-tied renewable energy generator produces more electricity than they need at some times. This is "exported" to the grid. At other times, the renewable sources don't generate enough electricity and the customer "imports" energy from the grid. Net Metering enables customers to financially balance the value of the energy that they export with the cost of the energy they import. Renewable systems without any batteries. Within this program, owners sell extra daytime solar energy to the utility in exchange for a credit. These credits can be used at night or whenever you need extra electricity - no batteries necessary! At the end of the month, you are only billed for the "net" amount of electricity you drew from the grid. Leftover credits can be carried over to the next billing cycle.
- iv. Solar Carve-Out Program and SREC's: The Solar Carve-Out program is a market based incentive to support residential, commercial, public, and non profits in developing 400MW of solar photovoltaic across Massachusetts. The program requires utilities to purchase a quota of solar renewable energy every year. Utilities can take credit for a homeowner or business' solar energy system by purchasing that system's Solar Renewable Energy Credit (SREC). Currently the minimum mandated SREC price is \$285, but that could rise as high as \$600 due to market conditions. This subsidy amounts to approximately a \$5,000 to \$6,000 incentive to small-scale system owners.



When all of these renewable energy subsidies and incentives are added together, they accumulate to a lot of savings for the homeowner! One Massachusetts company estimates that an average sized system with decent southern exposure can produce 8,000 kWh of energy and reduce a \$200/month electric bill by half. This system costs approximately \$19,000, but would produce a savings of \$3,500 a year when all of incentives and credits listed above are used. Therefore, it would pay for itself within 5 ½ years while also in cash and even more in increased adding value to the home home value. In fact, it is estimated that in 20 years, this system will have paid back the homeowner \$100,000 in addition to the monumental significant environmental benefits.

LEARN MORE:

DATABASE OF STATE INCENTIVES FOR RENEWABLES AND EFFICIENCY:

<http://www.dsireusa.org>

MASSACHUSETTS CLEAN ENERGY CENTER:

<http://www.masscec.com/>

SOLAR HOT WATER:

<http://energy.gov/energysaver/articles/solar-water-heaters>

http://www.energysavers.gov/your_home/water_heating/index.cfm/mytopic=12850

GEOTHERMAL HEAT PUMPS:

<http://energy.gov/energysaver/articles/geothermal-heat-pumps>

http://www.energysavers.gov/your_home/space_heating_cooling/index.cfm/mytopic=12640

NATIONAL GRID “GREEN UP” PROGRAM:

http://www.nationalgridus.com/masselectric/business/energychoice/3_renewable.asp



PURPOSE

Private automobiles are the most common form of transportation within the Pioneer Valley. Automobiles are also one of the largest contributors to greenhouse gas emissions and other air pollutants that cause climate change and reduce air quality. By following “eco friendly” driving practices, a driver can reduce pollution, save money by using less fuel, and increase the useful life of their vehicle.

WHAT TO DO:

Lighten Your Load:

Remove unnecessary items from your vehicle. Every extra 100 pounds in or on the vehicle could reduce your miles per gallon (mpg) by up to 2%. Remove unused roof, ski, and bike racks and when possible try not to carry items on your roof or on a trailer as they increase aerodynamic drag and fuel use.

Keep Your Cool;

It's a Breeze: Roll down windows and use the flow through air vents when first getting into a hot car and generally when driving under 40 miles per hour (mph). Above 40 mph, air conditioning is more fuel efficient than open windows. Use the “recycle inside air” feature that reuses the cooled air inside the car and so doesn't take as much gas to run. Try to park in the shade or use a window heat reflector.

Use the Highest Gear Possible:

Use the highest gear, or overdrive, on highways if your car has this feature. This practice requires less power while reducing fuel consumption, emissions, and engine wear.

Drive the Posted Speed Limit or the Minimum Allowed:

Vehicle fuel consumption increases about 5% for every 5 mph driven above 60 mph. Overall savings in fuel costs from slower driving can range from 7% to 23%.

Avoid Rapid Starts & Stops and Maintain a Constant Speed:

Quick starts and hard stops can increase fuel use by up to 40% but reduce travel time by only 4%. Instead, accelerate gradually and coast up to stops where not prohibited. Conserve momentum; a steady speed often helps avoid red lights and keeps cars moving more efficiently. By driving sensibly, an individual can save 5% to 33% in city driving costs. The MassPike FAST LANE transponder will let you sail through road, tunnel, and bridge toll plazas in 12 Eastern states. High occupancy vehicle (HOV) lanes save time, fuel and hassle.



Avoid idling:

Idling gets zero mpg. Do not idle or race your engine to warm it up; the engine will warm up quicker when you are driving. If you need to idle, shift to neutral, so the engine is not working against your brake and consuming more fuel.

Optimize vehicle trips:

Schedule travel so that multiple tasks can be accomplished in one trip.

Read your Vehicle Owner's Manual & Follow the Recommended Maintenance Schedule:

Change engine oil with correct grade oil (1-2% mpg benefit), replace your clogged air filter (up to 10% mpg benefit), and tune your engine (4% average mpg benefit). Practicing routine maintenance on your car helps it last longer and run more efficiently.

Check Your Tire Pressure Monthly:

An estimated 25% of all vehicles are running on under inflated tires. Tire pressures change an average of 1 pound per square inch (psi), a common unit of pressure, for every 10°F change in air temperature and can deflate naturally up to 1.5 psi per month. Proper tire pressure is safer, extends tire life, reduces risk of a flat tire, and can improve mpg by up to 3%. You can purchase a tire pressure gauge for accurate readings, and check tire pressure when tires are cold (when not driven for at least 3 hours or for less than 1.5 miles).

Consider Purchasing Fuel-Efficient Tires:

“Lower rolling resistance” tires that can improve mileage are now available. Tire traction and handling characteristics for your car should be checked when considering these tires.

Tighten Your Fuel Tank Cap:

A loose, damaged, or missing fuel tank cap can cost you as much as 30 gallons of fuel a year. Unsecure or missing fuel caps can also lead to fuel contamination and engine malfunctions that can be costly.

Learn More:

MASSACHUSETTS GAS SAVING TIPS:

<http://www.eot.state.ma.us/gastips/> Learn to raise your fuel economy

FROM AN ONLINE COMMUNITY:

<http://www.cleanmpg.com/>



PURPOSE

Using alternative transportation such as biking, walking, vanpools or busses has many benefits. They include increased energy efficiency, reduced air pollution, money savings in automobile costs and individual health benefits.

WHAT TO DO:

- a. Bike or walk for short errands: According to the Alliance for Biking and Walking, 40% of all US trips generated in 2009 were shorter than two miles, yet 87% of those trips were made by car. It is recommended that adults get about 30 minutes of exercise per day, such as walking or biking. So the next time you only need to travel a mile or two, try biking or walking to save on gas and burn some calories instead! If you are a business owner, providing showers for those who bike to work provides incentives to continue biking.
- b. Use mass transit – The Pioneer Valley Transit Authority (PVTA) provides bus services as well as disabled and elderly services in the Pioneer Valley. Rides cost \$1.25 or less for the elderly and children. Taking the bus is much more cost and fuel efficient than driving alone in a car. The bus is also a good choice for longer trips. Other bus systems operate throughout the entire country and though it may take a little longer, taking the bus is almost always cheaper than flying and the climate impact is significantly less.
- c. Use carpools and vanpools: Carpoolers can save money on fuel, insurance, and car maintenance. The ability to use high occupancy vehicle (HOV) lanes often reduces commuter time spent in traffic. When they are not behind the wheel, carpoolers can read, nap, or chat, which is shown to reduce stress and improve health. Fewer cars on the road also means less air pollutants and less greenhouse gas emissions.
- d. Register with NuRides: Get rewards when you walk, bike, telecommute, carpool, vanpool, take a train, bus, or even work a compressed week. When you record trips with NuRide, it tallies the CO₂ you save and gives you points that are redeemable for real discounts at major national and local stores. There are currently 66,000 members and growing!
- e. Consider transit opportunities when deciding where you live and work: Living near your work, shopping, food stores, schools, and transportation systems saves time, money and pollution. Denser, multiuse development generally provides communities with less congestion, better accessibility to necessities and an increased sense of community.
- f. Use a car share program when you need an automobile: Choosing not to own a car is a viable option for people who live close to public transportation, but



sometimes it is necessary to drive just for a few hours or a day. “Car sharing” programs are incredibly easy and affordable. A frequent user of one car share program can report an average monthly savings of \$500 over owning a car. Car shares can be more affordable and friendly than taxis and can get you to destinations that public transportation sometimes can’t. They also help the commuters and the environment—each car share vehicle by taking takes an estimated 15 privately personally- owned vehicles off of the road. For the infrequent driver, car shares can be the perfect solution.

- g. Allow employees to telecommute: Telecommuters are people who occasionally work from home and are connected to a business through various communication systems. This system can offer fuller employment by allowing parents or retirees a chance to work from home. It also reduces traffic congestion, energy use and greenhouse gases. For companies, it requires a different management style, but offers many benefits such as less sick days taken by employees, increased accountability for work and reduced overhead costs. Successful telework operations can save up to \$20,000 per employee per year.

LEARN MORE:

MASSRIDES REWARDS FOR COMMUTING ALTERNATIVES:

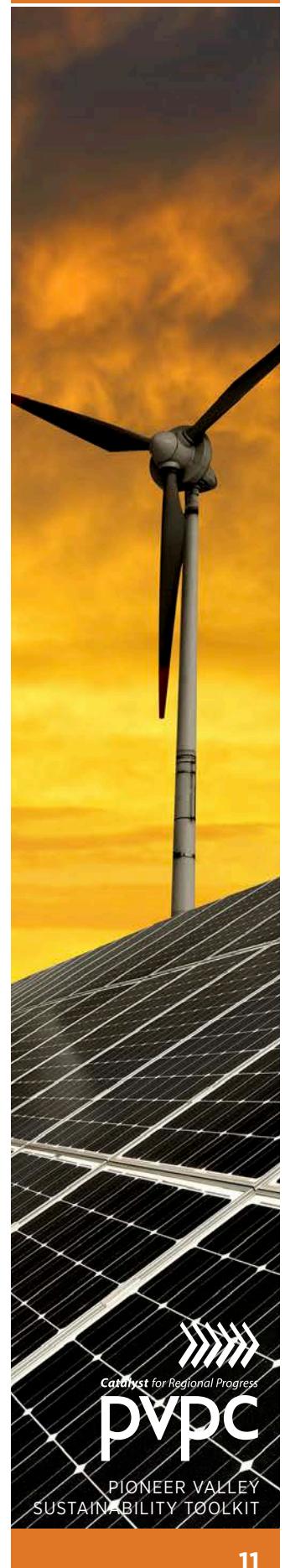
www.commute.com

NURIDE BENEFITS:

www.nuride.com

PIONEER VALLEY TRANSIT AUTHORITY:

www.pvta.com



PURPOSE

Conserving resources is a simple way to use less energy, reduce food and packaging waste in landfills, prevent water pollution and decrease fossil fuel consumption.

WHAT TO DO:

Understanding where waste occurs is the first step in conserving resources. Water, electricity, oil, and gas can all be wasted without a home or business owner's knowledge. Give these tips a try for a month and compare your energy usage. You will be surprised how much money and energy you save!

a. Use less water:

- i. Try installing a low-flow showerhead and low-flow toilets, or place a displacement object in your toilet's tank to reduce the water used with each flush.
- ii. Wash clothes in cold or warm water instead of hot. This can save 850 pounds of carbon dioxide savings from entering the atmosphere each year.
- iii. In your garden, plant vegetation that doesn't require a lot of water. Locally found vegetation is a great choice because it is used to surviving with your climate and water availability.
- iv. Shut off the faucet while you brush your teeth.
- v. If you own a pet, wash them outside where the waste water can be used to water the lawn.

b. Be aware of phantom loads: 5-10% of American energy use is a result of electronic devices using electricity while they are off or in standby mode.

Even if some appliances are powered off, they can still draw power and cost you money! To reduce this "phantom load", unplug appliances you don't use frequently, and put those you do on a power strip or "smart" strip (image on right). That way, you can turn them off easily at night or when you don't need them. For businesses, make sure computers are completely off at the end of the day.

c. Insulate your water heater: Wrap an insulation blanket around your water heater to save 10% of energy used by this appliance. While you're at it, set the unit's thermostat to no higher than 120 degrees Fahrenheit. Any temperature higher than this is a waste of energy.

d. Adjust your thermostat: Buttoning up instead of raising the heat can have significant money savings, since heating and cooling account for half of all energy use at home. Set your thermostat 2 degrees Fahrenheit lower in winter



and 2 degrees higher in summer.

- e. Recycle: Reuse products as much as possible, and when it's time to dispose of them – recycle! Most products – cell phones, clothing, batteries, light bulbs, computers, other large appliances and even paint can be responsibly recycled. Many programs take electronics for free and some even pay you for your used electronics! Earth911.com provides lists of local recycling centers for all products, making it easy to find a place to dispose of your unwanted items.
- f. Practice cooking and ordering the right amount of food: Approximately 11.2% of all trash thrown in landfills in America is wasted food. Combined it is enough food to feed the 1 billion hungry people on the planet! This waste depletes natural resources, raises the cost of food and contributes to pollution. Practice cooking the right amount and not wasting any food. Compost leftover food and use it to fertilize your garden. The environment and your pocket will thank you.

LEARN MORE:

FIND RECYCLING CENTERS:

<http://earth911.com/>

HOW TO MEASURE ACCURATE PORTIONS:

http://www.lovefoodhatewaste.com/perfect_portions

LEARN ABOUT RECYCLING FROM THE MASS DEP:

<http://www.mass.gov/dep/recycle/reduce/recyclin.htm>



PURPOSE

As a consumer, you have the power to “vote with your wallet”. Purchasing eco-friendly products has a direct impact on what and how consumer products are produced. When buying goods, understanding how it is made and what it contains can protect your health and the health of the environment.

WHAT TO DO:

- a. Avoid products with excessive packaging: Avoiding products with extra Styrofoam, cardboard or plastic wrap can reduce the amount of trash you need to recycle or throw away by 10%.
- b. Bring your own shopping bag: Choosing between paper and plastic at the grocery store is usually a lose-lose situation. In an average year, a grocery store uses 86,000 trees in paper bags. Although plastic can be recycled, in reality less than 3% of all bags get to the recycling plant. Keep reusable shopping bags in your purse or car. Many stores have incentive programs for shoppers who bring their own bags. You can save a little money while saving trees!
- c. Buy local food: Purchasing in season, organic or locally grown foods can be healthier for you, your local economy and the environment. In today's globalized food market the average product travels 1,200 miles from farm to shelf. Fossil fuels are wasted in the transportation of these items. By purchasing organic food from local vendors, you keep money within the community which benefits everyone in the long run by boosting the economy, decreasing pollution and reducing chemicals used in conventional food production.
- d. Explore close to home: Air travel is more popular than ever and fuel prices have made it increasingly expensive. Try taking a bus or train and explore the regions near where you live. If it is necessary to fly, offset the carbon released by flying through a carbon offset program.
- e. Purchase more efficient vehicle: When replacing your car, choose a more fuel-efficient vehicle. If you are in the market for a new or used car, buy the most fuel-efficient one that will meet your family's needs. Miles per Gallon (mpg) ratings for all new cars can be found at: www.fueleconomy.gov. No matter what size vehicle you need, you can save a lot of gas by choosing one of the models with the best mileage ratings. For example, if gas costs \$3 a gallon and you drive 15,000 miles a year, you could save \$1,300 a year by buying a 26 mpg mid-size car rather than a 15 mpg sports utility vehicle (SUV).

LEARN MORE:

WHAT IS LOCAL FOOD?:

<http://www.sustainabletable.org/issues/eatlocal/>

HOW TO OFFSET YOUR CARBON FOOTPRINT:

<http://www.carbonfund.org/>



PURPOSE

A The health of the environment largely impacts human health. Planting gardens and trees, reducing chemical waste and picking up trash are easy ways to keep your community beautiful and clean for this and future generations to come.

WHAT TO DO:

- a. Plant trees: Trees are the earth's air filters. Areas with more trees see increased economic, social and environmental benefits. According to the Massachusetts Department of Conservation and Recreation, these benefits include decreased energy costs due to shading as well as improved air quality for residents. Vegetation provides a sense of place as well as community valuation. More trees are shown to increase revenue from tourism from fall foliage viewing, as well as raise property values and revenue through taxes by 7-10%. Moreover, plantings can reduce storm water runoff and decrease the likelihood of flooding. Fruit and nut bearing trees can provide food to communities while beautifying the city streets.
- b. Re-use Gray Waters: Gray water is any wash water used inside the home (excluding toilets) as well as collected rain water. These sources account for 50-80% of residential "waste" water that usually either runs off into rivers or is directed to a waste water treatment plant. This water is safe to use for other purposes such as toilet flushing, or landscape irrigation. A grey water system collects this water and passes it through an advanced filtration system. Once filtered, it is reused by pumping it into your garden or lawn or directly into the bathroom where it can be used to flush toilets. Increasing gray water usage lowers fresh water use, reduces strain on septic tanks or treatments plants and reclaims nutrients lost in the water. These measures reduce storm water and waste water volumes and lower the chance of flooding within these systems. Moreover, installing a gray water system is incredibly safe – there has never been a case of gray water illness of 22 million users in the US.
- c. Reduce chemical use: Harmful chemicals are around us every day, but we often don't realize their health effects. Use environmentally- sensitive chemicals to clean your house such as those with the "Green Seal" third party standard rating. Time-tested products such as baking soda and vinegar are safe and inexpensive ways to clean your home. Be careful to not to put spill oils and or chemicals into onto the streets because they end up polluting rivers and streams. Consider organic fertilizing fertilizers rather than chemical fertilizing fertilizers and eliminate pesticide use on your lawn. It is much healthier for your lawn, your family and even your pets, who have a greater exposure risk to chemicals.

LEARN MORE:

EPA FACTSHEETS ABOUT COMMON HOUSEHOLD CHEMICALS:
<http://www.epa.gov/chemfact/>



PURPOSE

Knowledge is empowering! Continue your education about ways to fight climate change and help others learn about their environment as well.

WHAT TO DO:

- a. Calculate your carbon footprint: It's hard to change if you don't know where to start. Calculate your personal or household impact on climate change by using the Nature Conservancy Carbon Footprint Calculator at: <http://www.nature.org/greenliving/carboncalculator/>. Find out how your home electricity use and transportation choices affect air quality and global climate change with the EPA Power Profiler found at: <http://www.epa.gov/cleanenergy/energy-and-you/how-clean.html>.
- b. Attend town meetings: Make yourself heard in your local community. Voice concerns about environmental problems and offer solutions to mitigating climate change on a local level such as implementing recommendations found in this toolkit.
- c. Educate yourself and others about energy efficiency: Teach your children, family and friends about the importance of protecting our environment. The world we create now has all the air, water and food we and our children will consume for generations to come. Do your part in protecting it and helping others learn how to as well.
- d. Get the word out about MassSave.com: Tell your neighbors about the free energy audit that Massachusetts utilities offer. They might want to know that they can get renewable energy too!
- e. Share this Toolkit with others: Email, call or use social media to tell others about how much you saved by making simple changes. By encouraging others to modify behaviors, larger change is possible!
- f. Visit www.SustainableKnowledgeCorridor.org for more information on sustainability and learn about the projects that are happening right here in the Pioneer Valley to make our communities more sustainable.

FOR MORE INFORMATION, PLEASE CONTACT

Pioneer Valley Planning Commission
413-781-6045

60 Congress Street, Floor 1
Springfield, MA 01104-3419

www.pvpc.org



Tax Incentives Solar & Clean Energy

PURPOSE

To encourage the wider and more rapid purchase and installation of clean energy generation and energy conservation measures by providing income tax credits to individuals and businesses.

THE BASICS

Many states now offer credits to reduce state income and business taxes that help offset the initial costs of purchasing and installing clean energy generation equipment and energy conservation measures. This credit functions as a subsidy that helps shorten the “payback” period for the start-up cost of clean energy equipment. Consumers begin to realize the savings over conventional energy systems sooner—often within three to five years, and sometimes immediately.

CLEAN ENERGY TAX INCENTIVES IN MASSACHUSETTS

The Massachusetts Residential Renewable Energy Income Tax Credit offers a 15% credit, up to \$1,000, off a person’s state income tax if they buy and/or install a renewable energy system for their primary residence (renters are eligible, too). Products that are eligible for this credit include solar hot water, high efficiency heat pumps, solar photovoltaic (PV) and wind-energy systems. Energy efficiency measures for new and retrofitted buildings are also eligible, including insulation, air sealing, window replacement and other measures to save energy.

For example, a person who has extra insulation blown into their attic and walls for a typical cost of \$2,000 would see their state income tax bill reduced by \$300 (15% of \$2,000). If a person purchases and installs a rooftop solar PV system (which can cost between \$15,000 and \$30,000), he or she would receive the maximum tax credit of \$1,000. If the person’s tax credit is greater than their total tax bill for the year the system is installed, then the extra savings can be carried forward and spread out for up to three years.



Businesses have an additional benefit available to them: Massachusetts law (M.G.L. Chapter 63, Section 38H) exempts 100% of any “solar or wind powered climatic control unit and any solar or wind powered water heating unit” or any other unit or system powered by solar or wind from corporate excise tax for the length of the system’s depreciation period. Corporations that install qualifying solar or wind units can exempt the value of the unit from the overall property valuation used to assess the corporate excise tax.

FEDERAL CLEAN ENERGY TAX INCENTIVES

The U.S. government also offers tax credits or deductions for individuals and businesses that invest in renewable energy or energy efficiency. Individuals can receive up to \$500 in federal income tax credits for “Energy Star” certified energy efficient equipment, including biomass stoves, HVAC, insulation, roofs, water heaters, windows and doors, geothermal heat pumps, small wind turbines, and solar energy systems. And both individuals and businesses can earn up to a 30% tax credit on renewable energy generation equipment purchases, such as solar panels, heat pumps and wind turbines.



LINKS TO MORE INFORMATION

MASSACHUSETTS RESIDENTIAL CREDITS:

<http://www.mass.gov/legis/laws/mgl/62-6.htm>

MASSACHUSETTS CORPORATE CREDITS:

<http://www.mass.gov/legis/laws/mgl/63-38h.htm>

FEDERAL INCENTIVES FOR CLEAN ENERGY:

www.dsireusa.org



FOR MORE INFORMATION, PLEASE CONTACT

Pioneer Valley Planning Commission

413-781-6045

60 Congress Street, Floor 1

Springfield, MA 01104-3419

www.pvpc.org



Catalyst for Regional Progress
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SUSTAINABILITY TOOLKIT

Traffic Signals

PURPOSE

To reduce energy use and municipal utility bills by replacing inefficient traffic signals with very efficient Light Emitting Diode (LED) lighting.

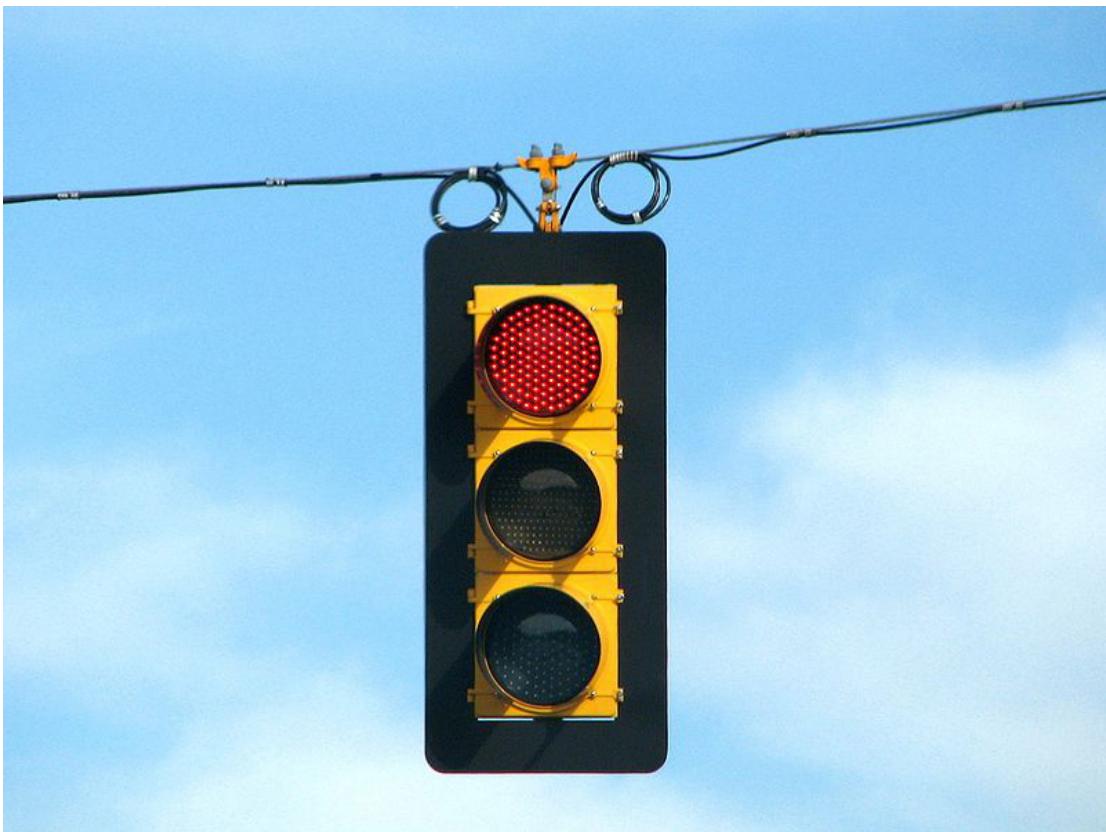
HOW IT WORKS

New LED traffic signals consume 80 to 90 percent less energy and last up to six to eight times longer than traditional incandescent signals. Initial purchase cost for LEDs are much higher than incandescent, fluorescent, compact fluorescent, or other electric light sources. However, monetary savings come in the form of lower utility bill and saved labor for replacement and maintenance of traditional incandescent signals. How to pay for this? Options include grants (see below) and incremental purchases as light replacements are needed.

EXAMPLES OF WHERE STRATEGY HAS BEEN ADOPTED

Easthampton, MA decided to replace over 400 street lights with LED high-efficiency street lights in 2011 to conserve energy as well as save money on annual maintenance and operating costs. The City estimated that the LED streetlights would save the city an estimated \$23,700 in energy bills and \$13,000 in maintenance costs each year. Easthampton was the first municipality in western Massachusetts to use the Green Communities Grant to create a large-scale installation of LED street lighting. The Mayor of Easthampton noted that the LED bulbs not only are more energy efficient but they also cause less light pollution and will last 10 to 15 years longer. The total cost of this project was \$223,000 of which all but \$300 was covered by grant funding from the Massachusetts Green Communities Program (\$170,000) and from the Western Massachusetts Electric Company (\$52,700).





Weymouth, MA is among the many communities statewide that recently changed its traffic signals to LED lighting. The town's Economic Development Planner estimates that the switch to LED will reduce energy use by 85 percent and maintenance by 50 percent. Weymouth also received grant funding through the Green Communities Program.

LINKS TO MORE INFORMATION

CITY OF EASTHAMPTON, MA, DEPARTMENT OF PUBLIC WORKS
<http://www.easthampton.org/>

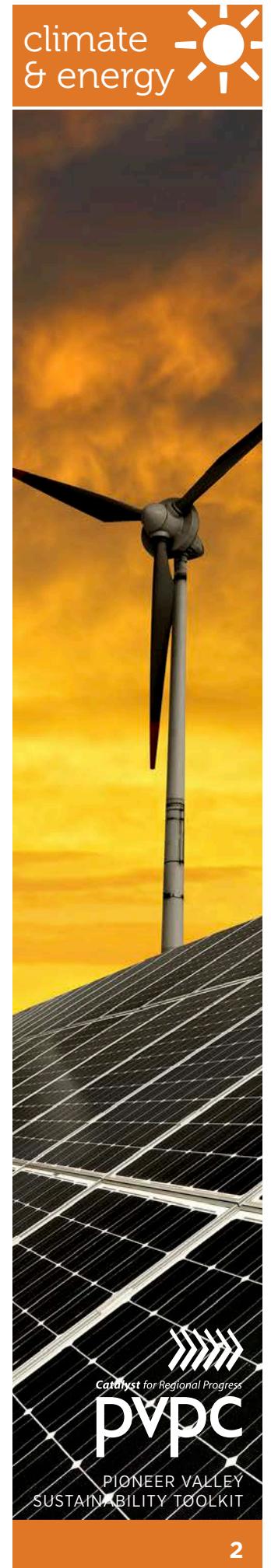
MASSACHUSETTS GREEN COMMUNITIES PROGRAM:
<http://www.mass.gov/?pageID=eoeeasubtopic&L=3&L0=Home&L1=Energy%2C+Utilities+%26+Clean+Technologies&L2=Green+Communities&sid=Eoeaa>

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Pioneer Valley Planning Commission
413-781-6045

60 Congress Street, Floor 1
Springfield, MA 01104-3419

www.pvpc.org



Transfer of Development Rights For GHG Reduction

PURPOSE

To provide bonus densities for developers in and around existing town and city centers, requiring in exchange, that the development include transit, bicycle and pedestrian amenities, as well as on-site workforce housing. Increased density reduces vehicle miles travelled, resulting in reduced greenhouse gas emissions.

HOW IT WORKS

Transfer of Development Rights (TDR) is a planning tool that can protect important habitats and ecosystems while promoting economic growth and denser development in less sensitive areas.

Most TDR programs designate a “Sending Area” and a “Receiving Area” with established boundaries. Sending Areas can include the community’s priority areas for land protection, such as farmlands, river corridors, water supply areas and wildlife habitat areas. Receiving Areas can include areas designated by the community to receive higher density development, such as areas in and around city/town centers, designated

SENDING



RECEIVING



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growth centers, areas served by existing infrastructure/transit and brownfields ready for redevelopment. The TDR program enables landowners in the sending area to sell development rights to landowners or developers in the receiving area.

The TDR process uses a Special Permit from the Planning Board for all TDR transactions. Applicants are developers of land in “Receiving Areas” seeking additional density or reduced lot size, parking, or height requirements. Applicants must identify a willing seller of development rights in the “Sending Area”. They must file development plans for both the Sending Area and Receiving Area parcels affected. The plans must illustrate the lots to be transferred from the Sending Area, and the lots to be created or increased density or reduced parking proposed in the Receiving Area. The Planning Board reviews the Special Permit application and approves or denies the application based on detailed criteria in the ordinance.

In some cases, TDR bylaws/ordinances are set up to enable developers to make cash payments, equal to the value of needed development rights, to the city/town in lieu of purchasing development rights from another landowner. This option simplifies the TDR process for developers and enables more participation in the program. Communities then use the cash payments to either buy development rights directly for priority parcels, or leverage state/federal funds to make larger purchases.

While TDR has been used extensively across the United States to preserve farmland, its use to reduce greenhouse gas emissions has little track record to date. The King County, Washington TDR program described below is one area where this approach is proposed.

EXAMPLES OF WHERE STRATEGY HAS BEEN ADOPTED

Pioneer Valley Region: The Pioneer Valley Planning Commission has a model TDR bylaw/ordinance that is unique in the United States, in that it enables the transfer of development rights from farmland to commercial or industrial properties. The PVPC model has been adopted, to date, in three communities: Hadley, Easthampton and Westfield, Massachusetts. In Hadley, the TDR bylaw has been particularly effective, and has resulted in the payment of \$338,000 in TDR cash payments to the town, which have in turn leveraged \$3.8 million in state/federal funds, and used to preserve nine farms and 239 acres of important farmland.

King County, Washington: This TDR program has been very effective and has preserved 92,000 acres of valuable open space and fish and wildlife habitat since 2000. The county has provided increased housing and infrastructure improvements in urban areas around the county's municipalities. The newly adopted 2008 King County Comprehensive Plan stipulates that TDRs are an option available to developers to mitigate for project-related



greenhouse gas (GHG) emissions that exceed a set threshold. That is, developers who use TDRs for increased density can also capture the GHG reducing benefits that TDRs create to meet emission reduction requirements. The requirements, which are forthcoming in 2009, will be in accordance with the State Environmental Policy Act. The idea is that TDRs carry with them a GHG reduction “value” which is based on the vehicle miles that will not be traveled as a result of restricting future development on rural TDR sending sites and relocating the development potential onto projects within existing urban areas – areas known to require less driving and commuting.

Montgomery County, Maryland: This TDR program was established to preserve farmland and curb sprawl originating from Washington D.C. The county has promoted development in areas that are readily served by public services such as transportation, wastewater, and public water supply. Montgomery County is touted as having one of the most successful TDR programs in the nation. Since its inception in 1980, the county has protected over 50,000 acres of farmland and open space. Montgomery County’s achievement is due in large part to its success in forming a market for development rights.

LINKS TO MODEL BYLAWS OR MORE INFORMATION

PIONEER VALLEY PLANNING COMMISSION:

http://www.pvpc.org/val_vision/html/toolbox/index.html

KING COUNTY, WASHINGTON TDR PROGRAM:

See <http://dnr.metrokc.gov/wlr/tdr/>.

MONTGOMERY COUNTY, MARYLAND PROGRAM:

www.mcparkandplanning.org/community/plan_areas/rural_area/planning_process/about_the_process/tdr.shtm

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60 Congress Street, Floor 1

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Transit Oriented Development

PURPOSE

To encourage a vibrant mix of residential, retail and commercial development and activities within walking distance of public transportation hubs.

Transit-oriented development (TOD) has been around a long time. Since the colonial era, our homes, shops, eating establishments, businesses, and work places have tended to be grouped within walking distance of ports, roads, trolley lines and train stations. It's only since the 1950s that an automobile-centric approach to development and zoning has largely reshaped communities and made it virtually impossible for many people to live without using a car for every trip they make.

But in recent years, many communities have begun to re-discover the benefits of encouraging the location of more people and jobs near transportation nodes. By returning to our TOD tradition in development patterns, communities are increasing the home values and walkability of their neighborhoods. TOD neighborhoods often include multifamily homes, parks, cafes, restaurants and civic gathering spaces, helping to strengthen the social and economic fabric of the community. These kinds of housing choices and neighborhoods are very appealing to retiring Baby Boomers (ages 55+) and the upcoming Millennials (ages 21 to 35), many of whom are seeking alternatives to single-family suburban homes on large lots.

Although most TOD districts are built around a transit or bus station, not every TOD district requires one. What is required are a walkable environment and multiple transportation options—especially public transit that is frequent, reliable, and easy to use.

HOW TOD ZONING WORKS

Transit-oriented development (TOD) zoning involves updates to local bylaws or ordinances to give property owners near transit stations greater flexibility to create homes and commercial buildings that are responsive to market demands and create high-quality pedestrian environments that encourage walking and transit use. This can be accomplished by: 1) establishing a new base zoning district with TOD-supporting performance standards; 2) adding TOD standards to an existing zoning base district; or 3) creating (or modifying an existing) overlay district to include TOD standards.



Geographically, a TOD district usually focuses on an area that is within a 5- to 10-minute walk of a transit station, usually $\frac{1}{4}$ to $\frac{1}{2}$ mile. Critical to the success of a TOD district are dimensional and density standards that foster more compact and fully built-out development near transit—and yet are compatible with the general existing neighborhood context. For example, a residential density of 25 to 40 units per acre (or more) is typically desirable in a downtown TOD neighborhood with high-capacity subways and/or light rail, but 12-15 units per acre may be more appropriate for a village TOD center served by commuter rail. Similarly, building heights, floor-area ratios, setbacks, lot coverage and other standards should encourage greater density while preserving what people like about the existing neighborhood.

TOD: A MIX OF USES

A diverse mix of residential and commercial uses is also desired in TOD districts. The optimal mix depends a lot on the station area context, whether it is a busy downtown area, a suburban location, or even small town center. Typical uses to consider include:

- » Multi-family homes (townhouses or apartment buildings with at least 3 units)
- » Live-work units (in which some occupants are also employed by a business also on the premises)
- » Grocery stores
- » Restaurants, cafes and bars

Uses that involve less efficient land use are not usually desirable in a TOD district and include auto sales, large parking lots (more than 50 spaces), mall-style shopping centers, drive-through restaurants and large-scale industry (though some types of manufacturing facilities may be a good fit).

Attractive street design is an important consideration for TOD zoning. Every attempt should be made to improve the safety and appeal of the pedestrian environment by minimizing curb cuts, requiring street-facing windows and entrances on buildings, specifying adequate sidewalk widths, allowing sidewalk café seating, locating parking at the side or rear of buildings, and using other complete streets techniques.

The issue of parking is critical to TOD districts. In many cases, a community will want to consider setting maximum parking limits in a TOD district, rather than minimum parking requirements for various types of uses. This approach relies more on developers' knowledge of parking needs for their respective uses, and can effectively reduce the amount of land that is devoted to autos. Strategies for meeting parking demand in TOD districts include shared parking among residential and commercial/office uses (residents park in the spaces during the evenings; shoppers or office workers during the day); credit for available underutilized on-street spaces; setting an appropriate price for



public parking; neighborhood parking permit systems; and developing public parking—especially parking garages.

ENGAGING STAKEHOLDERS

As with other zoning update process, it is important that community stakeholders participate. While TOD is actually a historically well-established development pattern, reaching community consensus about the best regulations and standards for TOD in your community can be challenging—especially because of the emphasis it places on pedestrian and transit access, versus the private automobile. It's also important to understand the existing and potential market for real estate development in the future district; can the market support the densities and uses needed to make TOD succeed? Therefore, it is strongly recommended that any TOD zoning effort include the participation of a local advisory committee. Before drafting the zoning code itself, it may be helpful to produce a station-area plan; this could be a brief vision statement about the goals for the new zoning district, or a more detailed document. Think not only about the land uses and transit services that exist in the area today, but those that are likely to be there 20 or 50 years in the future.

ASKING THE RIGHT QUESTIONS

Now is the time to ask questions about potential barriers to TOD development—and how to overcome them. Consider:

- » Are existing sewer, water and other infrastructure adequate for desired densities and uses?
- » If infrastructure upgrades are necessary, how they be funded? How long will they take?
- » Does the proposed TOD district currently have, or will have, reliable and frequent transit service? (“Frequent” usually means a minimum of every 15 minutes during peak travel hours). Is the service frequent enough to support targeted residential densities? (see below)
- » Is there enough parking for new growth? If not, where will it be provided and by who?
- » Are existing streets pedestrian-friendly? Is funding available for public streetscape improvements, and how long will it take to put them in place?
- » What park and streetscape improvements are needed to attract private investment?



Table 1: Residential Density Associated with Levels of Service

Service	Frequency	Coverage	Dwelling Units Per Acre
Commuter Rail	5 Minute Peak Headways ¹	100 – 150 mile corridor	12
Light Rail	5 Minute Peak Headways	20 – 100 mile corridor	9
Bus – Frequent Service	120 Buses per Day	½ mile between routes	15
Bus – Intermediate Service	40 Buses per Day	½ mile between routes	7
Bus – Minimum Service	20 Buses Per Day	½ mile between routes	4

Source: Pushkarev, B.S., Zupan, J.M. and R.S. Cumella. Urban Retail in America – An Exploration of Criteria for Fixed-Guideway Transit. Bloomington: Indiana University Press. 1982.

EXAMPLES OF TOD ZONING

TOD zoning has been implemented in numerous communities in Massachusetts and the United States, including Abington, MA; Ashland, MA; Concord, MA; Needham, MA; Woburn, MA; Atlanta, GA; Columbus, OH; Hartford, CT; Lower Merion, PA; and Seattle, WA.

LINKS TO MORE INFORMATION

CENTER FOR TRANSIT-ORIENTED DEVELOPMENT:

<http://www.ctod.org/>

HARTFORD CAPITOL REGION COUNCIL OF GOVERNMENTS TOD MIXED USE MODEL CODE:

http://www.sustainableknowledgecorridor.org/sites/default/files/CRCOG_MU_TOD_FINAL%204-4-2014.pdf

MASSACHUSETTS SMART GROWTH TOOLKIT MODEL TRANSIT-ORIENTED DEVELOPMENT OVERLAY DISTRICT BYLAW:

http://www.mass.gov/envir/smart_growth_toolkit/pages/mod-tod.html

FOR MORE INFORMATION, PLEASE CONTACT

Pioneer Valley Planning Commission

413-781-6045

60 Congress Street, Floor 1

Springfield, MA 01104-3419

www.pvpc.org



Tree Planting & Reforestration

PURPOSE

To promote the planting of trees and forests. Planting trees improves air quality and absorbs carbon from the atmosphere, provides shade, cooling and water management benefits as well as improving quality of life through beautiful public places and increased community valuation.

HOW IT WORKS

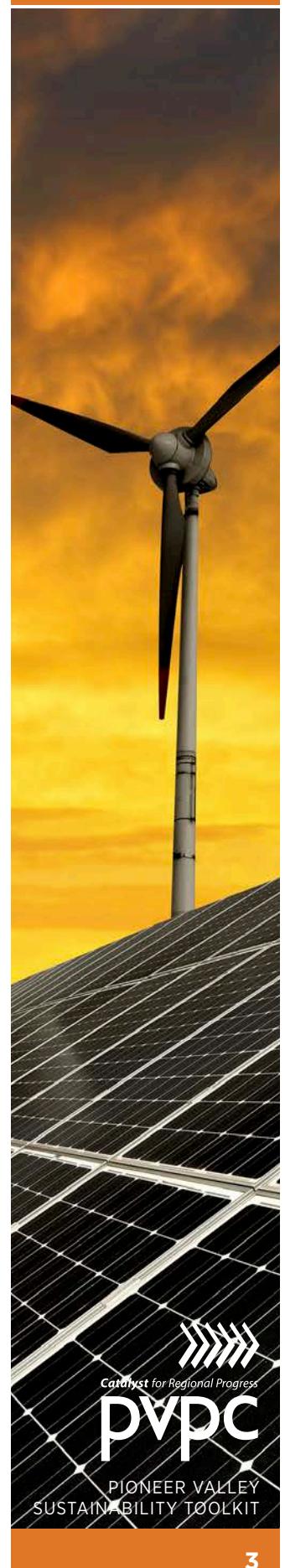
Planting trees and reforesting is a simple way to mitigate climate change while improving quality of life within a community. Areas with more trees see increased economic, social and environmental benefits. According to the Massachusetts Department of Conservation & Recreation, these benefits include decreased energy costs due to shading as well as improved air quality for residents. More trees are shown to increase revenue from tourism related to fall foliage viewing, as well as raise property values and revenue through taxes by 7-10%. Moreover, plantings can reduce storm water runoff and decrease the likelihood of flooding. Fruit and nut bearing trees can also provide food to communities while beautifying the city streets.



There are different ways to promote tree planting and reforestation in a community:

1. Urban and Community Forestry Program: Creating a municipal forestry department with management plans and professional staff is a strong way to encourage tree planting. These groups aim to improve their local environments and enhance livability of communities by protecting, growing and managing community trees and forests. The overall management plan should focus on caring for mature trees, creating planting programs and conserving the overall canopy as well as using the staff and funding to educate the public about the importance of trees in their community. Creating and following tree ordinances as well as adhering to state policies and regulations including Massachusetts General Law Chapter 87 is crucial for these bodies. Forestry programs within the government structure benefit by having city funding and enforcement agencies to support tree maintenance. Forestry programs can range from paid full time employees to a volunteer community tree board with a city budget.
2. Tree Ordinances: There are three basic types of tree ordinances:
 - a. **Planting and removal ordinances** regulate tree requirements within the public realm, such as the replacement of damaged or removed trees, plantings within new developments as well private tree removal if they pose a hazard to passing public.
 - b. **Tree protection ordinances** protect native or historic trees. These ordinances require a permit for pruning or removal of these trees.
 - c. **View ordinances** create rules for homeowner disputes about blocked views, shade or sunlight due to tree planting or removal. They set guidelines for planting trees that protect private property rights, scenic landscapes, and viewsheds. These ordinances attempt to provide a consistent process that homeowners must follow when planting or removing trees, so that conflicts can be minimized.
3. Volunteers and Non-Profit Organizations: Another way to promote tree planting is by engaging volunteer and citizens. Volunteer groups can help to secure outside funding to buy trees and supplies. Citizen members can encourage their neighbors to care for their current trees, and request new trees to be planted in beneficial locations. Success within these groups can be the catalyst for expanding tree planting within a community and eventually help in the creation of an Urban and Community Forestry Program.





4. Schools: Involving children in tree planting programs is a common way to get added help while teaching them about the importance of a healthy environment. Children have a lot to benefit from a shaded school and community environment and are willing to improve their town or city.

EXAMPLES OF WHERE STRATEGY HAS BEEN ADOPTED

Million Trees NYC

A public-private program that aims to plant one million trees in New York City. When complete, the effort will have increased the urban forest by 20%. To date, over 900,000 trees have been planted.

Boston Tree Party

The Boston Tree Party is an Urban Agriculture project run by a non-profit organization with the collaboration of organizations, institutions and groups across Boston. Their main goal is to support the planting of heirloom apple trees throughout the city. Communities request to be “Tree Delegations” – groups that work together to plant the trees in their communities and commit to the future care of their environment. Various companies throughout the city donated all supplies and helped organize the launch of the project.

Casey Trees, Washington D.C.

Casey Trees is a non-profit organization established in the nation’s capitol to restore the tree canopy. Their education coordinator helps schools make a treescape plan and implements the planting at the school. Casey Trees holds a rally for students, teaching them about the importance of planting trees and the varieties that will be planted. Then, the students get to plant these trees with the help of the Casey Trees employees. Programs such Casey Trees and the Boston Tree Party are located throughout the country. They help utilize youth volunteers while educating at the same time.

City of Cambridge Tree Planting

The Cambridge Urban Forestry Department uses a variety of tools to make tree planting successful in their city. Their website outlines exactly how to request a tree be planted on the sidewalk, or within a property. Their department handles the actual planting, but citizen volunteers are a crucial aspect of their department. Neighborhoods are asked to water newly planted trees, and people are asked to attend public hearings about new plantings and maintenance. They have programs for children to be involved in tree care.

Tree City USA

Throughout the country, communities have become members of Tree City USA, an organization that formally recognizes a town or cities commitment to planting, protecting and managing community forestry projects. It is a partnership of The Arbor Day Foundation, the USDA Forest Service and the National Association of State Foresters. There are 3,400 communities involved throughout the country - 89 in Massachusetts. Many of these communities are within the Pioneer Valley - including Amherst, Chicopee, Longmeadow, Springfield and Westfield. Receiving this recognition bestows a positive image on the community and enhances town pride, while letting citizens actively participate in their urban forestry program. Communities must apply to become a Tree City USA member, and meet certain criteria established by the program. Criteria include having a party legally responsible for the care of and responsibility of the community's trees. The tree board can be an entire department, or a volunteer tree board. A tree ordinance must designate the establishment of a tree board or forestry department and give this body the responsibility for writing and implementing an annual community forestry work plan. The tree ordinance provides rules for planting, maintaining and removing trees. The third criterion is a \$2 per capita budget for the program, which many municipalities often already spend in maintenance. The goal is to use these funds in preventative care instead. The final criterion is that the community must participate in an Arbor Day Celebration, a fun event for the community.

Universities

The University of Arizona has thousands of olive trees flanking its roads and sidewalks. They recently conducted a study of their benefits and found that the trees reduced heating cost by \$18,230 per year, and intercepted over one million gallons of storm water. The University of California at Davis also has an abundance of olive trees. Instead of letting the olives drop to the ground, they collect and use them to create olive oil to sell for profit; making a once burdensome problem into a money making idea.



LINKS TO MORE INFORMATION

MILLION TREES NYC

<http://www.milliontreesnyc.org/html/home/home.shtml>

BOSTON TREE PARTY

www.bostontreeparty.org

CITY OF CAMBRIDGE TREE PLANTING PROGRAM

<http://www.cambridgema.gov/theworksourservices/urbanforestry/citystreeplantingprograms.aspx>

MASSACHUSETTS DCR URBAN AND COMMUNITY FORESTRY RESOURCES

<http://www.mass.gov/eea/agencies/dcr/conservation/forestry-and-fire-control/picks-and-shovels-urban-and-community-forestry-faqs-resources-fact-sheets.html>

<http://www.mass.gov/dcr/stewardship/forestry/urban/urbanFAQs.htm>

TREE CITY USA

<http://www.arborday.org/programs/treeCityUSA/index.cfm>

FOR MORE INFORMATION, PLEASE CONTACT

Pioneer Valley Planning Commission

413-781-6045

60 Congress Street, Floor 1

Springfield, MA 01104-3419

www.pvpc.org



Trip Reduction Plans



PURPOSE

To encourage the use of alternative modes of transportation for day to day travel by requiring plans for vehicle trip reduction as part of large-scale commercial or residential development proposals. Trip reduction directly reduces greenhouse gas emissions.

HOW IT WORKS

Reducing the number of trips one makes is a key element in reducing overall greenhouse gas emissions. Communities can require trip reduction plans for large-scale commercial or residential developments to reduce single-occupancy automobile travel through zoning regulations. A municipal trip reduction plan regulation typically requires that the applicant outline the methods the development will employ to reduce single-occupancy automobile travel. Common methods include:

- » Provision of an on-site bus stop shelter if development is along an existing transit route.
- » Installation of bike racks and provision of bike storage areas.
- » Rideshare matching through carpools or van pools.
- » On-site postings of public transit schedules.
- » Financial incentives for commuters such as: free or discounted transit fares, travel reimbursement policies that reimburse bicycle or transit mileage for business trips, and Parking ‘Cash Out’ payments equivalent to the subsidy that employees receive for parking spaces in lots or garages at or near the place of employment.

- » Financial disincentives for commuters who drive alone such as elimination or reduction of parking subsidies for employees.
- » Alternative scheduling opportunities that allows for flextime, compressed work weeks, and working from home.

An effective municipal Trip Reduction Plan policy should be supported by an overall municipal Transportation Demand Management (TDM) that encourages more efficient travel patterns while taking into account local and regional travel patterns and socioeconomic conditions. A TDM program is a comprehensive set of policies to reduce travel demand, specifically that of single occupancy private vehicles. A TDM program may include bicycle and pedestrian amenities, subsidized transit costs, transit infrastructure, ridesharing programs and other measures.

EXAMPLES WHERE STRATEGY HAS BEEN IMPLEMENTED

CITY OF NORTHAMPTON, PROJECTS REQUIRING SITE PLAN APPROVAL AS MAJOR PROJECTS
<http://www.ecode360.com/?custId=NO2226>

TOWN OF HADLEY, COMMERCIAL DEVELOPMENT & PERFORMANCE STANDARDS BYLAW HERE

CITY OF EASTHAMPTON, COMMERCIAL DEVELOPMENT PERFORMANCE STANDARDS
<http://www.easthampton.org/downloads/ZONING008102010.pdf>

LINKS TO MORE INFORMATION

VICTORIA TRANSPORT POLICY GROUP, ONLINE TRANSPORTATION DEMAND MANAGEMENT ENCYCLOPEDIA.
<http://www.vtpi.org/tdm/tdm9.htm>

THE NATIONAL CENTER FOR TRANSIT RESEARCH'S NATIONAL TDM AND TELEWORK CLEARINGHOUSE
<http://www.nctr.usf.edu/clearinghouse/tro.htm>

MASSRIDES PROGRAM
<http://www.commute.com/>

MASSBIKE
<http://www.massbike.org/aboutus/pioneer-valley-chapter/>

FOR MORE INFORMATION, PLEASE CONTACT

Pioneer Valley Planning Commission
 413-781-6045

60 Congress Street, Floor 1
 Springfield, MA 01104-3419
www.pvpc.org



Address Climate Action Goals In Regional Transportation Planning

PURPOSE

To include consideration of goals for reducing greenhouse gas emissions (GHG) and climate action in regional transportation plans and transportation project selection. This will encourage expenditures of federal and state transportation funding for projects which will help to reduce vehicle miles traveled (VMT) and greenhouse gas emissions.

HOW IT WORKS

Metropolitan Planning Organizations and Regional Planning Agencies can significantly affect how public transportation funds are spent, and how transportation projects affect carbon emissions. Here are some examples:

1. Include Climate Goals in Regional Transportation Plans

GHG and VMT reduction targets can be included in regional transportation plans, which are blueprints to guide investments in the region's transportation system.

2. Quantification of GHG Impacts in Transportation Plans

Some metropolitan regions are now creating GHG inventories, and are taking steps to quantify the GHG emissions of transportation projects within their Regional Transportation Plans (RTPs). This can be done with sophisticated models or simple Vehicle Miles Travelled (VMT) multipliers applied the outputs of the travel demand model.

3. Regional GHG Inventories and Reduction Targets

Creating a regional GHG inventory with reduction targets is an important first



step in addressing GHG emissions from regional transportation projects. There are no standard tools yet for this task, and regions are trying a variety of approaches. Two regions, Philadelphia and Washington, are currently engaged in this process, with EPA assistance.

4. Redirect Transportation Funds from Road Expansion to Transit and Bike/Pedestrian Facilities

Metropolitan Planning Organizations (MPOs) can shift investments away from road expansion toward transit, bicycling and walking facilities.

5. Calculation of Emissions from Specific Projects

Some MPOs have begun calculating GHG emissions from specific highway and transit projects, as part of evaluating projects for funding.

6. Adding GHG Criteria for Evaluating Transportation Improvement Plan Projects

Regions currently use a variety of criteria for reviewing and ranking transportation projects to be placed on the Transportation Improvement Plan or TIP. Regions could add new criteria to this evaluation, by evaluating GHG emissions from individual projects and including these criteria in their rankings.

7. Alternative RTP Investment Packages

Regions can calculate and evaluate the GHG emissions from Regional Transportation Plan alternative investment packages. This is different from the traditional approach to RTPs, where only a single proposed package is evaluated. The San Francisco region is currently using this approach (see below).

EXAMPLES OF WHERE STRATEGY HAS BEEN ADOPTED

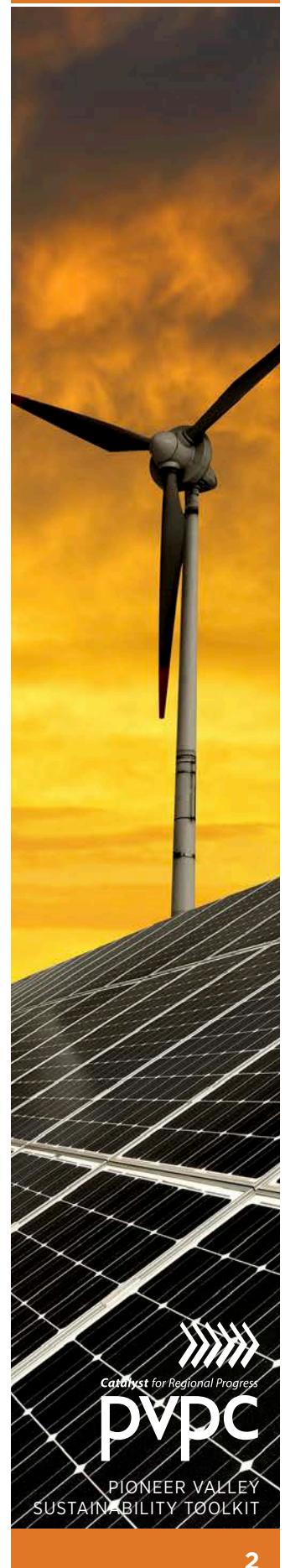
Quantification of GHG Impacts in Transportation Plans

The EPA's MOVES model is the recommended tool for GHG analysis. The MOVES model develops on-road energy consumption and emissions estimates based on speed and vehicle power output. The MOVES model has already been used by several State and local agencies for GHG analyses.

Metropolitan Transportation Commission, San Francisco

The Metropolitan Transportation Commission (MTC), the MPO for the San Francisco Bay Area, adopted performance targets for GHG emissions in its Regional Transportation Plan. Targets are to reduce CO₂ emissions 40% below 1990 levels by 2035, and to reduce VMT per capita by 10 percent by 2035. Proposed packages of investments are being analyzed for their ability to meet these targets, including:

- » freeway investment with modest efficiency improvements,



- » a high-occupancy toll (HOT) network with expanded express bus service,
 - » an expansion of rail transit,
 - » a comprehensive road-pricing policy, and
 - » a land-use strategy based on smart growth principles.
- » Puget Sound Regional Council

The Puget Sound Regional Council, the MPO for the Seattle area, is using the U.S. EPA's Motor Vehicle Emission Simulator (MOVES) model to do a regional level analysis of GHG emissions in its Long Range Transportation Plan.

Missoula County

Missoula County, Montana undertook a regional land use and transportation visioning exercise called Envision Missoula. Missoula plans to provide a basic estimate of CO₂ emissions from the plan, probably using a simple VMT multiplier applied to the outputs of the travel demand model.

Capital District Transportation Committee

Albany's Capital District Transportation Committee (CDTC) incorporates analysis of GHG emissions in its planning process in two ways. First, CDTC applies a "full cost analysis," including analysis of global warming costs, to major system decisions. Full cost analysis is also used to evaluate candidate TIP projects. Second, the agency estimates the GHG emissions resulting from its LRTP. New York requires MPOs to estimate the energy and CO₂ emissions from their long range transportation plans and also from their transportation improvement programs.

CDTC has taken an innovative approach to the use of their travel demand modeling. The region has been proactive in encouraging concentrated, sustainable development patterns, and has a focused interest in establishing linkages between policy setting and environmental responsibility. CDTC forecast a 15% reduction in trip generation per household based on a range of policies and principles, such as urban reinvestment, transit oriented development, and bus rapid transit.

Sacramento Area Council of Governments

SACOG is working with several modeling applications to analyze the impacts of different transportation and land use scenarios. SacSim, the agency's new travel demand forecasting model, is the first regional model to use individual land parcels as the level of input data.



REGIONAL GHG INVENTORIES AND REDUCTION TARGETS

Delaware Valley Regional Planning Commission, Philadelphia PA

The Delaware Valley Regional Planning Commission (DVRPC) is in the process of preparing a regional GHG inventory for 2005, as well as projected GHG emissions for 2035. Among the sources to be included in this inventory are emissions from on-road transportation, which are expected to be one of the region's primary sources of GHG emissions. CO₂, CH₄, and N₂O emissions will be calculated using modeled estimates of annual average daily vehicle miles traveled (VMT) by vehicle type and road class. Per mile emissions factors will be applied to the VMT totals. The VMT estimates will be generated by DVRPC's regional transportation model, which is used to support the region's long range transportation planning and air quality conformity analysis process. The regional transportation model will also be used to generate GHG emissions estimates for various transportation plan alternatives.

Metropolitan Washington Council of Governments, Washington DC

A regional inventory of CO₂ emissions from transportation was developed by the Metropolitan Washington Council of Governments (MWCOG). CO₂ estimates from mobile sources were calculated using data and forecasts of vehicle miles of travel (VMT) by vehicle type from the region's air quality conformity analysis. Emission factors were modeled using the software MOBILE6 and travel patterns in the COG region on network and local roadways. Emissions forecasts to 2030 were developed using the MOBILE6 model and the COG's travel forecasting model.

MWCOG has proposed two GHG emission reduction scenarios for development. The first scenario reflects the current Long Range Transportation Plan. The second scenario examines how new long-term goals could be achieved using various combinations of interventions, including improved fuel efficiency, alternative fuels, and reducing vehicle travel. The first step in developing this scenario is identifying a CO₂ emission reduction goal. The COG's Climate Change Steering Committee has discussed a proposed regional goal of reducing overall regional CO₂ emissions by 70-80% below 2005 levels by 2050.

CALCULATION OF EMISSIONS FROM SPECIFIC PROJECTS

New York

The State's Energy Plan requires an energy and GHG analysis for MPO transportation plans and TIPs and for all regionally significant projects and other projects that may lead to large increases in vehicle miles traveled. The environmental documents for those proposed projects typically include an analysis of projected CO₂ emissions associated



with construction and operation of each alternative.

Massachusetts

Certain projects subject to the Massachusetts Environmental Policy Act are required to include a quantification of GHG emissions as well as consideration of measures to avoid, minimize or mitigate such emissions. Massachusetts also has GHG planning level requirements under its GreenDOT initiative

California

The California Coastal Conservancy has developed a methodology for calculating GHG emissions from specific projects, including construction emissions, lifecycle emissions, operational emissions, building energy use, transportation trip generation, and alteration of land use cover or vegetation.

Metropolitan Transportation Commission, San Francisco

The Metropolitan Transportation Commission, the MPO for the San Francisco Bay Area, is currently evaluating the CO₂ impacts of individual highway and transit projects. This analysis will feed into a performance comparison of projects.

LINKS TO MODEL BYLAWS OR MORE INFORMATION:

MASSACHUSETTS' GREENDOT PROGRAM:

<http://www.massdot.state.ma.us/GreenDOT.aspx>

DELAWARE VALLEY REGIONAL PLANNING COMMISSION GHG INVENTORY:

<http://www.dvpc.org/EnergyClimate/inventory.htm>

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Pioneer Valley Planning Commission

413-781-6045

60 Congress Street, Floor 1

Springfield, MA 01104-3419

www.pvpc.org



Catalyst for Regional Progress

PVPC

PIONEER VALLEY
SUSTAINABILITY TOOLKIT

Integrating Land Use And Transportation Strategies

PURPOSE

To help reduce green house gas emissions by aligning transportation plans with sustainable land use strategies through strategic targeting of federal and state funds for sustainable infrastructure/development projects.

HOW IT WORKS:

Long-range Regional Transportation Plans (RTPs) and Transportation Improvement Plans (TIPs) provide the most important opportunities for linkages with local and regional land use goals. These linkages can take the form of evaluation criteria for analyzing potential transportation investments, or targeting of transportation funds for sustainable development projects.

Transportation agencies can:

1. include land use goals as part of scoring criteria for transportation projects, and;
2. create specific funding programs for transportation projects that support community and land use goals, such as pedestrian or streetscape improvements, mixed-use infill, transit-oriented development and transit improvement projects.



EXAMPLES OF WHERE STRATEGY HAS BEEN ADOPTED:

1. Include land use goals as part of scoring criteria for transportation projects

Aligning Transportation with Land Use: Atlanta Regional Commission

In Georgia, the Atlanta Regional Commission has taken several steps to better align its long range transportation decision-making processes with local land use goals. For the 2025 Regional Transportation Plan, ARC's scoring criteria for federal STP and CMAQ funds included support of local land use, which can provide a maximum of 15 points out of 135 total.

ARC has also created a \$350 million fund to help local agencies implement bicycle and pedestrian projects, streetscape projects, transit access improvements, and parking coordination efforts. To help local jurisdictions develop projects for this fund program, ARC has also provided funding for planning under a separate grant program called the Livable Centers Initiative.

Supporting Sustainable Land Uses with Transportation: North Central Texas COG

NCTCOG's Mobility 2030 Plan is the Metropolitan Transportation Plan for the Dallas-Fort Worth area, which establishes sustainable development as the region's strategic approach to transportation planning, programming, and construction. Sustainable development leverages the land use/transportation relationship to improve mobility, enhance air quality, support economic growth, and ensure the financial stability of the transportation system. The plan recognizes four categories of sustainable development:

- » Strategic Urban Development
- » Integrated Land Use Planning/Urban Design
- » Transit-Oriented Development
- » Access Management

The NCTCOG's Sustainable Development Funding Program was created by its policy body, the Regional Transportation Council (RTC), to encourage public/private partnerships that positively enhance existing transportation system capacity, rail access, air quality concerns, and/or mixed land uses. By allocating transportation funds to land use projects promoting alternative transportation modes or reduced automobile use, NCTCOG and its regional partners are working to address escalating air quality, congestion, and quality of life issues.

The program is designed to encourage planning and foster growth and development in and around historic downtowns and Main Streets, infill areas, and along passenger rail



lines and at stations. Three Calls for Projects were conducted in 2001, 2006, and 2010 to fund Sustainable Infrastructure, Landbanking, and Planning projects.

Program goals include:

- » Respond to local initiatives for town centers, mixed use growth centers, transit oriented developments, infill and brownfield developments, and pedestrian-oriented developments;
- » Complement rail investments with coordinated investments in park-and-ride, bicycle and pedestrian facilities;
- » Reduce the growth in vehicle miles traveled per person;
- » Promote economic development throughout the region through public-private partnerships.

Staff review project applications for the following criteria:

- » the proposed land-use change;
- » the private/public partnership and commitment to the project;
- » the project's consistency with the Mobility 2025 Update;
- » the project's consistency with Regional Transportation Council (RTC) policy on sustainable development.

Sustainable Development projects of approximately \$124 million over the past decade have been selected for funding through the program, with additional local match contributions of \$31 million from local governments and the private sector. Most of the funding is provided by Regional Toll Revenues (RTR).

This program supports private sector investment in mixed/integrated land use, infill development, transit, and pedestrian-oriented development by providing dedicated planning assistance and designating transportation project investments to support those projects. NCTCOG works through local governments to identify potential Development Excellence partners, to support their participation in the process, and ultimately to select projects that will receive dedicated transportation support. The program focuses on "joint ventures", referring to the contributions from multiple stakeholders: in addition to the developer's investment and the transportation investments, selected projects receive local tax, zoning, and other regulatory support.

FOR MORE INFORMATION:

<http://www.nctcog.org/trans/sustdev/landuse/>



Denver (Colorado) MPO

The Denver Regional Council of Governments' (DRCOG) selection criteria for local projects in the 2005-2010 TIP include up to 16 points (out of 100) for various, specified local actions supporting the regional Metro Vision. Points are awarded for a variety of criteria including signing the regional Mile High Compact, protecting open space, approving infill and mixed use development plans, adopting zoning changes, completing major streetscape projects, and building multi-family housing.

Wilmington (Delaware) MPO

In the late 1990s, the Wilmington Area Planning Commission (WILMAPCO) designated "Transportation Investment Areas" in the Wilmington region, including Center, Community, Development, and Rural areas. The agency has used these areas in the screening of projects for the LRTP to ensure that projects are appropriate to their respective area. WILMAPCO reports that a primary application of the policy has been to identify urban centers in which pedestrian and bicycle facilities should be included along with roadway improvements. Contact: Heather Dunigan, Principal Planner (302-737-6205).

Maryland State agencies, including DOT

Since the late 1990s, the State of Maryland has used priority funding areas to set criteria for State investments, including transportation investments by the Maryland Department of Transportation (MDOT). Priority Funding Areas are locations where the State and local governments want to target their efforts to encourage and support economic development and new growth. The criteria have led to the removal of bypass projects from MDOT's capital funding program, multimodal improvements in urban areas, and the use of access control as a tool for locating development. Contact: Don Halligan, MDOT Transportation & Land Use Planning (410-865-1294).

Seattle (Washington) MPO

The Puget Sound Regional Council's (PSRC) 2002 Regional TIP Policy Framework includes project selection criteria for consistency with Vision 2020, a regional transportation and land use vision adopted in 1990 and updated in 1995. Candidate TIP projects receive points for supporting designated urban centers, manufacturing/industrial centers, and connecting corridors, with specific criteria including circulation/continuity, urban environment, mobility/accessibility, benefit to the center, and sustainability. See: Puget Sound Regional Council, "Regional Project Evaluation Criteria."

LINKS TO MODEL BYLAWS OR MORE INFORMATION:

FOR MORE INFORMATION ON THE ATLANTA REGIONAL COMMISSION:

<http://www.atlreg.com/transportationair/transportationair.html>



2. Create specific funding programs that support community- and land use- oriented transportation projects, such as pedestrian, streetscape, mixed-use infill, transit-oriented development and transit improvement projects

EXAMPLES:

San Francisco (California) MPO

Since 1998, the Metropolitan Transportation Commission's (MTC) Transportation for Livable Communities program has provided planning and capital improvement grants for town centers, public transit hubs, key streets and other improvements designed to foster community vitality. The Housing Incentive Program provides additional funding for streetscape, pedestrian, bicycle, and other infrastructure improvements for communities building housing within 1/3 mile of rapid transit stations. Between 1998 and 2003, the programs funded \$2.2 million in planning grants and over \$54 million in capital grants and housing incentives. Funding has come from Federal sources including STP, CMAQ, and Transportation Enhancements, as well as from the State Transportation Development Act. Contact: Evelyn Baker, MTC (510-464-7753).

Dallas (Texas) MPO

Through the Land Use-Transportation Joint Venture Program, the North Central Texas Council of Governments (NCTCOG) provided \$41 million in STP and CMAQ funds between 2002 and 2004 for 19 transportation improvements (such as pedestrian and bicycle improvements) supporting transit-oriented developments, mixed-use, urban developments, and infill developments. Federal funds were matched with local, private sector funds, local/city funds, tax increment financing district funds, and right-of-way land donations. Due to the success of the first call for projects, NCTCOG issued a second \$40 million Sustainable Development call in October 2005. In addition to transportation infrastructure improvements, funds are available for land banking and local sustainable development planning programs. NCTCOG reports that as a result of the first call for projects and in anticipation of the second call, many local governments have updated or changed their zoning to include classifications that will allow mixed-use sustainable development projects to be built by right. In addition, NCTCOG is "trading" local for federal dollars to streamline and quicken implementation of small infrastructure projects that support development. Contact: Alicia Hopkins, NCTCOG (817-608-2380).

Massachusetts Executive Office of Transportation

The 2004 Massachusetts' Transportation Bond Bill directed the Office for Commonwealth Development (OCD) to create a Transit Oriented Development Infrastructure and Housing Support Program, to be administered through the Executive Office of Transportation (EOT). The program is providing \$30 million in financial assistance to public agencies for pedestrian improvements, bicycle facilities, housing projects, and parking facilities in mixed use developments located within one-quarter mile of a transit station. EOT is



collaborating with the Department of Housing and Economic Development (DHED) on implementing the housing component of this program. To ensure that projects support TOD principles, OCD, in consultation with EOT and DHED, established specific evaluation criteria for each of the four project types. Contact: Jane Healey, OCD (617-573-1388).

California: MPOs assigned responsibility for reducing GHG emission from cars and light trucks

In December 2008, the California Air Resources Board (CARB) approved the Climate Change Scoping Plan, which contains the main strategies California will use to reduce GHG emissions. An essential component of the state Scoping Plan is reducing GHG emissions from transportation. In September 2008, Governor Schwarzenegger signed Senate Bill (SB) 375 which mandates an integrated, regional land use and transportation planning approach to reducing GHG emissions from cars and light trucks. Cars and light trucks generate about 31% of statewide GHG emissions. The law directs CARB to establish regional GHG reduction targets for cars and light trucks and assigns Metropolitan Planning Organizations (MPOs) throughout the state (the Association of Bay Area Governments and the Metropolitan Transportation Commission in the Bay Area) to develop plans for achieving those targets. Essentially, SB 375 is a mechanism for implementing the measure in the state's Scoping Plan related to reducing regional transportation-related GHG emissions. Through the SB 375 process local governments in the Bay Area (and in other regions) will have to work together to integrate development patterns and transportation networks in a way that achieves regional GHG reduction targets while also meeting housing needs, protecting greenspace, and addressing other regional planning objectives.



LINKS TO MODEL BYLAWS OR MORE INFORMATION:

SAN FRANCISCO METROPOLITAN TRANSPORTATION COMMISSION'S (MTC)
TRANSPORTATION FOR LIVABLE COMMUNITIES
http://www.mtc.ca.gov/planning/smart_growth/tlc/

MASSACHUSETTS TRANSIT ORIENTED DEVELOPMENT INFRASTRUCTURE AND
HOUSING SUPPORT PROGRAM
<http://www.reconnectingamerica.org/resource-center/browse-research/2006/transit-oriented-development-infrastructure-and-housing-support-program-guidelines/>

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Pioneer Valley Planning Commission

413-781-6045

60 Congress Street, Floor 1
Springfield, MA 01104-3419

www.pvpc.org



Regionalized Performance Contracting

PURPOSE

To reduce the upfront cost of pursuing energy efficiency measures in municipal buildings by pooling the demand of several municipalities into one regional service contract for capital improvements.

Energy use in municipally-owned buildings, such as administrative offices and schools, accounts for a significant percentage of municipal budgets. One way to accomplish significant energy efficiency improvements in public buildings at no incremental cost to the local public purse is to engage an energy service company (ESCO) through a performance contract.

HOW IT WORKS

Through a performance contract, an ESCO will identify and evaluate energy-saving opportunities and recommend improvements, such as new lighting technologies, boilers and chillers, energy management controls, to be paid for through monthly energy savings over several years. The ESCO will guarantee that savings meet or exceed annual payments to cover all project costs. To ensure savings, the ESCO offers staff training and long-term maintenance services. If savings don't materialize, the ESCO pays the difference, not the municipality.

However, ESCOs have drawn a line at undertaking performance contracts directly with smaller municipalities, because the savings from energy consumption is deemed too small to cover their costs. As a result, many municipally owned structures in smaller communities and regional school districts have a harder time accessing these services. But by pooling the energy demand from buildings in multiple municipalities, such as town centers and schools from neighboring towns, officials can increase their municipality's profile and make energy performance contracting viable to companies.



Town	Annual Savings
Belchertown	\$300,000
Easthampton	\$166,262
Granby	\$60,000
Hadley	\$60,000
Holyoke	\$360,000
Ludlow	\$120,000
Monson	\$120,000
Palmer	\$120,000
South Hadley	\$120,000
Southampton	\$60,000
Southwick	\$120,000
Wilbraham	\$120,000
TOTAL	\$1,726,262

EXAMPLES OF WHERE STRATEGY HAS BEEN ADOPTED

In 2008, the Franklin Regional Council of Governments (FRCOG) launched a regionalization effort for energy savings performance contracting that encompassed sixteen towns and three regional school districts. FRCOG was able to successfully pool municipal demand, launch a Request for Proposals on behalf of the municipalities, and contract an ESCO for the initial energy audits. Once the ESCO provided initial energy audits, each town had the ability to decide whether or not to contract the ESCO for the capital improvements and longer-term repayment of the improvements through energy savings.

Likewise, the Pioneer Valley Planning Commission (PVPC) launched a regional energy auditing and building efficiency services initiative in 2010, assisted by funding provided by the Massachusetts Legislature and administered by the Department of Housing and Community Development. PVPC pooled the energy demand of buildings in over a dozen towns and regional school districts and successfully procured an ESCO at a lower-than-market price. The participating communities were Belchertown, Easthampton, Granby, Hadley, Holyoke, Ludlow, Monson, Palmer, South Hadley, Southampton, Southwick, Wilbraham and Williamsburg. The school districts for Chesterfield-Goshen, Southwick-Tolland and Granville also participated in the pool to contract an ESCO. The total estimated savings

LINKS TO MODEL BYLAWS OR MORE INFORMATION

ENERGY SAVINGS COALITION:

<http://www.energyservicescoalition.org/resources/whatis.htm>

FRANKLIN COUNTY COUNCIL OF GOVERNMENTS (FRCOG) ENERGY SAVINGS PERFORMANCE-BASED CONTRACTING:

http://www.frcog.org/services/regional_services/svcs_energy.php

PIONEER VALLEY PLANNING COMMISSION (PVPC) REGIONAL ENERGY AUDITING AND BUILDING EFFICIENCY SERVICES:

http://www.pvpc.org/pressreleases/pr-jul-16-09_enaud.shtml

FOR MORE INFORMATION, PLEASE CONTACT

Pioneer Valley Planning Commission

413-781-6045

60 Congress Street, Floor 1
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www.pvpc.org



Conservation Zoning

PURPOSE

To promote responsible use of natural resources by preserving open space and ensuring that development has minimal adverse impact.

Conservation zoning protects public open space, natural wildlife habitats, and scenic areas. It also reduces stormwater runoff and erosion. The preservation of vegetation and trees reduces the quantity of greenhouse gas in the atmosphere. By preventing development in areas that are susceptible to flooding, conservation zoning also helps adapt to the increased rainfall that will occur from climate change.

The language and methods used to regulate development through zoning ordinances, such as restrictions on density and land use, are well suited for implementing conservationist principles.

Conservation zoning is the act of restricting development completely in an area , because it is in a floodplain, there is a risk of soil erosion, or there or because they considered environmentally sensitive water table, risk of soil erosion, or fragile ecosystem. The most common conservation zoning ordinances are floodplain bylaws.

HOW IT WORKS

Similar to other zoning districts, conservation zoning focuses primarily on the density and type of permitted uses. Examples of commonly permitted uses for conservation purposes include fishing, forestry, wildlife preserves, and single family detached homes. Density requirements may be based on the floor-area ratio or total lot area coverage. For example, model zoning guidelines for Lancaster County, Pennsylvania includes a requirement that 80% of each lot be pervious. The particular details of the conservation district will be based on a community's needs and context. For example, municipalities that have a large amount of farmland may enact an agricultural zoning district. Similarly, in areas with wetlands, the zoning will have the purpose of protecting waterbodies and their associated watersheds.

The language for a conservation district can be incorporated into the zoning ordinance either as a stand-alone district or an overlay, the latter placing an additional layer of regulations on top of an existing district. For both methods, the implementation of the conservation district or zoning will be based on the municipality's standard procedures. Conservation zoning may also be incorporated into a municipality's subdivision code, in



order to reduce the environmental resources consumed by large-scale developments. Subdivision regulations can promote the use of cluster development, in which all buildings and impervious area are concentrated in one portion of a development. This allows the remaining land to be left untouched and kept as public open space or wildlife habitat.

EXAMPLES OF COMMUNITY IMPLEMENTATION

Frederick County, Maryland

The County's zoning includes a resource conservation (RC) district, which allows for low intensity uses in areas of forests and steep terrain. The County also incorporates an agricultural district that allows the operation of farms and related light industrial uses, and a floodplain district which requires a permit for all development within it.

LINKS TO MODEL BYLAWS OR MORE INFORMATION

WHITE TOWNSHIP IN NEW JERSEY HAS A CLUSTER DEVELOPMENT ORDINANCE:
LANCASTER COUNTY, PENNSYLVANIA DEVELOPED MODEL CONSERVATION DISTRICT ZONING LANGUAGE, WHICH CAN BE FOUND AT:
<http://www.co.lancaster.pa.us/toolbox/cwp/view.asp?a=3&q=641973>

FOR MORE INFORMATION, PLEASE CONTACT

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Springfield, MA 01104-3419

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Energy Efficient Building Requirements

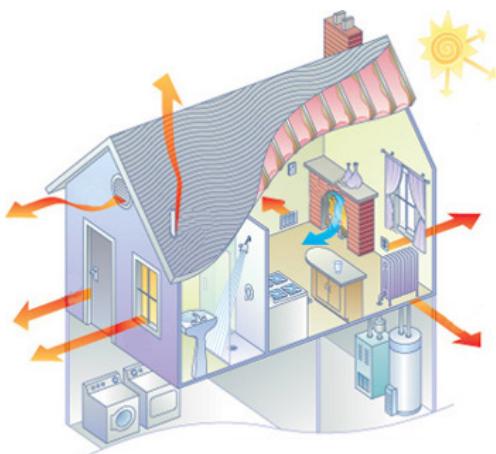
PURPOSE

To improve building energy efficiency for new and existing buildings in Massachusetts by locally adopting a building code which is a more energy efficient alternative to the state's Building Code.

There are many benefits associated with improving building energy efficiency. Residents, business owners, and municipal governments see energy savings and reduced energy bills. Energy efficient buildings consume less energy which helps to reduce greenhouse gas and environmental pollution. Increased energy efficiency also reduces dependence on foreign oil resources.

HOW IT WORKS

A Massachusetts municipality seeking to ensure that construction within its boundaries is designed and built above the energy efficiency requirements of the existing State Building Code (780 CMR) may elect to adopt a super-efficient building code known as the "Stretch Code" in place of the State's existing "base" Building Code. The term "stretch code" refers to the stretching of the existing Massachusetts State Building Code to cover more energy efficient measures. As of December, 2011, over one hundred municipalities had adopted the "Stretch Code" in Massachusetts.



Catalyst for Regional Progress

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PIONEER VALLEY
SUSTAINABILITY TOOLKIT

The “Stretch Code” requires all new residential, commercial and industrial construction to minimize, to the extent feasible, the life-cycle cost of the facility by utilizing energy efficiency, water conservation and other renewable or alternative energy technologies. The “Stretch Code” uses real-world testing to ensure residential energy savings, and energy modeling to ensure commercial energy savings. Performance testing is necessary because prescriptive codes do not guarantee good installation, air and water tightness, or that thermal insulation will be effective. Even the smallest air gaps can reduce the thermal resistance value of insulation by 50% or more.

Any town or city in the Commonwealth may adopt the “Stretch Code” by decision of its governing body following a public hearing. In a city, the governing body is the city manager and the city council, or the mayor and city council. In towns, the governing body is the Board of Selectmen. In order to be adopted, the “Stretch Code” must be first considered at an appropriate municipal public hearing, subject to the municipality’s existing public notice provisions.

Affordability

- » Training for building officials
- » Public education campaign
- » Municipal Public Hearing
- » Vote of Town Meeting, or Mayor and City Council

Timing of Adoption

- » Municipal vote can be at any time
- » Code change takes effect on January 1st or July 1st
- » Base & Stretch Code both in place for the first 6 months (concurrency period) during which builders can choose EITHER code.

Towns are advised to seek adoption of the Stretch Code as a general bylaw through a vote of Town Meeting. There can be no amendments to the bylaw/ordinance language in order for the bylaw / ordinance to be in effect. Municipalities that successfully adopted the “Stretch Code” found public outreach to the building community on the key requirements played an important role in its passage. A model article and bylaw as well as public outreach materials are provided in the links below.



LINKS TO MORE INFORMATION

FOR MORE INFORMATION ON THE STRETCH CODE, VISIT THE MASSACHUSETTS GREEN COMMUNITIES GRANT PROGRAM:

<http://www.mass.gov/eea/energy-utilities-clean-tech/green-communities/>

SAMPLE WARRANT ARTICLE

STRETCH CODE MODEL GENERAL BYLAW (CITY)

STRETCH CODE MODEL GENERAL BYLAW (TOWN)

STRETCH CODE REQUIREMENTS FACT SHEET

FOR MORE INFORMATION, PLEASE CONTACT

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60 Congress Street, Floor 1

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Solar Photovoltaic System Zoning

PURPOSE

To promote the production of clean, renewable power with solar energy systems while ensuring that they are properly sited, installed and maintained.

HOW IT WORKS

Photovoltaic (PV) systems use one or more panels to generate renewable energy by converting sunlight into electricity. PV Systems lower fossil fuel use and pollution, and increases energy independence.

These systems can be sized at different scales, from a few panels that aid a home's consumption to a utility-scale solar array meant to sell energy to electric utilities. While Massachusetts General Law Chapter 184, Section 23C states that municipalities cannot "forbid or unreasonably restrict" solar energy systems, cities and towns are free to create bylaws and ordinances that address environmental, design and safety standards to ensure PV systems are properly installed and sighted to avoid potentially negative impacts on neighbors.

In general, these municipal ordinances or bylaws are designed with standards that address different scales of PV installations, placing higher standards on large-scale, ground-mounted photovoltaic systems, since they have the potential to use a significant amount of land and therefore have a broader impact on the public. These bylaws cover issues such as: land clearing, landscaping, setbacks, lighting, signage, utility connections, emergency services, maintenance and decommissioning of the systems once it has reached the end of its useful life. Complying with these standards requires at a minimum Site Plan Approval and in some cases a Special Permit.

On the other hand, small-scale or building-mounted photovoltaic installations are often held to lower standards since their potential for public impacts is so low. These smaller systems, which are usually meant to provide electricity on-site rather than for the wholesale energy markets, are generally permitted as long as they comply with the building code and obtain a municipal building permit.



EXAMPLES OF WHERE STRATEGY HAS BEEN ADOPTED

Several Pioneer Valley municipalities, including Chesterfield, Easthampton, Holland, Holyoke, Monson, Middlefield and Palmer, and a handful of others throughout the state, have already adopted zoning ordinances or bylaws that allow photovoltaic systems in their jurisdiction.

The Massachusetts Green Communities Office, under the Department of Energy Resources, has developed a model bylaw for large-scale, ground-mounted solar photovoltaic systems. The bylaw allows these systems to be installed by-right as long as they meet the requirements it outlines and passes site plan review. The Town of Middlefield used this state model to allow large photovoltaic systems in their town, adding height limits, soil permeability and site shading requirements. Other towns, such as Chesterfield, Palmer, Monson and Holland have also used this state model to develop their own bylaws.

The Town of Hadley took a slightly different approach. The town's planning board worked on a bylaw that establishes clear guidelines for solar energy system permitting at all scales. The bylaw allows building integrated systems with only a building permit, allows small ground-mounted systems with planning board review, and requires a special permit for utility-scale installations.



LINKS TO MODEL BYLAWS OR MORE INFORMATION

U.S. DEPARTMENT OF ENERGY, DIVISION OF ENERGY EFFICIENCY AND RENEWABLE ENERGY

http://www.energysavers.gov/your_home/electricity/index.cfm/mytopic=10710

THE MASSACHUSETTS DEPARTMENT OF ENERGY RESOURCES HAS DEVELOPED A MODEL BYLAW FOR ALLOWING AS-OF-RIGHT USE OF LARGE-SCALE GROUND-MOUNTED SOLAR PHOTOVOLTAIC INSTALLATIONS. THIS MODEL CAN BE FOUND AT: <http://www.mass.gov/eea/docs/doer/green-communities/grant-program/model-solar-bylaw-rev-dec-2010.doc>

PALMER PHOTOVOLTAIC BYLAW:

http://www.townofpalmer.com/Pages/PalmerMA_TCOrdinances/Ordinance%202011-02%20Photovoltaic%20Ordinance?textPage=1

MASSACHUSETTS GREEN COMMUNITIES THAT HAVE ADOPTED BY-RIGHT RENEWABLE ENERGY BYLAWS:

<http://www.mass.gov/eea/docs/doer/green-communities/grant-program/adopted-as-of-right-siting-through-re-generation.pdf>

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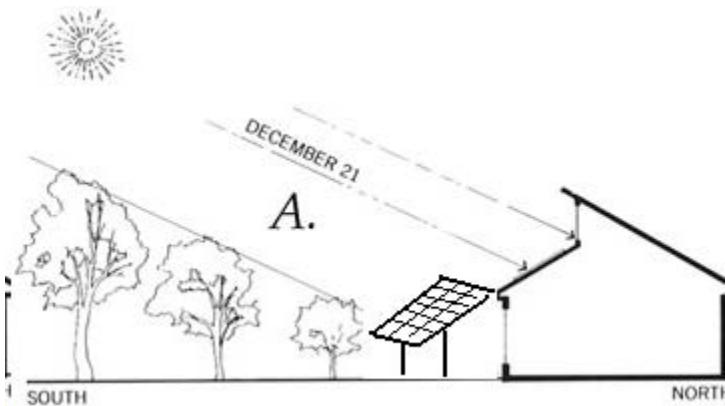
Solar Access Zoning

PURPOSE

To protect access to sunlight for all properties, and restrict shade due to structures and vegetation. Solar access zoning preserves the economic value of solar radiation falling on structures, investments in solar energy systems, and options for future uses of solar energy.

HOW IT WORKS

Solar access zoning preserves the economic value of solar radiation falling on structures, investments in solar energy systems, and options for future uses of solar energy. This is particularly important for the latter two; since their value is dependent on solar access and their installation require significant investment.



In Massachusetts, the state's Zoning Act, in Chapter 40A, Section 9B, provides that local zoning may protect solar access by regulation of the orientation of streets, lots and buildings, maximum building heights, minimum building setback requirements, limitations on vegetation, and other provisions. These height and setback requirements can be placed as a precondition for a permit by requiring a shadow analysis on the structure to be erected to make sure it does not block solar radiation on neighboring properties.



EXAMPLES OF WHERE STRATEGY HAS BEEN ADOPTED

In the Town of Cornwall, Connecticut, developers are “urged to consider solar access in the layout of features on the site plan” and are prohibited from locating buildings where they would cast shadows on the buildable part of an adjacent lot between the hours of 9 a.m. and 3 p.m. on December 21 of any year.

Boulder, Colorado protects solar access by delineating a 12 foot or 25 foot hypothetical “solar fence” on the property lines of the protected buildings. The ordinance is designed to protect access for a four hour period on December 21st. Under most circumstances, new structures are not allowed to shade adjacent lots to a greater extent than the applicable solar fence.

In Oregon, Eugene, Clackamas County and Ashland have adopted solar access zoning, which requires building setbacks to ensure that shadows are no greater than a specified maximum at property lines.

Ambitious jurisdictions can also protect solar access by requiring developers to consider solar access in entire subdivision lay outs. Already subdivisions in such widely disparate locations as Drake Landing, Alberta, and Davis, California, are being designed so that each lot receives maximum solar exposure. Fort Collins, Colorado, and Multnomah, Oregon have enacted regulations requiring that a specified percentage of lots in new subdivisions — 20 to 30 percent — must be oriented to take advantage of sunlight.

The City of Vancouver has developed and approved two passive solar design toolkits detailing ways to reduce energy use in new buildings, which are a major source of greenhouse gas emissions in Vancouver. The toolkits provide best practices for homes and larger buildings for passive design elements such as layout, orientation, insulation, landscaping and ventilation.



LINKS TO MODEL BYLAWS OR MORE INFORMATION

COMMUNITY SOLAR ACCESS INFORMATION FROM THE U.S. DEPARTMENT OF ENERGY. INCLUDES LINK TO A DOWNLOAD WITH EXAMPLES OF ADOPTED BYLAWS FROM AROUND THE COUNTRY.

http://www4.eere.energy.gov/solar/sunshot/resource_center/ask/question/question_6

A COMPREHENSIVE REVIEW OF SOLAR ACCESS LAW IN THE UNITED STATES:

<http://www.solarabcs.org/about/publications/reports/solar-access/>

FREQUENTLY ASKED QUESTIONS ABOUT PLANNING AND ZONING FOR SOLAR ACCESS, AMERICAN PLANNING ASSOCIATION

<https://www.planning.org/research/solar/faq.htm>

BOULDER, CO SOLAR ACCESS ORDINANCE:

http://www.smartcommunities.ncat.org/codes/boldera1_gb.shtml

CITY OF ASHLAND, OR SOLAR ACCESS ORDINANCE:

<http://www.ashland.or.us/Page.asp?NavID=2788>

CITY OF VANCOUVER PASSIVE DESIGN TOOLKIT:

<http://vancouver.ca/sustainability/documents/PassiveDesignToolKit.pdf>

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Pioneer Valley Planning Commission

413-781-6045

60 Congress Street, Floor 1

Springfield, MA 01104-3419

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Urban Forest Overlay Districts

PURPOSE

To mitigate climate change, reduce greenhouse gas, and absorb carbon dioxide through the use of zoning bylaws dedicated to creating a healthy tree canopy within an urban area.

Healthy urban forests have positive impacts on both the natural environment and human health. Trees absorb carbon dioxide and other pollutants, remove greenhouse gas, and improve air quality for nearby residents. Tree cover and the resulting shade limit the rise in temperature associated with urban heat island effect. Importantly, tree branches, leaves and root systems absorb rain water and thus limit the intensity and volume of stormwater runoff. This can have major watershed benefits, including reductions in particulate matter, nonpoint source pollution, and the temperature of water bodies. Full, healthy tree canopies also reduce noise and improve the natural beauty of an area.

In a variety of ways, the more trees there are in a community, the more beneficial those trees become. The root systems of multiple trees are able to more effectively stabilize soil from stormwater inundation. Wildlife is provided with a better habitat in which to live by having a continuous tree canopy. The aesthetics of a tree-lined road are more desirable than individual, spread-out trees. Finally, because greenhouse gas is being emitted at a high rate, the planting of many trees allows for much more effective mitigation.

Municipalities can protect and increase the number of trees to create urban forests through the use of zoning overlay districts. Overlays are incorporated into a zoning ordinance and place special land use regulations on top of existing zoning districts, such as requiring new development to include a certain number of trees. The requirements also often regulate permitted tree species, maintenance procedures, and the planting of other vegetation.

HOW IT WORKS

The first step in implementing an urban forest overlay district is to conduct a community tree inventory. The inventory will provide information about the number, type, and location of trees that already exist, as well as help inform the discussion about where the overlay district should be located. When conducted with the help of volunteers, the inventory can also be a way of facilitating community involvement.



After the inventory is complete, the results can be reviewed at a public meeting. This meeting can include a discussion and determination of specific areas in the community where more trees are needed. After these areas have been identified, the specific requirements of the overlay district can be discussed, which will help develop the language amended to the zoning code. The specific language for the zoning overlay district should include the following:

- » Purpose and intent of the overlay district
- » Defined boundaries of the district with identification of specific streets and lots
- » List of size and species of trees recommended or required as part of new development
- » Minimum number of trees required per specific lot area
- » Maximum and minimum spacing distances between trees
- » Amount or percentage of lot area that must be under tree canopy

The specific requirements for each of these items will depend on the particular context of the community. The resources and examples listed below can provide more information.

Important decision-makers to include in the discussion include the general public, the zoning board of appeals, planning board, planning department, and public works department. Once the specific requirements have been agreed upon and the language for the ordinance developed, it can be passed as an amendment to the zoning code, following the municipality's established procedures.

As an alternative to an urban forest overlay district, tree preservation and planting requirements can also be adopted in general ordinances and bylaws or in subdivision regulations. The Town of Granby, MA is an example of a community in which tree standards were incorporated into the subdivision regulations.

EXAMPLES OF COMMUNITY IMPLEMENTATION

Salem, Virginia

The purpose of the Salem Urban Forest Overlay District is to increase the quantity of trees present in new developments along seven designated corridors. New developments are required to have at least one tree per acre and at least one tree per 100 feet of street frontage. A list of specific trees is provided that are recommended for new developments. These trees are selected for their ability to grow to at least 20 feet tall, filter out particulate matter, and absorb ozone. The inclusion of these recommendations encourages the development of a healthy urban forest, with trees that are suitable to



local weather conditions and trees that will provide a large tree canopy.

Washington, D.C.

The Forest Hills Tree and Slope Protection Overlay District, effective in the city since 2007, was enacted to preserve the park-like character of several of its neighborhoods. The overlay helps to preserve natural topography and mature trees by restricting the maximum ground coverage allowed for new construction. The overlay is mapped over low-density residential zoning districts and restricts maximum lot occupancy to 30 percent, minimum lot size to 9,500 square feet, and requires side yards between 8 to 24 feet. Other density controls, such as maximum building height, remain controlled by the underlying zoning district.

Manassass, Virginia

Manassass' Tree Canopy Requirements article of the City's Zoning Ordinance provides for the long term preservation and development of a mature tree canopy. The article defines "tree canopy/tree cover" as "the aggregate area of coverage by plant material exceeding five feet in height and measured at the drip line. The article requires site plans applied for in low density zones to have 20 percent of the total lot area covered by tree canopy, moderate density zones to have 15%, and higher density apartments and condos to have a minimum of 10 percent. The City's design and construction standards manual, which also includes standards for tree preservation, size, and replacement guidelines, also references the Tree Canopy Requirement.

Granby, Massachusetts

An amendment to the subdivision regulations of the Town of Granby was drafted and passed in 2005. The code calls for the preservation of existing trees to the greatest extent possible, the planting of trees for new developments along the right of way at a minimum of 30 foot intervals, and that 35% of individual lots be shaded, excluding the building footprint and driveway.

Lawrence, Massachusetts

A zoning amendment was passed by the Town of Lawrence and includes requirements for two shade trees or three ornamental trees for every ten spaces in new or expanded parking lots. Multi-family developments requiring Site Plan Review are also subject to the regulations. The code also outlines guidelines for tree preservation during construction, maintenance procedures, and an 8-foot minimum height for tree plantings.



LINKS TO MODEL BYLAWS OR MORE INFORMATION

SOMERVILLE, MA TREE INVENTORY:

<http://www.somervillema.gov/departments/ospcd/parks-and-open-space/urban-forest/inventory>

MA DEPARTMENT OF CONSERVATION AND RECREATION,
URBAN FORESTRY SECTION:

<http://www.mass.gov/dcr/stewardship/forestry/urban/urbanFAQs.htm>

SALEM:

<http://www.rvarc.org/utc/SalemUrbanForestOverlayDistrict.pdf>

GRANBY:

<http://www.mass.gov/dcr/stewardship/forestry/urban/docs/ordgran.pdf>

LAWRENCE:

<http://www.mass.gov/dcr/stewardship/forestry/urban/docs/ordlaw.pdf>

FOR MORE INFORMATION, PLEASE CONTACT

Pioneer Valley Planning Commission

413-781-6045

60 Congress Street, Floor 1

Springfield, MA 01104-3419

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Wind Energy System Zoning

PURPOSE

To promote the production of clean, renewable power with wind energy systems while ensuring that they are properly sited, installed and maintained.

HOW IT WORKS

Wind is a renewable energy resource which lowers fossil fuel use and associated pollution, and increases energy independence. Wind energy systems use the kinetic energy in the natural motion of the wind and convert it into electricity. This is usually accomplished by fan-like structures that spin an electric generator as they are swept by the wind.

The scale of a wind energy installation can vary, from small-scale residential wind turbines as the height of a utility pole to large-scale commercial turbines a few hundred feet tall. Cities and towns can adopt bylaws and ordinances that address environmental, design and safety standards to ensure that any wind energy system is properly installed and sited to avoid potentially negative impacts on neighbors and the environment.

Zoning bylaws that regulate wind energy systems generally specify requirements for: lot size, type of tower, supporting foundations, tower height, setbacks, visual impact, color, lighting, signage, noise and measurement of any shadow or flickering effects, utility connections, emergency services, maintenance and decommissioning of the systems once it has reached the end of its useful life.

EXAMPLES OF WHERE STRATEGY HAS BEEN ADOPTED

Over 30 Massachusetts' towns have adopted wind energy bylaws, including Chester, Dennis, Middlefield, Nantucket, Plymouth, Revere, Spencer, Wenham and Worcester.

The Massachusetts Green Communities Office, under the Department of Energy Resources, has developed a model bylaw for large-scale wind energy systems. This model has been used by Kingston, Milton, Revere and Wenham to allow by-right installation of wind towers as long as they meet the requirements outlined in the bylaw and that projects comply with site plan review.



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The Town of Plymouth allows wind turbines of up to 350 feet in height to be located in their jurisdiction as long as they meet all the requirements for a special permit, such as those related to setbacks, noise, utility connections and others described above. Similar in requirements, the town of Chester in the Pioneer Valley region allows for large-scale wind turbines up to 420 feet.

Also in the Pioneer Valley, the Town of Middlefield allows only small-scale wind energy systems in their jurisdiction by special permit, which is defined as any system under 130 feet in height and with a capacity equal to or less than 60 kilowatts (kW).

LINKS TO MODEL BYLAWS OR MORE INFORMATION:

THE MASSACHUSETTS DEPARTMENT OF ENERGY RESOURCES HAS DEVELOPED A MODEL BYLAW WIND ENERGY INSTALLATIONS. THIS MODEL CAN BE FOUND AT:
<http://www.mass.gov/eea/energy-utilities-clean-tech/renewable-energy/wind/wind-energy-model-zoning-by-law.html>

TOWN OF CHESTER WIND BYLAW:

<http://townofchester.net/sitebuildercontent/sitebuilderfiles/windenergyconversionfacilitiesbylawfinal.doc>

TOWN OF DENNIS ZONING BYLAWS – SECTION 11:

http://www.town.dennis.ma.us/Pages/DennisMA_Building/bylaw.pdf

TOWN OF LUDLOW SMALL WIND ENERGY BYLAW – SECTION 6.19:

<http://www.ludlow.ma.us/reports/planning/bylaws/zoning-bylaw-text.pdf>

CAPE AND ISLANDS SELF-RELIANCE

<http://www.reliance.org/wind.asp>

MASSACHUSETTS GREEN COMMUNITIES THAT HAVE ADOPTED BY-RIGHT RENEWABLE ENERGY BYLAWS:

<http://www.mass.gov/eea/docs/doer/green-communities/grant-program/adopted-as-of-right-siting-through-re-generation.pdf>

CAPE COD COMMISSION MODEL BYLAW FOR WIND

ENERGY CONVERSION FACILITIES:

<http://www.capecodcommission.org/resources/bylaws/ModelWindBylaw.pdf>

FOR MORE INFORMATION, PLEASE CONTACT

Pioneer Valley Planning Commission

413-781-6045

60 Congress Street, Floor 1

Springfield, MA 01104-3419

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Clean Energy Financing Program

PURPOSE

To help property owners finance energy retrofits or clean energy systems in order to help municipalities achieve their greenhouse gas reduction goals, create more jobs, lower utility costs for property owners and reduce air pollution from fossil fuel sources.

A clean energy financing program sets up a revolving loan fund where property owners can borrow to improve their home or business' energy performance and value.

HOW IT WORKS

A clean energy financing program helps property owners borrow money to improve their home or business's energy performance and value. Often the property owner will not experience an increase in total monthly costs because reduced utility costs will offset the cost of the loan payment.

Municipalities can create a revolving loan fund and receive payment from program participants over an extended period of time. Some communities choose to enact a PACE Program which ties the loan to the a lien on the deed—rather than to the owner of the property (see box about PACE Program below). This encourages property owners to make long-term investments in energy efficiency; it frees them from worrying about whether their investment will be paid back within the period of their ownership.

Other clean energy financing programs are provided by municipal or privately-owned utilities. In some instances, the utility pays for a substantial part of the clean energy improvements. In other instances, the utility provides financing with low or no interest.



What's a PACE Program?

A PACE program is a mechanism which allows loans to be tied to the property owner through a lien on the deed. Therefore, if a home or business owner sells their property before having paid off the clean energy loan, the next owner will be responsible for continuing to repay the loan as they enjoy the benefits of the property's clean energy. PACE financing is allowed in under Massachusetts General Laws Chapter 44, Section 53E ¾ and requires municipal action to be enacted at the local level.

Program participation in clean energy financing programs may be open to everyone, or limited based on income level, energy use as determined by an energy audit, geography or some combination thereof. The program's first step is usually to conduct an energy audit of the residence or business, analyze the results and recommend the energy retrofits with the best monetary payback and positive environmental impact.



Thermal image of a house in the Pioneer Valley. Such imaging software helps auditors identify heat leaks to perform comprehensive energy retrofits.



After improvements have been performed, program costs can be recouped through periodic loan repayments by participants, or other innovative methods. For example, program costs may be partially repaid by utility subsidies, a monthly surcharge may be added to the utility bill of the customer, or the loan can be paid through a Property Assessed Clean Energy (PACE) financing mechanism.

EXAMPLES OF WHERE STRATEGY HAS BEEN ADOPTED

The City of Holyoke's Municipal Gas and Electric Company assists residential customers with loans to help make energy saving improvements on their homes. The loan provides 0% interest assistance of up to \$5,000 for single-family homes, or \$10,000 for multi-family homes with 4 or fewer units. Customers are required to pay a \$100 administrative fee in order to participate in this program. The loan is repayable over up to 5 years and charged to the customer's monthly HG&E bill.

Throughout Western Massachusetts, Columbia Gas will cover up to 75% of the cost to weatherize homes, up to \$2,000. Columbia Gas performs an energy audit and reports energy-saving measures that qualify for incentives. Energy saving measures eligible for the rebate include: attic, wall, and heating pipe/duct insulation and thermostats. When needed, water heater tank wrap, low-flow showerheads, and faucet aerators are installed at no cost.

The City of Northampton adopted a PACE program in 2011 for commercial and multifamily properties, whereby owners will be able to borrow money from the City and repay the loan via a special assessment on their property taxes over a period of years (up to 20 years).

The City of Berkeley, California was the first to offer financial support for residential renewable energy systems, specifically for solar energy sources in a pilot district. They now offer this assistance through the City's PACE financing program.



LINKS TO MODEL BYLAWS OR MORE INFORMATION

HG&E PROGRAM

http://www.hged.com/html/incentive_programs.html#RECProgram

COLUMBIA GAS PROGRAM:

<https://www.columbiagasma.com/en/ways-to-save>

PACE FINANCING INFORMATION:

<http://pacefinancing.org/>

NORTHAMPTON PACE ORDINANCE:

<http://www.northamptonma.gov/1051/PACE-Ordinance>

BERKELEY RENEWABLES FINANCING:

<http://www.ci.berkeley.ca.us/ContentDisplay.aspx?id=26580>

FOR MORE INFORMATION, PLEASE CONTACT

Pioneer Valley Planning Commission

413-781-6045

60 Congress Street, Floor 1

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Agricultural Best Management Practices (BMPs)

THE FOLLOWING RESOURCES ARE AVAILABLE TO HELP IMPLEMENT AGRICULTURAL BMPS:

Massachusetts Agricultural Environmental Enhancement Program (AEEP)—offers reimbursement funds up to \$25,000 for farmers that install BMPs that mitigate or prevent impacts on natural resources including water quality.

www.mass.gov/agr/programs/aEEP/index.htm

Section 319 Nonpoint Source Competitive Grants Program - for projects that address the prevention, control, and abatement of nonpoint source (NPS) pollution, such as agricultural runoff. A 40% match of the total project cost is required.

<http://www.mass.gov/dep/water/grants.htm#sums>

Massachusetts Environmental Quality Incentives Program (EQUIP) —offers technical expertise for planning and designing conservation practices that protect water along with cost share and incentive payments up to \$450,000 per farm to producers that adopt water management practices.

www.ma.nrcs.usda.gov/programs/eqip.html



Farm in Buckland, MA Source: FRCOG



What are the objectives of Agricultural BMPs?

To provide guidelines for agricultural operators that address environmental concerns, such as preventing contamination of water supplies, as well as improving the productivity of the land.

Why do we need Agricultural BMPs?

Because too much of an agricultural input in the wrong place can cause water quality degradation or other environmental problems. Management practices and systems have been developed that can sustain yields and protect the natural resources that support them.

How do Agricultural BMPs work?

Agricultural BMPs are guidelines that farmers can choose to follow in order to help prevent or mitigate the impact of agricultural practices on natural resources. Adapting land management practices and utilizing the latest appropriate technologies can result in higher levels of economic efficiency and cropland productivity. Common Agricultural BMPs relate to conservation tillage, crop nutrient management, weed and pest management, and conservation buffers. These BMPs are easily adaptable to virtually any farming situation and can be fine-tuned to meet unique needs. The net results tend to be better soil, cleaner water and greater on-farm productivity.

Types of Agricultural BMPs:

Conservation Tillage—A system of crop production with little, if any, tillage. Leaving crop residue undisturbed for as long as possible increases organic matter, improves soil quality, increases soil productivity, and can reduce soil erosion by as much as 90 percent. The conservation tillage system reduces labor, equipment costs, and fuel use.

Crop Nutrient Management—A practice which matches nutrient availability with the plant needs by fine-tuning application rates, timing, and placement to match plant growth. Efficient crop nutrient management addresses all nutrients including manure, fertilizer, and natural mineralization. These processes reduce the risk of nutrients such as nitrogen and phosphorous making their way to streams, groundwater, and surface water. This can result in improved fish habitat, greater recreational opportunities, and reduced water treatment costs. This type of BMP can also increase profit per acre by increasing the efficiency of crop inputs and the resulting yields.

Weed and Pest Management—A comprehensive approach to on-farm management of harmful weeds and pests including resistant plants, cultural controls, soil amendments, beneficial insects, natural enemies, barriers, physical treatments, behavioral disputants, biological and conventional pesticides. Weed and pest management can help match the best method of control with the optimum time to maximize benefits of the control.



By using mechanical cultivation, pesticides, fertilizers and tillage only when necessary, growers can decrease costs and reduce the amount of sediment and polluted runoff entering lakes, streams, and rivers.

Conservation Buffers—Small areas or strips of vegetated land or wetlands designed to slow water runoff, provide shelter and stabilize riparian areas. When located in environmentally sensitive areas, buffers can filter surface and ground water before it enters streams and lakes, reduce wind erosion, reduce downstream flooding, and stabilize stream banks. Buffers can also reduce crop losses from flooding, protect soil in vulnerable areas, and provide tax incentives.

SOURCES:

Barrios, Anna. "Agriculture and Water Quality." CAE Working Paper Series. WP))-2. June 2000. American Farmland Trust's Center for Agriculture in the Environment, DeKalb, Illinois.

U.S. Department of Agriculture and Natural Resources Conservation Service. NRCS/RCA Issue Brief 9. Water Quality. March 1996.

LINKS:

For more detailed information and listings of BMPs, see the following websites.

AMERICAN FARMLAND TRUST (AFT)

<http://www.farmland.org/>

MASSACHUSETTS DEPARTMENT OF AGRICULTURE (MDAR)

<http://www.mass.gov/agr/index.htm>

MASSACHUSETTS DEPARTMENT OF FOOD AND AGRICULTURE (MFDA)

<http://www.massdfa.org/>

NATURAL RESOURCES CONSERVATION SERVICE (NRCS)

<http://www.nrcs.usda.gov/>

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Pioneer Valley Planning Commission

413-781-6045

60 Congress Street, Floor 1

Springfield, MA 01104-3419

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Conservation Subdivision Design

THE IMPACT OF CONVENTIONAL RESIDENTIAL SUBDIVISION DEVELOPMENT

Typically, when land is developed for a conventional residential subdivision, the parcel is divided up in a “cookie cutter” fashion of individual house lots of a specified size laid out along a road or roads. In many rural communities, like those along the Connecticut River, towns require large lot sizes for each house, generally 1 acre or more. As the picture indicates, this traditional approach for a residential subdivision is land-consumptive and detracts from the rural landscape.



Center for Rural Massachusetts, University of Massachusetts

Large-lot residential development typically results in a condition known as sprawl, with houses scattered over a large area. Sprawl consumes open space; disrupts the natural terrain, hydrologic systems and wildlife habitat; and it increases the amount of impervious surfaces in the form of wide private roadways that may threaten water quality and create erosion.

CONSERVATION SUBDIVISION DESIGN

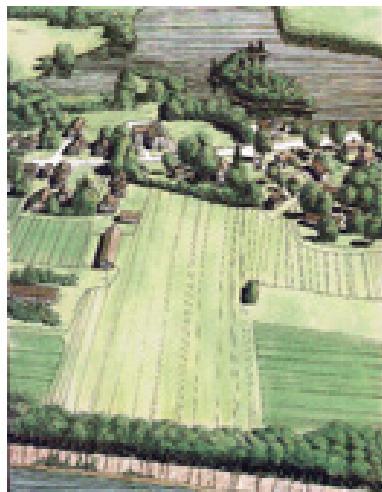
A community can encourage developers and property owners to develop their land in a more environmentally and aesthetically conscious manner through a Conservation Subdivision Design (CSD) bylaw (also known as Open Space Residential Design or Cluster Development). This technique is an innovative subdivision design process that provides the developer with the flexibility to use various lot sizes, setbacks, and frontage within



the development to preserve open space and critical natural resources. CSD standards and regulations will result in a subdivision that:

- » Preserves open space, protects natural resources and water quality, and conserves the scenic views and rural character of a community;
- » Allows for greater flexibility and creativity in the design of residential developments; and
- » Encourages a less sprawling and more efficient form of development that consumes less open land and conforms to existing topography and natural features.

A CSD project begins with determining how many lots could be developed under conventional zoning and subdivision regulations: this is the called the base yield of the property. From that point, the plan development process follows four basic steps: **identify conservation areas; locate house sites; align roads, trails, and other infrastructure; and draw in lot lines.** A CSD bylaw can provide sufficient flexibility to achieve the development goals of a community and a property owner. By working in partnership, the community and the developer can determine where the building footprint will be least disruptive to the landscape and which areas and features should be preserved – wetlands, floodplains, stream buffers, wildlife habitat, farm land, forested land, and viewsheds. Some towns also allow a density bonus to encourage this type of development over a traditional subdivision.



Center for Rural Massachusetts, University of Massachusetts

Usually, ownership and management of the preserved open space is conveyed to a Homeowners Association, the Town, or a non-profit land trust or conservation organization to ensure that emergency access to and the use of and management of the private lands are maintained in perpetuity. Another innovative approach, which can work well for property owners who are actively farming their land, is to have ownership and management of the preserved open space remain with the private landowner.





Conservation Subdivision Development can:

- » Preserve open space and natural resources.
- » Reduce impervious surfaces.
- » Reduce non-point pollution.
- » Preserve community character.
- » Provide a mix of housing types.

Adding Low Impact Development Techniques Further Improves the Subdivision

Coupling Low Impact Development (LID)¹ techniques with Conservation Subdivision Development further helps a developer to protect the natural and water resources on the property. These techniques include: limiting impervious surfaces by reducing private roadway and common driveway widths; using pervious pavers on driveways and walkways, and using rain gardens and roadside swales for stormwater management.

Incorporating LID strategies further protects water supplies and important habitat by reducing the amount of non-point pollution from runoff, preventing erosion and allowing for groundwater recharge.

Regional, State and Federal Resources

Massachusetts

PIONEER VALLEY PLANNING COMMISSION
www.pvpc.org/

FRANKLIN REGIONAL COUNCIL OF GOVERNMENTS
www.frcog.org/

CENTER FOR RURAL MASSACHUSETTS
www.umass.edu/ruralmass/

THE TRUSTEES OF RESERVATIONS: HIGHLAND COMMUNITIES INITIATIVE
www.thetrustees.org/

New Hampshire

SOUTHWEST REGIONAL PLANNING COMMISSION

UPPER VALLEY LAKE SUNAPEE REGIONAL PLANNING COMMISSION

NORTH COUNTRY COUNCIL



Vermont

WINDHAM REGIONAL PLANNING COMMISSION

SOUTHERN WINDSOR COUNTY REGIONAL PLANNING COMMISSION

TWO RIVERS OTTAUQUECHEE REGIONAL COMMISSION

NORTHEAST REGION DEVELOPMENT ASSOCIATION

US EPA: Smart Growth - www.epa.gov/dced/

Information on Low Impact Development can be found at the following website:

<http://www.mass.gov/eea/state-parks-beaches/land-use-and-management/land-conservation/planning-land-use/low-impact-development.html>

FOR MORE INFORMATION, PLEASE CONTACT

Pioneer Valley Planning Commission

413-781-6045

60 Congress Street, Floor 1

Springfield, MA 01104-3419

www.pvpc.org

Put Your Sidewalk and Driveway on a Low-Salt Diet

WHAT'S THE PROBLEM WITH GOOD OLD, NATURAL SALT?

Unfortunately salt (sodium chloride), even small amounts, leaches into surrounding soil changing its composition and making it hard for plants to survive. High concentrations of salt can damage and kill trees and other plants. Brown trees and shrubs along roadsides are evidence of this. Dried salt can also blow over the land seeping into groundwater and washing into lakes and streams destroying habitat for plants and animals. Salt is highly corrosive to paved surfaces, buildings, and cars.



And if that weren't enough, our pets suffer from the use of salt. When your pet's paws are exposed to salt, they lick it off and may end up ingesting toxic amounts of salt. Other de-icers may also be a problem for pets, so read the labels!



WHAT'S A SAFER ALTERNATIVE TO SALT?

What's a safer alternative? A de-icer is not a substitute for shoveling. Sorry! De-icers are actually more efficient if there is less snow in the way, and it is possible that obsessive shoveling could prevent the need for de-icers. But, this usually is not going to happen so we need to protect ourselves from slipping on walkways and the driveway.

Sand can be used for traction (not melting ice), but it needs to be swept up in the spring. Otherwise, it can clog storm drains in more urban areas and cause flooding. When sand reaches rivers and lakes, sand buries aquatic floor life and fills in natural habitats. Kitty litter and wood ash are not especially effective as, like sand, they do not melt ice and they tend to get messy when it warms up.

Unfortunately, there is no competitively priced safe alternative to salt. However, when purchased in small quantities, such as for a home, the price is much lower than the environmental impacts of salt. Calcium magnesium acetate (CMA) appears to be the best option. If you have large areas requiring de-icing, you might consider mixing salt with CMA or sand.

What can I do?

- » Clear snow early and often and before you use any de-icing product. NEVER put de-icer on top of snow.
- » Adopt the “Just Enough” principle putting down just enough de-icer to clear areas.
- » Apply de-icers evenly using a broadcast spreader rather than by hand.
- » Sweep up un-dissolved de-icer after a storm to re-use later.
- » Consider switching to a non-chloride de-icer.



What are the options?

De-Icer	Works to:	Cost relative to salt:	Advantages:	Disadvantages:
Sodium Chloride (rock salt)	15° F		Relatively low cost	Contains cyanide; chloride impact
Calcium Chloride	-25° F	3X more than salt	Can use lower amounts; no cyanide	Chloride impact
Potassium Acetate	-75° F	8X more than salt	Safer than salt for steel structures; performs very well; noncorrosive; biodegradable	Could cause slickness on pavement; lowers oxygen levels in water
Calcium Magnesium Acetate	25° F	20X more than salt	Less toxic; biodegradable	Subject to dilution and refreezing
Sand	No melting effect	Less than salt	Relatively low cost	Accumulates in streets and streams

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Household Hazardous Waste Collections

WHAT ARE THE WATER PROTECTION OBJECTIVES OF HHW COLLECTIONS?

To encourage local governments to provide household hazardous waste collections for their citizens. Providing collections for proper management of common household hazardous waste can keep it out of our water supplies. To educate local officials about the options for collections.

WHY DO WE NEED HHW COLLECTIONS FOR WATER QUALITY?

Leftover household products that contain corrosive, toxic, ignitable, or reactive ingredients are considered to be “household hazardous waste” or “HHW.” Products, such as oil-based paints, cleaners, oils, rechargeable batteries, and pesticides that contain potentially hazardous ingredients require special care when disposed of. Americans generate 1.6 million tons of HHW per year.

The average home can accumulate 100 pounds of HHW in the basement, garage, and storage cupboards. Improper disposal of household hazardous wastes can include pouring them down the drain, on the ground, into storm sewers, or in some cases putting them out with the trash. The dangers of such disposal methods might not be immediately obvious, but improper disposal of these wastes can pollute the environment and pose a threat to human health.

All Purpose Cleaner Recipes

Mix 2 tablespoons vinegar, 1 teaspoon Borax or washing soda, and 2 cups hot water in a spray bottle and shake. Add ¼ cup liquid soap. Mix gently.

Baking soda can be used for scouring powder.

Vinegar removes soap scum, grease and mineral deposits and acts as a deodorizer. Use white distilled vinegar. Mix with water to wash non-wax floors.



HOW DO HHW COLLECTIONS PROTECT WATER QUALITY?

HHW collections protect water quality by providing options to their citizens for proper management. Most HHW is highly regulated and must be managed by licensed personnel or contractors. However, local governments can provide daily collection of some HHW. “Universal Waste” is a type of HHW which the federal government allows to be collected and stored at municipal facilities because the waste type is so common. This includes rechargeable and other hazardous content batteries, fluorescent light bulbs and tubes, mercury-containing items such as thermostats and thermometers, and some pesticides. States may modify the definition and add other materials to be included in the definition of universal waste. For example, New Hampshire added electronics to their definition.

HOW AND WHERE ARE HHW COLLECTIONS USED TO PROTECT WATER QUALITY?

There are several options for managing HHW. The first as with all waste is to discourage purchasing it to begin with. Educate people about non-toxic alternatives, especially for cleaners. And if hazardous products are purchased, they should be used up rather than becoming waste. Educate your community about hazardous materials collection events and drop off locations. Many retail stores and municipal facilities provide daily collection of some materials such as used oil, car batteries, rechargeable batteries and cell phones, fluorescent bulbs, and electronics. Often this service is provided for free or a minimal fee.

THE FOLLOWING ARE EXAMPLES OF DIFFERENT TYPES OF HHW COLLECTION OPTIONS:

Swap Shops — Can be used to trade useable materials instead of discarding as waste, such as common garden pesticides and oil-based paint. One disadvantage is these shops can become overrun with materials, increasing the risk of a spill, or mixing inappropriate materials and creating a greater hazard by doing so.

Multiple or Single Day Collections — Typically, a public works garage or other municipal facility with shelter, toilets, safety equipment, and pavement is identified. A licensed contractor is hired who sets up the collection area. This can be open to residents and/or commercial small quantity generators. Often the participating towns will pay the cost for their residents using the collections. Institutions and businesses can pre-register and pay in advance or at the collection. Non-participating town residents may be allowed to attend the collection if they pay for their waste at the collection. All New Hampshire towns are serviced by this method.



Permanent Facilities — Often sited with existing transfer stations, these structures must be built to standards to provide safe storage for materials and be accessible and safe for users. They must be able to contain spills, be well ventilated and have some fireproofing. Appropriate containers must be available to store the various materials on site. The Hartford, Vermont facility meets the requirements for a permanent facility, but functions as a fixed site for multiple day collections instead.

Curbside Collection — These collections are typically arranged with individual households prior to the collection, or they are scheduled by the community a few times a year. Participating households and businesses are required to properly label and store their waste. The container of waste is then placed in a specified location, not on the street, to prevent spills or vandalism. This is generally the most expensive form of collection.

Mobile Unit Pick-Up — These collections are similar to the Multiple or Single Day Collections but require a specially built or modified vehicle designed to collect as well as transport the materials to its final management destination. The mobile units follow a route within the service area, stay for a specified period, and then move the whole operation to the next site.

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Pioneer Valley Planning Commission

413-781-6045

60 Congress Street, Floor 1

Springfield, MA 01104-3419

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Local Conservation Fund



WHAT ARE THE OBJECTIVES OF A LOCAL CONSERVATION FUND?

To provide a local funding source for acquiring and protecting important lands, open spaces and water supply protection areas through the purchase of land in fee simple, conservation restrictions or easements.

WHY DO WE NEED A LOCAL CONSERVATION FUND?

A local Conservation Fund provides communities with the funding needed to permanently protect important watershed and aquifer recharge lands. Local zoning and other regulations provide a level of protection, but the best way to permanently protect these lands is through the purchase of fee simple interests, conservation restrictions or easements. Often, if state and federal grants are available, they take long periods of time to secure. Communities need a local funding source to be able to move quickly to protect threatened lands.

Did you know a Local Conservation Fund can:

- » • accept private gifts, such as bequests in wills, which require only the Selectboard or Mayor's approval;
- » • include funds earmarked by Town Meeting or City Council for a specific project;
- » fulfill a psychological function by reminding communities to make annual contributions to conservation projects.

HOW DOES A LOCAL CONSERVATION FUND WORK?

A Conservation Fund is a dedicated account established by a municipality to ensure that the Conservation Commission will have cash that can be spent for any purpose stated in MGL Chapter 40, section 8C (The Conservation Commission Act) without further authorization. These purposes include protection of watershed resources. A Conservation Fund can be created by a vote of Town Meeting or City Council. Funds can be used for purchase of land, capital improvements to such land, and expenses directly related to land purchases, such as title searches and legal expenses. Money must be

specifically appropriated or transferred to the Conservation Fund by a majority vote of Town Meeting or City Council. Money voted to the Fund remains there until expended or until transferred out by a Town Meeting or City Council vote. No further authorization is needed to spend money from the Fund, even for the purchase of land.

HOW DOES A LOCAL CONSERVATION FUND PROTECT WATER SUPPLIES?

A local Conservation Fund could be used to purchase lands or easements or conservation restrictions in water supply areas, including Zone 1 or Zone 2 Aquifer Recharge Areas, and watershed areas for surface water reservoirs.

HOW AND WHERE IS A LOCAL CONSERVATION FUND WORKING?

CASE STUDY: TOWN OF HADLEY

Hadley, Massachusetts has had a Local Conservation Fund established for a number of years. This fund receives an annual Town Meeting appropriation, and has also received contributions from the town's Transfer of Development Rights bylaw, and mitigation funds from development project along the Route 9 Corridor. Hadley has used \$338,000 from its Local Conservation Fund to match \$3,483,000 in state Agricultural Preservation Restriction funds, in order to preserve 239 acres of land in nine parcels for farmland preservation purposes. The net result is that Hadley has been able to use its Local Conservation Fund to leverage approximately ten times that amount of funds in state funding. This means Hadley has been able to protect a sizable amount of land with only modest local funding.

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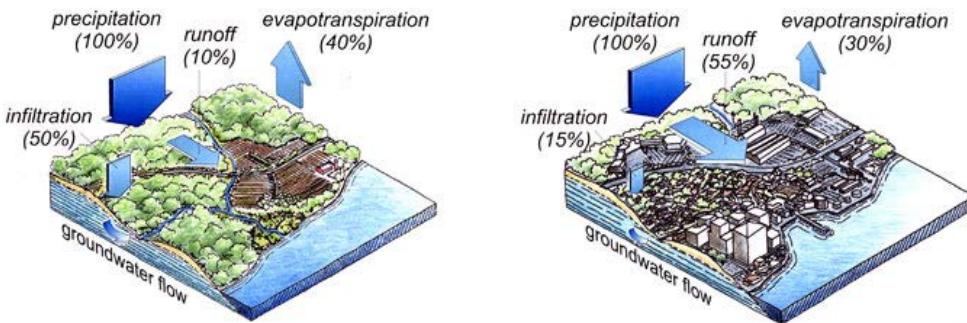
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SUSTAINABILITY TOOLKIT

Low Impact Development (LID)

WHAT ARE THE OBJECTIVES OF LOW IMPACT DEVELOPMENT?

To create a more sustainable land development pattern that results from a site planning process that first identifies critical natural resources, then determines appropriate building envelopes. To incorporate a range of best management practices (BMPs) that preserves the natural hydrology of the land.



Groundwater Base Flow, Rural and Urban Environments Source: MA Smart Growth Toolkit

WHY DO WE NEED LOW IMPACT DEVELOPMENT?

Development patterns based on conventional zoning codes in Massachusetts often result in „sprawl“ with its associated large impervious areas, loss of natural areas, and alteration of hydrologic systems. Too often, the development process begins with the clearing and leveling of an entire parcel. Conventional developments that follow commonly contain wide roads and large parking lots. These large impervious areas prevent water from infiltrating into the ground (which normally replenishes groundwater supplies and supports nearby wetlands and streams with baseflow) and convey polluted runoff into waterbodies. In order to deal with water that runs off of these sites, structural stormwater controls such as catch basins, pipes, and detention ponds are used. Conventional landscaping of these developments brings additional concerns including the introduction of non-native plants, use of herbicides, pesticides and fertilizers, and excessive water consumption.



HOW DOES LOW IMPACT DEVELOPMENT WORK?

The LID approach provides opportunities to build the homes and businesses that are needed, while conserving natural areas and drainage patterns. LID is accomplished as a two-step process: 1) thoughtful site planning, and 2) incorporation of best management practices (BMPs). Thoughtful site planning begins with an approach that identifies critical site features such as wetlands, poor soils, or drinking water protection areas that should be set aside as protected open space. Natural features, such as vegetated buffers and view sheds, will also play an integral role in any LID planning exercise. After the critical open space areas are identified and set aside, sustainable development areas are then identified as „building envelopes.“ Within the delineated building envelopes, a broad range of design techniques or BMPs, such as shared driveways, permeable pavers, and bioretention are used to reduce the level of impervious cover and improve the quantity and quality of stormwater drainage. Other LID design techniques include green roofs, rain barrels, rain gardens, grassed swales, stormwater infiltration systems, and alternative landscaping. Through these techniques, natural drainage pathways are conserved, open space is preserved, and the overall impact from development is significantly reduced.

HOW DOES LID PROTECT WATER SUPPLIES?

LID encourages recharge of groundwater and protection of water resources from polluted runoff. LID can be an important component in an overall water supply protection strategy. Elements for LID can be incorporated into Stormwater bylaws and ordinances, Water Supply Protection Overlay zones, and Green Performance Standards.

Did you know that Low Impact Development also provides:

- » • Preservation of open space, trees and natural drainage patterns;
- » • Aquifer protection;
- » • Environmental improvement (in retrofit situations);
- » • Reduction of impervious cover;
- » • Stormwater pollution mitigation; and,
- » • Aesthetic appeal.



HOW AND WHERE IS LOW IMPACT DEVELOPMENT WORKING IN MASSACHUSETTS?

CASE STUDY: TOWN OF PELHAM, MA

With a Smart Growth Technical Assistance Grant from EOEA, PVPC worked with the Pelham Growth Study Committee to draft a Low Impact Development (LID) zoning bylaw utilizing the LID Bylaw from EOEA's Smart Growth Tool Kit as a model template. Given the largely rural and residential nature of Pelham, the committee felt that the State's model was more complicated than they would be able to administer and was more appropriate for new commercial and industrial developments, the likes of which were not happening in Pelham. Therefore, PVPC significantly streamlined the model, making the bylaw applicable to two types of land uses: 1) all non-residential land disturbances requiring a Special Permit and/or Site Plan Approval, and 2) all residential uses, including single-family detached dwellings, creating land disturbances that require a Special Permit, Site Plan Approval, or Building Permit. The Committee opted to call the new zoning bylaw a Stormwater Management bylaw rather than an LID bylaw due to the fact that they believe stormwater management is a term more easily understood by the general public rather than low impact development.

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Pioneer Valley Planning Commission
413-781-6045

60 Congress Street, Floor 1
Springfield, MA 01104-3419

www.pvpc.org



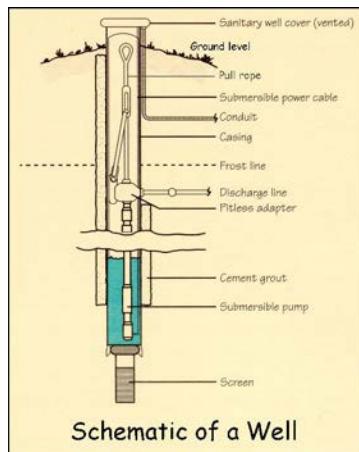
Private Wells

THE ISSUE – CONTAMINATION OF DRINKING WATER

A huge number of people rely on private wells for drinking water. In Massachusetts alone over 400,000 people have private water systems for their homes and businesses. These private wells draw water from groundwater and aquifers that are susceptible to contamination from a variety of activities and sources.

Some naturally occurring contaminants include bacteria; radioactive elements such as radium, uranium and radon; and chemicals and minerals like arsenic, lead, copper, chloride, sodium, and fluoride. Other pollutants are caused by human activity. Industrial, commercial and agricultural activities can introduce hazardous substances like volatile organic compounds (VOCs), fuels, solvents, bacteria and pesticides into the groundwater through improper storage and disposal and accidental spills. Even typical residential activities such as the use of fertilizers and pesticides, fueling of lawn equipment, and improper disposal of household chemicals in an on-site septic system can contaminate groundwater.

A range of adverse outcomes can result from exposure to pollutants in drinking water, principal among them are polluted groundwater and aquifer supplies that compromise public health; others are unacceptable taste and odor and aesthetic concerns.



Schematic courtesy of University of Maryland Extension



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STRATEGIES AND REGULATIONS FOR PROTECTING DRINKING WATER

Most states do not have any statutes that specifically regulate the quality of water for private wells, so the protection of drinking water is left to local government, specifically the Boards of Health, and the individuals or businesses with the wells.

Requiring regular monitoring of drinking water from private wells can help to mitigate the adverse outcomes of contamination for residents and identify threats to public health and public water supplies in your town.

PRIVATE WELL REGULATIONS

Regulations requiring regular water quality testing help to protect water supplies in private wells by identifying hazardous levels of drinking water contaminants that pose a health risk. Also, they identify some secondary contaminants that may present aesthetic problems affecting water quality.

Local governments in Massachusetts [VT & NH too?] are responsible for regulating private wells. Local Boards of Health (BOH) may adopt bylaws requiring testing of private wells to ensure the protection of drinking water. Testing of private wells may be required when a new well is installed, when a house is sold, or at regular intervals as recommended the State. Additionally, the BOH may require set backs for wells from possible pollution sources such as roads, septic systems, barn yards, and industrial sites. Banks usually require testing of wells on private property before providing mortgages.

Generally, states have guidelines that take into account the cost of monitoring to the homeowner, make recommendations for sampling frequency, and offer Recommended Concentration Limits for pollutants that have been identified by EPA and/or State. In Vermont and New Hampshire, state agencies recommend testing at a sampling frequency of three to five years. Massachusetts recommends initial monitoring and then testing again in 10 years if no problems are detected (See Private Well Guidelines. www.mass.gov/dep/water/laws/policies.htm#pwg). The exceptions to this recommended testing schedule are monitoring for nitrate/nitrite and bacteria levels, which all states recommend be done on an annual basis.

PRIVATE WELL TESTING

A listing of laboratories that are certified for specific analyses of well water can be obtained on State websites: <http://edep.dep.mass.gov/labcert/lacert.aspx>, [NEW HAMPSHIRE AND VERMONT WEBSITES?]

It should be noted that laboratories that are certified for one type of analysis may not be certified for other types. A basic scan typically tests for coliform bacteria, fecal coliform, nitrate, nitrite, pH, alkalinity, arsenic, iron, lead, manganese, copper, sulfate, chloride, sodium, fluoride, hardness, turbidity, conductivity, T. dissolved solids and chlorine. More advanced analyses can test for volatile organic compounds (VOCs) and/or radioactive elements (such as radium, uranium and radon).





Private well regulations require testing that can:

- » Identify hazardous levels of bacteria and inorganic compounds in drinking water from wells;
- » Detect dangerous levels of radon in drinking water;
- » Determine if VOCs resulting from spills of petroleum products are present in the water.

Owners of wells in industrial or densely developed residential areas are encouraged to conduct more frequent testing. Local Boards of Health in Massachusetts may adopt regulations that require more frequent monitoring of private wells.

CASE STUDY: PRIVATE WELL REGULATIONS

Town of Leverett, MA

The Town of Leverett adopted private well regulations in 1989 to “insure an adequate supply of safe water to houses with no access to public water supplies and to insure the safe destruction of abandoned private wells.” For homes that are served by private wells, owners must apply for a water supply certification certificate from the Leverett Board of Health. Application must be submitted within 30 days of the completion of the well’s construction and must include:

- » A completed and approved Application for Well Construction/Destruction Permit;
- » A copy of the Water Well Completion Report, provided by the well driller;
- » A water quality analysis performed by a state certified laboratory; and
- » A certificate of yield from the well driller that water quantity standards have been met.

No new well can be operated or building permit issued unless a water supply certificate has been issued by the Leverett Board of Health.

FOR MORE INFORMATION, PLEASE CONTACT

Pioneer Valley Planning Commission

413-781-6045

60 Congress Street, Floor 1
Springfield, MA 01104-3419

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Reduced Parking Footprint

WHAT IS REDUCED PARKING FOOTPRINT?

“Reduced Parking Footprint” aims to reduce the total area of paved surfaces and allow rainwater and snowmelt to travel more naturally across the landscape to surface waters as well as filter down naturally to groundwater aquifers. Reducing the parking footprint reduces the amount of impervious surfaces in watersheds. Watersheds with 10 to 20% impervious cover are more likely to have degraded water quality in rivers, streams and groundwater.ⁱ Reduced parking footprint is a valuable tool when used in conjunction with other measures to protect drinking water and provide cost savings in the long-runⁱⁱ.

HOW DO YOU REDUCE PARKING FOOTPRINTS?

Reduced parking footprint, in practice, may take many forms that are not new, but may require modifications to municipal by-laws and zoning. The intent is to limit the amount of land area dedicated to surface parking. Some options to reduce the parking footprint include:

- » Relax minimum parking standards or assign maximum parking standards;
- » Establish shared parking provisions for mixed-use development where adjacent uses that have peak parking demands at different times of day;
- » Encourage shared-footprint or multi-level parking design during site plan review.

Another strategy is termed “unbundled parking.” This option separates parking costs from leases or the purchase price of a condominium. Landlords then have the following options:

- » Parking can be bought or rented separately;
- » Discounted rental rates for residents who do not use their parking spaces;
- » Rental agreements with line items in the lease where parking cost may be negotiated or shared with another tenant;
- » A market for parking spaces would enable building owners or managers inventory and market vacant parking spaces to other users in the surrounding area.



Under most circumstances these efforts to reduce development parking footprints are commercially viable where land prices are at a premium rate and/or the development density and presence of other transportation modes like walking, biking, and transit, do not affect customer choice.

Successful Project Examples:

Seattle, WA: Residential units were offered without parking at a lower price.

St. Louis, Missouri: Buyers could opt-out of purchasing a parking spot. The site was adjacent to mass transit (bus, light rail), which made the opt-out program possible

Regulations and Incentives

To relax minimum parking standards for qualifying developments, towns can either pass ordinances or analyze parking through the site plan review process. Towns can also produce regulations either through zoning laws or site plan review for minimum, maximum and shared parking. Reduced parking footprint practices may be regulated in certain areas of concern (e.g.: public water supply districts, urban centers, transit hubs, etc.).

Contact Information and Links

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY:

<http://www.epa.gov/>

MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION:

www.mass.gov/dep

MASSACHUSETTS EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS:

www.mass.gov/envir

VERMONT AGENCY OF NATURAL RESOURCES:

www.anr.state.vt.us

NH DEPARTMENT OF ENVIRONMENTAL SERVICES:

<http://des.nh.gov/>

THE CENTER FOR WATERSHED PROTECTION:

<http://www.cwp.org/>

THE STORMWATER MANAGER'S RESOURCE CENTER:

<http://www.stormwatercenter.net/>

URBAN LAND INSTITUTE:

<http://www.ulii.org/>



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Best Management Practices for Road Crews

WHY DO WE NEED BMPS FOR ROAD CREWS?

Protecting the quality and quantity of clean drinking water is important to all communities. Routine road maintenance practices including managing stormwater, snow, and ice have a significant impact on local surface water and groundwater quality. Many communities throughout New England institute Best Management Practices (BMPs) for road crews to minimize roadwork impacts on nearby surface water and natural resources, increase efficiency and reduce operating costs.

HOW DO BEST MANAGEMENT PRACTICES FOR ROAD CREWS WORK?

In order to protect water quality through Best Management Practices, towns must first identify water resources and their watersheds including all past, present and future possible sources of drinking water from surface and groundwater supplies. Once watersheds have been delineated and mapped, place signage along roadways to indicate boundaries of the public water supply watershed. Within these boundaries, there may be special provisions for road maintenance practices such as reduced anti-icing.

Garages and maintenance yards should also follow best management practices for storage and disposal of materials. Salt piles and sand piles should be housed in sheds to reduce loss to rain, and prevent salt and sand runoff to rivers, streams and lakes. Stormwater in maintenance yards should be adequately mitigated and treated on-site wherever possible through low-impact designs, retention ponds and natural infiltration (except in the case where chemicals may be present). Maintenance products such as engine oil, gasoline, diesel, hydraulic fluid should be stored and disposed of in accordance with state laws.

Tree removal or trimming along roadways should be performed when necessary, but should follow protocols to reduce soil erosion and reduce damage to riparian buffers along rivers, lakes and streams.

Policies and guidelines for road crew best management practices should be adopted by local Highway Departments, and training provided to employees in the use of BMPs.



Municipalities should re-visit best management practices on a one to five year time frame to ensure that up-to-date methods are being implemented.



Employees should be trained in best management practices including:

- » Proper installation and maintenance of erosion and sediment control practices.
- » Familiarity with National Pollution Discharge Elimination System (NPDES) requirements, particularly with regard to Total Maximum Daily Loads for salt.
- » Develop equipment operator skills to minimize environmental impacts when working in environmentally sensitive areas.
- » Culvert sizing and natural-streambed design for fish populations and other aquatic species.
- » Techniques in snow and ice removal with sand, salt, and other applications. Such techniques may include reduced salt application areas, use of calibrated salt spreaders, and proper storage and handling of road treatment chemicals.
- » Methods to minimize salt or chemical migration from roadways to drinking water supplies.
- » Use of innovative techniques to increase operational efficiency.

HOW DO BEST MANAGEMENT PRACTICES PROTECT WATER SUPPLIES?

Towns can adopt regulations and bylaws for road salt, sand, and road-salt alternatives application for town employees, plowing contractors, parking-lot owners and residential use on driveways and walkways. Best management practices for road crews are critical to balancing safety needs with water quality protection.

HOW AND WHERE ARE BEST MANAGEMENT PRACTICES FOR ROAD CREWS WORKING?

In New Hampshire, The Town of Enfield has implemented best management practices to protect water supplies. Larger cities in New England are using technology to reduce salt dispersal.

The Vermont Better Roads Program is assisting towns with grants to inventory road erosion and develop capital improvement plans to improve them. In addition, grants are also available to correct existing erosion problems in Vermont. For more information go to

www.vt.nrcs.usda.gov/rc&d/bbcoverpage.html

In Massachusetts, the Baystate Roads Program offers statewide training on winter salt and sand practices, as well as a range of best management practices for road crews. A schedule of training opportunities can be found at

<http://baystateroads.eot.state.ma.us/Resources>

AASHTO CENTER FOR ENVIRONMENTAL EXCELLENCE:

<http://www.environment.transportation.org/>

US EPA:

www.epa.gov

FEDERAL HIGHWAY ADMINISTRATION:

www.fhwa.dot.gov



Road Salt Reduction

WHAT ARE THE OBJECTIVES OF A ROAD SALT REDUCTION PROGRAM?

Road crews across America use approximately 8 to 12 million tons of salt to treat roads annually. Northern New England relies heavily on salt applications during the winter months. The use of salt on roads leads to the potential for artificially high salinity levels in local surface water and groundwater resources and can be harmful to human and environmental health. Communities throughout New England seek to eliminate the use of road salt adjacent to community drinking water protection areas.

HOW DOES A ROAD SALT REDUCTION PROGRAM WORK?

Towns must first identify water resources including past, present and future groundwater and surface drinking water supplies, and delineate and map the associated watersheds. Prioritize roads, parking lots and driveways within these watersheds for reduced-salt application or salt alternative policies. Towns taking this approach should recognize that low or no-salt applications may not be practical due to safety, cost and availability of salt alternatives, and environmental impact of salt alternatives. Reduced road-salt areas are often noted with signage to alter motorists to potential changes in road conditions due to these practices.



The following are practical approaches for municipalities and private citizens to individually reduce the use of salt:

- » Salt application quantities should be determined by the temperature of the road surface.
- » Road salt should be properly handled and stored to reduce potential contamination and eliminate loss to runoff.
- » Evaluate salt alternatives and seek to use alternative road treatment chemicals in the most sensitive water resource areas. Many of the alternative chemical treatments require special consideration of how to handle and apply the chemicals effectively, whether there needs to be substantial equipment fit-up, and cost per ton.
- » Broader use of snow tires may have a positive impact on safety when salt reduction policies are in place. The use of snow tires is mandated in Quebec from December 15 to March 15.

WHERE AND HOW IS ROAD SALT REDUCTION WORKING?

A road salt reduction pilot program exists on the Interstate 89 bridge across the Connecticut River between New Hampshire and Vermont. This program utilizes continuous roadway monitoring software to measure conditions on the bridge deck. When sensors indicate unsafe conditions the system automatically applies chemical treatments on the bridge deck; limiting environmental impacts to the Connecticut River below.

Did you know that Towns can...

- » Implement regulations and bylaws for road salt application for town roads, private plowing contractors, parking-lot owners and residential driveways and walkways.
- » Pre-treat roads with salt brine to prevent ice buildup and reduce the amount of salt needed during a storm.
- » Equip plow trucks with slat calibration devices so that less salt can be applied in designated reduced salt zones.
- » Keep accurate records of salt application amounts per storm.
- » Prohibit dumping or plowing snow into rivers, streams, lakes or frozen water bodies or their buffer areas.
- » Recover sand and prevent it from running off to rivers, streams and lakes.



CONTACT INFORMATION AND LINKS

BAYSTATE ROADS PROGRAM
<http://baystateroads.eot.state.ma.us/>

FOR MORE INFORMATION, PLEASE CONTACT

Pioneer Valley Planning Commission

413-781-6045

60 Congress Street, Floor 1
Springfield, MA 01104-3419

www.pvpc.org



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Stormwater Management

THE CHALLENGE OF STORMWATER

Stormwater runoff is a real problem for cities and towns in the Connecticut River Valley. Stormwater can contain oil, grease, metals, chemicals and sediment that pollute our rivers, lakes, ponds, and aquifers. Without proper management and control, stormwater can cause serious erosion and flooding, destroy aquatic life, deplete groundwater, close waterways to recreation, and result in toxic algae blooms.

The construction of new subdivisions and commercial development can increase stormwater runoff from impervious surfaces such as buildings, parking lots, and roadways. In contrast, undeveloped land and Low Impact Development (LID) stormwater management techniques such as rain gardens, grassed swales and pervious pavers can filter polluted runoff, provide flood control, and slow the flow of water. Redevelopment of downtown areas, which generally have a high concentration of impervious surfaces, and Brownfield properties can present an opportunity for incorporating better stormwater management strategies such as LID techniques.



Rain Garden at Riverfront Park in Orange, MA.



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MANAGEMENT STRATEGIES AND STANDARDS

Local governments are responsible for managing stormwater to insure that new development does not diminish the safety and health of or the quality of the environment in their communities. There are a number of strategies and standards your community should consider to improve stormwater management and encourage development that protects your drinking water, wetlands, rivers, ponds and aquifers and safeguards structures and property. Towns can take a comprehensive approach by adopting a Stormwater Management Bylaw or Ordinance; most will need to manage the problem incrementally by:

- » Encouraging the use of Low Impact Development (LID) techniques by developers.
- » Adopting LID Standards in your zoning.
- » Requiring LID techniques to be used in aquifer recharge areas or other environmentally sensitive areas by adding language to an existing overlay district or creating a new overlay district.
- » Requiring Site Plan Review of all development proposals to encourage environmentally sensitive site design and the use of LID techniques.
- » Enacting source controls, pollution prevention standards and/or erosion and sediment regulations.



Pervious pavers used for the walkways at Riverfront Park in Orange, MA.



HELP IS ON THE WAY

Stormwater management is complicated and not easily implemented at the local level where it is most needed and important. However, if your town wants assistance help is available from your Regional Planning Commission or Agency, which will work directly with you to develop strategies to manage stormwater that fit the needs of your community. Also, the State has guidance documents, circuit rider programs, and an internet site that can help you understand stormwater management.

There are 9 Regional Planning Commissions in the Tri-State Watershed that are available to help watershed towns:

Massachusetts – Pioneer Valley Planning Commission and Franklin Regional Council of Governments;

New Hampshire – Southwest Regional Planning Commission, Upper Valley Lake Sunapee Regional Planning Commission, and North Country Council;

Vermont – Windham Regional Planning Commission, Southern Windsor County Regional Planning Commission, Two Rivers Ottauquechee Regional Commission, and Northeast Region Development Association.

The most common site design techniques used to minimize the creation of new runoff, enhance groundwater recharge, and remove suspended solids and other pollutants.

- » Minimize impervious surfaces
- » Fit the development to the terrain
- » Preserve and capitalize on natural drainage systems
- » Use LID stormwater management techniques

STATE RESOURCES

Each state has different resources that can help you understand stormwater management including publications, workshops, websites and circuit riders. For the big picture, explore the EPA web site at

www.epa.gov/nps/

Massachusetts

2008 MASSACHUSETTS REVISED STORMWATER MANAGEMENT STANDARDS AND STORMWATER HANDBOOK

<http://projects.geosyntec.com/NPSManual/>



MASSACHUSETTS NONPOINT POLLUTION SOURCE MANAGEMENT MANUAL
<http://www.mass.gov/dep/water/wastewater/stormwat.htm>

LOW IMPACT DEVELOPMENT TECHNIQUES
http://www.mass.gov/envir/smart_growth_toolkit/pages/SG-slides-lid.html

New Hampshire

NEW HAMPSHIRE DEPARTMENT OF ENVIRONMENTAL SERVICES WATER DIVISION
<http://des.nh.gov/organization/divisions/water/stormwater/>

NEW HAMPSHIRE STORMWATER MANUAL
<http://des.nh.gov/organization/divisions/water/stormwater/manual.htm>

UNIVERSITY OF NEW HAMPSHIRE STORMWATER CENTER
<http://www.unh.edu/erg/cstev/>

Vermont

VERMONT DEPARTMENT OF ENVIRONMENTAL CONSERVATION STORMWATER MANAGEMENT SECTION
<http://www.anr.state.vt.us/dec/waterq/stormwater.htm>

VERMONT EROSION PREVENTION AND SEDIMENT CONTROL FIELD GUIDE
http://www.vtwaterquality.org/stormwater/docs/construction/sw_vermont_field_guide.pdf

VERMONT BETTER BACKROADS
<http://www.vt.nrcc.usda.gov/rc&d/bbcoverpage.html>

VT LID BROCHURE AND TOWN GUIDE
<http://swcrpc.org/wp/programs/watershed-and-basin-planning/Federal>

FOR MORE INFORMATION, PLEASE CONTACT

Pioneer Valley Planning Commission

413-781-6045

60 Congress Street, Floor 1
Springfield, MA 01104-3419

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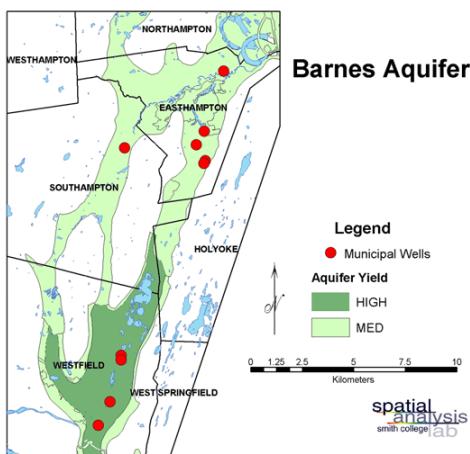
Memorandums of Understanding

WHY ARE MEMORANDUMS OF UNDERSTANDING (MOU) IMPORTANT?

MOUs encourage and support solutions to issues and problems that extend beyond individual municipal borders. In the 21st Century, many growth problems cannot be solved at the local level, and the traditional New England community-based form of government can seem like a disadvantage. However, regional solutions such as intergovernmental compacts and regional funding initiatives can help to address these regional growth concerns.

WHAT IS AN MOU AND HOW DOES IT FUNCTION?

MOUs, also called cooperative agreements or intergovernmental compacts, formally enable communities to work together toward achieving a specific goal. Specific functions enabled by an MOU might include joint review and comment on local land use permits, design and engineering studies, long-term land protection, public education, emergency response actions, and securing funding.



Regional MOU for the protection of the Barnes Aquifer enacted in 1989



BARNES AQUIFER PROTECTION ADVISORY COMMITTEE (BAPAC)

The Barnes Aquifer is the second largest regional aquifer in Massachusetts, provides drinking water to over 40,000 persons in Westfield, Holyoke, Easthampton and Southampton, and is a federally designated “Sole Source Aquifer” in portions of Easthampton, Holyoke and Southampton. The Barnes Aquifer Protection Advisory Committee (BAPAC) was formed in 1989 through an intergovernmental compact to protect this important resource. The compact was signed by all four communities and the Pioneer Valley Planning Commission, each with appointed representatives to BAPAC. BAPAC has advisory powers to work with communities on aquifer protection strategies, public outreach and education, and to review and comment on developments of regional impact.

DID YOU KNOW...

Intergovernmental compacts such as Mutual Aid Agreements have been very important in dealing with regional concerns. Such intergovernmental compacts can be used to deal with a host of regional concerns such as the protection of aquifers, rivers, or mountain ranges that extend beyond the boundaries of a single community. The issue of limited resources in smaller communities can also be addressed through regional efforts such as sharing staff (Building Inspectors) and/or equipment (snow plows, graders, etc.).

CASE STUDIES FROM THE PIONEER VALLEY

Connecticut River Cleanup Committee

Memorandum of Agreement

In 1999, an intergovernmental compact for Connecticut River Cleanup was adopted by the communities of Springfield, Chicopee, Holyoke, Ludlow, South Hadley and the PVPC. This compact has allowed the region to work successfully to secure federal funding earmarks totaling over \$10 million over the past decade. The Connecticut River Cleanup Committee (CRCC) has been effective in educating elected officials and the general public about combined sewer overflow issues. CRCC has also secured grants from the state and federal programs, and has established an effective stormwater committee.





Connecticut River and the City of Springfield



Mount Tom and Mount Holyoke Range Memorandum of Agreement

In late 2003, five municipalities and 10 organizations signed a Memorandum of Agreement (MOA) for the Protection of the Mount Tom and Mount Holyoke Ranges. The unique features and location of the Mt. Tom and Mt. Holyoke Ranges in Western Massachusetts, along with the threat of inappropriate development, has led to continuing efforts to protect this area. The ranges are the single most prominent natural feature of the Pioneer Valley and provide a backdrop to the daily lives of citizens throughout the region. The MOA created a committee, the Summit Land Use Task Force, which is comprised of representatives from municipalities, the Commonwealth of Massachusetts, and non-governmental organizations. The agreement states that the purposes of the Task Force are: (1) To advocate for the protection of the unique attributes of the Mt. Tom and Mt. Holyoke Ranges; (2) To improve and coordinate zoning and land use regulation in the Mt. Tom and Mt. Holyoke Ranges to achieve community goals; (3) To assist communities and agencies in efforts to protect the Mt. Tom and Mt. Holyoke Ranges; (4) To educate the general public in regard to issues, threats and opportunities facing the Mt. Tom and Mt. Holyoke Ranges.

FOR MORE INFORMATION, PLEASE CONTACT

Pioneer Valley Planning Commission

413-781-6045

60 Congress Street, Floor 1
Springfield, MA 01104-3419

www.pvpc.org

Community Preservation Act

WHAT IS THE COMMUNITY PRESERVATION ACT?

The Community Preservation Act is statewide enabling legislation in Massachusetts giving communities the authority to create a Community Preservation Fund by placing a surcharge on local property tax. The Act allows Massachusetts communities to establish a reliable funding source for open space, historic resources, and community housing purposes.

HOW CAN MY COMMUNITY ENACT THE COMMUNITY PRESERVATION ACT?

The Community Preservation Act must be voted on as a referendum at a local or state election. The Community Preservation Act may be placed on the ballot either through legislative body action (Town Meeting vote) or through a citizen's petition signed by at least 5% of the registered voters. The ballot question must include the percentage of the property tax surcharge. A majority of voters must approve the referendum to enact the Community Preservation Act.

Once the community enacts the Community Preservation Act, the community is then required to create a local community preservation committee responsible for studying the needs, possibilities, and resources of the city or town regarding community preservation. This committee is charged with making recommendations to the local legislative body for the acquisition, creation, and preservation of four community preservation interests: open space, historic resources, land for recreational use, and community housing. The committee may also recommend that moneys be spent to rehabilitate or restore any resources acquired or created through the community preservation fund.

HOW CAN MY COMMUNITY USE THE COMMUNITY PRESERVATION FUNDS?

Of the fund's annual revenues, a minimum of 10 percent each must be directed to open space (not including recreation lands), historic resources, and community housing issues. The remaining 70 percent of the funds may be used for any combination of community preservation issues, including recreational uses, deemed appropriate by and for the community.



IS THERE A STATE MATCH AND HOW IS IT FUNDED?

The commonwealth will provide matching funds through a new Massachusetts Community Preservation Trust Fund, which will be financed through surcharges on certain fees of the registers of deeds.

HOW IS THE STATE MATCH DISTRIBUTED?

The state matching funds will be distributed in up to three (3) funding rounds. The first round distributing 80% of the state funds raised is the Match Distribution round. Each community that has enacted the Community Preservation Act will receive the same percentage match (5-100%) against the total money raised through their surcharge. The current match value is 35%.

The second and third rounds of funding are available for those communities who have adopted the maximum 3% surcharge. The eligible communities will be ranked based on property valuation per capita and population. The funds will be distributed based on the community's ranking.

HOW MUCH WOULD THE CPA SURCHARGE BE?

The following example of potential CPA Surcharges are based on the FY08 Tax Rate of \$13.30 per \$1,000 assessed property value. The table illustrates potential surcharges from 1 to 3% for property valued between \$100,000 to \$300,000 and, potential surcharge amounts when the first \$100,000 assessed value is exempted from the surcharge.

CPA Surcharge Calculator:

TOWN: Tax rate:	Ware \$13.30	CPA surcharge for house valued at:					
CPA %	Exemption	\$300,000	\$250,000	\$200,000	\$150,000	\$100,000	
3	none	\$119.70	\$99.75	\$79.80	\$59.85	\$39.90	
2	none	\$79.80	\$66.50	\$53.20	\$39.90	\$26.60	
1	none	\$39.90	\$33.25	\$26.60	\$19.95	\$13.30	
3	first \$100K	\$79.80	\$59.85	\$39.90	\$19.95	\$0.00	
2	first \$100K	\$53.20	\$39.90	\$26.60	\$13.30	\$0.00	
1	first \$100K	\$26.60	\$19.95	\$13.30	\$6.65	\$0.00	



Other populations that can be exempted from any surcharge under the Community Preservation Act include:

- » low to moderate income households
- » the elderly
- » the full value of commercial/industrial properties in communities with a classified tax structure

FOR MORE INFORMATION ON THE COMMUNITY PRESERVATION ACT, VISIT:
<http://www.communitypreservation.org/>

FOR MORE INFORMATION, PLEASE CONTACT

Pioneer Valley Planning Commission

413-781-6045

60 Congress Street, Floor 1
Springfield, MA 01104-3419

www.pvpc.org



Green Development Performance Standards

WHAT ARE THE OBJECTIVES OF GREEN DEVELOPMENT PERFORMANCE STANDARDS?

The purpose of these standards is to promote high quality and greener developments that also preserve and enhance natural resources and the environment. Green development techniques also protect the quantity and quality of drinking water supplies.

WHY DO WE NEED GREEN DEVELOPMENT PERFORMANCE STANDARDS?

Unregulated new development can have severe impacts on the landscape and environment, including the destruction of trees, wildlife habitat, landscape features, open space and scenic views, the generation of water pollution, heat and light pollution, traffic and excessive waste, and the use of excessive energy and water resources. Green Development Performance Standards can address all of these issues, and promote greener, better quality development with less environmental and energy impacts.

HOW DO GREEN DEVELOPMENT PERFORMANCE STANDARDS WORK?

Green development standards are established in the Zoning Bylaw and are implemented by the Planning Board and Building Inspector through the Site Plan Review or Subdivision review processes. Single family and two-family residential uses must receive Planning Board approval under Limited Site Plan Review and comply with applicable Green Development Performance Standards. Commercial, industrial and civic projects must undergo full Site Plan Review. Review and approval of subdivisions also includes Green Development Standards.

The Green Development Performance Standards address the following issues: limits to site disturbance; tree preservation; passive solar siting; site and context assessment; energy efficiency; landscaping and water reduction; farmland preservation; parking and trip reduction; hazardous materials; heat island reduction; light pollution reduction; recycling; construction waste management; and pedestrian and bicycle access.





Incentives are offered for green development projects that include permeable pavement, a green roof or additional projected open space. Incentives can include additional lot coverage, reduction of parking requirements, and reduction of stormwater detention requirements.

HOW CAN GREEN DEVELOPMENT PERFORMANCE STANDARDS PROTECT OUR DRINKING WATER?

The quality and quantity of drinking water is protected by retaining more of the landscape in its natural state, with native vegetation and natural water drainage patterns. Groundwater recharge is promoted by use of permeable pavement. Water conservation is promoted by minimizing lawn area, use of plants not requiring irrigation, re-use of captured rainwater for watering, and low impact development practices such as rain barrels and rain gardens.



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HOW AND WHERE ARE GREEN DEVELOPMENT PERFORMANCE STANDARDS WORKING?

PVPC developed a model set of Green Development Performance Standards in cooperation with the Town of Palmer, MA. To date, these standards have not yet been adopted.

FOR MORE INFORMATION, PLEASE CONTACT

Pioneer Valley Planning Commission

413-781-6045

60 Congress Street, Floor 1

Springfield, MA 01104-3419

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Rivers Protection Bylaws

WHAT ARE THE OBJECTIVES OF A LOCAL RIVERS PROTECTION BYLAW?

To increase community control over activities on riverfront areas not regulated by the Massachusetts Rivers Protection Act. Although the Rivers Protection Act does offer communities an opportunity to protect river areas, additional regulation may be needed to protect water supplies fed by rivers.

WHY DO WE NEED LOCAL RIVERS PROTECTION BYLAWS?

River channels, riverbank areas, and floodplains are rich ecological areas, providing habitat for a diverse array of birds, fish, plants, and animals. Linear river channels function as wildlife corridors for migrating birds, anadromous fish, and many animals. Rivers also attract people, being ideal places to hike, fish, boat, and enjoy nature. Floodplains are important natural flood storage areas, that if left undeveloped, can help prevent flood damages and save lives in the event of a major flood. However, rivers are under considerable development pressure for a variety of uses, including housing developments, dams and hydroelectric facilities, and recreational activities.

HOW DO LOCAL RIVERS PROTECTION BYLAWS WORK?

A River Protection Overlay District can be designated for a portion of the riverbank from the shoreline landward up to an established distance from each bank. Uses permitted as a matter of right should be limited to those consistent with the scenic qualities of the river, such as agricultural production, recreational uses, reasonable emergency procedures, conservation measures, and residential development on lots with frontage on an existing way (Approval Not Required Development). Residential subdivision in the district can be required to include mandatory clustering, and be located away from the shoreline to the maximum practical extent. River protection districts can also be designed to incorporate floodplain regulations. These regulations prevent development within the floodplain that might increase flood levels and velocities, or cause flood damages due to unanchored materials.



HOW DO LOCAL RIVERS PROTECTION BYLAWS PROTECT WATER SUPPLIES?

Many public water supply wells are located close enough to rivers to induce infiltration from the river into the well's zone of contribution when the well is pumping. In other areas, rivers directly flow into a water supply reservoirs. A River Protection Overlay District can protect river water quality by establishing greater setbacks for new development from the riverbank, prohibiting hazardous land uses in the district, and establishing performance standards for other uses.



Westfield River, Chester, MA

CASE STUDY: WESTFIELD RIVER – NATIONAL WILD AND SCENIC RIVER

The Westfield River has been designated as a National Wild and Scenic River along a 78-mile section of the East Branch, Middle Branch and West Branch of the Westfield River. The corridor width is 200 feet wide from mean high water, corresponding to the width of the Massachusetts River Protection Act. The National Park Service identified outstandingly remarkable values on the Westfield River, including cold water fisheries, recreational amenities, historic resources, historic villages, unique geologic features, rare and endangered species and biodiversity habitat, as well as one of the largest roadless wilderness areas remaining in Massachusetts.



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Did you know river protection design standards can:

- » Require all structures to be located at an established setback (i.e., 100 feet) from the shoreline and be visually screened from the shoreline by a vegetated buffer;
- » Protect the scenic and environmental integrity of the district by prohibiting certain uses that alter the landscape or are hazardous;
- » Require each structure be integrated into the existing landscape to minimize its scenic and environmental impact;
- » Require runoff to be directed toward areas covered with vegetation; and,
- » Prohibit clear cutting of existing vegetation and minimize disruption of wildlife habitat.

In 1993, after years of study, adding protective bylaws, and working with an advisory committee composed of landowners and residents of Becket, Chester, Middlefield, Chesterfield, Worthington and Cummington, Pioneer Valley Planning Commission and Westfield River Watershed Association, 43 miles of the Westfield River were initially designated as a National Wild and Scenic River. In October 2004, the reach of the Wild and Scenic designation was expanded so that it now encompasses over 78 miles of river corridor, and ten communities.

PVPC drafted an intergovernmental compact for managing the river, which led to the creation of a Westfield River Wild and Scenic Advisory Committee. The MOA and Westfield River Greenway Plan outline other river protection strategies including: river protection bylaws; voluntary conservation restrictions; increasing the maintenance at river access points; grants for selected land acquisitions or improvements; riverbank beautification; and salmon restoration.

FOR MORE INFORMATION, PLEASE CONTACT

Pioneer Valley Planning Commission

413-781-6045

60 Congress Street, Floor 1

Springfield, MA 01104-3419

www.pvpc.org



Site Plan Review

WHAT ARE THE WATER PROTECTION OBJECTIVES OF SITE PLAN REVIEW?

Site Plan Review allows local governments a mechanism to review site specific development impacts to insure appropriate erosion and sedimentation controls are in place.

WHY DO WE NEED SITE PLAN REVIEW FOR WATER QUALITY?

Protecting the quality and quantity of clean drinking water is important to all communities. Many different methods of protecting and conserving clean drinking water have been used throughout history. One technique used in many communities throughout New England today is the “Site Plan Review” process when changes are made to the land. Site Plan Review allows site specific consideration of development impacts on water quality.

HOW DOES SITE PLAN REVIEW WORK?

Site Plan Review ensures municipal development requirements for certain types of non-residential or multi-unit residential development or re-development projects are adhered to. The plan typically must show buildings, parking areas, landscaping, drainage and other installations on the lot, and their relationship to existing conditions such as roads, neighborhood land uses, natural features, public facilities, ingress and egress roads, interior roads, and similar features. Site Plan Review is an extremely important method to insure that uses permitted by the zoning ordinance are constructed on a site in such a way that they fit into the area without causing drainage, traffic, or lighting problems.

HOW DOES SITE PLAN REVIEW PROTECT WATER QUALITY?

In order to protect water quality through the Site Plan Review process, towns must first identify water resources throughout their town, including all past, present and future possible sources of drinking water for the community from both above-ground and below-ground sources. Once these sources are identified, the watersheds from which these sources are recharged are determined (water sources are recharged by all rainwater and snowmelt that falls within the watershed and flows downhill to the water source). These watersheds can be known as “Water Supply Watersheds.” Mapping water supply sources and their watersheds can be done by drawing sources on a copy of a town map or by using a geographic information system. The United States Geological Survey has produced a map of potential underground aquifers throughout New England.



During the site plan review process, care should be taken to look for threats to surface water and groundwater such as: excessive runoff, toxic chemicals (including those from cars and parking lots), excessive impervious area, cutting of vegetation on steep slopes, excessive removal of native species, lack of adequate reclamation techniques for disturbed sites, poor stormwater management. Site plan and site design review checklists can be made so that a reviewer or team of reviewers has a list of all the factors they should be reviewing.

Cities and towns should first establish zoning ordinances and the site plan review process.

Massachusetts:

Massachusetts General Law Chapter Chapter 40A, the state Zoning Act, contains no specific reference to site plan review, but has been recognized in the courts of Massachusetts as a permissible regulatory tool for controlling “aesthetics and environmental impacts of land use”. This zoning tool is entirely the creation of local ordinances and bylaws, and as a result, the scope of site plan review, as well as the procedures and criteria, are dependent to a large extent on the contents of the individual ordinance or bylaw adopted by the municipality.

Generally, site plan review bylaws and ordinances establish criteria of the layout, scale, drainage, screening, lighting, stormwater maintenance, and other aspects to arrive at the best possible design for a project. Site Plan Review is used in a variety of manners by communities in Massachusetts. Some communities have attached Site Plan Review to the Special Permit process, and procedure for review is consistent with Special Permit review procedure addressed in MGL Chapter 40A, Section 9. Other communities have adopted Site Plan Review to be used with as-of-right uses and allow the reviewing body to impose conditions that do not have the effect of prohibiting the use.

Whether a community decides to adopt Site Plan Review for as-of-right uses, or attached to a Special Permit, the municipality can ensure that one of the criteria for approval is the prevention of pollution of surface and groundwater, soil erosion, increased runoff, and flooding and protection of wetlands, watersheds, aquifers, and well areas. The municipality can also encourage the use of Low Impact Development standards as part of the development process.

New Hampshire:

In New Hampshire, the authority to create zoning laws is presented in the state's land use planning laws under Revised Statutes Annotated (RSA) 674:16, and the power to establish the site plan review is under 674:43.

In New Hampshire, RSA 674:44 describes the following qualifications for the site plan review process. Projects must:



- » Provide a safe and attractive development, change or expansion
- » Guard against danger or injury to health, safety or prosperity by reason of inadequate protection of the quality of groundwater or any discharge into the environment which might prove harmful to persons, structures or adjacent properties.

Site plan review handbooks like the one that New Hampshire's Office of Energy and Planning has produced¹ contain requirements for stormwater management, erosion control, perimeters around existing and proposed wells for drinking water, and provisions for requiring state-approved septic systems where applicable.

Towns that adopt zoning ordinances and site-plan review gain the ability to find threats to groundwater and surface water prior to developments, changes or expansions. By working with developers, engineers or citizens in the site-plan review process, adequate protection measures can be discussed and agreed upon early in the process and avoid costly retro-fitting during or after construction. Well-planned sites will help towns to protect both the quality and quantity of drinking water supplies.

Towns can encourage retro-fit of large parking areas during re-development to implement low impact development (LID) strategies. LID can be used in new development and re-development to insure stormwater remains on-site.

In order to protect surface and groundwater resources, cities and towns should exercise their right to institute zoning laws and the site-plan review process. By working with site developers, engineers and citizens early in the process, water resources can be protected and conserved. By encouraging all parties to negotiate in good faith early in the process, wise use of the land can be discussed and implemented in the site plan, so that costly re-design or retrofitting can be avoided.

HOW AND WHERE IS SITE PLAN REVIEW USED TO PROTECT WATER QUALITY?

One of the primary functions of site plan review is to protect water quality. Most towns and cities with site plan review require evaluation of drainage from the site during and after construction. A New Hampshire model and municipal examples are available on line at:

<http://www.nh.gov/oep/resourcelibrary/referencelibrary/s/siteplanreview/index.htm>.



EXAMPLES

References

NEW HAMPSHIRE OFFICE OF ENERGY AND PLANNING SITE PLAN REVIEW HANDBOOK:

<http://www.nh.gov/oep/resourcelibrary/referencelibrary/s/siteplanreview/documents/subdivisionandsiteplanreviewhandbook.pdf>

HANOVER, NH SITE PLAN REVIEW REGULATIONS:

[http://www.hanovernh.org/stories/storyReader\\$86](http://www.hanovernh.org/stories/storyReader$86)

<http://web.valley.net/files/hanovernh/SitePlanRegulations.pdf>

LEBANON, NH SITE PLAN REVIEW REGULATIONS:

http://lebanonnh.virtualtownhall.net/public_documents/LebanonNH_PlanDocs/SPRREGS.PDF

LEBANON, NH SITE PLAN REVIEW CHECKLIST:

http://lebanonnh.virtualtownhall.net/public_documents/LebanonNH_PlanDocs/Applications/Siteplan%20check.pdf

Contact Information and Links

NH OFFICE OF ENERGY AND PLANNING:

www.nh.gov/oep

FOR MORE INFORMATION, PLEASE CONTACT

Pioneer Valley Planning Commission

413-781-6045

60 Congress Street, Floor 1

Springfield, MA 01104-3419

www.pvpc.org



Transfer of Development Rights

WHAT IS THE OBJECTIVE OF A TRANSFER OF DEVELOPMENT RIGHTS BYLAW?

With the adoption of a Transfer of Development bylaw, communities can preserve farmlands, open space and environmentally sensitive areas such as aquifer recharge areas by directing growth away from lands that should be preserved, to areas well suited for higher density development, such as village centers and areas with adequate infrastructure.



Econolodge in Hadley used the TDR bylaw to reduce the amount of parking

WHY DO WE NEED A TRANSFER OF DEVELOPMENT RIGHTS BYLAW?

Conventional low-density residential zoning allows for wide tracts of land to be developed as sprawl. Conversely, in areas that have emerged as potential community centers, existing zoning may not allow for density levels appropriate to a vibrant commercial or mixed-use district.



TDR provides another option for preserving farmland and open space, which benefits the community, farmers, landowners and businesses. Land is protected without needing public funds. TDR allows more options for businesses to expand in current business zones. TDR promotes creation of compact neighborhood-style residential developments to reduce sprawl. It is completely voluntary, and landowners only participate if they choose to do so.

HOW DOES A TRANSFER OF DEVELOPMENT RIGHTS BYLAW WORK?

Communities identify specific preservation areas as “Sending Areas” and specific development districts as “Receiving Areas”. The TDR bylaw allows development rights to be purchased in the Sending Area and transferred to the Receiving Area for use in more compact residential or business development projects. Project proponents can either purchase development rights directly from farmers or landowners, or can make a cash contribution to the community for purchasing agricultural or open space preservation restrictions.

The amount of money required to purchase these development rights is generally negotiated between the landowners, based on market values. In return for the purchase, landowners in the sending area place a deed restriction on their property. Developers who buy development rights are acquiring the capacity to build higher density on existing lots in a receiving area.

DID YOU KNOW...

The Town of Hadley has had a total of four TDR projects, generating a total of \$338,772 in TDR payment-in-lieu funds. This money has been used to offset the match requirements for APR purchases in the community. As a result, the town has been able to protect over 239 acres, valued at over \$3 million in APR price.

EXAMPLES FROM THE PIONEER VALLEY

Transfer of Development Rights Bylaw in Easthampton, Hadley, Hatfield, and Westfield

Transfer of Development Rights (TDR) bylaw is used to protect valuable working agricultural lands and promote compact development in identified growth centers. TDR bylaws have been adopted in Hadley, Easthampton, Hatfield, and Westfield. The bylaw works by creating two new zoning districts: a Farmland Preservation District and a Receiving District. Development rights can be purchased from the Farmland Preservation District and transferred to the Receiving District to be used for residential, commercial, or industrial development projects. This bylaw essentially moves green space from the Receiving District to the Farmland Preservation District. Adoption of this bylaw can provide a community with another option for farmland protection, and give developers more options for development in already existing growth centers.





For more information on examples of Transfer of Development Rights from across Massachusetts, please refer to the state's Smart Growth / Smart Energy Toolkit developed by the Executive Office of Energy and Environmental Affairs.

FOR MORE INFORMATION, PLEASE CONTACT

Pioneer Valley Planning Commission

413-781-6045

60 Congress Street, Floor 1

Springfield, MA 01104-3419

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Water Supply Protection Overlay Districts

WHAT ARE THE OBJECTIVES OF A WATER SUPPLY PROTECTION OVERLAY DISTRICT?

Protecting the quality and quantity of clean drinking water is important to all communities. Many different methods of protecting and conserving clean drinking water have been used since the earliest days of civilization. Today many communities throughout New England create Water Supply Protection Overlay Districts to identify water resources and the areas draining to those resources and regulate land use activities within those districts for the protection of the water supply.

WHY DO WE NEED A WATER SUPPLY PROTECTION OVERLAY DISTRICT?

Controlling land uses in areas that could impact water supplies can prevent contamination and overuse. Clean water is essential for our health and survival. Protecting this valuable resource is a best practice.

HOW DOES A WATER SUPPLY PROTECTION OVERLAY DISTRICT WORK?

To create a Water Supply Protection District, cities and towns must first identify water resources throughout their town, including all past, present and future possible sources of drinking water from both above-ground and below-ground sources. Once these sources are identified, the watersheds from which these sources are recharged are determined (water sources are recharged by all rainwater and snowmelt that falls within the watershed above the source and flows downhill to the water source). Mapping water supply sources and their watersheds can be done by drawing sources on a copy of a town map or by using a geographic information system. Maps of both surface water and potential groundwater sources from underground aquifers throughout New England are available from the United States Geological Survey.

Exact locations of large public water supplies should be distributed only to those who need the information. Having exact locations widely known and available may be a threat to the public water supply.



HOW CAN THE WATER SUPPLY PROTECTION OVERLAY DISTRICT PROTECT OUR DRINKING WATER?

Once the boundaries of the water supply district are determined, cities and towns will then decide what protection and conservation measures should be put in place in these districts. Some examples might include limiting high-risk uses in the district such as heavy industry, restrictions or control of substances that could contaminate drinking water, requiring buffers or setbacks from wells, wetlands and other surface waters in the district, or requiring or encouraging low-impact or no-impact stormwater management systems of any projects or improvements that are proposed in the district. Low-impact stormwater management can be addressed through the use of the water supply district and the implementation of a site-plan review process for developments.

Some communities have chosen to use both regulations and incentives in water conservation districts. Regulations determine what may and may not be done in a certain area. Incentives provide for credits or rebates for using low-impact development techniques (LIDs) and best-management practices (BMPs).

HOW AND WHERE ARE WATER SUPPLY PROTECTION OVERLAY DISTRICTS WORKING?

A few towns have water supply protection districts including Exeter and Newmarket, New Hampshire. You can view these ordinances on-line at

http://des.nh.gov/organization/divisions/water/dwgb/dwspp/ordinance_zoning.htm

The NH Office of Energy and Planning and the Department of Environmental Services work cooperatively in providing guidance for water supply protection in New Hampshire. In Vermont, it is the Agency of Natural Resources at <http://www.anr.state.vt.us/DEC/watersup/swapp.htm>. In Massachusetts, it is the Department of Environmental Protection.



REFERENCES

NH DEPARTMENT OF ENVIRONMENTAL SERVICES, INNOVATIVE LAND USE PLANNING GUIDE:

http://des.nh.gov/organization/divisions/water/wmb/repp/documents/ilupt_chpt_2.5.pdf

EPA MODEL SURFACE WATER AND GROUNDWATER PROTECTION ORDINANCES:

US EPA -

<http://www.epa.gov/owow/nps/ordinance/osm7.htm>

<http://www.epa.gov/owow/nps/ordinance/mol7.htm>

THE STORMWATER CENTER, MODEL ORDINANCE FOR AQUIFER PROTECTION DISTRICT:

http://www.stormwatercenter.net/Model%20Ordinances/Source_Water_Protection/Aquifer%20district%20ordinance.htm

MASSACHUSETTS MODEL GROUNDWATER ORDINANCE:

<http://www.mass.gov/dep/water/modgwpd.pdf>

TOWN OF GRAFTON, MASSACHUSETTS, WATER SUPPLY PROTECTION OVERLAY DISTRICT ORDINANCE:

http://www.town.grafton.ma.us/Public_Documents/GraftonMA_Planning/Documents/ZBL/Grafton%20ZBL%202008%20Section%207.pdf

MAP SAMPLE, WATER SUPPLY PROTECTION OVERLAY:

http://www.southhadley.org/Pages/SouthHadleyMA_Planning/maps/ZoningMap.pdf

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60 Congress Street, Floor 1

Springfield, MA 01104-3419

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Wetlands Bylaws

WHAT ARE THE OBJECTIVES OF A LOCAL WETLANDS BYLAW?

To increase community control over activities in or near wetland resource areas by imposing stronger protective measures, or increase the jurisdictional area, than the Massachusetts Wetlands Protection Act (G.L. Ch. 131 §40). Although the Wetlands Protection Act does offer communities an opportunity to protect river areas, additional regulation may be needed to protect water supplies hydrologically connected to wetlands.

WHY DO WE NEED LOCAL WETLANDS BYLAWS?

Wetlands are rich ecological areas, providing habitat for a diverse array of birds, amphibians, plants, and animals. Preserved wetlands and woodlands provide significant public health benefits in the form of clean drinking water, groundwater recharge, healthy fisheries, and recreational areas.

The Wetlands Protection Act is limited to protecting only eight wetland values and covers vegetated wetlands, flood prone areas and other listed resource areas if they border bodies of water. Vernal pools are protected only if they occur in resource areas. Communities usually wish to regulate work over more resource types including isolated vegetated wetlands, vernal pools, and other resources not linked to water bodies and also including adjacent upland areas, work on which may affect wetlands and floodplains.

Did you know that local wetlands bylaws can:

- » Expand Conservation Commission jurisdiction
- » add wetland values warranting local protection
- » Tighten permit and hearing procedures
- » Establish filing and consultant fees
- » Confer authority on the Commission to adopt its own regulations, and
- » Clarify the power to disapprove work in or affecting wetlands and floodplains.

HOW DO LOCAL WETLANDS BYLAWS WORK?

Local Wetland Bylaws are generally administered by the local Conservation Commission in tandem with their local administration of the Wetlands Protection Act. Both state and local standards must be observed. If the municipality holds a dual hearing, for example, it must be advertised, mentioning in the notice both the local law and state Act. If the terms of the two permits differ, this must be made clear in the text of each.



HOW DO LOCAL WETLANDS BYLAWS PROTECT WATER SUPPLIES?

Many lakes, rivers, and aquifers are important local sources of drinking water and require special protection. Open space adjacent to water bodies and over aquifers can help assure good water quality as well as recharge groundwater supplies. Vegetated uplands and wetlands in these watersheds filter pollutants and collect sediments from stormwater running across the land surface.

HOW AND WHERE ARE WETLANDS BYLAWS WORKING?

More than half of the 351 towns and cities in Massachusetts have adopted local wetlands bylaws or ordinances, taking a variety of approaches and using different formats (MACC, 2006).

CASE STUDY: CITY OF NORTHAMPTON, MA

The City of Northampton adopted a local Wetlands Bylaw administered by the Conservation Commission that includes Smart Growth principles encouraging infill development and a smaller environmental footprint in business and industrial zoned districts. Such provisions allow the Conservation Commission to waive performance standards over and above the state Act for such districts.

RESOURCES

Environmental Handbook for Massachusetts Conservation Commissioners, MACC, 2006

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60 Congress Street, Floor 1
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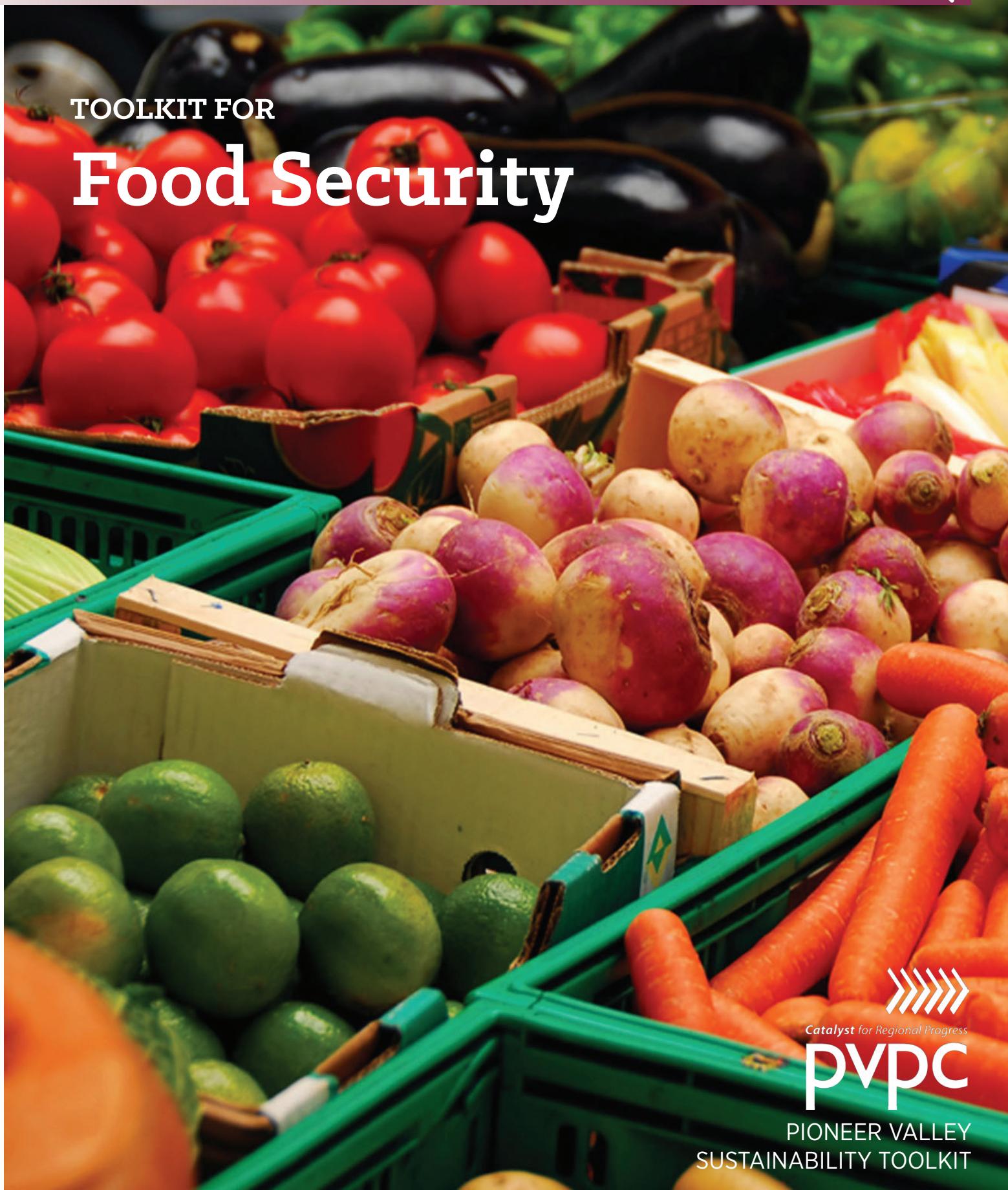
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TOOLKIT FOR

Food Security



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Community Gardens

Community gardens are a resource that many cities, even in the Pioneer Valley, use to increase local food accessibility. These gardens not only are a way to provide local produce, but they increase social interactions and bring about other benefits. They also assist in reducing blighted areas by creating an active use in an area that is normally rundown and vacant. It is said that community gardens reduce the occurrence of crime and vandalism. Community gardens are collectively run and managed by the community, so food grown can be taken by those associated with the garden, or be sold at local farmers markets to collect money for additional tools for the garden. Community gardens can be either temporary or permanent based on location and other factors. They can be used as an educational tool to teach community members and youth about the importance of local and sustainable food systems.

Gardens can either be closed gate or open gate, meaning they are only allowed to be used by a certain group of people, or can be used by anyone in the community. It is strongly encouraged that community gardens should be open gate, so that everyone has equal access to running and taking advantage of the garden plots

HOW CAN THIS BE IMPLEMENTED?

Verify the zoning codes first to ensure that certain targeted communities allow community gardens.

Assessing best locations to create community gardens is a good next step. Some areas that should be included -but are not limited to are low income neighborhoods, blighted areas, and schools zones. Pocket parks are also great locations for community gardens since it will bring more people to the determined area, and those already in the vicinity can learn about the community garden. Vacant lots are also good areas to establish community gardens. If the lot is privately owned, the community will clean up the parcel and put it to good use, which often times is an incentive for the owner to allow it. There would be no financial loss, and the plot of land would be maintained and utilized.

Affordable housing communities contain environmental justice populations, which tend to have a higher need for local and healthy fruits and vegetables. Community gardens increase social interactions, safety and sense of community in affordable housing environments.





Supplies and tools to start the community gardens can come in the form of donations from local stores, and residents. Continuous maintenance and need of supplies and seeds can come from the residents of the community who tend to take care of the garden, or from the organization overseeing the garden.

CHALLENGES COMMUNITY GARDENS ENCOUNTER

Management

Community gardens are management intensive. They demand patience, time and the capacity to work with and organize people and projects. They also typically require systems to enforce rules and resolve conflicts.

Maintenance

Community gardens are maintenance intensive. Grass will need to be mowed, equipment will need to be repaired, and plant debris will need to be composted, among other things.

Participation

From year to year, gardeners and garden leaders come and go from community gardens for a variety of reasons. Because of this, it can be challenging to maintain a sense of community and consistency at gardens.

Theft and vandalism

Theft and vandalism are commonplace at many community gardens. As a general rule, theft is the result of adult activity and vandalism is carried out by children.

Gardening skills

Many new and some returning gardeners don't know a lot about gardening. Gardeners who lack gardening skills and have poor gardening experiences may be more likely to give up.

Leadership skills

Many gardeners may not have the skills to take a leadership role at their respective garden.

Services and supplies

Plowing, tilling and the delivery of compost and mulch can be challenging services for gardeners to arrange for themselves.

Water

Most gardens need some way to irrigate fruits and vegetables during the summer. Finding a source of water can be challenging. Also, because most community gardens are located on borrowed land, installing a water hydrant may not be feasible or cost effective.



Site permanency

Most community gardens are located on borrowed land. This limits the amount of infrastructure that can be added to a particular site. It may also create an atmosphere of instability among gardeners since the garden could be lost at any moment.

TYPES OF COMMUNITY GARDENS

Youth/school gardens expose young people to gardening and nature, give them the opportunity to do some of their own gardening and/or educate them in a variety of subject areas. These gardens are typically associated with a formal or semi-formal program that incorporates classroom lessons with hands-on gardening activities. Gardens may be located on school grounds, at a community center, in neighborhoods or on other parcels of land.

Entrepreneurial/job training market gardens are typically established by nonprofit organizations or other agencies to teach business or job skills to youth or other groups. They grow and sell the produce they raise. Proceeds from the sale of garden products are used to pay the participants for their work. Programs typically rely on outside sources of funding to offset costs.

Communal gardens are typically organized and gardened by a group of people who share in the work and rewards. Plots are not subdivided for individual or family use. Produce is distributed among group members. Sometimes produce is donated to a local food pantry.

Food pantry gardens may be established at a food pantry, food bank or other location. Produce is grown by volunteers, food pantry clients, or both and donated to the food pantry.

Therapy gardens provide horticultural therapy to hospital patients and others. A trained horticulture therapist often leads programs and classes. Gardens may be located at hospitals, senior centers, prisons or other places. Demonstration gardens show different types of gardening methods, plant varieties, composting techniques and more.

Demonstration gardens located at working community gardens are often open to the general public for display and classes. They may be managed and maintained by garden members or a participating gardening group such as extension Master Gardeners, community members who receive training in home horticulture and then serve as volunteers to educate the public about gardening.



LINKS TO MORE INFORMATION

FOR MORE INFORMATION ABOUT ESTABLISHING A COMMUNITY GARDEN,
VISIT THE LINK BELOW

http://www.bostonnatural.org/cgOr_Resources.htm



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Agriculture in Malls

With a limited amount of space useable for agricultural processes, we need to start looking at more unique and creative locations to improve food accessibility. An ideal place for indoor agriculture is malls and shopping centers. With increasing vacant stores in malls and shopping centers, these underutilized spaces can be put to use by producing edible plants. Food grown in these areas can be sold to restaurants, retailers, at farmers markets, and directly to the public. If grown in malls, a direct sale to shoppers, ties in convenience. The mall gardens will raise awareness and popularity if it is viewed as being convenient for shoppers who are already shopping at the mall. Educational programs can be tied into the overall project to teach youth and the community about the importance of local, healthy sustainable food systems and urban agriculture. Agriculture in malls can be either a temporary or permanent use, based upon the location of where it is set up, popularity, or costs associated with it.

Gardens Under Glass

An example of urban agriculture in malls can be seen at the Galleria at Erieview Mall in Cleveland, Ohio. Between collaboration with the mall's owner and marketing director, agriculture brought into this commercial structure in an area that needed more locally grown food products. Through a system of hydroponics, the mall's glass atrium allows for the production of a variety of produce such as peppers, cucumbers, lettuce, tomatoes and herbs. The food grown is sold to local retailers and restaurants. A farmers market has been created once a week at the mall to sell the produce also to consumers and shoppers. The project has a sustainable aspect too. The hydroponic systems re-circulate wastewater from a nearby aquarium, reducing water consumption. For the future, a composting system is planned on being implemented that will recycle waste from the mall and will be used in the gardening. The project provides an educational component also. Workshops and learning sessions are frequently held to teach people about sustainable farming methods.

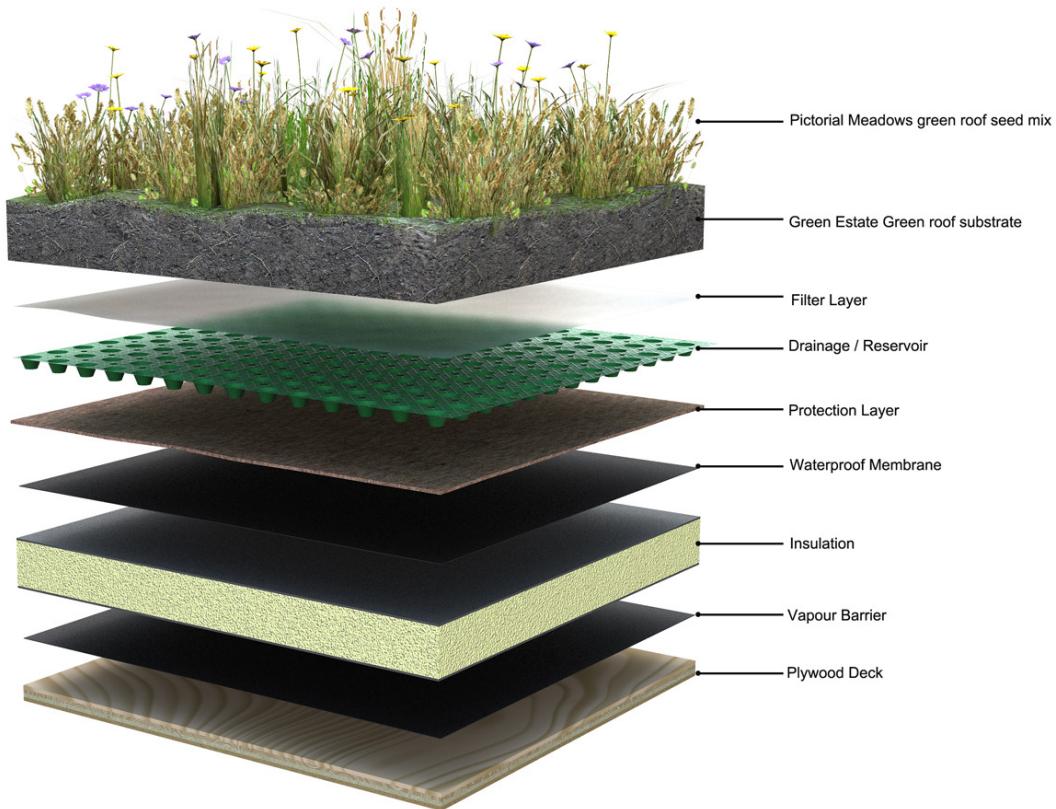
How is this implemented?

Collaboration between city staff, the community, local organizations, store owners, and mall personnel is important to ensure that everyone is on board with the project. City staff will help move the project along. The community and local organizations will offer input and volunteer help. Store owners can also offer input and can express whether they are interested or not in participating or donating some store space. Mall personnel will be the most important group to collaborate with, since they know the specifics of vacant stores, vacancy rates, space available throughout the mall, interested retailers and restaurant owners, and other important information. Assessing the space available and vacancy rates is an important factor to look at since this will display the chances of implementing such uses.



Zoning would not apply to urban agriculture in malls because the use is inside of the mall, although appropriate building codes and permits may need to be considered.

The Holyoke Mall at Ingleside in Holyoke, Massachusetts is a great mall to start a program similar to the Gardens Under Glass initiative. The Holyoke Mall is the largest mall in Western Massachusetts. Being located in a city that has a high number of environmental justice populations adds another demand to the equation. Local community groups that can be involved in this project are Nuestras Raices and the Holyoke Food and Fitness Policy Council. Eastfield Mall and Hampshire Mall, both also located in the Pioneer Valley, are also good malls to implement this project. All three of these malls have a number of vacant stores or spaces available to grow produce.



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Educational Programs

Each tool should also offer educational components to teach the community, especially the youth about sustainable local food systems. Different workshops, learning sessions, lunch and learn series, speakers or even volunteering methods are all viable of educating the community on this subject. Many programs already exist locally that do this in a successful manner. Educational programs can be tied into almost any aspect of an urban agriculture program. Community gardens, farmers markets, indoor markets, urban agriculture in malls, shopping centers, greenhouses, and rooftop gardens will be more successful if educational components are tied into the overall programs.

YouthGrow and UGrow Programs Worcester based YouthGrow and UGrow programs involve community members in the growth of produce for the community. The YouthGrow organization, fully known as Youth Growing and Raising Organic in Worcester, is an urban agriculture youth summer employment program for 14-16 year. The youth get paid as any summer job would, and they learn about organic farming, participate in skill building workshops, develop group projects and participate in youth empowerment and leadership activities.

The UGrow program, fully known as the Urban Garden Resources of Worcester, was created to increase food security and urban gardening within local neighborhoods. Neighborhood groups, schools, youth, senior citizens, social service agencies and grassroots community residents are involved in the community gardens that UGrow maintains in order to decrease Worcester's reliance on food systems located outside of the city. With 51 community gardens and over 400 volunteers, the organization has grown significantly since its creation in 1995. Fourteen of these community gardens are school gardens, aimed to educate school children about gardening and sustainable food systems. The organization also offers additional services such as compost delivery, soil testing services, organic seeds and seedlings, gardening workshops, and technical assistance.

HOW CAN THIS BE IMPLEMENTED?

Programs that already exist in Massachusetts related to agriculture and food are good places to start.. For example, Nuestras Raices in Holyoke and Seeds of Solidarity in Orange both offer educational programs to teach the community about sustainable, local urban agriculture. Nuestras Raices offers after school programs to Holyoke and other nearby schools to teach youth how to set up, plant and maintain gardens; educational



workshops on nutrition, cooking, health and leadership; and involves youth in painting murals, working on the farm and selling the produce at local farmers markets.

Seeds of Solidarity is a farm that grows food in a sustainably, and emphasizes teen and youth assistance. Mainly run by youth, Seeds of Solidarity grows food to sell at festivals and to local retailers and restaurants, offers internships, and has a deep connection with linking farmers to nearby schools and encourages the produce to be used in school systems. The organization's goal is to "provide people of all ages inspiration and practical tools to use renewable energy and grow food in their communities". Looking to existing programs and organizations like these is a good foundation for creating more food-related educational programs in the Pioneer Valley.

Though Pioneer Valley Planning Commission wouldn't be able to run the program entirely alone, they can help with kicking off organizing the program. Getting other organizations and the overall community involved in the process will ensure that the programs will continue to gain momentum and strive. Similar to the UGrow organization out of Worcester mentioned earlier, community gardens can be placed at local schools. This educates the school children of gardening and local sustainable food systems, in addition to providing fresh fruits and vegetables available for meals at the school. The children from the school can learn how to grow the food themselves, upkeep the gardens and be able to take home the food that they grow with their own hands. This type of project could prepare future food careers for these students.

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Farmers Markets

Farmers markets are a reasonably widespread food distribution site statewide. However, there are some food desert areas that do not contain any farmers markets. Also, many cities and towns in the Pioneer Valley do not have a farmers market in their communities. Advancing the number of these farmers markets will offer an array of benefits for neighborhoods, with access to affordable local food being the leading benefit. Consumers are not the only ones who benefit from farmers markets, but also local farmers who will be able to sell more of the produce that they grow.

NORTHAMPTON FARMERS MARKETS

Northampton has a number of farmers markets: The Northampton Saturday Market, Tuesday Market, Winter Market, and Florence's Wednesday Market. They all offer freshly grown food produce, dairy, flowers, and meat products. All, except for the Winter Market, accept WIC coupons and food assistance EBT cards. The Northampton Tuesday Market doubles the amount of food stamps, which is exceptionally beneficial to those of low income who need access to local, healthy and affordable foods the most. When a person swipes their EBT card for a certain designated amount, they will actually get double the amount. The Tuesday Market in Northampton made this campaign possible by collaborating with Grow Food Northampton and raising money from available grants and donations. Not all of the markets run year round (most run from May to November due to the growing season), but the Winter Market runs through the winter, so there is always access to healthy foods.

Markets are not limited to only selling food products to the community. They host special events, contests, and activities for children. This boosts social interactions, creating a sense of place in the community. Northampton Farmers Markets are not just to stop by and pick up some vegetables for dinner, it's also a place to interact with people and spend a few hours for an event like listening to a live band play. The Farmers Market also offers internships to students willing to learn about local and sustainable food systems.

INDOOR MARKETS

An downfall with most farmers markets is that they are located outdoors, restricting length of operation during the year. A solution to this is to create more indoor markets which would be located in a more temperature controlled setting, allowing a year round farmers markets to offer a continuous supply of produce. Obviously there is less food available during the winter months, but any locally produced merchandise can be sold (meat, eggs, bread, honey, preserves, jams, woolen products, etc). Indoor community gardens and greenhouses can supplement additional food if these uses are located nearby. Another advantage of indoor farmers markets is the ability to extend their hours of operation. For example, most traditional outdoor farmers markets close before the sun goes down. With adequate lighting at indoor markets, hours of operation can extend later into the night.



HOW CAN THIS BE IMPLEMENTED?

The first step is to contact local farmers and producers, to see if they would be interested in selling their food at a winter market. If there is a large enough interest, then a winter market would work. The next step is to decide where the best location would be for the winter market. Some considerations that play a factor in deciding where to establish the winter market are: the locations of low-income households, public transit and accessibility-related conflicts, zoning restrictions, and building capacity.

Since farmers markets will be aimed to be located in low income communities who do not have good access to healthy and local foods, the vendors at the markets should be able to accept EBT from customers. There are already markets of this type that exist in Massachusetts, such as the one located in downtown Holyoke, Northampton (previously mentioned) and Somerville. Specifically, Tuesday Market in Northampton offers double the price for food stamps as already mentioned. Programs like this should be implemented in almost all farmers markets, especially those located in environmental justice communities.

Once farms and vendors agree to participate in the farmers market, and a location is determined, deciding what days and times it will run would be the next step. Should it run weekly? Bi-weekly? This will obviously depend on factors, such as the availability of farmers, vendors, and space, the farmers' production and availability of prepared products, and popularity of the market itself.

Once the schedule and details are determined, methods of promoting the market need to be created. Flyers can be posted at key locations in the community, newspaper postings, as well as word of mouth is great methods. The flyers can be sent home with children from schools. The market should be advertised on the city or community's website, in addition to being broadcasted on local television channels and radio stations. The Northampton Farmers Markets are conveniently listed on the City of Northampton's website with information such as where to park, what payment options are available, hours and days of operation, and location of market. Supplemental websites are available for the individual markets which go into further detail on the vendors, photos, and upcoming events. Local news stations can also run a short news story about the new market, and a short article or advertisement can be run in the newspaper once in awhile to reach out further to the community. With marketing strategies in place, more of the community will be made aware of the available local, healthy foods that can be purchased using food assistance for those who need it, which will create more sales and make the market more successful.

For communities where farmers markets are already located, hours of operation can be extended if need be. The longer the farmers market operates, the more food can be sold and more consumers have the ability to shop there.



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LINKS TO MORE INFORMATION

FOR MORE INFORMATION ABOUT ESTABLISHING FARMERS MARKETS, VISIT THE LINKS BELOW

<http://www.farmfresh.org/?zip=01373&sortby=>

<http://northamptontuesdaymarket.com/>

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Pioneer Valley Planning Commission

413-781-6045

60 Congress Street, Floor 1

Springfield, MA 01104-3419

www.pvpc.org



Food Hubs

A regional food hub is an organization or business that actively manages the aggregation, distribution, and marketing of source-identified food products primarily from local and regional producers. Food hubs strengthen the producers' ability to satisfy wholesale, retail, and institutional demands.

Characteristics of a Food Hub

- » Carries out or coordinates the aggregation, distribution, and marketing of primarily locally/regionally produced foods from multiple producers to multiple markets.
- » Considers producers as valued business partners instead of interchangeable suppliers and is committed to buying from small to mid-sized local producers whenever possible.
- » Works closely with producers, particularly small-scale operations, to ensure they can meet buyer requirements by either providing technical assistance or findings partners that can provide this technical assistance.
- » Uses product differentiation strategies to ensure that producers get a good price for their products. Examples of product differentiation strategies include identity preservation (knowing who produced it and where it comes from), group branding, specialty product attributes (such as heirloom or unusual varieties), and sustainable production practices (such as certified organic, minimum pesticides, or “naturally” grown or raised).
- » Aims to be financially viable while also having positive economic, social, and environmental impacts within their communities, as demonstrated by carrying out certain production, community, or environmental services and activities.

Business structure classifications

- » Nonprofit food hubs may be tied more to a social mission than to business profitability. Therefore, nonprofits may emphasize products that are more expensive to source, such as organic and fair trade products, but are valued by its consumer base. The focus on, and ability to cultivate, programs that respond to community and producer needs isn't as widely seen in other business models.
- » Cooperative food hubs, whether producer-led, retailer-led, or with consumer members, there are several advantages to the cooperative business structure that make it a good fit for an emerging food hub. The cooperative structure is a well-known and established community entity with strong roots in agriculture that is owned and democratically controlled by its members. The membership fees provide working and investment capital for the food hub, and any surplus revenues are returned to the members.



- » A co-op is managed by a board of directors elected by the members, which – in the case of a food hub – may be made up entirely of producers who will manage the organization to meet their members' needs, such as providing a fair return on products sold, arranging transportation of goods to end consumers, promoting a certain production practice, or serving a certain geographic area.
- » Public run food hubs are often a city-owned public market or farmers market that is carrying out food hub activities. They play a “matchmaker” role, helping farmers connect to a market outlet and sell their food products. Entrepreneurs and established businesses have pursued local food hubs as a potential area for profits.

Primary service markets

- » Farm to business or institution food hubs sell to wholesale market buyers, such as food cooperatives, grocery stores, institutional foodservice companies, and restaurants. Under this model, food hubs provide new wholesale market outlets for local growers that would be difficult for them to access individually.
- » Farm to consumer food hubs are responsible for marketing, aggregating, packaging, and distributing products directly to consumers. This includes multi-farm community supported agriculture (CSA) enterprises, online buying clubs, food delivery companies, and mobile markets.
- » There are also hybrid food hubs that focus on both markets.

BENEFITS OF A FOOD HUB

Overcoming Infrastructure Barriers

The lack of distribution and processing infrastructure of appropriate scale restricts many farmers and ranchers from better accessing retail, institutional, and commercial foodservice markets, where demand for local and regional foods continues to rise.

Regional food hubs have emerged as an effective way to overcome these infrastructural and market barriers. For those smaller and mid-sized producers who wish to scale up their operations or diversify their market channels, food hubs offer a combination of production, distribution, and marketing services that allows them to gain entry into new and additional markets that would be difficult to access on their own. For larger producers, food hubs can provide product-differentiation strategies and marketing services that ensure the highest price in the market place. Moreover, for wholesalers, distributors, retailers, and foodservice buyers who would like to purchase larger volumes of locally and regionally grown products, food hubs lower the transaction costs by providing a single point of purchase for consistent and reliable supplies of source-identified products from local and regional producers.

Fulfilling essential services

In many parts of the country, wide gaps exist in local distribution and processing



infrastructure, making it difficult for small and mid-sized growers to gain access to markets where there is unmet demand for source-identified locally or regionally grown products. Regional food hubs are increasingly filling a market niche that the current food distribution system is not adequately addressing—the aggregation and distribution of food products from small and mid-sized producers into local and regional wholesale market channels (retail, restaurant, and institutional markets). Additionally, because food hubs provide a number of additional services that build the capacity of local producers and also engage buyers and consumers to rethink their purchasing options and habits, food hubs are emerging as critical pillars for building viable local and regional food systems.

Although regional food hubs are filling a market niche of small farm distribution, this does not mean they do not engage with conventional supply chains. In fact, many food hubs complement and add value to these more traditional distribution channels by enabling regional food distributors—and their national food distribution clients and partners—to offer a broader and more diverse selection of local or regional products than they would otherwise be able to source. In addition, they often add significant value to conventional supply chains by providing a reliable supply of source-identified (and often branded) local products that conform to buyer specifications and volume requirements and still enable their clients to “tell the story” behind the product. For this reason, regional distributors—and even broadline, full-service national distribution companies like Sysco—are beginning to view food hubs as critical partners instead of competitors to ensure they can meet the market demand for locally and regionally grown food.

Positively impacting the communities they serve

Even though many food hubs are relatively new, they demonstrate innovative business models that can be financially viable and also make a difference in their respective communities. Economically, they are showing impressive sales performance and help to retain and create new jobs in the food and agricultural sectors.

Many food hubs are also looking to leverage their economic impacts into wider social or environmental benefits for their communities.

Socially

Most food hubs are providing significant production-related, marketing, and enterprise development support to new and existing producers in an effort to increase the supply of local and regional food. In addition, quite a few food hubs make a concerted effort to expand their market reach into underserved areas where there is lack of healthy, fresh food.



Environmentally

There are some food hubs that are encouraging their producers to use more sustainable production practices, as well as finding innovative ways to reduce their energy use and waste in the distribution system. In summary, food hubs and those that operate them represent a new kind of food entrepreneur, one that is increasingly demonstrating a financially sound business model that can be both market and mission driven.

LINKS TO MORE INFORMATION

FOR MORE INFORMATION ABOUT FOOD HUBS, VISIT THE LINKS BELOW.

<http://www.fccdc.org/about-the-center>

<http://www.ngfn.org/>

FOR MORE INFORMATION, PLEASE CONTACT

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413-781-6045

60 Congress Street, Floor 1

Springfield, MA 01104-3419

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Farm to Institution

Farm to Institution involves local farmer production directly for the institutions in nearby areas. It is an alternative from traditional distribution strategies to improve the farmers' economy and promote healthy food. These institutions may be schools, colleges, hospitals, prisons and various cafeterias. While institutional demand for local food has been demonstrated in numerous projects in New England over the past few years, there are still hurdles in the sourcing and supplying of local products to meet this need.

FARM TO SCHOOL

Farm to School programs have been operational in the United States for nearly ten years. Data from 2006 indicates that there were over 950 schools programs in more than 35 states. The Farm to School can help resolve two important dilemmas in our society: the diet and health of children and the disappearance of farms in New England. With these alternatives the schools have better access to healthy and fresher food and create new markets for the local farmers. They can be incorporate educational activities and use the existing routes for the farms. There are about 250 public school districts, private schools, and colleges in the Commonwealth preferentially serving local foods, over half of which have received assistance from the Massachusetts Farm to School Project. About 110 farms are currently selling their products directly to schools across the state according to Massachusetts Data from Farm to School.

FARM TO PRISON

The State of Vermont hired a Whole Systems Design-led team for master planning of the Southeast State Correctional Facility's 900+ acre site in Windsor, Vermont. They have produced a vision, program and plan that will enhance inmate rehabilitation at the former working farm while regenerating agricultural practices, enhancing wildlife, recreation and other services of the site. The plan is aimed to articulate a new economic engine harnessing prison labor, regional interest in a more localized and sustainable food system, and the expansive underutilized former-farm site.

LINKS TO MORE INFORMATION

FOR MORE INFORMATION ABOUT FARM TO INSTITUTION PROGRAMS,
VISIT THE LINK BELOW.

<http://nofavt.org/sites/default/files/F2Ireport-exec-web.pdf>

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Rooftop Gardening & Green Roofs

A dilemma that urban communities are faced with when it comes to food production is, “where do we do this?!” A response to this question is creating such uses on top of buildings. Whether on existing or abandoned structures, utilizing vast areas of rooftops provides an array of benefits associated with urban agriculture and other social-environmental benefits. It contributes to reducing storm water runoff, reducing the urban heat island effect, adds to aesthetics and quality of life, and reduces the use of valuable undeveloped, green spaces that normally would be used for standard agricultural processes. As with most of the tools in this toolkit, educational programs can be incorporated to teach youth and community members about local and sustainable agriculture. The food grown on rooftop gardens can be sold directly to consumers at farmers markets, to retailers and restaurants, and to local schools within the community.

WHAT IS A GREEN ROOF?

A green roof is a roof that is covered with a water proof membrane and a variety of vegetation. Green roofs collect and filtrate water that normally would runoff into sewer and storm water systems; they help with cooling urban areas and reducing the urban heat island effect which is caused by a large number of impervious surfaces; they keep cooling and heating costs down for the building by acting as an insulation; they provide aesthetic qualities; they incorporate vegetation in needed urban areas where vegetation is sparse.

The main issues associated with implementing green roofs are costs and maintenance. In process to determining whether a building's roof is structurally stable, an architect must be hired to calculate the building's carrying capacity, and materials have to add to the roof to accommodate the water and soil usage. Different design features can be implemented that will reduce the weight of the greenhouse overall, such as the use of hydroponic systems which tend to be operated with no soil.

Utilizing green roofs as a source of food production is the main benefit that improves the Pioneer Valley's food system.



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Gotham Greens Rooftop Greenhouse

In Brooklyn, NY is a fairly new designed and operating industrial rooftop greenhouse. At Gotham Greens, a variety of vegetables and herbs are grown and harvested each day to be sold to local retailers and restaurants. The system already has restaurants and retailers invested in the fresh foods; one of these being the local Whole Foods market. Thirty tons of produce are grown annually. The greenhouse, which sits atop an old bowling alley in an industrial area, is sustainable, in addition to being pesticide, herbicide and soil free. The greenhouse uses hydroponic systems, water is re-circulated, cisterns collect rainwater used in the operations, and also atop the roof is an array of solar panels to run the project. Using soil free hydroponic systems uses 10 times less water than traditional agriculture processes. At higher elevations, the greenhouse receives optimal sunlight and can operate year long since the food is grown indoors where it is temperature controlled.

Gotham Greens plans to expand their greenhouse system on rooftops to other areas of the city.

How can this be implemented?

Collaboration with city staff, the community and building owners must be underway to make this happen. Large enough buildings that have structurally sound roofs to support a greenhouse or garden need to be available. Local zoning ordinances and bylaws, including building codes must allow for a greenhouse or rooftop garden. Appropriate building permits need to be sought out if necessary. In terms of finances, types of projects like this may be able to be funded through grants and/or loans.

In the Pioneer Valley, there are a large number of historical industrial buildings which are characterized by large, expansive, flat and barren rooftops. Utilizing these roofs for roof gardens and greenhouses would be beneficial to communities all around. The location of these old industrial buildings tends to be near the downtown area of cities. They also tend to be located near water bodies, such as rivers or canals. Community members can be involved in the maintenance and harvesting of the produce, along with local organizations. Or the facility can create jobs by hiring staff people to run the garden or greenhouse.

LINKS TO MORE INFORMATION

FOR MORE INFORMATION ON GREEN ROOFS, VISIT THE LINK BELOW
<http://www.greenroofplants.com/for-industry-professionals/book-tools/>

FOR MORE INFORMATION, PLEASE CONTACT

Pioneer Valley Planning Commission
413-781-6045

60 Congress Street, Floor 1
Springfield, MA 01104-3419

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Agricultural Commission

A town agricultural commission is a standing committee of town government that is created through a town meeting vote and is appointed by the Board of Selectmen or governing body of the town. It represents the farming community, encourages the pursuit of agriculture, promotes agricultural business and agricultural economic development, and protects farmland and farm businesses. Some communities focus on farmland preservation efforts, while others review regulatory proposals developed by town boards.

WHAT DOES AN AGRICULTURAL COMMISSION DO?

- » Serves as a local voice by representing the farming community and advocating for farmers, farm businesses and farm interests
- » Provides visibility for farming and encourages the pursuit of agriculture by promoting agricultural-based economic opportunities
- » Works with other town boards about issues that affect agriculture
- » Helps resolve farm related problems or conflicts
- » Protects farmland and natural resources by preserving, revitalizing, and sustaining the communities' agricultural businesses and lands

WHY ARE TOWN AGRICULTURAL COMMISSIONS FORMED?

Many towns communities trying to balance growth and quality of life issues are creating Agricultural Commissions. The intent of an Agricultural Commission is with the intent simple: to: protect agricultural lands, preserve rural character, provide a voice for farmers, and encourage agricultural based businesses.

ARE AGRICULTURAL COMMISSIONS REGULATORY?

Unlike other town committees, Agricultural Commissions do not operate under any regulatory authority from the Commonwealth. While town conservation commissions implement the State Wetlands Protection Act and planning boards enforce the local zoning code, Agricultural Commissions are created at town meetings to represent farming interests in the town, but they do not have any legal mandate or enforcement authority.



WHAT DO AGRICULTURAL COMMISSIONS DO IN MASSACHUSETTS?

- » Adopt local right-to-farm by-laws
- » Raise funds for farmland protection and economic development
- » Establish local farmers markets
- » Identify farmers' and community's needs, issues and concerns, and provide mediation and conflict resolution on agriculture-related disputes within town
- » Match farmers with available land and help the landowners and farmers promote sustained use
- » Collaborate with other town boards on development proposals
- » Recommend actions on land use programs that would help agriculture thrive, including Chapter 61, tax valuation, APR and other preservation programs and right-to-farm by-laws
- » Advocate at state and federal levels for support of community-identified agricultural needs
- » Educate town residents about the value of agriculture in the community
- » Identify informational and educational resources relevant to farms and farming communities
- » Develop trust and a working relationship between farmers, residents and institutions
- » Facilitate the technical, educational, business and regulatory assistance needed to farm and live near farms
- » Hold educational workshops on intergenerational transfer of property, Chapter 61 lands, farm viability, and Agricultural Preservation Restrictions
- » Obtain technical assistance on nonpoint source pollution, conservation farm planning, manure management, environmental stewardship
- » Map farmland
- » Host community agricultural events

STARTING AN AGRICULTURAL COMMISSION

Steps The following are steps towards starting an Agricultural Commission in your town, as recommended by the Massachusetts Agricultural Commission:

1. Draft an agricultural commission by-law and town meeting warrant article with input from town boards and town counsel.
2. Research advocates and opposition.
3. Present articles at Town Meeting for discussion and vote. Presentation is provided by well informed and prepared advocates.



WHAT HAPPENS AFTER PASSAGE OF THE AGRICULTURAL COMMISSION BY-LAW?



1. Steering committee and town leadership work together to solicit applicants for agricultural commission members.
2. Steering committee reviews applications and makes recommendations to the Select Board.
3. Select Board appoints members, assigns terms of service, and establishes date for convening first meeting.
4. First meeting business:
 - I. Identify facilitator and recorder.
 - II. Review by-law, focus on mission, membership, terms of service, and vote in officers.
 - » Chair convenes first meeting:
 - » Note Roberts Rules of Order.
 - » Identify Needs, Priorities.
 - » Establish goals.
 - » Begin development of work plan.
 - » Implement Work Plan.
 - » Guiding principle: Identify and work on achieving one or two measurable goals at a time...build success!
5. Seek Involvement from community through a Circle of Friends

Circle of Friends or Friends of Farmers

Agricultural Commission membership can leverage their resources by asking for help from others. Friends are people in the community (or connected to the community) that have skills and abilities that the Agricultural Commission needs to achieve their goals. A “friend” will be honored to assist if they are asked to volunteer time on a task that is focused, short term and achievable. Time volunteered by “friends” should be highly valued and respected.

Agricultural commission model bylaw:

For the furtherance of the goals of this Bylaw, there is hereby established an Agricultural Commission, to consist of five (5) members, appointed by the Board of Selectmen, at least three of whom shall be representative of the Bolton farming community and one (1) from the non-farming, residential community. The term of appointment shall be for three



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(3) years, timed to coincide with the Town's fiscal year. At the time said Commission is first appointed, one member shall be appointed for one (1) year, two members for a term of two (2) years, and two members for a term of three (3) years; all subsequent appointments shall be made for terms of three (3) years. The appointing authority shall fill any occurring vacancy based on the unexpired term being vacated.

THE AGRICULTURAL COMMISSION SHALL BE AUTHORIZED:

- » To act as a spokesperson for the Town farming community;
- » To present written or oral testimony in the context of public hearings before any Town Board or Committee; On its own initiative, to advise any Town Board or Committee on matters pertinent to the particular area of jurisdiction of that Board or Committee, insofar as the issue relates to the interests of agriculture;
- » To advise the Board of Selectmen and/or any other Town Board on any Town-wide issues relating to agriculture which, in the opinion of the Agricultural Commission, require a concerted Town action or response;
- » To respond to any request for information or advice from any Town Board or Committee;
- » To provide public information or public education services regarding agriculture and the practice of agriculture in Town, or in general;
- » To provide education and information for farmers in residential areas on how to minimize their impact on their neighbors;
- » To serve, at the written request of any Town Officer, Board, or Committee, as an arbitrator or negotiator in the resolution of disputes relating to agricultural issues, provided that no order or decision on the particular matter in question has already been issued by any Town entity legally authorized to do so; and that any resulting decision or recommendation shall be strictly advisory, and shall have no legal standing or definitive nature beyond the voluntary agreement of the parties to abide by it;
- » To promote farming business and agriculture in Town, to create awareness through education, and the promotion of agriculture and its benefits to Town.



THE AGRICULTURAL COMMISSION, PER SE, IS SPECIFICALLY NOT AUTHORIZED:

- » To acquire or hold property, real or personal;
- » To act as an agent or representative of any individual or entity in any matter pending before any Town or State agency;
- » To interfere with, litigate, or serve in any way as a conduit, agent, or forum for appeals relating to any decision made by a legally authorized Town Officer or agency.



LINKS TO MORE INFORMATION

FOR MORE INFORMATION ABOUT ESTABLISHING AN AGRICULTURAL COMMISSION,
VISIT THE LINK BELOW

<http://www.massagcom.org/resources/resources.html#toolkit>

<http://www.mass.gov/eea/agencies/agr/boards-commissions/agricultural-commissions.html>

FOR MORE INFORMATION, PLEASE CONTACT

Pioneer Valley Planning Commission

413-781-6045

60 Congress Street, Floor 1

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Agricultural District

Incorporating agricultural districts in Zoning Bylaws strives to protect the viability of agriculture in a region, and is generally used by communities that are concerned about maintaining the economic viability of their agricultural industry. A carefully written agricultural zoning ordinance can prevent farmland from being converted to nonfarm uses, can prevent the fragmentation of farms, prevent land-use conflicts, and protect agricultural producers from nonfarm intrusion into agricultural areas. A further consideration in agricultural zoning is the reduction or elimination of conflicts that arise between farm and nonfarm residents.

WHAT IS THE PURPOSE AND INTENT?

For the purpose of promoting public health, safety, morals, comfort and general welfare; to conserve and protect property and property values; to secure the most appropriate use of land; and to facilitate adequate but economical provisions of public improvements, all in accordance with a comprehensive plan, the voters of the zoned area finds it necessary and advisable to regulate sanitary drainage, the location, height, bulk, number of stories and sizes of buildings and other structures, including tents, cabins and trailer coaches, percentages of lot areas which may be occupied, set-back building lines, sizes of yards, courts and other open spaces, the density of populations, the uses of buildings and other structures including tenets, cabins and trailer coaches and the uses of land for trade, industry, residence, and recreation.



WHAT ARE THE USE REGULATIONS?

Uses permitted by right:

- » All forms of agriculture, including horticulture, and animal husbandry, including necessary farm structures;
- » Forestry uses, including sawmills;
- » Farm dwellings;
- » Production nurseries and production greenhouses;
- » Wildlife refuges and fish hatcheries;
- » Roadside stands for the sale of agricultural products, at least half of which are grown on the premises. Off-road parking shall be provided for all employees and customers and the stand shall be set back at least 20 feet from all property lines and road rights of way
- » Garages
- » Signs pursuant to the local sign ordinance
- » Beekeeping
- » Manure storage facility
- » Non-commercial recreation
- » Home occupation
- » Accessory apartment
- » Single-family dwelling



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Poultry And Small Livestock Regulations

The allowing of poultry and other small livestock in residential areas of communities is yet another method to increase accessibility to food. Poultry and small livestock not only provide eggs, milk, and meat; they also enhance gardens and farms by increasing biodiversity and help complete the nutrient cycle found in nature. Some communities in Massachusetts and even in the Pioneer Valley have already adopted regulations related to the housing and ownership of chickens and other small livestock. These regulations control the type and number of animals on one property (or per square footage/acreage), the size and setbacks of the enclosures for the animals, and what is done in the event that a public nuisance arises.

Some of these communities additionally allow and regulate the keeping of livestock, rabbits and other farm animals, which can be taken into consideration when viewing this toolkit.

EXAMPLES OF POULTRY AND SMALL LIVESTOCK BYLAWS IN MASSACHUSETTS

In Arlington, Massachusetts, hens are allowed in the R0, R1 and R2 residential districts by right. The following regulation was taken from the Town of Arlington Zoning Bylaw under Section 5.04, Table of Use Regulations:

Keeping of no more than six hen chickens (but no roosters) permitted by the Arlington Board of Health for egg-laying, pet, or other non-commercial purposes in an enclosure in the rear yard of a property at least six feet from all property lines and at least 25 feet from residences on adjacent lots.

This specific Town and their bylaw address the number and type of poultry animals allowed, for what purposes, and in what areas of the community. The bylaw also regulates that the animals must be kept in an enclosure and specifies location of this structure and setback requirements from property lines. Residents wishing to own chickens must apply for a permit through the Arlington Board of Health. This helps the Town know how many chickens are located in the residential areas and can better enforce regulations.



Located in the Pioneer Valley, Northampton, MA also has chicken regulations, in addition to regulations for livestock, rabbits and ducks. From Section 350-5.3 Accessory Uses of the City of Northampton Zoning Ordinances:



- a.** The keeping of farm animals, to include all farm animals and exotics, and a related private stable, for personal use, is permitted as an accessory use in accordance with the following conditions:
 - 1.** The minimum acreage required for keeping any farm or exotic animal, except as described below, shall be 30,000 square feet for the first animal and 15,000 square feet for each additional such animal. Animals under six months not to be counted for acreage requirements.
 - 2.** The minimum acreage required for keeping sheep, goats, llamas, rabbits, or poultry, except as allowed under household pets, shall be 30,000 square feet for up to three animals and 10,000 square feet for each additional such animal. Animals under six months not to be counted for acreage requirements. (The requirements for these animals are less stringent than other farm animals because these animals have less environmental impact.)
 - 3.** The location of any stable shall be not less than 100 feet from any street lot line and not less than 30 feet from any other lot line.
 - 4.** There must be adequate fencing to contain all farm animals at least 20 feet from all property boundaries at all times, except when animals are being directly supervised by and under control of a person.
 - 5.** Stables, corrals and yards shall be properly drained and reasonably free from excessive odor, dust, and mud, so as not to create a nuisance or health hazard to the community or to surrounding property owners, from an air or drainage pollution standpoint. Maintenance of the stable and property used in the keeping of animals shall conform to all health and wetland regulations.
 - 6.** Horses, ponies, llamas and sheep may be kept for personal use without being accessory to any other use, otherwise in accordance with this section.
- b.** The keeping of the household pets, for personal use is permitted as an accessory use for animals commonly considered household pets, including dogs, cats, fish, and birds (parrots, parakeets, doves, pigeons, etc.), six or fewer rabbits, and three or fewer ducks or hens.

These regulations are more specific and go into detail about fencing and square footage requirements. This is because they allow more than just poultry. With the addition of permitting livestock, more stringent standards must be addressed to ensure fewer occurrences of public nuisances.



Also in the Pioneer Valley, Easthampton allows the raising and keeping of small flocks of poultry, which is a maximum of 25 and not including roosters on a lot of at least one (1) acre, by right in the R-15, R-35, R-40, and R-80 residential districts. It is prohibited in the remaining districts. If the situation is the “keeping of up to six (6) chickens (no roosters) on a lot of at least 15,000 square feet for use of the occupants only”, it is allowed by right in a larger number of districts which include the R-5, R-10, R-15, R-35, R-40, and R-80 residential districts.¹ If it is on a lot less than 15,000 square feet than it is only allowed in those districts by Special Permit. Additionally, from Section 6.88a of the City of Easthampton Zoning Ordinance:

A small flock of poultry and a saddle or riding horse or other farm animal for the private use of occupants only shall be kept in an enclosure or building seventy-five (75) or more feet from a street line and fifty (50) of more feet from any dwelling other than the dwelling to which they are accessory.

In Lynn, Massachusetts, chicken applicants must obtain signatures from neighbors showing support of the housing of poultry on that property. This is a good way to keep the peace and reduce the occurrence of nuisances in communities. Coops and poultry enclosures can be required to be inspected by the public health department or animal control officer once or on a set basis to ensure that regulations are followed.

HOW CAN THIS BE IMPLEMENTED?

Looking at existing zoning ordinances and bylaws in the area and filtering out deciding what best applies to a specific community is the best option for formulating a poultry zoning bylaw. Each community is different and may be capable of better suited for allowing more poultry/livestock in a small amount of area compared to other communities. Obviously, the regulations mentioned in this toolkit can be molded in various ways to fit into a community’s framework. The number of poultry allowed, setback requirements, maintenance, fencing regulations, process, permits required, and approval of abutters details in the bylaw are all elements that can be changed. accordingly. Though some cities and towns in the Pioneer Valley may already contain some type of poultry bylaw or ordinance, these may be too restrictive to be able to increase local food access and security. Existing regulations can be examined and amended to allow more families to own their own chickens in order to increase their self reliance and dependence food accessibility in terms of food sources. It is also important to be aware that zoning regulations can be amended and changed if problems arise or a better option is discovered. Poultry regulations can be created for a community, and amended based on what works well for that city or town in the long term future.

If a community holds great opposition to residentially located chicken coops, the raising and keeping of these animals can be centrally located in one area of a community. For example, a neighborhood coop with a few chickens can be created in a local community



garden or indoors in a type of local structure. Though this will not have quite the effect as allowing residential zones the privilege of keeping their own chickens, the few local poultry can be utilized for fresh eggs which can be purchased or donated to the community. This will increase local food access more than having no chicken coops in the community at all.

LINKS TO MORE INFORMATION

FOR MORE INFORMATION ABOUT KEEPING CHICKENS, VISIT THE LINK BELOW
<http://pioneervalleybackyardchickenassociation.weebly.com/index.html>

FOR MORE INFORMATION, PLEASE CONTACT

Pioneer Valley Planning Commission
413-781-6045
60 Congress Street, Floor 1
Springfield, MA 01104-3419
www.pvpc.org



Right to Farm Bylaw

A Right to Farm bylaw is an important tool that can strengthen a community's efforts to protect the viability of farming. The intent is to reiterate the importance of – and support for – farming within the town. There is a notification provision that works to ensure that people moving into the community are aware that agriculture, and the associated sights, sounds, and smells, is an accepted and central economic and cultural activity. This type of bylaw seeks to prevent conflicts between farm operations and neighbors. There is a dispute resolution process for communities that have adopted an Agricultural Commission. It is strongly recommended that Agricultural Commissions are adopted even before enacting a Right to Farm Bylaw, as such a commission can help tailor the bylaw and educate the public about the need for such a provision.

LEGISLATIVE PURPOSE AND INTENT

The purpose and intent of this Bylaw/Ordinance is to state with emphasis the Right to Farm accorded to all citizens of the Commonwealth under Article 97, of the Constitution, and all state statutes and regulations there under including but not limited to Massachusetts General Laws Chapter 40A, Section 3, Paragraph 1; Chapter 90, Section 9, Chapter 111, Section 125A and Chapter 128 Section 1A. We the citizens of [City-Town] restate and republish these rights pursuant to the Town's authority conferred by Article 89 of the Articles of Amendment of the Massachusetts Constitution, ("Home Rule Amendment").

This General Bylaw/Ordinance encourages the pursuit of agriculture, promotes agriculture-based economic opportunities, and protects farmlands within the Town/City of [NAME] by allowing agricultural uses and related activities to function with minimal conflict with abutters and local agencies. This By-law/Ordinance shall apply to all jurisdictional areas within the Town/City.

TERMS

The term "farm" or agriculture of their derivatives that shall include but not be limited to the following for both agriculture-related educational and farm-base recreational activities, including agri-tourism:

- » Farming in all its branches and tilling of the soil
- » Dairying
- » Production, cultivation, growing, and harvesting of any agricultural aquacultural, floricultural, viticultural, or horticultural commodities



- » Growing and harvesting of forest products upon forest land, and any other forestry and lumbering operations
- » Raising of livestock including horses
- » Keeping horse as a commercial enterprise
- » Keeping and raising of poultry, swine, cattle, ratites (such as emus, ostriches, and rheas) and camelids (such as llamas camels), and other domesticated animals for food and other agricultural purposes, including bees and fur-bearing animals.

“Farming” shall encompass activities including, but not limited to the following:

- » Operation and transportation of wide, slow-moving farm equipment
- » Control of pests, including (but not limited to), insects, weeds, predators and disease organism of plants and animals
- » Application of manure, fertilizers and pesticides
- » Conducting agriculture-related educational and farm-based recreational activities, including agri-tourism, provided that the activities are related to marketing the agricultural output or services of the farm
- » Processing and packaging of the agricultural output of the farm and the operation of farmer’s market or farm stand including signage thereto
- » Maintenance, repair, or storage of seasonal equipment, or apparatus owned or leased by the farm owner or manager used expressly for the purpose of propagation, processing, management, or sale of the agricultural products
- » On-farm relocation of earth and the clearing of ground for farming purposes



RIGHT TO FARM DECLARATION

The Right to Farm is hereby recognized to exist within the Town of [Farm-Town]. The above-described agricultural activities may occur on holidays, weekdays, and weekends by night or day and shall include the attendant incidental noise, odors, dust, and fumes associated with normally accepted agricultural practices. It is hereby determined that whatever impact may be caused to others through the normal practice of agriculture is more than offset by the benefits of farming to the neighborhood, community, and society in general. The benefits and protections of this By-law are intended to apply exclusively to those commercial agricultural and farming operations and activities conducted in accordance with generally accepted agricultural practices. Moreover, nothing in this Right to Farm Bylaw shall be deemed as acquiring any interest in land, or as imposing any land use regulation, which is properly the subject of state statute, regulation, or local zoning law.

LINKS TO MORE INFORMATION

FOR MORE INFORMATION ABOUT CREATING A RIGHT TO FARM BYLAW,
VISIT THE LINK BELOW
<http://www.mass.gov/eea/docs/agr/righttofarm/farmbylaw.pdf> – MA EEA Model Bylaw

FOR MORE INFORMATION, PLEASE CONTACT

Pioneer Valley Planning Commission

413-781-6045

60 Congress Street, Floor 1
Springfield, MA 01104-3419

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Urban Agricultural District

An “Urban Agricultural District” is established as part of the Zoning Code in a town or city to ensure that urban agriculture areas are appropriately located and protected to meet the needs for local food production, community health, education and enjoyment, agriculture-related job training, environmental enhancement, and preservation of green space on sites for which urban agriculture represents the highest and best use for the community.

Various studies show positive correlations between Urban Agricultural Districts and the reduction of crime, economic development, increased property value, health benefits, and food security.

WHAT IS THE PURPOSE AND INTENT?

The “Urban Agricultural District” is hereby established as part of the Zoning Code to ensure that urban agriculture areas are appropriately located and protected to meet needs for local food production, community health, community education, garden-related job training, environmental enhancement, preservation of green space, and community enjoyment on sites for which urban gardens represent the highest and best use for the community.

DEFINITIONS

- » **Greenhouses** are buildings made of glass, plastic, or fiberglass in which plants are cultivated
- » **Hoop houses** are structures made of PVC piping or other material covered with translucent plastic, constructed in a “half-round” or “hoop” shape
- » **Cold frames** are unheated outdoor structures consisting of wooden or concrete frames and a top of glass or clear plastic, used for protecting seedlings and plants from the cold

PERMITTED MAIN USES

Only the following main uses shall be permitted in an Urban Agricultural District:

- » Community gardens which may have occasional sales of items grown at the site
- » Market gardens, including the sale of crops produced on the site



Permitted Accessory Uses

Only the following accessory uses and structures shall be permitted in an Urban Agricultural District:

- » Greenhouses, hoop houses, cold frames, and similar structures used to extend the growing season
- » Open space associated with and intended for use as garden areas
- » Signs limited to identification, information and directional signs, including sponsorship information where the sponsorship information is clearly secondary to other permitted information on any particular sign, in conformance with the regulations of underlying zoning
- » Benches, bike racks, raised/accessible planting beds, compost bins, picnic tables, seasonal farm stands, fences, garden art, rain barrel systems, chicken coops, beehives, and children's play areas
- » Buildings, limited to tool sheds, shade pavilions, barns, rest-room facilities with composting toilets, and planting preparation houses, in conformance with building regulations and underlying zoning
- » Off-street parking and walkways, in conformance with town regulations

Supplemental Regulations

Uses and structures in an Urban Agricultural District shall be developed and maintained in accordance with the following regulations:

- » Location. Buildings shall be set back from property lines of a Residential District a minimum distance of five (5) feet.
- » Height. No building or other structure shall be greater than twenty-five (25) feet in height.
- » Building Coverage. The combined area of all buildings, excluding greenhouses and hoop houses, shall not exceed fifteen percent (15%) of the garden site lot area.
- » Parking and Walkways. Off-street parking shall be permitted only for those garden sites exceeding 15,000 square feet in lot area. Such parking shall be limited in size to ten percent (10%) of the garden site lot area and shall be either unpaved or surfaced with gravel or similar loose material or shall be paved with pervious paving material. Walkways shall be unpaved except as necessary to meet the needs of individuals with disabilities.
- » Signs. Signs shall not exceed four (4) square feet in area per side and shall not exceed six (6) feet in height.



- » **Seasonal Farm Stands.** Seasonal farm stands shall be removed from the premises or stored inside a building on the premises during that time of the year when the garden is not open for public use.
- » **Fences.** Fences shall not exceed six (6) feet in height, shall be at least fifty percent (50%) open if they are taller than four (4) feet, and shall be constructed of wood, chain link, or ornamental metal. For any garden that is 15,000 square feet in area or greater and is in a location that is subject to design review and approval by the City Planning Commission or Landmarks Commission, no fence shall be installed without review by the City Planning Director, on behalf of the Commission, who may confer with a neighborhood design review committee. If one exists, so that best efforts are taken to ensure that the fence is compatible in appearance and placement with the character of nearby properties.

FOR MORE INFORMATION, PLEASE CONTACT

Pioneer Valley Planning Commission

413-781-6045

60 Congress Street, Floor 1

Springfield, MA 01104-3419

www.pvpc.org



TOOLKIT FOR

Green Infrastructure

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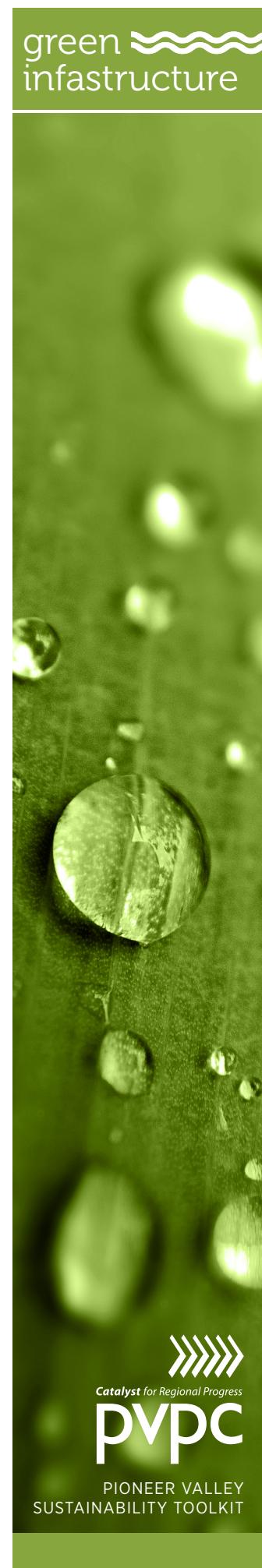
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Catalyst for Regional Progress

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PIONEER VALLEY
SUSTAINABILITY TOOLKIT

Bioretention Areas Fact Sheet

WHAT IT IS

Bioretention facilities (also known as rain gardens) are landscaped depressions designed with soils and a variety of plants to receive and treat stormwater through the use of natural processes. These natural processes include the uptake of water by plants and transfer of water to the atmosphere, and infiltration (or soaking up) of water into the soils where microbial action helps to breakdown pollutants and gravity pulls water further down through the soil layers to recharge groundwater. (See Figure 1)

Bioretention facilities can be used in a variety of settings: along a street edge or as an island in a parking lot to capture storm flow from asphalt or concrete surfaces; and near residential or commercial buildings to capture storm flow from roofs. Bioretention facilities are often designed with an underdrain or an overflow that directs flow to the municipal storm drain system.

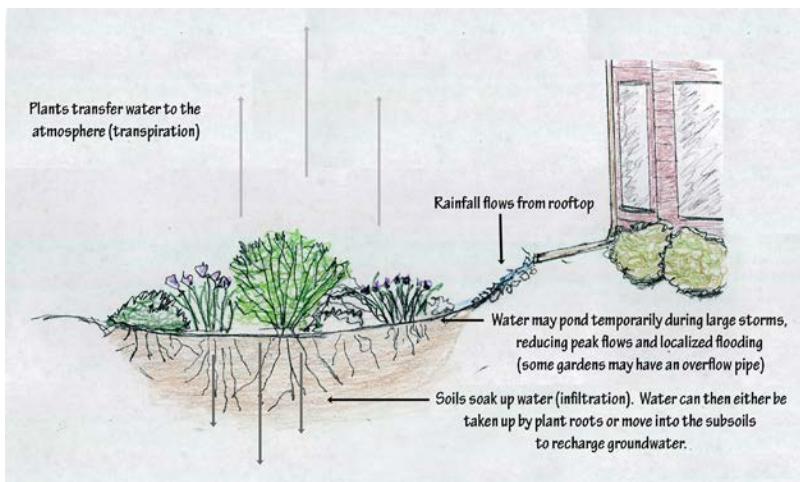
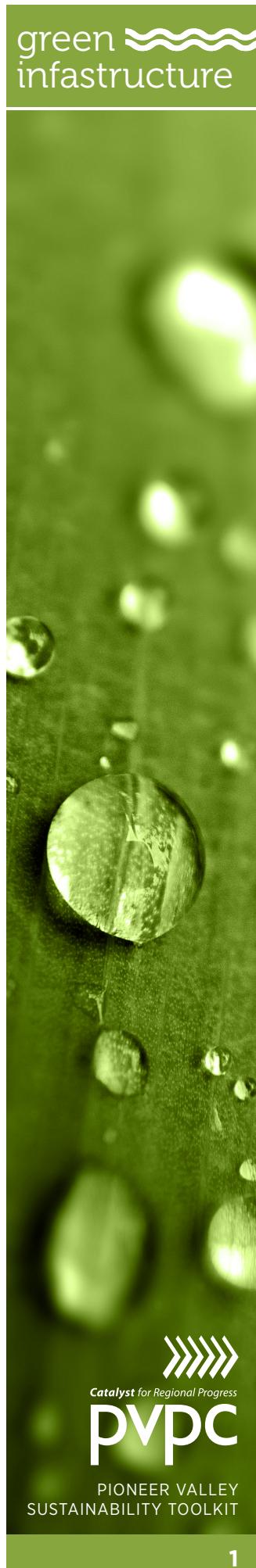


Figure 1: How a Bioretention Facility Functions



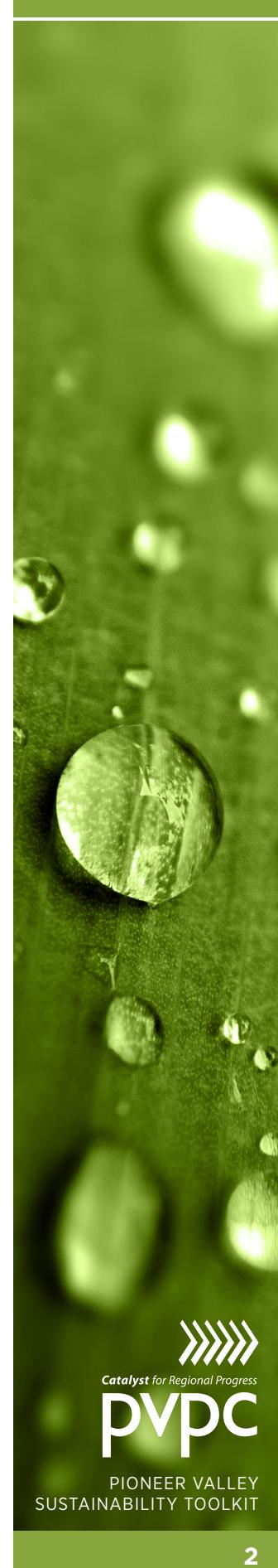
WATER QUALITY TREATMENT

When a bioretention facility is designed with an underdrain that ultimately delivers flow to surface waters, the capacity of a facility to treat stormwater is critical. Bioretention systems have proven effective at removing many pollutants associated with stormwater: suspended solids, including particulate phosphorous, petroleum hydrocarbons, and heavy metals. The table below shows water quality treatment in the four bioretention facilities tested to date by the University of New Hampshire Stormwater Center.



A rain garden along Route 9 in Hadley, captures storm flow from a drive and parking lot.
This photo is taken just after installation and before plants are really established.

Photo courtesy of Berkshire Design Group, Inc.



Pollutant Removal in Four Bioretention Facilities at the University of New Hampshire Stormwater Center

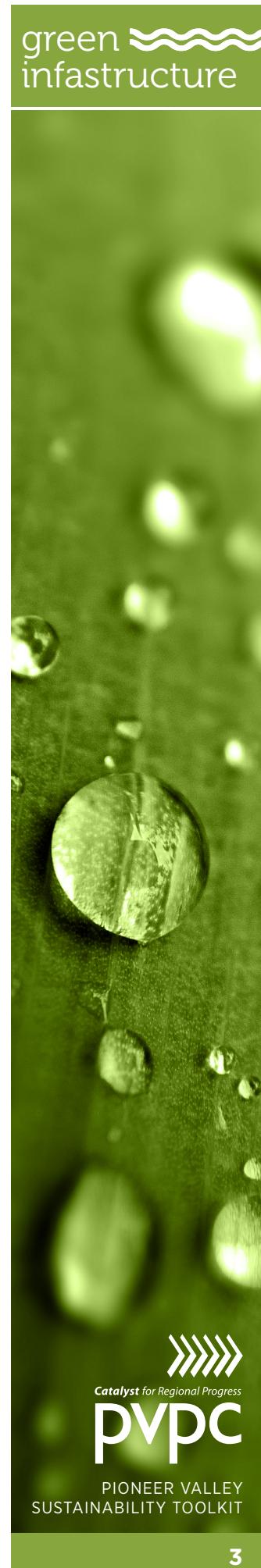
System	Pollutant					
	Total Suspended Solids (TSS)	Total Petroleum Hydrocarbons in the Diesel Range	Dissolved Inorganic Nitrogen (NO ₃)	Total Zinc	Total Phosphorous	Average Annual Peak Flow
					% Removal	% Reduction
Bio I-48" depth (42" filter depth)	97	99	44	99	-	75
Bio II-30" depth (24" filter depth)	87	99	NT	73	34	79
Bio III-30" depth (24" filter depth)	91	64	44	75	NT	84
Bio IV-37" depth (24" filter depth)	83	65	42	67	NT	95

NT = no treatment | Source: University of New Hampshire Stormwater Center 2012 Biennial Report

To boost the ability of bioretention facilities to manage for nitrogen and dissolved phosphorous, researchers have been experimenting with optimizing soil mixtures and design. See discussion under “Design considerations.” Furthermore, Allen Davis of the University of Maryland has noted that bowl volume, media composition, media depth, underdrainage configuration, and vegetation type, all have roles in effectively helping to address objectives, depending on needs, be they hydrologic (peak flow mitigation, infiltration, annual hydrology, and stream stability) and/or water quality (total suspended solids and particulates, pathogen-indicator species, metals, hydrocarbons, phosphorus, nitrogen, and temperature). Information on how best to design systems according to these needs is evolving.

DESIGN CONSIDERATIONS

For the Pioneer Valley, major design objectives for bioretention involve flow reduction and nutrient reduction. Following is some brief guidance on design considerations relative to these objectives. As noted above, bioretention design objectives that aim to address specific target pollutants are emerging. Some of the listings below under “Links to more information” provide some resources that will be useful in this regard.



Flow reduction

Maximum volume reduction comes when bioretention facilities are located in soils that provide for good infiltration and the use of fines in the soil mix are kept to a minimum (the entry of fines into the facility should also be limited through a pretreatment element that allows for settling of particles).

Research is showing that infiltration in soils can be enhanced and preserved over time through the use of dense vegetative cover. The University of New Hampshire Stormwater Center (UNHSC) reports that of the four bioretention facilities it has studied, infiltration rates over time were optimal in the basin (Bio III) where they used a continuous dense vegetative cover. They report, "Previous studies have indicated that plant roots generally experience a 30% die back each year which aids in the development of macropores that keep soil surface infiltration capacity high over time. The data from this study suggests that the dense vegetative cover is more important than plant type for maintaining infiltration rates in vegetative systems."

Nutrients

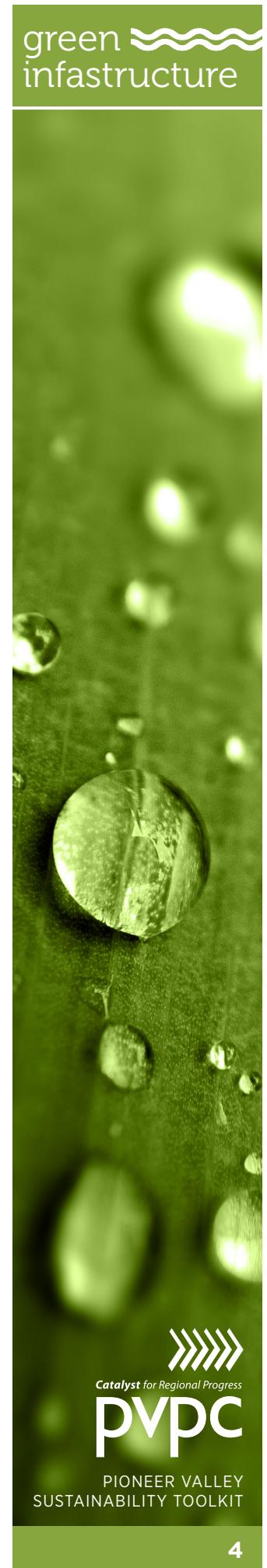
In designing bioretention facilities for nutrient removal, fill media selection is critical. As it breaks down organic matter typically leaches nitrogen and phosphorous and can exacerbate water quality issues. It is important to have some organic matter to aid plant growth, but limiting its use is critical for successful bioretention facilities.

Nitrogen

Research out of the University of Maryland points to two major considerations for promoting nitrogen removal:

Creation of an anaerobic zone where microbes can use forms of nitrogen (NO₂ and NO₃) instead of oxygen for respiration – Use of a deeper media layer (3 feet minimum), media with a less permeable bottom soil layer, lower infiltration rates (1 to 2 inches per hour), and design for internal water storage, (a subsurface portion of the media that provides some storage volume) are all important design components. In a 2003 study, he found that adding a suitable carbon source, particularly newspaper, to the gravel layer provides a nutrition source for the microbes, enables anaerobic respiration, and can enhance the denitrification process. Davis et al noted that while organic matter should be kept to very modest amounts to avoid leaching of nitrogen as it breaks down, there should be about 5% of total weight or 10% of total volume of organic matter to provide carbon sources. Postconstruction carbon can be supplied from plant roots, leaf litter, and of course the mulch as it breaks down.

More dense planting of vegetation with sizeable root masses (but not so aggressive so as to pose a threat to clogging underdrains) – Deeply rooted grasses, notes Davis et al, are expected to provide good performance. Note that in research at the UNHSC, nitrogen removal was poorest in the bioretention system that had a 60% sand mixture and wooded vegetation as compared to the sister system that had an Eco-Lawn.



Phosphorous

Media selection is the major considerations for promoting phosphorous removal in bioretention facilities. While modest amounts of mulch can be used, Davis et al recommend selecting media with high P-sorption potential, including iron and aluminum rich soils and iron and aluminum based water treatment residuals (a byproduct of drinking water treatment), which could be used as amendments.

Inclusion of vegetation within a bioretention facility also helps to promote phosphorous removal.

RELATED CONSIDERATIONS

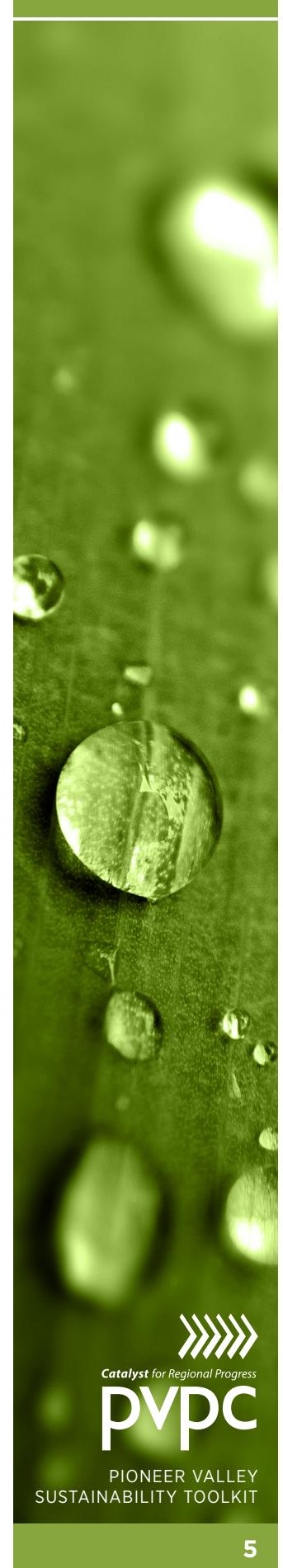
General design considerations noted by the U.S. EPA National Pollutant Discharge Elimination System (NPDES) Stormwater Menu of BMP's include:

Drainage Area – Bioretention facilities should usually be used on small sites (five acres or less). When used to treat larger areas, they tend to clog. In addition, it is difficult to convey flow from a large area to a bioretention facility.

Pretreatment – Incorporating pretreatment helps reduce the maintenance burden of bioretention and reduces the likelihood that the soil bed will clog over time. Several mechanisms can be used to provide pretreatment in bioretention facilities. Often, runoff is directed to a grass channel or filter strip to filter out coarse materials before the runoff flows into the filter bed of the bioretention facility. Other features include a pea gravel diaphragm, which acts to spread flow evenly and drop out larger particles.

Slope – Bioretention facilities are best applied to relatively shallow slopes usually at five percent. A sufficient slope is needed at the site to ensure that water that enters the bioretention area can be connected with the storm drain system. These particular stormwater management practices are most often applied to parking lots or residential landscaped areas, which generally have shallow slopes.

Landscaping – Landscaping is critical to the function and aesthetic value of a bioretention facility. Native vegetation is ideal for planting. Another important feature is to select species that can withstand the type of hydrologic system it will experience. At the bottom of the bioretention facility, it is important to have plants that can tolerate both wet and dry conditions. Along the edges, it will remain primarily dry, so upland species will be the most resilient to this type of condition.



MAINTENANCE CONSIDERATIONS

When properly designed, maintenance of these systems is minimal. UNHSC notes, "...the highest maintenance burden occurs during the first two years of operation as the vegetation grows and the system begins to stabilize." Once vegetation is established, maintenance is comparable to what is required for standard landscaping. (UNHSC, 2012 Biennial Report)

Systems with fine soils may need more cleaning due to obstruction from sediment. Long-term maintenance mainly requires inspection and scraping of surface pollutants.

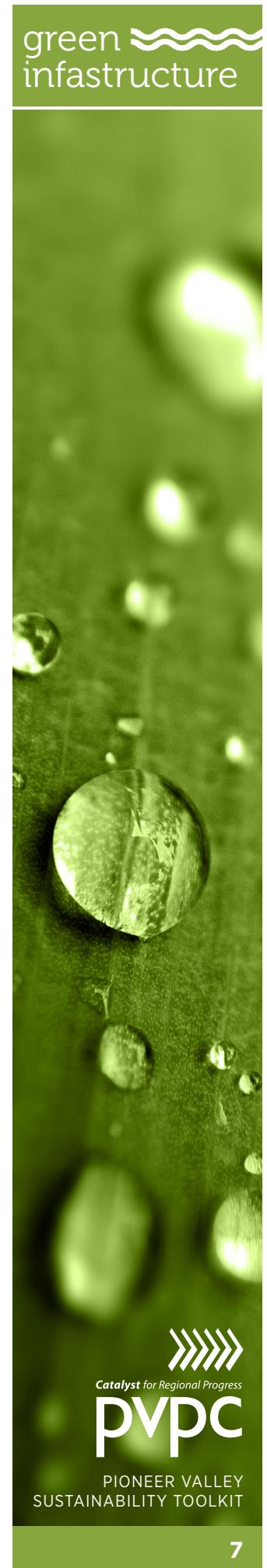
PERMITTING CONSIDERATIONS

In the Massachusetts Stormwater Handbook, Volume 1 under Stormwater Management Standard #6, stormwater discharges to a Zone I or Zone A are prohibited unless essential to the operation of a public water supply. Discharges within Zone II require the use of a treatment train that provides 80% TSS removal prior to discharge. Bioretention facilities are a good fit for discharges within Zone IIs as they have a TSS removal rate of 90%. In addition, under the Massachusetts Stormwater Handbook, Volume 2, Chapter 2, bioretention facilities are a good option for discharges near cold-water fisheries. However, these should not be developed near bathing beaches and shellfish growing areas.



BARRIERS TO USE

Concern	Experience
Cost	<p>The cost of installing a bioretention facility can vary greatly. A “do it yourself” bioretention facility that captures flow from the roof of a single family home and where soils are well draining can cost as little as a hundred dollars with a simple planting scheme.</p> <p>Engineered systems can cost \$4 to \$6 per square foot, including the grading, underdrain, stone, and plants. An estimate from the University of New Hampshire Stormwater Center (UNHSC) provides a cost based on per acre of impervious surface draining to the facility that ranges from \$14,000 and \$25,000 per acre, not including design, permitting, or construction oversight costs.</p> <p>UNHSC further notes that in 2007 they installed a bioretention system in a parking lot median strip as a retrofit. It cost a total of \$14,000 per acre, including \$8,500 per acre for labor and installation, and \$5,500 per acre for materials and plantings. “These finding indicate that for municipalities with equipment and personnel, the retrofit costs are nearly \$5,500 per acre of drainage.” (University of New Hampshire Stormwater Center 2012 Biennial Report)</p>
Accumulation of toxics	<p>Stormwater flow from roadways and parking lots typically carries a mix of pollutants. Where bioretention facilities are used to receive, capture, and treat these flows, do facilities become toxic? Lisa Stiffler, a researcher with the Sightline Institute, a Seattle based think tank, has been investigating. She has found the following:</p> <p>Petroleum pollutants/PAHs: Studies from the field and laboratory find that rain gardens do a great job of capturing petroleum pollution, and that the chemicals are largely eliminated when they are destroyed by bacteria in the soil.</p> <p>Heavy metals: Soil and mulch in rain gardens contain particles that will adsorb and hold metals including copper, cadmium, lead, and zinc. A small fraction of the metals are sucked into plant roots and vegetation. When Northwest counties test for metals in the sediment that is scooped from the bottom of stormwater ponds or rain gardens that drain parking lots and other city surfaces — material that would likely have higher levels of metals than your average residential rain garden — they found that the contamination levels were still below soil and compost standards meant to protect human health.</p> <p>Bacteria and viruses: While some research has found bacteria and viruses in stormwater that can cause disease in humans, sunlight as well as other microorganisms in the runoff and soil of rain gardens can destroy the pathogens. Also, most of the microorganisms present come from animal waste and are less likely to cause illness in people.</p> <p>The bottom line is that the soil in rain gardens is safe for kids and pets. That said, people are advised to wash their hands after working or playing in any soil, which can contain naturally occurring metals, fecal waste from pets, or any number of compounds one would not want to ingest.</p>



Snow management	<p>If used in conjunction with parking lots or roadways, bioretention facilities should be designed to make for easy movement of plows. Planning a plow path and telling snow plow operators where to push the snow is important in keeping snow out of bioretention areas.</p> <p>According to the Massachusetts Stormwater Handbook (Vol. 2, Ch. 2), never store snow in bioretention facilities. The operation and maintenance plan must specify where on-site snow will be stored. A major reason for this is that infiltrating capabilities will become impaired due to fines that remain once snow melts.</p>
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EXAMPLES OF WHERE STRATEGY HAS BEEN IMPLEMENTED

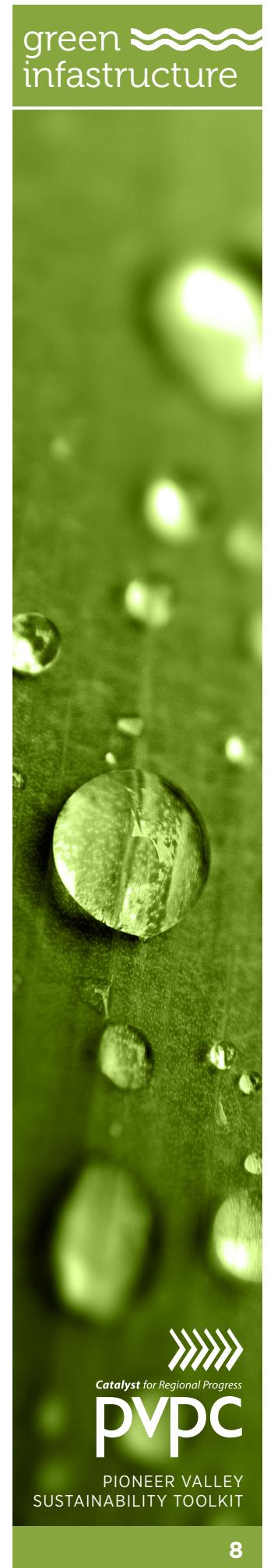
Veterans Affairs Medical Center, Northampton, MA

Three rain gardens at the Northampton Veterans Affairs Medical Center enhance drainage through infiltration of rainfall and snowmelt, and improve aesthetics and habitat values with extensive native plantings. The three rain gardens are part of a campus rain garden master plan.

The rain garden below on the right captures flow from a 1,200 square foot area of roof. The rain garden shown below, includes a “level spreader” built of stone at the top of the system to ensure that storm flow distributes evenly across the basin and does not cause gullies or erosion. This garden below receives flow from a 1,600 square foot area of roof.



Photos courtesy Thomas Benjamin

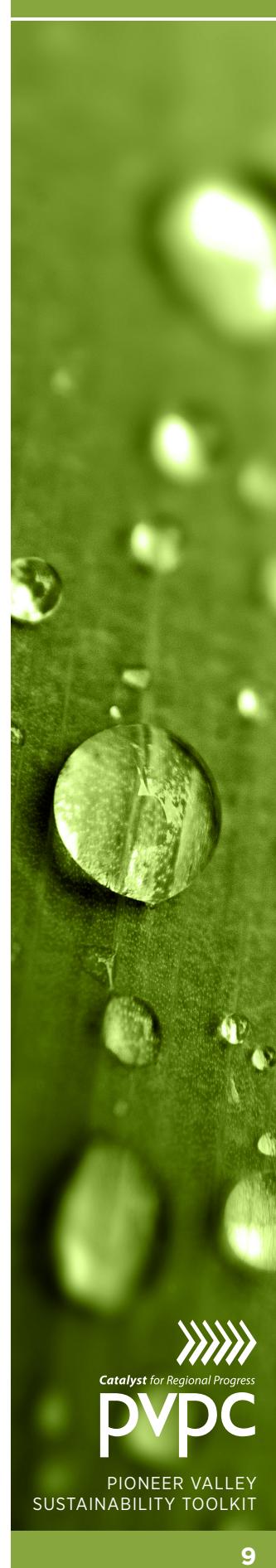


Keene Rain Garden Project, Keene, NH



Downtown Rain Garden Project, Keene, NH | Photo courtesy: Cheshire County Conservation District

Located in downtown Keene, this rain garden project will help protect and restore the water quality of the Ashuelot River Watershed. This project is supported by funds from the sale of the conservation license plate (Moose Plate) through the NH State Conservation Committee grant program. Partners for this project include Antioch University New England and the City of Keene, New Hampshire.



Town of Milton Bioretention Project, Milton, MA

In Milton, MA, several bioretention cells have been built to catch and filter runoff from adjacent streets. Stormwater has been diverted from pipes into bioretention cells to slow and filter flows, as well as help to cool waters before they enter Pine Tree Brook. The Neponset River Watershed Association, Milton Department of Public Works, and the Pine Tree Brook Neighborhood Association have worked together to establish this project. Costs of the project have been covered with the use of federal funds from the U.S. Environmental Protection Agency provided to the Massachusetts Department of Environmental Protection under an Section 319 grant.



Rain garden along Pine Tree Brook | Courtesy: Neponset River | Watershed Association

LINKS TO MORE INFORMATION

HUNT, WILLIAM F., DAVIS, ALLEN P., TRAVER, ROBERT G. JUNE 2012. "MEETING HYDROLOGIC AND WATER QUALITY GOALS THROUGH TARGETED BIORETENTION DESIGN." JOURNAL OF ENVIRONMENTAL ENGINEERING, AMERICAN SOCIETY OF CIVIL ENGINEERS. PP 698- 707. SEE:

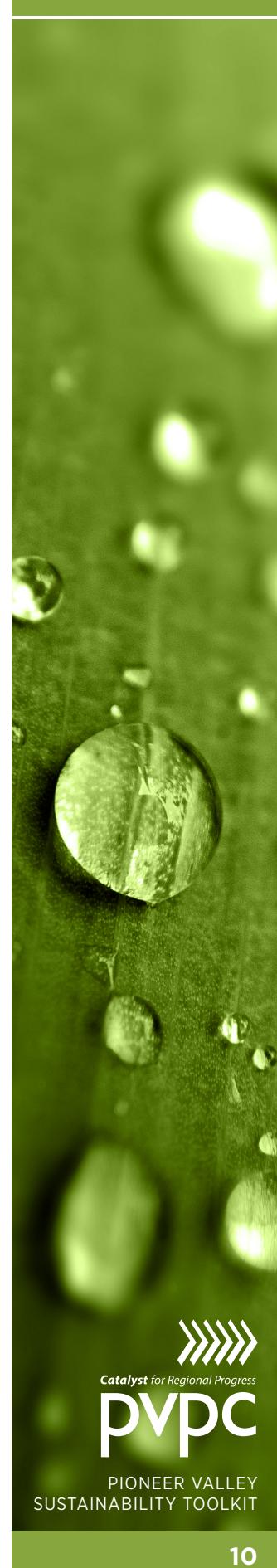
[http://ascelibrary.org/doi/abs/10.1061/\(ASCE\)EE.1943-7870.0000504](http://ascelibrary.org/doi/abs/10.1061/(ASCE)EE.1943-7870.0000504)

MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION. THE MASSACHUSETTS STORMWATER HANDBOOK, VOLUME 1, CHAPTER 1: THE STORMWATER MANAGEMENT STANDARDS. SEE:

<http://www.mass.gov/dep/water/laws/v1c1.doc>

MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION. THE MASSACHUSETTS STORMWATER HANDBOOK, VOLUME 2, CHAPTER 2: STORMWATER BEST MANAGEMENT PRACTICES (BMP'S). SEE:

<http://www.mass.gov/dep/water/laws/v2c2.pdf>



PUGET SOUND PARTNERSHIP AND WASHINGTON STATE UNIVERSITY. DECEMBER 2012. LOW IMPACT DEVELOPMENT TECHNICAL GUIDANCE MANUAL FOR PUGET SOUND. SEE PAGES ON BIORETENTION, 98 TO 148. THOUGH TAILORED TO PUGET SOUND REGION, THIS MANUAL HAS SOME USEFUL TECHNICAL SPECIFICATIONS FOR BIORETENTION FACILITIES. SEE:

http://www.psp.wa.gov/downloads/LID/20121221_LIDmanual_FINAL_secure.pdf

STIFFLER, LISA. JANUARY 2013. "ARE RAIN GARDENS MINI

TOXIC CLEANUP SITES?" SEE:

<http://daily.sightline.org/2013/01/22/are-rain-gardens-mini-toxic-cleanup-sites/>

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY. NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES). STORMWATER MENU OF BMP'S: BIORETENTION (RAIN GARDENS) SEE:

http://cfpub.epa.gov/npdes/stormwater/menufbmps/index.cfm?action=factsheet_results&view=specific&bmp=72&minmeasure=5

UNIVERSITY OF MARYLAND BIORETENTION LAB PAGE:

<http://www.cee.umd.edu/~apdavis/Bioret.htm>

UNIVERSITY OF NEW HAMPSHIRE STORMWATER CENTER

2012 BIENNIAL REPORT. SEE:

<http://www.unh.edu/unhsc/sites/unh.edu.unhsc/files/docs/UNHSC.2012Report.10.10.12.pdf>

UNIVERSITY OF NEW HAMPSHIRE STORMWATER CENTER. OCTOBER 2009. "UNHSC DESIGN SPECIFICATIONS FOR BIORETENTION SYSTEMS." SEE:

http://www.unh.edu/unhsc/sites/unh.edu.unhsc/files/pubs_specs_info/2009_unhsc_report.pdf

FOR MORE INFORMATION, PLEASE CONTACT

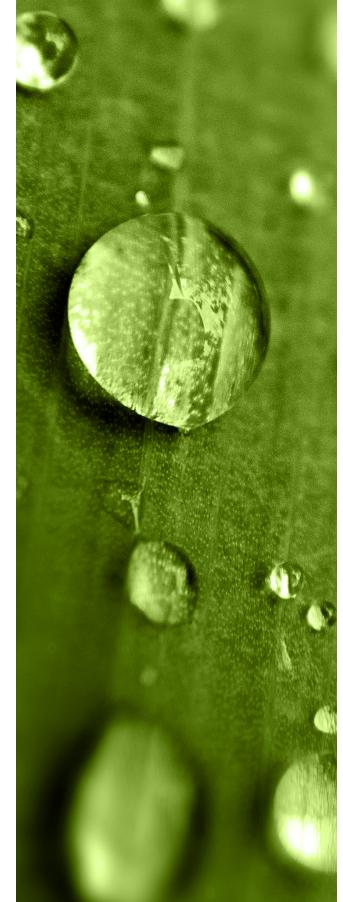
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413-781-6045

60 Congress Street, Floor 1

Springfield, MA 01104-3419

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Downspout Disconnection

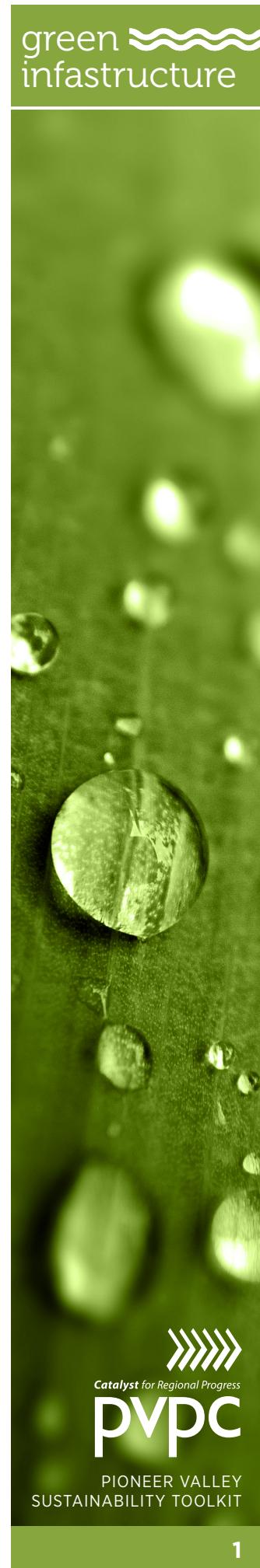
PURPOSE

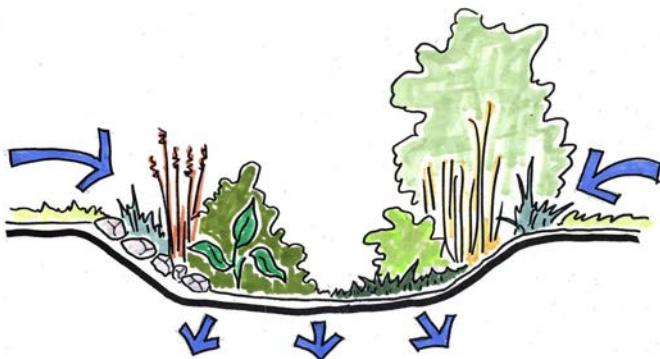
Establishing a municipal downspout disconnection program provides support for a simple, low cost and low maintenance green infrastructure practice to reduce the amount of runoff entering the municipal storm or combined sewer system, thus reducing the occurrence of combined sewer overflows and associated water pollution.

The purpose of a municipal downspout disconnection program is to identify and disconnect those downspouts (also called roof leaders) that discharge into the sanitary sewer system, thereby reducing peak storm flows and associated combined sewer overflows (CSO). Sometimes, downspouts may not be directly plumbed into the sewer, but flow onto contiguously connected impervious areas such as driveways and parking lots, which drain to storm drains in the street. Under both circumstances (direct connection or overflow), redirecting downspouts to vegetated areas such as lawns or rain gardens is a recommended best practice.

In a 2011 study conducted by the Center for Watershed Protection, researchers evaluated runoff reduction at downspout disconnections to six urban residential lawns in the City of Baltimore, Maryland with C-type soils (less cohesive granular soils). On average, runoff reduction was high with an average reduction of 95% for the 1-inch rainfall event, and an average reduction of 90% for the 2-inch rainfall event. Numerous factors affect runoff reduction including soil type, age of lawn, slope, organic matter content, and management practices. The study noted that D-type (or compacted soils) would have resulted in less runoff reduction.

Rain gardens are an attractive alternative to lawn and allow 30% more water to soak into the ground than a conventional lawn (Wisconsin Department of Natural Resources, 2003). In addition to their ability to retain and infiltrate runoff, they provide important habitat for bees, butterflies and birds in urban and suburban areas.



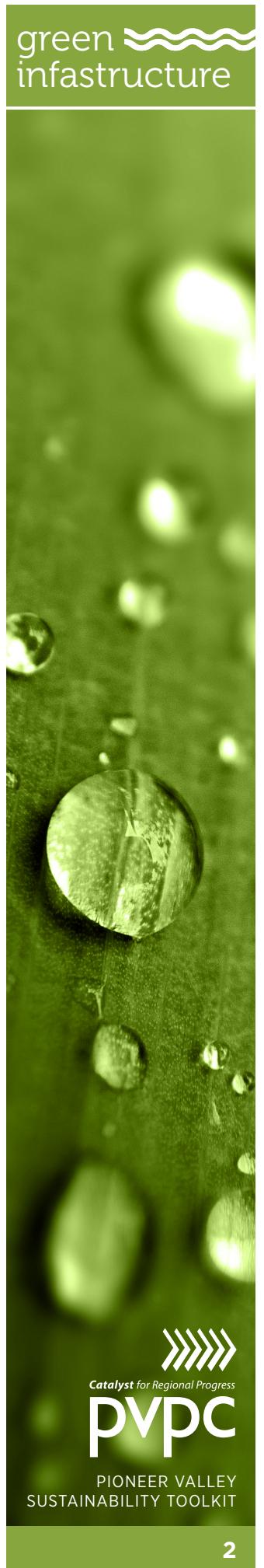


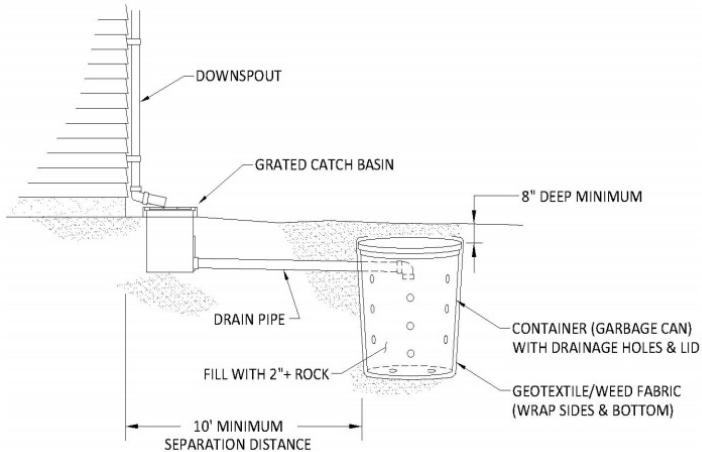
SOURCE: www.GroundworkAppliedDesign.com

DESIGN CONSIDERATIONS

The physical disconnection is relatively simple as illustrated below, however there are a number of design considerations that need to be factored into a project.

- » Evaluate soil type at the site to determine the type of on-site infiltration that will be most effective. Small highly compacted sites, or sites underlain with clay may not be feasible for on-site infiltration.
- » Direct downspout disconnections away from the basement foundation. Make sure downspout extensions end at least three feet away from basement foundations, and water is being directed on ground that slopes away from the building, however do not disconnect downspouts on slopes greater than 10%.
- » Downspout disconnections can redirect flows to vegetated areas such as a lawn or rain garden where there is the capacity for water to infiltrate into the ground.
- » Alternatively, a disconnected downspout can be plumbed into an underground drywell, gravel pit or trench where water is stored and slowly infiltrates into the ground.
- » Do not allow water to splash or pond on adjacent property. Infiltrate all water on site.
- » Do not redirect water to paved walkways and driveways as it will cause icing in the winter and unsafe conditions for pedestrians.





A subsurface infiltration chamber can be built from a variety of materials. Key components include pipe, a perforated storage chamber, stone, and filter fabric.

SOURCE: Fairbanks Green Infrastructure Group www.fairbankssoilwater.org

HOW TO DISCONNECT A DOWNSPOUT

Step 1: Observe Your Site

It is important to understand where runoff from your downspouts go, including your house, garage, and other covered surfaces. Identify the location of downspouts and roof line, and estimate the square footage of your roof area. Map out areas in your yard for infiltration down slope of structures where you might disconnect downspouts.

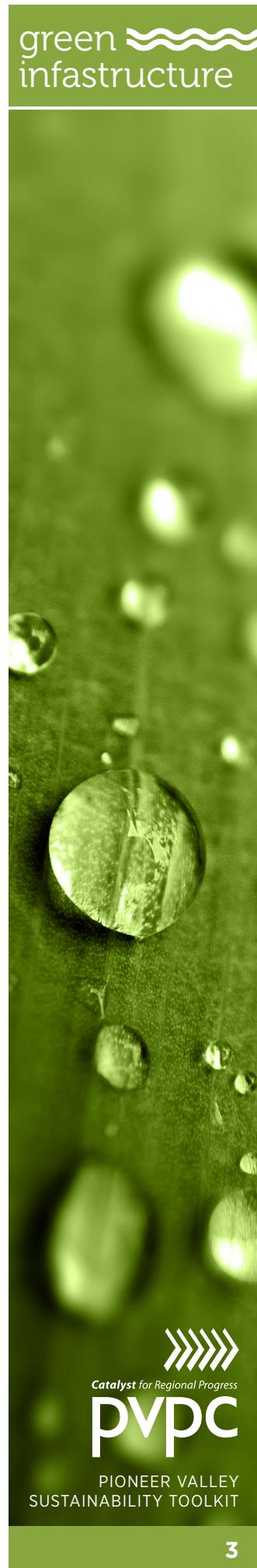
Step 2: Design Your Disconnection

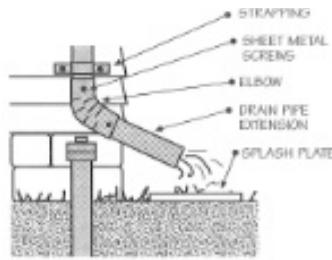
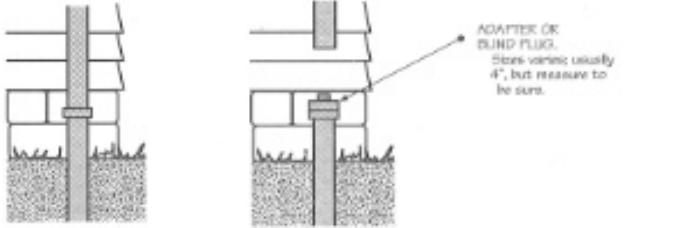
Make sure you have enough landscaped area for rain to soak safely into the ground. The ground area must be at least 10% of the roof area that drains to the disconnected downspout.

Example: roof area sizing factor landscapes area size
 500 sq. ft. X 10% = 50 sq. ft. (5'x10')

Step 3: Disconnect and Redirect

Cut off the downspout above the old connecting pipe. Cap or plug the top of the pipe. Fittings can be either approved adapters or blind plugs. These are available at most plumbing supply stores. Secure the cut downspout to the wall with a bracket. Next, install an elbow and extension to carry water away from the house. Add a concrete “splash pad” at the ground where the water spills from the downspout onto the lawn to prevent erosion, or landscape the area with stone, or install a rain garden to infiltrate the runoff water.





Step 4: Maintenance

Proper maintenance of your gutters, downspouts, and landscaping can reduce problems.

- » Clean gutters at least twice a year, and more often if you have overhanging trees.
- » Make sure gutters are pitched to downspouts, and repair low spots.
- » Check and clear elbows or bends in downspouts to prevent clogging.
- » The ground should slope away from the structures. Don't build up soil, mulch, or other landscaping materials against the foundation and siding.
- » Avoid draining water onto impermeable plastic weed block or cloth.
- » Maintain healthy vegetation (lawn or rain garden plants) in the drainage area to minimize erosion and promote optimum infiltration.

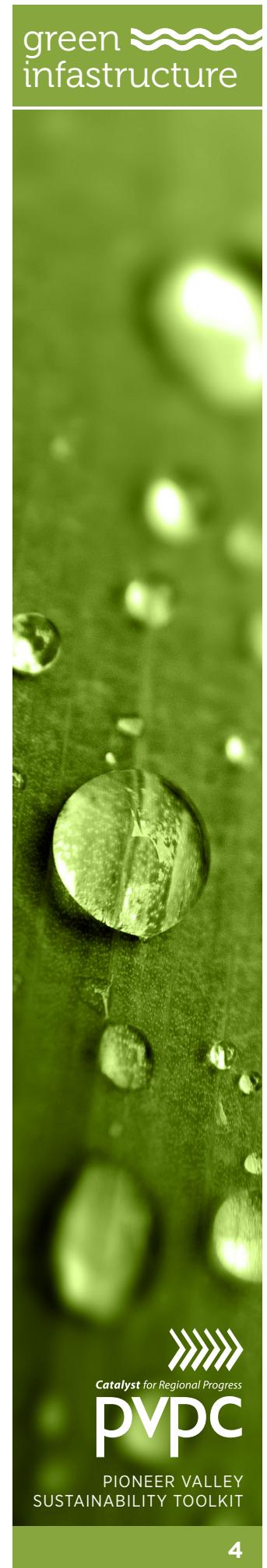
DEVELOPING A MUNICIPAL DOWNSPOUT DISCONNECTION PROGRAM

Some examples of successful municipal downspout disconnection programs are provided below. However, it is important to understand key program components so that a missing element does not become a barrier to program implementation.

Local Policies and Regulations

Municipalities should adopt a local policy or regulation prohibiting downspout connections and establishes a local program with standards and incentives for downspout disconnection and on-site infiltration. Such a program may not be appropriate in neighborhoods where soils are not suitable for infiltration. Neighborhoods with combined sewers are high priority areas for downspout disconnection programs. Soil suitability for infiltration should be assessed in these neighborhoods prior to implementing a program.

Stormwater plumped into the sanitary sewer can not only cause combined sewer overflows, but it increases the volume of water to be treated at the waste water treatment plant at an expense to the municipality. Clean roof runoff does not need the level of treatment sewage receives at a treatment plant. By reducing the volume of water being treated at the plant, the municipality saves money that can be used to support other infrastructure needs.



See local examples below for more information on funding and operating a downspout disconnection program.

Education and Outreach

Public service announcements, community meetings, YouTube videos, brochures, and financial incentives have proven very important to successful programs. Ongoing education to residents about the benefits of disconnection and redirection, and alternative uses of stormwater such as rainwater harvesting for irrigation or greywater, cannot be overlooked. This means adequate funding is needed for dedicated staff, outreach materials, and possibly materials such as a downspout disconnection kit or a drywell for infiltration.

Technical Support

All successful downspout disconnection programs provide a licensed plumbing contractor to perform the work at no cost to the homeowner. Alternatively, the homeowner can do the work themselves or hire a licensed plumber at their own expense, sometimes from a pre-approved list of contractors provided by the City. If a homeowner chooses not to use a city contractor, or a pre-approved contractor, a site inspection is performed upon completion to ensure compliance with local sewer regulations and/or plumbing codes. In some cases, dye testing may be needed to determine if a downspout is connected to or has been properly disconnected from the sanitary sewer.

Funding Sources

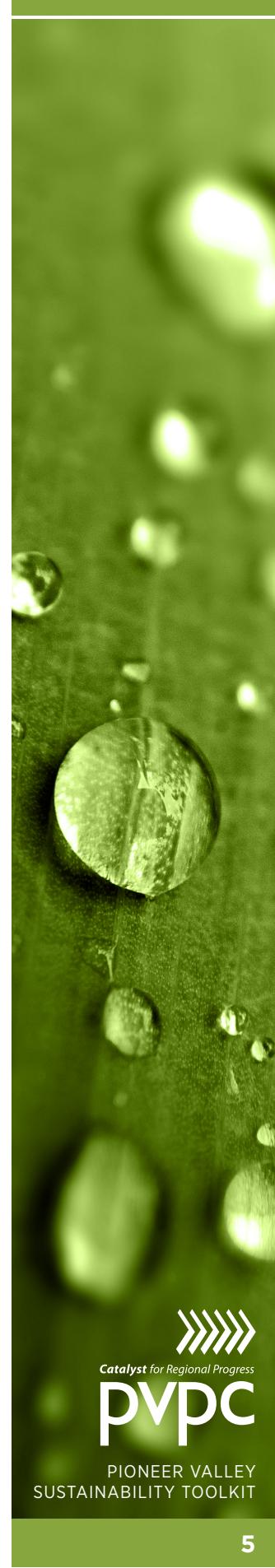
Funding sources are typically derived from one of the following or a combination thereof: sewer rates, stormwater utility fees, and State Revolving Fund (SRF). Dedicating funding to downspout disconnection from any of these sources is identified in planning phases such as I/I studies and master plans, capital improvement plans, or through enforcement proceedings such as Administrative and Court Orders.

DISCONNECTION PROGRAMS – LESSONS LEARNED

City of Portland, Oregon

The City of Portland, Oregon's Department of Environmental Services operated a very successful downspout disconnection program from 1993 to 2011, disconnecting more than 58,000 downspouts at a total cost of \$13 million, inclusive of disconnection construction, staffing, and outreach materials and media. The program was funded solely from their sewer and stormwater utility fee, established in 1977. Some key lessons learned include:

- » **Scale Matters** – The program targeted a large geographic area to reduce CSOs to the Columbia, Slough and Willamette Rivers. To do this successfully, they used a simple technique for disconnection that was conservatively applied to only downspouts that could be disconnected safely.
- » **Downspout Disconnections Only Tool in the Toolbox** - They did not build rain gardens or other systems, seeking as much benefit as simply as possible. If a downspout disconnection could not be done safely, they didn't do it.



- » **Build Trust with Consistent Messaging** – Consistent and persistent messaging through targeted and direct outreach to homeowners helped build trust in the community and grow the program. Homeowners were slow to sign up at first, but the programs reputation for working well with property owners and careful attention to site details encouraged others to participate.
- » **Financial Incentives are Important** - Homeowners could earn \$53 for each downspout disconnection toward the stormwater portion of their city utility bill. Homeowners could have their downspouts disconnected for free by a licensed and bonded plumber under contract with the City, do it themselves, or utilize one of the volunteer community groups trained by the City. All sites were inspected after disconnection by the City. Later, the City also established the Clean River Rewards program which offered on-going discounts on utility bills for other on-site stormwater management options.
- » **Keep Risk Low** – High safety standards meant some downspouts could not be disconnected without risk of onsite flooding or harm to workers performing disconnection.

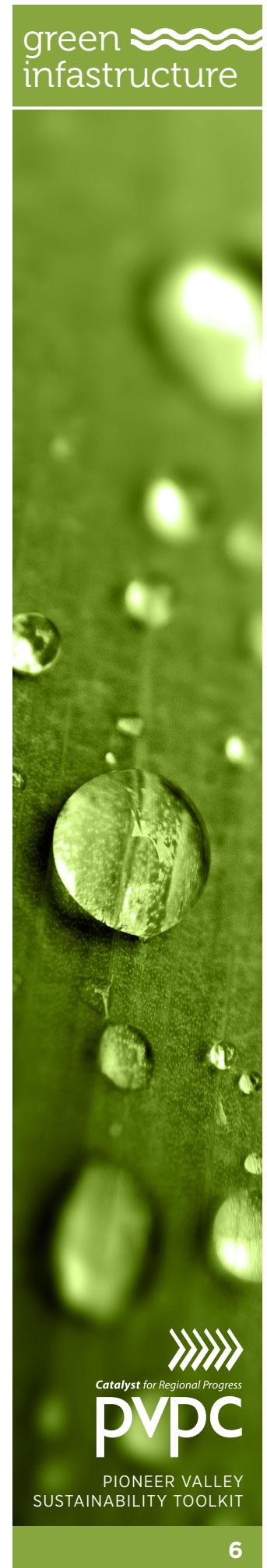
Boston Water and Sewer Commission

The Boston Water and Sewer Commission's (BWSC) downspout disconnection program was established 25 years ago as a component of their combined sewer separation. Through numerous Infiltration and Inflow Studies, the Commission identified neighborhoods and individual properties with downspouts connected to the combined or sanitary sewer, and initiated direct outreach to property owners about disconnecting their downspouts. Homeowners may choose to allow a contractor hired by BWSC to disconnect the downspouts at no cost to the homeowner, or the homeowner may hire a licensed plumber to disconnect at the owner's expense. The program has disconnected downspouts on 39,000 buildings, and estimates to have disconnected over 75,000 downspouts.

Funding sources have varied over the course of the program. In general, funding has been provided by the Metropolitan Water Resources Authority (MWRA), which gets its funding for sewer separation projects from SRF. MWRA operates the regional Deer Island Waste Water Treatment Plant. The funding structure has varied from full coverage to a cost share depending on different factors over time including the phase of separation, funding levels, and whether the project was located in a combined or separated sewershed. BWSC's portion of the cost share structure has come from their sewer rates revenue.

To support the sewer separation program, the City adopted a Sewer Use Regulation in 1998 prohibiting downspout connection to the combined sewer and requiring disconnection. The program saves BWSC money by reducing the volume of water it sends to the Deer Island Wastewater Treatment Plant, and supports MWRA's mandates to eliminate CSOs. More about this program can be viewed here:

<http://www.bwsc.org/SERVICES/Programs/downspout/downspout.asp>



REFERENCES AND RESOURCES

CITY OF PORTLAND, OREGON ENVIRONMENTAL SERVICES. HOW TO MANAGE STORMWATER: DOWNSPOUT DISCONNECTION.

www.cleanriverspdx.org

LAW, NEELY AND DANA PUZEY. DOWNSPOUT DISCONNECTION STUDY SHOWS GREAT POTENTIAL FOR RUNOFF REDUCTION ON SMALL URBAN LAWNS. CENTER FOR WATERSHED PROTECTION WINTER NEWSLETTER, 2012.

UNIVERSITY OF CONNECTICUT. RAIN GARDENS: A DESIGN GUIDE FOR CONNECTICUT AND NEW ENGLAND HOMEOWNERS.

www.nemo.uconn.edu/raingardens/

UNIVERSITY OF WISCONSIN EXTENSION. RAIN GARDENS: A HOW-TO MANUAL FOR HOMEOWNERS. 2003

<http://dnr.wi.gov/topic/shorelandzoning/documents/rgmanual.pdf>

FOR MORE INFORMATION, PLEASE CONTACT

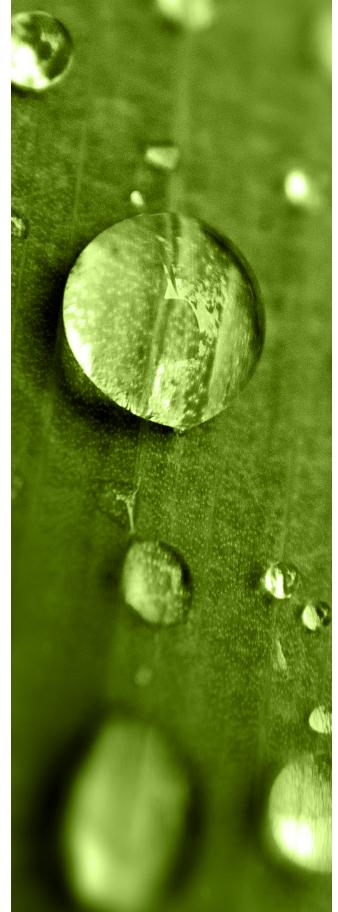
Pioneer Valley Planning Commission

413-781-6045

60 Congress Street, Floor 1

Springfield, MA 01104-3419

www.pvpc.org



Green Roofs

PURPOSE

Green roofs decrease greenhouse gas emissions caused by heating and cooling systems by making buildings more energy efficient through the installation of roofs with vegetation, soil, and membrane layers.

In recent years, green roofs have gone from a horticultural curiosity to a booming growth industry, primarily because the environmental benefits of extensively planted roofs are now beyond dispute. Whether for industrial or governmental complexes or private homes, in urban or suburban settings, green roofs provide many benefits to buildings, neighborhoods and municipalities including:

- » Reduce stormwater infrastructure needs and costs by retaining 25 to 90% of precipitation (seasonally dependant).
- » Insulate buildings by reducing heat loss (winter) and heat gain (summer) through the roof.
- » Provide new opportunities for urban agriculture, or the creation of community gardens.
- » Significantly reduce sound levels from sources such as traffic or airplanes.
- » Protect roof membrane resulting in longer material lifespan and decreased maintenance and savings in replacement costs.
- » Provide amenity space for day care, meetings, and recreation.
- » Provide aesthetic appeal, increasing property value and the overall marketability of the building, particularly for accessible green roofs.
- » Reduce ‘urban heat island effect’ in the summer



PROMOTING GREEN ROOFS IN THE PIONEER VALLEY

Communities can adopt local zoning incentives or provide financial incentives through municipal stormwater fee reductions, tax credits and grant programs to encourage the installation of green roofs on new and existing buildings. Examples of zoning incentives include density bonuses (typically in the form of floor area ratio (FAR) bonuses) or a reduction in parking requirements. Some cities in the United States have taken steps to mandate that all new privately-owned large buildings (typically over 50,000 sq/ft) meet LEED Certified standards, which require green roofs. Few municipalities actually require projects to achieve LEED certification.

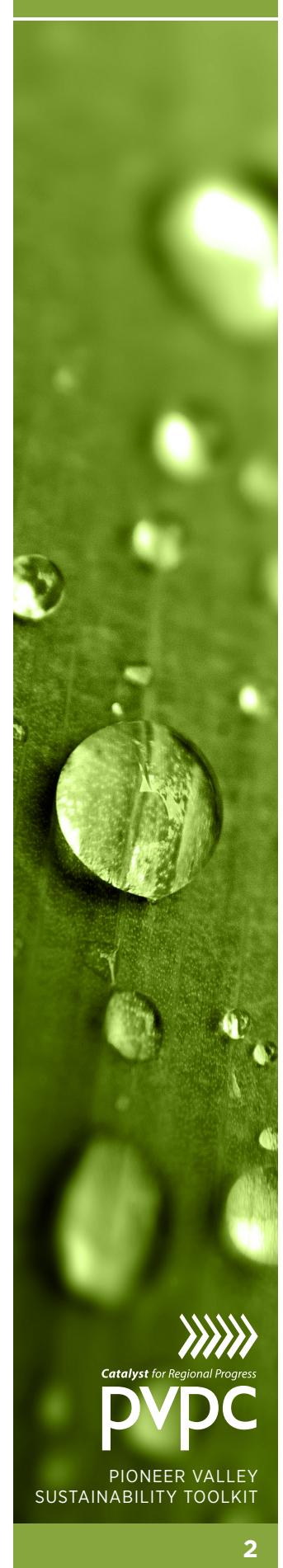
The U.S. is far behind other countries in adopting strategies to support the installation of green roofs. Germany has emerged as the world leader not only in developing green roof technologies and systems, but in passing federal and state legislation to mandate green roofs under specific conditions and offering economic incentives to install them. The state of Nordrhein-Westfalen, for example, pays €15.00 per square meter (\$19.40/10.8 square feet) to individuals who install them, while other states offer similar programs. (Snodgrass, 2006)

ENVIRONMENTAL BENEFITS

Improved air and water quality are two important environmental benefits to green roofs. The plants and growing medium of a green roof absorb water that would otherwise become runoff, thereby reducing peak storm flows and reducing associated water pollution. Research indicates that peak flow rates are reduced by 50% to 90% compared to conventional roofs. The characteristics of the soil substrate have a major influence on the effectiveness of a green roof. The soil layer traps sediments, leaves and other particles, thereby treating the runoff before reaching an outlet. The water retention capacity of the soil is dependent upon both the properties of the soil substrate and the vegetative cover. For example:

- » 1-inch deep moss and sedum layer over a 2-inch gravel bed retains about 58% of the water
- » 2.5-inch deep sedum and grass layer retains about 67% of the water
- » 4-inch layer of grass and herbaceous vegetation retains about 71% of the water

When incorporated into a combined sewer overflow abatement strategy, green roofs can reduce the need for sewer separation or storage projects required to reduce the volume and frequency of combined sewer overflows. (MA DEP and Low Impact Development Center)



The insulation provided by a green roof improves the cooling and heating efficiency of a building. By reducing energy demand for these functions, green roofs reduce air pollution and greenhouse gas emissions associated with energy production. Additionally, by reducing roof temperatures, green roofs slow the formation of ground-level ozone. Vegetation on a green roof can remove particulate matter and gaseous pollutants including nitrogen oxides, sulfur dioxide, and carbon monoxide from the air. They also remove carbon dioxide and produce oxygen. (MA DEP)

DESIGN CONSIDERATIONS

What is the purpose of the green roof?

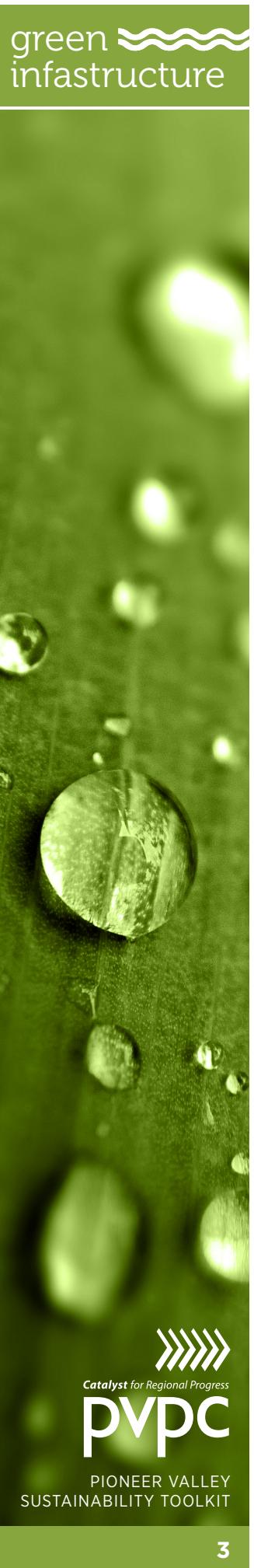
Identifying a green roof's purpose and incorporating that into the early stages of planning and design is critical. All of the end uses may be compatible (stormwater retention, temperature management, community garden), but each requires different design and structural emphases and will significantly impact how the roof looks and functions, including what vegetation will cover it.

Load-bearing Considerations

Load bearing is the most critical consideration for any green roof. There are no regulatory barriers to building a green roof per se. Structural engineers assess loads from two general perspectives: dead and live loads. Local building codes usually specify a roof's required live load, which includes snow, water, wind, and safety factors required for the building's performance. Live load also includes human traffic, temporary installations such as furniture or maintenance equipment, and anything else transient in nature. Dead load includes the weight of the roof itself, along with permanent elements that make up the roof's structure, including roofing layers, any permanent installations for heating and cooling, and the projected wind or snow loads. Green roofs must be designed to withstand both live and dead loads. Additionally, because extensive green roof systems must be evaluated while fully saturated – which adds from 15 to 25 pounds per square foot – this must also be factored in. (Snodgrass, 2006)

Components of the Green Roof

The term green roof actually denotes a system of comprising several components, or layers, that work together to function as a single combined unit. While a green roof can be built on a variety of decking surfaces including concrete, steel, wood, and composite, the system is only possible when other components are added to ensure that the roof is protected against collapse and degradation and several other conditions are met. The basic components include: decking, waterproofing layer, and insulation layer, a root barrier, a drainage layer, a filter layer, and a substrate or medium layer.



Vegetation and Plant Selection

The act of growing plants under atypical conditions necessarily influences their selection and maintenance in ways that differ from considerations for ground-level plants. Selecting the right plants is one of the foremost challenges. For example, without irrigation and at least 8 inches of mostly organic medium, most green roofs in North America cannot sustain a wide variety of plant species that appear in traditional gardens. (Snodgrass, 2006) Solar orientation will affect plant growth, and may be particularly important on sites with extreme slopes that have the potential to shade a roof.

Jones Ferry River Access Center Green Roof, Holyoke, MA

This green roof includes is 13,000 square foot roof built to reduce and treat stormwater runoff, improve energy efficiency within the building lowering heating and cooling costs, reduces rooftop noise and improve air quality. The building was designed to accommodate the roofing system, including a sturdier roof framing, a thick EPDM membrane for waterproofing the roof.

The six inches of growth media is an engineered blend of carefully selected materials designed to be light weight while providing superior moisture retention. It's superior to regular soil because it is lighter, free from pathogens, undesirable insects and weeds. The roofing system will weigh between 20-25 pounds per square foot saturated with water. On an annual average, 50%-80% of all stormwater that falls on the roof is retained and not released to the storm sewer system.

In a completely dry state, the R-Value of the roof garden is approximately 6. However, the higher the moisture content of the assembly, the lower the R-Value, as thermal conductivity increases. Plants function as small water pumps operating at high pressure and low volume. When materials experience a phase change from liquid to vapor, they absorb a large amount of heat energy from the surrounding environment. In the case of water, every gallon transpired by the plants absorbs roughly 8,000 BTU's of heat energy. As a result, during hot summer days, the roof membrane temperature is typically 5-10°F cooler than the ambient air temperature. The plants, mostly sedum acclimated to grow in this area, also stabilize the growth media and absorb stormwater.



MUNICIPAL INCENTIVE PROGRAMS FOR GREEN ROOFS

Portland, Oregon

The City of Portland offers a Floor Area Ratio (FAR) bonus to developers who build rooftop gardens or Ecoroofs in certain districts of the city. The ratio of the FAR bonus varies, depending on the percentage of the total building roof that the Ecoroof or rooftop garden covers. The City also funds up to \$5 per square foot of an ‘ecoroof’ project through their Ecoroof Incentive Program, which runs to 2013.

Chicago, Illinois

The City of Chicago’s “Green Permit Process” offers qualifying projects, such as green roof projects, an expedited permit process and possible reduction of the permit fees.

Minneapolis, Minnesota

The City of Minneapolis charges property owners for management of stormwater based on the degree to which their property is covered by impervious surfaces. Property owners could qualify for fee reductions of up to 100% by establishing onsite water-quality and/or quantity treatment systems, such as rain gardens, detention ponds and green roofs.

Toronto, Canada

The City of Toronto instituted a “green roof bylaw” that requires green roofs for all new development above 21,500 sq/ft. Coverage requirement range from 20-60% of the available roof space depending on the size of the development.

Acton, Massachusetts

The Town of Acton adopted a zoning by-law allowing for a density bonus for buildings achieving LEED certification in the East Acton Village District.

Portsmouth, New Hampshire

The City of Portsmouth adopted a density bonus for private projects that use LEED in the central business district by which a project benefits from a 0.5 increase in FAR if it meets appropriate open space requirements and build to LEED Certified standards.

Los Angeles, California

The City of Los Angeles requires all privately owned buildings in the city with more than 50 units or over 50,000 sq/ft to meet LEED Certified standards. Additionally, all City of Los Angeles building projects that are 7,500 sq/ft or larger are required to meet LEED standards.



REFERENCES AND RESOURCES

U.S. GREEN BUILDING COUNCIL, GREEN BUILDING INCENTIVE STRATEGIES:
www.usgbc.org/DisplayPage.aspx?CMSPageID=2078

TOWN OF ACTON ZONING BYLAW (SECTION 5.5B.2.2.D):
<http://www.acton-ma.gov/>

CITY OF PORTLAND ECOROOF PROGRAM:
<http://www.portlandonline.com/bes/index.cfm?f=c=44422>

CITY OF LOS ANGELES GREEN LA INITIATIVE:
www.ladwp.com/ladwp/areaHomeIndex.jsp?contentId=LADWP_GREENLA_SCID

CITY OF CHICAGO GREEN PERMIT PROCESS
www.cityofchicago.org/city/en/depts/bldgs/supp_info/overview_of_the_greenpermitprogram.html

CITY OF MINNEAPOLIS STORMWATER PROGRAM:
<http://www.ci.minneapolis.mn.us/stormwater/green-initiatives/>

CITY OF TORONTO GREEN ROOFS PROGRAM:
<http://www.toronto.ca/greenroofs/>

Snodgrass, Edmund C. and Lucie L. Snodgrass. *Green Roof Plants: A Resource and Planting Guide*. Timber Press, 2006.

FOR MORE INFORMATION, PLEASE CONTACT

Pioneer Valley Planning Commission

413-781-6045

60 Congress Street, Floor 1
Springfield, MA 01104-3419

www.pvpc.org



Green Streets

PURPOSE

Green streets are designed to treat and infiltrate stormwater close to its source while creating more vibrant and livable communities.

Stormwater runoff from streets, roads, parking lots, roofs and other impervious surfaces is a significant source of water pollution to our rivers, streams and ponds, as well as a major contributor to combined sewer overflows. Green streets can provide cost effective infrastructure solutions to reduce and manage stormwater runoff and flooding through the use of green infrastructure facilities – small, decentralized, natural or engineered systems that utilize soils and vegetation as a primary treatment mechanism. This approach integrates the built and natural environment, introducing park-like elements that enhance the pedestrian experience.

GREEN STREETS PRINCIPLES

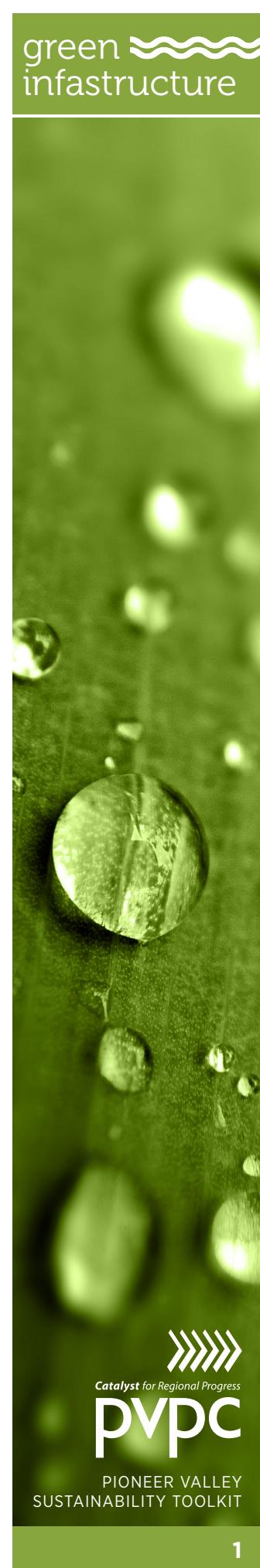
Green streets are designed utilizing three guiding principles:

Green Infrastructure – Use naturalized systems to treat and manage stormwater close to its source.

Green infrastructure (GI) uses naturalized systems to infiltrate, evapotranspire, and/or recycle stormwater runoff close to its source. Rain gardens, bioretention areas, tree box filters/trenches, green roofs, bioswales, permeable pavement, and street trees are some common GI practices. In addition to vegetation and engineered soils, GI uses permeable surfaces to intercept rain and snow melt close to the source, reducing the burden on traditional grey infrastructure systems. GI facilities seek to complement rather than replace existing grey infrastructure to achieve some of the additional benefits green streets have to offer a community.

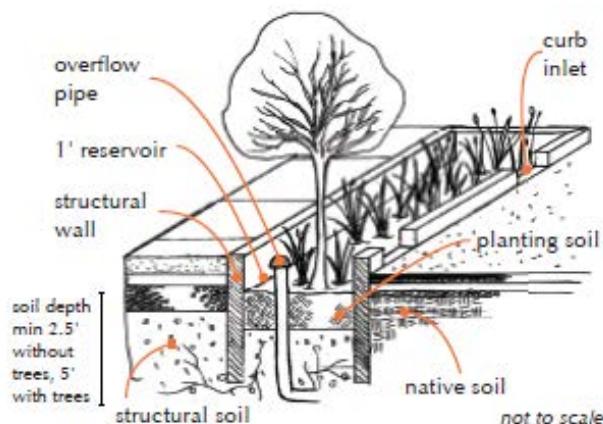
Complete Streets – Create bicycle and pedestrian friendly streets.

Complete Streets are designed for all users regardless of age, ability, income, or mode of transportation, and prioritize the health, safety, and comfort of residents and visitors. Through the use of designated bike lanes, safe pedestrian crossings, traffic-calming elements, and accessible transit systems, Complete Streets create healthier, more pleasant streetscapes that offer opportunities to walk and bicycle safely every day.



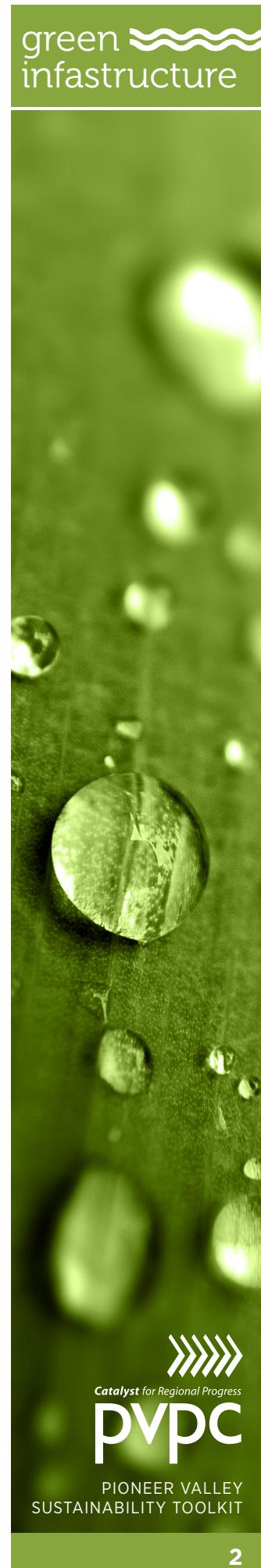
Placemaking – Generate a strong sense of place.

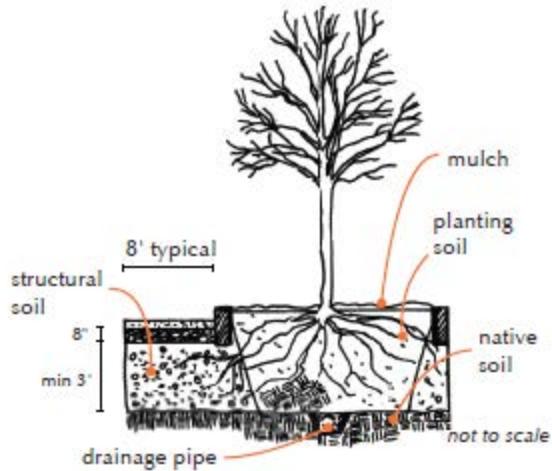
Placemaking is about strengthening the connection between people and the spaces they share. In this way, spaces are created that reflect the identity and history of residents, taking a number of forms from pocket parks to participatory art projects to human-scale built environments. Good public spaces can be both temporary and seasonal, as in a Saturday morning farmer's market on a local street closed to vehicular traffic, to permanent parks, plazas and boulevards. Placemaking can increase positive interactions between people, instill community pride, improve quality of, beautify a place, and support economic growth.



STORMWATER PLANTER

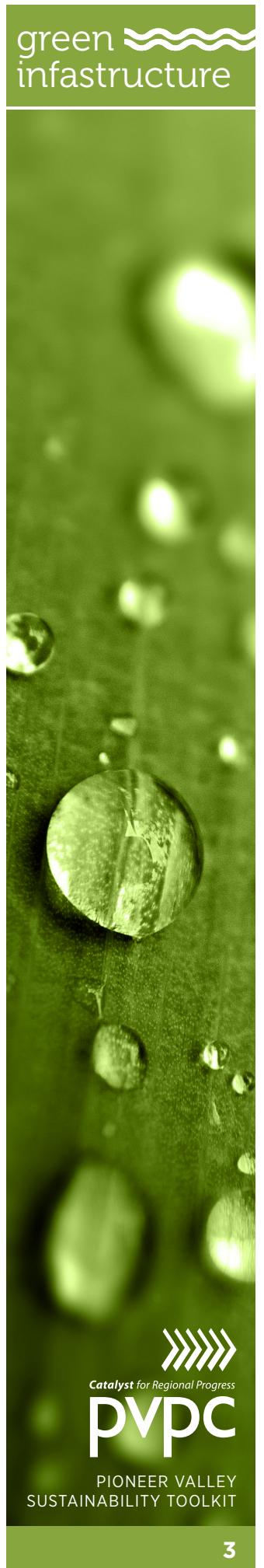
A stormwater planter is usually a rectangular, vegetated planter, sometimes planted with trees. Its four concrete sides double as a curb and structure for the planter and allow water to pool up to 1' before overflowing into another planter or the grey infrastructure system, storing and infiltrating water over time.





BREAKOUT

Break-outs are excavated areas filled with structural soil, often under sidewalks or roads. Used in combination with other green infrastructure tools such as tree trenches or stormwater planters, break-outs provide more room for tree roots to grow in tight spaces, increasing the longevity and survival rate of urban trees.



ADOPTING A GREEN STREETS POLICY

Adopting a municipal Green Streets Policy demonstrates a community's commitment to achieving the principles identified above in both private and public projects. The following are examples of Green Street Policies from cities around the country:

Northampton, Massachusetts – Green Streets Policy

Northampton has developed a Green Streets Policy statement which promotes the use of green streets facilities and green infrastructure in public and private development, including:

- » Road reconstruction, new road development and bicycle and pedestrian projects;
- » Stormwater projects, and;
- » New development and redevelopment projects

through regulation, capital investment and management mechanisms as a cost effective and sustainable practice for stormwater management.

Prince George's County, Maryland – Complete and Green Streets Policy

The County requires road, sidewalk, trail, and transit related construction/reconstruction projects to include environmental site design where practicable.

District of Columbia – Green Streets Policy

The District of Columbia's stormwater rules and the Department of Transportation's Low Impact Development Action Plan inform the City's Green Streets Policy.

Cleveland, Ohio – Complete and Green Streets Ordinance

The purpose of the ordinance is to the creation of a network of Complete and Green Streets that will improve the economic, environmental, and social well-being of the city.

Tucson, Arizona – Green Streets Policy

Tucson's policy requires stormwater harvesting features to be integrated into all publicly funded roadway development and redevelopment projects.

Holyoke, Massachusetts – Green Streets Guidebook

The City's Guidebook is intended to introduce city planners and policy makers to Green Streets, advocate for Green Streets implementation in Holyoke, and serve as a preliminary set of design guidelines to transform Holyoke's streets into more ecologically, socially, and economically positive spaces. The Guidebook includes a Toolbox with design standards for Green streets strategies; nine design templates representative street characteristics in Holyoke that can be applied to future projects; a site-specific application of Green Street design principles in downtown Holyoke; an exploration of relative costs and benefits; and recommended next steps for the city to implement Green Streets.



Catalyst for Regional Progress

PVPC

PIONEER VALLEY
SUSTAINABILITY TOOLKIT

Edina, Minnesota – Living Streets Policy

The policy enables the City to implement their Living Streets Plan for safe walking, bicycling and driving, reduced stormwater runoff, reduced energy consumption, and promoting health.



REFERENCES AND RESOURCES

CITY OF SEATTLE, RIGHT OF WAY IMPROVEMENTS MANUAL: GREEN STREETS
http://www.seattle.gov/transportation/rowmanual/manual/6_2.asp

CITY OF PORTLAND, GREEN STREETS CONSTRUCTION GUIDE
<http://www.portlandoregon.gov/bes/45379>

CITY OF PHILADELPHIA'S GREEN CITY CLEAN WATERS,
GREEN STREETS DESIGN MANUAL
http://www.phillywatersheds.org/what_were_doing/gsdm

U.S. ENVIRONMENTAL PROTECTION AGENCY, EFFECTIVE GUIDE TO GREEN STREETS
http://water.epa.gov/aboutow/eparecovery/upload/2009_09_10_eparecovery_EPA_ARRA_Green_Streets_FINAL.pdf

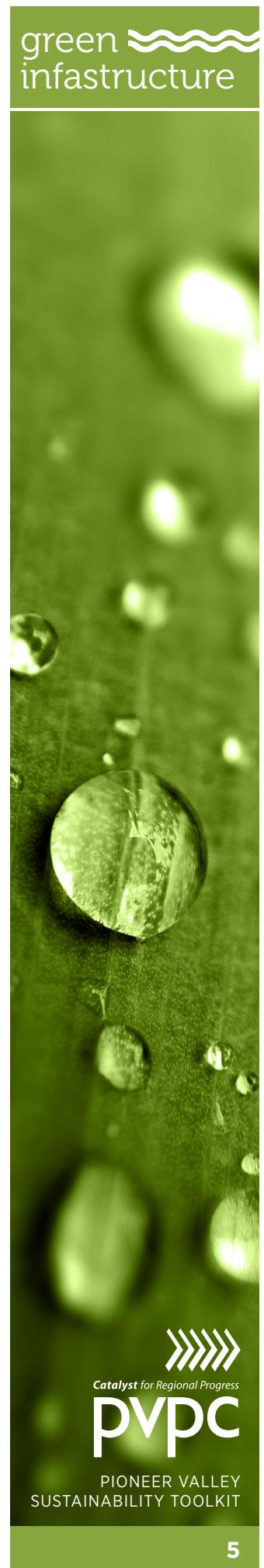
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413-781-6045

60 Congress Street, Floor 1
Springfield, MA 01104-3419

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Porous Asphalt

WHAT IT IS

With roads and parking lots accounting for a high percentage of impervious surface, porous asphalt can be an ideal Best Management Practice in the right location. It essentially eliminates the impervious surface that would otherwise be created. Porous asphalt uses a standard asphalt mix with no sand or fines and a polymer binder to provide strength and stability. The void spaces of this mixture allows rain and snowmelt to pass through to a subbase of stone aggregate that both supports the asphalt layer and provides storage for and treatment of rainfall or snowmelt.

Unlike many other stormwater management facilities, porous asphalt requires no additional land or space, functioning within the footprint of the roadway, parking lot, alley, or sidewalk. By promoting infiltration, filtration, and recharge of groundwater, porous asphalt significantly reduces runoff volume and peak flows, decreases runoff temperature, and improves water quality. The University of New Hampshire Stormwater Center (UNHSC) reports that it also speeds snow and ice melt, reducing the salt required for winter maintenance. While porous asphalt is most recommended for low volume and low speed applications, U.S. Environmental Protection Agency has noted that porous asphalt has performed well in all highway pilot projects in the United States. Maine DOT has recently used porous asphalt on a high volume road in South Portland (see more information about this project under Examples).

WATER QUALITY TREATMENT

The porous asphalt design tested at UNHSC, being widely promoted now in New England, uses coarse sand as a subbase filter course that enhances effectiveness in pollutant removal rates. The facility at UNHSC has demonstrated the following:

Pollutant	% Removal
Total Suspended Solids (TSS)	99
Total Petroleum Hydrocarbons in the Diesel Range	99
Dissolved Inorganic Nitrogen (NO ₃)	No treatment
Total Zinc	75
Total Phosphorous	60
Average Annual Peak Flow Reduction	82

Source: University of New Hampshire Stormwater Center 2009 Annual Report

DESIGN CONSIDERATIONS

Stormwater design parameters – Three to five feet of vertical separation is needed from seasonal high groundwater. U.S. EPA also notes, “The load bearing and infiltration capacities of the subgrade soil, the infiltration capacity of the porous asphalt, and the storage capacity of the stone base/subbase are the key stormwater design parameters. To compensate for the lower structural support capacity of clay soils, additional subbase depth is often required. The increased depth also provides additional storage volume.”

Quality control – Careful assessment of site conditions, and quality control for material production and installation methods are essential to success.

Protect porous surface from sediment and fines – To minimize clogging and promote continued good infiltration rates over time it is critical to protect the surface and base from sediment and fines during and after construction. Pretreatment BMPs, such as filter strips and swales, may be important considerations where water is flowing from upland areas onto the surface. Devices such as chatter strips at parking lot entries can also help reduce clogging. Sanding during the winter months should be discouraged.

Specifications - For guidance on design, see specification provided by UNHSC at: <http://www.unh.edu/unhsc/sites/unh.edu.unhsc/files/UNHSC%20PA%20Spec%20update-%20FEB-2014.pdf>.

The specification shown in Figure 1 (at right) is intended for:

1. porous asphalt pavement in parking lot applications;

2. a cold climate application based upon the field experience at the UNHSC porous asphalt parking lot located in Durham, New Hampshire. They note that the can be adapted to projects in other climates provided that selection of materials and system design reflects local conditions, constraints, and objectives.

The mix for porous asphalt requires a polymer binder, which may be difficult to acquire for small scale projects. For

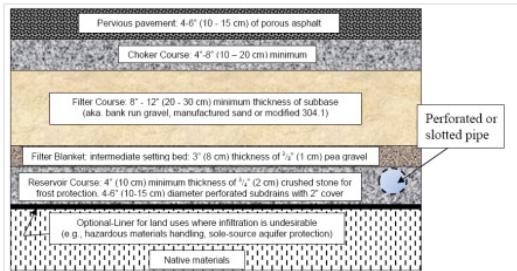
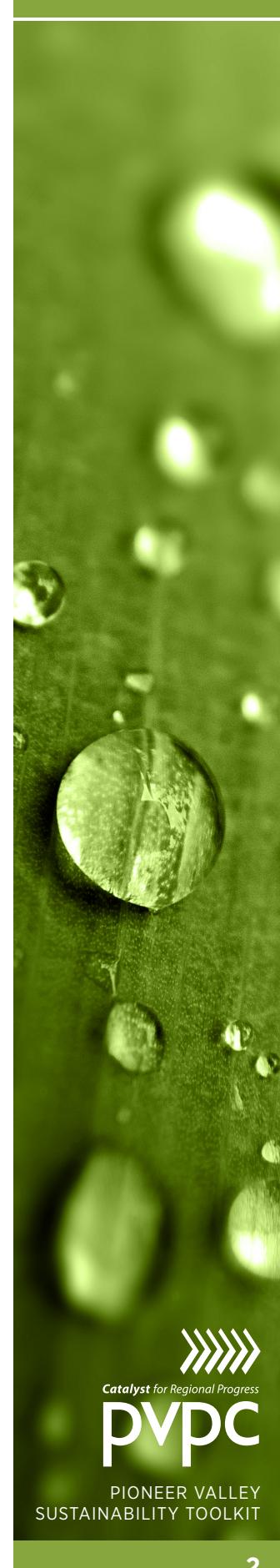


Figure 1: Typical Parking Area Cross Section for Porous Asphalt

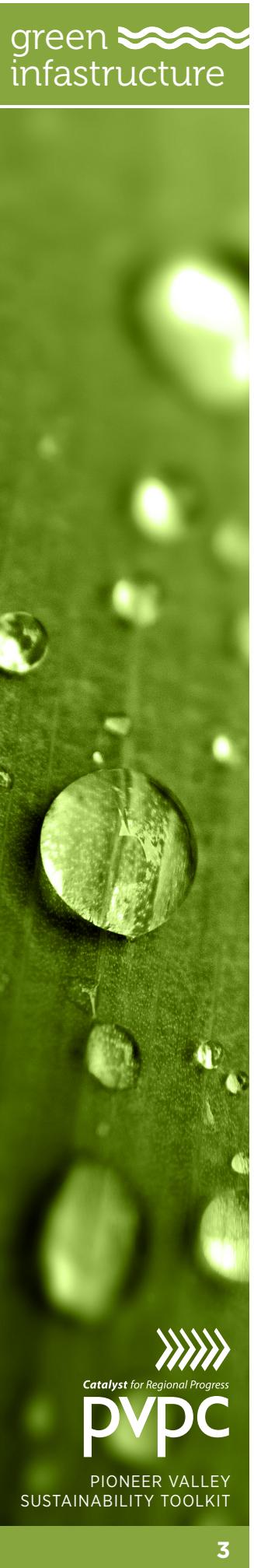
Courtesy: University of New Hampshire
Stormwater Center



example, when New England Environmental, Inc. in Amherst, MA constructed its porous asphalt parking lot in 2009 it found that the binder specified by UNH for the asphalt mix is only appropriate for larger-scale jobs, because it is only sold by the trailer truckload. New England Envriornmental, Inc. found a substitute binder that includes polymer fibers, much like what is used for asphalt curbing, that could be acquired by the barrel.

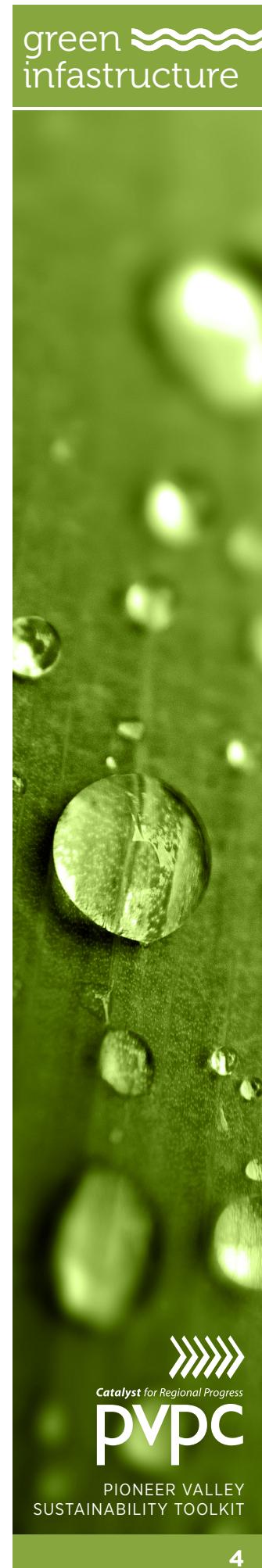
PERMITTING CONSIDERATIONS

The Massachusetts Stormwater Handbook currently does not allow for porous asphalt in Zone IIs, or near any other critical areas, including Outstanding Resource Waters and Special Resource Waters (see Stormwater Management Standard #6). While the stormwater management standards relate to jurisdictional areas under the Wetlands Protection Act, these standards have been applied by reference through local bylaws and ordinances to upland locations as well. MassDEP is currently proposing a revision to its guidance about porous asphalt, and porous pavements generally, as new information has become available on its treatment capabilities. Until this recommendation from MassDEP is accepted, however, any legal actions will be based on the current guidance within the Stormwater Handbook.



BARRIERS TO USE

Concern	Experience
Cost	<p>\$10 to \$12 per square foot based on costs for MassDOT Park and Ride facility in Whately, MA, including 16 inches of stone for subbase and 5 inches of surface mix. Note that the scale and size of a project can also affect price, with lower per square foot costs on larger projects.</p> <p>The UNH Stormwater Center notes that material costs alone are about 20 to 25 percent more than traditional asphalt, but total project cost for porous asphalt is comparable to those for conventional asphalt projects if one accounts for the stormwater infrastructure costs that are required to manage runoff from conventional asphalt. The University of Rhode Island in building their porous asphalt parking lots in 2002 and 2003 found that the construction costs were comparable to equivalent sized conventional parking lots.</p> <p>While initial costs of a porous asphalt facility may be slightly higher than a facility that uses conventional asphalt, the lifespan of a porous asphalt parking lot can be more than 30 years compared to 15 years for a conventional parking lot. (See: "Pervious Pavements: New findings about their Functionality and Performance in Cold Climates" by J. Gunderson, Stormwater, September 2008.)</p>
Winter performance	<p>Given the well draining stone bed and structural support of porous asphalt, the freeze thaw cycle tends to produce fewer cracks and potholes than on conventional asphalt pavement. (University of New Hampshire Stormwater Center)</p> <p>"Because of the well-drained nature of the porous pavement and reservoir base, issues related to frozen media were minimized. Significant frost penetration was observed up to depths of 71 cm without declines in hydrologic performance or observable frost heave." (Results of a study published in Journal of Environmental Engineering in January 2012 notes)</p> <p>Low to no black ice development, allowing for reduced salt application rates of up to 50 to 75 percent. Best not to use sand at all to avoid clogging of pores. (University of New Hampshire Stormwater Center)</p>
Maintenance	<p>Requires vacuuming twice each year (spring and fall), and perhaps more frequently depending on use, to prevent clogging of pores with sediment and fines. Several contractors in the region offer vacuuming services. Typically, per square foot costs will be lower with larger jobs. A municipality for example may see better value in hiring to have several lots vacuumed at once rather than each vacuumed on separate occasions.</p> <p>Repairs can be made with standard asphalt, not to exceed 10 percent of surface area. (University of New Hampshire Stormwater Center)</p> <p>For winter maintenance tips, see UNHSC recommendations related to plowing and use of salt for general maintenance, during a storm event, and between storm events. See: http://unh.edu/unhsc/sites/unh.edu.unhsc/files/docs/UNHSC%20porous%20winter%20maintenance%20fact%20sheet_1_11.pdf</p>
Clogging	<p>Studies of the long-term surface permeability of porous asphalt and other permeable pavements have found high infiltration rates initially, followed by a decrease that then levels off with time. With initial infiltration rates of hundreds of inches per hour, the long-term infiltration capacity remains high even with clogging. See: http://cfpub.epa.gov/npdes/stormwater/menufbmps/index.cfm?action=browse&Rbutton=detail&bmp=135&minmeasure=5</p>
Durability	<p>The University of New Hampshire Stormwater Center acknowledges that while porous asphalt is weaker than conventional asphalt pavements, durability can be greatly improved with the proper admixtures and design. It has been effective for both commercial and roadway applications. (UNHSC 2012 Annual Report)</p>



EXAMPLES OF WHERE STRATEGY HAS BEEN IMPLEMENTED

New England Environmental, Inc. headquarters, Amherst, MA

As part of developing their new LEED platinum rated office building, New England Environmental, Inc. included porous asphalt in a suite of stormwater management strategies that also includes rain gardens and grass pavers. They used porous asphalt for all travel lanes (about a 10,000 square foot area), while grass pavers were used in all parking stalls. The porous asphalt has been in place since 2008 and is performing beyond expectations with vacuuming occurring twice each year to remove sediment and fines. Owner Mickey Marcus reports that the cost for the parking lot as a whole was equivalent to the cost of a conventional parking lot with attendant stormwater management facilities. For the future, Marcus discourages the use of grass pavers in combination with porous asphalt as the pavers become too easily damaged with winter plowing. See figure 2.



Figure 2: New England Environmental, Inc. with porous asphalt drive in foreground and grass paver parking stalls in middle ground | Courtesy: Mickey Marcus, NEE

MassDOT Park and Ride facility, Routes 5 and 10, Whately, MA

At the request of the local conservation commission, which was concerned about the parking facility's proximity to a wetlands area, MassDOT used porous asphalt in the 40 parking stalls at this new Park and Ride facility in Whately, MA. The porous area has 16 inches of stone in the subgrade and 5 inches of surface mix. Construction costs ran \$10 to \$12 per square foot for the porous asphalt area. MassDOT used traditional asphalt in the travel lanes for this facility.

Maine Mall Road, South Portland, ME

Maine DOT used porous asphalt on this four lane (75-foot wide) high-volume road (16,750 AADT) as part of a larger effort to restore a local creek to its water quality classification. They installed porous asphalt on 850 linear feet and used a specification that included a 3-inch open graded friction course, followed by 6 inches of asphalt treated permeable base, 15 inches of stone reservoir, and 6 to 12 inches of porous filter material (see project location in Figure 3 and cross section in Figure 3 below.) Total project costs were \$90 per square yard and the project was funded entirely through the American Recovery and Reinvestment Act monies.¹



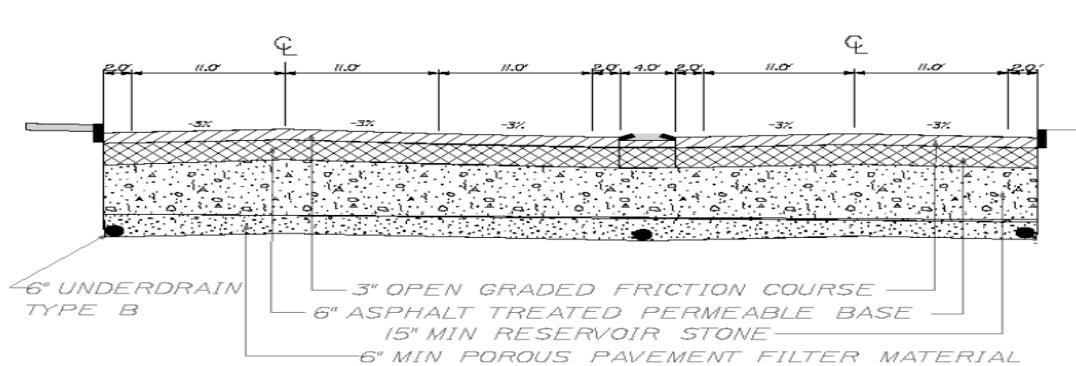


Figure 4: Cross section of porous asphalt system on Maine Mall Road | Source: Maine DOT

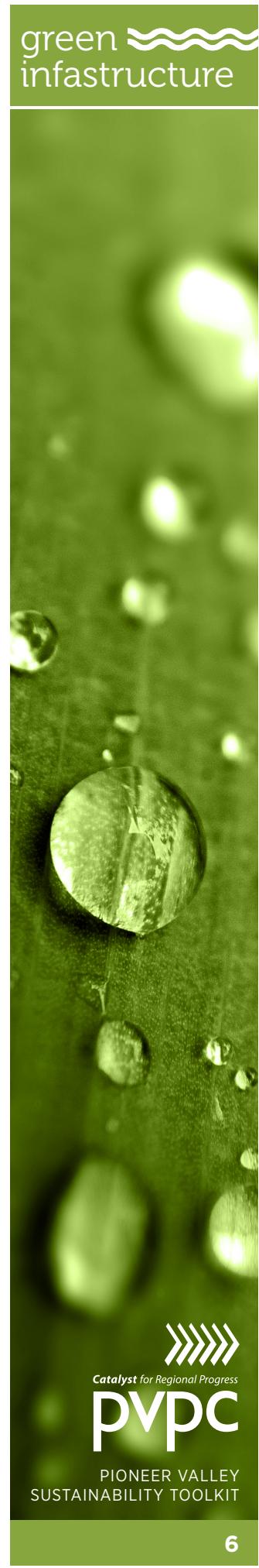
University of Rhode Island, Kingston, RI

In 2002 and 2003, the University of Rhode Island built two porous asphalt parking lots over a sole source aquifer. One lot is 5.5 acres and accommodates 800 vehicles while a smaller 1.47 acre lot accommodates 200 vehicles. Due to concerns of potential groundwater contamination and compaction of the asphalt, commercial and industrial vehicles are not permitted to park on these lots. In addition the recharge bed was designed to be 6 to 6.5 feet above seasonal high groundwater. Design of the facility includes a 2.5 thick porous asphalt surface layer, a 1-inch layer of choker course, and 3 to 3.5 feet of crushed rock to temporarily store and infiltrate rainfall and snowmelt. The crushed rock storage reservoir is separated from underlying soils and adjacent subsurface materials by a layer of geotextile filter fabric. Intended to prevent movement of fine soil particles up into the overlying reservoir, the fabric instead captured fines moving down from the overlying layers and became clogged so that water cannot infiltrate and moves laterally across the barrier.

Entrance areas of the parking lots are paved with conventional asphalt to accommodate heavier use and to better receive sediment deposition from tires as vehicles enter the lot. Landscaped parking lot islands act as bioinfiltration areas throughout the parking areas to provide a secondary route of infiltration during intense rainfall and in case the pavement surface gets clogged up. The outer areas of the lot are landscaped with trees and grass to keep windblown dust from nearby agricultural activities from accumulating on the porous asphalt.

During the summer of 2005, a new porous asphalt parking area was constructed expanding the existing lot and increasing the capacity from 814 to 1582 spaces. The new lot covers 5.8 acres. Several changes were made to the new lot to allow for simpler maintenance. They are:

- 1.** Fewer, wider infiltration islands
- 2.** Curb cuts for water entry to island bioinfiltration areas
- 3.** Mowed grass, not meadow grass for islands
- 4.** Fewer wheel stops, where possible, due to wheel stops being moved by cars and plowing



LINKS TO MORE INFORMATION

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<http://cfpub.epa.gov/npdes/stormwater/menufbmps/index.cfm?action=browse&Rbutton=detail&bmp=135&minmeasure=5>

FOR MORE INFORMATION, PLEASE CONTACT

Pioneer Valley Planning Commission

413-781-6045

60 Congress Street, Floor 1

Springfield, MA 01104-3419

www.pvpc.org



Rain Water Harvesting

PURPOSE

Rainwater harvesting is a means to capture runoff from rooftops and store it for non-potable uses such as irrigation and greywater plumbing. In addition to reducing the demand on public water supplies by replacing potable water with rainwater, rainwater harvesting can reduce peak stormwater flows, potentially reducing combined sewer overflows and other pollution associated with stormwater runoff.

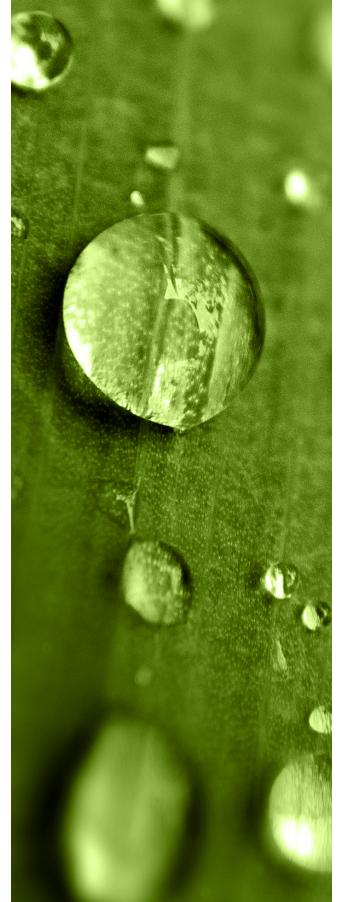
Rainwater harvesting – collecting rainwater from impervious surfaces and storing it for later use – is gaining in popularity as communities, businesses, and homeowners seek ways to affordably manage stormwater, and address the potential for increasingly limited water resources caused by climate change. The many benefits of rainwater harvesting and reuse include:

- » Provides inexpensive supply of water for outdoor water use and non-potable indoor uses
- » Reduces stormwater runoff and associated pollution by reducing peak flows
- » Helps reduce peak summer water use demand by creating alternative water supplies

RAINWATER HARVESTING SYSTEMS

Rainwater harvesting systems typically divert and store runoff from residential and commercial roofs. Often referred to as ‘clean’ runoff, roof runoff does contain pollutants (metals or hydrocarbons from roofing materials, nutrients from atmospheric deposition, bacteria from bird droppings), but they are generally in lower concentrations and absent from many of the pollutants present in runoff from other impervious surfaces. Installing a rainwater collection system requires diverting roof downspouts to cisterns or rain barrels to capture and store the runoff. Collection containers are constructed of dark materials or buried to prevent light penetration and the growth of algae.

From the storage container, a dual plumbing system is needed for indoor uses and/or connection to an outdoor irrigation system.

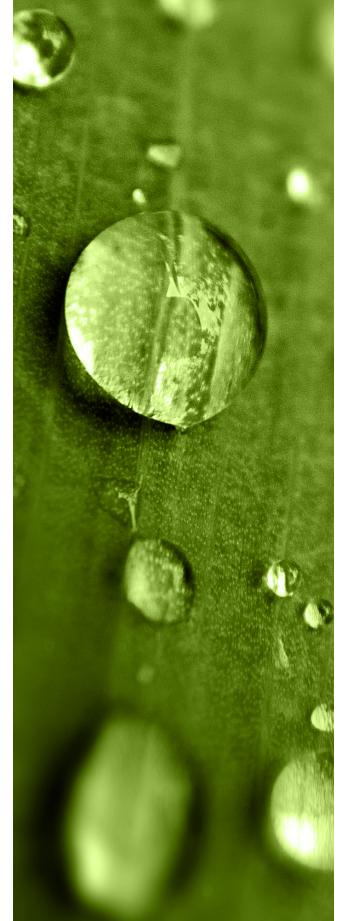


DESIGN CONSIDERATIONS

Every rainwater harvesting system, from a single 60-gallon rain barrel to a 1,400-gallon underground cistern, is custom tailored to site features, intended water use, budget, whether it is new construction or a retrofit, and how much space is available for storage capacity. Points toward LEED project certification are also available for a properly designed rainwater harvesting system.

Some general design considerations for every project include:

- » The earlier rainwater harvesting is incorporated into a new building design process, the more efficient and cost effective-it will be.
- » The largest and often most expensive system feature will be the storage tank, also called a cistern.
- » Storage tanks can be installed above or below ground.
- » Storage located high on the building or the site saves energy and costs (no pumps = zero energy use).
- » Elevated storage requires structural and seismic engineering.
- » Above ground storage structures can serve additional beneficial purposes as shade or privacy structures, and as heat sinks.
- » If space permits, size the cistern to capture the occasional really large storm, and have water available for extended dry periods.
- » Cisterns designed for full time domestic water use should be sized based upon a minimum of 30 gallons per day per person. <http://www.saveourh2o.org/water-use-calculator>
- » Underground storage tanks must be anchored to keep from floating when empty.
- » Use gravity as much as possible for the movement of water in the system.
- » Plumbing, backflow, overflow, and air gaps are important design features, and may require a licensed plumber depending on local code requirements.
- » Above ground tanks must be drained completely before freezing temperatures, and thus are seasonal applications.
- » Maintenance depends on intended reuse of water. Typical maintenance includes keeping gutters and cistern screens clean as well as periodic inspection and replacement of any water treatment components and equipment, including pumps and backflow prevention devices. The tank will require cleaning annually for potable water sources.
- » Rain barrel costs, including installation, range from \$60-\$150.
- » Underground storage systems range in cost depending on the size of the cistern and the water reuse application. For example, a buried 1,800 gallon storage tank with overflow directed to a drywell recharge area, including submersible pump for supply to an irrigation system, costs \$5,000-\$6,000, including installation.



How to Size a Rain Barrel

Rain barrel volume can be determined by calculating the roof top water yield for any given rainfall, using the following general equation:

$$V = A_2 \times R \times 0.90 \times 7.5 \text{ gals./ft.}^3$$

V = volume of rain barrel (gallons)

A₂ = surface area of roof (square feet)

R = rainfall (feet)

0.90 = losses to system (no units)

7.5 = conversion factor (gallons per cubic foot)

Example: One 60-gallon barrel would provide runoff storage from a rooftop area of approximately 215 square feet for 0.5 inch (0.042 ft.) of rainfall.

REGULATIONS

Massachusetts has no statutes or regulations concerning rainwater harvesting. Consequently, greywater requirements are often used to govern rainwater harvesting systems, resulting in requirements that are more stringent than necessary for outdoor water use. In 2010, the International Association of Plumbing and Mechanical Officials (IAPMO) published the first of its kind Green Plumbing and Mechanical Code Supplement (GPMCS). The supplement is a separate document from the Uniform Plumbing and Mechanical Codes and establishes requirements for green building and water efficiency applicable to plumbing and mechanical systems. In addressing “Non-potable Rainwater Catchment Systems”, the GPMCS specifically identifies provisions for collection surfaces, storage structures, drainage, pipe labeling, use of potable water as a back-up supply (provided by air-gap only), and a wide array of other design and construction criteria. It also refers to and incorporates information from the ARCSA/ASPE Rainwater Catchment Design and Installation Standard, a document published in 2008 under a joint effort by the American Rainwater Catchment Systems Association (ARCSA) and the American Association of Plumbing Engineers (ASPE). (EPA, 2013)

CROSS-CONNECTIONS WITH MUNICIPAL WATER SUPPLY AS BACKUP SOURCE

State code allows the direct plumbing of municipal water supply to a RWH system as a back-up water supply provided an approved reduced pressure backflow preventer (RPBP) is installed and included under a required maintenance plan. These fixtures have a physical air gap internal to the device that separates “unregulated” harvested water from the municipal supply. A standards model of an RPBP is approved by MA DEP for use in cross-connections.



WATER RATES

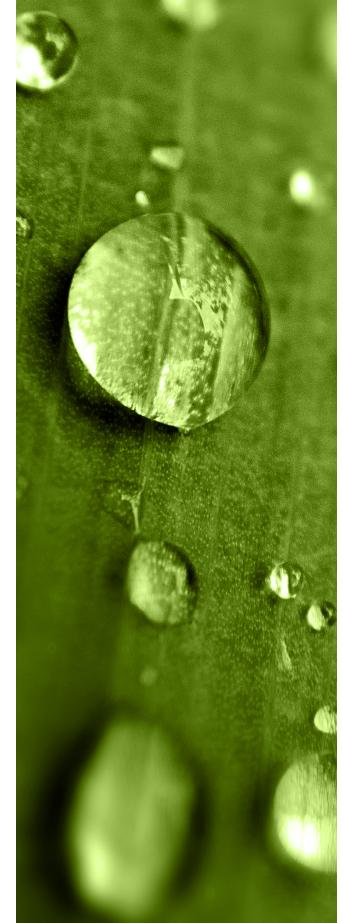
Water rates are perceived as irresponsibly low by many water sustainability professionals and researchers, and seldom reflect the true costs of its use. Many communities also have a decreasing block rate structure wherein water becomes cheaper on a unit basis the more one uses. Low rates are perhaps the largest impediment to rainwater harvesting systems, since under current rate structures one would never build a harvesting system to save money on water usage, except in a rare case where a site is particularly water constrained.

TREATMENT REQUIREMENTS

Since no standards exist for secondary exposure to contaminants or bacteria from use of harvesting systems (e.g spray irrigation, toilet use, etc.), municipalities often use primary exposure thresholds (e.g drinking the water) to set water quality requirements for harvesting systems since no scientific basis for assessing risk exposure exists today. Or, greywater reuse code provisions are applied which are not necessarily appropriate and are typically considered over treatment which results in increased costs to a project limiting implementation of these systems.

CONSIDERATIONS FOR ESTABLISHING A MUNICIPAL RAINWATER HARVESTING PROGRAM

- » **Establish specific codes or regulations for rainwater harvesting** – Local codes should define rainwater harvesting and establish its position as an acceptable stormwater management and water conservation practice.
- » **Identify acceptable end uses and treatment standards** – Consider and identify acceptable uses for harvested rainwater and the required treatment for specific uses. Rainwater is most commonly used for non-potable uses and segregated by indoor and outdoor use.
- » **Detail required system components** – Delineate between rain barrels and cisterns. Needed system requirements include: pre-filtration (screens, etc.), storage containers, back-flow prevention, dual piping system, cross-connection prevention, and signage for locations of potable and non-potable water within the system. Refer to the UPC's Green Plumbing and Building Code Supplement for guidance.
- » **Permitting** – Rain barrels should not require local permitting. A building permit may be required for cistern systems used for non-potable water uses. If harvested rainwater is used for potable water, the collection and treatment system should be inspected and approved by the local Board of Health.
- » **Maintenance** – Adequate design and maintenance of the cistern and piping system is the responsibility of the cistern owner.



» **Rates of use** – To be used efficiently for maximum stormwater retention, rainwater needs to be used in a timely manner to ensure adequate storage capacity for subsequent rain events. Municipalities should engage in outreach and education about best practices. Harvesting programs targeting combined sewer areas should promote post-storm slow draw down of rain barrels and cisterns to delay stormwater release to the sewer system and ensure maximum storage for the next storm.



LOCAL RAINWATER HARVESTING PROJECTS

Center-Pepin School, Easthampton, MA

A 305-gallon storage tank collects rainwater from a 670 square foot roof and serves as a source of irrigation water for the school yard garden. The cistern does not fully capture the first one inch storm, and overflow is directed to an existing ground level concrete channel along the building which drains to the municipal storm sewer. The system cost \$308 plus \$125 for delivery, and was installed by volunteers at the school.

MassMutual Financial Group, Springfield, MA

Roof water reclamation serves as a reservoir for on-site irrigation. 60-inch diameter HDPE piping provides 200,000 gallons of storage. An independent pumping system pressures water for irrigation system. There is automated conversion to domestic water during dry periods, and a smaller infiltration system for winter.



A similar system to the one in the photo was installed at MassMutual.

REFERENCES AND RESOURCES

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FOR MORE INFORMATION, PLEASE CONTACT

Pioneer Valley Planning Commission

413-781-6045

60 Congress Street, Floor 1

Springfield, MA 01104-3419

www.pvpc.org



Stormwater Utilities

WHAT IT IS

For many cities and towns there are significant costs associated with operating, maintaining, and upgrading stormwater infrastructure. The municipal system for capturing and conveying stormwater from rooftops, driveways, and roadways can include the hundreds of catchbasins along street edges and miles of underground pipes.

Establishing a stormwater utility is one important strategy to creating a reliable funding source for this work. Currently there are between 1,500 and 2,000 stormwater utilities in the United States, 5 of which are located in Massachusetts (Fall River, Newton, Northampton, Reading, and Westfield).

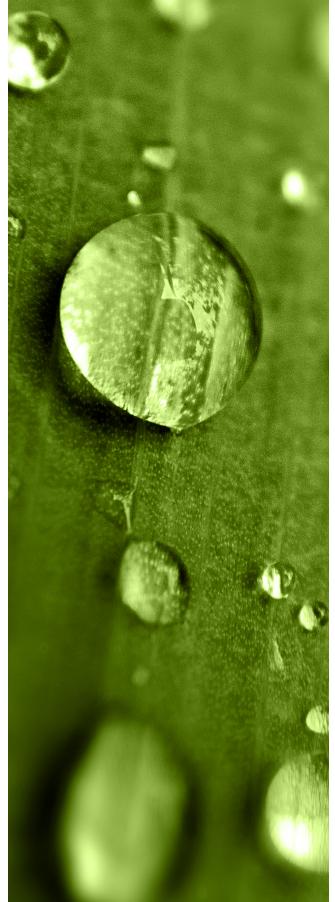
Most municipalities in the Pioneer Valley rely on allocations from the general fund to service stormwater infrastructure. These allocations, however, are not keeping pace with actual needs for upgrading aging systems, reducing localized problems—such as flooding and erosion—and meeting regulatory requirements for environmental protection.

A stormwater utility operates much like an electric or drinking water utility. Fees collected from property owners go into a dedicated fund to pay specifically for the work of operating, maintaining, and improving stormwater infrastructure. This reinforces the idea that like other utilities, stormwater management is a public service. Monies can be used to pay for operation and maintenance expenses, project or capital-related expenditures, staffing, engineering, permitting, inspection, and program management costs.

In 1998, the City of Chicopee was the first municipality in Massachusetts to collect a fee for maintenance and upgrade of stormwater infrastructure, but the program is technically not a “stormwater utility” as funds go into a water pollution control account that also receives funding for projects that include the sanitary sewer system. So the program is referred to simply as a “stormwater fee.”

HOW IT WORKS

Since impervious surfaces (roofs, driveways, and roadways) are what produce the runoff from rainfall and snowmelt that must be managed, stormwater utility rates are most commonly based on the amount of impervious surface on a property. For residential customers, many municipalities set rates according to a method called Equivalent Residential Unit (ERU). This unit is derived from the impervious area footprint of a typical single-family home. The City of Newton, Massachusetts, for example, currently has an ERU of 3,119 square feet. Each residential property is thus billed \$25 per year based on this average of 1 ERU. Non residential

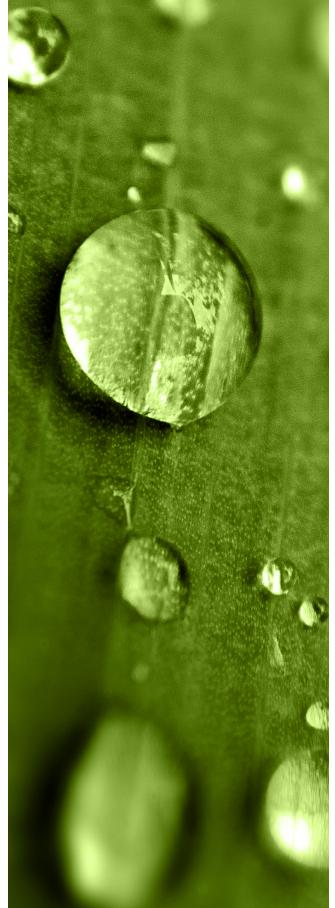


properties, including industrial and commercial properties are billed based on 6 ERUs or \$150 per year. The City has been exploring a different rate structure for residences of more than three households and commercial and industrial properties since the current flat rate of 6 ERUs has properties with small impervious areas (small downtown shops, etc.) paying the same as properties with large impervious areas (shopping malls). The new rate would assign a certain number of ERUs to a commercial and industrial property based on actual impervious area. Rates for larger properties in some municipalities are sometimes not based on ERUs, but rather a dollar per unit cost based directly on the area of impervious surface on a property.

A guidance document prepared by the National Association of Flood and Stormwater Management Agencies notes, “The fundamental objective of a stormwater utility/service fee is attainment of equity. Service fee rate methodologies are designed to attain a fair and reasonable apportionment of cost of providing services and facilities.”

Enabling Legislation

In Massachusetts there are two companion pieces of legislation that allow municipalities to set up stormwater utilities: MGL Chapter 83 Section 16 and MGL Chapter 40 Section 1A. The first, MGL Chapter 83 Section 16, is relatively new enabling legislation that allows municipalities to set up a stormwater management utility and charge utility fees for managing stormwater. The second, MGL Chapter 40 Section 1A, provides a definition of a district for the purpose of water pollution abatement, water, sewer, and/or other purposes. Together, these two pieces of legislation allow a municipality to set up an authority to manage stormwater and to charge utility fees for managing stormwater.



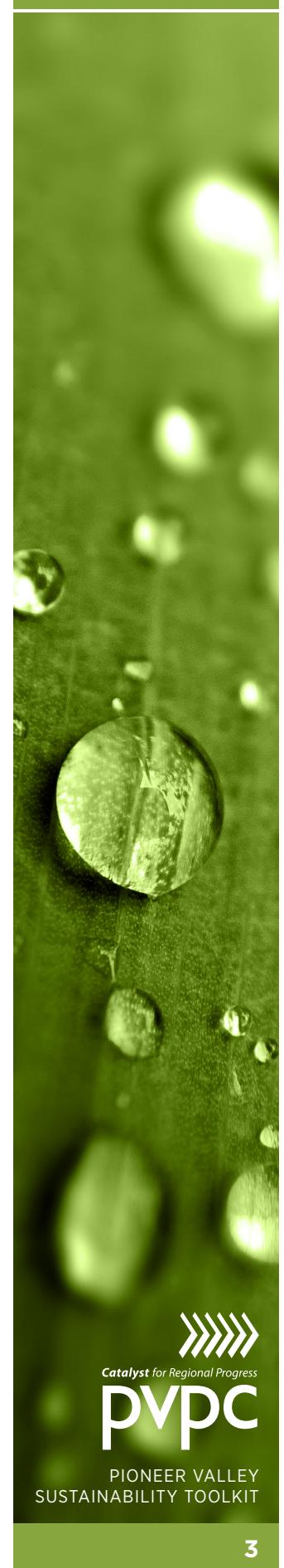
WHERE THEY ARE USED CURRENTLY IN MASSACHUSETTS

Two of Massachusetts' five stormwater utilities are located in the Pioneer Valley. (See table below.) The cities of Northampton and Westfield are currently the only municipalities in the region with programs that collect fees specifically dedicated to maintenance and upgrade of stormwater infrastructure. Westfield instituted a stormwater utility in 2010 for the purpose of financing a stormwater management division, responsible for meeting federal requirements for stormwater monitoring and maintaining the City collection system. Northampton adopted a stormwater utility in 2014 to generate funding for meeting federal permit requirements and attending to aged stormwater and flood control infrastructure.

There are roughly 6,600 smaller residential properties (1-3 family) in Northampton. Under the billing formula these properties are divided into four groups based on the impervious surface area on each property. All properties within each group pay the same fee. This standard fee is calculated based on the average impervious and pervious areas for all properties within each group. Based on the annual budget of \$1,980,056, the annual residential fees are estimated to be:

Stormwater Utilities/Fees in Massachusetts

Community	Date Created	Equivalent Residential Unit (ERU)*	Fee	Annual Revenue
Chicopee	1998	2,000 s.f.	Single family residential at \$100 per year Multi family, industrial, commercial properties at \$1.80 per 1,000 square feet, with a minimum charge of \$100 per year and a maximum charge of \$640 per year	\$1,500,000 (2012)

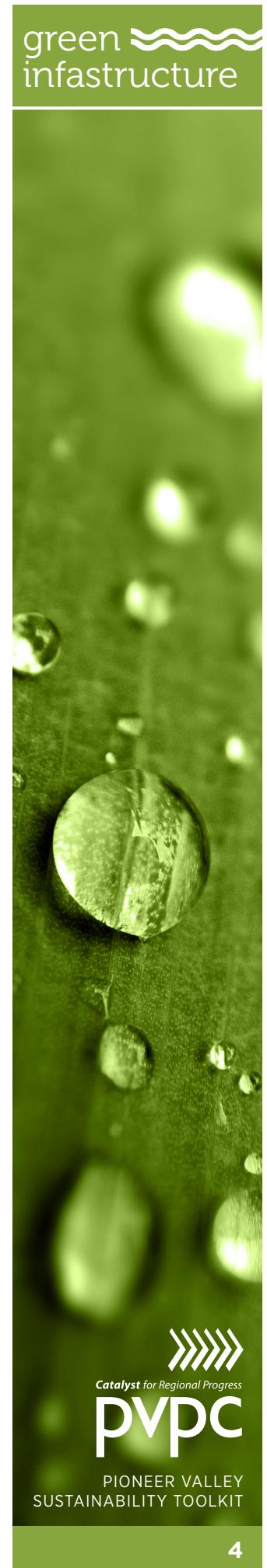


Catalyst for Regional Progress

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PIONEER VALLEY
SUSTAINABILITY TOOLKIT

Fall River	2008	2,800 s.f.	Residential: 1 to 8-family at \$140 per year Commercial, industrial and residential properties greater than 8 family at \$140 per year for 2,800 square feet of impervious surface	\$4,660,000 (2012)
Newton	2006	3,119 s.f. Proposed change: 2,600 s.f.	Residential at \$25 per year, with those receiving elderly discount, \$17.52 per year Non residential at \$150 per year (Proposed change involves replacing the flat fee with a fee based on area of imperviousness. This would include residences with 3 or more units.)	\$725,000 (2012)
Northampton	2014		1 to 3 family homes annual residential fee estimated to be: \$63.94 for impervious area <2,250 sq. ft. \$91.05 for impervious area 2,250 to 3,056 sq. ft. \$125.61 for impervious area 3,056 to 4,276 sq. ft. \$259.07 for impervious area >4,276 sq. ft.	\$2,000,000 (estimated)
Reading	2006	2,552 s.f.	Single and two-family residences at \$40 per year Multi-family, commercial, and industrial properties at \$40 per 3,210 square feet annually	\$357,000 (2012)



Westfield	2010	NA	Residential at \$20 per year Commercial properties at \$.045 per 1,000 square feet up to a maximum of \$600 per year	\$560,000 (2012)
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*Residential customers are typically billed for stormwater runoff based on the Equivalent Residential Unit (ERU). An ERU is based on the amount of impervious surface area or percent impervious area found at the typical single-family home within the municipality.

DISCOUNTS AND CREDITS

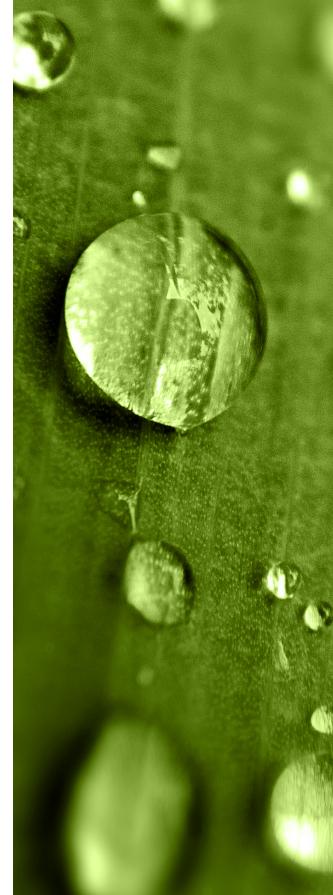
Local governments with stormwater utilities can encourage better practices on private property by reducing fees in exchange for facilities that reduce the need for service by the municipal stormwater system. Discounts and credits can be geared to promote impervious surface reductions, onsite management or volume reduction, or the use of specific practices, such as raingardens/bioretention facilities, drywells, cisterns, or green roofs.

The City of Chicopee has just begun to implement a “Rain Smart Rewards” ordinance that offers a stormwater fee reduction of up to 50 percent in exchange for implementation of improved stormwater management practices by property owners.

In Minneapolis, Minnesota, 50 percent of the stormwater fee can be waived if the property owner can demonstrate that the runoff from a 10-year, 24-hour storm event can be managed on site. If a property owner can demonstrate that the runoff from a 100-year, 24-hour storm event can be managed on site, the entire stormwater fee is waived.

Portland, Oregon’s Clean River Rewards program provides stormwater utility fee discounts to encourage residential and commercial property owners to manage stormwater on site (35 percent discounts) and/or on the public right of way that serves their property (65 percent discounts). Partial credits are also given for eco-roofs, four or more trees over 15 feet tall, and for properties with less than 1,000 square feet of imperviousness. There is a Residential Discount Calculator and a Commercial Discount Calculator on the program’s website so that property owners can calculate what changes they might make to obtain certain savings.

Starting July 1, 2014, credits in Northampton will be available for small residential stormwater improvements (rain gardens and porous driveways), construction and maintenance of larger stormwater best management practices, protected open land, commonly owned undeveloped properties and educational programs. Senior (needs-based), low income, and protected land credits are automatically applied based on documentation by the Northampton Assessor’s Office. All other credits will require submission of an application and other documentation.



BENEFITS

Establishing a stormwater utility is no easy task. It requires tremendous effort in terms of education and politics. The process, however, helps everyone to understand the service provided by the municipal stormwater system and the significant costs of operating, maintaining, and improving this infrastructure. In the end, the utility provides a dedicated and stable source of funding to maintain and upgrade an aging system, reduce localized problems—such as flooding and erosion, and meet regulatory requirements for environmental protection.

A stormwater utility has other benefits as well:

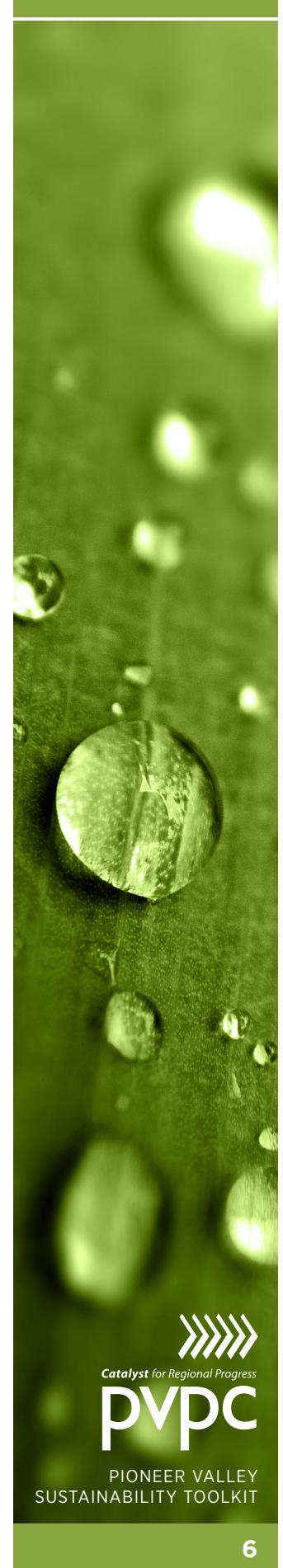
- » Creates an equitable way to pay for stormwater services, especially if the fee structure is based on the amount of impervious surface. Discounts or offsets can be provided to low-income residents or elderly, further ensuring the fee's equitability.
- » Tax-exempt properties like universities, hospitals, and places of worship are required to pay the fee, so that they help cover the cost of services they receive
- » Typically easier for the municipality to institute than other forms of funding. “In many communities, new taxes require a vote of approval by the public, while a fee is a charge that municipalities have the authority to leverage for the services they provide.”⁶
- » May enable municipalities to consolidate or coordinate responsibilities previously dispersed among several departments and develop programs that are comprehensive, cohesive, and consistent year to year
- » Creates funding that can be leveraged to meet grant and bond requirements
- » If a credit or reduction is offered, the fee can become an incentive for improved stormwater management on private property thereby reducing the service demand on the municipal system

IMPORTANT CONSIDERATIONS

To achieve desired objectives, several considerations should be taken into account when proposing and establishing a stormwater utility:

Start with a thoughtful outreach campaign that generates enthusiasm for the community’s stormwater vision. If property owners understand the benefits they will receive, they are more likely to support the fee. As part of this, it is important to work in advance with religious institutions, private schools, hospitals, and non profits to be clear that the utility is like other utilities that they must pay. And education should be ongoing.

As part of setting rates and calculating bills, develop a sound methodology with rigorous quality assurance. GIS mapping should be integral to this method if area of impervious cover is a factor in setting rates.



Set rates so that the fee provides adequate revenue to achieve stormwater goals. If the fee is unreasonably high, it will not be supported. If it is too low, promised benefits will not materialize and public support is likely to erode.

Give some advance thought to determining how stormwater utility fees can be collected. Typically, they have been collected either on a separate bill, added to a water collection bill, or added to the property tax bill.

Be sure that the greatest costs are directed toward those who create the most runoff, particularly commercial and industrial facilities with large areas of impervious cover, rather than residential and other properties with low impervious cover.⁷ At the same time, municipalities should be sensitive to where residents may already be paying stormwater management fees through homeowner associations.

Ensure that fees do not harm low-income residents, as in Detroit, where an increase in stormwater fees caused some low-income residents to be unable to pay their water bill and have their water turned off. Sliding fee scales, bill discounts, crisis vouchers, and zero interest loans for qualified customers are options for offsetting the burden on lower income residents.

LINKS TO MORE INFORMATION

METROPOLITAN AREA PLANNING COUNCIL. 2013. STORMWATER UTILITY FUNDING STARTER KIT. SEE:

<http://www.mapc.org/stormwater-utility-funding-starter-kit>

(Note: A well done update of PVPC's 1998 kit called, "How to Create a Stormwater Utility.")

ROSS STRATEGIC AND INDUSTRIAL ECONOMICS, INC. FOR US EPA, REGION 1. 2013. EVALUATION OF THE ROLE OF PUBLIC OUTREACH AND STAKEHOLDER ENGAGEMENT IN STORMWATER FUNDING DECISIONS IN NEW ENGLAND: LESSONS FROM COMMUNITIES. SEE:

<http://www.epa.gov/evaluate/pdf/water/eval-sw-funding-new-england.pdf>

WESTERN KENTUCKY UNIVERSITY. 2012. STORMWATER UTILITY SURVEY. SEE:

<http://www.wku.edu/engineering/civil/fpm/swusurvey/>

ENVIRONMENTAL FINANCE CENTER, UNIVERSITY OF NORTH CAROLINA. 2012. STORMWATER UTILITY DASHBOARD. SEE:

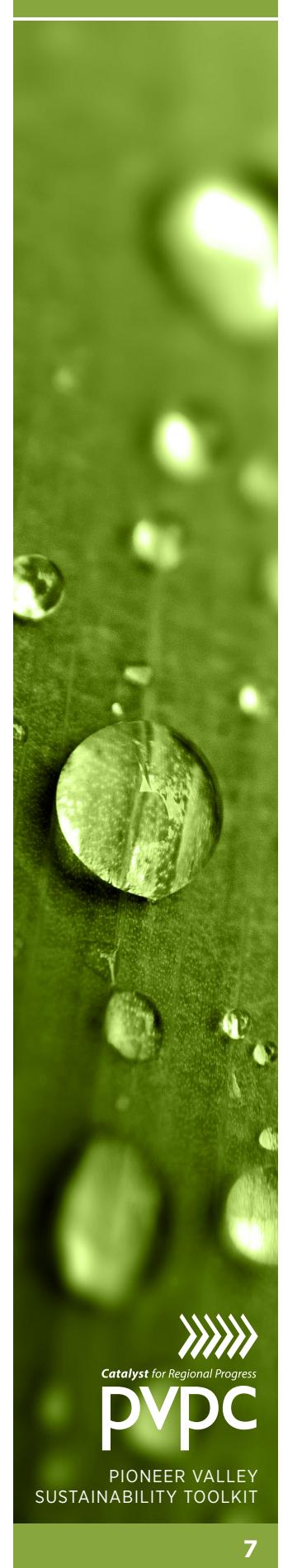
http://efc.unc.edu/tools/NCStormwaterDashboard_2012.html

DELANY, JOE, K. HONETSCHLAGER, AND T. MCINTIRE. 2009. STRUCTURING A STORMWATER UTILITY. TOWN OF READING, MA. SEE:

<http://www.salemsound.org/PDF/ReadingStormwaterUtility.pdf>

USEPA. 2009. FUNDING STORMWATER PROGRAMS FACTSHEET. SEE:

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2007. ASSESSMENT OF STORMWATER FINANCING MECHANISMS IN NEW ENGLAND.
SEE:

www.crwa.org/projects/stormwater/Municipal%20SFM%20Case%20Studies%20Repo.pdf

NEW ENGLAND ENVIRONMENTAL FINANCE CENTER. 2005. STORMWATER UTILITY FEES: CONSIDERATIONS AND OPTIONS. SEE:
<http://efc.muskie.usm.maine.edu/docs/StormwaterUtilityFeeReport.pdf>

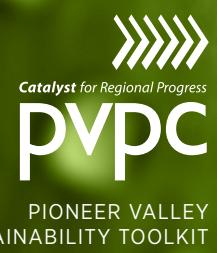
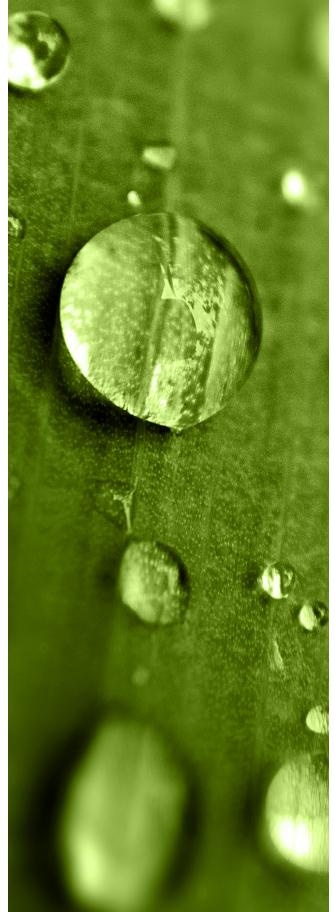
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60 Congress Street, Floor 1
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Tree Box Filtering

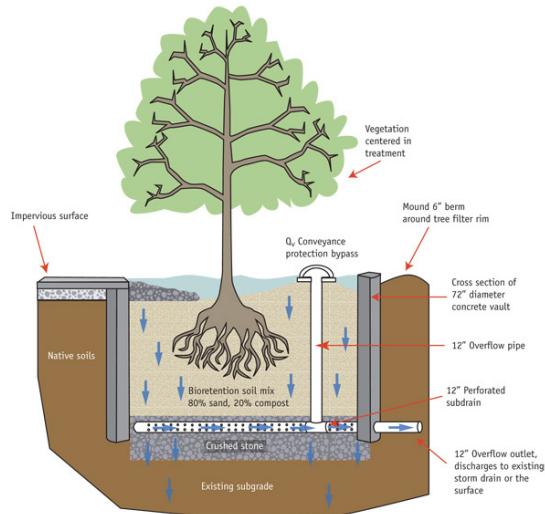
WHAT IT IS

Tree box filters are typically installed along roadways to act as mini bioretention systems. They are particularly useful in urban settings where space is limited and where traditional street tree plantings can be converted to provide stormwater management functions. A tree box filter involves a prefabricated concrete box that can be bottomless to promote infiltration or closed bottomed where soils are not conducive to infiltration. The box typically contains a metal grate at the surface to protect the integrity of the tree's roots and soils, a soils mix designed to both promote tree growth and stormwater function, a tree species (tolerant of road salt and the varying cycles of inundation and drought), and a perforated subdrain located within a bed of crushed stone at the very bottom.

Storm runoff from adjacent roadways and sidewalks enters the box through an inlet along the curbing and then soaks into and gets filtered by the soil mix. Stormwater is then taken up by tree roots, or soaks deeper into the subgrade to recharge groundwater, or collects in a perforated subdrain to discharge to the storm sewer system or to the surface.

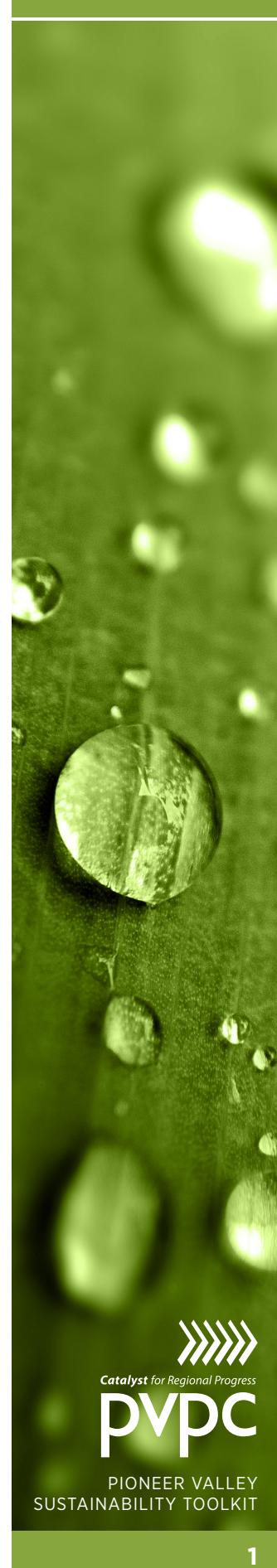
WATER QUALITY TREATMENT

Like other bioretention systems, the tree filter box retains, degrades, and absorbs pollutants as stormwater filters through layers of mulch, soil, and plant roots. The University of New



Source: University of New Hampshire Stormwater | Center, 2009 Biannual Report

Tree box filter boxes are prefabricated bioretention cells that can be integrated into existing curb and catch basins drainage systems along streets to receive runoff from adjacent impervious surfaces.



Hampshire Stormwater Center (UNHSC) installed its first tree box filter in 2004 and reports, “Their water quality treatment performance is high, often equivalent to other bioretention systems, particularly when well distributed through a site.” UNHSC’s 4-foot deep, 6-foot diameter facility demonstrated the following:

Pollutant	% Removal
Total Suspended Solids (TSS)	93
Total Petroleum Hydrocarbons in the Diesel Range	99
Dissolved Inorganic Nitrogen (NO ₃)	3
Total Zinc	78
Total Phosphorous	NT
Average Annual Peak Flow Reduction	NT

Source: University of New Hampshire Stormwater Center 2009 Biannual Report

During a two-year study at the University of Virginia using a manufactured tree box filter called Filterra made by Americast, Inc. researchers found “...pollutant removal rates vary as a function of the filter surface area to drainage area.” At the minimum of .33% filter surface area to drainage area ratio filtering 90% of the annual runoff (calculations that involved the rainfall distribution and frequency data from the mid Atlantic region) the expected pollutant removal rates are as shown below. They note that higher pollutant removal rates are made possible by increasing the ratio of filter surface area to drainage area.

Total suspended solids: 85%

Total phosphorous: 74%

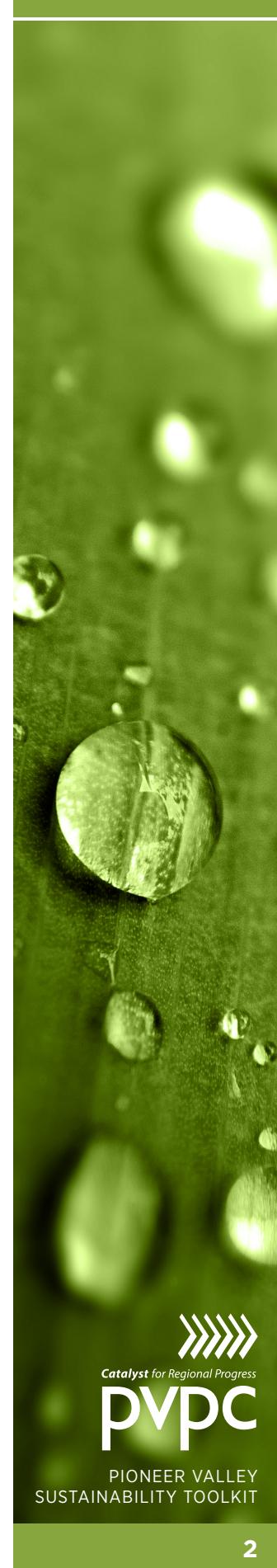
Total nitrogen: 68%

Metals: 82%

Peak Flow Reduction

UNHSC notes in its 2009 Biannual Report that, “Without additional engineering, the tree box filters can do little to reduce peak flows unless sited in appropriate soils, such as those in groups “A” (sand, loamy sand, or sandy loam with high infiltration rates) and “B” (silt loams or loams with moderate infiltration rates).”

A technical bulletin from the Virginia Stormwater Manual notes that while tree box filters are not used generally for the attenuation of runoff for stream channel erosion control and flood control purposes, “...some degree of volume/flow reduction can be achieved



by combining this filter system with an adjacent [downstream] underground storage / detention system (gravel trench or pipes). Such a combined system may be useful for urban retrofit projects to address problems associated with combined sewer overflows or for stream protection.”

DESIGN CONSIDERATIONS

There are numerous prefabricated tree box filter structures that are commercially available. They are generally sized and spaced much like catch basin inlets. Design variations are abundant and as mentioned above, the functionality of the tree box filter can be augmented for volumetric control with adjacent underground storage or given naturally well draining soils (Groups A and B). Design (sizing, spacing, installation, and location) are done in accordance with manufacturer's specifications.

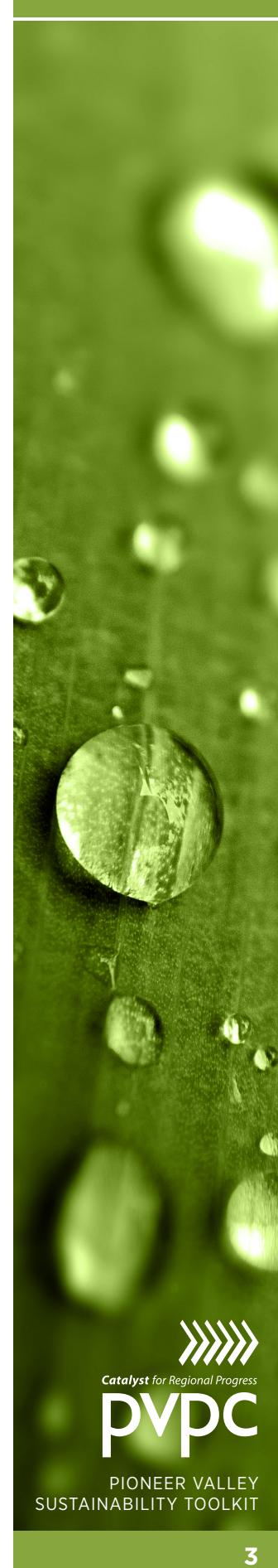
While drainage areas may range in size from one-quarter to a half acre, there is an optimum ratio between filter surface area to drainage area that brings together cost effectiveness



Source: Neponset River Watershed Association

The Neponset River Watershed Association worked with the Town of Milton to retrofit an existing “curb and catch basin” drainage system in the Central Crossing neighborhood with tree filter boxes. The project reduced bacterial loading to Pine Tree Brook and the Neponset River while raising awareness of these facilities as a cost effective approach to stormwater management.

with pollutant removal effectiveness. The two-year study at the University of Virginia, which used the tree box filter manufactured by Filterra and rainfall distribution / frequency for the Mid Atlantic region, found that the optimum ratio between filter surface area to contributing impervious surface drainage area is 0.33% (36 ft²) of filter surface for every ¼ acre of drainage area. This would require a 6 by 6-foot filter box.

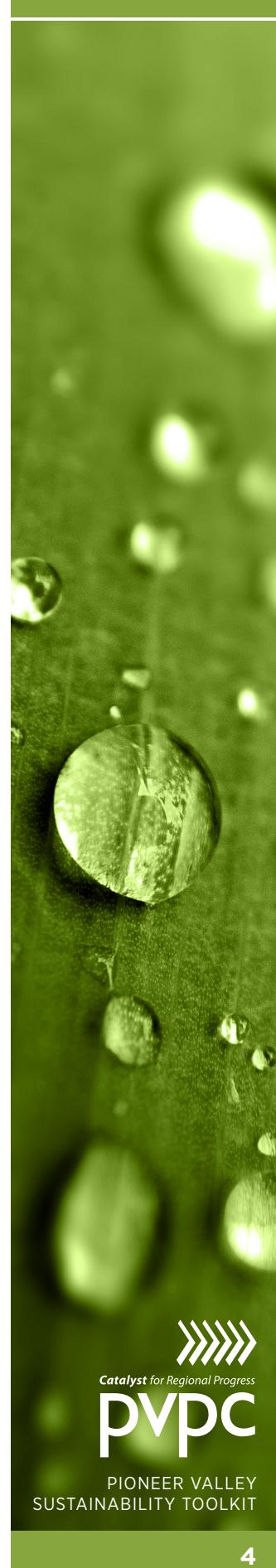


For locating tree box filters, the State of Virginia Stormwater Management Program offers the following guidelines. Tree box filters are,

...best incorporated into the overall site, or streetscape or parking lot landscaping plan. The individual box locations represent a combination of drainage considerations (based on final grades and water quality requirements), desired aesthetics, and minimum landscaping requirements, and must be coordinated with the design of the drainage infrastructure.

Because proper functioning of the soil media is so critical (as with other bioretention facilities), there are several additional consideration worth noting:

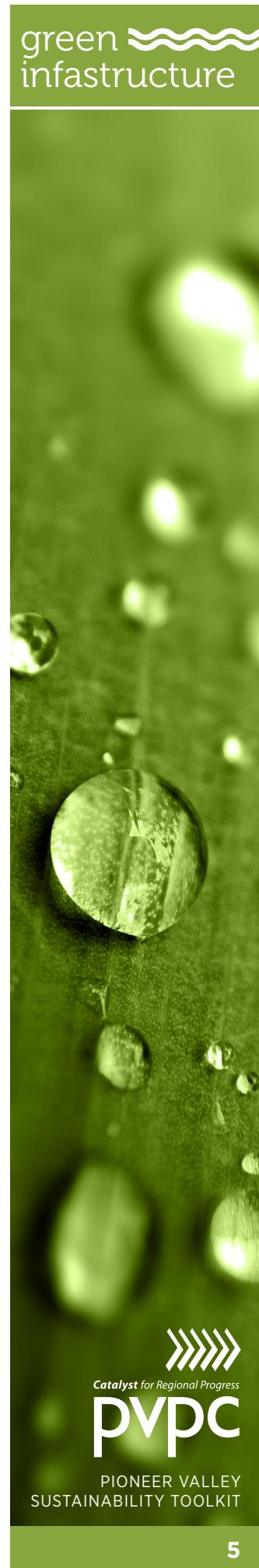
- » Tree box filters are installed after site work is complete and stabilization measures have been implemented. It is important to protect the filter media from premature clogging and failure.
- » Exposing the soil, microbes, and plants to prolonged and frequent flooding and wet conditions will significantly change the hydrologic regime reducing the effectiveness of the media to capture pollutant and the microbe's/plant's abilities to cycle nutrients, break down organics and uptake heavy metals. If the filter media remains water logged for 3 or 4 days anaerobic conditions will develop, dropping both oxygen and pH levels which may kill desirable soil microbes and plants. As such, runoff should not be detained and stored in a holding tank to be metered out to the filter media over a long period of time and frequent flows (such as from basement sump pumps) must be excluded.



BARRIERS TO USE

Following are possible concerns that may serve as barriers to use of tree box filters.

Concern	Experience
Cost	<p>There are a variety of costs described in the available literature on tree box filters, ranging from \$1,500 to \$10,000. Recent quotes from manufacturers of these systems provide perhaps a more realistic range: \$7,000 to \$12,000, depending on size and not including installation. For public projects, installations can be done by municipal public works department or they might be bid out as part of a larger construction project.</p> <p>Annual maintenance cost for an owner has been reported at approximately \$100 per unit. Annual maintenance by the manufacturer is \$500 per unit.</p>
Winter performance	<p>University of New Hampshire Stormwater Center found, "The tree box filter's ability to treat water quality remained relatively stable in all seasons... While some seasonal variation in infiltration capacity and nitrogen removal does occur, cold conditions do not seem to warrant significant design alterations."</p>
Maintenance	<p>Once the tree is established, annual maintenance is typically minimal. In UNHSC's five-year experience with the tree filter box (installed in 2004), they note that maintenance entailed only routine trash removal and periodic inspections to ensure that the bypass and soils are adequately conveying water. In 2008, they also removed the top two inches of surface fines accumulation to restore infiltration capacity (due to an accumulation of sealcoat fines and flakes which caused a noticeable reduction in infiltration). Periodic removal of surface fines (similar to that of deep sump catch basins) may be useful over the long term to support infiltration.</p> <p>Manufacturers may provide services for inspection, care, and maintenance of the tree box filter for the first year or two after installation.</p> <p>Charles River Watershed Association notes that maintenance entails the following: periodic inspection of plants and structural components, periodic cleaning of inflow and outflow mechanisms (the system comes with an observation well that can be used as a clean out), periodic testing of mulch and soil for buildup of pollutants that may be harmful to the vegetation. Biannual replacement of mulch.</p>



LINKS TO MORE INFORMATION

UNIVERSITY OF NEW HAMPSHIRE STORMWATER CENTER. MARCH 2010.
“UNIVERSITY OF NEW HAMPSHIRE STORMWATER CENTER 2009 BIANNUAL REPORT.” SEE:
<http://www.unh.edu/unhsc/>

CHARLES RIVER WATERSHED ASSOCIATION. APRIL 2008. “EVALUATION OF GREEN STREET DESIGN ELEMENTS AND BEST MANAGEMENT PRACTICES: COMPARISON OF CONVENTIONAL AND STORMWATER TREE PITS.” SEE:
http://www.crwa.org/hs-fs/hub/311892/file-642201447-pdf/Our_Work_Blue_Cities_Initiative/Resources/CRWA_Stormwater_Trees_Urban_Environment.pdf

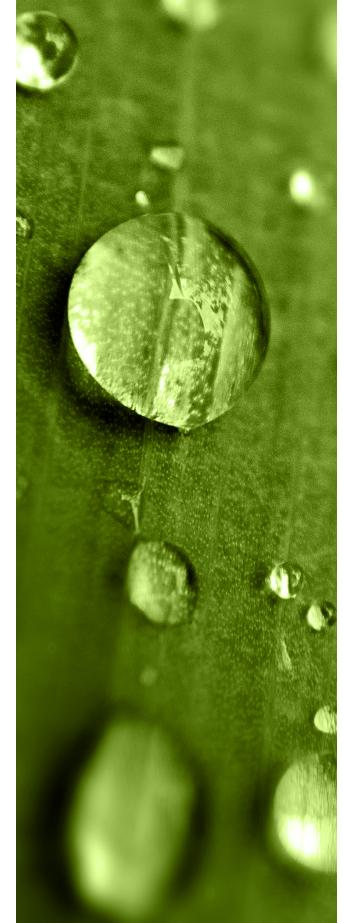
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Code Review Checklist

PURPOSE

The Code Review Checklist is a tool for assessing the capacity of local regulations to support green infrastructure options in new development and redevelopment within a community.

There are many reasons why a community should support the development of green infrastructure in both new development and redevelopment. In addition to the effectiveness of the many structural practices designed to manage and treat storm water close to its source through natural or engineered systems, green infrastructure facilities can be beautiful, compatible with the pedestrian environment, and support place making design elements at almost any site. The pending reissuance of the National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Permit will also require regulated communities to assess their local regulations and policies for compatibility with green infrastructure practices.

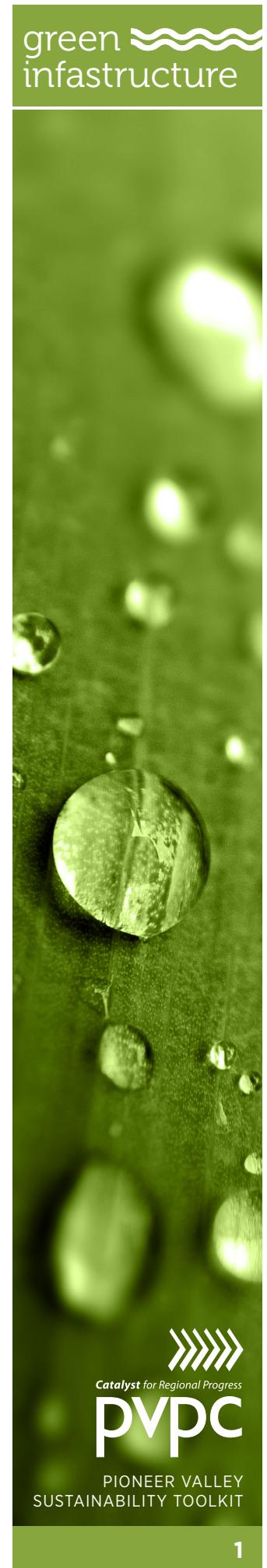
HOW IT WORKS

The Code Review Checklist is divided into several easy to follow sections that allow a community to determine:

- » if their local regulations are compliant with the draft 2010 NPDES MS4 Permit;
- » the degree to which their street design, parking lot and other local requirements affect the creation of impervious cover;
- » and the extent to which a Low Impact Design (LID) approach is integral to site planning and development.

The checklist does not offer a ranking or final score but rather identifies specific areas of local regulations that can be improved upon to better support green infrastructure and LID site planning.

NPDES MS4 Permit Compliance – Based on the draft 2010 permit, the Code Review Checklist asks a series of questions that allow the municipality to determine if their local bylaws or ordinances meet permit requirements for stormwater management program funding, illicit connections, erosion and sediment control at construction sites, and post construction stormwater management in new development and redevelopment.



Street and Parking Lot Standards in Subdivision Regulations and Zoning – Once completed, these sections of the Code Review Checklist offer a comparison between existing code requirements and LID standards for road width and length, rights of ways, sidewalks, cul de sacs, stormwater management facilities, and landscaping requirements.

Feasibility of Green Infrastructure in Other Local Regulations, Policies, and Programs

– This section of the Checklist seeks information about other zoning tools such as open space or cluster development, Board of Health and wetland regulations, street tree policies and programs, and local building/plumbing codes relative to programs such as rain water harvesting.

RESOURCES

The Pioneer Valley Green Infrastructure Code Review Checklist is a compilation of guidance drawn from several resources including The Center for Watershed Protection's Code and Ordinance Worksheet, the U.S. Environmental Protection Agency's Water Quality Scorecard, and the Metropolitan Area Planning Council's Low Impact Development Toolkit Checklist for Regulatory Review.

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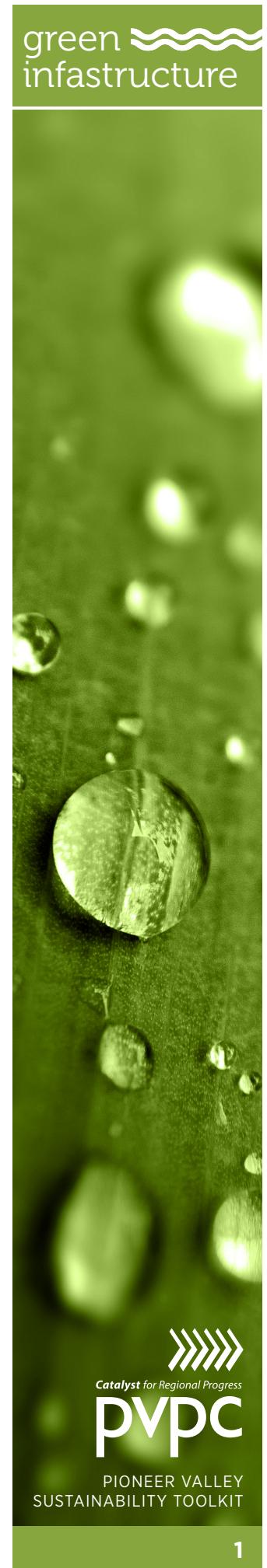
Green Infrastructure In Zoning

PURPOSE

Measurable standards can be adopted within municipal zoning codes, and subdivision and stormwater regulations, to promote a comprehensive approach to Low Impact Development and the integration of green infrastructure in community development.

There are many opportunities within local zoning codes and subdivision and stormwater regulations to promote Low Impact Development (LID) standards and green infrastructure including the use of incentives, code requirements with standards, and a well-defined planning process that promotes coordination between preliminary plans, site plans, and stormwater management plans. Examples include incentives such as density bonuses, infiltration requirements with design standards, and planning for multipurpose functionality of design elements such as buffers and screening for landscaping and stormwater management. Rather than adopting a separate bylaw that may conflict with other sections of the zoning code, integrate green infrastructure throughout such that it becomes the norm not an exception.

Many green infrastructure strategies have multiple benefits and offer a more comprehensive approach for addressing a range of issues and challenges. For example, a green roof takes up no extra space at all, manages storm water by reducing peak flows, improves the heating and cooling efficiency of a building, and has the potential to be a source of food production. Techniques such as bioretention areas, grass filter strips, and swales can also meet landscaping and open space requirements while addressing stormwater treatment and infiltration.



Green Infrastructure

Communities are exploring strategies that promote capture and control of rain water near where it falls. This includes the use of natural or engineered systems – such as green roofs, rain gardens, or cisterns. In these facilities, stormwater can be cleansed as it moves through soils and plant roots (treatment), returned to groundwater (infiltration), returned to the air (evapotranspiration), and/or captured to irrigate plants or flush toilets (reuse). This approach is called “green infrastructure” because of the use of plants to enhance and/or mimic natural processes. Green infrastructure contrasts with traditional “gray infrastructure” which is typically built to capture and retain large volumes of stormwater collected over a large area, and convey it to the nearest waterway.

Source: Pioneer Valley Green Infrastructure Plan, February, 2014

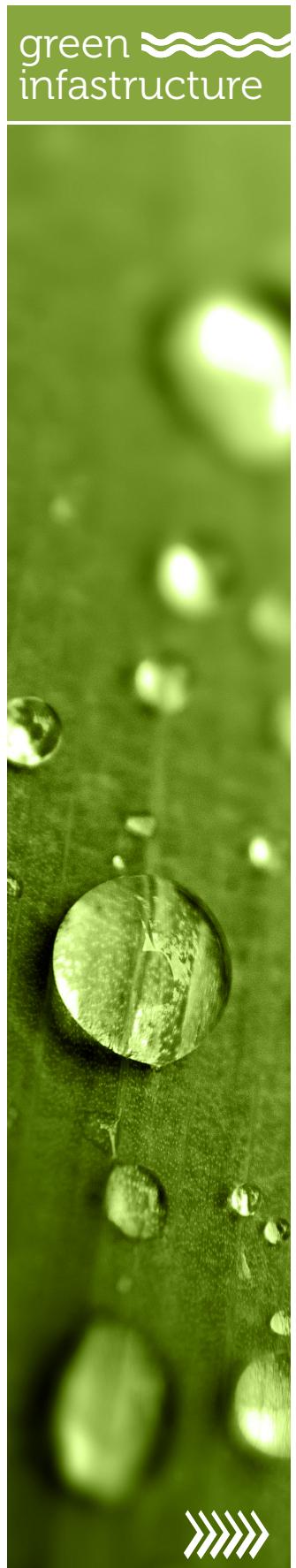
AN EFFECTIVE PERMITTING PROCESS IS CRITICAL

Critical to effective implementation of green infrastructure facilities is the site inventory and analysis process which should occur before any design work. Existing site conditions may offer opportunities to minimize impacts as well as the costs of stormwater management and can be identified through careful site analysis. Local zoning and permitting can promote a thoughtful process by defining the planning process, and providing standards for green infrastructure.

Town of Franklin, Massachusetts – Best Development Practices Guidebook

Franklin, Massachusetts’ commitment to expedited permitting resulted in creation of their Best Development Practices Guidebook to take the guess work out of permitting requirements for developers. Critical to smooth and successful permitting is their four step process for site plan and subdivision applications that begins with an existing site conditions map and an initial pre-development meeting, held every Wednesday at 3 PM, with representatives from all town boards, the police and fire departments, and Town Counsel. Developers are offered guidance on how to meet multiple permit requirements and community planning objectives with the least amount of time and expense. Through this process, LID and green infrastructure strategies are coordinated with other project requirements early in the planning process.

http://www.town.franklin.ma.us/Pages/FranklinMA_planning/initiatives/bestdevelopment.pdf



INTEGRATING GREEN INFRASTRUCTURE STANDARDS

Drainage

A best practice for eliminating conflicting standards is to reference the local stormwater bylaw or regulation within needed sections of the zoning code for appropriate drainage standards, thereby keeping all drainage standards and specifications in one section of the local code. All zoning standards for drainage should be consistent with the purpose and standards identified in any local stormwater management bylaw, regulation or policy to provide a seamless process for promoting LID site planning. Conserving the natural hydrologic function of a site, reducing impervious surfaces and preventing runoff are key principles in ensuring post development peak flows do not exceed predevelopment peak flows. Green infrastructure facilities should be explicitly encouraged for treatment, attenuation, and infiltration of stormwater at decentralized locations around a site to capture stormwater at its source.

Dimensional and Density Regulations

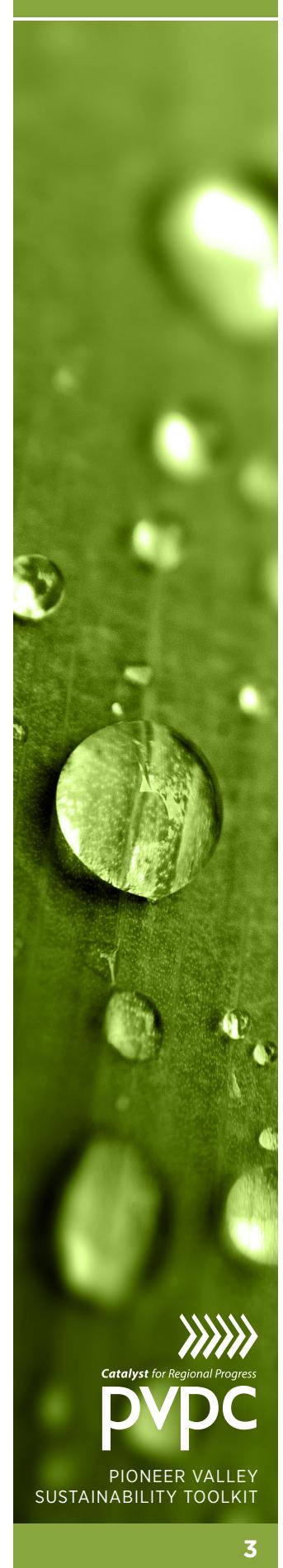
Explicitly allow bioretention areas, rain gardens, filter strips, swales, and constructed wetlands within required setback areas.

Allow reduction in frontage (and corresponding road length/paved area) where appropriate, such as in Open Space Residential Developments, at the outside sideline of curved streets, and around cul-de-sacs. Removal of all frontage requirements for open space developments allows greater flexibility for such projects.

Setbacks for front, rear, and side yards should promote a walkable streetscape and support community character which means they will likely vary based on land use. In a mixed use district, setbacks should include enough space to comfortably design a pedestrian sidewalk against the building, a single lane automobile access lane or driveway, and a substantial vegetated buffer adjacent to the residential use as a screening buffer that can also serve as stormwater green infrastructure. A rear setback of 30-50 feet maybe required to ensure that loading, trash removal and other similar activities have adequate room. Flexibility in these standards due to lot configuration is important.

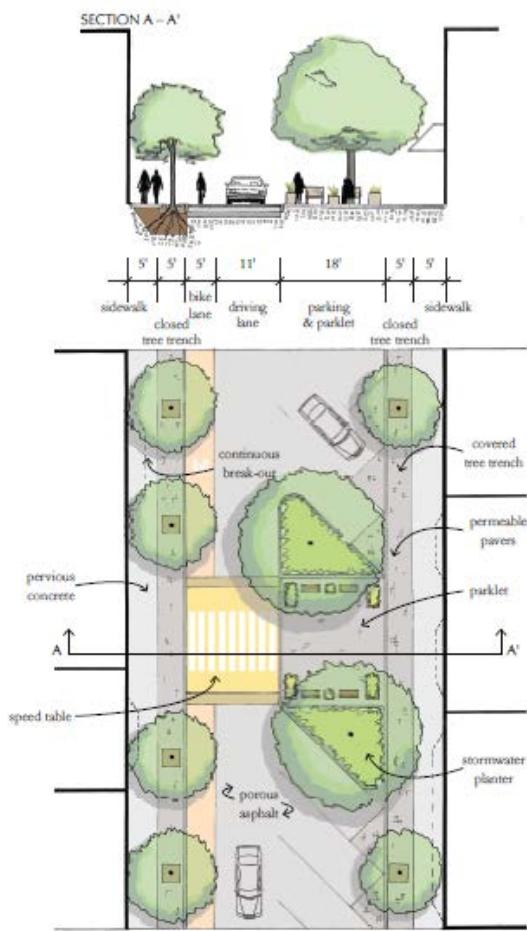
Site Preparation, Landscaping, Screening and Buffers

Landscaping requirements and objectives vary as a function of land use and activity. Emphasize native vegetation preservation on-site, and note that screening and buffer areas can be used for stormwater management provided that screening functions are not compromised. Consider including design standards for landscaping and screening that encourage the use of green infrastructure facilities. In the same way that architectural design standards serve a town, design standards for landscaping can support place-making within neighborhoods and across a community.



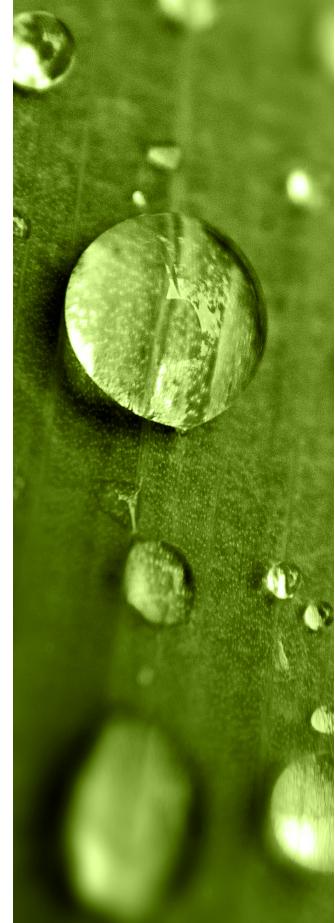
Roads

Roadways should be designed to be as narrow as possible while still wide enough to accommodate travel lanes, regular on-street parking (where required), and the passage of emergency vehicles, school buses, and the occasional delivery truck. Many local standards will specify that local urban roads be paved to a width of between 28 and 32 feet, while local rural roads might have a standard of only 22 feet in width. These guidelines are appropriate for high density development or higher vehicle volumes but are generally excessive for most suburban and rural developments. At a minimum, local codes and regulations should not discourage or prohibit impervious cover reductions. Curbs should be eliminated wherever possible to allow road drainage into open channel systems or other green infrastructure facilities. Requirements for curb and gutter infrastructure (i.e. requirements for new subdivisions to connect to storm sewer infrastructure) can be replaced with requirements for "perforated curb and swale" infrastructure, or simply roads without curbs where appropriate.



In thriving commercial areas, shaded pedestrian seating areas and calmed vehicular traffic invite people out in the neighborhood. Covered tree trenches manage stormwater and landscape pedestrian paths between the sidewalk and road, guiding circulation in the commercial district.

SOURCE: Holyoke Green Streets Guidebook, 2014



Landscaping and street standards can work well together to support community development objectives such as an improved pedestrian experience with a downtown commercial shopping district as illustrated in the City of Holyoke's Green Streets Guidebook (2014) image herein.

Example Road Travel Widths for Local Streets

Minimum Road	Parking	Average Daily Trips (ADT)	Number of Dwelling Units Served
20	Parking on both sides*	<200	20
22	Parking on one side*	200-400	20-40
26	Parking on both sides	400-2,000	40-200
28	Parking on one side	>2,000	>200
32	Parking on both sides	>2,000	>200

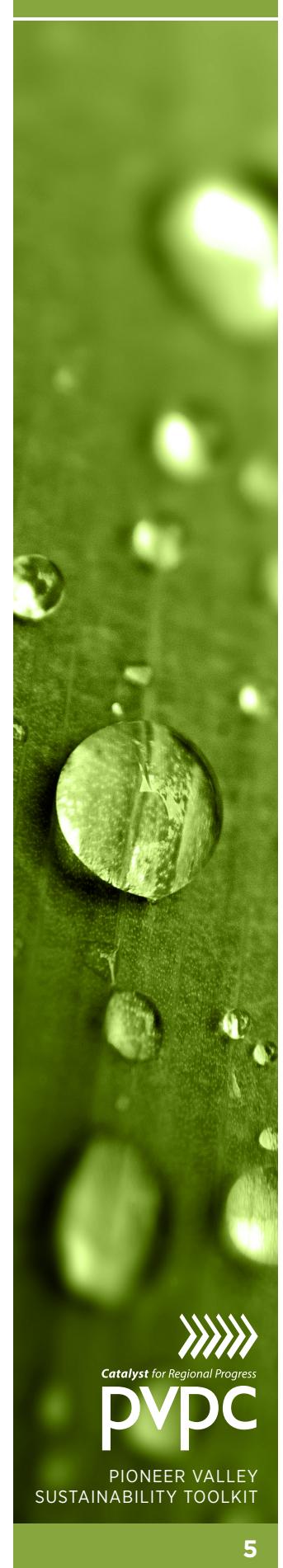
*Parking is restricted to one side during a snow emergency. No parking is designated of road is a designated fire lane. Source: Rhode Island Low Impact Development Site Planning and Design Guidance Manual. Horsley Witten Group and RI DEP, March 2011.

The standard ROW width of between 50-60 feet can also be excessive in many situations. Wide ROWs require more clearing and grading, potentially changing the ecological function of a site and creating more expense. The ROW need only be wide enough to contain all of the cross sectional elements including sidewalks, utility easements, parking lanes, drainage features, and travel lanes which depend on the size, density and location of the development. More moderate standards for ROW construction may include a 44- to 50-foot ROW width for 26- to 30-foot wide local urban and suburban streets. In a rural setting, a 40-foot ROW for 22-foot wide local roads might be more appropriate.

Also in subdivisions, there are opportunities to reduce the required radius of a cul-de-sac (down to an outer road radius of 30 to 40 feet), and to allow hammerhead turnarounds. On dead end streets, hammerhead turnarounds can provide a feasible way to reduce paved area while providing sufficient turnaround space for larger fire vehicles.

REDUCING IMPERVIOUS SURFACES IN PARKING REQUIREMENTS

Communities should establish both minimum and maximum parking ratios to provide adequate parking while reducing excess impervious coverage. Parking reductions could be allowed for factors such as: mixed land uses, access to alternative transportation, demographics, and utilization of Transportation Demand Management (TDM) Programs including subsidized mass transit and parking cash out programs. Flexibility is a key component to providing adequate but not excessive parking.



Off Street On-site Parking Requirements - Identify maximum parking spaces. Consider requiring a Special Permit for an increase in maximum parking allowance. Some on-site parking requirements could be met off-site particularly in redevelopment sites and compact mixed use centers.

Shared Parking and Other Opportunities to Reduce Parking Requirements - Establish formulas for the utilization of shared parking for uses with different peak demand periods (e.g. work day peak demand period 9am-5pm; housing peak demand period 6pm-8am). Provide a model shared parking agreement and facilitate implementation. An alternative to shared parking is increasing the number of zoning districts that have minimal parking requirements.

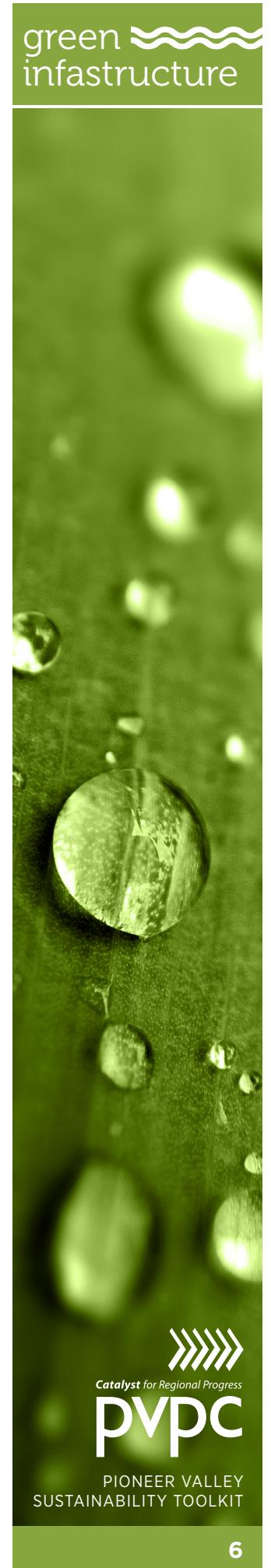
Parking and Loading Space Standards - Allow for smaller stalls for compact cars, up to 30% of total parking spaces. Allow pervious pavement driveways and parking stalls, soils permitting, in all zoning districts. Encourage pervious pavement in overflow parking areas and shoulders. Snow storage should not coincide with these areas as it may include sand which will clog pervious pavement and prevent infiltration. This is especially important if porous pavement is being utilized for stormwater management. Edging and curbing can be eliminated or perforated to allow stormwater flows into infiltration and bioretention areas. For larger parking lots, require separating parking rows with planting strips that may function to manage stormwater and shade the lot reducing the heat island effect. Shade tree requirements in planting strips should also take into consideration stormwater treatment.

On-Street Parking Demand - Wider residential streets are often justified by the need to provide on-street parking. However, providing a continuous parking lane on both sides of the street is usually an inefficient and expensive way to satisfy the required parking for residential areas, since most of the required parking per unit can be met in driveways or through shared parking. Consider using one or both of the on-street parking lanes as a traffic lane (i.e. a queuing street), both traffic movement and parking needs could be met with a narrower street.

SIDEWALKS

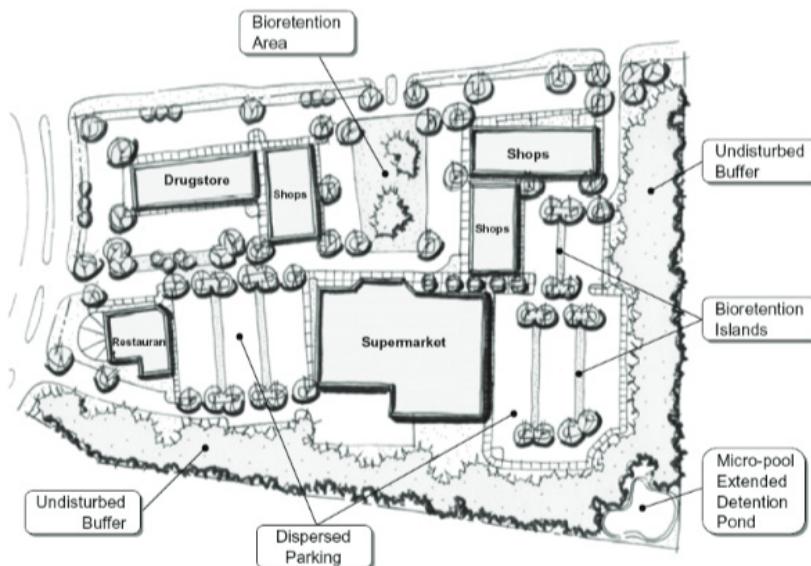
Flexible design standards should be adopted that are based on safe pedestrian movement and limiting impervious cover. Constructing five-foot wide sidewalks on both sides of the street is not always appropriate, even in medium to high density developments. A three- or four-foot sidewalk on one side of the street is appropriate for many situations. Where practicable, sidewalks should be graded to drain into front lawns, reducing the total amount of runoff generated by the roadway. Consider permeable surfaces such as permeable asphalt or compacted aggregate where appropriate. Walkways may be removed from the roadway entirely and used to provide access to natural features or connect other destinations such as a playground, park or adjacent development.

The Town of South Hadley, Massachusetts allows subdivision developers to pay a fee in lieu of sidewalks in small developments where a sidewalk network may not serve a purpose. The fee contributes to bicycle and pedestrian projects in other areas of town.



OPEN SPACE PROTECTION IN ZONING

Open Space Residential Development (OSRD), Open Space Design (OSD), Conservation Development and Natural Resource Protection Zoning (NRPZ) are the current zoning models for what was previously called cluster or flexible development. This approach utilizes LID site design strategies for conserving natural hydrologic functions and reducing impervious surfaces for preventing runoff, integrating green infrastructure as a fundamental design element. These plans retain native vegetation and natural areas, and structure site layout to greatly reduce street infrastructure. The open space set aside should be based on resource values, not by formula such as X% of the development. The four step planning process reverses the typical subdivision planning process by first, designating open space based on an environmental analysis, siting houses next, layout of roads and trails, and last, lot lines are drawn.



This commercial shopping plaza set aside an undisturbed buffer and integrated green infrastructure facilities to reduce impervious coverage and provide a natural vegetated corridor around the site.

Source: Rhode Island Low Impact Development Site Planning and Design Guidance Manual. Horsley Witten Group and RI DEP, March 2011.



REFERENCES AND RESOURCES

THE CONWAY SCHOOL. CITY OF HOLYOKE GREEN STREETS GUIDEBOOK. MARCH, 2014.

Mass Audubon's Shaping the Future of Your Community Outreach and Assistance Program

<http://www.massaudubon.org/our-conservation-work/community-outreach/sustainable-planning-development/shaping-the-future-of-your-community-program/workshops/protecting-land-habitat>

Massachusetts Smart Growth/Smart Energy Toolkit

http://www.mass.gov/envir/smart_growth_toolkit/pages/how-to-SG.html

RHODE ISLAND LOW IMPACT DEVELOPMENT SITE PLANNING AND DESIGN GUIDANCE MANUAL. HORSLEY WITTEN GROUP AND RI DEP, MARCH 2011.

www.dem.ri.gov/programs/bpoladm/suswshed/pdfs/lidplan.pdf

PIONEER VALLEY GREEN INFRASTRUCTURE PLAN, "TABLE 4.3 GREEN INFRASTRUCTURE DESIGN RESOURCES". PIONEER VALLEY PLANNING COMMISSION, FEBRUARY 2014.

www.pvpc.org/file/pvpc-green-infrastructure-plan-final-02-18-14pdf

FOR MORE INFORMATION, PLEASE CONTACT

Pioneer Valley Planning Commission

413-781-6045

60 Congress Street, Floor 1

Springfield, MA 01104-3419

www.pvpc.org



Subdivision Regulations

What it is

Subdivision regulations guide the private development of new roads. They control layout and construction, specifying municipal requirements for location, width, and grades of proposed ways. They also specify requirements for public utilities. As streets typically account for 50 to 75 percent of impervious cover in the developed environment, it is critical that these regulations encourage and even require best practices for stormwater management. These regulations should also be consistent with requirements within a municipality's stormwater management bylaw/ordinance.

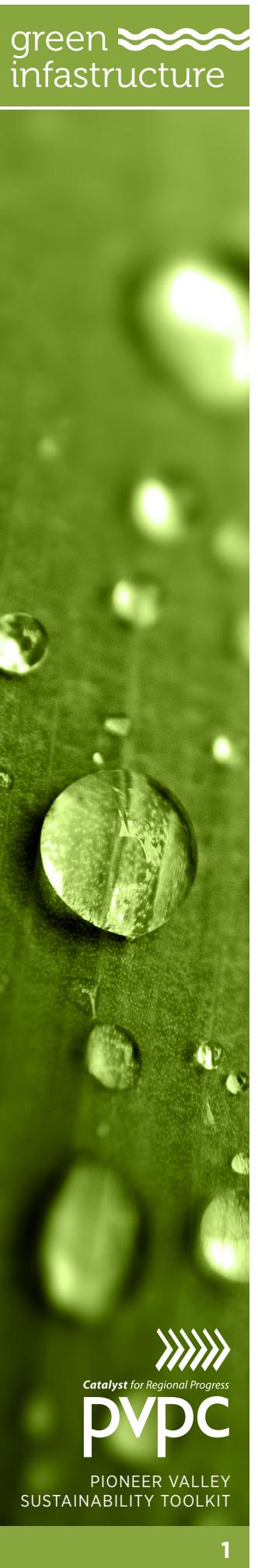
Cost Savings in a Subdivision Project



Photo: Nashua Telegraph

In Pelham, New Hampshire, a subdivision that took a low impact approach to site development and used green infrastructure stormwater management practices **realized a 6% savings on the total cost of stormwater infrastructure**¹. The road shown here makes use of porous asphalt, allowing rainfall to soak into the surface and filter through underlying soils.

For more on porous asphalt, see related fact sheet.



Within subdivision regulations, best practices can be addressed in the early stages of the planning process itself, and within requirements for the following:

- » location and length of roadways
- » right of ways
- » paved roadway width
- » curbs
- » drainage
- » sidewalks
- » utilities
- » landscaping
- » cul de sacs

Planning process

Approval for a subdivision project typically begins with submission of a preliminary plan, which helps initiate a conversation about the project between the developer, planning board, and board of health. This early stage in the project provides communities with an opportunity to promote an integrated site design process and use of distributed stormwater management practices to best match the predevelopment hydrologic condition. This could include advancing provisions within stormwater management regulations and also within zoning regulations for: 1. Open Space Residential Development, which allows for a more compact development pattern to preserve open space and reduce the amount of paved surfaces through clustering of development to the least environmentally sensitive areas; or 2. where appropriate Traditional Neighborhood Development (TND), which involves the more traditional neighborhood pattern used prior to the automobile, and includes small lots and homes with porches oriented toward the street. TNDs typically have narrow roads and on-street parking coupled with reductions in required off-street parking.

For preliminary plan submission, municipalities could provide to developers a standard site analysis checklist to maximize design and functionality of best stormwater management practices. This could include many of the same steps within the conservation development process, beginning with a good site analysis to designate natural drainage areas, important conservation areas, and locating development areas. Applicants could bring the results of this analysis to a pre-application conference. As part of this analysis and reporting, the applicant could identify proposed best stormwater management practices. Soil testing for this site analysis could be for the site overall and not as rigorous as the more detailed soil work necessary to design a stormwater management facility.

It may be useful to include credits for improved stormwater management practices. The Massachusetts Department of Environmental Protection (DEP) stormwater standards as incorporated into the state's Wetlands Protection Act Regulations has established a "LID Site Design Credit" whereby in exchange for directing runoff from roads and driveways to vegetated open areas, preserving open space with a conservation restriction, or



directing rooftop runoff to landscaped or undisturbed areas, developers can reduce or eliminate the traditional BMPs used to treat and infiltrate stormwater.²

Location and length of roadways

Protecting important natural features and minimizing disturbance and amount of paved area is a first line approach to protecting hydrology on a previously undeveloped site. This can be achieved by identifying opportunities to reduce:

- » cut and fill, thereby minimizing disturbance of native soils
- » unnecessary contouring of the site, and
- » removal of native vegetation.

In addition, streets ought to be located in order to protect important natural features, avoiding low areas and steep slopes.

Developers should be encouraged to limit clearing within the right-of-way to the minimum necessary for constructing roadway, drainage, sidewalk, and utilities, and to maintaining site lines. During site development, permeability of soils for infiltration should be preserved. Where soils are compacted by construction vehicles, contractors should be required to reestablish permeability.

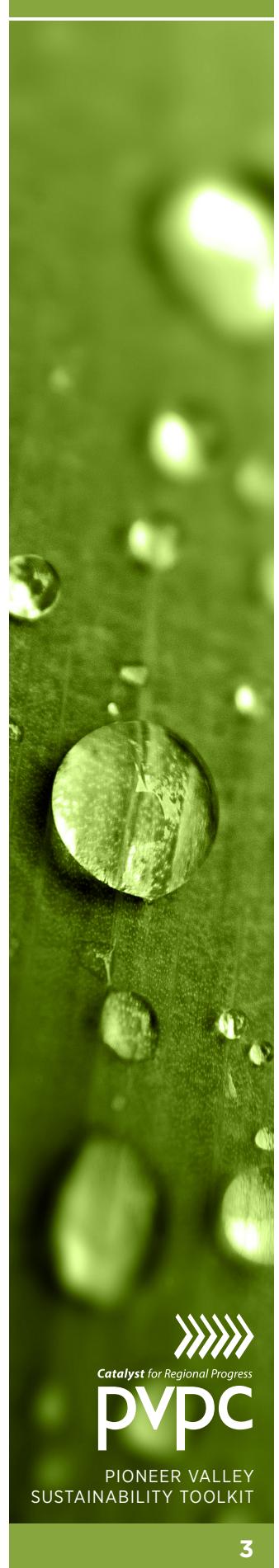
Alternative street layouts should be explored for options to increase the number of homes per unit length and minimize the length of the roadway. This might be achieved through clustering of the development or through Traditional Neighborhood Design as described above.

Right of ways

A right of way is the strip of land that contains all the elements of a roadway. At a minimum, this typically includes vehicle travel lanes, grading and drainage, and utilities. It also can include bike lanes, shoulders, on-street parking, curbs, sidewalks, and vegetated areas. Right of ways between 50 and 60 feet wide are standard, but this it has often led to overdesign with excessive clearing, grading and extensive use of the width for paving.

Good design has not so much to do with the width of the right of way itself, but considerations of context and what makes for efficient and effective use of the right of way. What makes sense for the elements of a right of way on a busy suburban road will likely not make sense for a low volume rural road.

Several communities in Minnesota have developed “Living Streets” policies that take context into consideration. This policy brings together “complete streets” objectives of providing for multiple modes of transportation (vehicular, pedestrian, and bicycle) and “green streets” objectives of reducing environmental impacts (through reduced impervious surface and improved stormwater management). In thinking about how to accommodate these various objectives within the right of way, these communities have developed design options that can be deployed depending on what specific objectives there may be for a project. In Maplewood, Minnesota, there are three design options for

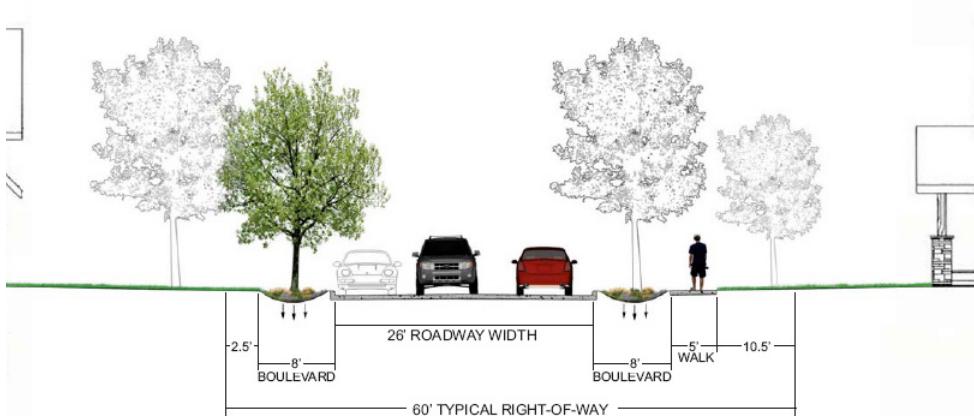


a local street with a 60-foot right of way (note that not all 60 feet in the right of way is used):

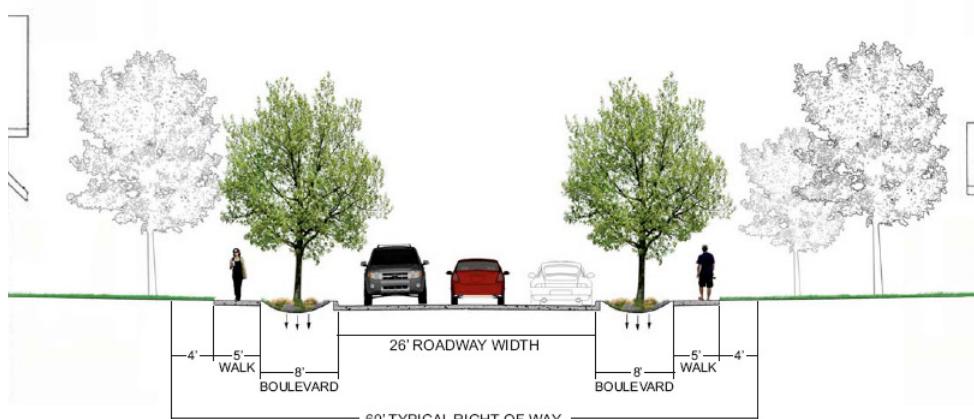
Guidelines from Edina, Minnesota's Living Street Policy are useful in thinking about right of way use:

- » Provide bicycle accommodation on all primary bike routes.
- » Allocate right-of-way for boulevards (stormwater infiltration facility)
- » Allocate right-of-way for parking only when necessary and not in conflict with Living Streets
- » principles
- » Consider streets as part of our natural ecosystem and incorporate landscaping, trees, rain
- » gardens and other features to improve air and water quality

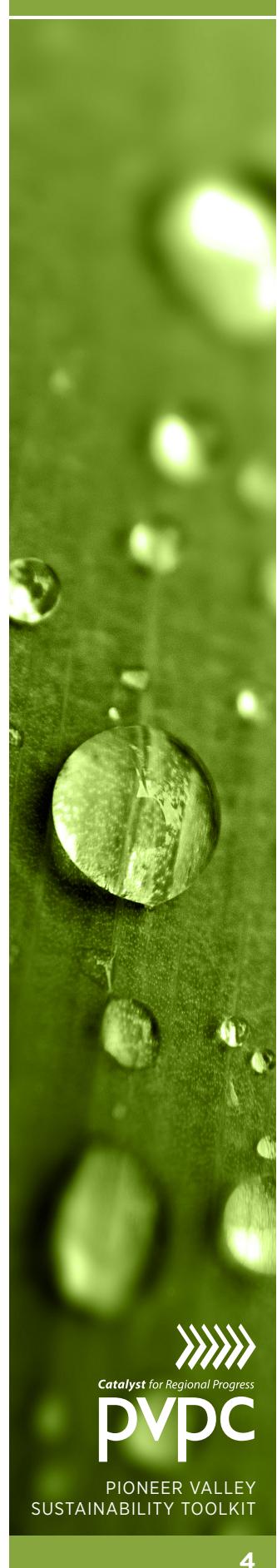
Municipalities ought to consider the use of drawings that show how the elements of a right of way cross section might vary given different contexts. Such drawings provide a clear understanding about objectives and efficient and effective use of the right of way area.

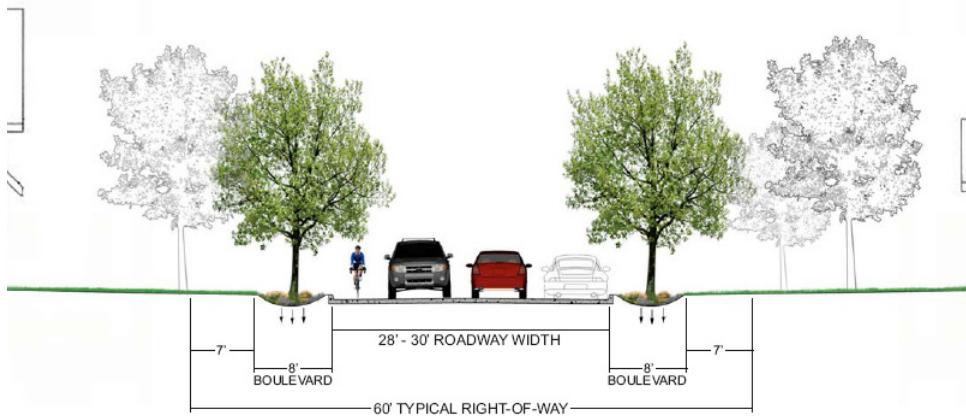


24 to 26-foot roadway width with parking on one side; 8-foot boulevard/ stormwater infiltration facility on each side; and 5-foot sidewalk on only one side



24 to 26-foot roadway width with parking on one side; 8-foot boulevard/ stormwater infiltration facility on each side; and 5-foot sidewalk on each side





28' to 30' roadway width with parking on one side; and 8-foot boulevard/stormwater infiltration facility on each side

Source: City of Maplewood, Minnesota, Living Streets Policy, Adopted January 28, 2013

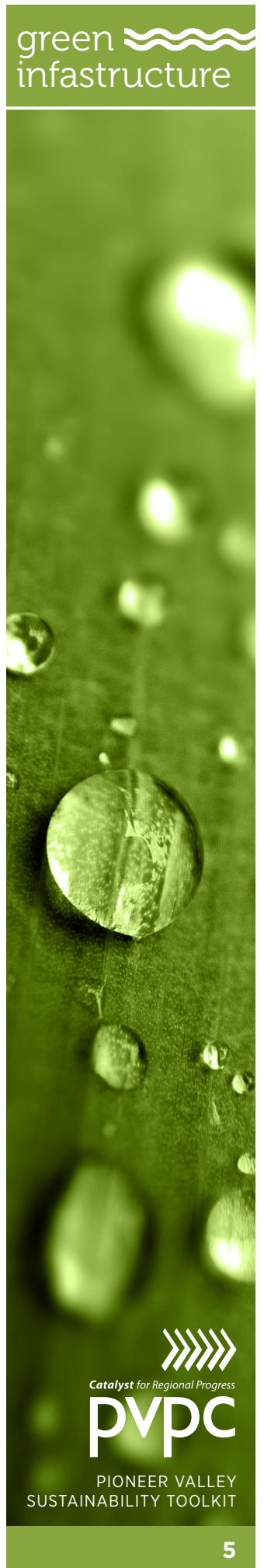
Paved roadway width

Narrower road widths produce advantages not only in terms of reduced stormwater impacts, but also lower development costs, improved community character, and enhanced pedestrian safety. As a result, it is important for municipalities to revisit and update roadway width standards within subdivision regulations. Many existing standards are based on universal application of guidelines for highways or very large scale subdivisions planned more than 50 years ago. Revised standards should involve the minimum required pavement width and derive from careful considerations with public works and emergency response officials of traffic volume, on-street parking (where required), and passage of emergency vehicles and school buses. Typical road width reduction standards are shown on the following page.

Communities might also explore the use of permeable shoulders to reduce overall imperviousness of a roadway. This would involve combining a traditional asphalt surface for the travel lanes and an adjacent porous surface for the shoulder or bike lane area. Snow and ice management for the roadway must avoid sand so as to avoid clogging of the porous shoulder area. For more information, see a recent publication entitled, "Permeable Shoulders with Stone Reservoirs," referenced more fully in the Links to More Information Section below.

Emergency Vehicle Access

Emergency access considerations can have direct bearing on street width. Under the Massachusetts' fire marshal code, the minimum fire access lane width is 18 feet. Generally speaking, this can be met by two 9-foot travel lanes. The purpose of a fire access lane is to allow one fire truck to operate while allowing enough space for a second truck to pass by during the event of an emergency. Fire access lanes can be located on roads, but they must not be obstructed (i.e. by parked cars or snow).



While the state fire marshal code provides a minimum width, fire access lanes cannot be standardized across the state. Each community has different needs and fire apparatus that range in size. Communities may increase minimum fire access lane widths if required for their particular equipment. Alternatively, municipalities may select fire access equipment that allows for narrower lanes consistent with community design goals.

Table 5: General Parameters for Residential Road Design

Parameter	Single Use Residential Wide	Single Use Residential Medium	Single Use Residential Narrow	Single Use Residential Alley
Traveled Way				
Typical ADT	4,999 < 1,500	1,499 < 400	399 < 0	100 < 0
Design speed	25-30 mph	20 mph	20 mph	15 mph
Operating speed	20-25 mph	20 mph	15-20 mph	15-20 mph
Number of Through Lanes	2	2	2	1
Lane Width	10-12 feet	10-12 feet	10 feet	9-10 feet
Shoulder	2 feet	2 feet	2 feet	2 feet
Bike Lanes	Shared road Or 6 feed wide	Shared road	Shared road	Shared road
Utility Easement Width	----	----	10 feet	10 feet
Range of ROW Width	40-50 feet	36-40 feet	33-36 feet	20 feet
Roadside				
Desirable Roadside Width (pedestrian, swale, and planting strip)	5.5-12 feet	5.5-10 feet	5.5 feet	None
Grass Plot/Planting Strip	0-6 feet	0-6 feet	0-6 feet	None
Minimum Sidewalk Width	4 feet one side ok	4 feet/Shared road	Shared road	Shared road
Street Lighting	At intersections and pedestrian scale lighting at residential driveways.	At intersections and pedestrian scale lighting at residential driveways.	At intersections and pedestrian scale lighting at residential driveways.	At intersection with road
Intersections				
Traffic control	Stop signs, 4-way yield	4-way yield	4-way yield	Yield exiting alley
Curb Radii	15-25 feet	15-25 feet	15-20 feet	15 feet

Source: Sustainable Neighborhood Road Design: A Guidebook for Massachusetts Cities and Towns, May 2011, American Planning Association, Massachusetts Chapter and Home Builders Association of Massachusetts (page 27).

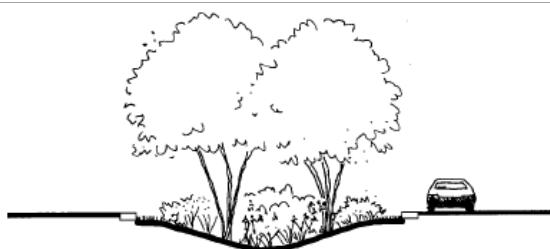
Cul de sacs

The required radius for a cul-de-sac also impacts the amount of impervious area. In the Pioneer Valley, minimum cul-de-sac radius requirements (at outer road edge) are typically set between 60 and 120 feet, and hammerhead turnarounds, which would greatly reduce impervious cover, are not typically allowed. Better stormwater management recommendations often call for cul-de-sacs to be designed with an outer road radius of 30 to 40 feet, as well as allowing for hammerhead turnarounds in lieu of cul-de-sacs.

Also in subdivision regulations, there are opportunities to reduce the required radius of a cul-de-sac (down to an outer road radius of 30 to 40 feet), and to allow hammerhead turnarounds. On dead-end streets, hammerhead turnarounds can provide a feasible way to reduce paved area while providing sufficient turnaround space for larger fire vehicles.

- » E. Cul de sac or dead end street -- Revise cul de sac requirements for granite curbing to allow bioretention area on landscaped island (soils permitting). This could entail curbing that is perforated to allow for the flow of runoff to the bioretention area;

- » Minimize the required radii for cul-de-sacs - radius of 35 feet is optimal, depending on emergency vehicles;
- » Minimize the number of residential street cul-de-sacs and incorporate landscaped areas to reduce their impervious cover. The radius of cul-de-sacs should be the minimum required to accommodate emergency and maintenance vehicles. Alternative turnarounds should be considered.



Cul-de-sac infiltration island accepts stormwater from surrounding pavement. Note flat curb.

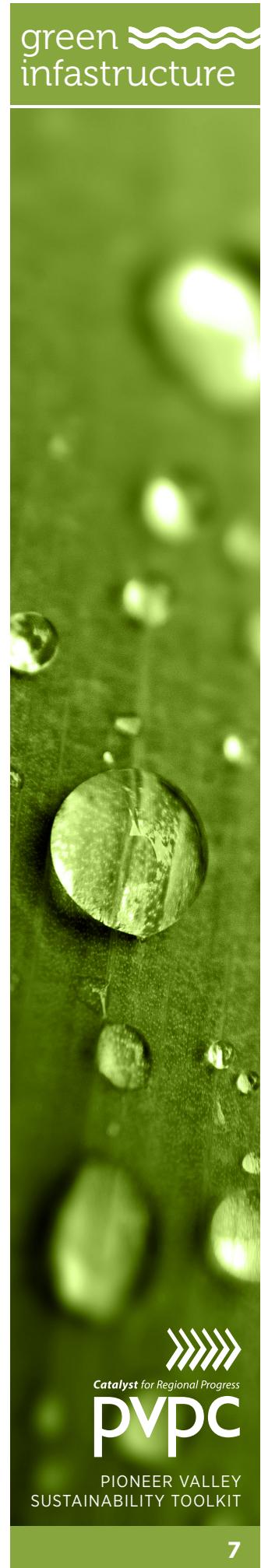


The cross section drawing to left shows how a cul de sac can be designed to serve as a bioretention area for stormwater runoff. The photo to the right shows a bioretention cul de sac in Waterford, Connecticut, that is designed to collect and filter roadway runoff from a residential development.

Curbs

Currently subdivision regulations typically call for the use of curb and gutter infrastructure connected to storm sewer infrastructure. This traditional approach produces stormwater flows that have greater impacts on local rivers and streams. As an alternative, regulations can promote roads without curbs where appropriate or the use of “perforated curbs.” Perforated curbs are curbs with gaps that allow stormwater to move from the street through to a stormwater management facility that could include swales or planters, such as tree box filters. (See image on the following page.)

Another alternative involves the use of “invisible curbs.” Invisible curbs are granite curbs that are buried along the street edge so as to allow stormwater to flow over into a stormwater management facility. Invisible curbs provide the structural support needed to plow from curb to curb, thereby retaining the desired roadway width even in snowy conditions. (See images on the following page.)





Perforated Curbs

Perforated curbing allows stormwater to enter planters that are designed to soak up rainfall.



Invisible Curbs

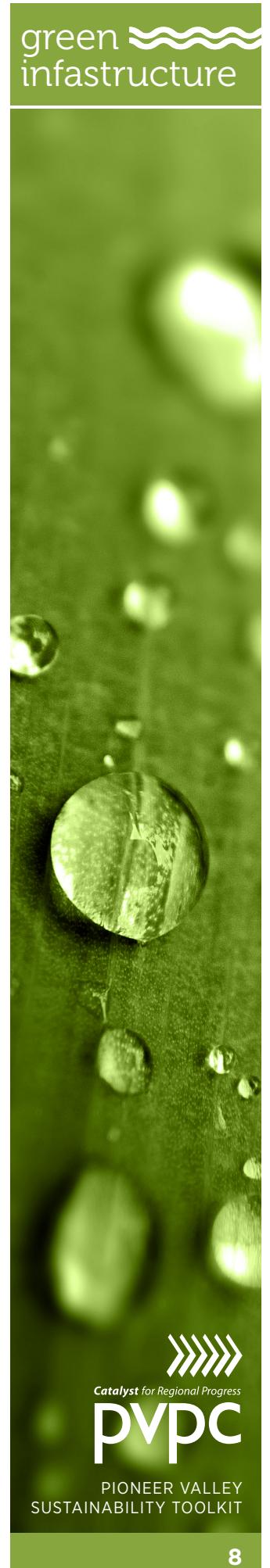
"Invisible" curbs along the street edge allow runoff to move into bioretention swales.

Drainage

Standards for drainage within the subdivision regulations should encourage and even require better site design with a low impact development approach that includes:

- » conservation of open space, natural drainage systems, native vegetation and other resources on site;
- » minimizing and disconnecting impervious surfaces;
- » clustering, and eliminating impervious surfaces that are connected to the municipal stormwater system; effective BMP selection and placement

This section should also refer to and be consistent with the stormwater management bylaw/ordinance. It should identify which size projects require a stormwater management permit, and what are the design parameters for drainage (i.e., water quality volume treatment, which targets pollutant transport; channel protection volume, which targets erosion; and overbank and extreme flood protection). For communities that have adopted for upland areas the *Massachusetts Stormwater Handbook*, the design parameters with Standard 2 address downstream and off-site flooding. It requires that the post-development peak discharge rate is equal to or less than the pre-development rate from the 2-year and the 10 year 24 hours storms. The Model LID Bylaw prepared



by the Massachusetts Executive Office of Energy and Environmental Affairs suggests performance standards that go further, including treatment of discharges and protection for channels, overbank flooding, and extreme flooding.

The drainage section should also address requirements for bridge openings and major culverts. There are now important habitat preservation and climate change adaption considerations that ought to be considered in the design of these facilities. *The Massachusetts River and Stream Crossing Standards* should be referenced as an important resource for design of these facilities.

Sidewalks

In addition to roadways, sidewalks provide another important opportunity to reduce impervious area or provide better management of stormwater runoff. Regulations can promote a variety of strategies for achieving this, including:

Use of porous surfacing material for sidewalks and bus waiting areas. A recent publication on complete streets by the City of Boston that promotes the use of porous materials in certain sidewalk zones describes the advantages of this choice in paving:

Permeable pavements provide increased traction when wet because water does not pool, and the need for salt, sand, and plowing is reduced during winter due to low/no black ice development. Compared to traditional paving methods, long-term maintenance costs may be lower in cold climates since permeable pavements resist cracking and buckling in freeze-thaw conditions. Nevertheless, permeable paving requires regular maintenance including: annual inspection of paver blocks for deterioration; periodic replacement of sand, gravel and vegetation; and annual industrial vacuuming of pavements to unclog sand and debris (Note: The use of sand in ice prevention should be avoided because it will clog pavement pores.)³

Flexibility in sidewalk standards to accommodate best management practices. This might include allowing alternatives to the minimum sidewalk standards or alternatives to sidewalk layout where pedestrian circulation makes use of common areas rather than street rights of way.

Grading of impervious sidewalk surfaces to direct stormwater runoff to bioretention areas or other such facility to eliminate or keep flow out of the municipal storm drain system

Utilities

Rather than require all electric, telephone, cable TV, fiber optic, and other conduits to be installed away from the road and its edge, allow placement of utilities under the paved section of the right of way. This creates essential space along the roadway edge for stormwater management facilities.

Often there is concern that such placement of utilities under the road will result in traffic delays and additional costs to utility companies. In the *Rhode Island LID Site Planning and Design Guidance for Communities*, however, authors from the Horsley Witten Group



note that the reality is, “The amount of pavement needed to be removed during such operations can be decreased through better diagnostic tests and trenchless technologies for utility construction and repair.”

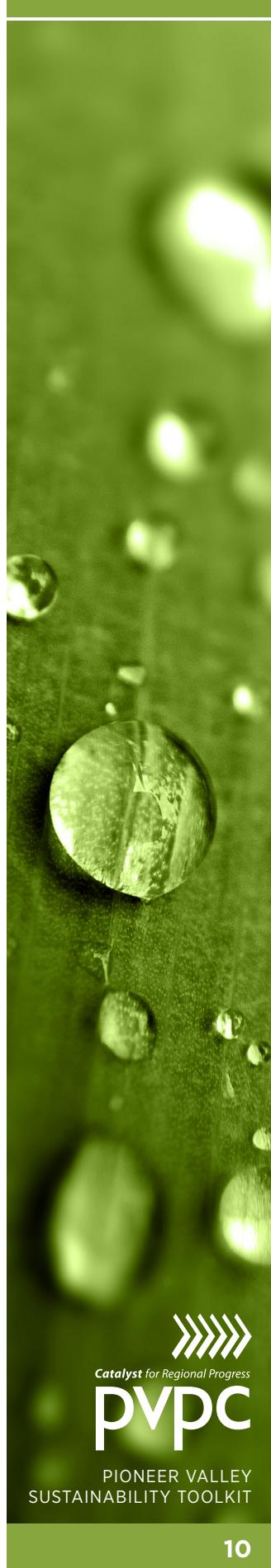
If the idea of putting utilities under the road edge is too great a concern for Departments of Public Works, then the next best strategy is to place utilities directly abutting roadway pavement, within 1 to 2 feet.

Landscaping and trees

Trees, shrubs, and ground covers are essential to good stormwater management. Leaves, needles, branches, and bark intercept rainfall so that it can then evaporate to the atmosphere. Leaf litter and mulch on the ground creates a spongy surface for retention of stormwater. Rainfall that reaches the roots is taken up into plants and then transpired to the atmosphere. Roots also help to stabilize soils and prevent erosion.

Subdivision regulations can recognize these important benefits through the following:

- » Encourage both preservation of existing stands of trees and mature trees on site as well as plans that incorporate trees into stormwater management practices. This can be done through specific requirements and through a system of credits. Calculating stormwater benefits of certain species based on size can be done through the National Tree Benefit Calculator at: www.treebenefits.com/calculator/
- » Allow for bioretention areas or other vegetated stormwater facilities within treebelt areas and to count toward other required landscaping features, including site, parking or perimeter screening. This creates areas that function on several levels, including aesthetics and stormwater management.



LINKS TO MORE INFORMATION

AHBL FOR PUGET SOUND PARTNERSHIP. NOVEMBER 2011. INTEGRATING LID INTO LOCAL CODES: A GUIDEBOOK FOR LOCAL GOVERNMENTS. SEE:
http://www.psp.wa.gov/LID_GLG.php

AMERICAN PLANNING ASSOCIATION, MASSACHUSETTS CHAPTER, AND HOME BUILDERS ASSOCIATION OF MASSACHUSETTS. MAY 2011. "SUSTAINABLE NEIGHBORHOOD DESIGN: A GUIDEBOOK FOR MASSACHUSETTS CITIES AND TOWNS." SEE:
www.apa-ma.org/apa-ma_documents/.../NRB_Guidebook_2011.pdf

CENTER FOR WATERSHED PROTECTION AND USDA FOREST SERVICE. "USING TREES TO REDUCE STORMWATER RUNOFF." FOR THIS POWERPOINT PRESENTATION, SEE:
<http://www.slideshare.net/watershedprotection/using-trees-to-reduce-stormwater-runoff-formatted-presentation?type=powerpoint>

ALSO SEE WEB PAGE RELATED TO THIS COLLABORATION:
<http://www.forestsforwatersheds.org/reduce-stormwater/>

LAWRENCE, TIMOTHY AND MYERS, MONIQUE. 2009. "EMERGENCY SERVICES AND STORM WATER MANAGEMENT." CALIFORNIA SEA GRANT PROGRAM. SEE:
www-csgc.ucsd.edu/BOOKSTORE/Resources/LID_FACTSHEET.pdf

RHODE ISLAND DEPARTMENT OF ENVIRONMENTAL MANAGEMENT AND COASTAL RESOURCES MANAGEMENT COUNCIL. MARCH 2011. "RHODE ISLAND LOW IMPACT DEVELOPMENT SITE PLANNING AND DESIGN GUIDANCE MANUAL." SEE:
www.dem.ri.gov/programs/bpoladm/suswshed/pdfs/lidplan.pdf

1 In his presentation, "Right Practice, Right Place: Green Infrastructure Technologies that Work in New England" at EPA's Growing Your Green Infrastructure Program, December 2012, Robert Roseen noted that in addition to reducing the number of acres to be cleared, the developer was able to avoid the use of 1,616 feet of curbing, 785 feet of pipe, 8 catch basins, 2 detention basins, and 2 outlet control structures.

2 Information on the LID Site Design Credit is found in Volume 3 of the Massachusetts Storm-water Handbook.

3 For more information, see the document from which this quote is drawn:
http://www.bostoncompletestreets.org/pdf/2/chap2_5_sidewalk_materials.pdf

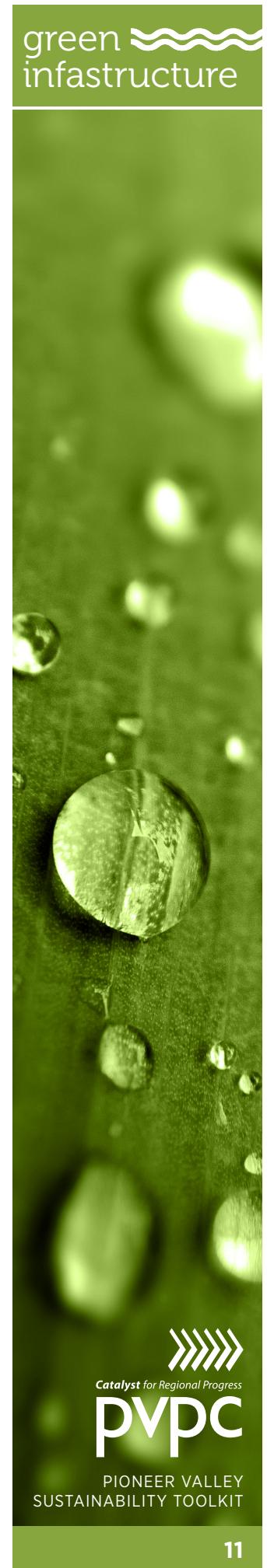
FOR MORE INFORMATION, PLEASE CONTACT

Pioneer Valley Planning Commission

413-781-6045

60 Congress Street, Floor 1
Springfield, MA 01104-3419

www.pvpc.org



Paying for Green Infrastructure

WHAT IT IS

Paying for green infrastructure projects can happen in a variety of ways. Green infrastructure facilities can be integrated into projects where stormwater management is already a component. This often presents important savings in avoided costs. Green infrastructure can also be paid for through a variety of mechanisms, including: stormwater utilities, fees tied to permitting, connection fees, establishment of betterments and management districts, bonds and loans, and sponsorships. While stormwater utilities are covered in a separate fact sheet within this series, the other financing mechanisms are described in more detail below.

AN INTEGRATED APPROACH

Wherever there are considerations of stormwater management, as there are in most public development or redevelopment projects, there is a role for green infrastructure. Funding for green infrastructure work can come from a variety of sources already used to cover the costs of such projects, including roads, combined sewers, railways, sidewalks, and schools. See diagram below.

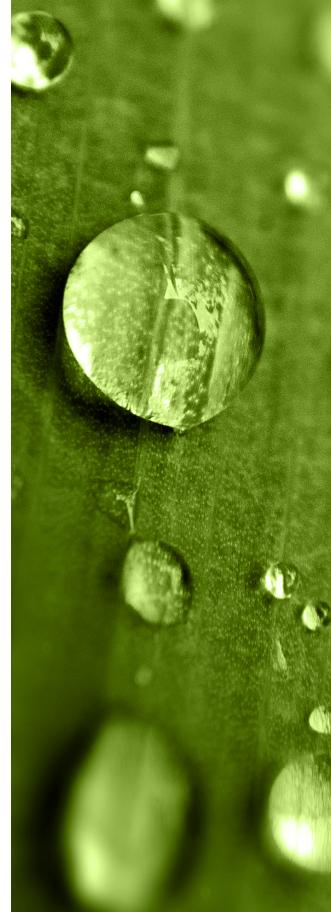


Opportunities for Integrating Green Infrastructure with Other Projects

Recognizing the full value of green infrastructure can be an important impetus for integration of such facilities in existing projects. These are often referred to as secondary benefits. These are not typically part of stormwater projects that rely solely on traditional “gray”/underground infrastructure. Secondary benefits include: social, such as avoided flooding and healthier neighborhoods; economic, such as job creation and increased property values; and environmental such as cleaner waters and improved air quality. This more comprehensive accounting method is known as the “Triple Bottom Line” of green infrastructure used most notably by Philadelphia in their planning for green infrastructure. (For more information on the Triple Bottom Line approach, see Philadelphia’s Long Term Control Plan Update (2009).) By integrating green infrastructure across the range of municipal projects while also accounting for all of the benefits to be derived, proponents can think more broadly and call on a far wider range of sources for project funding. (See Pioneer Valley Green Infrastructure Plan, page 82-84 for matrix showing Potential Sources for Enhanced Project Funding at: <http://www.pvpc.org/plans/pioneer-valley-green-infrastructure-plan> .

The City of Lancaster, Pennsylvania, accounted for these benefits in terms of “avoided costs or savings.” With a goal of reducing annual average stormwater runoff by 1.053 billion gallons within the next 25 years, the city developed a study—drawing from their green infrastructure plan and a national valuation guide. The study involved placing a value on practices, such as bioretention and other infiltration practices by monetizing the benefits of services, such as: improved water quality, increased groundwater recharge, reduced flooding, reduced energy use, and reduced atmospheric CO₂. The result is projections showing significant annual avoided costs/savings at the end of the 25-year implementation period. See table below.

Projected annual avoided costs/savings in Lancaster, PA, case study (benefits accrued at end of 25-year implementation period)	
\$122.4 billion per year	Water - Avoided costs for wastewater treatment and the use of traditional “gray infrastructure” through green roofs, tree planting, permeable pavement, bioretention and infiltration practices, and water harvesting
\$2,368,000	Energy - Reduced electricity and natural gas usage due to green roofs, tree planting, water harvesting, providing insulation shading, wind blocking, and evaporation

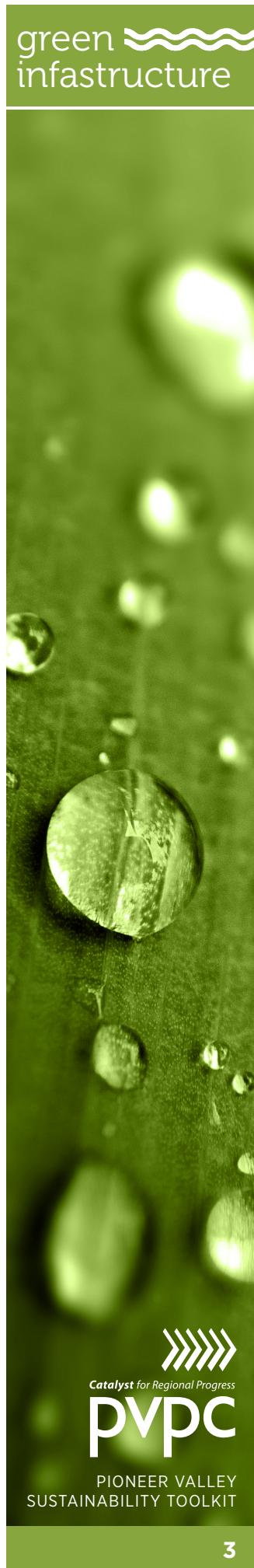


\$1,023,000	Air quality - Reduced emissions of nitrogen dioxide, ozone, sulfur dioxide, and particulate matter due to uptake and absorption, reduced energy emissions, reduced ozone with trees, green roofs, permeable pavement, and bioretention and infiltration practices
\$786,000	Climate change-related benefits in reduced CO2 through direct carbon sequestration, reduced water and wastewater treatment, reduced energy production due to vegetation and permeability.

Source: Webinar presented by Hal Sprague of Center for Neighborhood Technology, Valuing Green Infrastructure: Economic, Environmental, and Social Benefits, September 26, 2013, for the Vermont Agency of Natural Resources.

Portland Takes Direct Approach

A national leader in green infrastructure, the City of Portland, Oregon, took a direct approach to integrating green infrastructure into projects as a way to abate stormwater flows into the combined sewer system. One strategy entailed adopting a green streets policy whereby all City of Portland funded development, redevelopment or enhancement projects meeting the threshold in their stormwater management manual (of developing or redeveloping 500 square feet of impervious surface) must incorporate green street facilities.¹ This policy led to what EPA has described as, "...a formal process to overlay multi-bureau project plans and scheduled capital improvement projects to identify how public and private projects can achieve multiple community and environmental benefits through green infrastructure."² To cover the costs of green streets projects, Portland supplemented funds from general budget and capital improvement funds with innovation grants from EPA, revenue from a stormwater utility fee and from a one percent tax on construction projects that cannot meet the City's stormwater management regulations. What they learned, as did other case study communities examined by EPA, is that the increased investment necessary to include green infrastructure in large undertakings is typically a very small percentage of the total project costs. In addition, the use of green infrastructure elements can also decrease overall project costs, particularly with reductions in use of concrete or asphalt. Portland's story underscores how integrating or overlapping green infrastructure with street development, redevelopment, or enhancement can yield tremendous value. For Pioneer Valley cities and towns where might there be other possibilities of overlap that may be worth exploring?



STORMWATER PERMIT FEES

Stormwater permit fees address potential stormwater impacts related to new construction. The fees are typically site specific and can be an unreliable source of funding when development slows.

Currently, three communities in the region assess stormwater permit fees to review and permit new development projects (Agawam, Northampton, and Wilbraham). While there is no direct connection between these permit fees and funds to maintain the stormwater system, stormwater permit fees are paid into general funds, and most communities pay for stormwater system maintenance from the general funds. In a sense, then, some part of these permit fees may help to cover some stormwater system maintenance costs.

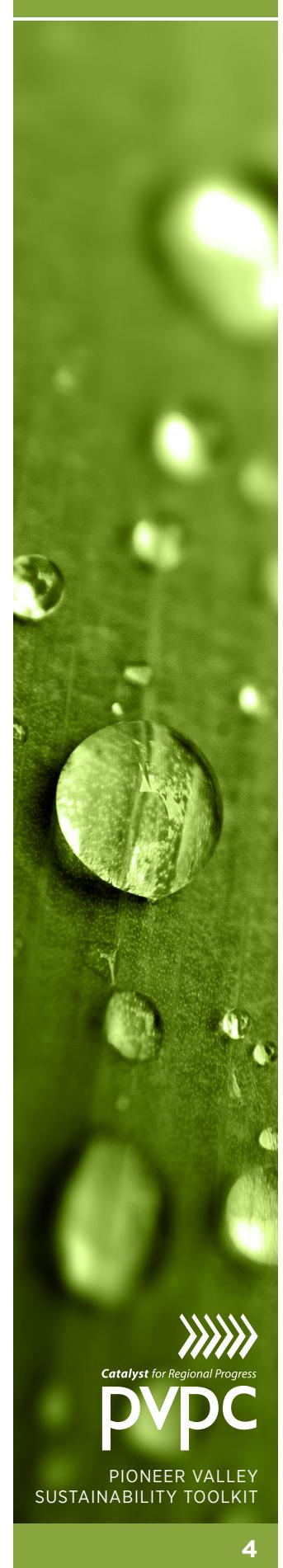
CONNECTION FEES

Northampton is one community that currently charges a fee for a property's initial connection to the stormwater system. Connection fees for stormwater might be augmented based on a practice in Westfield relative to wastewater. The City of Westfield established a connection fee associated with new sewer hook ups aimed at helping to increase capacity at the wastewater treatment plant (where the City was reaching capacity). For every new gallon of sewage to be generated, the customer pays a fee equivalent to the cost of fixing 5 gallons worth of infiltration and inflow. It may be worth exploring whether this same strategy could be applied to stormwater whereby new connections to the system help to mitigate other flows into the system, thereby preserving capacity and avoiding the need for costly expansion projects.

BETTERMENTS AND MANAGEMENT DISTRICTS

MGL Chapter 80 allows for the assessment of cost of public improvements by municipalities. Whenever a certain location or district receives exclusive benefit or advantage from a public improvement, betterments can be assessed in that area for the improvement. This could be the case where several neighborhoods in a town require improved stormwater infrastructure. The cost of improvements can be offset by charges to those properties located within that jurisdiction.

To implement the Long Creek Watershed Management Plan in Maine (the result of a citizen's lawsuit over impaired waters), landowners in four municipalities joined forces to create the Long Creek Watershed Management Plan District. The District collects fees from property owners and uses the money to restore Long Creek and install stormwater retrofits. The fee is \$3,000 per acre of impervious surface per year.



BONDS AND LOANS

Bonds are useful to initiate large capital projects, but they involve borrowing money and accruing debt. MassDEP's Clean Water State Revolving Loan Fund (SRF) has been an important source for low interest loans for many water infrastructure projects in the Pioneer Valley.

A 2014 letter from MassDEP Division Municipal Services Director Steve McCurdy, notes that MassDEP will receive a \$47.6 million federal grant to subsidize the CWSRF program and that at least 10 % of these monies must be dedicated in 2014 to Green Infrastructure projects or components as defined by EPA. The 2014 Intended Use Plan lists 12 new Green Infrastructure construction projects in Massachusetts and 3 additional Green Infrastructure construction projects are on the 2014 Carry-Over list. "The exact monetary value of the Green components of these projects will be determined when project applications are submitted, but are expected to be well in excess of the \$4.76 million requirement," he concludes.

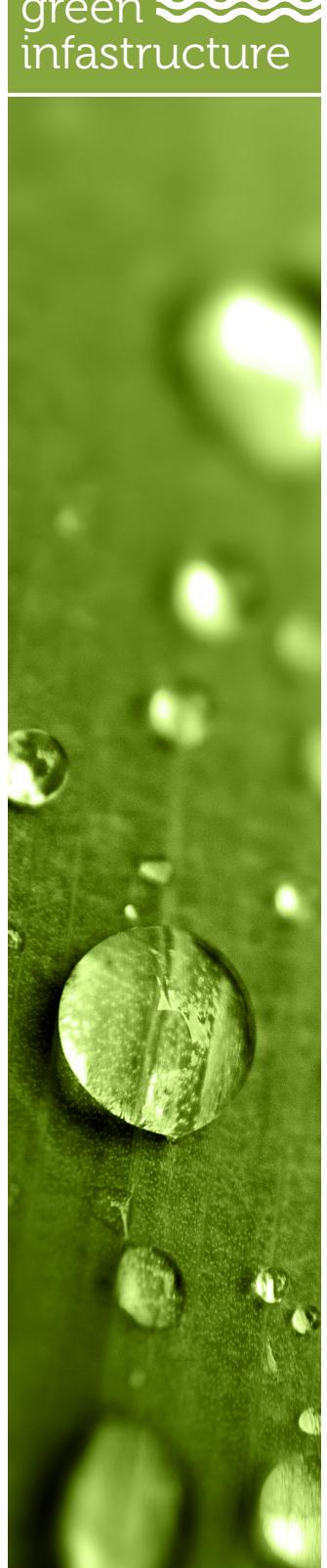
In addition, the SRF program has offered principal forgiveness for Environmental Justice projects, those projects occurring in areas defined to be a neighborhood with annual median household income (MHI) less than 65 percent of the state MHI.

SPONSORSHIPS

Several communities have been able to tap into local businesses to provide donations and sponsorships for green infrastructure projects.

In Portland, Maine, businesses helped to cover \$20,000 of the \$64,000 cost for a demonstration rain garden along the tidal Back Cove. The garden covers 2.5 acres of land adjacent to a popular recreational trail that is heavily used by walkers, joggers, and cyclists. The project's popularity led to the installation of a second rain garden adjacent to the trail's parking area, which was designed and funded by Stantec, a national engineering firm with local offices. Signage at the rain gardens highlights corporate sponsors.⁸ This idea builds on the successful Adopt a Trail corporate sponsorship program run by Portland's local land trust.

In Lynchburg, Virginia, a new corporate sponsorship program is drawing funding for the installation of demonstration rain gardens in prominent public places throughout the City. Each garden is sponsored by a local business, which is then credited with an attractive sign onsite. To date, this program has raised over \$1.6 million and established 50 gardens.





Virginia also has a related statewide program called Streetscape Appearance Green Enhancement (SAGE), a comprehensive roadside management program that has been in existence since 2006. Funded entirely by donations, but managed by municipalities, the program aims to beautify local streetscapes, boost civic and community pride, and facilitate future economic development. Municipalities manage the donations through a 501(c)3 non-profit and contributions are organized so as to cover construction, maintenance, and renewal, typically after 5 years.

OTHER POTENTIAL AND FUTURE SOURCES

Hazard Mitigation Funding

Though green infrastructure implemented area wide could help to mitigate natural hazards and build community resiliency, grant programs out of the Massachusetts and Federal Emergency Management Agencies do not as of yet provide opportunities for funding of green infrastructure stormwater management projects. The Massachusetts Emergency Management Grant Program's State Hazard Mitigation Officer Richard Zingarelli notes:

Standard hazard mitigation projects require a benefit-cost analysis that shows that the cost of the project is exceeded by the benefit as measured by direct reduction of damages from natural hazards. The difficulty is that it is difficult, if not impossible, to quantify a direct reduction in damage that results from measures like green roofs and porous pavement. As a result, any limited eligibility for funding in these programs would fall under the “5% Initiative” of the Hazard Mitigation Grant Program (HMGP), which allows for setting aside up to 5% of the total available HMGP funding for activities that are difficult to evaluate using traditional cost-effectiveness criteria.

It is important to know that the use of the word “mitigation” in emergency preparedness means avoidance and preparation (resiliency) and is more closely linked to the concept of “adaptation” in climate change.

WATER QUALITY CREDITS TRADING

Water quality trading is a market-based approach—an idea that has emerged from the energy market—that enables jurisdictions to achieve needed pollution controls through the purchase of credits for a particular pollutant. Landowners can produce water quality credits by implementing green infrastructure practices that reduce volume and pollutants, and typically at a much lower cost than a municipal treatment facility. EPA notes, “Through water quality trading, facilities that face higher pollutant control costs to meet their regulatory obligations can purchase pollutant reduction credits from other sources that can generate these reductions at lower cost, thus achieving the same or better overall water quality improvement. In most cases, trading takes place on a watershed level under a pollutant cap (the total pollutant load that can be assimilated by a waterbody without exceeding water quality standards) developed through the TMDL



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process or a similar type of water quality analysis that produces information on pollutant loadings and resulting water quality conditions.”

For the Long Island Sound TMDL, the state of Connecticut adopted trading legislation. Public Act No. 01-180, which establishes the trading framework for a Long Island Sound Nitrogen Credit Exchange Program to be directed by a Nitrogen Credit Advisory Board appointed by the General Assembly and the governor. EPA notes, “The Nitrogen Credit Exchange Program establishes a well-defined trading structure supported and regulated by limits mandated in state law. The state legislation specifies trading ratios (e.g., delivery and location ratios) and accounting methodologies to formalize all calculations used in trading.”

LINKS TO MORE INFORMATION

ENVIRONMENTAL FINANCE CENTER UNIVERSITY OF MARYLAND. 2014. LOCAL GOVERNMENT STORMWATERFINANCING MANUAL: A PROCESS FOR PROGRAM REFORM. SEE:

[http://efc.umd.edu/assets/efc_stormwater_financing_manual_final_\(1\).pdf](http://efc.umd.edu/assets/efc_stormwater_financing_manual_final_(1).pdf)

NATURAL RESOURCES DEFENSE COUNCIL. FEBRUARY 2012. FINANCING STORMWATER RETROFITS IN PHILADELPHIA AND BEYOND. SEE:

<http://www.nrdc.org/water/files/stormwaterfinancing-report.pdf>

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY. 2013. COMMUNITY BASED PUBLIC PRIVATE PARTNERSHIPS FOR GREEN INFRASTRUCTURE-DRIVEN STORMWATER RETROFITS: A WEBINAR.

ENVIRONMENTAL FINANCE CENTER, UNIVERSITY OF NORTH CAROLINA. 2014. A CATALOG OF FINANCE PUBLICATIONS ON GREEN INFRASTRUCTURE APPROACHES TO STORMWATER MANAGEMENT. SEE:

<http://www.efc.sog.unc.edu/reslib/item/catalog-green-infrastructure-and-stormwater-finance-publications>

USEPA. 2009. FUNDING STORMWATER PROGRAMS FACTSHEET. SEE:

www.epa.gov/region1/npdes/stormwater/assets/pdfs/FundingStormwater.pdf

CHARLES RIVER WATERSHED ASSOCIATION FOR MA COASTAL ZONE MANAGEMENT. 2007. ASSESSMENT OF STORMWATER FINANCING MECHANISMS IN NEW ENGLAND. SEE:

www.crwa.org/projects/stormwater/Municipal%20SFM%20Case%20Studies%20Repo.pdf

FOR MORE INFORMATION, PLEASE CONTACT

Pioneer Valley Planning Commission

413-781-6045

60 Congress Street, Floor 1
Springfield, MA 01104-3419

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Green Roof Model Incentives

The following green roof model incentives are excerpted from municipal bylaws, regulations and policies from around the United States, and offer example language for customizing incentives to meet the needs of your municipality.

FLOOR AREA RATIO BONUS

City of Portland Zoning Code Title 33, Chapter 33.510 Central City Plan District

Rooftop Gardens OptionIn CX, EX, and RX zones outside of the South Waterfront Subdistrict, developments with rooftop gardens receive bonus floor area. For each square foot of rooftop garden area, a bonus of one square foot of additional floor area is earned. To qualify for this bonus option, rooftop gardens must meet all of the following requirements.

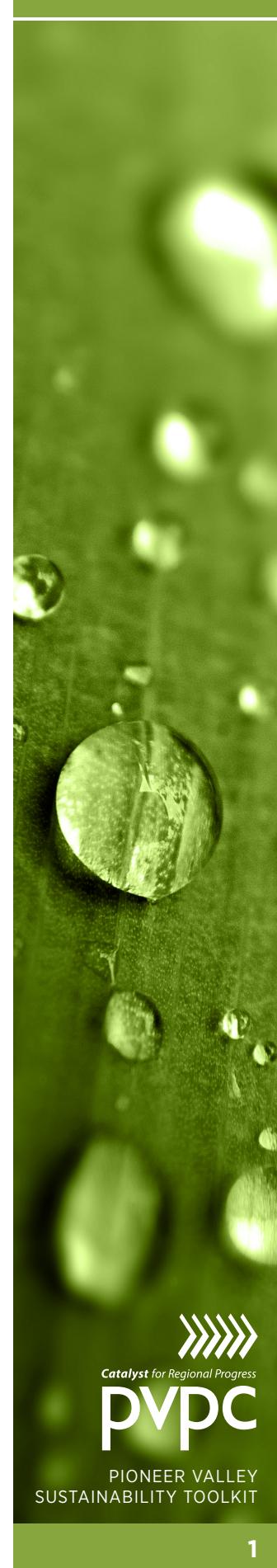
- a. The rooftop garden must cover at least 50 percent of the roof area of the building and at least 30 percent of the garden area must contain plants.
- b. The property owner must execute a covenant with the City ensuring continuation and maintenance of the rooftop garden by the property owner. The covenant must comply with the requirements of 33.700.060.

GREEN ROOF POLICY

City of Portland, Green Building Policy

NOW THEREFORE, BE IT RESOLVED that the Portland City Council amends the City of Portland's Green Building Policy to direct all City Bureaus and the Portland Development Commission to:

- » Require design and construction of all new City-owned facilities to include an ecoroof with at least 70% coverage AND high reflectance, Energy Star-rated roof material on any remaining non-ecoroof roof surface area; OR, Energy Star-rated roof material when an integrated ecoroof/Energy Star-rated roof is impractical;



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GREEN ROOF BYLAW

Toronto, Canada Green Roof Bylaw

<http://www1.toronto.ca/wps/portal/contentonly?vgnextoid=83520621f3161410VgnVCM10000071d60f89RCRD&vgnextchannel=3a7a036318061410VgnVCM10000071d60f89RCRD>

Toronto Municipal Code Chapter 492, Green Roofs

The Bylaw applies to new building permit applications for residential, commercial and institutional development made after January 31, 2010 and will apply to new industrial development as of April 30, 2012. The full bylaw is available at the web link above.

§ 492-2. Green roofs required.

A. Every building or building addition constructed after January 30, 2010, with a gross floor area of 2,000 square meters or greater shall include a green roof with a coverage of available roof space in accordance with the following chart:

Gross Floor Area (Size of Building)	Coverage of Available Roof Space (Size of Green Roof)
2,000 — 4,999 m ²	20%
5,000 — 9,999 m ²	30%
10,000 — 14,999 m ²	40%
15,000 — 19,999 m ²	50%
20,000 m ² or greater	60%

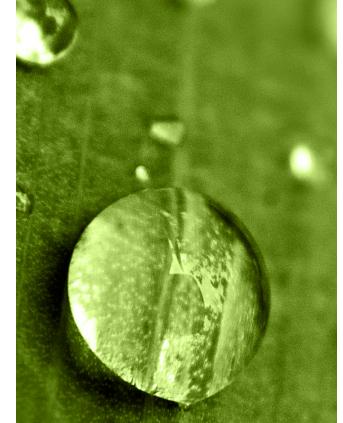
GREEN PERMIT PROCESS

City of Chicago Green Permit Process

http://www.cityofchicago.org/city/en/depts/bldgs/supp_info/overview_of_the_greenpermitprogram.html

Projects meeting the following criteria are eligible for the Green Permit Process:

- » Permit applications that include green technologies such as green roofs, rainwater harvesting, solar panels, solar thermal panels, wind turbine and geothermal systems are REQUIRED to be submitted through a Green Permit Program Project Administrator.
- » Commercial project participant must earn certification within the LEED rating system
- » Smaller Residential Project participant must earn certification under the Chicago



Green Homes Program checklist based rating system or LEED for Homes.

- » Green Menu Items – All Green Permit Program participants must utilize certain green strategies or green technologies to receive incentives offered by the Green Permit Program.

- » Green roofs improve the urban environment by combating the urban heat island, reducing stormwater runoff, and reducing the energy use of the building beneath.
- » For projects with no other green roof requirement, provide 50% green roof. For projects with a green roof required by Department of Planning and Development, add 25% to the DPD green roof requirement.

GREEN ROOF FEE CREDIT

City of Chicago Green Roof Fee Credit

http://www.cityofchicago.org/content/dam/city/depts/bldgs/general/GreenPermit/Green_Roof_Checklistada.pdf

FEE STRUCTURE	
<input type="checkbox"/> Building Permit Fee	Building permit fee calculation is based on building occupancy and area of work. Please visit our website for additional information and to use the permit fee calculator. www.cityofchicago.org/buildings
<input type="checkbox"/> Green Roof Fee Credit	A credit of \$0.05 per square foot of green roof provided will be applied to your total permit fee.
<input type="checkbox"/> Building Permit Deposit	50% of total building permit fee due at permit submittal meeting. Please make checks payable to The City of Chicago Department of Revenue

Minneapolis Fee Reductions

http://www.minneapolismn.gov/publicworks/stormwater/fee/stormwater_fee_stormwater_mngmnt_feecredits

The Stormwater Credit system provides:

- » Up to 50 percent credit (reduction) in your stormwater utility fee for management tools/practices that address stormwater quality
- » 50 percent or 100 percent credit (reduction) in your stormwater utility fee for management tools/practices that address stormwater quantity

Below is a partial list of stormwater BMPs approved for use in the Quality Credits program:

- » Rain Gardens
- » Pervious Pavers
- » Wet Ponds
- » Dry Wells
- » Sand Filters

- » Filter Strips
- » Infiltration trenches
- » Green Roofs

Only those properties that can demonstrate the capacity to handle a 10-year or 100-year rain event can receive a stormwater quantity credit. To apply for a stormwater quantity credit, property owners must have their applications certified by a state licensed engineer or landscape architect.

Property owners can apply for either the “Standard Quantity Reduction Credit” or the “Additional Quantity Reduction Credit.”

Standard Quantity Reduction Credit. The Standard Quantity Reduction Credit is a 50 percent credit on a property’s stormwater fee. The “Standard Quantity” credit is based on a property’s stormwater quantity management tools/practices being able to retain the 10-year, 24-hour type II SCS storm event. To qualify for this credit, the property owner must demonstrate that stormwater from the property is controlled with an on-site constructed stormwater quantity management tool/practice (BMP).

Additional Quantity Reduction Credit. The Additional Quantity Reduction Credit is a 100 percent credit on a property’s stormwater fee. To be eligible for the “Additional Quantity” credit, a property’s stormwater quantity management tools/practices must be able to retain the 100-year, 24-hour type II SCS storm event. To qualify for this credit, the property owner must demonstrate that stormwater from the property is controlled with an on-site constructed stormwater quantity management tool/practice (BMP).

You can learn more about stormwater quantity management tools/practices from the Minnesota Stormwater Manual.

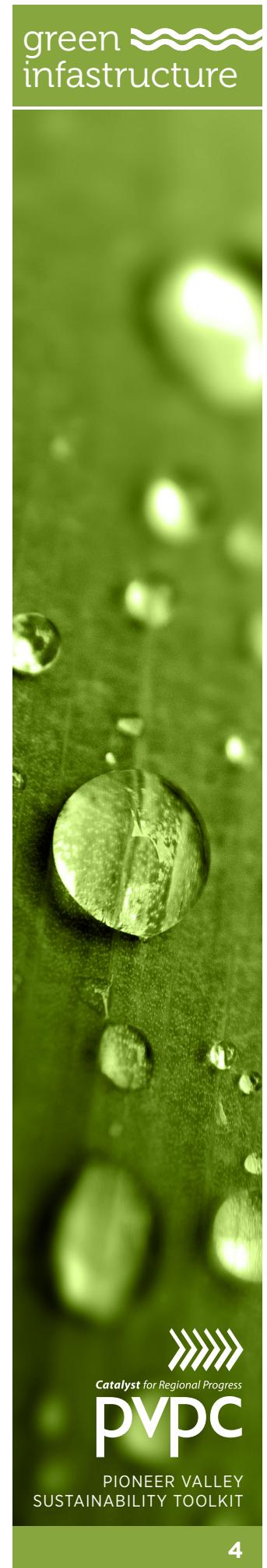
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Pioneer Valley Planning Commission

413-781-6045

60 Congress Street, Floor 1
Springfield, MA 01104-3419

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Model Green Streets Policy Statement

City of Northampton Massachusetts

In City Council, October____, 2014

Upon the recommendation of Mayor David J. Narkewicz, the Planning Board, the Conservation Commission, and the Board of Public Works

Ordered, that the City adopt a Green Streets and Infrastructure Policy

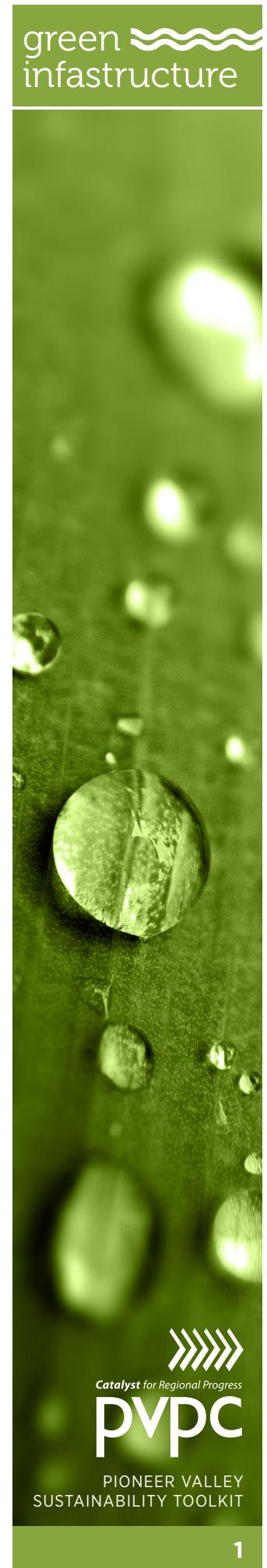
WHEREAS, Stormwater runoff from streets, roads, parking lots, roofs and other impervious urban surfaces is a significant source of water pollution to our rivers, streams and water bodies, and also is a key contributor to inflow into sanitary sewers; and

WHEREAS, Green Streets may provide cost-effective infrastructure solutions to reduce and manage stormwater runoff and flooding, including from more intense storm and flooding events and reduce localized flooding from surcharging, adapt to climate change, and manage stormwater runoff; and

WHEREAS, Green Streets improve water quality by filtering stormwater, removing contaminants and cooling the stormwater before it encounters groundwater or surface water bodies, such as rivers, all of which ultimately benefit watershed health. Facilities that filter stormwater through vegetation and soil can reduce total suspended solids (TSS), organic pollutants /oils, and heavy metals by at least 90%; and

WHEREAS, Green Streets foster unique and attractive streetscapes that protect and enhance neighborhood livability, integrate the built and natural environments, enhance the pedestrian environment, and introduce park-like elements into neighborhoods; and

WHEREAS, Green Streets can serve as urban greenways or pathways and provide a preferred means of connecting neighborhoods and parks/recreation areas in ways that are attractive to pedestrians and bikers and complement complete streets; and



WHEREAS, Green Streets encourage the planting of landscapes and trees which contribute environmental benefits such as reduced summer air temperatures, reductions in global warming through carbon sequestration and air pollution screening.

WHEREAS, green infrastructure may help to reduce the long-term costs of gray infrastructure maintenance, and complement gray infrastructure with hybrid systems of gray, piped infrastructure combined with green, vegetated infrastructure; and

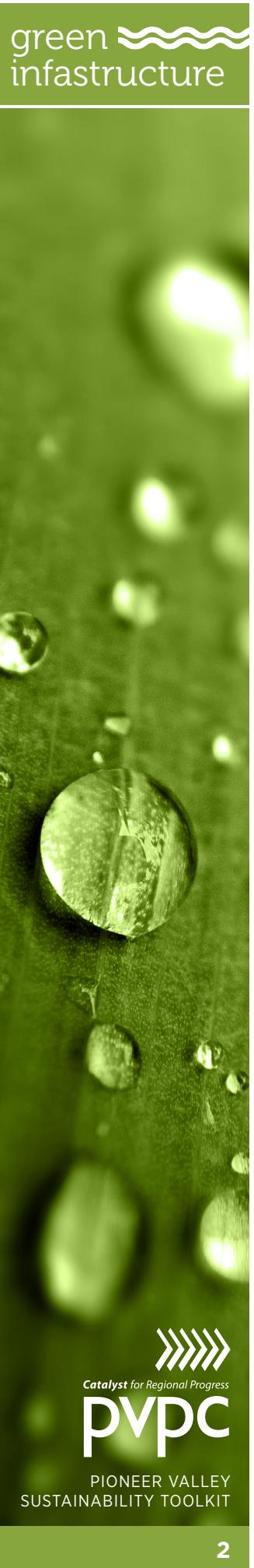
WHEREAS, a Green Streets and Infrastructure policy demonstrates the City's commitment to achieving comparable infrastructure required for private developments and complements the City's complete streets policy by providing pedestrian and bicycle access; and

WHEREAS, forthcoming U.S. Environmental Protection Agency Municipal Separate Storm Sewer System (MS4) stormwater permits will require that the city control the amount and quality of stormwater discharged from the MS4s to rivers, streams, lakes, ponds, and wetlands; and

WHEREAS, recharge of groundwater sources is a key mitigation activity under the soon to be amended Massachusetts Water Management Act regulations 310 CMR 36.00; and

DEFINITIONS:

- » **Green Infrastructure:** Infrastructure which keeps rain close to where it falls, using structures to improve on-site infiltration, such as rain gardens, green roofs and permeable pavements, to promote cleaner, slower, and smaller storm flows to nearby rivers and streams;
- » **Green Street:** A subset of Green Infrastructure in which the street handles significant amounts of stormwater on site through use of vegetated and/or soil-infiltration facilities. Green Streets can include landscaped street-side planters or swales or tree box filters or porous pavement that capture stormwater runoff and allow it to soak into the ground as soil and vegetation filter pollutants.



RESOLUTION

Now, **THEREFORE, IT IS HEREBY RESOLVED** that the City of Northampton adopts a policy to promote the use of green street facilities and green infrastructure in public and private development through regulation, capital investment, and management mechanisms as a cost-effective and sustainable practice for stormwater management in current and future projects wherever technically and economically feasible. This includes:

- » Road reconstruction, new road development and bicycle or pedestrian projects;
- » Stormwater projects; and
- » New development and redevelopment projects

Further, it is city policy to:

- » Incorporate and maintain green street facilities and green infrastructure into all City-funded development, redevelopment, and enhancement projects, to the extent technically and economically feasible, and utilizing the best technology available at the time to meet water quality goals with the lowest lifecycle costs; and
- » Ensure that regulations require and incentivize all development to incorporate some Green Streets and green infrastructure features; and
- » Ensure coordination and communication between City departments, in particular, Public Works and Planning and Sustainability, to ensure implementation of this policy, as well as fully addressing competing priorities.

FOR MORE INFORMATION, PLEASE CONTACT

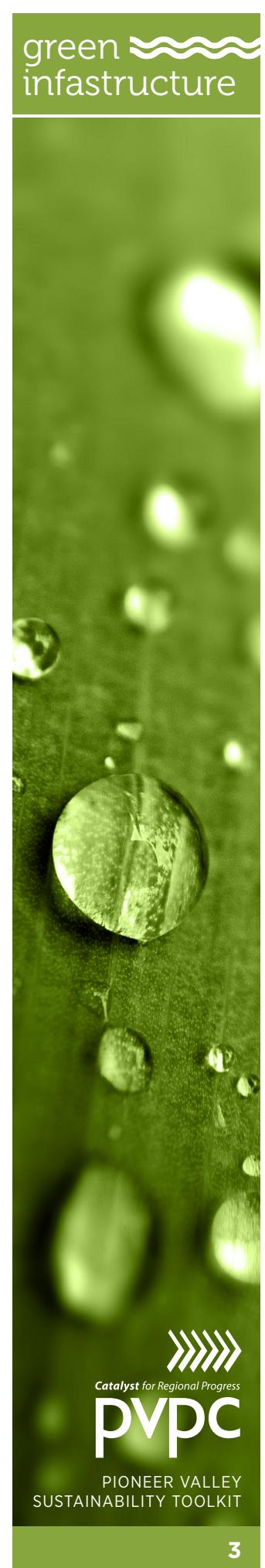
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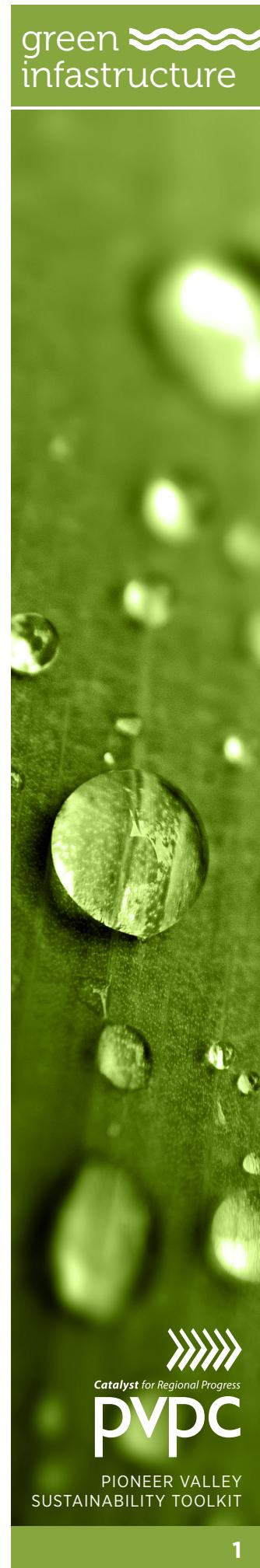
Model Sewer Regulations For Downspout Disconnection

**REGULATIONS GOVERNING THE USE OF SANITARY AND
COMBINED SEWERS AND STORM DRAINS OF THE BOSTON
WATER AND SEWER COMMISSION**

Adopted February 27, 1998

Section 4 - Wastewater-Stormwater Separation.

- (a) The plumbing of any existing or new building shall be so constructed as to keep all stormwater, surface water, groundwater, roof and surface runoff, subsurface drainage, uncontaminated cooling water, and uncontaminated industrial process water, non-contact cooling water, and non-contact industrial process water separate from sanitary sewage and industrial wastes, and from the building sewer.
- (b) The building drain conveying wastewater from plumbing fixtures within the building shall discharge to a building sewer, while the building drain conveying stormwater and other drainage shall discharge to a building storm drain.
- (c) Where separate storm drains and sanitary sewers are provided, and the Commission has determined that on-site retainage of stormwater is not possible, building storm drains shall be connected to a storm drain. Connection of a building storm drain to a sanitary sewer is prohibited.
- (d) Where separate storm drains and sanitary sewers are provided, building sewers shall be connected to a sanitary sewer. Connection of a building sewer to a storm drain is prohibited.
- (e) Where only a combined sewer has been provided, and the Commission has determined that on-site retainage of stormwater is not possible, the separate building storm drain shall be connected to the building sewer in a manner prescribed by the Commission's



Requirements for Site Plans and the building sewer connection shall be made to such combined sewer.

(f) The Commission shall require an owner to eliminate a source of infiltration or inflow whenever the Commission determines that the source is resulting in excessive infiltration or inflow to be discharged directly or indirectly to the sanitary sewer system.

Section 5 - Connections to Combined Sewers.

In order to prevent the direct discharge of wastewater to receiving waters under dry weather conditions, a building sewer shall not be connected to a combined sewer overflow.

Section 6 - Connections to Manholes.

Building sewer connections for new or substantially rehabilitated buildings shall not be made directly to Commission-owned manholes unless expressly authorized in writing by the Commission.

Section 7 - Connections to Catch Basins.

Private drains, including but not limited to, building storm drains for new or existing buildings and drains from irrigation systems, shall not be connected directly to catch basins.

Section 8 - Connections from Individual Wastewater Disposal Systems.

Connection of an individual wastewater disposal system, whether directly or indirectly, to a Commission sewer or drain is prohibited.

Section 7 - Connections to Catch Basins.

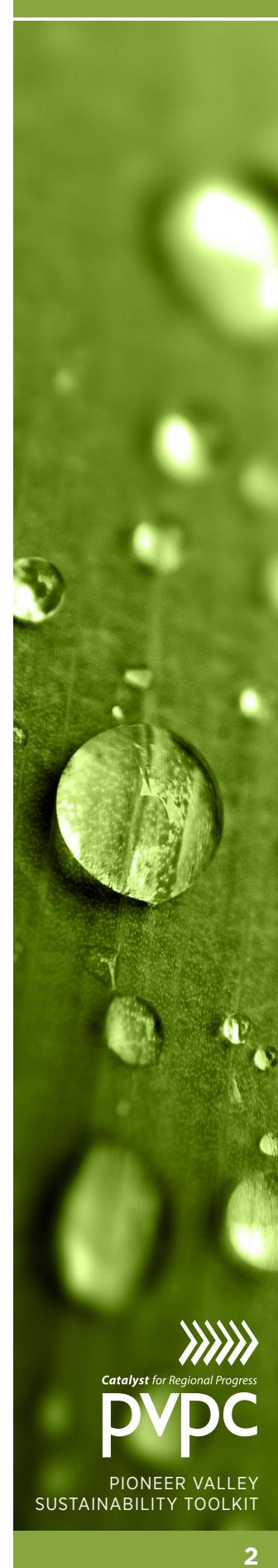
Private drains, including but not limited to, building storm drains for new or existing buildings and drains from irrigation systems, shall not be connected directly to catch basins.

Section 8 - Connections from Individual Wastewater Disposal Systems.

Connection of an individual wastewater disposal system, whether directly or indirectly, to a Commission sewer or drain is prohibited.

Section 9 - Dye Testing of Connections.

Prior to activating water service, every new building sewer shall be dye tested by the Commission, or by the owner or his designee in the presence of a Commission inspector, to establish that the building sewer is properly connected to the Commission's wastewater system. The Commission may conduct dye testing of an existing building sewer to establish that it is properly connected to the Commission's wastewater system. The



Commission may require the owner forthwith to eliminate a connection from a building sewer to a storm drain (also referred to as an illegal connection) at the owner's expense. Where separate sanitary sewers and storm drains exist, the Commission may also dye test, or require the owner to dye test in the presence of a Commission inspector, a new or existing building storm drain to establish that the building storm drain is properly connected to the Commission's storm drainage system. The Commission may also require the owner forthwith to eliminate a connection from a building storm drain to a sanitary sewer at the owner's expense.

FOR MORE INFORMATION, PLEASE CONTACT

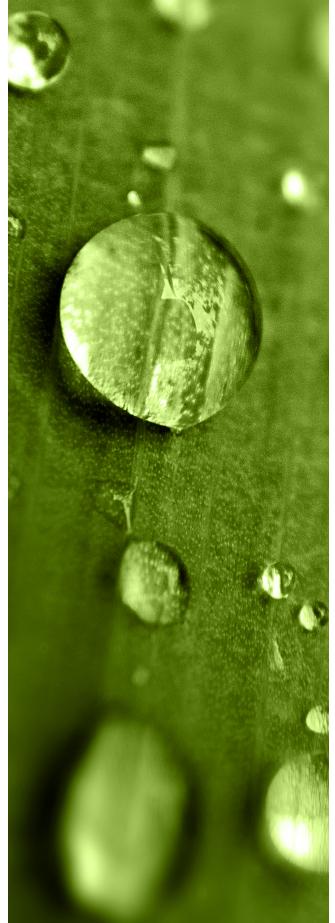
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Model Zoning Provisions

The following model green infrastructure in zoning provisions are excerpted from municipal bylaws, regulations and policies from around the United States, and offer example language for customizing incentives to meet the needs of your municipality. Refer also to the Green Roof Incentives factsheets in this series for examples specific to green roofs.

FLOOR AREA RATIO BONUSES

Portsmouth, New Hampshire Zoning Ordinance. Article V, Dimensional and Intensity Standards. Section 10.536.20. Central Business A – Maximum Floor Area.

10.536 Central Business A – Maximum Floor Area Ratio

In Central Business A, the floor area ratio (FAR) shall not exceed 3.5 except as provided below:

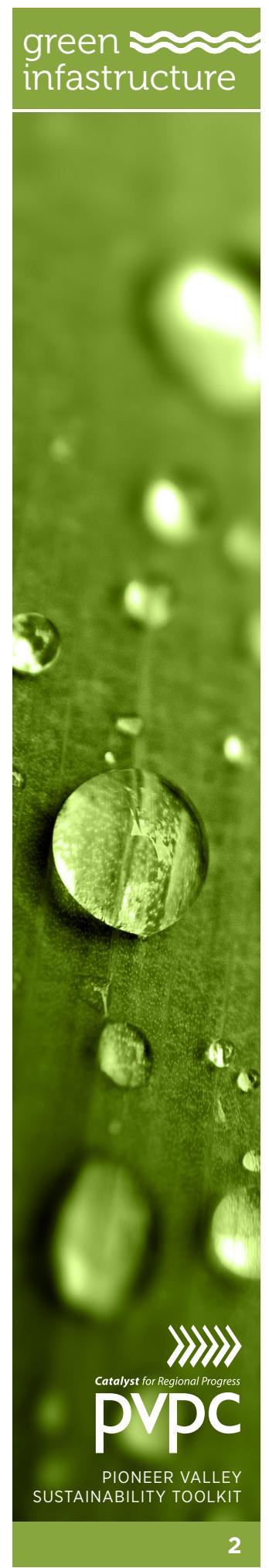
10.536.10 The FAR may be increased to a maximum of 3.75 provided that public amenities are provided in accordance with the following open space standards:

10.536.11 Lots adjacent to North Mill Pond or the Piscataqua River:

The development shall provide a continuous public right of way and pathway parallel to the waterfront for the entire width of the lot, including connections to abutting lots or public ways. When such connections are not available due to current conditions on abutting lots, provisions shall be made for future connections to such abutting lots in locations determined by the Planning Board.

10.536.12 Lots not adjacent to North Mill Pond or the Piscataqua River: The development shall include a pedestrian plaza or pocket park that meets the following standards:

- a. The plaza or park shall contain a minimum of 1,500 square feet and shall measure at least 20 feet in width.
- b. The plaza or park shall adjoin the public sidewalk and shall be open on one or more sides to the sidewalk.



- c. The plaza or park shall be open to the public, shall be used exclusively by pedestrians, and shall be designed with pedestrian amenities such as benches.
- d. The plaza or park shall include trees and other landscaping to create a separation from the street, to provide shade, to reduce noise, and to mitigate fumes.

10.536.20 The FAR may be further increased to a maximum of 4.00 provided that the lot complies with the applicable open space standard in Section 10.536.10 and also provides one or more of the following:

10.536.21 The principal building on the site is US Green Building Council LEED (Leadership in Energy and Environmental Design) certifiable as demonstrated by a completed LEED checklist/scorecard.

10.536.22 The development provides mid-block public pathways connecting two streets or connecting streets to public pathways along the waterfront.

LANDSCAPING REQUIREMENTS

City of Providence Tree Canopy Requirements, Chapter 1994-24 Section 425, Trees and Landscaping

Requires a minimum percentage of a lot maintains a vegetative canopy of trees. The required percentage varies by zoning district. Residential districts require at least 30% of the total lot square footage be tree canopy coverage, whereas commercial and industrial districts require at least 15% of the lot be covered. The ordinance includes specific provisions for calculating tree canopy coverage based on the type and size of trees. Parking area requirements and maintenance requirements are also provided.

SCREENING, BUFFERS, AND WALKWAYS

Providence RI, Zoning Ordinance, Trees and Landscaping

425.3 - Land Adjacent to Water Bodies: There shall be a vegetated buffer, at least 25 feet wide, measured from the water's edge, or the inland edge of a coastal shoreline feature for tidal waterbodies (as defined by the Rhode Island Coastal Resources Management Program), adjacent to the entire length of any water body. This buffer shall include trees and plant material that will filter stormwater runoff and help to improve the quality of the water body. No parking or buildings are permitted within this buffer. However, paving for a walking path, bicycle path, or access to docks, piers, or beaches may be included within this buffer. [Fresh water streams, rivers and ponds can be replaced for coastal shoreline and tidal waterbodies in this example. Project would need to meet the MA Wetland and River Protection Act requirements.]



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ROAD WIDTH

City of Portland, Oregon Street Standards

<https://www.portlandoregon.gov/transportation/article/83383>

City of Portland local street standards were adopted by City Council in 1991 to address many issues facing Portland. Streetscape design standards were developed to address environmental considerations, neighborhood speeding, traffic reduction, and neighborhood livability.

Local street widths range from 20 feet to 32 feet. Most local streets are 26 feet wide, which provides residents parking on both sides. In some cases, due to topography constraints, local streets will be constructed to a 20-foot width, which allows parking on one side only.

DRIVEWAYS AND PARKING

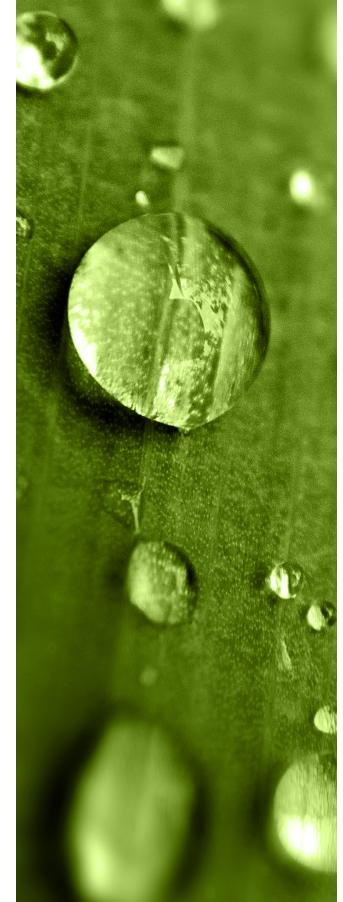
Port Angeles, Washington Title 17 Zoning Ordinance, Chapter 17.44 Planned Low Impact Development Overlay Zone

17.44.120 Circulation and access.

- a. Circulation and access provisions shall be appropriate to the scale of the project and to anticipated traffic characteristics, and consistent with the requirements of City of Port Angeles road standards. Deviations from the City of Port Angeles Public Works standards may be granted subject to the following criteria:
 - 1. Approval by the City of Port Angeles Public Works and Utilities and Fire Departments;
 - 2. A vegetated bioretention swale with compost amended soils shall be provided within the right-of-way or in islands created by loop roadways.
- b. Loop roadways are encouraged to minimize impervious surfaces, facilitate emergency vehicle access, and provide vegetated areas to help manage stormwater.

17.44.130 Parking. Parking space requirements shall conform to the requirements of Chapter 14.40. If parking cannot be accommodated on site, common parking areas must be incorporated on approved privately maintained easement areas using pervious surfacing materials.

17.44.140 Alternative surfacing methods. Alternative surfacing including, but not limited to: paving blocks, bark or wood mulch, turf block, pervious concrete, porous asphalt, plastic or other material grid systems, and other similar approved materials are encouraged and may be approved for appropriate applications. Alternative surfacing



methods may be approved for parking areas, emergency parking areas, private roads, fire lanes, road shoulders, bike paths, walkways, patios, driveways, and easement service roads where appropriate unless site constraints make use of such materials detrimental to water quality. Utilization of alternative surfacing methods shall be subject to review and approval by the City of Port Angeles Public Works and Utilities Department and Fire Marshal for compliance with other applicable regulations and development standards. Surfaces that comply with this section shall not be considered impervious surfaces under Section 17.44.020 PAMC.

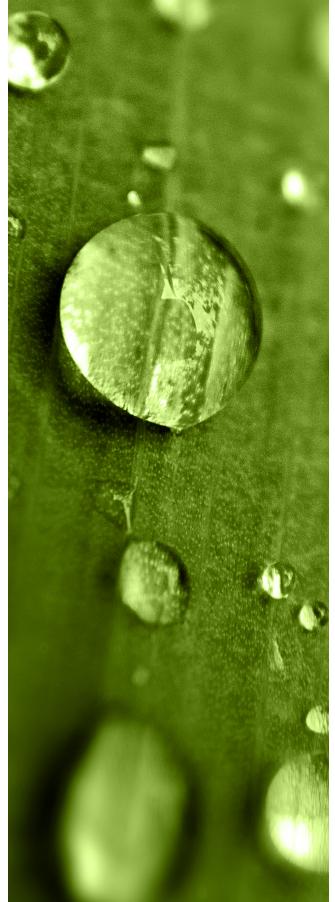
GREEN PERMIT PROCESS

City of Chicago Green Permit Process

http://www.cityofchicago.org/city/en/depts/bldgs/supp_info/overview_of_the_greenpermitprogram.html

Projects meeting the following criteria are eligible for the Green Permit Process:

- » Permit applications that include green technologies such as green roofs, rainwater harvesting, solar panels, solar thermal panels, wind turbine and geothermal systems are REQUIRED to be submitted through a Green Permit Program Project Administrator.
- » Commercial project participant must earn certification within the LEED rating system
- » Smaller Residential Project participant must earn certification under the Chicago Green Homes Program checklist based rating system or LEED for Homes.
- » Green Menu Items – All Green Permit Program participants must utilize certain green strategies or green technologies to receive incentives offered by the Green Permit Program.
 - a. Transit Oriented Development
Transit-oriented development promotes alternatives to the private auto by creating most everyday needs within walking distance. This approach fosters pedestrian friendly neighborhoods, helps reduce traffic congestion and environmental degradation, and reduces household expenses.
Locate project within specified census tracts (e.g. low/mod CDBG guidelines or tax credit areas) AND Locate mixed-use developments within a ¼ mile of transit at a minimum of 30 dwelling units per acre or 3 FAR for all types of land uses. AND Use maximum parking reduction provisions permitted by the Chicago Zoning Ordinance for developments within 600' of transit. AND Provide on-site car share program for developments of 100 units or more.



b. Exceptional Water Management

Reducing water consumption and stormwater runoff reduces demand on city infrastructure and preserves Lake Michigan and the Chicago River.

- 1.** 1. Provide water efficient fixtures sufficient to meet requirements for LEED credit WEc3.1 AND
- 2.** 2. Projects that are regulated by the stormwater management ordinance must provide evidence of a 50% reduction of impervious area from a baseline condition (as defined by ordinance).
OR
Retain 0.75 inches of stormwater from the proposed impervious area (up from 0.5").
- 3.** 3. Projects that are not regulated by the stormwater management ordinance must demonstrate a 100% increase in the zoning open space requirement
OR
reduce the impervious site conditions from existing baseline by 50%.

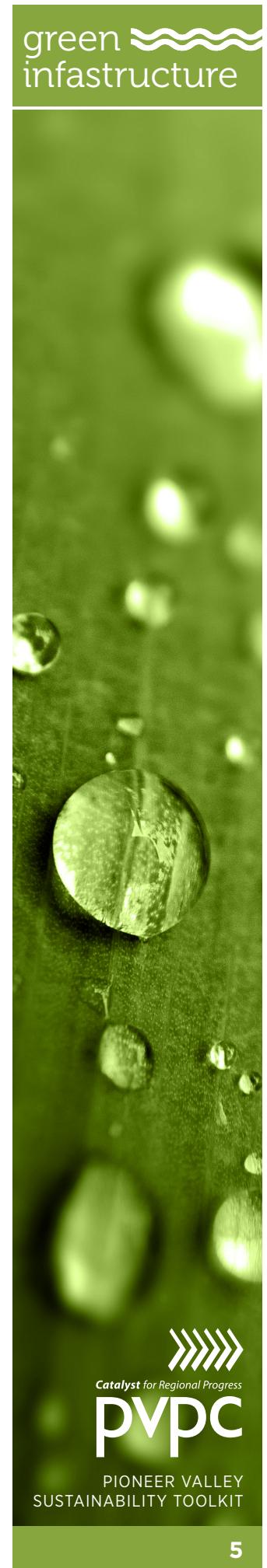
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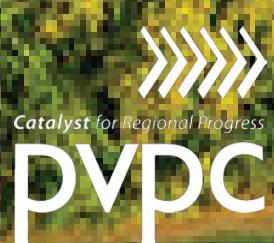


smart
growth



TOOLKIT FOR

Smart Growth



PIONEER VALLEY
SUSTAINABILITY TOOLKIT

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Adaptive Reuse & Infill Development



What is the objective of this strategy?

Through Adaptive Reuse and Infill Development, communities can encourage more investment or reinvestment of underutilized buildings and lots in downtown areas and encourage more efficient use of existing infrastructure resources, improve streetscapes in downtown urban core and village areas, further economic development opportunities, and to promote historic preservation.

Why should we implement this strategy?

Adaptive reuse, along with infill development, is seen by many as a key factor in land conservation and reducing the amount of sprawl. For those who prescribe to the smart growth concept, it is more efficient and environmentally responsible to redevelop older buildings closer to urban cores, where infrastructure such as water, sewer, and roads already exist, rather than build new construction on faraway greenfield sites. In addition, adaptive reuse and infill development can provide opportunities for mixed-use development, a variety of housing options, and encourage economic development in commercial centers.



Adaptive reuse of the old Baystate Hotel and infill development on Strong Avenue, Northampton

How does Adaptive Reuse / Infill Development work?

Adaptive reuse is the act of finding a new use for a building. The recycling of buildings has long been an important and effective historic preservation tool. Buildings and neighborhoods with interesting spaces and unusual appearance are particularly attractive to developers and buyers.

Infill development is the process of developing vacant or under-used parcels within existing urban areas that are already largely developed. Often within urban core areas and downtowns, there exists vacant or under utilized lots that do not meet current zoning standards such as frontage and lot area. Through the use of an infill development ordinance/bylaw, these vacant nonconforming lots can be brought back into productive use.

DID YOU KNOW...

In 1997, Builder magazine published a survey of 516 new-home shoppers. While one-third said they preferred life in suburbia, nearly two-thirds objected to the extra driving suburbia typically requires.

Some 84 percent desired proximity to a town center with shops, cafes, and small parks.

(Source: Northeast Midwest Institute, "Strategies for Successful Infill Development, 2001)

EXAMPLES FROM THE PIONEER VALLEY

Eastworks, Easthampton

The redevelopment of the Eastworks building was the first in a series of public and private actions to revitalize the center of Easthampton. Formerly the Stanley Home Products factory, the Eastworks building in Easthampton is a vibrant mixed-use mill redevelopment containing 75 businesses and 32 housing units. Purchased in 1997, the 500,000 square foot complex houses public retail space, a restaurant, an art and photography school, offices for non-profit organizations and professional businesses, and a branch office for the Registry of Motor Vehicles. This adaptive reuse project has generated 170 new or retained jobs and eventually will provide housing for 46 households. In recognition of their achievements, the City of Easthampton received a 2005 Smart Growth Governor's Award.



A model bylaw or strategy is included in the Pioneer Valley Sustainability Toolkit.



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Bike And Pedestrian Features

What are the objectives of zoning for bike and pedestrian features?

To develop a regional network of pedestrian and bicycle trail systems to provide residents with viable travel alternatives to the single occupancy vehicle.



Bike lanes in Northampton

Why do we need to encourage bike and pedestrian features in our community?

Walking and bicycling are important forms of transportation and recreation throughout Massachusetts. Unfortunately, the rate at which people are walking or biking to work has decreased in many communities since 1990. During this same period the number of people who are obese in Massachusetts increased significantly from 1990 to 2000 according to the Centers for Disease Control (CDC). These two trends are related, and creating a better built environment for walking and bicycling is a key element to rectifying this critical issue. As the costs of health care, energy, and transportation continue to escalate, walking and bicycling continue to be important solutions which require the support of policy, planning, and infrastructure.

DID YOU KNOW...

That 79.3% of commuters in the Pioneer Valley drove alone to work. Only 0.3% bike to work, and 5% walk to work. (US Census, 2000)

How does the zoning for bike and pedestrian features work?

Communities can adopt regulations and bylaws that promote pedestrian and bicycle



linkages, and to meet the following goals: 1) promoting the safety of pedestrian access, movement, and protection for the physically able, physically challenged, children or seniors within the community; 2) insuring that the ADA guidelines are met for all sidewalk or pathway installations, existing and proposed; 3) promoting attractive and well-constructed sidewalks or pathways that correspond to the character, aesthetic qualities, natural, environmental, and historical features of developing or existing neighborhoods; 4) connecting to existing and projected sidewalks or pathways whenever the opportunity arises to insure an interconnected pedestrian system; and 5) insuring that all development actively implements the building of sidewalks for new construction, reconstruction, or rehabilitation.

EXAMPLES FROM THE PIONEER VALLEY

Connecticut Riverwalk and Bikeway

The Connecticut Riverwalk and Bikeway was proposed by PVPC in 1995 as a regional pedestrian and bicycle path along the banks of the Connecticut River, connecting the communities of Springfield, Chicopee, Agawam, West Springfield and Holyoke. The Riverwalk creates a linear park along both sides of the Connecticut River, which when completed, will extend over 20 miles in total distance. It links residential neighborhoods with urban employment centers and riverfront parks and amenities. Two segments of the Riverwalk have now been constructed at a cost of \$5 million, and opened to the public, including a 3.7 mile segment in Springfield and a 2.1 mile segment in Agawam. Other segments are currently under design in Chicopee, Holyoke, West Springfield and Agawam.



Southwick and Westfield Rail Trail

The Southwick Rail Trail and Columbia Greenway in Westfield are part of a regional bike system that will connect the Farmington River Greenway in Connecticut to the Rail Trail in Northampton. The 9.5-mile trail segment in Southwick and Westfield will provide residents access to a variety of natural and culturally significant resources. Southwick Bike Trail follows an abandoned rail line and runs from the Connecticut border north to the town of Westfield. The trail will pass through residential neighborhoods, protected agricultural lands, and the Congamond Lakes region. Currently, the design stage for the Southwick Rail Trail is completed and construction on this project is scheduled to begin



in spring 2008. The Columbia Greenway in Westfield is in the development stage, with construction also expected to begin in 2008. This greenway will run through the center of the city on an elevated rail bed, and provide a safe and easy route to the center of town for residents in surrounding neighborhoods.

A model bylaw or strategy is included in the Pioneer Valley Sustainability Toolkit.

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Brownfield Inventories



Demolition of the HB Smith Boiler Company, Westfield. | Photo provided by Tighe & Bond

What are the objectives of a brownfield inventory?

A brownfield is a property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant. An inventory can assist in the prioritization of brownfield sites for redevelopment and create a marketing tool for interested redevelopment partners.

Why do we need brownfield inventories?

A Brownfield Inventory can assist a municipality in prioritizing sites for redevelopment by identifying its assets and liabilities in terms of redevelopment potential. With all of this information compiled, potential redevelopment partners identify sites that have the criteria they are looking for to locate their project. Easily accessible information facilitates communication with potential developers and can expedite site selection for a project. The inventory also helps the municipality keep track of issues which may be complicating site redevelopment for certain properties, therefore allowing them to dedicate resources, such as grant funding, to sites that have a higher potential for redevelopment.

How is a brownfield inventory created?

There is no standardized methodology for creating an inventory. It is important that the type of data compiled in the inventory can meet the goals of all potential users including municipal staff as well as potential redevelopment partners. Given the needs of the parties the inventory will serve, the types of information relevant to each must be identified and the data sought. To create an inventory, data must be gathered from a number of sources including, but not limited to: the Massachusetts Department of



Environmental Protection, Mass GIS, the local assessor's office, local records of past use, and neighborhood surveys and interviews. Specific information about the property such as its structural integrity, proximity to public water and sewer service, access to major transportation routes, lien status, existing infrastructure, available parking, neighboring land use and zoning, MCP status, etc. Once this information is compiled and weighted as to relevance or importance for redevelopment, a prioritization schedule can be assigned to each property.

DID YOU KNOW...

It is estimated that there are more than 450,000 brownfields in the United States (US Environmental Protection Agency) Demolition of the HB Smith Boiler Company, Westfield. Photo provided by Tighe & Bond

SPRINGFIELD AND HOLYOKE, MASSACHUSETTS

The Pioneer Valley Planning Commission (PVPC) and the Center for Urban and Regional Policy (CURP) of Northeastern University partnered with the cities of Springfield and Holyoke to develop brownfield inventories for each of their communities. Data was gathered from the Massachusetts Department of Environmental Protection, Mass GIS, the cities local records of past use, and property assessment records. The inventory was built in Excel and linked to GIS for map locations of all of the sites.



For more information on brownfield redevelopment, please refer to the state's [Smart Growth/ Smart Energy toolkit](#), developed by the Executive Office of Energy and Environmental Affairs.

A model bylaw or strategy is included in the Pioneer Valley Sustainability Toolkit.

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Business Improvement Districts



Logo courtesy of City of Springfield BID

What are the objectives of Business Improvement Districts?

To encourage investment/reinvestment in downtown urban core and village areas; create a more pedestrian friendly environment in these areas; improve urban streetscapes and infrastructure in downtown urban core and village areas to further economic development; and to promote historic preservation.

Why do we need a Business Improvement District?

A key element in reducing sprawl is to encourage growth and revitalization in existing downtowns and other urban centers. With revitalization, downtowns serve prominent and important roles within their communities. There are many important reasons to revitalize downtowns, including the fact that downtown areas are usually centrally located and already contain water and sewer lines and streets. Downtowns are walkable and well served by public transit, allowing reduced car use. It is more economical to use existing and necessary support systems rather than pay for extensions outside of the area. Downtowns also have large employment opportunities, a community focus, and greater functional diversity than outlying areas. In many communities, downtowns still serve as a center for retail stores, financial institutions, public agencies and local government offices, local public transportation, historic areas, and cultural and educational institutions.

How does a Business Improvement District work?

A business improvement district formed pursuant to M.G.L. Chapter 400 is a contiguous geographic area with clearly defined boundaries in which at least three-fourths of the area is zoned or used for commercial, industrial, retail, or mixed uses. As part of the creation of a BID, an "Improvement plan" must be submitted and approved by the local municipal governing body as part of the creation of the BID. An Improvement Plan is

the strategic plan for the BID which sets forth the supplemental services and programs, revitalization strategy, budget and fee structure, as well as the management entity for the business improvement district. Presently, there are only three BIDs in Massachusetts: Hyannis, Springfield, and Westfield.

DID YOU KNOW...

The rights and powers of a BID approved by a municipal governing body include:

- » Retain or recruiting businesses
- » Administer and manage central and neighborhood business districts
- » Promote economic development
- » Design, engineering, construction, maintenance or operation of buildings, facilities, urban streetscapes or infrastructures to further economic development
- » Conduct historic preservation activities
- » Lease, own, acquire, or option real property
- » Undertake planning, feasibility, and market analyses

EXAMPLES FROM THE PIONEER VALLEY

Town of Springfield Business Improvement District (SBID)

The City of Springfield established a BID on November 18, 1998. The SBID calls for an aggressive beautification plan which includes: cleaner streets and sidewalks, more attention to the aesthetics of downtown parks, historic buildings and care for new and existing trees, perennials, annuals and hanging baskets. Through the SBID, local businesses band together to enhance City services and take public safety, community responsibility, and carefully planned growth to a new level. It's a lean, well organized coalition of property owners, tenants, city officials and other groups with a stake in Springfield's success. Property owners pay fees set by their peers, an 11-member Board of Directors. The City collects the funds but keeps them in a separate account, exclusively for the BID.

A model bylaw or strategy is included in the Pioneer Valley Sustainability Toolkit.

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District Improvement Financing & Tax Increment Financing



The X in Springfield

What are the objectives of a District Improvement Financing and Tax Increment Financing?

To encourage investment/reinvestment in downtown village and urban core areas; improve urban streetscapes and infrastructure to further economic development. District Improvement Financing (DIF) and Tax Increment Financing (TIF) are economic tools that promote redevelopment by use of public/private partnerships. TIF offers tax breaks to developers, while DIF channels tax dollars into targeted redevelopment districts.

Why do we need District Improvement Financing and Tax Increment Financing?

Many municipalities in the Pioneer Valley Region as well as throughout Massachusetts are faced with blighted, distressed, or simply underutilized areas. Many of these sites contain abandoned or contaminated facilities, while others are characterized by dilapidated infrastructure and commercial operations that simply are not economically viable. These areas often see a decrease in assessed property values with a corresponding decrease in municipal revenue. At the same time, they pose a drain upon municipal services. Often, it is difficult to attract private investment to these areas.

DIF and TIF provide opportunities to redevelop areas in ways which can lead to increased property values, increased tax revenue, improved infrastructure, enhanced transportation services, increased housing supply, new jobs and an overall improvement in quality of life for the inhabitants of the city or town.



Aerial view of the Star Container Corporation complex

Star Corporation, Leominster | Source: MA Smart Growth Toolkit

How does District Improvement Financing and Tax Increment Financing work?

A city or town wishing to utilize DIF must first designate a development district and a corresponding development program. The district and program must then be certified by the State Economic Assistance Coordinating Council (EACC). A development district may be as small as one parcel or may comprise up to 25% of a town or city's land. A district can be in effect for a maximum of 30 years. Each district must have a unique development program which spells out the goals of the district and the means to achieve them.

Under TIF state enabling legislation, landowners may be granted property tax exemptions of up to 100% of the tax increment. A municipality may enter into a TIF Agreement with a landowner for a maximum term of 20 years. The legislation also authorizes TIFs for housing in urban centers. A city or town must initiate a TIF by a vote of its governing body approving the TIF Plan.

At this time, there are no examples of DIF or TIF in the Pioneer Valley region.

However, outside the region the Massachusetts Office of Energy and Environmental Affairs highlighted three DIF/TIF case studies in their Massachusetts Smart Growth Toolkit. This toolkit was prepared by the Horsley Witten Group under contract to the Massachusetts Executive Office of Energy and the Environmental Affairs (EOEEA).

EXAMPLES FROM OUTSIDE THE PIONEER VALLEY

Leominster, MA - Star Container Corporation (TIF District)

The City of Leominster entered into a Tax Increment Financing Agreement with Star Container Corporation to encourage Star Container's expansion plans for its packaging facility. The expansion consisted of an additional 54,000 square feet of floor area and the



purchase of additional corrugated box manufacturing equipment. The TIF Agreement had an eight year term, and provided for a front loaded sliding scale of exemptions from taxation of the tax increment as follows:

- » Year 1 100% of the increment
- » Year 2 90% of the increment
- » Year 3 75% of the increment
- » Year 4 60% of the increment
- » Year 5 45% of the increment
- » Year 6 30% of the increment
- » Year 7 15% of the increment
- » Year 8 0% of the increment

Star Container invested approximately 6.2 million dollars into the facility and equipment. The Agreement provided for the creation of 25 new full time manufacturing and managerial jobs. 150 existing jobs were retained by ensuring the facility stayed at the existing site. At the end of the TIF period, the City will gain approximately \$23,000 annually in additional property taxes.

Leominster uses TIF agreements only for manufacturing businesses. This is compatible with the needs of the city, which historically has had a manufacturing base in the plastics industry. Star Container distributes its packaging to many local and regional firms. The focus on manufacturing has the effect of creating jobs, which pay higher than the minimum wage, bringing a greater economic benefit to the area. The shorter term TIF is also geared towards manufacturing, and is tied to the equipment life.

For additional case studies on DIF/TIF, please see the [Massachusetts Smart Growth Toolkit](#) developed by the Executive Office of Energy and Environmental Affairs

A model bylaw or strategy is included in the Pioneer Valley Sustainability Toolkit.

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Environmental Impact Statements



An Underground Storage Tank (UST) site on Maple Street in Holyoke, Massachusetts – prior to construction of the Multimodal Transportation Center. Photo courtesy of flickr user Massachusetts Dept. Of Environmental Protection



What are the objectives of environmental impact statements?

Environmental impact statements (EIS) are a procedural requirement of the National Environmental Policy Act (NEPA). An environmental impact statement is intended to detail the impacts of any proposed action by a federal agency on the environment. Environmental impact statements detail any detrimental impacts that could not be avoided in the event that the proposal is implemented, as well as any reasonable alternatives to the proposal. Additionally, an EIS demonstrates the relationship between the local short-term uses of a proposal and any long-term effects or irreversible commitments of resources involved in a proposal.

Massachusetts passed the Massachusetts Environmental Policy Act (MEPA) as a supplement to NEPA in 1972. The MEPA review is a state version of the NEPA review process. This process is designed to evaluate the impacts of proposed developments upon the environment. However, the term “environment” is a broad term that includes things beyond air, water and wildlife habitats to include things like historic preservation, traffic generation, and quality-of-life issues.

Why do we need to encourage environmental impact statements in our communities?

While environmental impact statements in the state of Massachusetts do not result in whether a project may go forward or not, the issuance of a certificate is instrumental for other agencies in determining whether funding or permits should be issued for the proposal. Unique to Massachusetts and Minnesota, citizens can petition the government for an environmental assessment - the stepping stone to an EIS – and thereby have a greater say in the development process. Environmental impact statements provide a

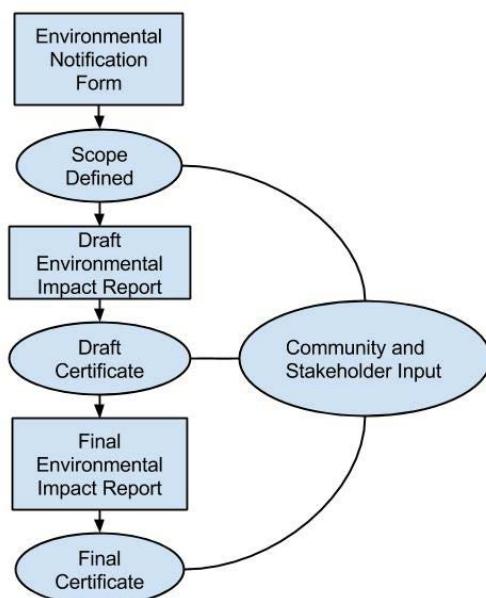
range of possible alternatives to any one proposal and are therefore a valuable tool in assessing the outcomes of any proposed development.



How do environmental impact statements work?

The NEPA and MEPA processes are not a strict regulatory process and do not result in an issuance of a permit or a final sign-off. Instead, MEPA and NEPA issue a “certificate” instead of a permit, and that certificate is used to guide other permitting processes. The certificate can condition an approval based upon what sorts of mitigation measures are taken to minimize the impact on the environment, however it is up to the agency that actually issues a permit to enforce those conditions. The NEPA, MEPA, and other state processes are all generally similar, however only Massachusetts, Montana, South Dakota, and Wisconsin limit this review to state permitting actions only.

When a project is initiated, the proponent – which is usually a public agency – submits an initial report referred to as an Environmental Assessment or an Environmental Notification Form to the appropriate national or state Environmental Protection Agency office. Those forms serve as a formal notification that the proponent aims to implement the proposal, and allows the proponent to seek a waiver from the full EIS process if it believes it to be unnecessary. Comments are taken on that form, and NEPA or the state EPA then determines whether a waiver should be granted, and if not the specific environmental impacts that the proposal needs to address in a more detailed stage of review. This decision is referred to as the ‘scope’, which is based upon a previous ‘scoping session’ held by NEPA, the state EPA, or other state equivalents which may include site visits open to the public, presentations of the proposal, and a community dialogue to elicit feedback on the proposal.



MEPA Planning Process¹

Following the scope, a Draft Environmental Impact Statement or Report is created by the proponent to address the issues outlined in the scope. Following public comments



regarding the draft report, NEPA or the state EPA evaluates those comments and then tells the proponent what additional steps need to be taken in order to create a final draft.

The final draft produced is referred to as the Final Environmental Impact Statement, or Final Environmental Impact Report. After public comments are taken on this version, and if the EPA deems this report satisfactory, it will issue a final 'certificate' stating that the EIS is complete and that the proponent has agreed to make changes to the project to minimize environmental impacts. The certificate is then used by other agencies in determining whether any funding or permits that the proponent is considering for the proposal should be issued.

MEPA establishes three tiers of jurisdiction over projects: complete, broad, and limited. MEPA has full jurisdiction over any project that is undertaken by an Agency, those aspects of a project within the subject matter of any required permit, projects involving financial assistance, and any aspects of a project which are within the area of any land transfer. MEPA has broad jurisdiction over any project undertaken by an Agency or any project that involves financial assistance. Broad jurisdiction in this case means that the scope, if an EIR is required, shall extend to all aspects of a project that are likely, either directly or indirectly, to cause damage to the environment. MEPA jurisdiction is limited when a project is undertaken by a person and requires land transfers or permits but does not involve financial assistance.²

The MEPA law (301 CMR 11:00) includes mandatory thresholds for conducting EAs and EISs with the provision of agency discretion regarding the significance of determinations. Massachusetts is unique with MEPA compared with other SEPA states in that the threshold for preparing an EIS is not a finding of significant environmental impact, but rather a finding that the proposal may "damage" the environment. Also unique to Massachusetts and Minnesota is the fact that citizens can petition the government to require the preparation of an EA for a project.

At the local level cities and towns may require proposals to undertake an EIS within their subdivision regulations or site plan review process. Should the planning board deem it necessary, a proposed development may be required to submit an EIS or a development impact statement in order to obtain a permit for a proposal.

DID YOU KNOW...

That since 1970 dozens of other nations have established their own versions of EISs? The 17th principle of the Rio Declaration on Environment and Development (1992) is devoted to the creation of environmental impact statements by countries around the world.

¹ Adapted from: Hamin, Elisabeth M., Linda Silka, and Priscilla Geigis. Preserving and Enhancing Communities: A Guide for Citizens, Planners, and Policymakers. Amherst: University of Massachusetts. 2007

² For more information see: 301 CMR 11:00: MEPA REGULATIONS. <http://www.env.state.ma.us/mepa/regs/11-01.aspx>



A model bylaw or strategy is included in the Pioneer Valley Sustainability Toolkit.



FOR MORE INFORMATION, PLEASE CONTACT

Pioneer Valley Planning Commission

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Catalyst for Regional Progress

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Green Communities



Governor Deval Patrick at the commemoration of the 100th Green Community.

Photo courtesy of flickr user Deval Patrick



What are the objectives of the Green Communities Program?

The Green Communities Designation and Grant Program is the result of S. 2768, The Green Communities Act, which was passed in 2008. The Green Communities Division is part of the Office of Energy and Environmental Affairs and is tasked with enhancing energy efficiency within the 351 cities and towns of Massachusetts. The Green Communities Division's role is to help communities in the Commonwealth to find clean and renewable energy solutions to reduce their long-term energy costs and strengthen local economies. This is accomplished by providing technical assistance and financial support for municipal initiatives that improve energy efficiency and increase the use of renewable energy in public buildings, facilities and schools.

Why do we need to encourage Green Communities?

Cities and towns across the Commonwealth face both economic and climate-change related challenges in the coming years. The Green Communities Designation and Grant Program provides municipalities with the necessary financial and technical assistance to implement changes in the way that energy is consumed. By adopting clean and renewable energy in public buildings, facilities, and schools, municipalities can start moving forward in addressing climate change and save money in the process.

How does the Green Communities Act work?

The Green Communities Act increases energy efficiency in Massachusetts by expanding investments in energy efficient measures in order to reduce electricity demand. This is accomplished by the following measures:

- » Efficiency First: Requires that electric and gas utilities secure energy efficiency resources that are cost-effective or less expensive than supply as a first recourse, before more expensive generation resources can be purchased. This



also mandates that an efficiency plan is produced every three years and be approved and that a Energy Efficiency Advisory Council be created to review plans. Plans are approved by the Department of Public Utilities.

- » **Efficient Buildings:** Requires the adoption of the International Energy Conservation Code (IECC) and updates within a year of any revision. This provision also provides for related training, implementation and compliance and requires the disclosure of information regarding the benefits of home energy audits to buyers of single-family dwellings or small multi-family dwellings at the time of closing.
- » **Regional Greenhouse Gas Initiative Implementation:** The act maximizes the benefits of Massachusetts' adoption of the regional power plant CO2 cap and trade program known as "RGGI". This requires the auction of all permits to emit pollution under the program rather than giving them away for free. Eighty percent or more of the auction proceeds go towards energy efficiency programs and the remainder goes to municipalities where power plants are situated, funding for community clean energy programs and voluntary green power development
- » **Renewable Energy:** The Act promotes renewable energy by strengthening the Massachusetts Renewable Energy Portfolio Standard (RPS) by increasing requirements for new renewable every year with a target of 15% of electricity for Massachusetts consumers supplied by renewables by 2020. The act also promotes net-metering, long term contracts, and municipal/utility ownership of utilities.
- » **Renewable Energy Trust Fund:** The Act establishes a new governing board and requires the development of 5-year strategic plans for the existing Renewable Energy Trust Fund (RETF)
- » **Cleaner Vehicles:** The Act promotes hybrid or alternative fuel vehicles by calling for state government vehicles to be comprised of 50% of such vehicles by 2018.

How does the Green Communities Designation and Grant Program work?

The Green Communities Grant Program provides up to \$10 million per year statewide in technical and financial help to municipalities to promote energy efficiency and the financing, siting and construction of renewable and alternative energy facilities. In order for a community to qualify for technical and financial assistance and be designated a Green Community, they must adopt the following:

- » As-of-right siting for renewable or alternative energy generating, manufacturing or R&D facilities in designated locations
- » An expedited permitting process for approving such facilities within one year of the filing of an application
- » Energy use baseline and a program to reduce energy use by 20% within 5 years
- » Policy to purchase only fuel efficient vehicles; and

- » A policy to minimize lifecycle energy and water costs for all new commercial, industrial and large-residential construction.

Funding is provided to communities through Cap and Trade programs (including RGGI), compliance payments pursuant to the Massachusetts Renewable Portfolio Standard, and the Renewable Energy Trust Fund.

DID YOU KNOW...

The Green Communities Designation and Grant Program is currently working with 123 cities and towns throughout the commonwealth that have earned Green Communities designation. There is currently more than \$28 million dollars from Green Community grants at work in these cities and towns.

EXAMPLES FROM THE PIONEER VALLEY

The Pioneer Valley is well represented thus far with Green Community designations in comparison to the rest of the State. However there are still a number of communities which have not been designated as Green Communities. Holyoke received \$321,221 for the conversion of exterior parking lot lighting to LEDs at all twelve schools, and to purchase BigBelly Solar Compactors for public parks and high traffic areas. Northampton received \$198,500 for a 51 kW solar power project on the Smith Vocational and Agricultural High School (SVAHS), and to purchase an energy auditor/building performance education kit for the SVAHS Home Building Program. Springfield received \$988,102 to replace inefficient boilers at the Deberry, Mary Lynch, and Freedman Elementary Schools and the Fire Repair Building; installation of vending machine misers at the Freedman and Brunton Elementary Schools and the Fire Repair Building; and for five energy management systems at the Deberry, Mary Lynch, Brunton, and Zanetti schools, the Fire Repair Building and the Sixteen Acres Branch Library.

For more information contact Jim Barry, the Western Region Green Communities Coordinator at jim.barry@state.ma.us

Phone(413)755-2232 | Mobile (617) 823-4588

OR GO ONLINE TO:

<http://www.mass.gov/eea/energy-utilities-clean-tech/green-communities/>

A model bylaw or strategy is included in the Pioneer Valley Sustainability Toolkit.

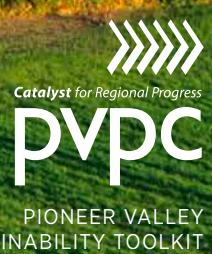
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413-781-6045

60 Congress Street, Floor 1
Springfield, MA 01104-3419

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Municipally Owned Clean Energy



Brockton Mass, "Brightfields" www.brockton.ma.us

The 535 Megawatt hours of clean electricity generated from the Brightfield will result in a reduction of 589,570 lbs. of carbon dioxide (a greenhouse gas), 1,086 pounds of sulfur dioxide and 289 pounds of nitrogen oxide emitted into the atmosphere each year.

Converts a blighted industrial brownfield into a clean energy showcase

Enhances local property values and encourages reinvestment

What are the objectives of municipally owned clean energy?

To manage risk, stabilize municipal budgets, and combat climate change.

Why do we need municipally owned clean energy?

All levels of government around the world have recognized the need to invest in clean and safe renewable energy sources. Climate change must be addressed to ensure a safe and healthy future for our children and grandchildren. The United States is dependent on foreign sources of non-renewable dirty energy. We have reached peak oil production and we need to transition to safe, sustainable, clean sources of energy. In 1998 the Commonwealth of Massachusetts joined a select number of states being one of the first to pass a renewable energy portfolio standard. This legislative act committed the Commonwealth to secure an ever increasing percentage of its electricity needs from clean and safe renewable sources and created a very competitive market for clean energy. Municipalities can save money and manage risk by investing in municipally owned clean energy.

How does municipally owned renewable energy work?

We recommend reviewing the Massachusetts Clean Energy Center (CEC) website for detailed resources on municipally owned clean energy. Municipally owned clean energy is



just like any other municipal asset. You make the decision to invest your limited resources in clean energy. You use local staff and community resources, including PVPC and Department of Energy Resources, and hire consultants as necessary and possible; to help you determine what source(s) of clean energy is/are available and make the most sense for your community. You allocate the resources necessary (some funding is available from CEC—on a reimbursement basis) and you install the facilities. Massachusetts law prohibits municipalities from generating their own power for sale to the grid—unless you have a municipal utility. Therefore we recommend that you design your municipal clean energy facilities to generate only enough power to use on site. If you want to be an electricity generator, you can create a municipal utility or you can petition Congress for permission.

DID YOU KNOW...

That the city of Northampton has received more than one hundred thousand dollars from MTC for clean energy installations because 3% of residents agreed to pay more to buy clean energy?

EXAMPLES FROM THE PIONEER VALLEY

Easthampton Solar Project

Easthampton is interested in capitalizing on current state and federal government policy initiatives by enlisting a private developer to construct and operate a solar array on its closed landfill. Private sector partners can utilize the tax advantages while the city provides the location and consumption necessary to make the project financially feasible. Such a partnership can be beneficial to both parties by saving money for the city and providing a profit incentive for the developer, while at the same time fostering a conservation ethic by reducing our greenhouse gas emissions and dependence on fossil fuel.



EXAMPLES FROM OUTSIDE THE PIONEER VALLEY

Town of Hull, MA

The state's first recent, commercial-scale turbine began generating green energy in the coastal town of Hull. A 660-kW turbine, Hull Wind 1, was installed on the harbor in 2001. In spring 2006, the Hull Municipal Light Plant dedicated a second turbine. Hull Wind 2 is a 1.8 MW Vestas V80, installed on a closed landfill. The two wind turbines supply more than 10 percent of the community's energy needs. For more information on this project, please visit the [Hull Wind](#) webpage.

For more information on Smart Energy, please visit the state's [Smart Growth / Smart Energy toolkit](#), developed by Executive Office of Energy and Environmental Affairs

A model bylaw or strategy is included in the Pioneer Valley Sustainability Toolkit.



FOR MORE INFORMATION, PLEASE CONTACT

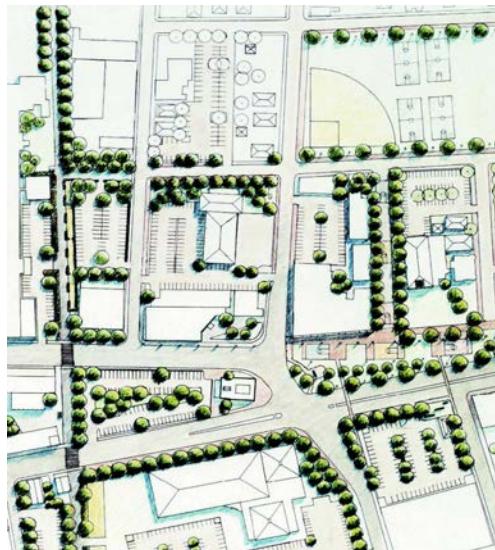
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413-781-6045

60 Congress Street, Floor 1
Springfield, MA 01104-3419

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Planning Board Assistance Program



What are the objectives of the Planning Board Assistance (PBA) program?

PVPC's Planning Board Assistance (PBA) program provides municipal planning boards with professional, high quality planning services on a part-time, cost-effective basis.

Why do we need the PBA Program?

As new laws are passed and the state of municipal planning becomes more sophisticated the responsibilities of local planning and zoning boards becomes more complicated and time consuming to administer. These citizen boards often find themselves lacking the in-house capacity to sufficiently and expeditiously carry-out these responsibilities and budget constraints limit their ability to hire full-time professional planning staff.

Under the PBA program PVPC will provide a planner on a fee-for-services basis. This planner will provide a higher level of technical assistance and attention beyond the free services available through our Local Technical Assistance (LTA) program. The PBA program is not a substitute for a town planner or community development professional, but is an extremely cost-effective alternative.

How does the PBA Program work?

If your community is interested in formalizing participation under the PBA program, the first step is to establish an agreement for services. This agreement will include a detailed scope of work describing the Planning Board's work priorities and the number of hours of professional planning services available to the community. Typically, the PBA year starts

on July 1st and extends through the following June 30th, but shorter-term agreements for a specific project or task are also possible.

Through the PBA program, the Planning Commission will assign a professional land use planner with expertise in zoning and master planning services as the municipal's key contact. This planner will provide technical assistance to the Planning Board on a part-time basis, and will be available for Planning Board members to contact whenever questions arise. The planner will become familiar with local planning issues and problems.

DID YOU KNOW...

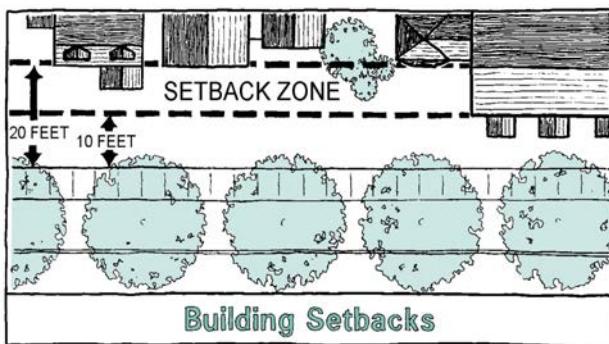
The town of Hadley has been participating in the PBA program continuously for over a decade

The local communities of Cummington, Granby, Longmeadow, Middlefield, Southampton and Westfield have also been recent participants

... The PBA program provides a cost effective alternative for small towns to afford professional planning services, as well as to assist current municipal planning staff.

Levels of Assistance

Under the PBA Program, communities can request a level of assistance that fits the community's budget and individual needs. PVPC staff will assist communities in determining the appropriate level of assistance.



Types of Planning Board Assistance

Planning Boards can create their own unique scope of services tailored to local needs through the PBA program. The following is a menu of planning services which could be included:

- » Assistance with the review of development proposals (subdivision and site plan review applications)
- » Review and comment on adequacy of existing zoning ordinances and bylaws or subdivision regulations
- » Review zoning ordinances and bylaws for consistency with state law
- » Creating development review intake and tracking systems





- » Assistance in re-drafting and updating zoning ordinances and bylaws or subdivision regulations
- » Updates on planning board requirements and responsibilities
- » Assistance in implementing smart growth tools and strategies
- » Urban Design
- » Visualization
- » Access to the key contact via telephone, e-mail and scheduled meetings for guidance and advice
- » Attendance at Planning Board meetings
- » Assistance in reviewing meeting agendas and meeting minutes
- » Planning Board training
- » Guidance concerning planning principles and planning law
- » Interpretation of local ordinances, bylaws and regulations
- » General municipal planning functions

A model bylaw or strategy is included in the Pioneer Valley Sustainability Toolkit.

FOR MORE INFORMATION, PLEASE CONTACT

Pioneer Valley Planning Commission

413-781-6045

60 Congress Street, Floor 1

Springfield, MA 01104-3419

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Stormwater Management



Congamond Lakes Restoration Project, Southwick

What are the objectives of Stormwater Management?

To regulate land activities which generate runoff by requiring on-site management of stormwater runoff, to protect public health and water quality by reducing pollution, flooding, siltation and drainage problems, and to help prevent increases in stormwater runoff, protect groundwater recharge, control erosion and sedimentation, reduce pollutants in runoff, and protect waterways.

Why do we need Stormwater Management?

As urbanization occurs, large areas of impervious surfaces are created by roads, buildings and parking lots. In turn these paved areas generate higher volumes of stormwater runoff at greater velocities and pollutant loads. Without controls, each new development incrementally increases the pollution of waterways. Pollution from urban runoff is now recognized as a significant source of water quality degradation that is virtually impossible to deal with without adequate stormwater controls.

How does a Stormwater Management bylaw work?

A stormwater management bylaw/ordinance can require all new development to provide a Stormwater Pollution Prevention Plan (SWPPP) and design that incorporates Best Management Practices (BMPs) to reduce runoff impacts. The plan's overall goal is to prevent post-development increases or decreases in the total volume or rate of stormwater discharges from the site, as compared with pre-development conditions. This goal could be achieved using stormwater controls or BMPs, such as vegetated swales, retention or detention basins, oil and grease separators, infiltration basins, constructed





wetlands or other measures. The stormwater plan includes a description of existing site characteristics including topography, soils, hydrology and floodplains. Calculations for pre- and post-development stormwater volume and rates of runoff are needed to size appropriate BMPs. The bylaw/ordinance contains specific design criteria for handling post development peak discharge for a particular storm event. For example, the bylaw/ordinance might require that the plan contain adequate control measures for a 24-hour storm event that occurs every 2, 10 or 25 years. The bylaw/ordinance also includes requirements for inspection and maintenance of BMPs during and after construction, with a performance bond to ensure maintenance.

DID YOU KNOW...

Stormwater runoff is our most common cause of water pollution. Rainwater and snowmelt run off streets, lawns, farms, and construction and industrial sites and pick up fertilizers, dirt, pesticides, oil and grease, and many other pollutants on the way to our rivers, lakes, and coastal waters. (US EPA)

EXAMPLES FROM THE PIONEER VALLEY

Stormwater Bylaws

In 1999, the U.S. Environmental Protection Agency promulgated the Storm Water Phase II Final Rule of the National Pollutant Discharge Elimination System (NPDES). The program is intended to preserve, protect, and improve the Nation's water resources from polluted storm water runoff. Three of the NPDES Phase II "Six Minimum Control Measures" required regulated municipalities to adopt and enforce regulatory mechanisms for controlling illicit discharges, construction site runoff, and post-construction runoff.

PVPC researched model bylaws from around the country and crafted a two model bylaws that addressed all of the NPDES Phase II review and control requirements for construction and post-construction runoff. These bylaws are known respectively as Illicit Connections and Discharges to the Municipal Storm Drain System and, Erosion and Sediment Control. Since development of the two bylaws, PVPC has worked with the communities of Chicopee, Northampton, Southampton, Westfield, and Southwick in tailoring the bylaw to address their specific needs. To date, the cities of Chicopee, Northampton and Westfield and the Town of Southampton have fully adopted both bylaws.



CASE STUDIES FROM OUTSIDE THE PIONEER VALLEY REGION

Additional case studies on Stormwater Management, can be found at the US Environmental Protection website on stormwater protection.

A model bylaw or strategy is included in the Pioneer Valley Sustainability Toolkit.



FOR MORE INFORMATION, PLEASE CONTACT

Pioneer Valley Planning Commission

413-781-6045

60 Congress Street, Floor 1

Springfield, MA 01104-3419

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Stormwater Utilities



Pequot Pond restoration project, Southampton

What is a stormwater utility?

Stormwater utilities are proven effective mechanisms for generating revenue to manage stormwater. Just like electric or water utilities, stormwater utilities collect fees from residents to pay for a ‘product’. Stormwater utilities are different from the other more established utilities as the ‘product’ being paid for is not something concrete and measurable like water or electricity. The product being paid for is stormwater management, and design to control or eliminate water pollution, erosion and flooding.

Why do we need stormwater utilities?

For hundreds of communities in Massachusetts, the National Pollutant Discharge Elimination System (NPDES) Phase II program prompted a shift in the way many cities and towns view stormwater programs. Unable or unwilling to fund stormwater management improvements out of general funds, a municipal stormwater utility offers a proven successful way for municipalities to generate the funds required to finance stormwater management programs and upgrade of existing stormwater facilities.

How do stormwater utilities work?

As a rule, municipal stormwater utilities are established by ordinance (or bylaw in the case of a town). The vast majority of these ordinances/bylaws are enacted by local government. Public referendum is also an option. Stormwater Utilities are, in a sense, a form of user fee in which the fee is based on the amount of stormwater run-off created by the development of a property. A fee is assessed to each developed property, and is calculated on the amount of the property’s impervious cover.

For more information on stormwater utilities and a thorough overview of legal issues, sample ordinances, and other technical information, please refer to the PVPC document “How to Create a Stormwater Utility” toolkit.



DID YOU KNOW...

that there are more than 360 stormwater utilities established across the country in 31 states?

EXAMPLES FROM THE PIONEER VALLEY

City of Chicopee Stormwater Pilot Program

In 1998, the City of Chicopee implemented a pilot storm water utility or fee-based management program. Although the City of Chicopee did not establish a storm water utility per se, the city opted to incorporate storm water management into the existing Wastewater Department to save on administrative costs and take advantage of the expertise of the Wastewater Department's staff. Chicopee also passed an ordinance to collect fees from residents specifically for the purpose of managing storm water. The city conducted extensive research before instituting the storm water ordinance. Residents said that they would be willing to pay a new fee for storm water management if they were sure that the money would be used to address the problems directly affecting them, such as sewer back-ups during wet weather. The ordinance was therefore designed to address such concerns.

Instituting a specific storm water fee rather than increasing sewer fees to cover the costs of storm water management had two advantages. First, it meant that Chicopee could assess fees based on the amount of storm water generated by each property tied into the sewer system. Second, the city expects that over time, large storm water generators will begin to invest in best management practices and remediation measures to treat their storm water in order to reduce their storm water management fee, thus reducing the amount of storm water pollution being generated.

Chicopee's storm water management fee has been in place since December 1998. In the first year, the city raised some \$400,000 for storm water management; by the third year, revenues had increased to \$550,000. To date, the money has been used for activities such as stepping up cleaning of catch basins, purchasing a catch basin cleaning truck, grouting joints in the sewer system to stop leakage and inflow, stenciling storm drains, and cleaning sewer lines. Chicopee has also used the funds to leverage additional state loan funding for a \$5 million sewer separation project.

City of Westfield Stormwater Utility

In 2010 the City of Westfield adopted a formal Stormwater Utility Ordinance. The process took two years and involved numerous revisions to tailor it to the specific needs of the community. While similar to Chicopee's in many ways, it is important to note that each community needs to mold such ordinances to meet their own unique circumstances. While the City Council establishes the rate, the program is administered by the Department of Public Works as they are responsible for the city's stormwater



management system. Residential properties are assessed a flat fee while non-residential property fees are based on the amount of impervious surface on the property. The fees raise in excess of \$450,000 per year which are deposited into a special dedicated account that can only be used to defray the cost of administering and implementing the city's stormwater management program.

A model bylaw or strategy is included in the Pioneer Valley Sustainability Toolkit.

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Traffic Calming Measures



Raised pedestrian walkways (Speed Tables) near Amherst College

What are the objectives of traffic calming?

To improve neighborhood livability and pedestrian safety through the reduction of average travel speeds on residential roads.

Why are traffic calming measures needed?

Traffic calming relies on the installation of physical features to slow vehicle speed and enhances safety on local streets. Already used effectively in Europe for decades, traffic calming techniques are now being instituted in communities throughout North America. Reconfiguring the physical design a roadway is the most effective way to reduce speeding on residential streets, avoid traffic accidents and prevent fatalities. Cities with successful traffic calming programs have neighborhoods that are safer, more livable, and more enjoyable. Small, inexpensive retrofits of a roadway can result in speed and traffic volume levels that promote more livable communities.

How do traffic calming measures work?

Rather than relying on stop signs, speed limits and legal penalties (the regulatory approach) to reducing average vehicle speeds and promote safe neighborhoods, traffic calming has been introduced to change the driving conditions on roadways in such a way that traffic speeds and driver behavior are self-enforced. This is accomplished through incorporating design elements into the roadway--such as raised crosswalks, traffic roundabouts and traffic circles—that lead a driver to choose to travel at a reduced speed. This reduces the possibility of severe collisions between motorists, increases safety for



bicyclists and pedestrians, reduces erratic or aggressive driving behavior, and enhances the livability of neighborhoods and business districts through attractive street design.



DID YOU KNOW...

That there are three general types of traffic calming measures:

1. Narrowing the Real or Apparent Width of a Street: through pavement cross-section features, placement of street treatments and pavement edge treatments
2. Deflecting the vehicle path: such as chicanes, lane offsets, crossing islands and site-specific traffic circles; Introducing roundabouts, traffic circles, curb extensions
3. Altering the vertical profile of the vehicle path: such as speed humps and speed tables, raised crosswalks, and textured pavement

(Massachusetts Highway Department Project Development and Design Guide)

EXAMPLES FROM THE PIONEER VALLEY

Amherst College and the Town of Amherst

In 2002, Amherst College identified pedestrian safety as a major point of concern for its student population; this was due, in large part, to the presence of Route 9 and Route 116 on the college's main pedestrian access points. To reduce the risk of pedestrian and automobile collisions, Amherst College began working with the Town of Amherst in 2003 to finance and design the first test Speed Table on Seelye Street (a minor collector off of Route 9). The successful application of a Speed Table at Seelye Street lead to the installation of four major Speed Tables along College Street (Route 9) in 2004. Raised Speed Tables were installed at the crossings of Boltwood Avenue, Webster Circle, and Dickinson Street, and a pedestrian-activated system of flashing lights was also embedded within the Speed Tables to enhance night time visibility.

Amherst College performed an assessment of the section of College Street that the crosswalks were installed on to determine the effectiveness of this project. The findings from the assessment indicated that the average travel speed that existed before the installation of the Speed Tables, 47 miles an hour, was reduced to the posted speed limit of 35 miles per hour. This project relied on the third approach to achieving traffic calming (see inset), and successfully altered the vertical profile of the vehicle path.

This project has been a success with both residents and college students, and the Town of Amherst and Amherst College are proceeding with the installation of four crosswalks along South Pleasant Street (Route 116) to replicate the success of the College Street project. In addition to Speed Tables, the South Pleasant Street crosswalk project will install new curbing and add vegetated traffic islands to the roadway. These design features will accomplish the goals of redesigning the roadway to reduce travel speeds, enhancing pedestrian safety, and improving street design and neighborhood quality.



EXAMPLES FROM OUTSIDE THE PIONEER VALLEY

City of Cambridge, Massachusetts

The City of Cambridge has been extremely active in implementing traffic calming designs into their existing roads system. Please visit the city's Office of Community Development traffic calming webpage for more information on funded projects and resources on traffic calming.

Seattle, Washington: Neighborhood Traffic Circle Program

Please visit the Neighborhood Traffic Circle Program webpage for more details on this nationally recognized traffic calming program.

ADDITIONAL RESOURCES

Chapter 16: Traffic Calming and Traffic Management, Massachusetts Highway Department, Project Development and Design Guide, January 2006.

A model bylaw or strategy is included in the Pioneer Valley Sustainability Toolkit.

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Trip Reduction



Rideshare Program in Washington State



What is the objective of trip reduction?

Trip reduction programs give commuters alternative options to reduce single occupancy automobile trips by offering resources, incentives, or disincentives. Trip reduction strategies work to reduce the impacts of traffic on air pollution, greenhouse gas emissions, and congestion by requiring major employers and schools to develop, implement, and maintain a trip reduction program.

Why do we need to encourage trip reduction strategies in our community?

Excessive traffic can have many negative impacts on communities and individuals. By reducing the number of vehicle trips in our communities, we can minimize unhealthy air pollution, curb greenhouse gas emissions, limit noise, ease congestion, and increase health and convenience for individuals. Federal policy, as set forth in 49 CFR 614 requires Massachusetts to develop, adopt, and annually update a congestion management program to reduce emissions. The Clean Air Act Amendments of 1990 call for the adoption, implementation and enforcement of transportation control measures sufficient to assure the attainment of Federal ambient air quality standards in Massachusetts no later than 1999. Massachusetts' Department of Environmental Protection has an air pollution control regulation, 310 CMR 7.16, which requires the reduction of single-occupant commuter vehicle use. This regulation requires employers of 250 or more to provide incentives for public transit facilities and carpooling and requires employers of 1,000 or more to make vanpool amenities available to any interested group of at least ten employees.

Communities can set more ambitious trip reduction strategies by enacting trip reduction measures through local ordinances and bylaws. A municipality could enact an ordinance which goes even further than State regulation such as the City of Cambridge did with a Parking and Transportation Demand Ordinance (PTDM). This ordinance formalizes parking and transportation demand management planning, programs and coordination for all commercial and non-residential parking facilities over a certain size and requires that a PTDM management plan be approved by a PTDM Planning Officer for any development

prior to receiving a permit or variance from the Planning Board. Cambridge's PTDM plan has been wildly successful in decreasing traffic congestion and increasing the use of bicycling and public transit. By reducing traffic impacts with trip reduction strategies, communities in the Pioneer Valley will remain and become more desirable places to live, work, visit, and do business.

How do trip reduction strategies work?

Communities can adopt a Trip Reduction Ordinance/Bylaw that establishes programs and requirements for new and existing employers and owners of employment complexes that will contribute to reductions in traffic and improvements in air quality from levels that would otherwise exist. Trip reduction measures consist of incentives or disincentives to reduce single-occupancy trips, or the rate of single occupancy vehicle miles traveled, such as:

- » A commuter matching service to facilitate ridesharing for commute trips
- » Providing of vans for vanpooling
- » Subsidies for carpooling or vanpooling including payment for fuel, insurance, or parking
- » Use of company vehicles for carpooling
- » Provision for preferential parking for carpool or vanpool users which may include close-in parking or covered parking facilities
- » Cooperation with other transportation providers to provide additional regular or express service buses to the work or school site
- » Subsidized bus fares
- » Construction of special loading and unloading facilities for transit, carpool, or vanpool users
- » Cooperation with a subdivision to construct walkways, or bicycle routes to the work site or school site
- » Provision of bicycle racks, lockers, and showers for employees who walk or bicycle to work or students who walk or bicycle to school
- » Establishment of a telecommuting program for employees
- » Establishment of a program of adjusted work hours which may include compressed work weeks or staggered work hours
- » Establishment of a program of parking incentives such as a rebate for employees or students who do not use the parking facility
- » Incentives to encourage employees to live closer to work or students to live closer to school
- » Provision of day care facilities
- » Emergency transportation services
- » Joining a Transportation Management Association





smart
growth



- » Incentives to encourage the use of certified vehicles for commute trips or, work-related trips
- » Establishment of a trip reduction committee to define new strategies and assist with the implementation of measures
- » Replace gasoline powered motor vehicles with electric golf-type carts or bicycles for traveling at the work site
- » Modify procedures to enable employees who normally commute for the sole purpose of picking up a company vehicle, to bring those vehicles home at the end of the work day to eliminate the commute trip.¹

Alternatively, trip reduction measures may be incorporated into zoning bylaws as opposed to the creation of a separate Trip Reduction Ordinance. The Town of Hadley inserted trip reduction measures into their zoning bylaw for Commercial Site Plan Approval. The bylaw requires that any new building or new use of a building in excess of 10,000 square feet must submit a Trip Reduction Plan which clearly identifies a combination of transportation system management strategies designed to reduce anticipated vehicle trips by 35%. The Trip Reduction Plan includes measures such as vanpool/carpool incentive programs, on-site bicycle storage and locker facilities, and encouraging employee and customer use of transit services, amongst others. Additionally, the Planning Board may reduce minimum parking standards by a percentage for developments that make a long-term commitment to promoting employee and public use of transit, ridesharing, and other means of reducing single occupant vehicle trips.

DID YOU KNOW...

That as of the year 2000, 79.3% of commuters in the Pioneer Valley drove alone to work. Only 9.1% carpool to work, 2.5% use public transportation, 0.3% bike to work, 5% walk to work, and 3.1% work from home (US Census, 2000)

EXAMPLES FROM THE PIONEER VALLEY

The Pioneer Valley has a number of facilities, organizations and programs to help people share rides, either on public transportation or by private autos. These include ride sharing and park and ride lots. Ride sharing is increasingly popular as more facilities and programs for it become available and the price of auto fuel fluctuates. There are several opportunities for ride sharing in the Pioneer Valley, one of the most notable is MassRides. MassRides is a private non-profit organization working with MassDOT. The MassRides Employer Partner Program helps businesses and their employees cut commuting costs, shorten travel times, and improve the quality of commutes. MassRides holds commuter events at a participating business's worksites to provide information to employees. Also, MassRides can help set up carpooling, vanpooling, preferential parking, transit, teleworking, flexible work hour programs, or other cost saving programs, such as pre-tax payroll deductions of transit costs. MassRides Partner Program participants currently include Westfield State College, Solutia, Mass Mutual, Holyoke Community College and PVPC.



Additional Examples

<http://www.cambridgema.gov/CDD/Transportation/fordevelopers/ptdm.aspx>

Northampton allows parking requirement reduction up to 20% for employee parking on major projects (350-8.6) through site plan review. Also requires a trip-reduction plan through Site Plan Review for “new commercial, office and industrial buildings or uses over 10,000 square feet.” (see details at 350-11.5(3)b Ayers MA has similar incentives, though the criteria are different, and the method of requiring the trip-reduction plan is different and the criteria for writing trip-reduction plan is even more vague than Northampton’s. (Ayers zoning 6.4.2c and 9.4b)

http://www.ayer.ma.us/pages/AyerMA_About/zoningbylaws/zbylaws

Easthampton also has similar, and again fits it into the bylaw in a slightly different way. Their mdescription of the trip-reduction plan is the best of the three. (zoning 10.511 and 10.524)

A model bylaw or strategy is included in the Pioneer Valley Sustainability Toolkit.

FOR MORE INFORMATION, PLEASE CONTACT

Pioneer Valley Planning Commission

413-781-6045

60 Congress Street, Floor 1

Springfield, MA 01104-3419

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Intergovernmental Compact



The Chesterfield Gorge is located on the East Branch of the Westfield River. The Westfield River has been designated a National Wild and Scenic River thanks in part to the signing of the Westfield River Protection Memorandum of Agreement

What are the objectives of an intergovernmental compact?

An intergovernmental compact is a cooperative effort between local, state, and/or federal government entities that binds the parties involved through joint exercises of power to actively participate in carrying out an agreed upon activity. The problems addressed by compacts were initially used primarily to settle boundary disputes. Compacts are now being used in an ever-expanding number and variety of fields that are relevant to planning such as: energy conservation, mass transit, education, pollution control, law enforcement and corrections, natural hazards mitigation, land use and water resources, and a myriad of other applications.

Why do we need to encourage intergovernmental compacts in our community?

Intergovernmental cooperation allows for economies of scale, the provision of specialized services that would not otherwise be available to small governments, maximum utilization of certain types of capital-intensive facilities, and specialization among governments. Such cooperative efforts also avoid the unnecessary duplication of governmental services, inefficient distribution of resources or expertise, and the need to change basic governmental structure.

A variety of challenges that face the Pioneer Valley are regional in scope and thus require the collaboration of multiple actors and stakeholders in order to be effectively addressed. Intergovernmental compacts are legally binding agreements that ensure that



the services, activities or undertakings detailed in the compact will be attended to by all parties involved for the duration of the compact. By entering into an intergovernmental compact, the parties involved can be assured that each member will be held accountable by other members for upholding their respective roles.

How do intergovernmental compacts work?

Communities may decide that it is mutually beneficial to work together and develop an intergovernmental compact on any issue of significance to more than one community. Examples of compact topics can range from protecting regional natural resources, to managing growth and development, to shared municipal services such as health agents or emergency call services. Chapter 40, Section 4A of the Massachusetts General Laws provides authorization for intergovernmental compacts and establishes that intergovernmental compacts may be entered into by the chief executive officer of a city or town, or a board, committee or officer authorized by law to execute a contract in the name of a government unit with other governmental units. Typically, an intergovernmental compact is managed through membership by involved parties on a commission, board, or other entity formed to oversee the cooperative efforts. A ‘governmental unit’ consists of a city, town or a regional school district, a regional planning commission, a regional transit authority, a water and sewer commission, a county, or a state agency as defined under Massachusetts General Laws. A governmental unit in turn may raise money by any lawful means, including the incurring of debt for purposes which it may legally incur debt, to meet its obligations under the compact agreement. No governmental unit is exempt from liability for its obligations under an agreement lawfully entered into.

Intergovernmental compacts detail the responsibilities and duties of participating governmental units through a ‘memorandum of agreement’. Participating cities and towns, for instance, may agree to pursue strategies such as the adoption and enforcement of new zoning bylaws, or the use of community funds to acquire lands of conservation interest. A regional planning agency such as PVPC may be required to assist municipalities in meeting their responsibilities and to monitor their compliance. State and Federal agencies may in turn be required to enforce all applicable laws and regulations as it applies to the aims of the intergovernmental compact.

DID YOU KNOW...

That in 1990 six towns along the East Branch of the Westfield River, PVPC and the Westfield River Watershed Association signed a “Memorandum of Agreement” that was the first step leading to the Wild and Scenic River designation by the State.

EXAMPLES FROM THE PIONEER VALLEY

The Connecticut River Clean-up Committee (CRCC)

The Connecticut River Clean-up Committee (CRCC) is composed of representatives from four Massachusetts communities (Springfield, Chicopee, Holyoke, and Ludlow) and the Pioneer Valley Planning Commission (PVPC). Each of the municipal members are under EPA Administrative Orders to address the negative water quality impacts to the





The Connecticut River from atop Mt. Sugarloaf in South Deerfield. In 1993 the Connecticut River Clean-up Committee (CRCC) was formed by the signing of an intergovernmental compact

Connecticut River from combined sewer overflows (CSOs). CRCC was formed in 1993, with the signing of an intergovernmental compact between the communities and PVPC. The Committee is an action-oriented entity that explores funding sources and opportunities for intermunicipal cooperation on river cleanup. CRCC has been instrumental in leading efforts to secure federal funding for CSO control.

Over the past 20 years, the Connecticut River Clean-up Committee has made great strides in cleaning up the Connecticut River, with the support of our Massachusetts Congressional delegation. In fiscal years 1999 through 2010, CRCC worked to secure \$17.6 million in funding for clean-up of our rivers, including \$9.6 million in federal funds and \$8 million in matching local funds. CRCC has Using the CRCC as a vehicle, the members a high degree of inter-municipal collaboration has been achieved despite the absence of a metropolitan district commission. Key achievements of the regional collaboration as a whole include over one billion gallons/year in CSO discharges reduced, 18 miles of the Chicopee River and its tributaries have no CSOs, and the two largest CSOs on Connecticut River have been reduced by 415 million gallons per year.

Other intergovernmental compacts that have achieved success in the Pioneer Valley include the Barnes Aquifer Protection, Westfield River Protection, and Valley Vision Memorandums of Agreement.

A model bylaw or strategy is included in the Pioneer Valley Sustainability Toolkit.



FOR MORE INFORMATION, PLEASE CONTACT

Pioneer Valley Planning Commission

413-781-6045

60 Congress Street, Floor 1
Springfield, MA 01104-3419

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Accessory Apartments



An accessory apartment over the garage in a single family house

What are the objectives of Accessory Dwelling Units?

To add rental units to the housing stock of a community, while protecting the residential character of a neighborhood or community. Accessory apartments can improve the affordability of housing for both homeowners and renters at all stages in their lives.

Why do we need Accessory Dwelling Units?

Rising housing costs in Massachusetts have made finding and staying in affordable housing difficult. For some homeowners, with limited incomes and rising real estate taxes, the income from an accessory apartment could mean the difference between being able to afford to stay in the community and having to move away. These apartments can also allow families to provide support to another family member such as a young adult or grandmother who can live independently close to the family home. Accessory units help to maximize use of existing public infrastructure and services since they are created on already developed sites. They can help reduce development pressure on “greenfield” sites like farmland and wooded sites..



How do Accessory Dwelling Units work?

Accessory dwelling units (also known as accessory apartments, granny flats, guest apartments, in-law apartments, family apartments or secondary units) provide supplementary housing that can be integrated into existing single family neighborhoods to provide a typically lower priced housing alternative with little or no negative impact on the character of the neighborhood. Because the units are usually small, they are more affordable than full-size rentals. Accessory dwelling units can be permitted and regulated through the adoption of zoning provisions.



Example of a detached accessory dwelling unit in Northampton, MA. Source: Dillon Sussman

EXAMPLES FROM THE PIONEER VALLEY

As of August 2007, there are 18 communities in the Pioneer Valley that have adopted Accessory Apartment Bylaws. Most of the communities in the region permit accessory apartments to be built within a single family home. These units are typically called “attached” accessory apartments, in that the new dwelling is incorporated within a single family dwelling, and therefore attached to the primary residence. Communities often encourage accessory apartments to be developed in this manner to ensure these new units blend within the existing neighborhood.

DID YOU KNOW...

There are three different types of Accessory Dwelling Units...

1. Interior – using an interior part of a dwelling.
2. Interior with modifications – the outside of the dwelling is modified to accommodate a separate unit. Also called “attached” accessory apartments.
3. Detached – a structure on a residential lot that is a separate from the main dwelling, yet by definition still “accessory” to the main unit.

The Town of Plainfield, however, recently amended its Accessory Apartment bylaw to allow accessory apartments to also be built within detached accessory buildings, such as a barn or detached garage. In Plainfield, the development standards for accessory



apartments are the same for both attached and detached apartments. The accessory apartments must be clearly subordinate to the primary structure, with the new unit being no larger than 1/3 of the existing primary, residential structure. By allowing residents the opportunity to build accessory apartments in these existing detached structures, the town has increased the possibility of the creation of affordable rental units to the existing housing stock, without significantly changing the character of the community.



Communities that have adopted an Accessory Apartment Bylaw

Amherst / Chester / Chesterfield / Easthampton / Granville / Huntington / Ludlow /
Monson / Montgomery / Northampton / Palmer / Pelham / Plainfield / Ware / Westfield
/ Wilbraham / Williamsburg / Worthington

For more information on examples of Accessory Units from across Massachusetts, please refer to the state's Smart Growth / Smart Energy Toolkit developed by the Executive Office of Energy and Environmental Affairs.

A model bylaw or strategy is included in the Pioneer Valley Sustainability Toolkit.

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413-781-6045

60 Congress Street, Floor 1

Springfield, MA 01104-3419

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Agricultural Commission

What are the objectives of an Agricultural Commission?

To create programs to protect prime farmlands, and incentives to encourage the growth and development of farm-related businesses.

Why do we need an Agricultural Commission?

The incremental loss of farmlands and agricultural heritage is one of the major issues facing the Pioneer Valley region. Suburban sprawl is consuming acres of farmland and open space. The American Farmland Trust listed the Connecticut River Valley as one of the twenty “most endangered agricultural regions in the United States”. The protection and maintenance of farmlands in agricultural use is important in maintaining the region’s ties to its farming history, preserving open space and promoting smart growth.



Tobacco Fields in Hadley

What does an Agricultural Commission do?

An Agricultural Commission is an appointed town standing committee, usually comprised of farmers, that provides a voice for the agricultural community and improves the visibility of farming in the community. Agricultural commission can tackle a whole variety of tasks, depending on the community. Here in the Pioneer Valley, Ag Commissions have sponsored Right-to-Farm bylaws, inventoried and identified agricultural properties in the community, created guides and brochures for community farms, researched information and educational resources for farmer, and have hosted community agricultural events. Ag Commissions can also advocate at the local and state level for zoning and regulatory changes that benefit existing and future farming, and work with other town boards and committees, such as the Planning Board, to ensure that the community actively retains agricultural and forest land and agricultural businesses.



DID YOU KNOW...

The Pioneer Valley Planning Commission can assist your local Agricultural Commission in developing an inventory of existing farms in your community as well as develop a map with Chapter 61A lands, agricultural lands, prime agricultural soils, and parcel data (if available).



EXAMPLES FROM THE PIONEER VALLEY

Town of Hatfield Agricultural Commission

The Town of Hatfield adopted their Agricultural Advisory Committee (ACC) in 2001 and has been extremely active in promoting agricultural activities in their community. In its first year, the ACC sponsored two educational seminars on farm support and farmland protection efforts, one for town officials and another for farm and forest land owners. The ACC also researched and assisted in the implementation of agricultural water rates for farm operations in town.

Other notable activities include a brochure developed by the ACC entitled "Hatfield Farms," which highlights farms and farm stands throughout town with product and sales information for each, including a map locating each establishment. Over 2,500 copies of the brochure were distributed at Town Meeting in 2004, with an update brochure distributed in 2005.

Communities that have established Agricultural Commissions

Amherst / Belchertown / Blandford / Chester / Chesterfield / Cummington / Granby / Granville / Hadley / Hatfield / Ludlow / Middlefield / Monson / Montgomery / Northampton / Plainfield / Southampton / Southwick / Westhampton / Wilbraham / Williamsburg

Finally, in 2005, with seed money from the Massachusetts Cultural Council, the Hatfield ACC commissioned a mural with the town's high school art program depicting farm scenes, activities and farmers in town. The mural was then displayed on a barn in a prominent location in town, then moved to the town's farm museum for the winter. Due to the large success of the first mural, a second mural was recently completed and third mural will be completed next year. The town plans to display the three murals each spring.

For more information on Agricultural Commissions, and to access a copy of the "Agricultural Commission Handbook," please visit the Massachusetts Department of Agricultural Resources website.

A model bylaw or strategy is included in the Pioneer Valley Sustainability Toolkit.

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Pioneer Valley Planning Commission

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Chapter 4oR – Smart Growth Districts



Former Holyoke Catholic High School

What is a Smart Growth District?

This is a district in which the community has decided it would like to encourage housing and mixed use (residential and office or retail uses together in one area). Usually these districts are located in or near town centers and help to maintain the character of the community's 'downtown'. At least 20% of the housing units created in this district will have to be affordable to families who make approximately \$50,000 per household annually.

Why do we need Smart Growth Districts?

Well-designed residential, commercial and mixed use development can be a valuable addition to a community's tax base, a source of jobs, and an attractive component of the character of the community center(s). Adopting a Smart Growth Zoning District can:

- » Create a range of housing and transportation options for residents;
- » Foster a sense of place by encouraging distinctive and attractive neighborhoods & centers;
- » Take advantage of the quality of life improvements that can be gained by mixing housing, commercial activities, access to open space, and transportation options;
- » Preserve farmland and critical environmental areas by directing growth to areas with existing infrastructure; and
- » Earn the community priority for state funding programs that are part of the state's Commonwealth Capital program.

Also, the municipality will be eligible for an incentive payment of between \$10,000 and \$600,000 depending on the number of new units that this district allows. These funds are unrestricted and may be used to meet the community's needs.

How does this strategy work?

In its zoning ordinance or bylaw, a municipality may adopt a smart growth zoning overlay district in an eligible location, as defined by the Chapter 40R enabling legislation. Within this district, a city or town shall zone for primary residential use as of right and may also permit business, commercial or other uses by right or by limited site plan review. The minimum density requirements within a Smart Growth District are 8 units/acre for single family homes, 12 units/acre for two and three family homes, and 20 units/acre for multifamily units. The community also develops design standards for this district to assure that the required density is achieved in a way that preserves and reflects the existing character in the town's district.

DID YOU KNOW...

Chapter 40S is additional state funding that is directed to cities and towns that establish a 40R district, to cover the costs of educating any school-age children who move into such districts. This legislation was in response to the common concern that new housing was costly in terms of municipal finances, given the imbalance of tax revenues and service costs. Qualifying communities will be reimbursed for the net cost of educating students living in new housing in smart growth districts.

EXAMPLES FROM THE PIONEER VALLEY

Sub-regional Smart Growth Zoning Districts Approach

Easthampton, Holyoke and Westfield applied together and were awarded Priority Development Funds to create Smart Growth Zoning Districts and are working with Pioneer Valley Planning Commission staff to achieve this.

Communities in Massachusetts that have adopted a Smart Growth District

Amesbury / Chelsea / Dartmouth / Haverhill / Lakeville / Lunenburg / North Reading / Norwood

In the first stage of the process, areas that could be eligible for smart growth districts were mapped based on the 40R eligibility criteria and draft smart growth overlay ordinances and design standards are being developed. In the next stage of the process an advisory committee from each community will review the potential smart growth district maps and draft bylaw for their city. There will be a public outreach effort in all three communities prior to the adoption of a 40R Smart Growth District or the submission of a 40R application to the Department of Housing and Community Development.



As part of the 40R application to DHCD, housing needs assessments are being completed and/or updated and community housing goals and strategies are being developed.



8 Units Per Acre



12 Units Per Acre



20 Units Per Acre



Source: Massachusetts Smart Growth Toolkit

A model bylaw or strategy is included in the Pioneer Valley Sustainability Toolkit.

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413-781-6045

60 Congress Street, Floor 1

Springfield, MA 01104-3419

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Commercial/ Industrial Development Performance Standards



What are the objectives of commercial/industrial performance standards?

To control potential adverse impacts of new commercial or industrial development on traffic safety, existing residential neighborhoods, community character and the environment.

Why do we need commercial / industrial performance standards?

Uncontrolled commercial or industrial development can create traffic congestion problems on local roads and traffic safety hazards due to poor access layout or inadequate parking. Community character and adjacent property values can be degraded by poor design, lack of landscaping, uncontrolled signage or lighting. Environmental degradation, such as water pollution by toxic chemicals, soil erosion and flooding due to uncontrolled stormwater runoff can also occur without proper controls.



Downtown Palmer

Commercial and industrial performance standards establish specific standards in several categories. These are essentially “good neighbor” standards because they minimize adverse impacts on surrounding properties and the community. Standards for “access and traffic impacts” are designed to minimize traffic and safety impacts on highways and roads by minimizing curb cuts, encouraging shared access, requiring all driveways to have safe sight distances for exiting motorists, and providing sidewalks and safe internal circulation plans. Parking standards encourage parking areas located to the rear or side of buildings, and shared parking areas between businesses. Landscaping standards require a landscaped buffer strip along all public road frontage, landscaped islands in large parking lots, and screening of storage, machinery or service areas. Appearance and architectural design standards require that commercial and industrial building designs be compatible with the rural and historic character and scale of existing buildings in the neighborhood and the community. Stormwater runoff and erosion control standards ensure that runoff from commercial and industrial properties will not result in water pollution or flooding. Water quality standards are established for outdoor storage of hazardous materials. Lighting standards limit the height of light poles and require shielding of outdoor light fixtures to reduce light pollution.



DID YOU KNOW...

With conventional suburban parking ratios of five spaces per 1,000 square feet of building space, at least 50% more square footage will be devoted to parking than to space under roof. (Making Smart Growth Work, Urban Land Institute, 2002)

A model bylaw or strategy is included in the Pioneer Valley Sustainability Toolkit.

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Community Preservation Act



CPA funds were used for the protection of Echodale Farm in Easthampton. Photo courtesy of the Easthampton Master Plan Committee

What are the objectives of the Community Preservation Act?

To help communities preserve open space and historic sites, and create affordable housing and recreational facilities through a reliable funding source.

Why should we adopt the Community Preservation Act?

Passed in 2000, the Community Preservation Act (CPA) is a critical tool to enable communities to protect open space, protect historic resources, and provide affordable housing for low and moderate income individuals and families, including low or moderate income senior housing. The CPA has been heralded by the Trust for Public Land and other organizations, as one of the most important environmental protection tools in the country.

How does the Community Preservation Act work?

The Community Preservation Act (CPA) enables communities to establish, through a ballot referendum, a local Community Preservation Fund dedicated to historic preservation, low and moderate income housing, and open space including active and passive recreational uses. Revenue for the fund is generated through a surcharge of 0.1 to 3% of the local property tax. While local adoption of the Act is optional, the Commonwealth is providing, as an adoption incentive, state matching funds totaling approximately \$26 million annually. This funding incentive will match up to 100% of the money raised annually by a community through its surcharge.

Passage of the Act on the community level is a two step process. First, a community must place the CPA on the ballot by obtaining approval of Town Meeting or City Council. Alternatively, a petition of 5% of registered voters can place the CPA on the ballot. Second, once on the ballot, a majority of voters is required to make the CPA law. The CPA is designed to maximize spending flexibility to enable each community to meet its unique needs. A minimum of 10% of annual funds must be spent for each category of historic preservation, affordable housing, and open space. The remaining 70% of funds may be spent in any category. A community may reserve funds to be spent in later years. Additionally, funds may not be used to supplant existing operating funds already dedicated to similar purposes.

DID YOU KNOW...

In 2006, the state distributed \$58.6 million to 102 communities in matching funds.
Since 2002, the state has distributed a total of \$180.6 million.

EXAMPLES FROM THE PIONEER VALLEY

City of Easthampton

The City of Easthampton adopted the CPA in 2001, at a 3% surcharge and an exemption for the first \$100,000 of the assessed value of a residential home. Since 2001, the city has spent a total of \$1.5 million dollars on fourteen (14) projects using local and state match CPA funds, on historic preservation projects, affordable housing, open space protection, and recreation.

Communities that have adopted the Community Preservation Act

Agawam / Amherst / Belchertown / East Longmeadow / Easthampton / Goshen / Hadley / Hampden / Hatfield / Longmeadow / Monson / Northampton / Southampton / Southwick / Westfield / Wilbraham

The greatest percentage of funds (66%) have been used for open space protection, particularly the acquisition of Echodale Farm, a 164 acres of pristine farmland and open space within the Park Hill region of the city. The Echodale Farm acquisition utilized \$650,000 in CPA funds to match APR and private donations. The CPA also provided \$300,000 in funds for dredging of Nashawannuck Pond, a mill pond located within the center of the city. The city is making great efforts to revitalize this water body and restore environmental quality to the pond.

The CPA has also funded in Easthampton:

- » Five historic preservation projects, including the repairs and improvements to many historic structures throughout the city. (\$244,000)
- » Three recreation projects, including restoration of ball fields and the creation of Lower Mill Pond Park. (\$152,130)
- » Three affordable housing projects. (\$120,000)



Project recommendations are made by the Community Preservation Committee to City Council. The committee is nine members as established by local ordinance. The six core committees represented are the Planning Board, Conservation Commission, Parks and Recreation Commission, Housing Authority, City Council Finance Committee, and Historic Commission. The remaining members are appointed by the City Council President, and Mayor. Final appropriations are made by the City Council.

A model bylaw or strategy is included in the Pioneer Valley Sustainability Toolkit.

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Pioneer Valley Planning Commission

413-781-6045

60 Congress Street, Floor 1

Springfield, MA 01104-3419

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Commercial Site Plan Review



King Street, Northampton

What are the objectives of site plan review?

To promote standards for new business development and advance the appearance, traffic conditions, shopping atmosphere and opportunities in pertinent zoning districts.

Why do we need commercial site plan review?

Commercial and industrial growth is important for any community's tax base and can benefit the community by providing needed jobs and services. However, without proper local review, large-scale projects such as shopping centers or industrial parks can have significant impacts on traffic, neighboring properties and community character. To prepare for the new forms of development anticipated today and beyond, communities need a site plan approval process for commercial and industrial uses.

How does commercial site plan review work?

To streamline the process, Site Plan Approval is usually undertaken simultaneously with the Special Permit review process. In general, the types of projects which require site plan approval include retail services, wholesale, transportation and industrial uses, community facilities, commercial earth removal operations, and multi-family residential uses. Other more simple projects usually require only administrative site plan review. Depending on the use, the Special Permit Granting Authority may be the Planning Board, Zoning Board of Appeals, or Board of Selectmen.

A site plan approval bylaw/ordinance sets forth specific procedures for application, review and approval of both Special Permits and Special Permits with Site Plan Approval. Such regulations include a description of the necessary application contents for basic Special



Permits and for Special Permits with Site Plan Approval. The procedures are described for review by municipal boards and for joint public hearings on both the Special Permit and Site Plan Approval, where necessary. Detailed criteria are established for evaluating site plans and special permits in order to ensure a fair and objective review process. The Special Permit Granting Authority's final action on a site plan may be to either approve, approve with modifications, or deny the application. After approval of the site plan, the Special Permit Granting Authority then takes action on the Special Permit.

DID YOU KNOW...

Special Permit with Site Plan Review: This is a clearly designated Special Permit Process that follows all requirements for public hearing and application review timeframes

Site Plan Review: This is an administrative review process only, not a Special Permit process, and applies to certain uses permitted as a matter of right.



EXAMPLES FROM THE PIONEER VALLEY

Hadley Commercial Strip Standards

In the mid-1980s, commercial development along the Route 9 corridor in Hadley began to accelerate at an alarming rate. The Town of Hadley recognized that unmanaged growth along the corridor would have detrimental results on the scenic, rural, and historic character of the town. In 1989, the town adopted the Commercial Site Plan Approval Standards that would help Hadley control development along this commercial corridor. The purpose of these standards is to discourage unlimited commercial strip development by promoting compatible architectural design and safe traffic guidelines in order to protect the rural character of Hadley. These standards require site plan review for any new or expansion of commercial developments with the Business, Limited Business and Industrial zoning districts. In order to receive site plan approval, all commercial projects within these zones must comply with a series of performance standards developed by the planning board. The Hadley bylaws also include trip reduction requirements and traffic impact statement requirements for large developments.



A model bylaw or strategy is included in the Pioneer Valley Sustainability Toolkit.



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Comprehensive Zoning Overhaul



ANR development in the Valley

What are the objectives of a comprehensive zoning overhaul?

To encourage and support reform at the local level of outdated and inefficient zoning regulations that promote sprawl to more efficient growth patterns.

Why do we need comprehensive zoning overhaul?

Antiquated local zoning laws that prescribe sprawl as the preferred development pattern should be updated to promote more efficient growth patterns. While the responsibility for land use planning and regulation rests with each of Massachusetts' 351 cities and towns, the authority to do so effectively is often undermined by the state's out-dated and unduly limiting Zoning Act.

What steps can communities take to complete a comprehensive zoning overhaul and update?

One tool that communities can use to ensure that their zoning regulations are consistent with current state law and to encourage or require Smart Growth strategies is called a Comprehensive Zoning Overhaul and Update. A Comprehensive Zoning Overhaul and Update is a critical review of a community's existing land use regulations relative to internal consistency, consistency with state law, and Smart Growth. Such reviews provide recommendations to help the community achieve three important objectives with its zoning bylaw/ordinance:

1. Bring the zoning bylaw/ordinance into compliance with current state law, Chapter 40A of the Massachusetts General Laws.



- 2.** Identify and correct errors, omissions and unclear language in the zoning bylaw/ordinance.
- 3.** Develop and refine regulations that allow for locally-appropriate development within the community while preventing adverse impacts to natural areas, neighborhoods and to citizen safety.

DID YOU KNOW...

New development in the Pioneer Valley is primarily residential, despite the fact that the population has remained stable over the past 30 years. Between 1971 and 1999, over 30,000 acres were converted to residential development, mostly in the form of “ANRs” or Approval Not Required development.

EXAMPLES FROM THE PIONEER VALLEY

Smart Growth Technical Assistance Grant Program

The Commonwealth of Massachusetts provided the Pioneer Valley Planning Commission with grant funds to review the zoning bylaws and zoning ordinances for several communities in Hampshire and Hampden Counties. Land Use staff at PVPC used their expertise in deciphering land use regulations and applied it to the review of these zoning documents with the intent of finding any inconsistencies within the documents, reformatting tables of use regulations to promote sustainable land use, and flagging those sections that were not consistent with Massachusetts General Law 40A, also known as the Zoning Act. This process involved drafting a brief history of a given community’s zoning efforts, identifying areas of concern in either the table of uses or the zoning regulations, recommending policies for improving a given community’s zoning regulations, and flagging any portions of a given community’s zoning regulations that might be inconsistent with the Zoning Act.

The staff at PVPC endeavored to make sure that common concerns, such as floodplain regulations and water supply district protection areas, were addressed adequately within a community’s zoning regulations. Staff also took the opportunity to include recommendations on how to promote smart growth within Hampshire and Hampden Counties. Many of these recommendations resulted in communities allowing open space residential developments by right, adopting mixed-use district regulations, adopting infill development guidelines, and decreasing lot sizes in appropriate areas.

A model bylaw or strategy is included in the Pioneer Valley Sustainability Toolkit.

FOR MORE INFORMATION, PLEASE CONTACT

Pioneer Valley Planning Commission

413-781-6045

60 Congress Street, Floor 1
Springfield, MA 01104-3419

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Conservation Development



What are the objectives of Conservation Development?

Conservation Developments are compact residential developments that use flexible dimensional standards in order to preserve and enhance rural town character, protect open space, natural resources, and scenic areas, as well as promote the use of sustainable and energy efficient development standards .

Why do we need Conservation Developments?

Growth in many of our small cities and towns is a result of residential development, primarily Approval Not Required (ANR) developments. ANR developments need only an endorsement from a town's planning board that the proposed residential parcel meets the town's frontage requirements along a public way. This type of development has changed the rural character in many of our communities and is the greatest contributor to sprawl development in the region. Conservation Developments are a flexible way for ANRs to consider the rural character of the community and promote green energy sources in residential development

How does Conservation Development bylaw work?

Conservation Development bylaws allow applicants to use common driveways and flexible area and frontage requirements to create permanent open space and avoid standard Approval Not Required and subdivision development. Conservation Developments are allowed by-right with a Site Plan Approval process. Through this approval process, towns work with the applicant to consider development standards such as Stormwater Management, Low Impact Development, Green Energy and Open Space Connectivity. A portion of the development must also be set aside as permanently protected open space.


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Conservation Developments allow applicants flexibility in designing the layout of the lots. The bylaw does not require a minimum lot size or minimum frontage requirement, but allows the applicant to consider the designing the development around the unique characteristics of the land. The number of buildable lots is determined by setting an average size lot size for the entire development as a whole, which number is determined by the community. Design flexibility is also enhanced by permitting the use of common driveways rather than a formal subdivision road.

DID YOU KNOW...

In a national random sample survey of 1,130 adults age 18 and older, about 55 percent of Americans prefer a smart growth community and 45 percent prefer a sprawl community, after hearing detailed description of the two community types. (2004 National Community Preference Survey, conducted for Smart Growth America and National Association of Realtors).

EXAMPLES FROM THE PIONEER VALLEY

Highland Communities Initiative Green Development project

PVPC and the Highlands Communities Initiative have partnered with the towns of Chesterfield, Conway, Montgomery, and Worthington to develop and adopt the Conservation Development bylaw by Annual Town Meeting in 2011. PVPC and HCI will be providing technical support to these communities as they develop a campaign for adoption of this bylaw in their communities.

A model bylaw or strategy is included in the Pioneer Valley Sustainability Toolkit.

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Green Building Codes & Standards



Green affordable housing project developed by Rural Development Inc, Franklin County

What are the objectives of green building codes and standards?

To increase the efficiency of buildings and their use of energy, water, and materials, and reduce building impacts on human health and the environment, through better siting, design, construction, operation, maintenance, and removal.

Why do we need green building codes and standards?

Massachusetts is a leader in the rapidly growing green building movement. Buildings consume 70% of the nation's electricity and a large part of the materials, water and waste used and generated in our economy. Buildings have traditionally been viewed as a relatively static sector of the economy experiencing relatively little change in technology or resource consumption patterns, but that is not the case. According to Ed Mazria, founder of Architecture 2030, and international movement to transition to zero energy buildings by 2030, greening the building sector is a key to combating global climate change. Codes and standards are increasingly being used to encourage the development of renewable energy, energy-efficient technologies, and high-performance buildings in Massachusetts. In addition to state requirements, codes and standards for specific building types and individual municipalities are in development to encourage a breadth of clean and green features in building projects.

How do green building codes and standards work?

"Green" or "sustainable" buildings use key resources like energy, water, materials, and land more efficiently than buildings that are just built to code. With more natural light and better air quality, green buildings typically contribute to improved employee and student health, comfort, and productivity. In addition, they use less energy and other





essential resources, therefore saving more money. Through zoning and other regulatory measures, communities can require that new and rehabilitated buildings are built to meet green building standards. The green building standard most used is the Leadership in Energy and Environmental Design (LEED) System, developed by the United States Green Building Council. LEED is the nationally accepted benchmark for the design, construction, and operation of high performance green buildings. LEED promotes a whole-building approach to sustainability by recognizing performance in five key areas of human and environmental health: sustainable site development, water savings, energy efficiency, materials selection, and indoor environmental quality.

DID YOU KNOW...

Although the US is home to only 4.5 percent of the global population, it is responsible for over 15 percent of the world's consumption of wood.

(Source: www.GreenBuilding.com)

EXAMPLES FROM THE PIONEER VALLEY

Kittredge Business and Technology Center at Holyoke Community College

Holyoke Community College's Kittredge Center is a 54,000 square foot building on the current HCC campus providing educational opportunities, workforce training, and business development services. The new Kittredge Center for Business and Workforce Development is the first state-owned building with a green roof. Green roofs are part of an important design trend to produce buildings that are more sustainable in that they reduce storm water impacts to nearby rivers and streams, provide better insulation to buildings, and reduce the amount of energy needed for heating and cooling. The 2,500 square foot roof—with 6 inches of soil planted up with drought-tolerant sedums—intercepts and soaks up rainfall. As a result, the amount of storm water running off the built surfaces is greatly reduced.



EXAMPLES FROM OUTSIDE THE PIONEER VALLEY

The City of Boston

The City of Boston recently amended their Zoning Code to require all projects over 50,000 square feet to be designed and planned to meet the “certified” level using the US Green Building Council’s and Leadership in Energy and Environmental Design (LEED)

building rating systems. The Article also provides incentives by allowing up to four of the required LEED points to be obtained from the Boston Green Building Credits. One point can be obtained if the proposed project includes on-site combined electrical and heat generation; one point for the historic renovation of an existing structure; one point for on-site groundwater re-charge; and one point for sustainable transportation options for residents, such as public transit passes and car-sharing options. The City of Cambridge is also developing Green Building standards for buildings over 25,000 square feet.

Maine State Housing Authority

The Maine State Housing Authority (MSHA) has developed a set of green building standards for designers, developers, and contractors who apply for MSHA funding. These standards are a requirement for all projects that apply for funding, including rehab and renovation projects. A copy of the standard can be found [here](#).

ADDITIONAL LINKS:

“Leading by Example: An Action Plan for Green Building in Massachusetts State Construction Projects”, Massachusetts Sustainable Design Roundtable.

A model bylaw or strategy is included in the Pioneer Valley Sustainability Toolkit.

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Green Building/ Stretch Code



Habitat for Humanity Housing-Amherst



Brightly daylit, south-facing rooms, super-insulated envelope, energy-efficient, economical point-source heating units, energy-star appliances, super-insulated envelope and point source heating provide an economical alternative for affordable housing.

What are the objectives of green building codes, such as “the stretch code”?

To save money and improve the environment by reducing waste of energy, water, and land in building siting, design, construction, de-construction, and operation. Some codes also seek to improve occupant health by prescribing types of equipment and materials allowed in construction and operation of buildings.

Why do we need green building codes and standards?

Because buildings unnecessarily use 70% of electricity consumed in the U.S., 39% of energy, 40% of raw materials, and 12% of all potable water, wasting building owners billions of dollars each year. Buildings unnecessarily produce 39% of all carbon dioxide (CO₂) emissions and 30% of all waste (136 million tons annually) because they are poorly sited, designed, built and even torn down. In the past planners, architects, designers and builders did not always factor use of resources into building design and construction. As a result, most existing buildings waste a lot of energy which translates into wasting a lot of money. We need green building codes and standards to save money and limited natural resources and to achieve our vision of a sustainable region.

How do green building codes, including the stretch code, work?

Green building codes and standards work by requiring building siting, design, construction and de-construction to achieve whatever level of resource efficiency a community wants. In Massachusetts, all new construction must conform to the state building code. In 2008

when Massachusetts adopted the Green Communities Act, the Commonwealth committed itself to updating the state building code in accordance with the International Energy Conservation Code (IECC) which is usually updated every three years. This commitment will ensure a much greater level of new building efficiency throughout Massachusetts. At the same time, the Massachusetts Legislature enabled cities and towns to adopt an even more energy efficient building code, called “the stretch code”. Adopting the stretch code is optional, but it is one of the five requirements of Green Communities designation. The stretch code is called the stretch code because it is a “stretch” with respect to building efficiency. A building built to the stretch code will be 15% more energy efficient than one built to the base code. Building codes and standards are just like any other local government regulation. They represent a community’s values and they tell builders how to build. “Green” or “sustainable” buildings use key resources like energy, water, materials, and land more efficiently. With more natural light and better air quality, green buildings typically contribute to improved employee and student health, comfort, and productivity. And as stated, they use less energy and other essential resources, thereby reducing wasteful spending. Towns are advised to seek adoption of the Stretch Code as a general bylaw through a vote of Town Meeting. Cities may adopt the stretch code through a vote of city council.

DID YOU KNOW...

Springfield was the first city in Massachusetts to adopt the Stretch Code.

(Source: www.mass.gov/eoeea)

In addition to the stretch code in Massachusetts the other green building standard most used is the Leadership in Energy and Environmental Design (LEED) System, developed by the United States Green Building Council. LEED promotes a whole-building approach to sustainability by recognizing performance in five key areas of human and environmental health: sustainable site development, water savings, energy efficiency, materials selection, and indoor environmental quality. To adopt a requirement of LEED certification for all new buildings, Towns are advised to seek adoption of LEED certification as a general bylaw through a vote of Town Meeting and Cities are advised to seek adoption of through a vote of the city council.



EXAMPLES OF GREEN BUILDING IN THE PIONEER VALLEY

Hampshire College – The Ken Burns Wing, LEED certified



New 6,700 square foot addition to the Jerome Liebling Center for Film, Photography and Video, a part of the Arts Complex at Hampshire College.



Interior Design for the Ken Burns Wing of the Jerome Liebling Center included selection of interior finishes, furnishings, and lighting. Since it is a LEED registered project, special care was taken in making these selections to ensure that products were low in VOC's and that lighting was as efficient as possible. Post-construction graphic design services were also provided.



EXAMPLES OF GREEN BUILDING CODE IN THE PIONEER VALLEY

As of the end of 2010, six communities in the Pioneer Valley had adopted the stretch code and 12 are working on adoption (42%).

ADDITIONAL LINKS:

www.mass.gov/energy/greencommunities detailed resources on adopting the stretch code, cash flow analysis, commercial case studies and detailed FAQ

A model bylaw or strategy is included in the Pioneer Valley Sustainability Toolkit.

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Green Development Performance Standards



What is the objective of Green Development Performance Standards?

The purpose of these standards is to promote high quality and greener developments that also preserve and enhance natural resources and the environment. Green development techniques also protect the quantity and quality of drinking water supplies.

Why are Green Development Performance Standards needed?

Unregulated new development can have severe impacts on the landscape and environment, including the destruction of trees, wildlife habitat, landscape features, open space and scenic views, the generation of water pollution, heat and light pollution, traffic and excessive waste, and the use of excessive energy and water resources. Green Development Performance Standards can address all of these issues, and promote greener, better quality development with less environmental and energy impacts.

How do Green Development Performance Standards work?

Green development standards are established in the Zoning Bylaw and are implemented by the Planning Board and Building Inspector through the Site Plan Review or Subdivision review processes. Single family and two-family residential uses must receive Planning Board approval under Limited Site Plan Review and comply with applicable Green Development Performance Standards. Commercial, industrial and civic projects must undergo full Site Plan Review. Review and approval of subdivisions also includes Green Development Standards.

The Green Development Performance Standards address the following issues:

- » limits to site disturbance; tree preservation;
- » passive solar siting;
- » site and context assessment; energy efficiency;
- » landscaping and water reduction;
- » farmland preservation;
- » parking and trip reduction;
- » hazardous materials;
- » heat island reduction;
- » light pollution reduction;
- » recycling;
- » construction waste management; and
- » pedestrian and bicycle access.

Incentives are offered for green development projects that include permeable pavement, a green roof or additional projected open space. Incentives can include additional lot coverage, reduction of parking requirements, and reduction of stormwater detention requirements.

EXAMPLES FROM THE PIONEER VALLEY

PVPC has developed a model set of Green Development Performance Standards, which are the first of their kind. The towns of Palmer, Easthampton and Hatfield, MA are currently considering adopting Green Development Performance Standards. To date, these standards have not yet been adopted.

A model bylaw or strategy is included in the Pioneer Valley Sustainability Toolkit.

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Home Based Business



Home based business in Hadley

What are the objectives of a home based business bylaw?

To promote economic development by allowing town residents a broad choice in the use of their homes as places of livelihood in residential areas, while protecting the character and quality of life in the neighborhood.

Why do we need a home based business bylaw?

A home based business bylaw is a useful economic development tool for rural communities or communities that want to promote and permit neighborhood businesses. It encourages local economic development opportunities by allowing entrepreneurs and small business owners the ability to run a small business out of the home. In addition, these bylaws provide standards to ensure that these small businesses protect neighborhoods and residential areas from adverse impacts, such as noise, lighting and traffic.

How do home based bylaws work?

A Home Based Business bylaw establishes three types of Home Business that would be allowed in a community, and establishes minimum standards for parking, screening, lighting, traffic, signage, and hours of operation. The three levels of homes based business are:

- » Home Occupation, which has no more than two (2) non-resident employees and occupies no more than 33% of the gross floor area of the home



- » Minor Cottage Industry, which has no more than five (5) non-resident employees and occupies no more than 49% of the gross floor area of the building for business purposes.
- » Major Cottage Industry has no more than ten (10) non-resident employees and may not use less than 33% of the gross floor area for business purposes.

The bylaw provides minimum performance standards for each type of home-based business. Home Occupations are allowed by right subject to these minimum standards while Minor and Major Cottage Industries require Site Plan Approval from the Planning Board. The minimum performance standards address such things as residency requirements, minimum dimensional requirements, parking standards, screening, lighting, traffic, signage, and hours of operation. The Planning Board may grant a waiver or amendment from one or more requirements of the bylaw if it finds that the waiver or amendment is in the public interest and meets the intent of the Bylaw.

A model bylaw or strategy is included in the Pioneer Valley Sustainability Toolkit.



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Housing For Older Adults



Photo courtesy of flickr user Luvida Care

What are the objectives of pursuing multiple housing options for older adults within the community?

As the baby boomer generation continues to age, the number of older adults will rise to record levels. This will bring strong demand for housing suitable for older adults. Older adults have expressed a strong desire to ‘age in place’. Close to 90% of adults aged 45 and over that were surveyed by AARP indicated that they wished to stay within their homes for as long as possible as they aged.¹ The housing and care services available for older adults need to be both cost effective and attuned to seniors’ desires to age in place. The current approach to housing for older adults is dominated by institutional nursing homes and assisted living facilities. These facilities are expensive for residents who may often not require the level assistance provided by such facilities. Furthermore, large-scale senior housing developments typically require large tracts of land on ‘greenfield’ sites that are often located away from the neighborhoods and communities that older adults would like to stay connected with. By considering alternative forms of housing for older adults, communities can help to create housing that is reflective of the wishes of older adults to age in place with dignity and independence.



DID YOU KNOW...

By 2050, the number of adults aged 65 and older will double to over 88 million with more than 19 million over the age of 85.

(Source: Lipman, Barbara, Jeffrey Lubell, and Emily Salomon. *Housing an Aging Population: Are We Prepared?* [Washington, D.C.]: Center for Housing Policy, 2012.)

In 2012, the average annual cost of a semi-private room in a nursing home was \$81,030. A private room or apartment in an assisted living facility costs an average of \$42,600 annually.

(Source: Metlife Mature Market Institute. *Market Survey of Long-Term Care Costs.*

(2012) Retrieved from: <https://www.metlife.com/assets/cao/mmi/publications/studies/2012/studies/mmi-2012-market-survey-long-term-care-costs.pdf>

What types of housing for older adults are possible in our communities and how do they work?

The chart below lays out various options for communities to pursue in order to create a greater amount of housing options for older adults.

Housing Types for Older Adults			
Housing Type	Purpose	Physical Form	Recommended Regulatory and Policy Reforms
House-Sharing	As adults age they may want to share housing with unrelated adults. This may include renting rooms within their own home an exchange of housing for help with daily chores, or moving into a shared-home with others. House-sharing allows older adults to remain in their own homes and share daily activities with others while defraying the costs associated with house upkeep.	House-sharing relies upon the existing housing stock within a community, reducing the need for new developments.	Some zoning codes restrict house-sharing by limiting housing units to one family per unit. The definition of "family" unit is often defined as a limited number of unrelated adults. Changes to the definition of family can facilitate house-sharing by older adults. Similarly house-sharing can be added as an allowed use in appropriate districts
Multi-Family Housing	Single-family homes are typically the most expensive form of housing. They typically require the most maintenance, have the highest utilities bills, and can be isolating for older adults. Allowing more than one dwelling unit in a building provides more diverse choices for older adults and can make it easier for older adults to remain in their home community without the expense of a single-family home.	Multi-family housing consists of multiple housing units within a single building. Units may be leased from a building owner or owned as a condominium or co-op unit. Multi-family housing units may consist of flats, duplexes, townhouses, apartment buildings, mixed use buildings, and apartment communities.	Older adults looking to downsize into an apartment may find limited multi-family housing options available in their community. This may be the result of market forces, but it is often also the result of local zoning. Many zoning codes, particularly in rural areas, significantly limit or even outlaw housing other than single-family houses. Zoning codes may limit multi-family housing to undesirable or economically unfeasible locations which may force older adults to sacrifice their social connections and life patterns for housing that meets their size or cost needs. A community can review its zoning code to make the most efficient and effective changes to accommodate older adults who desire multi-family housing.





Housing Types for Older Adults			
Housing Type	Purpose	Physical Form	Recommended Regulatory and Policy Reforms
Naturally Occurring Retirement Communities (NORCs)	Naturally occurring retirement communities is a term that describes buildings or neighborhoods which have developed a concentration of older adult residents over time. NORCs do not have an official designation as a retirement or assisted living community, though recently NORCs in conjunction with supportive services programs have emerged as an alternative to assisted care facilities. The NORC supportive services model works through partnerships with property managers, health care and social service agencies, and other organizations.	Naturally occurring retirement communities take advantage of existing housing stock and may be located within denser, single-family neighborhoods, or within multi-family housing complexes. As the name suggests, NORCs are guided by the preferences of older adults who choose to live in a certain neighborhood amongst people their own age.	<p>Naturally occurring retirement communities vary depending upon the community. Communities can help encourage NORCs by allowing house sharing, multi-family housing, and accessory dwelling units in the zoning code. When NORCs are identified, communities can revise the zoning code for that location to allow goods and services that are frequently used by older adults.</p> <p>When a NORC is identified, a community can prioritize infrastructure changes to meet the needs of older adults in the vicinity of NORCs. For example, extending pedestrian crossing times, improving sidewalk maintenance, and ensuring adequate non-glare street lighting.</p>

Housing Types for Older Adults			
Housing Type	Purpose	Physical Form	Recommended Regulatory and Policy Reforms
Accessory Dwelling Units, i.e. "Granny-Flats"	Accessory dwelling units (ADUs) are an additional housing unit that is added on to an existing house. ADUs can be used by relatives of older adults to house and care for them while still providing the individual independence. Alternatively, older adults may construct an ADU for themselves to live in while renting their home for supplemental income, or they may choose to rent the unit itself.	Accessory dwelling units may be attached to an existing house such as above an attached garage or they may be detached, stand-alone structures such as a cottage or guesthouse on the property. ADUs typically have their own separate entrance, kitchen, and bathroom but often share certain amenities with the adjoining housing unit like laundry facilities.	Many communities do not allow ADUs within their zoning code or restrict where they can be built by requiring excessively large lot sizes or setbacks, or by restricting the conversion of non-conforming structures into ADUs. By allowing ADUs or revising requirements for them communities can increase housing flexibility for older adults—sometimes enabling an older adult to age-in-place when they would otherwise have to move.

Housing Types for Older Adults			
Housing Type	Purpose	Physical Form	Recommended Regulatory and Policy Reforms
Continuing Care Facilities	Continuing care facilities (CCFs), also known as life care facilities or residential care facilities are retirement communities that consist of assisted living facilities and personal care homes. These facilities provide housing and supportive services to persons who may be unable to live independently, but generally do not require the skilled level of care provided by nursing homes. There are a variety of life care facilities which range in size and services provided. Continuing care facilities are a multi-tiered approach to aging that accommodates residents' changing needs in one place.	Individuals entering a continuing care facility may live an independent lifestyle in a single family home, apartment or condominium, while having services nearby if needed. As residents age and everyday activities become more difficult, they may move into assisted living or nursing care facilities on site. Because they provide a variety of unit types, continuing care facilities are often large developments and are generally built on greenfield sites on the outskirts of a community. This can present challenges for older adults who wish to remain active within a community.	Zoning for senior housing like continuing care facilities is often achieved through establishing specialized use categories within the zoning code. This allows communities to regulate where senior housing can be located, as well as its characteristics. Since life care facilities are often built upon greenfield sites at the edge of a community, residents may be forced into a car-dependent lifestyle. Communities can review site plan and subdivision regulations in order to ensure that a proposed senior housing development will provide safe access and internal circulation for pedestrians and automobiles. Communities can proactively identify appropriate parcels for senior housing and work to steer development towards them. It is especially helpful if communities can advocate for planned development that includes not only senior housing, but housing for other age groups as well as commercial development.





Housing Types for Older Adults			
Housing Type	Purpose	Physical Form	Recommended Regulatory and Policy Reforms
Cohousing	Cohousing is a method of housing development where a group of people get together to act as the developer for a housing community. By building as a group, per unit costs can be reduced (by achieving an economy of scale, eliminating redundant infrastructure, and eliminating the profit margins that a developer would usually make). Cohousing developments typically further reduce costs by building small units in a dense cluster.	Cohousing is typified by shared common spaces (outdoor spaces and common buildings), smaller units, shared parking located at the periphery of the development, and pedestrian-only paths within the development (pedestrian paths often double as emergency access). Because of these design features, cohousing developments have been noted for the safe and sociable environment they create which residents say enriches their lives.	Communities can promote cohousing by allowing “flexible development”, sometimes referred to as cluster development, open space residential development, or natural resource protection zoning. ² Additionally, communities can add cohousing as an allowed use in their zoning regulations, including explicitly allowing common buildings for residential use including shared home office and workshop space. Lastly, communities can review their subdivision regulations to make sure that there are no obstacles preventing compact development patterns associated with cohousing.

Housing Types for Older Adults			
Housing Type	Purpose	Physical Form	Recommended Regulatory and Policy Reforms
Cottage Housing	Cottage housing is similar to cohousing and is another innovative form of housing that is well suited to older adults. Cottage housing is usually composed of a number small housing units clustered around a common space with parking to the outside of the development. Like cohousing, cottage housing is appealing to older adults for the safe and sociable environments they create. Because cottage units are smaller than typical single-family houses, they are usually more affordable than single family houses in the same area.	Sometimes referred to as a “pocket neighborhood”, cottage housing typically takes an individual lot that would have otherwise been developed for large single-family homes, or a commercial use, and instead develops a number of small cottage units (under 1000 sq ft) around a cottage green. The size of housing units and the total developed parcel of cottage housing units is generally smaller than a cohousing development, and is usually not initiated and developed by future occupants. Parking is typically located around the periphery of the development. It may or may not be shared. Internal paths are typically for pedestrians-only.	Communities can encourage cottage housing by allowing zoning for “multiple units per lot” in certain districts thereby allowing the applicant to avoid a costly subdivision permitting process. If a community wants to promote cottage housing while prohibiting other similar forms of development, they can establish a use category in zoning for cottage housing with an associated definition that distinguishes cottage housing from other forms of development. Criteria likely would include benchmarks for parcel size, unit size, minimum and maximum densities, and provision of shared outdoor space. Cottage housing can be allowed by-right, but communities may want to require a site plan review in order to make sure a proposed development “fits in” to a neighborhood. Alternatively, a community could require a special permit for cottage housing. Finally, zoning dimensional requirements, and subdivision regulations standards can be modified to facilitate cottage housing.

² Natural resource protection zoning is a relatively recent zoning technique that has been developed for rural and suburban edge locations. It was created to improve conservation outcomes for high priority land, while allowing for predictable development of housing at appropriate neighborhood densities.



Housing Types for Older Adults

Housing Type	Purpose	Physical Form	Recommended Regulatory and Policy Reforms
Assisted Living	Assisted living communities are licensed and regulated by the state and intended for older adults who require assistance with certain daily activities like dressing, bathing and eating, but are not completely disabled. As with continuing care facilities, residents of assisted living facilities typically rent or buy their own rooms or apartments.	Like continuing care facilities, assisted living facilities and nursing home facilities are generally large developments which are typically located on greenfield sites away from the community and amenities. Many older nursing home facilities are set up like and resemble a hospital, though lately some newer developments have a greater degree of privacy and amenities like shared kitchens and living spaces.	Zoning for senior housing for assisted living facilities and nursing home facilities is often achieved through establishing specialized use categories within the zoning code. This allows communities to regulate where senior housing can be located, as well as its characteristics. Since life care facilities are often built upon greenfield sites at the edge of a community, residents may be forced into a car dependent lifestyle. Communities can review site plan and subdivision regulations in order to ensure that a proposed senior housing development will provide safe access and internal circulation for pedestrians and automobiles. Communities can proactively identify appropriate parcels for senior housing and work to steer development towards them. It is especially helpful if communities can advocate for planned development that includes not only senior housing, but housing for other age groups as well as commercial development.
Nursing Homes	Nursing homes focus on caring for older adults that are disabled, severely ill or need help with a majority of daily tasks. Nursing home costs are covered by a combination of savings, relatives, private health insurance or government programs like Medicare or Medicaid.		

EXAMPLES FROM THE PIONEER VALLEY

American Inn, Southwick

The American Inn in Southwick is a 50 acre life care facility that provides residents with a variety of housing choices and recreational opportunities. Residents may live in one or two bedroom cottage units, or spacious independent living apartments. For those that need greater assistance with daily activities there are assisted living apartments available as well. There is a host of amenities on the premises including a wellness center, fitness center, a café, library, beauty parlor and barber shop, social, recreational and educational programs, a billiard and card room, and local transportation. The American Inn provides residents with an active lifestyle which includes evening strolls, neighborhood socializing, dining, and numerous activities which bring residents together for socializing.



Photo courtesy of flickr user Luvida Care

One to two bedroom independent living apartments at American Inn are priced from \$145,900 to \$249,900 dollars and include thirty meals per month. The independent living cottages are priced from \$164,900 to \$269,000 and include a fully appliance kitchen and access to the Crane Building facilities. Assisted living apartments include three meals a day, as well as a wide variety of services and is priced at a base level of \$3,364 per month.

Links to More Information

SENIOR COHOUSING:
<http://www.seniorcohousing.com/>

A model bylaw or strategy is included in the Pioneer Valley Sustainability Toolkit.

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Springfield, MA 01104-3419

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Inclusionary Zoning



Affordable Units in Amherst



What are the objectives of inclusionary zoning?

To increase the affordable housing inventory in a community, and to help provide a range of housing options to include homebuyers or renters whose income is below the regional median household income of \$62,900.

Why do we need inclusionary zoning?

Rising housing costs and lack of housing diversity can make housing choices difficult for young adults seeking to live in the town they grew up in, for people to live in the same community where they work to avoid long commutes, or for the elderly to continue living in the same community as their housing needs change. Communities need to make a concerted effort to ensure that homes are available for modest-income households. The task is complicated for several reasons. First, increasing construction and land costs have driven up the cost of development projects, especially after Hurricane Katrina. Developers also profit more by building luxury homes, which has spurred the construction of “McMansion” subdivisions throughout the state. At the same time, many cities and towns do not have zoning that allows more affordable multi-family dwellings or homes to be built on smaller lots.

How does inclusionary zoning work?

Cities and towns can pass a zoning bylaw or ordinance that requires private developers to make a fixed percentage of their housing affordable to low- or moderate-income households. Amherst, for example requires that in all new developments of over 21 housing units, at least 12% of the units have to be affordable. The affordability of the units

is maintained through a deed restriction, typically for 20 or 30 years and in some cases in perpetuity. Most programs contain “cost offsets” (e.g., density bonuses, expedited permitting processes, or fee waivers) that help developers meet the cost of producing affordable homes. Chapter 40R Smart Growth Zoning districts, which are also included in this toolkit, could also be considered a kind of inclusionary zoning. It requires that in any development in the Smart Growth District over 13 units, 20% of the units have to be affordable. In exchange the developers may build at a higher density within the district designated by the community. Over 100 Massachusetts communities have adopted inclusionary zoning regulations.



DID YOU KNOW...

Households whose income falls at or below 80% of the median income for the area qualify for affordable housing programs. For 2007, in Hampshire and Hampden Counties, this is \$57,350 for a family of four and \$61,950 for a family of five. For example, a five person “household” could be a couple, one working full-time and the other part-time, with two children and an elder parent living with them.

(Source: US Department of Housing and Urban Development)

EXAMPLES FROM THE PIONEER VALLEY

Town of Hadley

The Town of Hadley was awarded a Smart Growth Technical Assistance Grant to prepare an Inclusionary Zoning bylaw as a result of the Pioneer Valley Planning Commission’s regional application to the Executive Office of Environmental Affairs. A model Inclusionary Zoning bylaw developed by PVPC and tailored to Hadley’s needs was prepared and given to the Planning Board for their review and consideration. PVPC worked with the Planning Board over the summer of 2006 to finalize the language of the proposed inclusionary zoning bylaw. PVPC also prepared a fact sheet on affordable housing and inclusionary zoning regulations to be used as an educational tool during the public hearing process. The Inclusionary Zoning Bylaw was adopted at a Special Town Meeting held in the fall. The bylaw requires that all new residential developments of six (6) or more dwelling units must provide a minimum of fifteen percent (15%) of the units to be affordable as defined in M.G.L. Chapter 40B.

Town of Amherst

Amherst has also adopted an inclusionary zoning bylaw. Following is an excerpt from their bylaw:

SECTION 15.1 REGULATIONS

To ensure the purposes of this section, the following regulations shall apply to residential development in Amherst:

- » 15.10 All residential development requiring a Special Permit and resulting in additional new dwelling units shall provide affordable housing units at the following minimum rates:

» Total Development	Required Affordable
» Unit Count	Unit Provision
» 1-9 units	None*
» 10-14 units	Minimum one (1) dwelling unit
» 15-20 units	Minimum two (2) dwelling units
» 21 units	Minimum 12% of total unit count

» * While provision of affordable units is not required for developments containing 1-9 units under this section, the Bylaw encourages affordability and provides for incentives. See Sections 4.33 and 4.55. For developments of 21 or more total units, calculation of the number of affordable units shall, if the required percent of the total results in a fraction, be rounded up to the next whole number where the fractional portion is equal to 0.5 or greater, and shall be rounded down to the next whole number where the fractional portion is less than 0.5.
- » 15.11 Affordable dwelling units provided under Section 15.10 shall be counted as meeting the requirements for affordability density bonuses under the provisions of Section 4.550.0 (Open Space Community Developments).
- » 15.12 The applicant shall establish such housing restrictions, conditions, and/or limitations as are necessary to ensure that the affordable housing units provided under this section will be permanently available for purchase by eligible low-and moderate-income buyers, and available for a minimum of twenty years in the case of rental housing.



OTHER RESOURCES:

"Inclusionary zoning: Guidelines for cities and towns" prepared for the Massachusetts Housing Partnership Fund by Edith M. Netter, Esq.

http://www.mhp.net/uploads/resources/inclusionary_zoning__guidelines__netter.pdf

A model bylaw or strategy is included in the Pioneer Valley Sustainability Toolkit.

FOR MORE INFORMATION, PLEASE CONTACT

Pioneer Valley Planning Commission

413-781-6045

60 Congress Street, Floor 1

Springfield, MA 01104-3419

www.pvpc.org



Low Impact Development



Streets designed without curbs allow water to drain into natural systems, such as gardens

What are the objectives of Low Impact Development?

To create a more sustainable land development pattern that results from a site planning process that first identifies critical natural resources, then determines appropriate building envelopes. To incorporate a range of best management practices (BMPs) that preserves the natural hydrology of the land.

Why do we need Low Impact Development?

Development patterns based on conventional zoning codes in Massachusetts often result in “sprawl” with its associated large impervious areas, loss of natural areas, and alteration of hydrologic systems. Too often, the development process begins with the clearing and leveling of an entire parcel. Conventional developments that follow commonly contain wide roads and large parking lots. These large impervious areas prevent water from infiltrating into the ground (which normally replenishes groundwater supplies and supports nearby wetlands and streams with baseflow) and convey polluted runoff into waterbodies. To deal with water that runs off of these sites, structural stormwater controls such as catch basins, pipes, and detention ponds are used. Conventional landscaping of these developments brings additional concerns including the introduction of non-native plants, use of herbicides, pesticides and fast-releasing fertilizers, and excessive water consumption.

How does Low Impact Development work?

The LID approach provides opportunities to build the homes and businesses that are needed, while conserving natural areas and drainage patterns. LID is accomplished as a two-step process: 1) thoughtful site planning, and 2) incorporation of best management



practices (BMPs). Thoughtful site planning begins with an approach that identifies critical site features such as wetlands, poor soils, or drinking water protection areas that should be set aside as protected open space. Natural features, such as vegetated buffers and view sheds, will also play an integral role in any LID planning exercise. After the critical open space areas are identified and set aside, sustainable development areas are then identified as “building envelopes.” Within the delineated building envelopes, a broad range of design techniques or BMPs, such as shared driveways, permeable pavers, and bioretention are used to reduce the level of impervious cover and improve the quantity and quality of stormwater drainage. Other LID design techniques include green roofs, rain barrels, rain gardens, grassed swales, stormwater infiltration systems, and alternative landscaping. Through these techniques, natural drainage pathways are conserved, open space is preserved, and the overall impact from development is significantly reduced.



DID YOU KNOW...

Vegetated rooftops have been used extensively in Germany for more than 25 years and results show up to 50% reduction in annual runoff in temperate climates. (US EPA)

EXAMPLES FROM THE PIONEER VALLEY

Town of Pelham

With a Smart Growth Technical Assistance Grant from EOEA, PVPC worked with the Pelham Growth Study Committee to draft a Low Impact Development (LID) zoning bylaw utilizing the LID Bylaw from EOEA's Smart Growth Tool Kit as a model template. Given the largely rural and residential nature of Pelham, the committee felt that the State's model was more complicated than they would be able to administer and was more appropriate for new commercial and industrial developments, the likes of which were not happening in Pelham. Therefore, PVPC significantly streamlined the model, making the bylaw applicable to two types of land uses: 1) all non-residential land disturbances requiring a Special Permit and/or Site Plan Approval, and 2) all residential uses, including single-family detached dwellings, creating land disturbances that require a Special Permit, Site Plan Approval, or Building Permit. The Committee opted to call the new zoning bylaw a Stormwater Management bylaw rather than an LID bylaw due to the fact that they believe stormwater management is a term more easily understood by the general public rather than low impact development.

EXAMPLES FROM OUTSIDE THE PIONEER VALLEY

Please visit the Massachusetts Smart Growth Toolkit, developed by the Executive Office of Energy and Environmental Affairs, for more examples of LID in Massachusetts.

A model bylaw or strategy is included in the Pioneer Valley Sustainability Toolkit.



FOR MORE INFORMATION, PLEASE CONTACT

Pioneer Valley Planning Commission

413-781-6045

60 Congress Street, Floor 1
Springfield, MA 01104-3419

www.pvpc.org

Mixed Use Development Districts



What is the objective of Mixed Use Development Districts?

Mixed use districts foster well planned, mixed use, compact developments within downtown and village areas, in keeping with the character of traditional New England villages. They can create places with unique and positive local identities, and provide development opportunities for expanding a community's economic diversity and vitality.

Why are Mixed Use Development Districts needed?

Low density urban sprawl has become the Pioneer Valley's dominant form of growth, consuming open land at an accelerated pace. Smart growth principles promote the mixing of commercial and residential uses to help create more interesting, functional, and environmentally sensitive built environments. Mixed use developments integrate housing, shops, offices, schools, parks, and civic facilities into compact areas to make biking, walking, and using transit easier. They can help limit sprawl and lessen air pollution.

How do Mixed Use Development Districts work?

Communities can adopt mixed use village center zoning to provide for pedestrian-friendly "Main Street" shopping districts with attractive facades, parking on the street or behind buildings, tree-lined streets and human scale buildings with offices/apartments above first-floor shops. Mixed-use projects can combine residential, retail, office, and public institutional uses in compact villages or clusters to provide opportunities for people to live close to work and services.



A Mixed Use Development District can be adopted as either a stand-alone zoning district, or as an overlay district which can be superimposed over several underlying zoning districts. This bylaw/ordinance does not create any new zoning restrictions, but rather allows new opportunities for economic development.

The Bylaw/Ordinance will allow mixed use developments to be constructed with the approval of a Special Permit with Site Plan Approval granted by the Planning Board. The following uses may be included within a mixed use development: retail uses; quality restaurants; multi-family residential uses; home occupations; professional service offices; personal service establishments; municipal uses; banks or financial institutions; health club; small hotel or motel; bed-and-breakfast establishments; townhouses; theatre; park; artist studio/residence; assisted living residential uses; parks and recreation; artisan manufacturing; civic uses; live/work units; multiple uses in the same structure.

The Bylaw/Ordinance prohibits certain uses in Mixed Use developments, such as industrial uses, gas stations, dry cleaning, auto sales, adult uses, bars, and animal hospitals.

To protect the community and neighborhoods, the Bylaw/Ordinance contains detailed performance standards for such issues as: access and traffic impacts; noise; vibration; odors; lighting; storage; waste disposal; loading; vehicular access; parking; architectural design; signs; and landscaping.

Finally, the Bylaw/Ordinance provides a density bonus for Mixed Use developments that include affordable housing.

DID YOU KNOW...

In a Seattle study, authors found that by mixing land uses and enhancing the relative convenience on non-auto travel, 12.2% of all trips were non-motorized, compared to 3.9% in single-use residential neighborhoods.

MIXED USE DEVELOPMENT EXAMPLES FROM THE PIONEER VALLEY

South Hadley Village Commons

The Village Commons is an outstanding example of a mixed use development in South Hadley center, which includes retail shops and restaurants, a movie theater, as well as a residential component. It is designed to fit compactly on a small site on the town common, with a well defined street line, pedestrian friendly features and parking in the rear.



Pomeroy Commons, Amherst

Pomeroy Commons is a mixed-use development in Pomeroy Village Center of Amherst. Five townhouse style residential units occupy the top two floors, with commercial space on the street level. The site is located in the center of south Amherst, within walking distance of many amenities. The building features a front porch and balcony in the style of a grand old Berkshires hotel, parking in the rear, and secure bicycle storage in a shed at the end of the building.

A model bylaw or strategy is included in the Pioneer Valley Sustainability Toolkit.



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60 Congress Street, Floor 1

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Open Space Residential Development, Creative Development, & Conservation Development Bylaws

What are the objectives of Open Space Residential and Conservation Developments?

Cluster, Open Space, Conservation or natural Resource Developments, they are called many names as they've evolved over the decades but they are all essentially a variation on a theme, developments utilizing smaller lots in order to create more common open spaces. By promoting compact residential developments utilizing more flexible dimensional standards communities can preserve and enhance their rural town character by protecting open space, natural resources, and scenic areas, as well as promote the use of sustainable and energy efficient development standards .

Why do we need Open Space Residential & Conservation Developments?

Growth in many of our small cities and towns has been primarily comprised of ANR residential development along existing town roads and large lot single family home subdivisions. This has resulted in sprawling residential strips and the clearing of large swaths of woodlands and the conversion of farmland for individual single family homes. This has not only resulted in the loss of natural resources but has also contributed to the loss of a community's rural character and small town identity. Open Space Residential and Conservation Developments provide an alternate way for towns to accommodate growth, but in a more flexible manner which preserves open space and reduces the visual impact of residential development.

DID YOU KNOW...

In a national random sample survey of 1,130 adults age 18 and older, about 55 percent of Americans prefer a smart growth community and 45 percent prefer a sprawl community, after hearing detailed description of the two community types. (2004 National Community Preference Survey, conducted for Smart Growth America and National Association of Realtors).





How do Open Space Residential and Conservation Development bylaws work?

These types of bylaws promote development using common driveways and flexible area and frontage requirements to create permanent open space and avoid standard Approval Not Required and conventional subdivision developments. While some versions are permitted by Special Permit recent variations are allowed by-right with a Site Plan Approval process. Through this process, towns work with the applicant to consider development standards such as Stormwater Management, Low Impact Development, Green Energy and Open Space Connectivity in designing the layout of lots and designing the development around the unique characteristics of the land. A portion of the development must also be set aside as permanently protected open space.

Over 65% of the communities in the Pioneer Valley Region have adopted Open Space Residential and Conservation Development Bylaws in one form or another.

PVPC OFFERS THREE MODEL VARIATIONS OF THESE BYLAWS:

Open Space Residential Development bylaw

This model is based on the more traditional cluster concept adopted by most communities in the region over the last 30 years. It often requires a Special Permit, Open Space Residential Developments permit greater density on smaller lots but includes specific minimum dimensional requirements for the reduced lot sizes and frontages. This bylaw

typically requires a minimum 50% open space requirement. Only a limited percentage of the open space can be composed of wetlands, floodplains and areas of steep slopes to ensure adequate open space for active outdoor recreational activities.

Creative Development Bylaw

Expanding on the original version, Creative Development Bylaws utilize the same principles as Open Space Developments but allow more flexibility by utilizing common driveways and permitting reduced minimum lot sizes with no minimum frontage requirements. The purpose of this approach is to preserve open space and encourage structures to be situated on the site in a manner that minimizes their visual impact. Creative Developments are permitted by Special Permit and offer Farmland Preservation Standards as well as an Affordable Housing alternative.

Conservation Development Bylaw

Representing a more recent evolution of the concept, and building on the Creative Development Bylaw, Conservation Development Bylaws provide extremely flexible dimensional standards with no dictated minimum lot size or frontage requirements. The purpose of this is to encourage the design of the development that best fits the parcel's unique landscape--conserving the most unique features and blending roads and structures into the site's existing topography, vegetation, and context. The type of conserved open space has been expanded to also include farmland, historic/cultural and significant natural features, endangered species habitat and scenic views. The intent is that through the imaginative layout of the road, buildings and open space these parcels can appear to be undeveloped from the town roads giving the appearance of open space. To encourage developers to take advantage of this alternative Conservation Developments are often permitted By-Right with Site Plan approval and apply to both "ANR" lots and subdivisions.

A model bylaw or strategy is included in the Pioneer Valley Sustainability Toolkit.

FOR MORE INFORMATION, PLEASE CONTACT

Pioneer Valley Planning Commission

413-781-6045

60 Congress Street, Floor 1

Springfield, MA 01104-3419

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Parking Bylaws



Northampton Parking Garage

What are the objectives of a parking bylaw?

To ensure that all uses provide sufficient off-street parking space to meet the needs of employees, patrons and deliveries; to reduce congestion on streets; to improve pedestrian and vehicular circulation and safety in a cost effective and environmentally sound manner.

Why do we need a parking bylaw?

Parking is an essential component of any land use as well as the overall transportation system. Parking must be accommodated at every destination whether at a residence, convenience store, commercial strip or urban center. The vast majority of a vehicle's life is spent parking and utilizes several parking spaces over the course of the day. From a consumer's point of view there is a perceived parking problem if they can't park near the front door of where they want to shop, and from a developers point of view they are required to provide too much parking. Parking problems are less often a matter of supply and more often a matter of inefficient management of existing resources. Parking regulations promote better designed, more efficient and cost effective off-street parking creating more functional and attractive communities with reduced environmental impacts.

How do parking bylaws work?

Parking requirements are typically based on general land use categories and calculated on either the amount of square footage of a facility or the number of cars/trucks expected to be generated. Often times these numbers are based on a worst case scenario (i.e. holiday season shopping) leaving a majority of the parking lot unused for large portions of the year (resulting in increased construction costs, excessive stormwater run-off and heat island effects). In many urban centers parking requirements are being reduced



(and in some cases even eliminated) in place of instituting better parking management practices (off hour/dual usage of spaces, combined facilities, shared off-site facilities, parking garages, peak demand plans, pricing, improved signage, encouraging other modes of transportation, etc.). Bylaws can also, through a Special Permit, allow for a reduction in the number of parking spaces where it can be demonstrated as being warranted (employer car/van pooling, flexible/alternative work hours, telecommuting programs).

Some communities also allow for a payment into a municipal parking fund in lieu of physically providing the spaces on the ground. This enables communities to raise funds to develop new shared municipal parking facilities.

DID YOU KNOW...

Cost-effective parking management programs can usually reduce parking requirements by 20-40%

EXAMPLES FROM THE PIONEER VALLEY

Northampton MA

Northampton recently eliminated most of the parking requirements for its Central Business District. The downtown is well served by a municipal parking garage as well as a number of strategically located municipal parking lots. In addition the Planning Board can issue a Special Permit allowing multiple buildings, uses and parcels to share a combined facility. In all districts except the Central Business District the Planning Board can permit (through Site Plan Approval) a reduction of up to 20% of the required number of spaces with an acceptable trip reduction plan and even greater percentages (through a Special Permit) where dual usage of spaces are utilized based in different peak demand periods. The Planning Board can also issue a Special Permit for off-site parking in available non-municipal lots within 500-1000 feet of the use. The Central Business District also allows a by-right option to pay into a Downtown Parking Reserve Account to be used solely for expenses related to increasing parking availability, improving the management and utilization of existing parking spaces, or reducing the need for new parking.

Westfield, MA

Recognizing that strict on-site parking requirements sometimes discouraged otherwise viable and desired downtown revitalization projects, the city of Westfield recently revised its parking ordinance to provide more flexible standards and options. While downtown Westfield does not have a parking garage, it does have a number of well utilized and maintained municipal lots behind its main street stores. The ordinance allows for shared off-site facilities within 300 feet of the uses. The Planning Board can also issue a Special Permit for the multiple use of individual spaces in accordance with an approved Parking Management Plan. The Plan must demonstrate that the peak parking demand generated by the uses occur at different times, and that there will be adequate parking for the combined uses at all times. Westfield also offers a “payment in lieu of” option by Special



Permit in the downtown. These other new parking options are not just limited to the downtown but are also available in all business and industrial districts.

For more information on examples of Smart Parking from across Massachusetts, please refer to the state's **Smart Growth / Smart Energy Toolkit** developed by the Executive Office of Energy and Environmental Affairs.

A model bylaw or strategy is included in the Pioneer Valley Sustainability Toolkit.

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Planned Business Development



Village Commons, South Hadley

What are the objectives of Planned Business Development?

A Planned Business Development offers an alternate development tool allowing for a more creative and innovative approach to developing business and industrial uses. Projects are undertaken in a comprehensive coordinated manner with clustered buildings often utilizing shared parking, signage and utilities such as storm water drainage systems.

Planned Business Developments result in a lessening of traffic congestion, reduction in vehicle trips, and an increase in public safety through the coordination of land development and traffic patterns. They also promote more attractive development through grouping in clusters and nodes instead of typical highway strips. The resulting projects can be more compatible with existing development on adjacent sites, create a more pedestrian-friendly environment in both design and scale, and utilize a development review and approval process that meets these purposes without causing undue delays.

Why are Planned Business Developments needed?

By promoting Planned Business Developments, communities can capitalize on their limited availability of business and industrially zoned properties by maximizing their development potential with more efficient land usage resulting in an expanded tax base and increased job opportunities. Planned Business Developments provide greater opportunity for the construction of quality, attractive developments on large (or even limited) tracts of land by providing flexible guidelines which allow the integration of shared utilities and on-site improvements and increased densities in one development, sometimes issued under a single Special Permit/Site Plan Approval permit.



How does the zoning for Planned Business Developments work?

Communities adopt zoning provisions permitting Planned Business Developments through the issuance of a Special Permit and/or Site Plan Approval. These provisions also establish incentives to promote Planned Business Developments and performance standards to ensure that such projects have a positive effect on a community's environment, character and quality of life. The incentives could allow for reduced lot sizes, increased densities, increases in the allowed percentage of building coverage, shared parking and reduced parking requirements.



DID YOU KNOW...

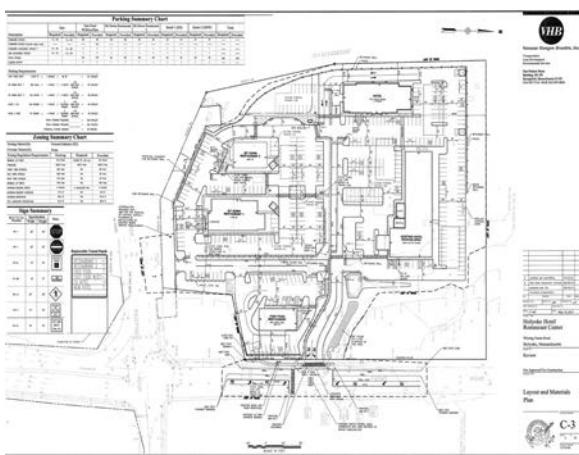
Planned Business Developments can be permitted through the issuance of a single Special Permit/Site Plan Approval that covers the entire parcel(s)/project. This single approval has the advantage of making the subsequent development of the individual units more marketable as being "shovel ready" and pre-permitted.

EXAMPLES FROM THE PIONEER VALLEY



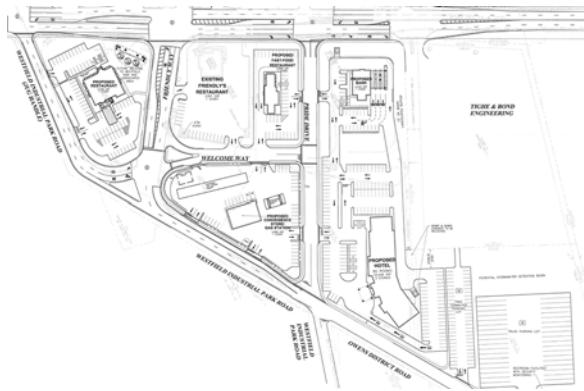
Village Commons, S. Hadley

Following a major fire, this site was redeveloped as a comprehensive mixed use project including retail shops, professional offices, restaurants, coffee shops, theaters personal services and apartments.



Holyoke Hotel & Restaurant Center, Holyoke

Proposed at the corner of Lower Westfield Road and Whiting Farms Road, this proposed redevelopment of a former Holiday Inn site will encompass a new hotel along with an array of restaurant types. Submitted as a single comprehensive project including all on-site traffic circulation, storm water drainage, lease areas, building envelopes, etc. The Planning Board approved the overall development's master plan and uses with unknown specific tenants. As each site is leased, tenants will meet with the Planning Board to review their lease area's landscaping and building materials.



Westpark, Westfield

Developed on Southampton Road across from the Mass Turnpike interchange, this development was also approved as a master plan addressing all traffic circulation, storm water drainage, and lease areas for the site. Like the example from Holyoke, the initial submission included only one identified tenant (Holiday Inn Express) and as each site is leased tenants will meet with the Planning Board to review their lease area's landscaping and building materials.

A model bylaw or strategy is included in the Pioneer Valley Sustainability Toolkit.

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Pioneer Valley Planning Commission

413-781-6045

60 Congress Street, Floor 1
Springfield, MA 01104-3419

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Planned Unit Development



Echo Hill, Amherst

What are the objectives of Planned Unit Development?

The Planned Unit Development (PUD) is a form of development that usually includes a mix of housing units and nonresidential uses in one unified site or subdivision. Communities can minimize sprawling growth by replacing it with alternative development patterns such as Planned Unit Development projects which combine residential, retail, office, and public institutional uses in compact, pedestrian-friendly villages or clusters. PUDs create opportunities to live and work close to shopping, and services; and placing housing and jobs in close proximity reduces the number of vehicle trips to work, home, or shopping, limiting air pollution.

Why are Planned Unit Developments needed?

The adoption of a Planned Unit Development bylaw promotes development projects to develop a tract of land (relatively large scale, but not always) in a unified manner. Through PUDs, a municipality can achieve greater design flexibility in the development of particular land areas, and guide commercial and mixed-use projects to reflect the needs and character identified by the community. PUDs also provide the opportunity to achieve flexibility in architectural design, a mix of compatible land uses as well as the preservation of key natural or historic features, that are otherwise difficult to achieve using traditional, lot-by-lot zoning.



How does the zoning for Planned Unit Developments work?

Communities can adopt zoning provisions that establish incentives to promote Planned Unit Developments and performance standards to ensure that such projects have a positive effect on a community's environment and quality of life. The incentives could allow for reduced lot sizes, increases in the allowed percentage of a lot that can be built upon, and reduced parking space requirements provided that the development is clustered and planned as an integral unit.

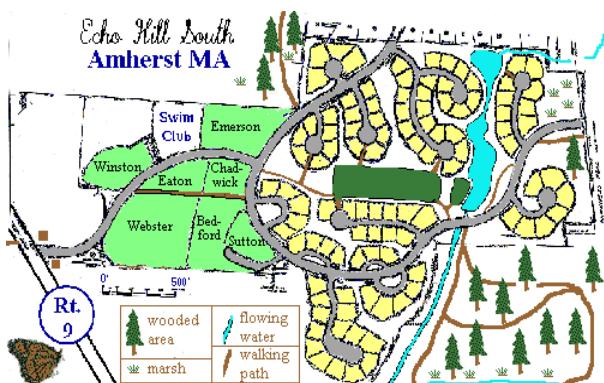
DID YOU KNOW...

In a 1990 study comparing market appreciation of homes in a cluster development versus a conventional subdivision, the cluster/open space Echo Hill development exceeded its conventional counterpart, Orchard Valley, in open-market, sale-price appreciation during the period of 1968 to 1989. ("An Examination of Market Appreciation for Clustered Housing With Permanent Open Space", Jeff Lacy, Center for Rural Massachusetts)

EXAMPLES FROM THE PIONEER VALLEY

Echo Hill, Amherst

Located off of Route 9 in Amherst, Echo Hill South was conceived and built in the 1960s, becoming the first "open-space" development built under zoning in Massachusetts. Utilizing the flexible provisions of the planned unit development zoning bylaw, the developer and landscape architect designed and built the subdivision while preserving over 36 acres of commonly-held, open-space – nearly half the total area of the original tract.



Source: Echo Hill South (EHS) Community webpage

Echo Hill South houses six sets of condominiums, 102 single family homes, protected open space, marsh, walking trails, a health club and small commercial center. To accomplish this without affecting the overall housing density, individual house lots were reduced from the required one-half acre lots in the underlying zoning, to one-quarter acre. The remaining lands are now held in common ownership, with each individual homeowner possessing an undivided, but equal, interest in the property.



One major collector street serves the development. This roadway was built “over-standard,” having a paved width of 31 to 32 feet, 3 feet of which, on either side, is marked for pedestrian travel. It is a through-street, linking Echo Hill South to three entries and exits onto major roads. None of the 102 house lots have their road frontage on this collector street. Rather, 13 cul-de-sacs and “eyebrow” streets form the core of distinct neighborhoods where the houses are grouped. These roads, designed for local-access traffic only, were built “under-standard,” with paved widths ranging from 21 to 28 feet. Each of the 13 access streets serves from 3 to 14 units, creating distinct groupings of houses.

The removal of trees and low-growing vegetation from the house lots was kept to a minimum. Open space, in the form of woods and fields, threads between adjoining neighborhoods, providing privacy while creating a rural atmosphere. Most of the open land remains in its natural, wooded state with an inter-connecting network of trails, providing every resident to direct access to the open space. A large, open field has been maintained as a “town green” which provides space for ball sports and community events. Nearby, a pond with park benches is available to residents for fishing, birdwatching and skating.

A model bylaw or strategy is included in the Pioneer Valley Sustainability Toolkit.

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Ridgeline & Hillside Development Bylaw



View of the Holyoke Range from Interstate-91

What are the objectives of Ridgeline and Hillside Protection Bylaws?

To protect scenic areas, such as prominent ridge lines, or exceptional vistas, as important resources which contribute to the character and quality of life in a community. These bylaws encourage carefully designed low-impact development which minimizes the removal of native vegetation and limits the excavation and alteration of land in order to reduce environmental impacts. Such bylaws also preserve and enhance biodiversity, wildlife habitat, corridors and open space linkages.

Why do we need Ridgeline and Hillside Protection Bylaws?

Most member communities of the Pioneer Valley Planning Commission are fortunate to have large areas of undeveloped hillsides, valleys and ridgeline areas which not only contribute considerable scenic and aesthetic value to the community's historic character, but also have special environmental and public health and safety concerns associated with their development. Inappropriate development of these fragile areas can result in excessive cuts and fills, unattractive slope scars, and erosion and drainage problems which can further result in septic tank failures, sedimentation, flooding, water pollution and the destruction of scenic qualities or natural resources.

How does a Ridgeline and Hillside Protection Bylaw work?

Adopted as an Overlay District, these regulations are designed to ensure that the development of such areas is done in an environmentally sensitive manner which protects the public health, safety, and welfare. Ridgeline and Hillside Protection Bylaws

are designed to be flexible, allowing for development to be tailored to the unique individual characteristics of each site and encouraging innovative approaches to ensure minimal environmental impacts. Bylaws include guidelines for appropriate site planning, buildings, utilities, grading, landscaping and erosion and sedimentation control. Development projects are reviewed by an advisory board that makes recommendations to the permitting authority ensuring that they comply with the purpose of the bylaw by balancing the development of the site with minimizing site alterations and impacts on the natural setting.

DID YOU KNOW...

Ridgeline and Hillside Protection Bylaws have two major objectives: the protection of views and the protection of natural features associated with hillside ecosystems.

(“Aesthetics, Community Character, and the Law”, American Planning Association)



EXAMPLES FROM THE PIONEER VALLEY

Mount Tom and Mount Holyoke Ranges

In addition to ridgeline and hillside protection zoning bylaws, an intergovernmental compact is another way to protect these resources. The Mount Tom and Mount Holyoke Ranges' unique attributes and vital natural resources are key components in defining the region's character and quality of life especially in the Towns of Amherst, Belchertown, Granby, Hadley, and South Hadley, and the Cities of Easthampton and Holyoke. On April 21, 2001, the “Summit on the Range” was held and included participants from throughout the Pioneer Valley. Participants agreed to work cooperatively toward the protection of the Mount Tom and Mount Holyoke Ranges. Through a Memorandum of Agreement (MOA), the Towns of Amherst, Granby, Hadley, and South Hadley, the cities of Easthampton and Holyoke, the Pioneer Valley Planning Commission, the Executive Office of Environmental Affairs, as well as other signatories to the agreement agreed to work cooperatively to seek protection of the Mount Tom and Mount Holyoke Ranges and their scenic, natural, recreational and historic attributes.

The following PVPC communities have adopted Ridgeline and Hillside Protection Bylaws:

- » Hampden
- » Monson
- » Wilbraham

A model bylaw or strategy is included in the Pioneer Valley Sustainability Toolkit.



FOR MORE INFORMATION, PLEASE CONTACT

Pioneer Valley Planning Commission

413-781-6045

60 Congress Street, Floor 1

Springfield, MA 01104-3419

www.pvpc.org

Right to Farm Bylaws



What are the objectives of a Right to Farm Bylaw?

To protect and encourage the growth and development of farm-related businesses by protecting farmers and farm operators against nuisance lawsuits.

Why do we need a Right to Farm Bylaw?

Over the past 30 years, as productive farmland has been converted to residential development, persons not involved in farming were beginning to move into traditional agricultural areas and with them they were bringing new complaints concerning odor, flies, dust, noise from field work, spraying of farm chemicals, slow moving farm machinery, and other necessary byproducts of farming operations. Many states, including Massachusetts, adopted Right to Farm language in the state statutes to protect active farmers from nuisance lawsuits from neighbors. Local communities in Massachusetts can also adopt a local Right to Farm bylaw to create public awareness relative to the needs of local farms and farmers.

How does a Right to Farm bylaw work?

A right-to-farm bylaw is a general bylaw that encourages the pursuit of agriculture, promotes agriculture-based economic opportunities, and protects farmlands within the community by allowing agricultural uses and related activities to function with minimal conflict with abutters and town agencies. Language is based on the all state statutes and regulations protecting agricultural activities, such as MGL Chapter 40A, Section 3; Chapter 90, Section 9; Chapter 111, Section 125A and Chapter 128 Section 1A.

Such a bylaw or ordinance restates and republishes these rights pursuant to a town's authority conferred by Article 89, or the "Home Rule Amendment" of the Massachusetts Constitution.



DID YOU KNOW...

In 1997, farm product sales in Massachusetts reached an all-time high of \$454 million. Net farm income—returns to the farm operator after paying expenses—climbed to a record high of \$143 million in 1997.

(“Agriculture’s Hold on the Commonwealth”, University of Massachusetts Amherst, 2000)

EXAMPLES FROM THE PIONEER VALLEY

Smart Growth Technical Assistance Grant Program

Several communities in the Pioneer Valley region were funded under Rounds 1 and 2 of the Smart Growth Technical Assistance Grant Program to prepare and adopt right-to-farm bylaws/ordinances. The Towns of Middlefield and Plainfield were funded under Round 1, both of which have adopted right-to-farm bylaws at their annual town meetings. The communities of Agawam, Granville, Hampden, Montgomery, and Westhampton were funded under Round 2 of this grant program. The Towns of Montgomery and Westhampton have adopted right-to-farm bylaws at Town Meeting. The Town of Hampden will vote on this bylaw at their spring town meeting and the Town of Agawam will vote on their right-to-farm ordinance during the summer of 2007. The Town of Granville has not yet adopted their right-to-farm bylaw but will consider it at a future town meeting.

Communities that have adopted Right to Farm Bylaw

Cummington / Hadley / Hatfield / Middlefield / Montgomery / Northampton /
Plainfield / Southwick / Westhampton

A model bylaw or strategy is included in the Pioneer Valley Sustainability Toolkit.



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Rivers Protection Bylaws



East Branch of the Westfield River



What are the objectives of a Local Rivers Protection Bylaw?

To increase community control over activities on riverfront areas not regulated by the Massachusetts Rivers Protection Act. Although the Rivers Protection Act does offer communities an opportunity to protect river areas, it is too broad-based to address specific community concerns generated by development activities.

Why do we need a local Rivers Bylaw?

River channels, riverbank areas, and floodplains are rich ecological areas, providing habitat for a diverse array of birds, fish, plants, and animals. Linear river channels function as wildlife corridors for migrating birds, anadromous fish, and many animals. Rivers also attract people, being ideal places to hike, fish, boat, and enjoy nature. Floodplains are important natural flood storage areas that if left undeveloped, can help prevent flood damages and save lives in the event of a major flood. However, rivers are under considerable development pressure for a variety of uses, including housing developments, dams and hydroelectric facilities, and recreational activities.

How does a Stormwater Management bylaw work?

A River Protection Overlay District can be designated for a portion of the riverbank from the shoreline landward up to an established distance from each bank. Uses permitted as a matter of right should be limited to those consistent with the scenic qualities of the river, such as agricultural production, recreational uses, reasonable emergency procedures,

conservation measures, and residential development on lots with frontage on an existing way (Approval Not Required Development). Residential subdivision in the district can be required to include mandatory clustering, and be located away from the shoreline to the maximum practical extent. River protection districts can also be designed to incorporate floodplain regulations. These regulations prevent development within the floodplain that might increase flood levels and velocities, or cause flood damages due to unanchored materials.

DID YOU KNOW...

Stormwater runoff is our most common cause of water pollution. Rainwater and snowmelt run off streets, lawns, farms, and construction and industrial sites and pick up fertilizers, dirt, pesticides, oil and grease, and many other pollutants on the way to our rivers, lakes, and coastal waters. (US EPA)

EXAMPLES FROM THE PIONEER VALLEY

Westfield River, National Wild and Scenic River

The Westfield River has been designated as a National Wild and Scenic River along a 78-mile section of the East Branch, Middle Branch and West Branch of the Westfield River. The National Park Service identified outstandingly remarkable values on the Westfield River, including cold water fisheries, recreational amenities, historic resources, historic villages, unique geologic features, rare and endangered species and biodiversity habitat, as well as one of the largest roadless wilderness areas remaining in Massachusetts.



In 1993, after years of study, adding protective bylaws, and working with an advisory committee composed of landowners and residents of Becket, Chester, Middlefield, Chesterfield, Worthington and Cummington, Pioneer Valley Planning Commission and Westfield River Watershed Association, 43 miles of the Westfield River were initially designated as a National Wild and Scenic River. In October 2004, the reach of the Wild and Scenic designation was expanded so that it now encompasses over 78 miles of river corridor, and ten communities.



PVPC drafted an intergovernmental compact for managing the river, which led to the creation of a Westfield River Wild and Scenic Advisory Committee. The MOA and Westfield River Greenway Plan outline other river protection strategies including: river protection bylaws; voluntary conservation restrictions; increasing the maintenance at river access points; grants for selected land acquisitions or improvements; riverbank beautification; and salmon restoration.

Each of the Westfield River Wild and Scenic communities has adopted a River Protection Zoning Overlay District which:

- » Restricts development within 100 feet of the river;
- » Limits cutting of trees and vegetation along the riverbank; and,
- » Prohibits uses which could degrade water quality to the river.

A model bylaw or strategy is included in the Pioneer Valley Sustainability Toolkit.

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60 Congress Street, Floor 1
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Scenic Upland Protection



View of the Holyoke Range from Interstate-91



What are the objectives of Scenic Upland Protection?

To protect scenic areas, such as prominent ridge lines, or exceptional vistas, as important resources which contribute to the character and quality of life in a community. To avoid problems of erosion, sedimentation, septic tank failures, flooding, water pollution, and the destruction of scenic qualities or natural resources.

Why do we need Scenic Upland Protection?

The Pioneer Valley is home to the Mount Tom and Mount Holyoke Ranges, the Berkshire Hills, and many other upland areas which contribute significantly to the unique character of the region. These upland areas have outstanding scenic qualities, outdoor recreational opportunities, wildlife resources, unique geologic features, forest resources, biodiversity, historic features, and unique natural and cultural characteristics. These same areas are also commonly the most fragile areas with the least carrying capacity for development due to steep slopes, unstable or poor soils, and inadequate public infrastructure. To avoid problems of erosion, sedimentation, septic tank failures, flooding, water pollution, and the destruction of scenic qualities or natural resources, development must be done with a particular sensitivity to the land in scenic upland areas.

How does Scenic Upland Protection work?

Scenic upland protection zoning bylaws can protect these important resources by regulating alterations to the land which may have significant effects on these natural resources. Scenic district regulations function in a similar manner to site plan review or design review bylaws. All proposed development is scrutinized for potential negative

effects on the environment, and on the scenic amenities of the district. The following issues can be addressed in scenic area regulations: 1) alterations to the environment, 2) new residential or commercial development, and 3) incentives for land uses which maintain scenic qualities.

DID YOU KNOW...

Scenic Upland Protection Bylaws have two major objectives: the protection of views and the protection of natural features associated with hillside ecosystems.

(“Aesthetics, Community Character, and the Law”, American Planning Association)

EXAMPLES FROM THE PIONEER VALLEY

Mount Tom and Mount Holyoke Ranges



In addition to scenic upland protection zoning bylaws, an intergovernmental compact is another way to protect these resources. The Mount Tom and Mount Holyoke Ranges' unique attributes and vital natural resources are key components in defining the region's character and quality of life especially in the Towns of Amherst, Belchertown, Granby, Hadley, and South Hadley, and the Cities of Easthampton and Holyoke. On April 21, 2001, the “Summit on the Range” was held and included participants from throughout the Pioneer Valley. Participants agreed to work cooperatively toward the protection of the Mount Tom and Mount Holyoke Ranges. Through a Memorandum of Agreement (MOA), the Towns of Amherst, Granby, Hadley, and South Hadley, the cities of Easthampton and Holyoke, the Pioneer Valley Planning Commission, the Executive Office of Environmental Affairs, as well as other signatories to the agreement agreed to work cooperatively to seek protection of the Mount Tom and Mount Holyoke Ranges and their scenic, natural, recreational and historic attributes.



Catalyst for Regional Progress

PVPC

PIONEER VALLEY
SUSTAINABILITY TOOLKIT

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Catalyst for Regional Progress

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PIONEER VALLEY
SUSTAINABILITY TOOLKIT

Sidewalk Requirements



Photo courtesy of flickr user Complete Streets

What are the objectives of sidewalk requirements?

Sidewalk requirements ensure that a community builds and maintains adequate facilities for pedestrians. Pedestrians of all physical abilities and ages need functional sidewalks to safely access goods and services, move freely, and get exercise while carrying out day-to-day activities. Furthermore, sidewalk requirements can promote an attractive streetscape--one that is in harmony with a community's natural, historic, and aesthetic features.

Why do we need to encourage sidewalk requirements in our communities?

In 2012, there were 4,743 pedestrian fatalities and an estimated 76,0000 pedestrian injuries in traffic crashes in the United States which equates to a pedestrian killed every 2 hours and injured every 7 minutes¹. High quality sidewalks can improve the safety of pedestrians and reduce the number of pedestrian deaths and injuries. In addition, improving sidewalks encourages more pedestrian traffic which has numerous personal and community benefits. A recent study has noted that by increasing pedestrian traffic, pedestrians in turn become safer². This is known as the safety in numbers hypothesis. As pedestrian traffic increases, deaths and injuries decline as motorists are more aware of pedestrians in the area. Pedestrians also contribute to eyes on the street which can reduce crime.



Sidewalks bring foot traffic to businesses, which can increase the value of real estate and improve a community's tax base. And finally, walking has numerous health benefits. Sidewalks are created in several ways. They may be created by a governmental body as part of road construction. They may be built by a private entity as part of a development project or subdivision. With the passage of the Americans with Disabilities Act in 1990, public entities are prohibited from designing new facilities or altering existing facilities--including sidewalks--without making them accessible to people with disabilities. However, communities can enact policies and regulations to speed implementation and fill gaps.

How do sidewalk requirements work?

Sidewalk requirements may be incorporated into a municipality's zoning code and/or subdivision regulations, and/or design guidelines, and/or as an administrative policy. Sidewalk requirements include regulations on where sidewalks shall be constructed within the community. This should include a) Areas where there are not sidewalks in existence and where pedestrian traffic is not adequately accommodated by existing sidewalks; b) Areas where there is an opportunity to make connections between existing or proposed sidewalks; c) All new developments and redevelopment, construction or reconstruction; and, d) Areas where the health, welfare, and safety of the public require that adequate sidewalks be provided for public convenience, including safe routes for school children to and from educational facilities.

Sidewalk regulations include standards that specify the dimensions and layout of sidewalks. These standards include minimum width requirements in compliance with the Americans with Disabilities Act, as well as slope and grade requirements, and standards that detail curb ramps, how to deal with intersections, driveway crossing, curb extension, crosswalk design, pedestrian signals, etc.

A pedestrian circulation plan may be required for all proposed subdivisions, site plan reviews and special permits. A pedestrian circulation plan includes a) The locations of streets and roads adjacent to the site and proposed roads within a site; b) The location of walkways, road, transit, parking infrastructure and all destination facilities; c) The links between sidewalks and pathways within the development to neighborhood destinations and existing sidewalks in the surrounding area; d) A description of estimated daily and peak-hour pedestrian trips to be generated by the site as well as the flow patterns for pedestrians showing adequate access to and from the site as well as circulation within the site; and, e) An interior traffic and pedestrian circulation plan designed to minimize conflicts and safety problems.

Within the subdivision rules and regulations a paragraph may be inserted in the Design Standards section to provide a direct way for the community to benefit. Requirements may include sidewalks on both sides of all public ways wherever topographically feasible, the inclusion of buffer strips and shade trees, and pedestrian and bicycle connections in cul-de-sac or oddly shaped blocks to enhance circulation. In areas where a sidewalk is limited to one side of the street, provisions may be made for the developer to install or repair an equal number of feet of sidewalk in another area of the community.





Photo courtesy of flickr user Complete Streets



DID YOU KNOW...

That there were 62 pedestrian fatalities in Hampden County and 11 pedestrian fatalities in Hampshire County between 2003 and 2012. The vast majority of these fatalities occurred on roadways of 40 miles per hour and over. (Source: Smart Growth America, Dangerous by Design 2014)

EXAMPLES FROM THE PIONEER VALLEY

Many communities in the Pioneer Valley have realized the benefit of encouraging walking through infrastructure improvements. The Town of Ludlow constructed sidewalks within a mile of every elementary school. With children walking to school the town revamped its crossing guard program and saved money on busing. With local funding sources in short supply, many communities have had to “get smart” when it comes to pedestrian improvements. To lower costs, East Longmeadow developed a prioritized sidewalk infrastructure improvement plan and began incorporating the cost of sidewalk improvements into larger roadway reconstruction projects. In the Forest Park neighborhood of Springfield, public works officials replaced painted crosswalks with new long wearing thermoplastic designs. While more expensive initially, the new crosswalks will last 5 times as long as painted crosswalks.

1 National Highway Traffic Safety Administration. (2014). Traffic Safety Facts: 2012 Data. Retrieved from: <http://www-nrd.nhtsa.dot.gov/Cats/listpublications.aspx?Id=A&ShowBy=DocType>

2 Jacobsen, P. (2003). “Safety in Numbers: More Walkers and Bicyclists, Safer Walking and Biking.” Injury Prevention (2003): 205-209.

A model bylaw or strategy is included in the Pioneer Valley Sustainability Toolkit.

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Pioneer Valley Planning Commission

413-781-6045

60 Congress Street, Floor 1
Springfield, MA 01104-3419

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Sign Bylaws



Route 20 in Westfield

What are the objectives of a sign bylaw?

Sign bylaws establish guidelines and procedures designed to enhance the health, safety and visual environment of the community while still permitting businesses adequate visual exposure to patrons through the use of signage. Sign regulations, which at times may seem excessive, serve to curb unsightly clutter and provide a sense of uniformity to our communities making them more attractive and desirable.

Why do we need a sign bylaw?

Signage is an essential component of most land uses as well as way finding. Sign bylaws encourage the proper development and regulation of signs and signage systems to prevent them from becoming a distraction or obstruction to the safe flow of pedestrian and vehicular traffic. Sign regulations also prevent signage from becoming a nuisance to adjacent properties or uses while protecting and encouraging a healthful economic business environment and protecting the general health, safety, and welfare of the community. Effective sign regulations can promote economic development, create civic identity, identify community activities and events, and create vibrancy and excitement.

How do sign bylaws work?

Sign bylaws should be based on valid public purposes and further community goals. Well written sign bylaws provide comprehensive regulations that are clear, understandable and are easy to both comply with and enforce. They regulate size, quantity, type placement, location and illumination and permit signs which are appropriate for the districts in which they are located. Because there is such a wide variety of sign types, defining what constitutes a sign is critical. At what point does a mural become a sign? Does a canopy or awning sign constitute a wall sign? Signs are typically by-right upon the issuance of a



sign permit by the Building Inspector. However some communities require design review to encourage signage that is consistent and complementary with a district's particular existing character. Some communities require a Special Permit for certain types of signs (large signs, interior illuminated, scrolling message signs, etc.) so they can exercise a level of control. Sign bylaws should be flexible to facilitate creativity and need to be updated to keep pace with emerging technologies such as automatic changeable copy signs. While political signs cannot be prohibited, they can be reasonably regulated in terms of size, longevity and placement. Some communities provide flexibility to their sign regulations by permitting waivers to strict compliance through a Special Permit process.



DID YOU KNOW...

That the most effective sign bylaws are reached through consensus by balancing the needs of the local business community with the needs and interests of local residents and elected officials?

Cottage Street in Easthampton

A model Sign Bylaw is included in the Pioneer Valley Sustainability Toolkit. The model sign bylaw is intended to show what is typically included. Because each community is different, sign bylaws should be developed to reflect the unique challenges and opportunities of each individual community. The model can be used as a menu which can be tailored to address the needs and character of each individual business district.

A model bylaw or strategy is included in the Pioneer Valley Sustainability Toolkit.

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Springfield, MA 01104-3419

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Traditional Neighborhood Development



Village Commons, South Hadley

What is the objective of Traditional Neighborhood Development (TND)?

Traditional Neighborhood Development (TND) provides an alternative to traditional suburban sprawl by creating vibrant mixed use, pedestrian oriented neighborhoods revitalizing existing town centers, and creating new ones. By providing a balance of housing, shops, and public and civic spaces declining urban and village centers are stabilized and energized with new development that is in character with the traditional neighborhood.

Why is Traditional Neighborhood Development needed?

Higher density mixed-use developments with a variety of housing types in close proximity to shopping, jobs, parks, schools address many of the issues of both suburban sprawl and declining urban centers. TNDs preserve and replicate the characteristics of traditional New England town centers providing compact pedestrian friendly neighborhoods establishing a sense of place and identity. TNDs result in a reduction of car trips, protect environmental quality and open space, and increase the pedestrian/bicycling network. The community's tax base is strengthened, and declining neighborhoods are stabilized and revitalized.

How does Traditional Neighborhood Development work?

TND is unique in that it is flexible and can be used for small-scale rural villages as well as large-scale urban neighborhoods. It can be used for new developments or as infill in existing developed areas. This type of development is usually oriented around a public space with civic and commercial activities within easy walking/biking distance of the residents. Based on a $\frac{1}{4}$ mile maximum walking distance, a typical TND neighborhood scale is 10-15 acres. Higher residential densities are necessary to provide a population base sufficient to support the commercial and public functions of the TND. To ensure that projects incorporate the design and aesthetic elements which complement and strengthen the character of the neighborhood, TND incorporates form based and other standard zoning practices, as well as utilizing comprehensive design standards. Local history, character and architecture should be strongly considered and incorporated into the context, massing and scale of the development.

DID YOU KNOW...

TNDs are particularly well suited for preserving the rich character and sense of place of New England village centers, easily modified to fit each community's unique characteristics.

EXAMPLES FROM THE PIONEER VALLEY

Village Commons, South Hadley

Located in the center of South Hadley, proximate to Mount Holyoke College, this commercial center was constructed with a massing, scale and character integrating it into an old New England village center. The project replaced a number of historic buildings on the site which burned down and were raised in 1985. Comprised of eleven buildings the development presents a high density, 80,000 square foot commercial facility featuring eight restaurants, two luxury theaters, ten retail/service shops and over 30 professional offices creating more than 200 full and part-time jobs. It also includes 19 apartments.

Village at Hospital Hill, Northampton MA

This project represents a large scale comprehensive redevelopment of the former Northampton State Hospital. At build-out the proposed development will offer a full mix of residential (with varied housing types), assisted living, daycare, commercial, office, live/work artist studios and light industrial uses in a pedestrian/bike oriented campus.



EXAMPLES FROM OUTSIDE THE PIONEER VALLEY

For more information on examples of Transit Oriented Development from across Massachusetts, please refer to the state's [Smart Growth / Smart Energy Toolkit](#) developed by the Executive Office of Energy and Environmental Affairs.

A model bylaw or strategy is included in the Pioneer Valley Sustainability Toolkit.

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Transfer Oriented Development



Roundhouse Parking Lot project, Northampton

What is the objective of Transit Oriented Development? (TOD)

Transit Oriented Development (TOD) promotes a balance of jobs and housing, encourages the use of bus and other transit opportunities, while reducing single occupant vehicle trips and discouraging suburban sprawl. To begin to limit sprawl, improve air quality and provide access to goods, services and jobs in close proximity to residential areas, TODs offer opportunities for mixed-use development served by transit in higher density developments.

Why is Transit Oriented Development needed?

Concentrated mixed-use development and transit availability address the issues of sprawl, air quality, declining urban centers and variety in housing. TOD regulations can help limit sprawl by enabling mixed-uses and higher densities near transit stops with a good pedestrian access system. TODs reduce car trips, protect environmental quality and increase the pedestrian access network. The tax base is strengthened and new jobs infuse the local economy with increased activity.

How does Transit Oriented Development work?

Communities can create TOD zones within walking distance of major transit lines in urbanized areas, which allow for higher density and mixed-use. TODs typically consist of a mixed-use core commercial area adjacent to the transit stop. Surrounding the core commercial area is a mix of housing types, including small-lot single family, townhouses, condominiums, and apartments. TODs also include public uses, such as parks, plazas, greens, public buildings, and public services. Other transit and pedestrian-friendly strategies include: 1) Reducing parking requirements for developments in TOD zones



in anticipation of decreased automobile use, 2) Creating a comfortable pedestrian environment with tree-lined streets and sidewalks and well-defined transit stops to promote transit use, and 3) Providing incentives to developers for installing transit amenities such as bus shelters or benches.

DID YOU KNOW...

TODs are generally located within one-quarter to one-half mile from a transit stop.

EXAMPLES FROM THE PIONEER VALLEY

City of Northampton

The roundhouse parking lot project in the city of Northampton is an example of infill, brownfields re-development, and transit oriented development. The project is located in close proximity to the existing Peter Pan bus station and immediately adjacent to the primary PVTA transit pulse point for northern Hampshire County. The 146 PVTA/FRTA buses arrive and depart at this transit pulse point per work day. The project consists of a hotel, restaurant and conference space with a parking garage. In addition to transit access via the Peter Pan bus company and the PVTA/FRTA, the hotel will be running a bus shuttle service to the 5 colleges and Bradley International airport in Windsor Locks, CT. In addition to being serviced by the three sources of transit, the site is also located on a key route for bicyclists and pedestrians and is served by a local taxi company. The project is the hub of a city-identified TOD district that includes tax-credit affordable housing as well as high-end market housing.

EXAMPLES FROM OUTSIDE THE PIONEER VALLEY

For more information on examples of Transit Oriented Development from across Massachusetts, please refer to the state's [Smart Growth / Smart Energy Toolkit](#) developed by the Executive Office of Energy and Environmental Affairs.

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Urban Growth Boundary



Downtown Amherst



What are the objectives of Urban Growth Boundaries? (UGB)

To control urbanization and minimize sprawl by designating the area inside the urban growth boundary for higher density urban development and the area outside the boundary for lower density rural development.

Why are Urban Growth Boundaries needed?

Across Massachusetts, development is occurring in an increasingly sprawling form, with many negative impacts on both rural areas and central cities. UGBs seek to prevent sprawl by encouraging new development in and around existing town or urban centers, and slowing growth in more rural, undeveloped open areas.

DID YOU KNOW...

Over the past decade in the Pioneer Valley, while the region's population has remained relatively stable, sprawl has consumed 37,329 acres of land, or about 5% of the total acreage in the region.

(PVPC Data Center, 2004)

How do Urban Growth Boundaries work?

Ideally, urban growth boundaries are prepared as part of an overall community or regional Master Plan. In any case, careful analysis and documentation must be done in preparing urban growth boundaries. Boundaries should be drawn based upon detailed analysis of the carrying capacity of the land, environmentally sensitive areas, existing and planned infrastructure, and natural resource areas. Some states, such as Oregon, have adopted special legislation to enable the creation of UGBs. However, even in states without such enabling legislation, such as Massachusetts, it is possible to combine multiple growth control strategies to create “de facto urban growth boundaries.” For example, the following components could become part of an overall growth boundary strategy:

- » Moratoria on sewer and water extensions to areas beyond the established urban growth boundary;
- » Reduced lot size, and related zoning incentives for areas within the UGB and lot size disincentives for areas outside the UGB;
- » Subdivision regulations which require that developers pave town roads leading to new subdivisions;
- » Annual building permit limits for areas inside and outside UGBs, with project evaluation and rating criteria. Substantially more building permits would be allowed within the UGB than outside its boundaries. All development projects would be rated and permits awarded to projects best meeting community goals;
- » Establishment of a community or regional fund to match state grants for land acquisition of farmlands or environmentally sensitive areas outside urban growth boundaries only.

EXAMPLES FROM THE PIONEER VALLEY

Phased Growth/Building Cap - Towns of Amherst and Hadley

The *Town of Amherst Phased Growth Bylaw* (adopted in 1987) has a complex system of incentives for awarding building permits to projects that best meet town goals for open space preservation, affordable housing and other issues. There are three primary components of this bylaw:

- » An overall cap of 250 dwelling units during any two year period is imposed. This cap, based on historical trends, was determined to be appropriate to provide time to respond to infrastructure needs created by growth.
- » All developments of four residential units or more are required to phase their construction over two to five years based on the number of units proposed.
- » All developments of four residential units or more are rated against a series of criteria (eg. provision of affordable housing, open space and farmland protection, cluster developments and a discretionary category) the score of which determines the phasing schedule.



The *Town of Hadley* adopted (1988) a simple cap on the maximum number of building permits which could be issued in a calendar year which limited a subdivision's building permits as follows:

- » less than ten lots, one dwelling unit per year
- » more than ten lots, one tenth of the maximum number of dwellings permitted per year

Hadley's bylaw was recently overturned by the Supreme Judicial Court (*Zuckerman v. Town of Hadley*) who held that the bylaw failed to meet the classic test for constitutionality: whether it is "clearly arbitrary and unreasonable, having no substantial relation to public health, safety, morals and general welfare" and whether the bylaw bears a "rational relation to a legitimate zoning purpose". This case provided important guidance regarding the legal parameters surrounding phased growth bylaws:

- » it must have a sunset provision, such as five years;
- » it must have a specified purpose (eg. addressing public utility or school capacity problems);
- » it must act, in consort with planning, to solve that problem.

The Hadley case has forced Amherst to consider revisions to their bylaw, including a five-year duration and tie it to the formation and execution of a comprehensive plan.

Sanitary Sewer Expansion Plan – City of Westfield

With limited treatment capacity at their newly expanded wastewater treatment facility, Westfield adopted (2006) a Sanitary Sewer Extension Plan ordinance that restricted future sewer expansion to a specific designated area (primarily encompassing the urbanized center and surrounding high density neighborhoods). All extensions must meet specific criteria, and waste volumes generated by projects are projected to ensure that the treatment capacity is not exceeded. The ordinance contains an Infiltration & Inflow (I&I) Waiver provision allowing for eligible projects outside the extension area, or projects which exceed the treatment capacity at the wastewater facility, to pay a fee equal to the city's expense to eliminate 5 gallons of groundwater/stormwater infiltration/inflows for every 1 gallon of sewerage projected to be generated by the project.

A model bylaw or strategy is included in the Pioneer Valley Sustainability Toolkit.



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