

Promoting Green Infrastructure

Strategies, Case Studies, and Resources

Water Infrastructure Capacity Building Team | Capacity Building for Sustainable Communities | June 2012

Report Background

This document was developed by Environmental Finance Center Network (EFCN) through the Capacity Building for Sustainable Communities program funded by the U.S. Department of Housing and Urban Development and the Environmental Protection Agency. The report was prepared by request of an individual Sustainable Communities grantee seeking information about and examples of specific strategies that can be used to promote green infrastructure approaches for managing stormwater.

About the Sustainable Communities Capacity Building Program

Through a cooperative agreement with HUD, EFCN is providing capacity building and technical assistance to recipients of grants from the federal Partnership for Sustainable Communities. Learn more about the Partnership and its work to help towns, cities, and regions develop in more economically, environmentally, and socially sustainable ways: www.sustainablecommunities.gov.

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Funding and Finance

Stormwater fee/utility

A stormwater utility or fee is a “dedicated and separate fund created to pay for stormwater management, planning, and outreach activities within a specified area. A fee can be collected on a separate bill, added to a water collection bill, or added to the property tax bill. Usually an ordinance is passed by the council or commission for approval.”¹

Benefits of a stormwater fee:

- It is a dedicated source of funding for a community’s stormwater management program.
- It is generally considered equitable because users pay for the stormwater services they receive, especially if the fee structure is based on variables such as the amount of impervious surface, property size, and land use type.
- Discounts or offsets can be provided to low-income residents, further ensuring the fee’s equitability.
- Tax-exempt properties like universities, hospitals, and places of worship are required to pay the fee, so that these institutions help cover the cost of services they receive.
- If a credit or reduction is offered, the fee can become an incentive for green infrastructure stormwater management on private property (see “stormwater fee discounts” under Incentives section).
- It is 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.”²

To achieve desired objectives without causing harmful unintended consequences, several considerations should be taken into account when setting stormwater fees:

- 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.
- Start with a thoughtful outreach campaign that generates enthusiasm for the community’s stormwater vision. No one wants new fees or taxes, but if residents understand the benefits they will receive they are more likely to support the fee.
- Be sure that the greatest costs are directed toward those who create the most runoff, i.e. commercial and industrial facilities with large areas of impervious cover, rather than residential and other properties with low impervious cover.³
- Ensure the fee does 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.⁴

Case study: Philadelphia, PA

“Like many large cities, Philadelphia has witnessed a significant increase in stormwater management costs over the past several years. In an effort to comply with state and federal regulations, the city has incurred substantial capital expenditures and operating costs to maintain its aging stormwater infrastructure. In addition, the city will need to invest hundreds of millions of dollars over the next decade to reduce the frequency of combined sewer overflows.

“To help offset these tremendous costs, the Philadelphia Water Department recently decided to revise its stormwater fees. For years, the Water Department recovered the costs of operating and maintaining stormwater infrastructure through a service charge collected from metered customers. Under this system, properties with larger water meters - such as commercial and industrial facilities - paid a higher service charge. While this fee structure may seem reasonable, it has one major drawback in that non-metered properties such as parking lots and utility right-of-ways have not had to pay a stormwater fee.

“The Water Department convened a Citizens Advisory Council to make recommendations for improving the city’s stormwater fee. This group of stakeholders recognized that impervious cover is the primary factor in determining the amount of runoff a property will generate. As a result, 80 percent of the city’s new stormwater fee is based upon a

¹ University of Maryland Environmental Finance Center website. <http://www.efc.umd.edu/SFOUfinoptions.html>

² US Environmental Protection Agency. 2009. *Managing Wet Weather with Green Infrastructure Municipal Handbook: Funding Options*, p. 2. http://water.epa.gov/infrastructure/greeninfrastructure/upload/gi_munichandbook_funding.pdf

³ Ibid.

⁴ Ibid.

property's impervious area, with the remaining 20 percent based upon the property's gross area. In this way, stormwater fees will reach non-metered customers such as rail lines, parking lots and utility right-of-ways that account for significant impervious space (and stormwater runoff) within the city.

"Philadelphia offers a stormwater fee discount for customers who reduce impervious cover using green infrastructure practices, including rain gardens, infiltration trenches, porous pavements, vegetated swales, and green roofs. If a property is retrofitted with any of these features, the Water-Department will re-calculate that property's stormwater fee based on the 80/20 impervious/gross area formula.

"The Water Department is planning to implement this new fee among its large-meter non-residential customer base over a four year period beginning in FY 2009. However, for residential and other small-meter customers, the City recognized that a detailed analysis of each of the City's 450,000 residential properties would be administratively complex and have chosen not to implement this level of detail for an impervious-based billing program at this time. As a result, all residential properties have been combined and treated as a single land parcel with the total costs of the 80/20 calculation divided equally among all households. Under this new fee system, stormwater costs will be spread out and shared over a larger customer base, and calculations show that the majority of customers will see a reduction or otherwise minor impact on the stormwater component of their water and sewer bills. For those customers that experience a noticeable increase in their fees, the Water Department will provide site-design recommendations that will decrease the amount of impervious area on their properties and thus decrease their stormwater fees."⁵

Additional case studies

- Takoma Park, MD: <http://www.takomaparkmd.gov/publicworks/stormwater.html>
- Rockville, MD: <http://www.rockvillemd.gov/residents/swm/>
- Portland, OR, Toledo, OH, and Lenexa, KS:
http://water.epa.gov/infrastructure/greeninfrastructure/upload/gi_munichandbook_funding.pdf

Resources

- New England Environmental Finance Center. 2005. *Stormwater Utility Fees: Considerations and Options for Interlocal Stormwater Working Group*. <http://efc.muskie.usm.maine.edu/docs/StormwaterUtilityFeeReport.pdf>
Provides guidance to decision makers on the development and implementation of a stormwater utility. Includes a detailed discussion of 11 important considerations for establishing a stormwater utility, including start-up strategy, user fee structure, organizational structure, and fee basis and data collection, as well as various options for each category.
- Environmental Finance Center, University of North Carolina. 2010. Stormwater Utility Dashboard. <http://www.efc.unc.edu/tools/NCStormwaterDashboard.html>
Allows users to compare residential and non-residential stormwater fees charged in 2010 by all of the NC stormwater utilities. Comparisons are made across subgroups of utilities with similar characteristics, such as location, EPA phase, rate structure, and customer income levels.
- Florida Stormwater Association. 2003. *Establishing a Stormwater Utility In Florida*. <http://www.florida-stormwater.org/content.asp?contentid=53>
Developed to assist communities that are considering the development and implementation of a stormwater utility as a means of providing supplemental or alternative funding for their stormwater management program. The manual is written for citizens, elected officials, and city or county administrators and staff who want to understand the issues, benefits and community investment associated with stormwater utilities.
- US Environmental Protection Agency. 2009. *Managing Wet Weather with Green Infrastructure Municipal Handbook: Funding Options*.
http://water.epa.gov/infrastructure/greeninfrastructure/upload/gi_munichandbook_funding.pdf
Includes considerations for setting up a stormwater fee or utility.

Municipal infrastructure bonds

Municipalities can finance green infrastructure projects by contracting debt through general obligation bonds. These bonds are "a method of financing debt that traditionally carries low interest rates because the County/City pledges its full faith and credit to the repayment of the bonds. Bonds are usually voted on by the public at large and then put into a Capital Improvement Program."⁶ General obligation bonds backed by the full faith and credit of the state or local

⁵ Ibid.

⁶ University of Maryland Environmental Finance Center website. <http://www.efc.umd.edu/SFOUfinoptions.html>

government are termed unlimited tax bonds. Limited tax bonds are used when the issuer's constitution or statutes limit the issuer's taxing power.⁷

Another option is a revenue bond. Revenue bonds are sold for revenue-generating projects such as water treatment facilities. These bonds generally carry a higher interest rate because they are not as secure as a general obligation bond since they are not backed by government taxing power. When a government pledges its taxing power for additional security the bond is considered double-barreled. One potential advantage of revenue bonds is that a voter referendum is often not required for issuance.⁸

The first step in the bond issuing process is a Capital Improvement Plan (CIP). A CIP will take into account capital and operational needs with attention to current needs and policy considerations. These considerations are used to create a 5-10 year CIP. Political requirements for plans will differ depending on local laws. Sometimes voter approval is required. In some municipalities enabling legislation must be passed to create a new authority to issue bonds. The next step is to assemble a financing team of professionals including a legal advisor, financial advisor, and an underwriter. This team will then work within the bounds of state laws to determine remaining details of the bond sale and to create the documents required.⁹

Case studies

- New Jersey's Green Acres / Blue Acres program is a good example of bond-funded green infrastructure, focusing on open space acquisition, flood plain management, and source water protection. Learn more: <http://www.nj.gov/dep/greenacres/>
- The Trust for Public Land's Land Vote program provides data and examples of the process communities experience to place these kinds of measures on the ballot successfully. See www.landvote.org and <http://www.tpl.org/what-we-do/policy-legislation/landvote.html>.
- Raleigh, NC is credited with developing one of the first comprehensive greenway systems in the country.¹⁰ With a population of 276,093 the city has 8,990 acres of park land, totaling nearly 10 percent of the city's land area. Raleigh pays for its comprehensive greenway systems with bonds approved by voters every few years since 1981.¹¹ This initiative is part of the city's Capital Improvement Program (CIP) which is updated every five years.¹² The Raleigh City Council approves potential projects proposed by the Parks and Recreation Department that are then put on a ballot for voter approval. The city is authorized under North Carolina law to issue bonds valued at up to two thirds of the amount by which the municipality reduced its outstanding general obligation indebtedness in the previous year. Funding earned through this process, along with minimal municipal funding, grants and donations provides funding for this large green infrastructure project.¹³ Learn more: <http://www.raleighnc.gov/arts/content/PRecDesignDevelop/Articles/ParksandGreenwayFunding.html>

Development review and impact fees

Fees tied to new development are based on the fact that new development brings new infrastructure costs, for services such as roads, schools, and utilities. Called impact fees or plan review and permitting fees, these fees represent "an alternative to providing the needed public improvements rather than letting the improvements lag behind or putting the burden upon taxpayers by increasing taxes. The purpose of these charges is to shift a pro rate share of public capital improvement costs to the developments that create the need for those improvements."¹⁴

Special assessment fees can be used to discourage development in environmentally sensitive areas or other land integral to the community's green infrastructure plan. 'Fees in lieu' are so-named because these exempt developers from having to implement on-site water quality treatment practices but instead requires them to pay into a fund that the municipalities can use to finance green infrastructure projects in priority areas.

⁷Temel, Judy. 2001. *The Fundamentals of Municipal Bonds*. New York: John Wiley and Son, p. 55.

⁸ Temel, Judy. 2001. *The Fundamentals of Municipal Bonds*. New York: John Wiley and Son, p. 58.

⁹ Ibid.

¹⁰ Merriam, Dee. Jan. 31, 2011. *Urban Green Infrastructure: A Study of Implementation Strategies*.

http://smartech.gatech.edu/jspui/bitstream/1853/38253/1/DeeMerriam_Urban%20Green%20Infrastructure.pdf, 31

¹¹ Ibid.

¹² City of Raleigh, *Funding for Parks and Greenways*. May 15, 2012.

<http://www.raleighnc.gov/arts/content/PRecDesignDevelop/Articles/ParksandGreenwayFunding.html>.

¹³ Ibid.

¹⁴ University of Maryland Environmental Finance Center website. <http://www.efc.umd.edu/SFOUfioptions.html>

Case study: Lenexa, KS

"In 2004, the Lenexa City Council adopted the Systems Development Charge to require new development to pay a one-time fee at the time of building permit as a means for recovering costs for capital improvement activities within the Rain to Recreation program so that growth pays for growth. Although all public projects incorporate water quality treatment and protection into all new city facilities, the focus of this fee is to systemically address water quantity needs through construction of regional retention facilities and necessary capital improvements to streamways, many of which are protected by the City's stream setback ordinance.

"Some other cities refer to this as a 'fee in lieu' of requiring developers to construction detention areas on new development sites (and in this case detention of the 100 year (1 [percent] storm) event), and instead directs the money towards projects that have wider public benefit beyond just water quality treatment. Because new developments are contributing to the problems of water quantity, Lenexa has required that they pay into the pool of funds used to build new projects, including the construction of regional watershed management, multi-use lakes, wetlands and stream restorations."¹⁵

Dedicated taxes and fees

A dedicated stormwater tax can be imposed in order to finance green infrastructure projects. Requiring approval by City or County Council or by voters via referendum, stormwater taxes are often added to and collected along with the property tax bill. "The tax is usually a general fund collection but can then be redistributed into a special stormwater fund. This money is not necessarily dedicated, however, and may be reallocated to other pressing community needs."¹⁶ Advantages of a tax include that it is relatively easy for the municipality to administer and the fact that it may allow property owners a tax deduction. Other dedicated fees include real estate taxes and capital cost recovery fees.

Case studies

- Fairfax County, VA uses a tax based on property value, which is straightforward but not the most equitable way to collect stormwater revenue. Learn more: <http://www.fairfaxcounty.gov/dpwes/stormwater/servicedistrict.htm>.
- State of Maryland: On the land preservation side of green infrastructure, Maryland uses a portion of the agriculture transfer tax to fund the Maryland Ag Land Protect Fund which purchases easements on rural lands.
- Lenexa, KS: "Lenexa taxpayers voted for a ballot in 2000 to add a 1/8 of a cent sales tax levy to support building stormwater facilities that repair existing infrastructure problems and protect against future flooding events. The sales tax passed by a 78% margin. It generated \$7.2 million between 2000 and 2005 [...] The sales tax levy supports a frontloaded capital improvement program."¹⁷ This program was scheduled to sunset in 2010.

Loans and grants

"Loans and grants are not considered stable or long-term solutions or fixes. They can be useful, however, as seed funding or as funding for pilot projects. Depending on loan and grant funding to support a stormwater program is not highly recommended as the funds are not sustainable, are subject to change from year to year, and are often competitively won."¹⁸

A variety of federal and state loan programs are available to pay for green infrastructure, including Community Development Block Grants administered by the US Department of Housing and Urban Development as well as funding under Section 319 of the Clean Water Act (see Funding and Finance Resources at the end of this section for more resources). One of the largest and most readily available sources is the US Environmental Protection Agency Clean Water State Revolving Fund (CWSRF).

"Under current regulations, the CWSRF can fund only the "capital costs" of a water quality improvement project. However, the CWSRF's definition of capital costs is very broad. In addition to traditional infrastructure expenditures on pipes, pumps and treatment plants, capital costs also include things like land conservation, tree plantings, equipment purchases,

¹⁵ US Environmental Protection Agency. 2009. *Managing Wet Weather with Green Infrastructure Municipal Handbook: Funding Options*, p. 10.

http://water.epa.gov/infrastructure/greeninfrastructure/upload/gi_munichandbook_funding.pdf

¹⁶ University of Maryland Environmental Finance Center website. <http://www.efc.umd.edu/SFOUfinoptions.html>

¹⁷ US Environmental Protection Agency. 2009. *Managing Wet Weather with Green Infrastructure Municipal Handbook: Funding Options*, p. 9.

http://water.epa.gov/infrastructure/greeninfrastructure/upload/gi_munichandbook_funding.pdf

¹⁸ University of Maryland Environmental Finance Center website. <http://www.efc.umd.edu/SFOUfinoptions.html>

environmental cleanups and even the development and initial delivery of environmental education programs. One of the few things the CWSRF cannot fund is the operation and maintenance costs of a project, such as periodic cleaning of pervious pavement. Some examples of green infrastructure projects that are eligible for CWSRF include: land conservation, reforestation, tree boxes, cisterns [and] rain barrels, downspout disconnections, wetland restoration, parks [and] greenways, rain gardens [and] bioinfiltration practices, permeable pavements, green roofs.¹⁹

Case study: Ohio Clean Water SRF Program

“The Ohio CWSRF program recently provided over \$1.1 million in low interest loans to Hidden Creek, Ltd., a residential development company, to fund the installation of a variety of green infrastructure practices that protect the Big Darby Creek watershed – one of the highest-quality aquatic ecosystems in the United States. Home to 25 rare or endangered species, this watershed encompasses 557 square miles in central Ohio and has been recognized as one of The Nature Conservancy’s “Last Great Places” in the western hemisphere.

“When a large tract of highly sensitive agricultural land within this watershed was put up for sale, Hidden Creek Ltd. bought the property and designed a housing project to demonstrate that development can be both environmentally sensitive and financially profitable. With the help of CWSRF funds, a comprehensive set of actions were taken to limit the amount of runoff generated from the development project, including the construction of vegetated swales for stormwater treatment, restoration of wooded stream buffers, and the establishment of emergent wetland habitat. In addition, 230 acres of the riparian stream corridor within the development have been protected via a conservation easement held by the Natural Resources Conservation Service. A program has also been developed to educate homeowners and housing contractors about watershed protection and related deed restrictions attached to each property. Hidden Creek, Ltd. received a national wetland award for land stewardship and development from the Environmental Law Institute for their watershed protection efforts, and has repaid the CWSRF loans with revenues from the sale of the housing lots.”²⁰

Resources

- Clean Water State Revolving Fund. 2008. *Green Infrastructure Approaches for Managing Wet Weather with Clean Water State Revolving Funds*. http://www.epa.gov/owm/cwfinance/cwsrf/green_if.pdf
Fact sheet identifying several ways in which states, communities, and individuals can use the Clean Water State Revolving Fund (CWSRF) to finance green infrastructure projects.
- Massachusetts Department of Environmental Protection State Revolving Fund program information: <http://www.mass.gov/dep/water/wastewater/wastewat.htm>

Private donations and sponsorships

Private funds may be available to fund green infrastructure projects, especially demonstration or pilot projects in public places. Corporate sponsorships will be most effective if the business receives publicity through signage and/ or media attention. Nonprofit organizations concerned with water quality or habitat may be helpful in recruiting donations from their members.

Case study: Portland, ME

Private donations from individuals and businesses supported the installation of a demonstration rain garden along the tidal Back Cove in Portland, Maine. The garden covers 2.5 acres of land adjacent to a popular recreational trail that is heavily used by walkers, joggers, and cyclists. The garden was funded by a \$34,000 federal grant, a \$10,000 grant from a private foundation, and \$20,000 in donations from local businesses and garden clubs. The project was managed by the Cumberland County Soil and Water Conservation District, with volunteers providing much of the labor needed for construction and maintenance. 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 provides educational opportunities as well as visibility for corporate sponsors. Learn more:

http://www.pressherald.com/news/new-gardens-nurture-nature-naturally_2012-06-11.html?searchterm=back+cove
<http://www.pressherald.com/life/homeandgarden/rain-garden-gives-city-a-green-way-to-stop-flow-of-pollution-2010-07-04.html>

Another good example from Portland comes from the urban land trust Portland Trails. They have a very strong adopt-a-trail corporate sponsorship program that is often cited as a case study www.trails.org

¹⁹ US Environmental Protection Agency. 2009. *Managing Wet Weather with Green Infrastructure Municipal Handbook: Funding Options*, p. 11-13. http://water.epa.gov/infrastructure/greeninfrastructure/upload/gi_munichandbook_funding.pdf

²⁰ US Environmental Protection Agency. 2009. *Managing Wet Weather with Green Infrastructure Municipal Handbook: Funding Options*, p. 13-14. http://water.epa.gov/infrastructure/greeninfrastructure/upload/gi_munichandbook_funding.pdf

Case study: Lynchburg, VA

A new corporate sponsorship program in Lynchburg, Virginia is successfully funding 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 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. Through corporate sponsorship, businesses and individuals help create favorable impressions to visitors and businesses. The program is embraced by municipalities because the rain garden design and installation are covered by private donations. Money is then put aside to pay for maintenance. An example of the contribution is two donors contribute \$12,500 each. The garden construction costs \$5,000. One year of maintenance is \$2,000. There is a \$25,000 renewal required after five years. Low impact development installation costs approximately \$15,000 to \$20,000 extra. The municipalities are the program champions helping to manage the donations through a 501 (c)3 non-profit.

Learn more: <http://www.sage-project.com>

Resources

The following table lists good resources for more information on green infrastructure funding and finance.

Title	Link	Date	Author	Type	Description
Federal Funding Resources	http://water.epa.gov/infrastructure/greeninfrastructure/gi_funding.cfm	On-going	US Environmental Protection Agency	Website	Lists potential federal funding sources for green infrastructure projects.
Stormwater Financing Workshops	http://www.efc.umd.edu/swlidfinancing.html	2009 and 2007	Environmental Finance Center, University of Maryland	Workshop presentations	University of Maryland Environmental Finance Center hosted three workshops on financing stormwater management programs. Presentations are available for download.
Stormwater Financing Options	http://www.efc.umd.edu/SFOUfinoptions.html	On-going	Environmental Finance Center, University of Maryland	Website	Overviews stormwater financing options, including utilities, fees, taxes, bonds, loans, grants, and unconventional funding structures. Provides case studies for each.
Stormwater Financing Presentations	http://www.efc.unc.edu/projects/stormwater.htm	2008 - 2010	Environmental Finance Center, University of North Carolina	Workshop presentations	UNC hosts workshops and trainings on how to plan and fund stormwater programs and watershed protection efforts. Downloadable presentation slides provide an overview of funding and financing options, including fees, mitigation banks, nutrient trading, and state revolving funds.
Financing Alternatives Comparison Tool	http://water.epa.gov/grants_funding/cwsrf/fact.cfm	On-going	US Environmental Protection Agency	Online tool	A financial analysis tool that helps to identify the most cost-effective method to fund a wastewater or drinking water management project. This tool produces a comprehensive analysis that compares various financing options for these projects by incorporating financing, regulatory, and other important costs.
Municipal Handbook: Funding Options	http://water.epa.gov/infrastructure/greeninfrastructure/upload/gi_munichandbook_funding.pdf	2009	US Environmental Protection Agency	Handbook	Describes strategies and provides case study examples of how local governments are generating reliable funding for green infrastructure.

Regulatory Strategies

Zoning and subdivision regulations

Local development codes and ordinances are often the best place to start when a municipality wants to increase the adoption of green infrastructure practices. Even when there is political and public support for green infrastructure, “existing requirements in comprehensive plans, zoning codes, and building standards may be silent on, ambiguous towards, or even in conflict with the principles of green infrastructure. Zoning density standards, storm sewer connection requirements, and minimum parking and road widths are just a few of the requirements that can limit opportunities for green infrastructure.”²¹

A systematic review or audit of local codes and ordinances allows municipal leaders to identify and remove regulatory barriers to using green infrastructure. Tools such as the EPA’s Water Quality Scorecard and the Center for Watershed Protection’s Better Site Design Codes and Ordinances Worksheet²² can help identify and overcome barriers, including ones that may not be immediately apparent. The code audit should include any regulation that might address stormwater, including:

- Zoning ordinances
- Development codes and design standards
- Subdivision ordinances
- Erosion and sediment control ordinances
- Stormwater management ordinances
- Parks and open space plans and ordinances

Within these ordinances, special attention should be given to “anything with the words ‘roof,’ ‘curb,’ ‘edge,’ or ‘tree.’”²³

Other elements to inspect:

- Dimensional standards: lot size, frontage, height, coverage, yards, parking
- Building codes and public works standards: drains, roads, sewers
- Landscaping, buffers, trees, and tree canopy (landscaping and planting requirements)
- Site plan review
- Maintenance requirements found in subdivision, site plan, and stormwater ordinances
- Stormwater drainage and detention
- Soil erosion and sediment control
- Floodplain management
- Stream and wetland protection
- Natural area protection and management
- Landscaping standards
- Street and parking requirements (impervious area reduction)
- Conservation design (look in zoning and subdivision codes)²⁴

Following the audit, codes and ordinances should be amended in order to “integrat[e] the principles of green infrastructure into stated goals and [add] language that provides flexibility for green infrastructure.”²⁵ Green infrastructure should be integrated into the entire planning and permitting process, including not only the zoning code, but also the comprehensive plan, the site plan review process, and the post-construction inspection and enforcement protocol. Equally as important, the audit should involve and educate all municipal staff and partners who influence green infrastructure adoption, including planning and zoning staff, consulting engineers, public works staff, and appointed citizen boards.²⁶

²¹ US Environmental Protection Agency. 2012. *Green Infrastructure Website: How Can I Overcome the Barriers to Green Infrastructure?*
http://water.epa.gov/infrastructure/greeninfrastructure/gi_barrier.cfm

²² See resources section for links.

²³ US Environmental Protection Agency. 2012. *Green Infrastructure Website: How Can I Overcome the Barriers to Green Infrastructure?*
http://water.epa.gov/infrastructure/greeninfrastructure/gi_barrier.cfm

²⁴ US Environmental Protection Agency, Region 5. 2011. *Using Local Codes to Cultivate Green Infrastructure and Foster Sustainable Stormwater Management* webinar. http://water.epa.gov/infrastructure/greeninfrastructure/gi_training.cfm

²⁵ US Environmental Protection Agency. 2012. *Green Infrastructure Website: How Can I Overcome the Barriers to Green Infrastructure?*
http://water.epa.gov/infrastructure/greeninfrastructure/gi_barrier.cfm

²⁶ US Environmental Protection Agency, Region 5. 2011. *Using Local Codes to Cultivate Green Infrastructure and Foster Sustainable Stormwater Management* webinar. http://water.epa.gov/infrastructure/greeninfrastructure/gi_training.cfm

Case study: Cleveland Heights OH²⁷

In 2010, Cleveland Heights Department of Planning and Development hired a consultant to review the City's zoning code and other regulations to remove barriers and encourage ecological practices in land development and building construction. The review process included two main phases: the first designed to engage the public and the second to develop an easily understood and administered document. Overall objectives of the sustainability audit included decreasing water consumption, reducing impervious surfaces, increasing tree and vegetation coverage, increasing biodiversity, reducing landfill dumping and encouraging energy efficiency and clean modes of transportation.

Consultants and city staff reviewed general zoning provisions as well as specific provisions for large-scale developments, residential districts, commercial districts, accessory structures and uses, principal uses, parking standards, and landscape and water conservation. The final report made the following recommendations:

- Large-scale development process: expand planned development to include sustainable benefits; encourage energy efficient buildings, conservation easements, innovative water management, public infrastructure improvements (complete streets, bike lanes), public open spaces, public plazas, public art, accessible / ADA compliant units, proper solar orientation
- Residential districts: allow greater lot coverage, reduce impervious surface, reduce parking requirements
- Commercial districts: encourage pedestrian-oriented, compact design, transparency along street frontages, bike access and storage, connections to surrounding areas, high quality, sustainable building materials, proper landscaping
- Accessory structures and uses: allow structures and uses that encourage alternative energy production (solar, thermal, wind), water and energy efficiency (rain barrels, cisterns, clotheslines, rain gardens), and local food production (greenhouses, chicken coops, etc)
- Parking standards: adjust parking demand formulas, include *maximum* number of parking spaces rather than minimum, allow land banked parking, update shared parking flexibility, reduce parking for car-sharing programs, allow car sharing in parking lots and structures, allow compact spaces, allow parking for charging of electric vehicles, allow semi-pervious material for paving, require parking lots over a certain size to use semi-pervious materials for a percentage of the parking lot, encourage retention basins, require bike parking in new lots, create design and siting requirements for bike parking, allow racks in the public right-of-way where space is available
- Landscape and water conservation: minimum installation sizes for all plant types, allow for naturalized lawns, native landscapes and gardens, species diversity requirement, require native plant species, establish recommended and prohibited plant lists

More information: http://water.epa.gov/infrastructure/greeninfrastructure/upload/gi_webinar_part4.pdf

Read the Sustainability Audit: http://www.clevelandheights.com/citydept_dev_sustainabledevelopmentpractices.asp

Design guidelines

Amending codes to make green infrastructure legal, as described above, is a critical first step in the regulatory category. To further encourage the use of GI practices, municipalities can develop guidelines illustrating accepted designs. Design guidelines are an effective way to educate developers as well as public works staff who may not be familiar with GI techniques. Two approaches for developing design guidance are:

- 1) Adopt a design manual. A manual makes a clear statement about the intent to use green infrastructure practices, but it also typically provides more flexibility and discretion to use conventional techniques instead of GI. It can be a “kinder, gentler way to introduce these techniques, especially to engineers / Departments of Public Works.”²⁸
- 2) Adopt design standards. Standards clearly delineate what is and isn't allowed. For example, green street standards might specify allowed street width, paving material, and stormwater management designs. While standards remove ambiguity, they can be inflexible.

Resources

- Green Highways Partnership: <http://www.greenhighwayspartnership.org/index.php>
This website has lots of great information and examples on greening transportation infrastructure, including green streets and green parking lots. Their G3 initiative in particular focuses on green streets, jobs, and towns.

²⁷ US Environmental Protection Agency. 2012. *Green Infrastructure Website: How Can I Overcome the Barriers to Green Infrastructure?*

http://water.epa.gov/infrastructure/greeninfrastructure/gi_barrier.cfm

²⁸ US Environmental Protection Agency, Region 5. 2011. *Using Local Codes to Cultivate Green Infrastructure and Foster Sustainable Stormwater Management* webinar. http://water.epa.gov/infrastructure/greeninfrastructure/gi_training.cfm

- Maryland Stormwater Design Manual:
http://www.mde.state.md.us/programs/Water/StormwaterManagementProgram/MarylandStormwaterDesignManual/Pages/Programs/WaterPrograms/SedimentandStormwater/stormwater_design/index.aspx
 This manual consists of two volumes. The first volume provides designers a general overview of how to size, design, select and locate best management practices (BMPs) at a new development site to comply with state stormwater performance standards. The second volume contains appendices with more detailed information on landscaping, BMP construction specifications, step-by-step BMP design examples, and other assorted design tools.
- New York State Stormwater Management Design Manual:
http://www.dec.ny.gov/docs/water_pdf/swdm2010entire.pdf
 This manual provides designers a general overview of how to select, locate, size, and design BMPs at a development site to comply with state stormwater performance standards. Chapter 5 provides complete definitions, design specifications, and computational methods for particular green infrastructure practices.

Municipal green streets policies

Good examples of municipal policies for green street replacements include the following:

- Portland, OR adopted a comprehensive Green Street policy in 2007, to promote green street facilities in both public and private development. For examples, definitions, and design ideas, see: <http://www.portlandonline.com/bes/index.cfm?c=44407>
- Ventura, CA has had a green streets policy in place for almost as long as Portland. With the adoption of the policy in 2008, the city dedicated 20 percent of its street paving fund to incorporating green street elements into repaving projects on a citywide basis. It also led the way by designing and constructing a pilot project on a major street. Learn more: <http://www.venturariver.org/2008/07/ventura-adopts-green-streets-policy.html>
- Chicago, IL has a green alleyways program, including a handbook/design manual. This approach works in Chicago, because alleys are public property in that City; however, even in communities where alleys are privately owned, an incentive program might be an option. Learn more: http://www.cityofchicago.org/city/en/depts/cdot/provdrs/alley/svcs/green_alleys.html and http://www.cityofchicago.org/dam/city/depts/cdot/Green_Alley_Handbook_2010.pdf

Resources

The following table lists good resources for more information on regulatory strategies for implementing green infrastructure.

Title	Link	Date	Author	Type	Description
Water Quality Scorecard	http://www.epa.gov/smartgrowth/pdf/2009_1208_wq_scorecard.pdf	2009	US Environmental Protection Agency	Online tool	A program evaluation tool that local governments can use to collaboratively identify the barriers to green infrastructure in local codes and ordinances. The scorecard guides municipal staff through 230 policies, codes, and incentives that could be adapted to promote sustainable stormwater management. The scorecard also provides extensive references and case studies.
Better Site Design: A Handbook for Changing Development Rules in Your Community	http://www.cwp.org/documents/cat_view/77-better-site-design-publications.html	1998	Center for Watershed Protection	Handbook	Covers everything from basic engineering principles to actual vs. perceived barriers to implementing better site designs. Outlines 22 guidelines for better developments and provides detailed rationale for each principle. Also examines current practices in local communities, details the economic and environmental benefits of better site designs, and presents case studies from across the country.
Better Site Design Code and Ordinance Worksheet	http://www.cwp.org/documents/cat_view/77-better-site-design-publications.html	1998	Center for Watershed Protection	Worksheet	Allows you to enter data to see how the local development rules in your community stack up against the model development principles outlined in the Better Site Design Handbook (above).
Green Infrastructure	http://www.epa.gov/owow/NPS/lid/gi_c	2010	US Environmental	Case study	Examines the policies adopted by 12 local governments that have successfully promoted green

Case Studies	ase_studies_2010.pdf		Protection Agency		infrastructure, as well as the policy drivers and policy outcomes. A menu of policy options is presented and barriers and lessons learned are summarized.
Managing Wet Weather with Green Infrastructure Municipal Handbook	http://water.epa.gov/infrastructure/greeninfrastructure/gi_policy.cfm	2008	US Environmental Protection Agency	Handbook	Provides local governments with a step-by-step guide to growing green infrastructure in their communities. Chapters address funding options, retrofit policies, green streets, rainwater harvesting, and incentive mechanisms. Each chapter provides a discussion of available programs and policies and several case studies.
Using Local Codes to Cultivate Green Infrastructure and Foster Sustainable Stormwater Management	http://water.epa.gov/infrastructure/greeninfrastructure/gi_training.cfm	2011	US Environmental Protection Agency, Region 5	Webcast	Describes the interaction of zoning and building codes with water quality; presents several examples of code audits conducted in Illinois, Ohio, and Minnesota; and highlights the top 10 obstacles to green infrastructure in local codes and ordinances.
Top Ten Green Infrastructure Issues in Plans and Codes	http://water.epa.gov/infrastructure/greeninfrastructure/upload/gi_webinar_part5.pdf	2011	Tetra Tech	Webcast slides	Part of the webcast listed above “Using Local Codes to Cultivate Green Infrastructure.” Identifies common code barriers in local codes and ordinances, and offers solutions.
Revising Local Plans, Codes, and Ordinances	http://cfpub2.epa.gov/npdes/courseinfo.cfm?program_id=0&outreach_id=409&schedule_id=1045	2009	US Environmental Protection Agency	Webcast	One of six two-hour webcasts on green infrastructure offered by EPA in the spring and summer of 2009. Presented by Abby Hall of US EPA, Chris Kloss of the Low Impact Development Center, and Bill Davis of Progressive Design and Planning.
Managing Wet Weather with Green Infrastructure Municipal Handbook	http://water.epa.gov/infrastructure/greeninfrastructure/gi_policy.cfm	2008	US Environmental Protection Agency	Handbook	Provides local governments with a step-by-step guide to growing green infrastructure in their communities. Chapters address funding options, retrofit policies, green streets, rainwater harvesting, and incentive mechanisms. Each chapter provides a discussion of available programs and policies and several case studies.
Low Impact Development Strategies and Tools for NPDES Phase II Communities	http://www.lowimpactdevelopment.org/lidphase2/	On-going		Website	Contains various resources to assist stormwater Phase II communities integrate low impact development (LID) strategies into their compliance programs.

Incentives

Stormwater fee discounts

Local governments can encourage stormwater management on private property by reducing stormwater fees in exchange for desired green infrastructure practices, such as reducing impervious cover or installing cisterns, rain gardens, or trees. “Fee discounts and credits provide an opportunity for property owners to reduce the cost of their stormwater fees by using green infrastructure techniques that limit impervious cover and reduce the amount of runoff generated. The public system clearly benefits when property owners manage stormwater runoff on site. If less water enters the sewer system, less money needs to be spent on treatment, maintenance, and operation expenditures. Further, discounts and credits support the fee-for-service system because property owners can reduce the amount they pay by reducing the service they receive.”²⁹

Case study: Reading, MA’s Stormwater Enterprise Fund Fee Abatement

“The City allows single and two-family residential properties to abate up to 50[percent] of the total fee if they install and maintain infiltration systems or other means to reduce runoff. Commercial/industrial/multi-family properties are allowed this abatement if they install and maintain “state-of-the-art” stormwater treatment and infiltration systems. Typical devices that qualify are drywells, infiltration chambers, and detention ponds. Drinking water filtration systems and rain barrels do not qualify. The stormwater abatement continues as long as the impervious surface does not change.”³⁰

Case study: Portland, OR’s Clean River Rewards program

“Clean River Rewards is the most recently updated version of the stormwater discount program. Launched in 2006, it provides discounts to property owners based on the extent and effectiveness of on-site stormwater management practices that control flow rate, pollution and disposal. Because the on-site portion of the stormwater bill is only 35 [percent], this is the maximum discount received for full on site management. Different forms and requirements apply to two ratepayer categories, either single-family homes or commercial, industrial, and multi-family homes. The process for registering is very simple and straightforward, can be done entirely online and requires only the property owner’s signature for certification.

“Single-family homes are given a stormwater discount based on roof runoff management. Property owners are given a checklist to choose what type of on-site management qualifies them for the discount. For example, different percentage discounts are given for disconnecting downspouts and depending on the type of practice collecting runoff, such as a drywell, swale or rain barrel. Partial credit is also given for ecoroofs, four or more trees over 15 feet tall and for properties with less than 1,000 square feet of imperviousness.”³¹

Case study: Toledo, OH’s stormwater fee discount program

“Toledo, OH instituted a stormwater fee discount program as a way for non-residential property owners to reduce their stormwater service fee. The credit program was developed based on research and evaluation of 15 other communities with existing Stormwater Utilities. The program identifies several different practices that property owners can install to reduce stormwater runoff and pollution and establishes different discount percentages for each practice. For example, a property owner can receive a 10 [percent] discount for brownfield reuse, and a 30 [percent] discount for installing a forested buffer or swale. The current guidelines of the program are as follows:

- Credits are available only for non-residential property owners who pay a stormwater fee.
- The maximum credit receivable is 50 [percent].
- Credit is awarded only for fully constructed and functional practices.
- The credit is applicable only to the impervious area that is controlled by the practice.”³²

Resources

- Orem, UT. *Storm Water Quality Credit Manual*. <http://www.orem.org/PDF/PW/Credit.pdf>

²⁹ US Environmental Protection Agency. 2009. *Managing Wet Weather with Green Infrastructure Municipal Handbook: Funding Options*, p. 3. http://water.epa.gov/infrastructure/greeninfrastructure/upload/gi_munichandbook_funding.pdf

³⁰ US Environmental Protection Agency. 2009. *Managing Wet Weather with Green Infrastructure Municipal Handbook: Incentive Mechanisms*, p. 10. http://water.epa.gov/infrastructure/greeninfrastructure/upload/gi_munichandbook_incentives.pdf

³¹ *Ibid*, p. 7.

³² US Environmental Protection Agency. 2009. *Managing Wet Weather with Green Infrastructure Municipal Handbook: Funding Options*, p. 8-9. http://water.epa.gov/infrastructure/greeninfrastructure/upload/gi_munichandbook_funding.pdf

- Charlotte, NC. *Draft Charlotte-Mecklenburg Stormwater Credit Manual*. <http://chameck.org/stormwater/FeesandBilling/Documents/Fee%20Credit%20Manual%20Draft%20Jan%202026.pdf>
Charlotte will enact a stormwater credit program beginning July 1, 2012. The program focuses on reducing peak flow, surface runoff and pollution runoff. Charlotte's credit application instruction manual provides technical details and examples for calculating storm water credits. See sections 5 and 6 of the manual.
- See also stormwater utility resources in Funding and Finance Strategies section (p. 7).

Zoning and permitting incentives

Various incentives can be integrated into the framework of existing development codes and regulations. Such incentives encourage private developers to implement green infrastructure practices in new or redevelopment projects, in exchange for an easier and/or cheaper permitting process. Some common types of incentives include:

- Density bonuses/ zoning upgrades
- Increases in floor area ratios
- Reduced parking requirements
- Reduced stormwater requirements
- Expedited permitting
- Waived fees (consultant code review fees, application fees)
- Free consulting from in-house design experts or other staff, to help navigate the permit process

Incentives can be offered for a wide range of desired practices. Some examples include:

- Green buildings and developments (as defined by the US Green Building Council or a state or local program)
- Installing green roofs, rain gardens, rain harvesting devices (barrels, cisterns), or permeable pavement
- Vegetated stream buffers
- Removing impervious cover or disconnecting impervious areas from stormwater control system via infiltration systems

Case studies

- Chicago's Green Permit Program "reviews permits much faster, even in as few as 30 days, for projects that meet certain LEED (Leadership in Energy and Environmental Design) criteria that include better stormwater management practices."³³ In addition, "participants that display a particularly high level of green strategy can possibly have consultant code review fees waived."³⁴
- Portland, OR's "Floor Area Ratio (FAR) Bonus increases a building's allowable area in exchange for adding an ecoroof/greenroof. Portland has seen over \$225 million in additional private development through this program, and more than 120 ecoroofs have been built in the center city district."³⁵
- Knox County, TN's Water Quality Volume Credits program "allows for a reduction in the water quality treatment volume (WQv). The credit system directly translates into cost savings to the developer by reducing the size of structural stormwater control and conveyance facilities. If a developer incorporates one or more of the credited practices in the design of the site, the requirement for capture and treatment of the WQv will be reduced. Site designers are encouraged to utilize as many credits as they can on a site. Greater reductions in stormwater storage volumes can be achieved when many credits are combined (e.g., disconnecting rooftops and protecting natural conservation areas)."³⁶

Tax abatements and credits

Municipalities may consider offering tax-based incentives to private property owners who implement specific practices, particularly in targeted areas. On the land preservation side of green infrastructure, several states (including Massachusetts) have a tax credit program from purchased and donated easements. On the stormwater side of green infrastructure, tax credits have primarily been given for green roofs (see below).

³³ US Environmental Protection Agency. 2009. *Managing Wet Weather with Green Infrastructure Municipal Handbook: Incentive Mechanisms*, p. 4. http://water.epa.gov/infrastructure/greeninfrastructure/upload/gi_munichandbook_incentives.pdf

³⁴ Ibid, p. 20

³⁵ Ibid, p. 4

³⁶ Ibid, p. 22

Case studies:

- Virginia's state tax credit program for purchased and donated easements: http://www.dcr.virginia.gov/land_conservation/documents/lctaxbro.pdf
- Philadelphia's Green Roofs Tax Credit: Business owners may receive a credit for a green roof covering at least 50 percent of the building's rooftop or 75 percent of eligible roof top space. They may claim a tax credit of 25 percent of all costs actually incurred to construct the green roof, provided that total tax credits for a green roof do not exceed \$100,000. The tax credit is applied against the applicant's total business privilege tax liability for the Tax Year during which the applicant certifies completion of the green roof, provided that any unused credits may be carried forward until fully used.³⁷
- New York's Green Roof Tax Abatement: Building owners in New York City can apply for a one-time tax credit of up to \$100,000 for the installation of a green roof. The green roof must be on at least 50 percent of available rooftop space. The credit would be equal to \$4.50 per square foot of roof area that is planted with vegetation. It is a state program for New York City residents only and is administered by the city. The program sunsets in 2013 unless extended by the state legislature.³⁸

Rebates and grants

Rebates, grants, and installation financing are powerful mechanisms for encouraging private property owners to implement green infrastructure techniques. Such incentives can be targeted to high-priority areas, such as regions served by combined sewer systems, or they can be used to achieve community goals like "cisterns for water conservation, rain gardens to improve groundwater recharge, and green roofs to mitigate urban heat island effects."³⁹ Grant and rebate programs can also be an effective form of public outreach about the benefits and uses of green infrastructure. A drawback of monetary incentives is their cost to municipalities. Local water authorities and nonprofits may prove valuable partners in funding and promoting such programs.

Case studies⁴⁰

- Montgomery County, MD's Rainscapes program incentivizes green infrastructure / low-impact development techniques on private property. <http://www.montgomerycountymd.gov/dectmpl.asp?url=/content/dep/water/rainscapes.asp>
- Washington, DC's River Smart Homes and Schools programs and their green roof rebate program are also designed to incentivize GI on private property. Learn more: <http://ddoe.dc.gov/stormwater>
- Santa Monica, CA provides \$160,000 per year in Landscape Grants to develop sites with native landscaping that reduce water consumption and absorb runoff.
- Chicago's Green Roof Grant program has helped this former industrial city add over 2.5 million square feet of green roofs across the city. The program grants \$5,000 awards to residential and small commercial buildings that meet criteria based on location, visibility and environmental benefit. Green infrastructure grant programs provide awards and savings to developers and properties that take extra steps to add greener stormwater management practices to both new and existing sites.
- Portland, OR's Willamette Stormwater Control Program "provides technical and financial assistance for a limited number of pilot projects that control stormwater runoff. [It has] funded 15 demonstration projects to retrofit existing sites in targeted areas. Up to \$30,000 was available for design and construction for projects that were part of an existing development, located in the city's combined sewer target area, and removed runoff from at least 10,000 [square feet] of paved or roof area."
- King County, WA's Impervious Surface Cost Share and Credit Program: "As an incentive to reduce impervious surface, the county is making funds available for sharing the costs of converting impervious surface to (1) native-vegetated landscape, (2) compost-amended lawn or (3) grassed, modular-grid pavement. To qualify, a plot plan, technical information and description must be submitted to county engineers who will work with the customer to develop the plan. 50 [percent] of costs up to \$20K will be reimbursed after the job is complete and inspected."

³⁷ US Environmental Protection Agency. 2009. *Managing Wet Weather with Green Infrastructure Municipal Handbook: Funding Options*. http://water.epa.gov/infrastructure/greeninfrastructure/upload/gi_munichandbook_funding.pdf

³⁸ Ibid.

³⁹ US Environmental Protection Agency. 2009. *Managing Wet Weather with Green Infrastructure Municipal Handbook: Incentive Mechanisms*, p. 4. http://water.epa.gov/infrastructure/greeninfrastructure/upload/gi_munichandbook_incentives.pdf

⁴⁰ All but the first two case studies come from US Environmental Protection Agency. 2009. *Managing Wet Weather with Green Infrastructure Municipal Handbook: Incentive Mechanisms*. http://water.epa.gov/infrastructure/greeninfrastructure/upload/gi_munichandbook_incentives.pdf and US Environmental Protection Agency. 2009. *Managing Wet Weather with Green Infrastructure Municipal Handbook: Funding Options*. http://water.epa.gov/infrastructure/greeninfrastructure/upload/gi_munichandbook_funding.pdf

Reducing impervious surface could potentially place the property into a lower rate category, reducing the surface water fee.”

- Cincinnati, OH’s Mt. Airy Rain Catchers program was a “reverse auction to encourage the installation of rain barrels and rain gardens. Bids were received from qualified residents which outlined what rain catcher projects they agreed to have installed and the incentive payment they requested to do so. The bids were selected based upon the project(s) they agreed to install, their scoring within an Environment Benefit Index and the amount of the incentive payment requested. The selected project(s) were installed for free and the residents were paid the bid amount as a one-time incentive payment. The first round of the reverse auction in 2007 resulted in 50 rain gardens and 100 rain barrels installed at 67 of the approximately 350 residential properties in the watershed. In 2008, the auction was repeated and an additional 35 rain gardens and 74 rain barrels were installed.”

Resources

The following table lists good resources for more information on various incentives to encourage the use of green infrastructure.

Title	Link	Date	Author	Type	Description
Municipal Handbook: Incentive Mechanisms	http://water.epa.gov/infrastructure/greeninfrastructure/upload/gi_munichandbook_incentives.pdf	2009	US Environmental Protection Agency	Handbook	Green infrastructure on private property can significantly reduce the public cost of stormwater management. This chapter of EPA’s green infrastructure municipal handbook describes a number of incentives that municipalities can offer to promote the implementation of green infrastructure on private properties and reduce their stormwater management costs.
The Value of Green Infrastructure: A Guide to Recognizing its Economic, Environmental, and Social Benefits	http://www.cnt.org/repository/gi-values-guide.pdf	2010	Center for Neighborhood Technology and American Rivers	Report	Cumulatively assesses the multiple benefits of low-impact development (LID) and green infrastructure (GI) as a municipal or private investment. Since methods and tools for assessing benefits have been lacking, municipalities more easily can assess gray infrastructure cost-benefits and favor those solutions. This guide provides simplified ways to assess the full benefits of LID and GI to aid decision-makers in evaluating options for water management.
Green Infrastructure Case Studies: Municipal Policies for Managing Stormwater with Green Infrastructure	http://www.epa.gov/owow/NPS/id/gi_case_studies_2010.pdf	2010	US Environmental Protection Agency	Case studies	Examines the policies adopted by 12 local governments that have successfully promoted green infrastructure, as well as the policy drivers and policy outcomes. A menu of policy options is presented and barriers and lessons learned are summarized.