City of Fairfax
Comprehensive Plan Update
Moving Fairfax Forward

Briefing Paper Series
Sustainability & the Environment

Community Development & Planning Department ◆ May 2012

Table of Contents

Executive Summary 1

Introduction 2

Background 2

Existing Programs 5

Regional Policy 7

Local Policy 8

Best Practices/ Learning from Others 9

Concluding Summary 13

Bibliography 13

Contact:

Community Development & Planning

City Hall Annex Room 207
10455 Armstrong Street
Fairfax, VA 22030

Hours: 8:30 am to 5 pm weekdays
Phone: 703.385.7930

Executive Summary

The City of Fairfax Planning Commission has initiated discussions regarding a complete update to the City's Comprehensive Plan, which was most recently amended in 2012. During the initial stages of these discussions, a series of Briefing Papers will be published on matters related to planning. The topics of the papers include:

- Comprehensive plan mechanics
- Regional development snapshot
- Census 2010 data update
- Public facilities and lands
- Sustainability and the environment
- Multimodal transportation
- Parking
- Economic development opportunities and partnerships
- Land use and zoning
- Fiscal Impact Analysis
- Models of development

The papers are intended to provide information that may be useful as the process to draft a new Comprehensive Plan moves forward. The papers will explore the aforementioned topics in detail, providing both a local perspective and examples of best practices that may be applicable to the City of Fairfax. In addition, the papers will provide context for the discussion by providing background information and, when applicable, a glossary of terms.

Sustainable practices, which encourage the thoughtful use of resources and place value on the life cycle of products and systems, are being incorporated into a wide range of decision-making models in the public, nonprofit, and private sectors. Sustainable initiatives can address environmental, economic, or social issues. Of particular importance in a comprehensive plan are those values and policies related to the built and natural environments. While the preservation and protection of natural resources remain at its core, the concept of sustainability is no longer confined to

these areas, and thus its principles are being considered in many facets of the physical environment, including how new techniques affect the economic bottom line. This briefing paper defines sustainability, examines how other jurisdictions are addressing it, and identifies best practices from around the country. The topics include: green building, stormwater management, water quality/ watershed protection, urban forestry, energy use and land conservation.

Introduction

Sustainability and environmental issues have come to the forefront of discussions as localities grapple with how to plan for future growth that preserves local values while also supporting regional sustainability goals. Some of the most significant regional issues relate to reducing carbon emissions from both building energy use and transportation and improving water quality of local streams and the Chesapeake Bay.

Many local governments are implementing new policies and programs to support reductions in carbon emissions and improve water quality. Programs range from promoting green building standards, home energy audits, and community environmental education on both energy and stormwater issues to constructing green roofs on public buildings. One of the purposes of this paper is to introduce and provide information on recent concepts relating to the environment and sustainability as the development of a future vision for a sustainable Fairfax is considered.

Background

To support the City's continued prominence as a desirable place to live in Northern Virginia, consideration of issues such as smart growth, green buildings, efficient use of resources, reductions in energy use, water conservation, stormwater management, low impact development and stream water quality is imperative. As the city prepares for a rewrite of the Comprehensive Plan, it is important to recognize that sustainability has facets that span to social, economic and environmental issues and therefore permeates through more than just the environment section of the plan.

Preserving the character of the City through the implementation of sustainable practices is important. Since the City is built-out, engaging residents and business owners as partners in this process will ensure that the attributes which first attracted people to Fairfax

Definitions of Sustainability & Smart Growth

"There may be as many definitions of sustainability and sustainable development as there are groups trying to define it. All the definitions have to do with:

- **Living within the limits**
- **Understanding the interconnections among economy, society, and environment**
- **Equitable distribution of resources and opportunities"**

- Sustainable Measures

"Sustainability may be described as our responsibility to proceed in a way that will sustain life that will allow our children, grandchildren and great-grandchildren to live comfortably in a friendly, clean, and healthy world."

- Thomas Jefferson Sustainability Council

"Smart Growth means using comprehensive planning to guide, design, develop, manage, revitalize, and build inclusive communities and regions to:

- **have a unique sense of community and place;**
- **preserve and enhance valuable natural and cultural resources;**
- **expand the range of transportation, employment, and housing choices in a fiscally responsible manner;**
- **promote public health and healthy communities"**

- American Planning Association

remains. Because infrastructure is already in place, the City is ideal for incorporating smart growth concepts to further enhance the ability of residents to take advantage of available public transportation, parks, open space and trails. Since there is a tendency for residents to want to remodel existing older homes, an opportunity exists to promote more energy efficient homes while also encouraging designs that fit within the context of existing neighborhoods.

Stormwater Management

One of the most significant regulatory changes that will impact the City in coming years relates to new stormwater requirements. To address water quality, quantity and local stormwater management program criteria, the Virginia General Assembly stipulated that amended stormwater regulations be adopted by localities no later than July, 2014. The new regulations will change the technical criteria for stormwater discharges and establish minimum criteria for locality administered stormwater management programs. The new regulations require more stringent phosphorus load reductions for both new and redevelopment projects.

In addition to the new stormwater regulations, the City will need to comply with Total Maximum Daily Loads (TMDL) for both the Chesapeake Bay and Accotink Creek. The TMDLs are being required by the Environmental Protection Agency since the Chesapeake Bay and its tidal waters do not meet the water quality standards under the Federal Clean Water Act. The loads are developed to provide the maximum amount of a pollutant that a water body can receive and still meet water quality standards. The Chesapeake Bay TMDL which requires nutrient reductions for sediment, phosphorus and nitrogen. The Accotink Creek TMDL uses flow as a surrogate for the pollutants and requires flow reductions of approximately 50 percent.

Watershed implementation plans are currently being developed that will specify methods and time lines that jurisdictions must follow to achieve their portion of the required load reductions to meet the TMDLs. Because the two TMDLs have different requirements, achieving reductions for both will be especially challenging for the City. The City is in the process of working with the state and EPA to develop implementation plans to meet the required load reductions. Most likely, the City will need to look at a variety of options to meet the requirements including new measures as well as retrofitting older facilities to provide additional flow and pollutant removal capabilities. For work on City owned property, it is expected that significant public funding will be needed. Private development will also need to comply

Virginia Stormwater Management Program (VSMP)

The Commonwealth of Virginia enforces the Virginia Stormwater Management Act and the Clean Water Act through the VSMP permitting process. The program, which applies to every jurisdiction within the state, regulates land-disturbing activities and other types of projects that affect the local stormwater system.

- Virginia Administrative Code (4VAC50-60)
Effective Date: July 1, 2009

with TMDL requirements. The specifics, which have yet to be developed, will become part of the City's municipal state stormwater permit. Following this action, it will be necessary to adopt new standards for both development and redevelopment to achieve the load reductions.

Stormwater education for residents should be planned to meet the public education and participation requirements under the City's municipal stormwater permit. As part of this effort, homeowners can learn about low impact development measures that can be installed on residential lots to reduce runoff. Popular measures include rain barrels and rain gardens. Proper installation and maintenance will need to be discussed to ensure the facilities continue to function as designed. Having homeowners accept responsibility for properly maintaining on-site low impact development measures is seen as one obstacle to ensure their success. Some localities have found that providing information through their website, holding workshops and having staff available to meet with property owners has helped to ensure measures are properly maintained.

Green Building/Energy Use Reduction

In May, 2009, the City Council adopted a resolution recommending the incorporation of green building practices and climate protection strategies for development and operations in the City. Included in the resolution was language that the Comprehensive Plan update should support green building practices using the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED®) rating or a similar system. The intent of LEED and other green building certifications is to ensure that buildings receiving these labels meet a host of energy efficient and sustainable practices. By passing this resolution the City Council resolved that the City would establish LEED® silver as the goal for all public facilities and would encourage private developers to meet the LEED® certified building requirements. These recommendations support the regional goals of the Metropolitan Council of Government's Greening the Metropolitan Washington Region's Built Environment report.

While LEED is the most well known green building rating system, the City will need to determine whether this system best fits its goals for sustainable development. The Environmental Sustainability Committee has briefed the Planning Commission on a list of potential recommended green building practices that could be referenced when developing proffers. The concept of having a list of preferred measures, which work towards meeting City goals, is that it may provide a better mechanism for buy in from the development community thereby enabling that more practices are incorporated into development projects. Such a system would also avoid the costs associated with many green building certifications.

To support regional goals to reduce carbon emissions from government buildings, the City is considering a performance contract to fund energy retrofits at City facilities. Measures to reduce consumption of electricity, natural gas and water will be considered. Through the State's Performance Contract, the City can fund energy retrofits whereby the annual savings is used to pay back the costs over the term of the contract. The true benefit of this program is that it allows the City to reduce carbon emissions without an upfront expenditure of funds and expedite the energy savings that might have taken years to fund. The next step is for the City to evaluate how to expand energy retrofits to existing commercial and residential developments and to promote new developments to meet the latest guidelines for energy efficiency.

Economic Benefits of Sustainability

In addition to the inherent environmental benefits of sustainability, sustainable development can also enhance the economics of local development. Recent trends show that office space that meets new energy efficient standards generally experiences higher demand and can be a catalyst for bringing new businesses to a community. Regarding the architectural style of green buildings, it is a misconception that the buildings need to have a modern appearance. Green buildings can be designed in any architectural style that is desired for a community.

Existing Programs

Over the last five years, great strides have been made towards greening City operations. On-site recycling is provided at all City-owned facilities, the majority of building lighting is energy efficient and rain gardens have been installed at City Hall, Stafford and Draper Drive parks and most recently at the Sherwood Community Center. Six of the City's CUE buses use hybrid electric diesel technology to reduce fuel consumption. The City's connection via the CUE bus to local businesses, George Mason University and the Vienna/Fairfax metro station provide residents an option to use public transportation thereby reducing vehicle trips and its association pollution. In the 1990s, the City was one of the first jurisdictions in the area to complete stream restoration projects to protect the streams from further erosion. Since that time over four miles of streams have been restored. Presently, the City is completing audits of all City facilities in an effort to retrofit systems to save energy and reduce carbon emissions. Efforts to move the City's transportation system in line with more sustainable practices will be discussed in the *Multimodal Transportation* briefing paper.

Environmental Sustainability Committee

To advise the City Council on policies and practices related to the environment and energy conservation, the City Council established the Environmental Sustainability Committee (ESC). The ESC is comprised of eight members appointed by the City Council and includes a mix of residents and City of Fairfax business owners. The ESC has been meeting since February 2010 and has discussed and provided input on a range of environmental topics and issues. The committee acts as an advocate for protecting, preserving and enhancing the environment and sustainability. The committee also serves in an advisory role to the City Council and all Boards and Commission on environmental and sustainability policy issues.

ESC Vision Statement

The Environmental Sustainability Committee envisions an environmentally sustainable City of Fairfax that supports the well being of its residents and businesses.

Environment/Sustainable Programs and Education

Education especially at the elementary level with continuation through high school has been shown to increase awareness on environmental issues not only with school children but with their parents. Daniels Run Elementary School has a Living Classroom that provides students with hands on learning opportunities. In recognition of their efforts the school is the only one in the Fairfax County system that has received the Virginia Naturally Schools designation. This designation is given to schools whose efforts have resulted in increased environmental awareness and stewardship for children.

Ashby Pond

Ashby Pond Conservatory Site, which totals nearly four acres, was purchased by the City of Fairfax in 2004. Recent improvements include dredging of accumulated sediments, constructing a new outlet structure and floating treatment wetlands have been installed and will be monitored by Virginia Tech through a grant with the National Fish and Wildlife Foundation.

Floating treatment wetlands refer to plants that can grow hydroponically on floating rafts. The plants remove pollutants from the pond water which thereby improve the water quality of the pond and the flows to Daniels Run which flows to Accotink Creek, the Potomac River and eventually the Chesapeake Bay.

Lanier Middle School was presented the National Wildlife Federation's Green Flag award in June 2011. Lanier was the first school in Virginia and the third nationwide to receive this award. To win this award, Lanier's students completed a number of sustainability initiatives ranging from forming an Eco-Action team to auditing facility energy efficiency and waste disposal. Lanier students have also established a courtyard wildlife habitat and vernal pool through a creative combination of grants, non-profit partnerships and community participation. The courtyard not only provides habitat and an outdoor classroom experience but also helps to solve an existing stormwater problem in the courtyard by using the rainfall water to support the plant and wildlife habitats.

Virginia Municipal League Green Government Challenge

As a sign of the City's efforts to be more sustainable, the City received recognition from the Virginia Municipal League for being a Certified Green Government for 2009 and 2010. By expanding green programs, the City was awarded a Silver Certification for 2011. Certification is based on meeting program objectives outlined under the League's guidelines for the *Go Green Virginia Green Government Challenge* where a specified level of points are required to meet certified, silver and the highest gold recognitions. Examples of some of the programs the City received points for include:

- Creating an Energy Improvement Plan
- Establishing a green building policy
- Having a community-wide recycling program that recycles an additional 5 percent above the state-mandated rates
- Adopting policies that encourage Low Impact Development
- Establishing an advisory committee composed of local residents and business representatives to advise and assist the City on issues related to the environment and energy conservation

Other City efforts include:

- Mason to Metro study is underway to provide a designated bike route between George Mason University and the Vienna/Fairfax-GMU Metro Station.
- Conversion of unused dead end streets into green space.
- Requirement for private developers to submit LEED® checklists with site plan applications.
- Designation by Arbor Day Foundation as a Tree Cities USA Community for 24 years
- Requirement for businesses to submit annual recycling reports that are used to track commercial recycling rates.

Green Buildings in the City of Fairfax

ENERGY STAR® Rated *(US EPA)*

- Mosby Towers
- Daniels Run Elementary

LEED® Rated Buildings *(U.S. Green Building Council)*

- 3950 University Drive - Certified
- Fair City Mall, Best Buy - Certified
- Fairfax County Health Department Lab - Gold

LEED® Ratings

Certified	26-32 points
Silver	33-38 points
Gold	39-51 points
Platinum	52-69 points

Regional Policy

Metropolitan Washington Council of Governments

The Washington Metropolitan Washington Council of Government's (MWCOG) has taken a major role in facilitating local government discussions on sustainability issues. More specifically, two reports have provided guidance for localities working toward achieving the region's sustainability goals. *Greening the Metropolitan Washington Region's Built Environment* was approved in December 2007 and provides a reference guide to develop and implement green building programs and policies.

In January 2010, the MWCOG approved *The Region Forward* report with recommendations that local governments execute a voluntary regional compact incorporating regional goals and commit to consider regional implications in their local decisions and actions. The City Council approved a resolution adopting the Greater Washington 2050 Compact on March 30, 2010.

Summaries of both reports are provided below:

Greening the Metropolitan Washington Region's Built Environment

Recommendations include:

- Establish Leadership in Energy and Environmental Design (LEED®) as the region's preferred green building rating system for new commercial and high-rise residential projects
- Establish LEED® Silver as the goal for all local government facility construction in the Washington region
- Develop COG regional green standard for private development to be LEED® Certified
- Provide education and collaboration to promote regional innovation
- Implement actions to insure the success of a Regional Green Building Policy, 2008 Green Building Work Plan

Metropolitan Washington Council of Governments Green Building Definition

Green building is an approach to design, construction, and management that reduces the negative impact of buildings on the environment while increasing building performance and occupant health.

Region Forward- A Comprehensive Guide for Regional Planning and Measuring Progress in the 21st Century

Goals include:

- Significantly decreasing greenhouse gas emissions from the built environment and transportation sector
- Efficient public and private use of energy region-wide utilizing renewable energy and alternative fuels sources for buildings, vehicles and public transportation
- Enhancement of established neighborhoods with compact, walk able infill development, rehabilitation and retention of historic sites and preservation of open space
- Protect and enhance environmental resources by meeting and exceeding standards for air, water and land
- Preserve and enhance the region's open space, green space and wildlife preserves

In 2009 the MWCOG Board created a Climate, Energy and Environment Policy Committee (CEEPC). This committee has been instrumental in providing guidance that was included in the Region Forward report as well as developing a Regional Climate and Energy Action plan. The CEEPC is also responsible for developing an annual progress report that includes updates on how localities are meeting the plan goals. Included in the 2012 plan goals is that local governments integrate greenhouse gas emission impacts into Comprehensive Plans.

Local Policy

Promoting sustainable practices at the local level requires policy that addresses the actions of both the public and private sectors. Effective policy directs these two sectors to work collaboratively toward established goals. One of the most significant environmental issues that the City will face in the short term is meeting the Accotink Creek and Chesapeake Bay TMDL requirements. Compliance will require substantial investment along with new programs and possible amendments to City ordinances. While these changes to stormwater requirements will affect how a site is developed or redeveloped, a similar level of emphasis on the associated building(s) will be needed to address the overall sustainability of the property. To support additional green building in the City, and in accordance with the City Council guidance in the green building resolution, the City should consider additional steps that support green building practices.

As a Dillon Rule state, Virginia localities are only provided the authority granted to them by the Commonwealth. Some authority remains with the State, such as setting the building code, and other is grated to localities through enabling legislation, such as the zoning code. As a result, many localities increasingly rely on their zoning code to promote green building through the use of development proffers.

In cases where more density or other exceptions are being requested and proffers can be established, localities often take this opportunity to request that site and building plans include additional measures to reduce the environmental impact of a development on natural resources. Examples of measures that could be requested include requirements to reduce energy use from buildings and the stormwater runoff that is a result of the impervious site area. Measures can include performance criteria for heating and air conditioning systems, lighting, building orientation for reducing energy use, increasing natural light and possible solar energy collection, stormwater systems to infiltrate water rather than just detention and reuse for landscaping and nonpotable water uses. Guidance supporting development plans having increased density on a portion of the site can be an effective tool for leaving more area for open space. For example,

Permeable pavement allows water to infiltrate into the stone base below the pavers and then into the ground thereby reducing runoff.

Fairfax Marketplace parking lot, Fairfax Boulevard

conventional strip centers are mostly impervious with land consumed with low level retail and surface parking. If sites are developed with higher floor area ratios and structured parking, more land is available to provide open space allowing stormwater to infiltrate rather than directly runoff to storm drains and streams. For surface parking and paved areas, the use of pervious pavers/ pavement can significantly reduce runoff. Reducing impervious area and its related stormwater runoff from both new and redevelopment projects will play a major role in meeting the Chesapeake Bay and Accotink Creek TMDLs. In addition to commercial development, citizens should be encouraged to look at pervious pavement options when building/replacing driveways and when building patios.

To provide guidance for future development projects, jurisdictions will likely need to develop a list of preferred environmental measures that could be referenced when these opportunities are available. By developing a specific list, the measures would support local goals to protect and improve environmental resources, while also meeting new regulatory requirements.

The City's Chesapeake Bay Ordinance protects and limits disturbance in the stream buffer areas adjacent to Accotink Creek and its tributaries. While much of the City's streams are located in City park areas there are still significant portions located on private property. A green infrastructure network may be an option to further protect and preserve these areas by providing a mechanism to accept conservation easements along the private property sections of streams.

Low Impact Development (LID)

- **Reduces runoff from storms**
- **Phosphorus runoff levels are significantly reduced as water remains on site**
- **Streams are protected from storm flows**
- **Objective is met to reduce phosphorus loads reaching the Chesapeake Bay**

Best Practices/Learning from Others

With the increased concerns for the environment and greenhouse gas emissions over the last ten years, many area jurisdictions have reviewed their comprehensive plans and made updates to incorporate sustainability concepts. Localities have included new recommendations highlighting LEED® and other nationally recognized green building programs, as well as low impact development, smart growth and other measures that support reduced environmental impacts. Best practices associated with supportive transportation systems will be addressed in the *Multimodal Transportation* and *Models of Development* briefing papers.

Fairfax County, Virginia

Fairfax County's 2011 edition of their Comprehensive Plan added new environmental goals. The goals include:

- Preserve and improve air quality
- Prevent and reduce pollution of surface and groundwater resources
- Protect and restore the ecological integrity of streams
- Protect the Potomac estuary and the Chesapeake Bay from the avoidable impacts of land use activities
- Minimize human exposure to unhealthful levels of transportation generated noise
- Minimize light emissions to those necessary and consistent with general safety
- Design and construct buildings and associated landscapes to use energy and water resources efficiently and to minimize short and long term negative impacts on the environment and building occupants
- Consistent with other Policy Plan objectives encourage the application of energy conservation, water conservation and other green building practices in the design and construction of new development and redevelopment projects.
- Encourage commitments to implementation of green building practices through certification under established green building rating systems

(e.g., the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED®) program or other comparable programs with third party certification). Encourage commitments to the attainment of the ENERGY STAR® rating where applicable and to ENERGY STAR® qualification for homes.

Other Metropolitan Washington Jurisdictions

Other area jurisdictions such as: Arlington County, the City of Alexandria, and the District of Columbia have also initiated impressive programs that support green building, improved water quality and reductions in stormwater runoff from development. In addition, some localities have sponsored green business challenge programs. The purpose of the programs is to both educate businesses and to involve them in the community's goals to reduce energy consumption and waste.

Some of the work of other area jurisdictions are shown in the following examples:

sustainable.dc
has your voice been heard?

In July 2011, Mayor Gray announced his intention to make DC "the greenest, healthiest, and most livable city in the nation" and initiated Sustainable DC . The City's plan focuses on major categories such as:

- Built Environment
- Climate
- Energy
- Food
- Nature
- Transportation
- Waste
- Water
- Green Economy

http://sustainable.dc.gov/

Arlington's Smart Growth Journey

In 2002, Arlington was awarded the Environmental Protection Agency's National Award for Smart Growth Achievement for smart growth in the Rosslyn-Ballston (RB) Metro Corridor. According to Arlington's website, 39% of those who live in the RB Corridor take transit to work and 6% of Arlington's work force can walk to work.

Arlington's website also hosts information on how the County has addressed smart growth issues over the years and a documentary film, "Arlington's Smart Growth Journey", tracing the past half-century of growth and development in the County.

http://www.arlingtonva.us/departments/CPHD/planning/CPHDPlanningSmartGrowth.aspx

Eco-City Alexandria

Beginning in spring 2007, the City of Alexandria partnered with Virginia Tech's Department of Urban Affairs and Planning (UAP) to design and facilitate a strategic, collaborative planning process, called Eco-City Alexandria.

The Eco-City Challenge is a survey containing questions and Green Tips to help you learn ways to:

- Reduce your carbon footprint
- Reduce air, water, and solid waste pollution
- Reduce resource consumption
- Reduce water and energy costs
- Improve your indoor environment
- Improve your health and the health of the environment

http://alexandriava.gov/Eco-City

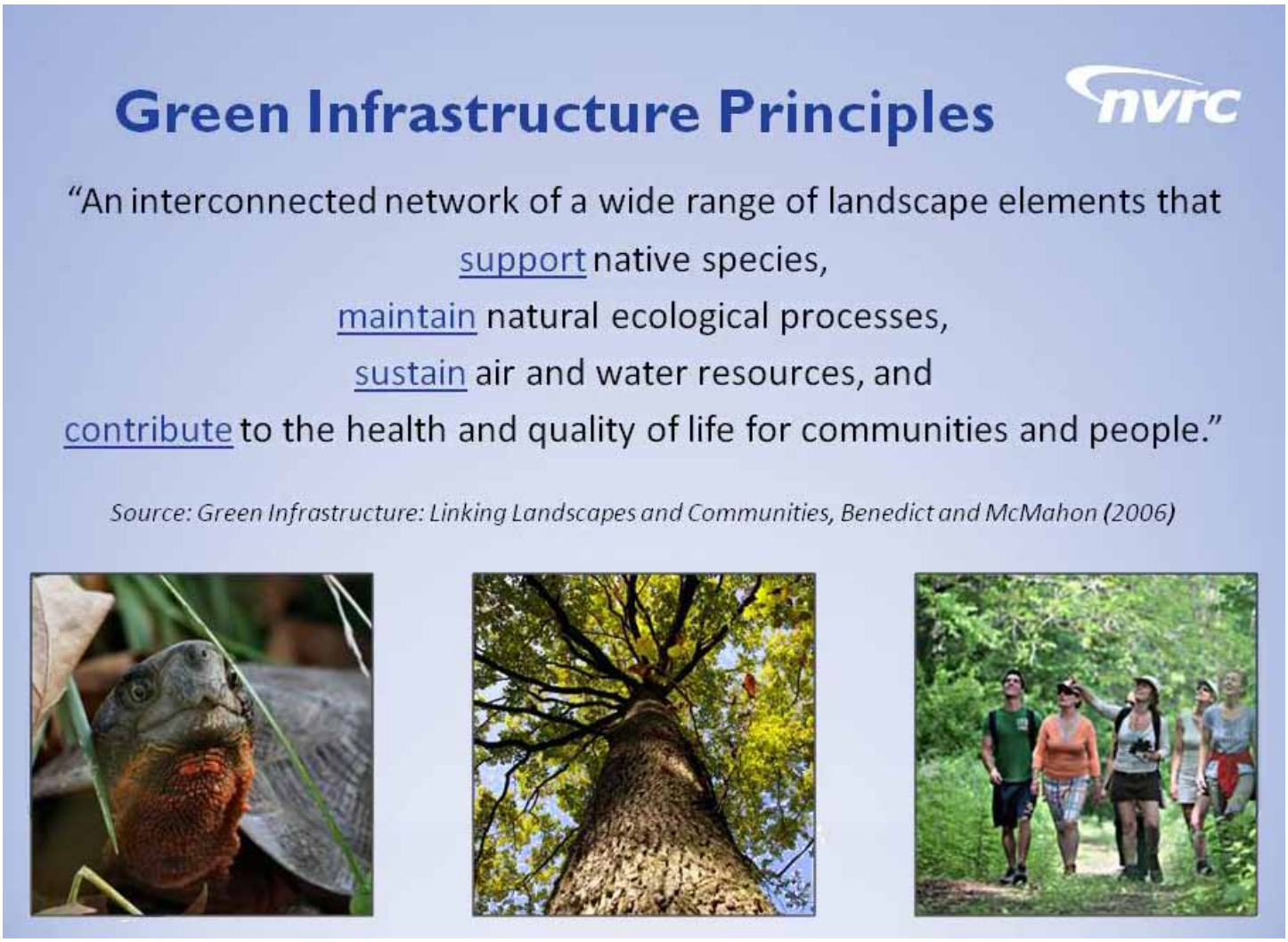
Northern Virginia Regional Commission

The Northern Virginia Regional Commission (NVRC) provides a resource to counties, cities and towns in the Northern Virginia area. Each member jurisdiction has representation on NVRC's Board of Commissioners. As well as providing information, technical support and facilitating regional coordination NVRC supports regional planning efforts with data and maps, land use and transportation information and a variety of environmental program support.

One recent NVRC project relates to green infrastructure and how localities can collaborate to create an interconnected system of natural areas that can be used by both animals and people. By working on a regional basis, localities can plan to include these areas in future planning documents and mapping to ensure these areas are preserved as natural habitats. Breaks in the green infrastructure system can limit the effectiveness of the system to protect area wildlife.

Portland, Oregon

With regard to stormwater, the City of Portland has a gained national recognition for its sustainable stormwater management programs. Portland has not only developed programs that meet regulatory requirements but they have expanded stormwater education and beautification programs for the community that all support stormwater goals. As part of their work, the city developed a stormwater manual that highlights measures that use



plants and soil to reduce stormwater runoff and improve water quality. In 2000, Portland approved a program that rewards property owners for reducing runoff. Rewards are given for reducing the runoff from paved surfaces by disconnecting downspouts and installing rain gardens or other low impact development (LID) measures. In 2001, the city established a Sustainable Infrastructure Committee to look into stormwater options that had not been widely used at the time, such as: porous pavement, green streets, and stormwater reuse. Reducing stormwater is even more crucial to Portland as they have a combined stormwater and sewer system.

Because streets constitute a significant portion of Portland, the city developed an extensive green street program that incorporates design features that allow runoff from the streets to enter landscaped areas that capture and treat the runoff. Porous pavement is another option used to reduce runoff. Swales and planter strips adjacent to the street also function as infiltration areas. Green streets are promoted for use in both private and public development projects. Not only do the green streets reduce runoff but they provide an amenity to the community.

Another measure encouraged by Portland to reduce runoff is the use of green roofs. Floor area bonuses are provided for installing green roofs in one of the city's planning districts and consideration is being given toward expanding this to all city areas. The city has adopted a policy that requires green roofs for all new city-owned facilities and when roofs are replaced.

Types of Green Streets

Green Streets have different shapes and sizes, but they all have stormwater management benefits and help protect watershed health. Here are some examples:

SE 42nd and Belmont

SE 12th and Clay

Stormwater Curb Extension

Extending into the street, stormwater curb extensions transform the curb lane into a landscape area. Curb extensions can conveniently integrate a ramp for safe pedestrian crossing.

SW 12th and Montgomery

SE 92nd street

Stormwater Street Planter

Stormwater Street Planters between the sidewalk and the curb work well in areas with limited space, and they allow for adjacent street parking or travel.

NE 21st and Sandy

SE 55th and Belmont

Rain Gardens

Where there is plenty of space, rain gardens are ideal. They can also transform awkward street intersections into safe pedestrian and bicycle crossings.

N Willamette and Denver

NE 23rd and Irving

Simple Green Street

Excavating an existing planting area behind a reinforced curb, making curb cuts for inflow and outflow, and landscaping with appropriate vegetation is a simple approach to capture and treat street runoff.

WS 0895 August 2008

Image Source: Portland Bureau of Environmental Services

Concluding summary

The City has a significant amount of natural resources that should be protected as the City continues to grow and redevelop. Encouraging green building, smart growth , efficient transportation systems and the development of green infrastructure networks will help to meet the region's goals for improving air quality. Installing measures to reduce runoff and remove nonpoint source pollutants from stormwater flows will put the City on track to meet TMDL requirements. With the government as the leader, businesses and residents can be encouraged to reduce the use of nonrenewable resources, lower energy use, increase recycling rates , reduce stormwater runoff and improve the water quality of local streams. Incorporating sustainable practices will enable the city to grow while still protecting the resources that are valuable to the community.

Bibliography

"Commercial Real Estate and the Environment." *CoStar Group Real Estate Information.* Web. Mar. 2008. http://www.costar.com/uploadedFiles/Partners/CoStar-Green-Study.pdf.

"Definitions of Sustainability." Sustainable Measures. Web. April 2012. <http://sustainablemeasures.com/node/35>.

Energy and Environment Policy Committee (CEEPC). *National Capital Region Climate Change Report*. Rep. DC: Metropolitan Washington Council of Governments, 2008. Print.

"Eco-City Alexandria." *City of Alexandria, Virginia*. City of Alexandria, Virginia. Web. 27 Mar. 2012. <http://alexandriava.gov/Eco-City>.

"Fairfax County Comprehensive Plan, 2011 Edition." Web. <http://www.fairfaxcounty.gov/dpz/comprehensiveplan/area3/overview.pdf>.

Greater Washington 2050 Coalition. *Region Forward*. Rep. DC: Metropolitan Washington Council of Governments, 2010. Print.

"Green DC." *Ddoe*. District Department of the Environment. Web. 27 Mar. 2012. <http://green.dc.gov/>.

"Green Streets." *City of Portland, Oregon*. City of Portland, Oregon. Web. 27 Mar. 2012. <http://www.portlandonline.com/bes/index.cfm?c=45379>.

"Higher Occupancy, Higher Lease Rates for Green Buildings." BuildingGreen.com. *Environmental Building News.* Web. 1 May 2008. http://www.buildinggreen.com/auth/article.cfm/2008/4/29/Higher-Occupancy-Higher-Lease-Rates-for-Green-Buildings/.

Intergovernmental Green Building Group (IGBG). *Greening the Washington Metropolitan Region's Built Environment*. Rep. DC: Metropolitan Washington Council of Governments, 2007. Print.

"Northern Virginia Regional Commission - Website - Green Infrastructure." Northern Virginia Regional Commission, Jan. 2012. Web.. <http://novaregion.org/index.aspx?NID=1102>.

"Policy Guide on Smart Growth." Policy Guide on Smart Growth. Web. April 2012. <http://www.planning.org/policy/guides/adopted/smartgrowth.htm>.

Region Forward. Rep. DC: Greater Washington 2050 Coalition, 2010. Print.

"Smart Growth." Official Site of Arlington County Virginia : General Information : Arlington, Virginia. Arlington, Virginia. Web. 27 Mar. 2012. <http://www.arlingtonva.us/departments/CPHD/planning/CPHDPlanningSmartGrowth.aspx>.

"The Thomas Jefferson Planning District Commission." Thomas Jefferson Planning District Commission. Web. April 2012. http://www.tjpdc.org/index.asp.