2013 Annual Report on the Environment

Environmental Quality Advisory Council

DETAILED REPORT

November 2013

A Fairfax County, Virginia Publication

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The cover shows a Pipevine Swallowtail Butterfly. Photo by Charles Smith, Fairfax County Park Authority. Cover design by Hana Burkly, Student Member, Environmental Quality Advisory Council.

ANNUAL REPORT
on the
ENVIRONMENT

2013

DETAILED REPORT

Fairfax County, Virginia

Environmental Quality Advisory Council

November 2013

Printed on recycled paper

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Introduction

This year's Annual Report on the Environment has been prepared by the Environmental Quality Advisory Council. Staff support for the coordination and printing of the report has been provided by the Planning Division of the Department of Planning and Zoning.

The Annual Report on the Environment, which is an update on the state of the county's environment, serves a threefold purpose. Initially, it is intended to assist the Board of Supervisors in evaluating ongoing environmental programs and to provide the basis for proposing new programs. The document also aids public agencies in coordinating programs to jointly address environmental issues. In addition, the report is directed to residents and others who are concerned with environmental issues.

Similar to Annual Reports from the past several years, EQAC is presenting this year's report in two formats: (1) A detailed report similar to the reports that have been produced each year; and (2) A summary report providing highlights of recent activities, key issues, and comments and recommendations associated with each of the major topical areas covered in the larger report. Both report formats are provided electronically, but only the summary document is being made available in hard copy. It is EQAC's hope that this approach to report formatting will provide interested readers with the level of detail or generality that they desire while saving resources associated with hard copy production.

The report continues to include chapters on major environmental topics including: climate change and energy; land use and transportation; air quality; water resources; solid waste; hazardous materials; ecological resources; wildlife management; and noise, light, and visual pollution. An appendix addressing state legislation relating to the environment is also provided within the detailed report format, as is an appendix providing EQAC's resolutions and positions taken over the past year. In last year's report, EQAC included a "spotlight" on two environmental initiatives of Fairfax County Public Schools: High performance and sustainable schools; and Get2Green Environmental Education and Action. EQAC has updated these discussions and has added to the "Spotlight" section a discussion of a collaboration between FCPS and the county's Stormwater Planning Division on stormwater management plans for school properties. EQAC commends FCPS for working towards improved environmental performance in these areas. The report also includes a short table identifying who people can call in regard to various potential environmental crimes/concerns. A similar table has been provided in previous years' reports. The report also includes EQAC's "Scorecard" of progress made on its recommendations from last year's report. Finally, new to this year's report is a brief section highlighting environmental stewardship/volunteer opportunities in Fairfax County.

Within each chapter of the detailed report format are: a discussion of environmental issues; a summary of relevant data; and a discussion of applicable government programs. Most of the chapters include information regarding stewardship opportunities and conclude with recommendations that identify additional actions that EQAC feels are necessary to address environmental issues. References are generally presented only in the detailed report format. As was the case in last year's report, recommendations are presented in two formats: items addressing ongoing considerations and continued support for existing programs are noted as "comments." Items addressing new considerations, significant refinements of previous recommendations, or issues that EQAC otherwise wishes to stress, are presented as "recommendations."

This report covers activities affecting the environment in 2012; however, in some cases, key activities from 2013 are also included.

While the Environmental Quality Advisory Council has prepared and is responsible for this report, contributions were made by numerous organizations and individuals. Many of the summaries provided within this report were taken verbatim from materials provided by these sources. EQAC therefore extends its appreciation to the following:

Alice Ferguson Foundation
Audubon Naturalist Society
Clean Air Partners
Clean Fairfax
Coalition for Smarter Growth
Fairfax County Airports Advisory Committee
Fairfax County Deer Management Committee
Fairfax County Department of Cable and Consumer Services
Fairfax County Department of Code Compliance
Fairfax County Department of Information Technology
Fairfax County Department of Neighborhood and Community Services
Fairfax County Department of Planning and Zoning
Fairfax County Department of Public Works and Environmental Services
Fairfax County Department of Transportation
Fairfax County Department of Vehicle Services
Fairfax County Executive's Office
Fairfax County Environmental Coordinator
Fairfax County Facilities Management Department
Fairfax County Fire and Rescue Department
Fairfax County Health Department
Fairfax County Master Naturalists
Fairfax County Office of Community Revitalization
Fairfax County Park Authority
Fairfax County Police Department, Division of Animal Services
Fairfax County Public Schools
Fairfax County Restoration Project
Fairfax County Wetlands Board
Fairfax County Wildlife Biologist
Fairfax Joint Local Emergency Planning Committee
Fairfax Master Naturalists
Fairfax ReLeaf
Fairfax Water
Federal Aviation Administration
Illuminating Engineering Society of North America
International Dark-Sky Association
Interstate Commission on the Potomac River Basin
Metropolitan Washington Airports Authority
Metropolitan Washington Council of Governments
Northern Virginia Conservation Trust
Northern Virginia Regional Commission
Northern Virginia Regional Park Authority
Northern Virginia Soil and Water Conservation District
Occoquan Watershed Monitoring Laboratory
Reston Association
United States Fish and Wildlife Service
United States Geological Survey
United States National Museum of Natural History
Upper Occoquan Service Authority
Virginia Department of Environmental Quality
Virginia Department of Forestry

Virginia Department of Game and Inland Fisheries
Virginia Department of Transportation
Virginia Outdoor Lighting Taskforce
Virginia Outdoors Foundation

Finally, EQAC wishes to acknowledge the efforts of the county's interagency Environmental Coordinating Committee, which coordinated the staff responses to the recommendations within EQAC's 2012 *Annual Report on the Environment*, as well as the ongoing efforts of the interagency Energy Efficiency and Conservation Coordinating Committee.

County of Fairfax, Virginia

To protect and enrich the quality of life for the people, neighborhoods and diverse communities of Fairfax County

Board of Supervisors
County of Fairfax
12000 Government Center Parkway
Fairfax, VA 22035

November 19, 2013

The Environmental Quality Advisory Council is pleased to present the 2013 Annual Report on the Environment. In this report, we discuss various environmental issues in Fairfax County and make recommendations as to what actions the county should take to resolve identified problems. This report covers 2012, but also includes significant actions from 2013 that could impact EQAC's comments and recommendations. We recognize that the report does not capture all ongoing actions; if we tried to accomplish this, the report would never be finished and would be even longer. The report consists of nine chapters – each chapter addressing a different aspect of the environment. The chapters are arranged to reflect the order of topics listed in the Board of Supervisors' Environmental Agenda. We have again have created two versions of the report; one a printed summary version, and two, an electronic complete version with all data included, available both on-line and in the CD attached to this report. We have again highlighted environmental stewardship opportunities within the report chapters; this year, however, we have added a summary of these opportunities.

EQAC thanks the board for its continued strong support of environmental programs. We understand that although budget constraints lessened again this year they continue to impact all programs within the county.

EQAC asks that you continue to support the environmental programs you have established. These programs are important if we are to maintain the high quality of life we have in Fairfax County and the high standards we have set for ourselves. We note that for Fairfax County residents, quality of life is not just about good schools and jobs but also about having a clean and healthy environment in which to live and recreate.

EQAC's priority recommendations this year focus on the need for continuing long-term financial support to sustain these environmental programs:

1. EQAC recommends that Fairfax County continue to adequately fund and implement its ongoing stormwater program, which includes dam maintenance, infrastructure replacement, water resource monitoring and management,

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watershed restoration and educational stewardship programs. EQAC realizes the funding for the stormwater program will come entirely from funds generated through the Service District rates.

EQAC recommends that the Stormwater Service District rate be increased in FY 2015 by at least one-quarter penny, from a rate of 2.0 cents per $100 assessed real estate value to 2.25 cents per $100. EQAC understands that this increase would not fully meet stormwater management needs and therefore suggests that additional increases be continued each fiscal year until adequate funding to support the program is achieved. This would, once again, result in more funding for modest watershed improvement programs and a somewhat more realistic infrastructure replacement timeline. We realize that there will be a need for additional increases in funding for water quality projects to meet future permit conditions, and for infrastructure reinvestment, as the system is continually growing and aging.

2. EQAC recommends that the board **continue support for funding for the Environmental Improvement Program for the upcoming fiscal year.** The EIP is a reflection of those non-stormwater programs, including Energy Action Fairfax and other county sustainability initiatives. Funding the EIP is necessary to implement the Environmental Agenda adopted by the board for this county.

3. **EQAC is looking forward to the upcoming County Dialogue on Transportation and recommends that non-motorized and multi-modal transportation options receive priority**. The Fairfax County Bicycle Master Plan, Phase 1: Tysons Corner, for example, identifies healthy, effective, shovel-ready options to better connect Tysons with neighboring communities and trails in the county. There are both capital and non-capital elements in the plan. In order to be successful, we recommend that outreach and education be included. This is an example of combining land use and transportation to create great interconnected places across the county.

As we do each year, EQAC would like to commend the outstanding efforts of the following groups whose actions improve and safeguard the environment in Fairfax County. The Northern Virginia Soil and Water Conservation District continues its work to provide excellent education programs, to consult with the county on innovative stream restoration work, to have a large and successful stream monitoring program and to be available to residents and developers alike for site work consultation. The Northern Virginia Conservation Trust continues to obtain easements on privately owned environmentally sensitive land. Fairfax ReLeaf continues to promote tree preservation and tree replacement programs. The Park Authority Natural Resources staff continues to provide exemplary service due to a small group of dedicated individuals, working with a very small budget, who are slowly enhancing environmental efforts in the county's parks. The members of EQAC thank all these groups, and all others who work to preserve and enhance the environment of the county.

Once again, EQAC would like to thank and commend the county staff for its continued outstanding work. We thank staff especially for providing the data for this report and for a continued willingness to meet with EQAC to discuss various issues. We commend the county's Environmental Coordinating Committee, which is chaired by Deputy County Executive David Molchany, for its continued efforts at managing environmental action within the county. We appreciate the ECC's willingness to meet with EQAC twice each year and to discuss issues of environmental significance.

As I do every year it gives me great pleasure as the representative of EQAC to thank and acknowledge the work of two individuals. Every year we do this and every year the members of council continue to be impressed with the work and input of these two people.

First, we need to truly thank Noel Kaplan of the Environment and Development Review Branch, Department of Planning and Zoning. Noel provides county staff support to EQAC. Noel sets up and tapes every EQAC meeting, follows up on actions generated from the meetings and coordinates the inputs and publication of the Annual Report. Although the members of EQAC write the Annual Report, it is Noel who makes publication of the document possible. Again EQAC cannot thank him enough for his hard work and long hours in our support.

Second, we thank Kambiz Agazi, Environmental Coordinator, Office of the County Executive, who also attends all of our meetings and provides helpful advice and suggestions. His insight and his overview of county environmental activities are invaluable to our work. EQAC thanks him for his assistance and valuable contributions.

Finally, as I did last year, I would like to personally recognize my fellow EQAC members. They represent a diversity of views that allows for knowledgeable discussions and results in thoughtful recommendations. They spend extensive time investigating issues, write excellent resolutions and produce comprehensive chapters on subjects they have carefully researched. They are to be commended for their efforts.

The members of EQAC thank the Board of Supervisors for its leadership and look forward to continue working with you to achieve the goals of the Environmental Agenda and protecting and enhancing Fairfax County's quality of life in the coming years.

Respectfully submitted,

Stella M. Koch

Stella M. Koch, Chairman

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SCORECARD
Progress Report on 2012 Recommendations

1. CLIMATE CHANGE AND ENERGY

Climate Change & Energy Recommendation	Action taken by Agency or Department	EQAC Comments	Completed
1. EQAC is very encouraged to hear that a process has been established through which the funding of education programs (including social media) and programs to promote energy efficiency through the county's Environmental Improvement Program can be considered. EQAC recognizes that a broader range of EIP projects may be proposed in any given year and that any education and energy efficiency proposals will compete against these other proposals for limited funds; however, EQAC stresses the need for the prioritization process to ensure that strong education and energy efficiency proposals will be successful. Further, while EQAC appreciates all the efforts that have been made, EQAC recognizes that both the County Executive must recommend funding projects recommended by county staff and that the Board of Supervisors must approve the funding. EQAC recommends that the County Executive and the Board of Supervisors support and fund those projects that are recommended by staff.	This recommendation has been addressed. In response to a recommendation included in the FY 2012 Environmental Quality Advisory Council's Annual Report on the Environment, beginning in FY 2014, a new project selection process has been implemented. A staff Environmental Improvement Program Committee developed a more rigorous project selection process to support the board-adopted Environmental Agenda and other board-adopted environmental and energy policy. To facilitate the selection process, the committee developed minimum submission requirements and specific project scoring criteria, both of which were reviewed by EQAC. The committee then solicited requests from county agencies for project proposals, interviewed project teams and ranked each proposal based on the project scoring criteria and subsequent interviews.	EQAC agrees that a process has been addressed to implement the recommendation. EQAC will continue to track this recommendation until implementation is successful.	In progress.

Climate Change & Energy Recommendation	Action taken by Agency or Department	EQAC Comments	Completed
2. EQAC recommends that the Board of Supervisors direct county staff to evaluate alternatives for the county to further reduce greenhouse gas emissions from either incineration of waste or placement of waste in landfills. The long-term goal should provide for expanding the recycling of all waste streams, including composting of compostable waste. The expansion of waste streams recycled should be considered as the county develops a strategic plan for the management of county waste. In order to support the expansion of recycling, the following steps are recommended: a. Education and outreach on options for increasing recycling, including the composting of compostable material. b. Cooperating with other governments in the region to build capacity and enhance affordability for recycling and composting of-waste. This work should include quantifying the various waste streams. c. Gaining experience in expanding recycling streams. For example, modest composting efforts similar to what is being pursued-in the District of Columbia and Arlington County that are helping to provide experience in expanding recycling programs and waste composting should be undertaken.	These recommendations are currently being addressed as described below. *Education and outreach on options for increasing recycling, including the composting of compostable material.* Currently, information about composting is on the county website at http://www.fairfaxcounty.gov/dpwes/recycling/composting.htm. A new backyard composting outreach campaign will require an evaluation of best management practices of the compost piles to ensure that practices recommended do not create odors or harbor rodents. *Cooperating with other governments in the region to build capacity and enhance affordability for recycling and composting of waste. This work should include quantifying the various waste streams.* The county solid waste program staff has been involved in attempting to address organics management needs by participating in the Metropolitan Washington Council of Governments' organics committee that was established in 2009. *Gaining experience in expanding recycling streams. For example, modest composting efforts similar to what is being pursued in the District of Columbia and Arlington County that are helping to provide experience in expanding recycling programs and waste composting should be undertaken.* Fairfax County has recently embarked on a project to evaluate other opportunities to recycle and dispose of waste from the county. This is a Request for Expressions of Interest to manage any and all of the waste generated in the county and it allows prospective bidders to present proposals for a variety of waste management techniques. As of the time that this summary was prepared, the results of this RFEI have not been analyzed but they should help guide future decisions on recycling in Fairfax County.	Progress on this recommendation is great but concrete steps have yet to have been implemented. A key issue in determining what waste streams will or can be recycled will depend on the final contract requirements for the flow of waste to the Covanta facility.	In progress.

Climate Change & Energy Recommendation	Action taken by Agency or Department	EQAC Comments	Completed
3. While the county has promoted the incorporation of energy efficient certification, such as LEED at the Silver level or higher, EQAC recommends that the Board of Supervisors should also promote periodic (e.g., bi-annual) evaluation of the GHG footprints for buildings and facilities. Such a step would be a natural follow up action to education and outreach that has been started in 2012 for residential energy use and that is envisioned for the commercial sector. While EQAC is encouraged that plans are being developed that would address this recommendation, additional work will be needed before this recommendation can be fulfilled.	This recommendation will continue to be addressed with an action in the Environmental Improvement Program that will be updated for fiscal year 2015. In January 2012, Fairfax County launched its Energy Action Fairfax pilot program to increase the awareness of Fairfax County residents regarding their personal energy consumption and to encourage them to reduce that consumption. Major activities in developing and implementing the initial residential Energy Action Fairfax program included proposing program names and logos, developing messaging and branding, creating informational materials and content for the program website, establishing contacts with community organizations and preparing for and hosting numerous events with participating communities, including workshops focused on home energy efficiency and energy audit "parties" at the homes of community volunteers.	While progress has been made with this recommendation and while EQAC sees great promise with the new Energy Coordinator, this recommendation is still in implementation.	In progress.

Climate Change & Energy Recommendation	Action taken by Agency or Department	EQAC Comments	Completed
4. EQAC recommends that Fairfax County fund a program to serve as follow-on to the Energy Action Fairfax (previously referred to as the Residential Energy Education and Outreach) program that was funded by a grant through the American Recovery and Reinvestment Act of 2009. The EAF program completed a small number of outreach events and audits and developed a website and educational videos. The program educated county residents on energy conservation and greenhouse gas emission reductions. EQAC feels that it would be beneficial if the program was to continue. Given the significant efforts and expenditures made by the county to get this program started, it would be most cost-efficient to continue the program at this time rather than stop it and then try to re-start it at some future date	In January 2012, Fairfax County launched its *Energy Action Fairfax* pilot program to increase the awareness of Fairfax County residents regarding their personal energy consumption and to encourage them to reduce that consumption. The pilot program relied on three distinct but inter-related approaches to energy education and outreach: direct engagement to homeowner and civic associations; a social media and marketing "push;" and a user-friendly website that serves to "pull" residents and Web-visitors to the site and program. The direct engagement aspect provided the peer-to-peer contact essential to behavior change; it also generated content for the marketing efforts. Program objectives included educating citizens about their energy consumption both at home and in the workplace, explaining the energy assessment (audit) process and encouraging residents to undertake energy-savings measures. The program also educated residents about the expected direct benefits and costs of typical improvements and considerations for evaluating and prioritizing recommended improvements. Although the pilot program has ended with the expiration of the EECBG award term, the county extended the contract with GolinHarris on December 10, 2012 to begin the process of developing a long-term strategic plan that will serve to guide future Energy Action Fairfax program efforts and initiatives. Although details of the draft plan are currently under development, it is envisioned that the plan will include a residential and commercial sector business energy outreach and education plan. In addition, the fiscal year 2014 budget included an amount of $250,000 to support Energy Education and Outreach initiatives including the county's *Energy Action Fairfax* program. This program is intended to increase the awareness of Fairfax County residents and businesses regarding energy consumption and to encourage them to reduce consumption.	We are encouraged to see continued progress and hope that an effective established program can be developed.	In progress.

II. LAND USE AND TRANSPORTATION

Land Use & Transportation Recommendations	Action taken by Agency or Department	EQAC Comments	Completed
1. EQAC recommends that the county prioritize the Fairfax Forward work plan. EQAC also recommends that the county establish a stakeholder task force to work with the Fairfax Forward team to build familiarity and support for the new approach.	Fairfax Forward is an important step in the continued maintenance of the county's Comprehensive Plan. Building familiarity and support for the recommendations of Fairfax Forward, including the new approach to Plan review and the Comprehensive Plan Amendment Work Program, are critical to the success of the effort. … The recommendations have received support through substantial public outreach efforts, which provide information about the project, build understanding and gather stakeholder input. Public outreach has involved community meetings, generally one in each supervisor district, at significant milestones in the process.	Fairfax Forward was carefully initiated and is following a work plan with broad community support. EQAC wants to encourage the process for adopting future work plans and processes.	Ongoing
EQAC also recommends that the county continue to refine and formalize process for revitalization, especially in mixed-use centers. . . . This formalization should include incorporating GIS technology directly into the planning process and expanding the use of modeling to help understand future conditions and scenarios.	The county encourages revitalization efforts throughout the land use process through a variety of techniques. The techniques are applied when needed during revitalization projects, depending on the stage in the land use process and the particular proposal, but may not be necessary as a formal part of all revitalization efforts. In order to better utilize these techniques and their appropriateness, an evaluation of revitalization incentives is being conducted this year and should result in a more comprehensive understanding of how current incentives influence development decisions and identify possible new incentives and improvements to current incentives.	EQAC looks forward to an evaluation of revitalization practices.	Ongoing

Land Use & Transportation Recommendations	Action taken by Agency or Department	EQAC Comments	Completed
2. EQAC is an advocate of the county GIS and the Integrated Parcel Lifecycle System. . . . a. EQAC recommends that the county push to have all land use and parcel based data tied into the GIS. . . . b. EQAC continues to recommend that the Comprehensive Plan be reflected and modeled in the GIS. Applications such as the internal Comprehensive Plan Potential and the Comprehensive Plan Amendment applications (used to gather data for the State of the Plan report) are very useful for understanding the real time status of the Comprehensive Plan. These applications should be available to the public on the Comprehensive Plan website. IPLS has made great strides with the housing base, but other systems need to continue to be brought up to date. New nonresidential pipeline data should be incorporated in IPLS. . . .	The integration of land use and parcel information with GIS has been done through several venues, including the Land Development System, IPLS and internal DPZ GIS applications and databases. There is an established regular feed of Plan data from the DPZ databases to IPLS for land use forecasts. These data are currently used for various planning functions, including population and employment forecasting for Fairfax County. In 2012, the county created a new data repository called Land Development Information, which consolidated land development and land use data from multiple current and legacy systems.... LDI provides powerful web based inquiry and search capabilities. The LDI portal is regularly used by employees, developers and residents and can be found at: http://ldip.fairfaxcounty.gov/ . Part b of this recommendation has be addressed and implemented partially. The Comprehensive Plan Map has been digitized and is accessible to the public. In addition, the Comprehensive Plan Potential database was refined and the improvements to the Comprehensive Plan Potential GIS application are on-going. As part of the Area Plans Review Retrospective, Plan Amendment data were refined and updated to create a GIS layer of all the Plan Amendments going back to 1994.	EQAC appreciates the work done to digitize the Comprehensive Plan Map and refine the plan potential tools. EQAC is still concerned that nonresidential data are not integrated into the GIS.	Partially.

III. AIR QUALITY

There were no recommendations in the 2012 Annual Report

IV. WATER RESOURCES

Water Resources Recommendations	Action taken by Agency or Department	EQAC Comments	Completed
1. EQAC recommends that Fairfax County continue to adequately fund and implement its ongoing stormwater program, which includes dam maintenance, infrastructure replacement, water resource monitoring and management, watershed restoration and educational stewardship programs. . . . EQAC recommends that the Stormwater Service District rate be increased in FY 2014 by a half penny, from a rate of 2.0 cents per $100 assessed real estate value to 2.5 cents per $100. This would, once again, result in more funding for modest watershed improvement programs and a somewhat more realistic infrastructure replacement timeline. We realize that there will likely be a need for additional increases for water quality projects to meet future permit conditions, and for infrastructure reinvestment, as the system is continually growing and aging.	There was no increase in the Stormwater Service District rate in FY 2014, but staff has identified an approach to a gradual, long-term, increase in the rate and has recommended completion and consideration of a long-term funding and staffing plan for the stormwater program.	EQAC continues to support this request for increases in the Stormwater Service District rate to meet the needs and requirements for Stormwater management and stream protection and restoration.	In progress.

Water Resources Recommendations	Action taken by Agency or Department	EQAC Comments	Completed
2. Fairfax County is preparing a Stormwater Management Ordinance in response to state regulations requiring localities to adopt ordinances and take over reviews and inspections for Virginia Stormwater Management Program general permits relating to stormwater runoff from construction sites; the program must be effective on July 1, 2014. As the ordinance is developed, EQAC will provide more specific comments. However, EQAC recommends that this new Stormwater Management Ordinance maximize stream protection and curtail exceptions and waivers that might have an adverse impact on the environment.	The proposed ordinance has been drafted and is undergoing review; a Planning Commission public hearing has been held, and a Board of Supervisors public hearing has been scheduled. There is some lessening in certain areas proposed but also language that would keep the present level of protection. Decisions have not yet been made by the Board of Supervisors.	EQAC continues to recommend that this new Stormwater Management Ordinance maximize stream protection and lessen no current protection, in order not to have an adverse impact on the environment.	In progress.

V. SOLID WASTE

There were no recommendations in the 2012 Annual Report

VI. HAZARDOUS MATERIALS

There were no recommendations in the 2012 Annual Report

VII. ECOLOGICAL RESOURCES

Ecological Resources Recommendations	Action taken by Agency or Department	EQAC Comments	Completed
1. The Fairfax County Park Authority approved a Natural Resource Management Plan in 2004. This partially fulfills a long-standing EQAC recommendation to develop and implement a countywide Natural Resource Management Plan. However, most of this plan cannot be implemented without additional staff and funding for the FCPA. The FCPA staff estimates that implementation will require approx.. $8 million per year. A more phased approach will allow FCPA to begin to manage 10 percent of parklands and set up the program to be phased in over time. Phase 1 with this approach would require $650,000 and six positions. EQAC strongly feels that the plan needs to be implemented. Therefore, EQAC recommends that the Board of Supervisors provide sufficient funding to implement Phase 1. EQAC recommends that some of the six staff positions should be found from internal FCPA staff assets.	The Park Authority concurs with the recommendation to fund and implement the Natural Resources Management Plan, but at this time cannot realign staff from other important existing programs and services to the natural resources management program—FCPA is unable to reallocate staff to the natural resources management program without sacrificing other important existing programs and services to the public. However, the Park Authority will continue to work with the Department of Management and Budget to seek funding in future years. If funding is provided, FCPA will look at its positions again to see if any can be realigned to the natural resources program. Staff began revision of the agency Natural Resource Management Plan in fall 2012. The Park Authority staff will hold a public review in fall 2013 and hope to adopt the revised Natural Resource Management Plan by January 2014	The Park Authority ungraded the Natural Resource Management and Protection Section to a Branch plus created new positions. Unfortunately, sufficient funding does not exist to increase staff and fully implement the Natural Resources Management Plan. A revised Plan should be adopted by January 2014. EQAC reiterates its recommendation that the Board of Supervisors provide funding to implement the first phase of the Plan. (EQAC expects the first phase under the revised Plan to be similar to the Phase 1 associated with the current Plan.)	No

VIII-1. IMPACTS OF DEER IN FAIRFAX COUNTY

Deer Management Recommendations	Action taken by Agency or Department	EQAC Comments	Completed
1. Managed hunts should be continued as they are both cost-effective and efficient in reducing excesses in the deer herd and deer vehicle collisions.	The Fairfax County Deer Management Program will continue to utilize all available deer management tools for population control. Public managed hunts will continue to be used at selected parks to implement sustainable hunting pressures.	The numbers of hunts and the success rates have been what could be reasonably expected given the level of staffing availability.	Yes
2. The sharpshooter program should be continued as it is both cost-effective.	Sharpshooting operations will continue to be used at night to implement sustainable hunting pressures at selected parks.	The number of sharpshooter events and the success rates has been what could be reasonably expected given the level of staffing availability.	Yes
3. The newly begun archery program should be continued as a means of controlling deer depredation of vegetation on residential properties where firearms cannot be used.	The Archery Program will continue to be used at selected parks to implement sustainable hunting pressures.	The archery program has been very successful in addressing one of the key needs of homeowners to control the environmental destruction caused by deer in residential neighborhoods.	Yes, within the limits of staff availability. Expanded effort would be desirable.

VIII-2. IMPACTS OF GEESE IN FAIRFAX COUNTY

Geese Management Recommendations	Action taken by Agency or Department	EQAC Comments	Completed
1. EQAC strongly recommends that geese management be continued, particularly the public outreach and training activities so that a cadre of volunteers can be created to provide the labor to do the actual egg-oiling that is the principal control measure. In addition, the shotgun hunt pilot test conducted by the Park Authority should be expanded into an established program.	Community outreach and a public education program to train volunteers to "addle" (oil) eggs will continue to be used as management tools to control the resident Canada geese population at selected sites. To date it appears that the majority of the egg oiling activity remains concentrated on public lands. In order to be effective at reducing local resident goose populations, efforts will need to be greatly expanded on both public and private lands county and region wide, particularly by land managers and volunteers working on properties which contain large amounts of managed turf and/or water features. Egg oiling efforts should be combined with habitat modification to reduce the amount of suitable habitat for resident geese; behavior modification to discourage use of lands by resident geese; and goose population control (hunting) to better manage resident goose populations.	With the increases in the resident goose population it is desirable to increase the staffing for this program as soon as the budget situation permits.	Yes, within the limits of staff availability.

VIII-3. COYOTES IN FAIRFAX COUNTY

There were no recommendations in the 2012 Annual Report

VIII-4. WILDLIFE BORNE DISEASES OF CONCERN IN FAIRFAX COUNTY

There were no recommendations in the 2012 Annual Report

IX-1. NOISE

Noise Recommendation	Action taken by Agency or Department	EQAC Comments	Completed
1. The noise monitor at Great Falls Elementary, which primarily served Reagan National Airport, has been decommissioned with no plans for a replacement as there are currently few complaints about noise at that site. EQAC is concerned that that noise may become more of a concern in the future and that a monitor would then be needed. EQAC therefore recommends that the Board of Supervisors request to MWAA that a replacement site be found.	MWAA reports that the monitor that had been stationed at Great Falls Elementary had been destroyed and there were no plans to replace it, as there have been few complaints of aircraft noise in the Great Falls area. In fact, aircraft-related noise levels recorded at this site were in the range of DNL 45 dBA (annually), which is 20 decibels below the threshold at which federal interagency noise compatibility guidelines identify potentially incompatible land uses. MWAA has, therefore, concluded that the cost of replacing this monitor cannot be justified. The staff response stated that, for the reasons noted above, the replacement of the Great Falls monitoring site may not be justifiable without some clear evidence that noise may become more of a concern in this location in the future. The response suggested, though, that a more appropriate question may be whether this site should be replaced elsewhere in Fairfax County; i.e., are there any gaps in the monitoring network in Fairfax County that would benefit from the relocation of the Great Falls monitoring station to another location in the county? MWAA's view on this question is that the site selection process was completed about five years ago, resulting in the addition of several Fairfax County sites. MWAA points out that since the process is so complex, involving coordination with MWAA, county staff and the Airports Advisory Committee to recommend sites that would be appropriate (sites that then must meet very restrictive siting criteria of being publicly owned, being accessible to ground transportation and being accessible to electric service), it is not worth the time and money to go through the process again. MWAA believes the Great Falls Elementary site should be valued on its own merits and a replacement site not be researched. Staff recommended referral of this issue to the county's Airports Advisory Committee.	EQAC concurs with the staff recommendation to refer these questions to the Airports Advisory Committee, in order to give the committee the opportunity to consider MWAA's view of the merits of decommissioning the Great Falls site, and relocating the station elsewhere in the county. EQAC understands that the Airports Advisory Committee will be reviewing this issue and making recommendations about a replacement monitor. While EQAC's recommendation calls for the referral of the issue to the Airports Advisory Committee, no Board of Supervisors action is needed to effectuate the committee's review.	In progress.

IX-2. LIGHT POLLUTION

There were no recommendations in the 2012 Annual Report

IX-3. VISUAL POLLUTION

Visual Pollution Recommendation	Action taken by Agency or Department	EQAC Comments	Completed
1. The Environmental Quality Advisory Council supports the general concepts as discussed by the Board of Supervisors at its December 6, 2011 meeting concerning actions that the county can take regarding the removal of illegal signs in the county. This includes: support for legislation that would remove unnecessary restrictions that apply to Fairfax County (refer to discussion above about recent activities); development of options for the removal of signs (including an estimate of cost and the potential reduction in cost over a three-year period); an agreement with the Commonwealth Transportation Commissioner that would authorize the Board of Supervisors to remove all signs from VDOT rights-of-way; and research on the opportunities for the sign bond to be increased to $1,000. EQAC requests that, within six months of receiving the Annual Report on the Environment, the results from these efforts be completed and provided to the public, or that the board identify an alternative timeline for addressing these actions.	The Board of Supervisors at its meeting on February 27, 2013 directed the county executive to enter into an agreement with the State of Virginia which would allow for the removal of illegal signs in the public rights-of-way by the county.	EQAC applauds the county's efforts to enter into a legal agreement with the Virginia Department of Transportation that addresses removal of illegal signs from highway rights-of-way. Further, EQAC supports the plan noted by the county to evaluate the program following its first year of operation in the county. EQAC intends to follow the results from this program and to provide further input regarding both the county staff's analysis of its successes and/or failures and staff's recommendations about retention of and possible modifications to the program.	Partial.

Spotlight on Fairfax County Public Schools

Fairfax County Public Schools is the largest school district in Virginia (the 11th largest in U.S.) and has an enrollment of over 184,625 students for the 2013-14 school year. Over 14 percent of Virginia's K-12 students are enrolled in FCPS.

In this Spotlight, EQAC wants to provide recognition and highlighting for three areas where FCPS is working towards improved environmental performance. These areas are:

- High Performance and Sustainable Schools.
- Get2Green Environmental Education and Action.
- Collaboration between FCPS and the county's stormwater program.

High Performance and Sustainable Schools (Facilities and Transportation) – A high performance school implements design, construction and implementation strategies intended to create a learning environment which is: healthy; thermally, visually and acoustically comfortable; efficient in its use of energy, water and materials; easy to maintain and operate; environmentally responsible; a learning tool; safe and secure; and a community resource. Benefits of a high performance school include: heightened student performance; increased daily attendance; better student and teacher health; improved teacher satisfaction; improved indoor air quality; and reduced environmental impact.

FCPS uses the Collaborative for High Performance Schools (see http://www.chps.net/dev/Drupal/node) as its standard for sustainable design.
CHPS offers resources for different phases and types of projects, including planning, designing, operating, specifying for, commissioning or maintaining a school. In addition, it offers a "Best Practices Manual" to help schools, districts and practitioners to achieve: high performance design, construction and operation; assessment tools for new construction, major modernizations and relocatable classrooms; and recognition programs.

FCPS's use of CHPS is relatively new and data are not yet available on overall district-wide compliance with CHPS. FCPS did not identify anything new in regard to CHPS in the information it provided for this report.

Historically, managing energy has been about providing comfort and lighting in our classrooms and offices while containing costs. The need to control greenhouse gas emissions and other air pollutants resulting from energy use has become increasingly important as our understanding of climate change and its potential ramifications has advanced.

The FCPS Energy Management Section monitors energy and water consumption for 245 buildings. Nearly all schools and offices have digital energy management control systems that are programmed to turn off heating and air conditioning systems at night, on weekends and on holidays.

U.S. EPA ENERGY STAR® data are automatically uploaded and scores are determined for 194 schools each month. Forty nine schools have received the EPA ENERGY STAR certification and the ENERGY STAR plaque is displayed in the school lobby. FCPS continues to increase the number of certified schools as building efficiency improves.

As part of an energy performance contract done between 2003 and 2006, FCPS invested over $21 million in 107 buildings that received upgraded lighting, windows and heating, ventilation and air conditioning systems.

Infrastructure replacement projects where systems and building components are beyond the ends of their useful lives are designed and selected to conserve energy. Examples are: boiler and chiller and other HVAC system replacements that are selected to be high efficiency units; energy management control systems that are modernized and re-commissioned; roofs that are replaced with reflective materials to reduce heat loads; lighting systems that are upgraded; and older windows that are replaced with high quality double pane windows.

The Office of Facility Management Energy Management Section prepares an annual greenhouse gas inventory for all of FCPS (See http://www.fcps.edu/fts/facmanagement/greenhousegas/index.shtml). However, that office has not yet completed the inventory for 2012; additional data about emission factors for specific types of equipment are needed before the inventory can be completed.

Get2Green Environmental Education and Action – FCPS Get2Green (see http://www.fcps.edu/is/science/get2green/) is a set of internal and external partnerships and resources aimed at producing a cadre of environmental stewards as mandated by School Achievement Goal 3.

Get2Green will promote environmental education and environmental action across disciplines K-12 through three main foci:

- Professional development of teachers.
- Technical support for schools that wish to participate in a project or become an Eco-school.
- Building relationships around environmental stewardship that will help pyramids and clusters develop successful, student driven programs.

FCPS has formally partnered with the National Wildlife Federation Eco-Schools USA program to assist with these endeavors. The Eco-Schools USA program is based upon student-driven action teams that work on issues such as schoolyard wildlife habitat, recycling, composting, energy conservation and other environment and health related topics. In an effort to promote environmental action among students, FCPS sees the Eco-Schools USA program as a framework to facilitate this at any school. Eco-Schools USA provides sample action materials, curriculum and background information on its website and personnel are available to lend expertise to FCPS teacher trainings and meetings.

To date, FCPS has approximately 65 schools that are in some stage of the Eco-School process, and another 60 schools that are asking for technical assistance to get involved. Additional metrics include: schoolyard habitats (45 schools); edible gardens (33+ schools); staff training (1,600); and Blackboard Get2Green Community Members (500). As of August 2013, FCPS had three Green Flag Eco Schools, the highest honor in the Eco School process. They are Lanier Middle School, Churchill Road ES and Centreville ES.

Get2Green collaborates with a wide variety of internal FCPS departments to assist schools in their "greening" efforts, as well as a group of Get2Green principals that meets quarterly. The school district works with many external partners across the county and region to bring expertise and resources to the schools. Get2Green is also working on efforts to improve communication both internally and externally and to provide staff development for teachers and administrators to help student teams successfully work on sustainable projects.

Get2Green in Fairfax County is part of a regional and national movement to make schools healthier environments for students and staff. There is a Mid-Atlantic Elementary and Secondary Environmental Literacy Strategy that was released last year and the Virginia Resource Use Education Council is developing a policy on environmental education. Further, Virginia is participating in the U.S. Department of Education's Green Ribbon Schools program.

Recycling efforts have been under way at Fairfax County schools for several years. The district's waste hauler, Potomac Disposal Services, provides a consultant to assist schools in setting up recycling efforts. In addition, Get2Green is encouraging student teams to upgrade recycling efforts at all schools. Many schools have been recycling white paper for several years. There are some high schools like George C. Marshall HS that have relationships with outside vendors that buy white paper and cans collected at the school; they are continuing that practice in addition to recycling other items.

With the new Fairfax County move to single stream recycling, student teams are being encouraged to single stream recycle from their cafeterias and classrooms. In the cafeterias, some schools such as Westbriar ES and Centreville ES are upcycling (collecting and sending materials such as juice pouches and chip bags to organizations such as TerraCycle for payment back to the school). A short video on the methods Centreville ES uses for recycling can be seen at http://youtu.be/JU6_IRhG9I4.
Other schools are involved in composting cafeteria food waste. Recently, Food and Nutrition Services worked with school administrators to develop a letter of agreement to be used if a school wants to donate unopened food to an area food pantry. Dranesville ES and Churchill Road ES are leading the way with this, with other schools such as Louise Archer ES investigating the feasibility of doing this within their communities. Food sharing has recently been the largest way schools are reducing the weight of cafeteria waste.

Some schools elect to run special recycling programs for batteries, printer cartridges, electronics, etc. if there is an adult staff member or PTA representative or student group that can administer the program. For example, Thomas Jefferson High School for Science and Technology and Centreville ES have been doing this for several years.

In conjunction with FCPS Recycling, Langley High School ran a program to recycle on its playing fields during the spring 2012 sports season. The program was to have been expanded for the fall football season with the hopes that other high schools will follow Langley's lead. Langley funded this effort through grants from Clean Fairfax and a FCPS Schoolyard Stewardship Mini Grant.

Collaboration between Fairfax County Public Schools and the County's Stormwater Planning Division on Stormwater Management Plans--In November 2012, staff from FCPS and from the county's Department of Public Works and Environmental Services provided a briefing to EQAC regarding the identification of opportunities to enhance stormwater management efforts (beyond code requirements) on school properties through FCPS and DPWES collaboration. These efforts have targeted events of two inches or less of rainfall, which is 98% of all rainfall events. There was an identification of opportunities to implement stormwater management measures during school renovation/construction processes (the Capital Improvement Program for schools), and funding of enhancements through the Stormwater Service District revenue.

Stormwater management projects have been implemented at eight schools with CIP projects and 10 others where watershed plan projects have been identified, with a potential for increased efforts during Fiscal Year 2014. In the briefing to EQAC, examples of stormwater management projects were discussed for Waples Mill Elementary School (rain garden, native meadow, tree planting, and permeable pavers) as well as preliminary concepts for Sunrise Valley and Terraset Elementary Schools. In addition, there were discussions about collaboration among FCPS, the Fairfax County Park Authority and DPWES at the Forestville Elementary School/Nike Park site (early in the planning stages).

Environmental Stewardship/Volunteer Opportunities in Fairfax County

Environmental Quality in is a team effort. We need partnerships with government, commercial and volunteer organizations to strive to improve our environment as is described throughout this annual report. We give details of stewardship efforts and best practices supporting government and non-government resources and broader environmental needs. This section is provided to highlight a group of governmental and non-governmental opportunities that individuals or organizations might consider supporting with their time and focus. Many of these organizations rely on volunteer resources to be effective, and greater participation may allow the organizations to expand the scope of their current work. EQAC does not assert that these are the only organizations making a valuable contribution to our environment, and we hope, in future reports, to expand the list of activities that are identified--this is the first year that we have provided this section and we hope to make it more valuable to the county leadership and to environmentally-conscious members of the community in the future. Some government organizations are listed if they either organize environmental activities or provide a good source for members of the community who want to contribute their time to improving environmental quality.

1. NORTHERN VIRGINIA REGIONAL PARK AUTHORITY

For the environmentally-conscious park enthusiast, we recommend contacting the Northern Virginia Regional Park Authority, http://www.NVRPA.org/. NVRPA continues to have a roving park naturalist regularly visit the high-attendance parks such as pools, campgrounds and golf courses, bringing live wildlife and other exhibits and providing programming about nature and the environment. The naturalist also attends events and functions such as the Dominion W&OD Trail Mix, the Walter Mess 5K race and the Friends of the W&OD 10K race.

In 2012, the Northern Virginia Regional Park Foundation gave grants through its Nature Nuts Program to 11 Fairfax County public schools for children to attend environmental education camps at Hemlock Overlook Regional Park. Adventure Links at Hemlock Overlook Regional Park in Clifton offers a variety of outdoor and environmental education, team development programs for public and private schools, religious and community groups, sports teams, corporations, professional organizations and local, state and federal government and military agencies. Also in 2012, Meadowlark partnered with the Volgenau Foundation to provide teacher training and student field trips to Meadowlark Botanical Gardens and Potomac Overlook Regional Park. These trips focus on the natural history of the Potomac River basin, conserving native plants and animals.

NVRPA partners with REI's adventure school, introducing people to the outdoors at Pohick Bay, Hemlock Overlook and Fountainhead Regional Parks. NVRPA's naturalists hold regular educational canoe and kayak trips at Pohick Bay, and the roving naturalist conducts environmental programs at Meadowlark Botanical Gardens as well as at Bull Run and Pohick Bay Regional Park campgrounds. Potomac

Overlook Regional Park and W&OD Trail staff hosted booths at various county fairs to give environmental information to the public.

Occoquan Regional Park hosted two clean up events on the Occoquan River and added five new recycling bins at its picnic shelters and boat ramp. Fountainhead and Bull Run Marina were host sites for the Friend of the Occoquan clean-up days, removing dozens of bags of trash from the reservoir area. At Sandy Run Regional Park, rowing crew teams took part in water clean-up days, removing trash from the Occoquan Reservoir around Sandy Run. New trash cans were installed at Fountainhead and the W&OD Trail to prevent tipping and foraging by wildlife.

Environmental stewardship opportunities for volunteers are available at Meadowlark Botanical Gardens, Potomac Overlook Regional Park, Upton Hill Regional Park, Pohick Bay Regional Park and various other parks on occasion. NVRPA implemented a program that allows youth to access its fee-based park facilities through volunteer service. It has a wide variety of community partnerships in place that encourage groups to take advantage of the regional parks for environmental and historic education and service projects.

2. FAIRFAX COUNTY PARK AUTHORITY

The Fairfax County Park Authority offers a number of opportunities for volunteers, and EQAC encourages county residents to take advantage of these opportunities. Information about these opportunities is available at http://www.fairfaxcounty.gov/parks/volunteer/.
More information about FCPA and its programs is available at: http://www.fairfaxcounty.gov/parks/resources.

Many of the stewardship activities that occur on parkland could not take place without the efforts of many volunteers and partners. Groups and individuals participate in a wide range of volunteer opportunities in environmental stewardship on parkland, from becoming a permanent volunteer for the Park Authority to one-off events. In FY13, volunteers contributed over 26,000 hours to natural resource stewardship activities on parkland.

Specifically, volunteers engage in programming, leading walks and tours, writing fliers or brochures, answering the phone when a resident calls with an environmental question and/or hands-on resource management. FCPA partners with local agencies and nonprofits in two different annual stream clean-up events, although many individuals and friends groups participate in more regular clean-ups along certain sections of stream throughout the year. FCPA also has habitat restoration events, including invasive plant removal and native species planting that attract day participants and more committed volunteers, e.g. the IMA Volunteer Leaders. Wildlife monitors work on birds and salamanders and everything in between, often in coordination with a long-term wildlife monitoring program such as the Virginia Bluebird Society. The Fairfax Master Naturalists have taken on some of

these projects or created new opportunities to contribute hundreds of hours to Park Authority sites. FCPA continues to offer many of its environmental stewardship opportunities for youth to get involved in their local parks to include as permanent volunteers, as students for their community service hours and scouts for Eagle and Gold Award projects. FCPA encourages its volunteers, be they individuals, groups, students or scouts, to propose ideas of how they can help steward the parks.

3. NORTHERN VIRGINIA SOIL AND WATER CONSERVATION DISTRICT

The Northern Virginia Soil and Water Conservation District supports numerous opportunities throughout the year to participate in stream cleanups, storm drain labeling, volunteer water quality monitoring and tree planting projects. Interested parties can send an e-mail to NVSWCD at https://www.fairfaxcounty.gov/contact/mailform.aspx?ref=9990 or call 703-324-1460. It is also a good resource for advice to homeowners on problems with ponds, eroding streams, drainage, problem soils and other natural resource concerns. More information about managing land for a healthier watershed is available from the NVSWCD publications "You and Your Land, a Homeowner's Guide for the Potomac River Watershed" (http://www.fairfaxcounty.gov/nvswcd/youyourland/ and the "Water Quality Stewardship Guide" (http://www.fairfaxcounty.gov/nvswcd/waterqualitybk.htm). NVSWCD can assess the problems and advise on possible solutions.

4. FAIRFAX COUNTY DEPARTMENT OF PUBLIC WORKS AND ENVIRONMENTAL SERVICES

There are numerous opportunities throughout the year to participate in stream cleanups, storm drain labeling, volunteer water quality monitoring and tree planting projects. Interested parties can send an e-mail to NVSWCD at https://www.fairfaxcounty.gov/contact/mailform.aspx?ref=9990 or call 703-324-1460. Additionally, DPWES-Stormwater Management provides links to information about these popular volunteer programs on its website at http://www.fairfaxcounty.gov/dpwes/stormwater/. For a list of common household hazardous materials and how to dispose of them, go to http://www.fairfaxcounty.gov/dpwes/trash/disphhw.htm.

5. ENERGY ACTION FAIRFAX PILOT PROGRAM

Fairfax County has implemented the Energy Action Fairfax pilot program to provide ways for residents to learn about their energy consumption and how to reduce it through improved energy efficiency. The program has been narrowly focused and aimed at homeowners in Fairfax County, particularly those occupying single-family homes and townhouses. The program's direct outreach has included presentations at homeowner association meetings, small "audit parties" within selected communities and the distribution of informative brochures at events and fairs. The program also generated stories for local media and created a multi-faceted presence on the county

website (www.fairfaxcounty.gov/energyactionfairfax/) that includes tips sheets, checklists and short how-to videos. Groups or individuals may want to contact Energy Action Fairfax to discuss ways to support their educational efforts within a specific community.

6. THE NORTHERN VIRGINIA CLEAN WATER PARTNERS EFFORTS TO MANAGE PET WASTE

Examples of activity of this group include its Dog Blog and Facebook pages for dog owners. During 2012, the blog and Facebook pages had more than 88,000 views, up from about 24,000 views in 2011. Based on the success of the 2010 and 2011 contests, the organization held the Third Annual Dog Blog Essay Contest. Eleven nonprofit organizations submitted an entry into the "Bark Your Piece" contest, which resulted in 10,360 votes. The three winning organizations received $5,000 in grants to use toward veterinary care, spaying and neutering, dog food and pet owner education. Find out more about this organization at its website at http://www.onlyrain.org.

7. CLEAN FAIRFAX

Clean Fairfax Council, now known as Clean Fairfax, is a private, nonprofit (501(c)(3)) corporation dedicated to educating residents, students and businesses in Fairfax County about litter prevention and recycling. Clean Fairfax focuses on environmental education provided to students and adults throughout the county. Clean Fairfax continues efforts of updating the educational and interactive programs for students, community service opportunities for students (i.e., support at the council's office or organizing clean ups), classroom presentations and presentations to homeowner associations and other groups.

A key effort of the council is the sponsorship of spring and fall cleanups. These cleanups rely on volunteers who desire to clean up a certain area of the county. The council asks volunteers to plan their cleanup by selecting a site, gathering volunteers and setting a date and time. Clean Fairfax supplies all the necessary tools provided (gloves, trash bags, recycling bags, vests and safety tips) for a successful cleanup. A follow-up form is available on the Clean Fairfax website to track progress, tally volunteer hours and trash pickup tonnage. Last year, Clean Fairfax worked with over 1,200 volunteers at 85 assisted clean ups, picking up over 67,000 pounds of trash, on and around Fairfax County's roads, parks and side streets. Clean Fairfax also organizes periodic clean-up projects around the Government Center, with Fairfax County employees and area businesses.

Clean Fairfax continues to organize and lead the Earth Day/Arbor Day event, now called SpringFest Fairfax, in partnership with the Department of Public Works and Environmental Services, the Fairfax County Park Authority, Fairfax Water, Fairfax Connector and Lorton Arts Foundation. Clean Fairfax now combines workshops and community service elements with this event. This past year at its new location at the

Workhouse Arts Center in Lorton, over 3,000 children and families attended this all day event. Other major projects for the upcoming year include outreach on reducing residents' compliance on plastic grocery bags, promoting small scale, backyard composting and providing services and workshops at Fairfax County Farmers Markets.

Clean Fairfax reaches Fairfax County residents by e-newsletters, Facebook and Twitter as well as an environmental blog updated twice weekly at www.cleanfairfax.org.

There are many other programs offered by Clean Fairfax, including programs beyond litter prevention and control. For more information, please visit the website at www.cleanfairfax.org or the SpringFest Fairfax website at www.springfestfairfax.org

8. ALICE FERGUSON FOUNDATION

The nonprofit Alice Ferguson Foundation was established in 1954. While chartered in Maryland, it has implemented programs throughout the Potomac River watershed, with benefits to the main stem of the river as well as tributaries in Washington, D.C., Maryland, Pennsylvania, West Virginia and Virginia. As stated on its website, the foundation's mission is "to provide experiences that encourage connections between people, the natural environment, farming and the cultural heritage of the Potomac River Watershed, which lead to personal environmental responsibility."

In April 2013, the foundation held its 25th annual Potomac River Watershed Cleanup. A total of 14,586 volunteers removed 312 tons of trash and debris from the region at 633 cleanup sites throughout Washington, D.C., Maryland, Virginia, West Virginia and Pennsylvania. The 312 tons of trash collected during the cleanup included 1,314 tires, 193,800 beverage containers, 27,200 plastic bags and 27,400 cigarette butts.

Other programs implemented by the foundation include:

- Trash Free Potomac Watershed Initiative: This is a program to reduce trash, increase recycling and provide education regarding trash issues in the watershed.

- Potomac Watershed Trash Treaty: As of summer 2012, this treaty commits 112 signers to achieving a "Trash Free Potomac by 2013" and to: support and implement regional strategies aimed at reducing trash and increasing recycling; increase education and awareness of the trash issue throughout the Potomac watershed; and reconvene annually to discuss and evaluate measures and actions addressing trash reduction. Fairfax County was one of the founding signers of the treaty in 2005.

- Potomac Watershed Trash Summit: The foundation convenes this meeting annually to provide a venue for key stakeholders to collaborate on strategies to eliminate trash from waterways, communities, streets and public lands, including

regional public policy, model best management practices, business actions and public education.

- Enforcement: The foundation worked in partnership with the Metropolitan Washington Council of Governments' Police Chief Committee on "Litter Enforcement Month," which provided a focus on litter-related crimes and raised awareness of the harmful effects trash has on communities and the environment.

There are numerous other programs and initiatives that are implemented by the foundation; the reader is encouraged to visit the foundation's website at www.fergusonfoundation.org.

HOW TO REPORT ENVIRONMENTAL CRIMES OR CONCERNS IN FAIRFAX COUNTY	
Type of Incident	**Phone Number**
RELEASE OF HAZARDOUS MATERIALS INTO THE ENVIRONMENT To report the dumping of any materials into a stream, manhole, storm sewer or onto the ground, call 9-1-1. When calling, be prepared to provide specific information about the location of the incident. County inspectors will investigate complaints within the county; Cities of Fairfax and Falls Church; and the Towns of Clifton, Herndon and Vienna.	**911** **TTY 711**
LAND CLEARING;TREE REMOVAL; DUMPING OF FILL To report the suspected illegal removal of trees, clearing of land, digging or dumping of fill dirt, contact the Department of Code Compliance, or visit www.fairfaxcounty.gov/code.	**703-324-1300** **TTY 711**
SOIL EROSION To report soil erosion from private properties or construction sites, contact the Department of Code Compliance, or visit www.fairfaxcounty.gov/code.	**703-324-1300** **TTY 711**
GENERATION OF DUST FROM CONSTRUCTION, GRADING OR LAND CLEARING Contact the Department of Code Compliance, or visit www.fairfaxcounty.gov/code.	**703-324-1300** **TTY 711**
CONSTRUCTION NOISE To report construction noise outside between 9 p.m. and 7 a.m. or before 9 a.m. on Sundays and federal holidays, contact the Department of Code Compliance, or visit www.fairfaxcounty.gov/code.	**703-324-1300** **TTY 711**
TRASH COLLECTION BETWEEN 9:00 P.M. AND 6:00 A.M. Call the Department of Public Works and Environmental Services. If possible, provide descriptive information about the truck, such as color, truck number, and license plate number.	**703-324-5230** **TTY 711**
SIGNS ON ROADS AND MEDIANS If a sign on a road or median poses a safety hazard, call the Virginia Department of Transportation to have it removed. The County of Fairfax performs monthly collections of illegal roadway signs on certain designated roads. More information at www.fairfaxcounty.gov/code/signs.	**1-800-367-7623** **TTY 711**

Type of Incident	Phone Number
SIGNS ON PRIVATE PROPERTY There are restrictions for signs on private property. For more information contact the Department of Code Compliance, or visit www.fairfaxcounty.gov/code.	**703-324-1300** **TTY 711**
POORLY MAINTAINED HOMES To report problems including broken windows and gutters, junk or debris in yards and tall, uncut grass, contact the Department of Code Compliance, or visit www.fairfaxcounty.gov/code.	**703-324-1300** **TTY 711**
OUTDOOR LIGHTING CONCERNS To report problems with glare, overlighting or other issues, contact the Department of Code Compliance, or visit www.fairfaxcounty.gov/code.	**703-324-1300** **TTY 711**
AIR POLLUTANTS Air pollutants are emitted by stationary sources, such as power plants, gasoline service stations, and dry cleaners, as well as by mobile and area sources, such as from automobiles, trucks and other highway activities. This phone number is for the Virginia Department of Environmental Quality Northern Regional Office.	**703-583-3800** **After hours, call 1-800-468-8892** **TTY 711**
NO RECYCLING IN SCHOOLS Section IX of the Fairfax County School Board's Policy 8542 states that "Schools and centers will have mandatory recycling programs for paper products, cans, and bottles. Construction waste materials will be separated and recycled." To report schools that are not recycling in accordance with this policy, contact the Fairfax County Public Schools Office of Facilities Management, Plant Operations Section. More information is available at: http://www.fcps.edu/fts/facmanagement/recycle.shtml	**703-764-2459** **TTY 711**
HEALTH HAZARDS For information and guidance on a suspected environmental hazard that may pose a public health risk, call the Health Department's Division of Environmental Health. These hazards include unsanitary storage or disposal of waste; unburied dead animals; medical waste; insect infestations; and mosquito breeding sites.	**703-246-2444** **TTY 711**

ANNUAL REPORT ON THE ENVIRONMENT

CHAPTER I

CLIMATE CHANGE AND ENERGY

I. CLIMATE CHANGE AND ENERGY

A. BACKGROUND

The impact of environmental contamination on climate change/global warming is the result of world-wide emissions of greenhouse gases, including carbon dioxide. Because the rise in greenhouse gas concentrations is attributed to the combustion of fossil fuels, many local governments across the United States are working to improve energy efficiency and reduce GHG emissions (http://www.mwcog.org/uploads/pub-documents/zldXXg20081203113034.pdf). This chapter outlines work that is under way in Fairfax County to reduce GHG emissions and improve energy efficiency.

Why is climate change important? Climate change is already impacting the United States. The governments of many countries and scientists worldwide acknowledge a real concern for the impacts of climate change. Levels of carbon dioxide have risen from around 350 ppm near 1950 to over 400 ppm in 2013. Carbon dioxide levels have been examined by groups such as CO2now. According to the report *Global Climate Change Impacts in the US,* some key findings within the US include[1]:

- U.S. average temperature has risen over the past 50 years and is projected to rise more in the future; how much more depends primarily on the amount of heat-trapping gases emitted globally and how sensitive the climate is to those emissions.

- Precipitation has increased an average of about five percent over the past 50 years. Projections of future precipitation generally indicate that northern areas will become wetter, and southern areas, particularly in the West, will become drier.

- The amount of rain falling in the heaviest downpours has increased approximately 20 percent on average in the past century, and this trend is very likely to continue, with the largest increases in the wettest places.

- Many types of extreme weather events, such as heat waves and regional droughts, have become more frequent and intense during the past 40 to 50 years.

- The destructive energy of Atlantic hurricanes has increased in recent decades. The intensity of these storms is likely to increase in this century.

- In the eastern Pacific, the strongest hurricanes have become stronger since the 1980s, even while the total number of storms has decreased.

- Sea level has risen along most of the U.S. coast over the last 50 years, and will rise more in the future.

- Cold-season storm tracks are shifting northward and the strongest storms are likely to become stronger and more frequent.

- Arctic sea ice is declining rapidly and this decline is very likely to continue.

Is there evidence of climate change for Fairfax County? In recent years we have seen warmer temperatures and more poison ivy, which has been attributed to slightly warmer temperatures. As a result of the rise in sea level in Fairfax County, the county has redrawn the floodplain boundaries on maps to meet Federal Emergency Management Agency floodplain designations, resulting in more home structures now being located in floodplains. The Governor's Commission on Climate Change estimated that there will be a sea level rise between 1 and 1.6 feet by 2050 and between 2.3 and 5.2 feet by the year 2100. Similar impacts are being predicted around the world. National and international responses to climate change are expected, and while there are few national mandates to address climate change, Fairfax County is fortunate that it is actively pursuing opportunities to inventory and reduce GHG emissions.

The 2008 National Capital Region Climate Change Report provides some excellent background information on climate change in the metropolitan Washington, D.C. area. The report (http://www.mwcog.org/uploads/pub-documents/zldXXg20081203113034.pdf) highlights many important considerations, including:

- Temperatures are rising along with both sea level and atmospheric carbon dioxide levels.

- As population continues to increase in the Washington, D.C. area, emissions of GHG are also projected to increase.

- A variety of actions have been proposed in the report to reduce GHG emissions; these recommendations have formed the basis for bringing together local governments from the Washington, D.C. area to take action to reduce GHG emissions.

According to the Pew Center for Climate Research[2], the United States has five percent of the world's population and 17 percent of the world's GHG emissions. Moreover, U.S. emissions account for 30 percent of the world's GHG emissions since 1850. Given the observed increases in GHG concentrations in the atmosphere, the increases in temperature, melting of the glaciers and rises in sea level, the world is moving towards controlling GHG emissions.[1]

While the impact of greenhouse gases is widely accepted by the scientific community, there are few required steps to address greenhouse gases. Some steps that have been taken include:

- The light duty vehicle GHG National Program extends to model years 2017-2025.

- GHG regulations have been adopted for heavy-duty engines and vehicles.

- The Renewable Fuel Standard lays the groundwork for significant reductions in GHG emissions, which will also lower our dependence on petroleum.

- On March 21, 2011, the U.S. Environmental Protection Agency published a deferral for sources that emit CO_2 from biomass processes such as wood combustion. The deferral is in effect until July 21, 2014. The EPA deferral was adopted into the Virginia regulations by the State Air Pollution Control Board and went into effect on November 9, 2011. Sources that would have been major only because of their CO_2 emissions from biomass will not have to go through the major New Source Review permitting process until the deferral expiration. The deferral applies only to CO_2 emissions and does not apply to other GHGs.

In summer 2006, Fairfax County was approached by the Sierra Club and was asked to join its Cool Cities Program. This program was designed to help cities meet the conditions of the U.S. Mayors Climate Protection Agreement, which was to reduce their greenhouse gas outputs seven percent below their 1990 levels by 2012. Chairman Gerald E. Connolly and other members of the Fairfax County Board of Supervisors decided to develop a program that would be more robust and contain similar goals and be better suited to county protocols. This program, Cool Counties, which was first mentioned by Chairman Gerald E. Connolly in his 2007 State of the County address, was developed in collaboration with the Sierra Club and other local government partners and was officially unveiled in July 2007 at the National Association of Counties annual conference that was held in Richmond, Virginia.

Much of what Fairfax County lists within the framework of this Cool Counties program was initiated previously to address clean water and clean air issues. However, on October 1, 2007, county staff presented its climate change initiatives as part of its fiscal year 2009 Environmental Improvement Program http://www.fairfaxcounty.gov/living/environment/eip/).

Solving climate change is a daunting task by any measure, but Fairfax County continues to play a leadership role in this effort. The county plays an active and significant role in regional cooperation and influence on major environmental policy and operations like air quality, land use planning and zoning, transportation, forest conservation, solid waste management and recycling and water conservation. Fairfax County leads by example by: adjusting Fairfax County operations to

understand both GHG emissions and energy use; adopting programs to improve energy efficiency and reduce GHG emissions; and looking at county operations to assess what policy or program changes we have the authority and resources to enact in order to lower the emissions produced by county operations.

To guide efforts to address energy, Chairman Sharon Bulova created the Chairman's Private Sector Energy Task Force to bring together prominent members of the Fairfax County development and business communities as well as academia to create a new energy strategy for the county. The task force brought together the private sector, utilities, schools, government officials, organizations including the Environmental Quality Advisory Council and county staff.

Recommendations from the Private Sector Energy Task Force (see link shown below) were presented to the Fairfax County Board of Supervisors on October 16, 2012. One of the primary recommendations was the creation of an Energy Alliance to guide and implement improvements in energy efficiency and to create economic opportunity for the private sector in Fairfax County.

Fairfax County government was directed to assist the leadership of the Private Sector Energy Task Force and the Fairfax County Chamber of Commerce to set up the Energy Alliance, which would ultimately review the recommendations that were contained in the final report (http://www.fairfaxcounty.gov/chairman/pdf/energy_task_force_recommendations.pdf). The chartering process to set up the Energy Alliance is currently ongoing.

The new energy strategy will also attract green collar jobs to Fairfax County. This will be achieved by fostering a business community that these industries find attractive--one that is committed, across all sectors, to achieving ambitious energy efficiency goals. More information is available at http://www.fairfaxcounty.gov/chairman/energytaskforce.htm.

In order to assess the impact of climate change on rises in sea level, the Board of Supervisors asked staff to update a presentation on the impact of climate change on Fairfax County. The Northern Virginia Regional Commission is also preparing a number of products that will address regional impacts on climate change by the end of 2013.

Climate change is a very active area for the region and it is impressive the way that most local governments are undertaking efforts to address it. This chapter reviews efforts that Fairfax County is taking and provides some information on regional efforts as well as the efforts of nearby counties.

Arlington County:

In March 2011, a Community Energy and Sustainability Task Force provided the Arlington County Board with a report containing 18 recommendations and

strategies to guide and manage energy use between 2011 and 2050. The task force report envisions and recommends the installation of both types of district energy systems as well as the creation of new, local district energy companies to operate and manage the district energy systems.[3, 5]

The task force report did not analyze either the public or private sector's ability to implement district energy systems. Arlington County is now in the process of developing a work plan to implement the task force's recommendations. According to the draft work plan, research regarding legal options for district energy is a high-priority task that is ongoing as of the preparation of this report.[3]

Loudoun County

In December 2009, Loudoun County adopted an energy strategy, the development of which was funded by its federal Energy Efficiency and Conservation Block Grant. That energy strategy appears to contemplate both thermal district energy systems and thermal/electric district energy systems.

The Loudoun County Energy Strategy concludes that there is no regulatory impediment to the establishment of district energy systems. According to Loudoun County, "*[f]rom a regulatory standpoint, there are no known barriers to implementing district energy (heating or cooling) networks, other than the provision of public rights of way for infrastructure. It is assumed this is a local County or Town jurisdiction.*"[6] The reasoning underlying this conclusion is not provided. The assumption regarding public rights of way suggests that the conclusion itself may rest on an assumption; significantly, the strategy does not acknowledge Title 56 of the Virginia Code, which addresses public utility regulation.

Loudoun County anticipates the use of scale projects to implement its district energy systems. These scale projects are expected to help the county develop a detailed set of local guidelines applicable to "the formation of neighborhood district energy entities and their relationship to the incumbent utilities." No scale projects involving district energy are currently under way.

Virginia laws complicate the question of district energy and whether and how energy can be sold back into the grid. This point can adversely affect the economics of such projects so that they would not be profitable in Virginia when they would be viable in the District of Columbia or Maryland. Fairfax County has been active in working with other Virginia jurisdictions to evaluate district energy. Moreover, the use of district energy is easier to implement when a single owner is responsible for multiple buildings, as is the case in Crystal City (part of Arlington County). Moreover, there are issues with obtaining credit for the return of excess energy back into the grid resulting from the way that Virginia law is written. Fairfax County is an active participant with this and other issues at a regional level and is undertaking efforts to

provide answers that will allow Fairfax County and other Northern Virginia jurisdictions to move forward on this and other issues in the future.

Another example involves efforts to obtain a "carbon footprint" (i.e., the GHG emissions associated with the consumption of fossil fuels and other activities that release GHG emissions). Briefings to EQAC from county and Fairfax County Public Schools staffs have reported significant energy savings in a variety of county facilities, including schools that are renovated. While Fairfax County government has undertaken work to characterize the carbon footprint for government buildings, similar building-specific efforts evaluating the performance of individual non-government buildings have not been expanded to the residential and commercial sectors. There are a number of issues associated with such work, some of which might be solved by reporting from utilities. Again, Fairfax County is working with other jurisdictions to explore options for obtaining and managing this information.

This chapter focuses on three areas: (1) activities that Fairfax County government is undertaking to reduce GHG emissions associated with county operations; (2) efforts that Fairfax County is taking to network with the greater Washington metropolitan region in these efforts; and (3) Fairfax County's GHG emissions and activities that the county is taking to reduce such emissions from residences and business operations.

B. FAIRFAX COUNTY GHG EMISSIONS INVENTORY

The Fairfax County GHG emissions inventory followed accepted practices for the conduct of such inventories. The compilation of GHG emissions employed the following practices:

Only property that was under the jurisdiction of Fairfax County was included. Thus, the federal government properties located within the county, including but not limited to Fort Belvoir, Dulles Airport, the Central Intelligence Agency and the National Reconnaissance Organization, were not included. In addition, independent political subdivisions such as the City of Falls Church and the City of Fairfax were excluded from the analysis.

The analysis includes scope 1 (all direct GHG emissions) and scope 2 (indirect GHG emissions) emissions. Scope 3 emissions associated with the extraction and production of purchased materials and fuels, transport-related activities in vehicles not owned or controlled by the reporting entity, electricity related activities not covered in Scope 2, outsourced activities, waste disposal and other GHG emissions are mentioned but excluded from the analysis.[4,7]

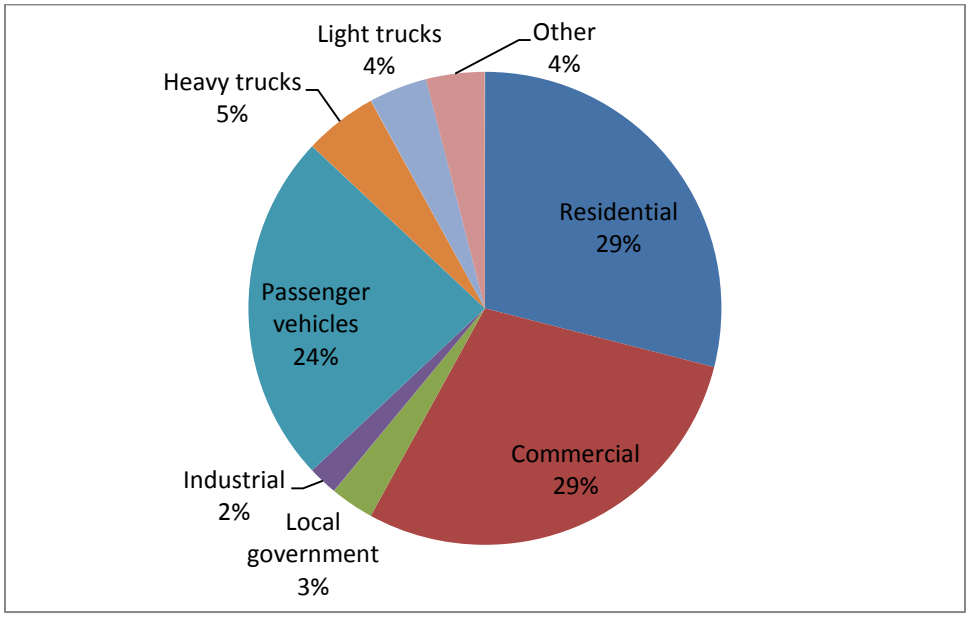
Both of the above assumptions, though reasonable, should be examined when comparing the Fairfax County emissions of 11.4 metric tons CO_2 equivalent per

capita across local jurisdictions. For example, Arlington County's estimate of over 13 metric tons per capita includes emissions from National Airport, although Arlington County exerts no control over the airport.

Figure I-1 shows that the main sources of GHG emissions are electricity generation (both residential and commercial) and mobile sources. The annual GHG emission per average Fairfax County resident is about 11.4 $MTCO_2e$. Information from the county's GHG emissions inventory, which includes a base year of 2006 with four additional years of data, shows that this number has decreased slightly in 2010, which could be attributable to a combination of factors, including education and outreach efforts to reduce energy consumption. According to the Pew Center for Climate Research, the average U.S. citizen has an annual average GHG emission of over 20 $MTCO_2e$, over twice the world average. However, the lower estimate of GHG emissions per person reported in this inventory has a much sounder basis than this gross estimate from the Pew Center. There are valid reasons that the Fairfax County per capita GHG emissions could be higher or lower. For example, the mix of vehicles in the Washington, D.C. area is newer than in many other areas, the Washington, D.C. area has mass transit to serve the population, and much of the building stock of Fairfax County is newer and more energy efficient than buildings in other areas. However, the Washington metropolitan region does suffer from some of the nation's worst traffic, which would raise GHG emissions. Moreover, the estimate of GHG emissions for Fairfax County does not include scope 3 emissions, which we expect is consistent with the GHG inventories of many, if not most, local governments.

While Figure I-1 groups GHG emissions into a few groups of emission sources, there are many different sources of GHG emissions and many opportunities for reducing GHG emissions. For example, most waste in the Washington, D.C. area is incinerated, which is preferred to landfill disposal of waste because landfills generate methane (which is 20 times more potent than carbon dioxide as a GHG). Recently, however, some property managers of buildings in Arlington County, the District of Columbia and parts of Maryland adopted a more comprehensive recycling program, which is being offered by a private company. One of the reasons that this program for waste management is being selected is that the cost is similar to the cost of incineration and ash disposal. Materials recycled include the materials that most waste companies offer (i.e., glass, aluminum, newspaper) as well as other materials that include batteries, plastic bags and any material that can be composted (i.e., food waste, soiled paper towels, and other materials). In addition to providing for a more comprehensive recycling program, the composting of food waste and other materials decreases waste. Composting of waste is far more desirable because it reduces the generation of GHG when compared with the

Figure I-1. 2006 Countywide GHG Emissions (11.838 MMTCO2e)[4]



Source: *Community Greenhouse Gas Inventory for Fairfax County, Virginia, Report of Findings: 2006-2010*, Fairfax County, Virginia (advance copy).

past practice of landfilling waste. Moreover, because composting of waste provides a useful product as opposed to ash from an incinerator that must be managed into the future, composting of food and other materials that can be composted has merits that warrant further consideration as about 30 percent of this material will remain as ash after incineration.

The Northern Virginia Regional Commission is undertaking a regional GHG inventory update that will facilitate aggregating GHG emissions and facilitate comparisons among jurisdictions. Fairfax County is participating in an effort to update all GHG inventories in the region to remove the inconsistencies in GHG inventories resulting from different assumptions and approaches.

C. ACTIVITIES THAT FAIRFAX COUNTY RESIDENTS CAN UNDERTAKE TO REDUCE GHG EMISSIONS

The Fairfax County GHG inventory serves as a guide for both actions that EQAC feels are fundamental to any GHG emissions reduction effort (e.g., monitoring energy use in government buildings and undertaking renovations to be energy efficient) and other actions. Some efforts, such as saving energy, reducing vehicle miles, carpooling or maybe riding a bike to work will involve changes in lifestyle that can be better for the planet and good exercise. Key opportunities for GHG emissions reductions include:

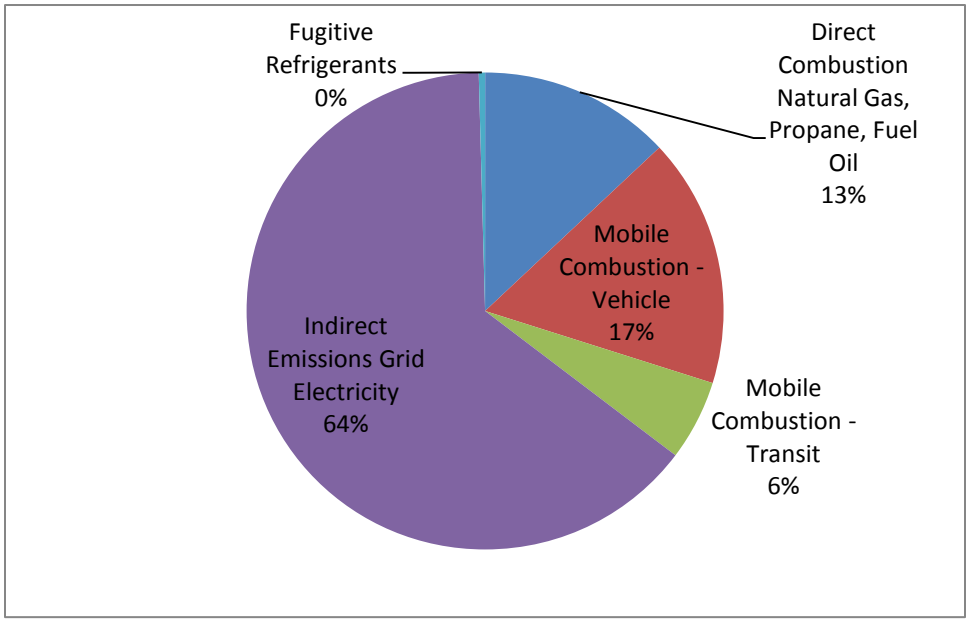
- Reduce home energy demands. Much of the electrical use shown in Figure I-1 serves to power, heat and cool buildings. Insulation, energy efficient windows, solar panels, geothermal energy and wind power can all help to reduce GHG emissions from building operations. As the use of renewable energy sources increases, the availability and cost of these sources will hopefully decrease.

- Reduce the use of single occupancy vehicles by carpooling, using mass transit, bicycling, walking or pursuing other alternatives (including work at home opportunities). Vehicle emissions constitute another significant source of GHG emissions, so this is another area that seems to be an appropriate target for reduction.

- Participate in local efforts to plan for improved land use patterns and to encourage energy efficient construction practices. Participating in these local efforts will also help to ensure that energy efficient construction practices will have a better chance of acceptance and success.

The Fairfax County GHG inventory also provides historic emission estimates going back to 2010. Figure I-2 shows Total Fairfax County GHG emissions for 2010.

Figure I-2. 2010 Fairfax County Government Emissions by Source Type (460,695 MTCO2e)[4]



Source: Fairfax County, Virginia.

D. FAIRFAX COUNTY OPERATIONS GHG EMISSIONS AND ACTIONS TO REDUCE THESE EMISSIONS

1. Overview

The Fairfax County government has undertaken extensive efforts to both characterize GHG emissions associated with county operations and to target opportunities for increased energy efficiency. While county savings from these efforts are to be commended, the success of Fairfax County government in characterizing emissions and improving the efficiency of operations serves as a model for both businesses and residents in the county.

Fairfax County has already taken a number of significant actions, such as purchasing hybrid vehicles, promoting green energy efficient buildings, promoting renewable sources of energy and teleworking to name just a few.

Fairfax County has had a hybrid vehicle replacement program since 2002 and currently has 112 hybrids in its vehicle fleet. In 2006, the county converted one of its Toyota Priuses to a "plug-in-hybrid-electric" vehicle. This car travels up to 30 miles on electric power from the grid before engine-generated electric power is used; on some trips it has a fuel efficiency over 100 miles per gallon of gas (plus grid electricity). More recently, the county purchased five plug-in hybrid electric Chevrolet Volts.

Fairfax County is using renewable energy technology to harness energy. This includes landfill gas to energy systems at both closed landfills and solar mixers at the Noman M. Cole Jr. Pollution Control Plant. In addition, Fairfax County is purchasing energy from renewable energy sources, which both reduces GHG emissions and encourages the further development of these energy sources.

Telework is another effective tool for reducing our GHG emissions by taking cars off our roadways and commuters out of already-crowded trains and buses. Removing just five percent of cars from the road reduces traffic congestion by up to 20 percent. In 2000, the Metropolitan Washington Council of Governments set the goal of having at least 20 percent of all eligible workers in our region telecommuting one day a week by 2005. All 17 jurisdictions in the region endorsed that goal, and Fairfax County was the first to achieve it.

In October 2009, Fairfax County was awarded a three-year $9.6 million grant under the federal Energy Efficiency and Conservation Block Grant program. The EECBG program, which was funded by the American Recovery and Reinvestment Act of 2009, was intended to fund projects that improve building and transportation energy efficiency and achieve measurable reductions in energy consumption. The county developed a pragmatic, results-oriented strategy to achieve these objectives within the three-year grant term. Its strategy included projects in the areas of information technology, facility improvements,

transportation and professional services. By the time the award expired in October 2012, the county had completed 14 projects and had spent all but $187.73 of the award. As these examples demonstrate, the benefits of these EECBG projects include reductions in energy consumption and greenhouse gas emissions for the lifetime of the equipment purchased or installed:

- Information Technology: The county's single largest EECBG project funded the consolidation and virtualization of its enterprise servers. According to the Department of Information Technology, in 2011 this project reduced electricity demand by about 2.319 megawatts of electricity, saving approximately $188,000 in annual electricity costs. The reduced energy demand avoided GHG emissions of approximately 1,524 metric tons. The project also created additional savings by reducing the need for computer hardware and software and reducing space requirements in the county's data center.

- Schools: The EECBG award funded the purchase and installation of digital energy management control systems and occupancy sensors at Oakton High School, Bryant Alternative High School, Luther Jackson Middle School and Washington Mill Elementary School. According to the Fairfax County Public Schools' Energy Manager, in just over a year the EECBG-funded improvements to Oakton High School avoided the use of 1.465 megawatts and 737 metric tons of GHG emissions, while enhancing occupant comfort. The project also helped Oakton High School earn ENERGYSTAR® certification in January 2012.

- Facilities Management: EECBG funding was used at the Gum Springs and Lillian Carey/Bailey's Community Centers to replace outdated rooftop heating/cooling units with energy-efficient models and to install energy management control systems. According to the county's Facilities Management Department, these improvements have reduced average monthly electricity consumption 22 percent while enhancing occupant comfort. FMD reports that the installation of EECBG-funded lighting controls at the Herrity and Pennino Buildings and the South County Center reduced average monthly electricity consumption 34 percent across the three buildings.

- Parks: EECBG-funded lighting improvements at Fairfax County Park Authority properties included the purchase and installation of (1) LED parking lot lights at four parks; (2) web-based lighting controls at over 20 athletic fields located at 12 sites; (3) user-controlled timers at over 50 tennis and basketball courts in 23 parks; and (4) outdoor lighting upgrades at an additional eight parks. Precise energy savings cannot be determined because these lighting fixtures are not separately metered. However, curbing night-time lighting promotes dark sky stewardship and benefits park neighbors. Additionally, the user-controlled lighting timers installed at

basketball and tennis courts help allow park users to assume responsibility for lighting and energy consumption. More information is available at http://www.fairfaxcounty.gov/living/environment/energy/eecbg-project-status-march2011.pdf.

2. Facilities Management

A decade ago, the county's Facilities Management Department set an internal goal of a one percent annual reduction in energy use per square foot (measured in kBTU/square foot) for the buildings in its inventory. Because annual savings are cumulative, reductions of over 10 percent in energy usage per square foot are expected over a 10-year period. Recent numbers show FMD achieving or exceeding this goal, despite a substantial increase in square footage. During the period Fiscal Year 2001 – FY2010, FMD's energy reduction efforts resulted in a cost avoidance of more than $7 million.[1] The magnitude of the energy savings is illustrated by kilowatt hours avoided: in 2005, FMD's actions saved 4,232,639 kWh and saved an additional 2,398,036 kWh in 2006. Additionally, during these same years natural gas consumption was reduced by 111,440 therms per year. FMD took a wide range of actions to achieve these savings, including: the installation of energy management control systems; right-sizing heating, ventilating and air conditioning equipment; and installing efficient lighting and lighting controls.

3. Vehicle Services

In response to the county's need for cleaner and more energy-efficient vehicles, the Department of Vehicle Services began to include hybrid-electric vehicles in its vehicle replacement program, where appropriate. As a result, a conventional gasoline-fueled county fleet vehicle at the end of its service life may be replaced with a hybrid vehicle, if requested by the agency and conditions warrant. There are over 100 hybrid vehicles in the county's fleet, including five Chevy Volts. The county saves over 60,000 gallons of gas each year from its use of hybrid vehicles. DVS operates a number of other non-conventional vehicles, including a hybrid-electric school bus and a hybrid hydraulic launch assist refuse truck, which can generate up to 25 percent savings in fuel and energy costs depending on duty cycle and driver behavior. DVS has undertaken a diesel exhaust retrofit project, in which it retrofitted 1,012 school buses, 167 Connector buses, and 113 heavy duty trucks with exhaust after-treatments that reduce particulate emissions. Other innovative energy-saving DVS activities include programming automatic idle shutdown into all county solid waste trucks and all Fairfax Connector buses and de-rating the engines on 25 Connector buses by 25 horsepower to reduce fuel consumption and corresponding emissions by five percent for affected buses. Using federal stimulus funding, DVS is adding five

[1] The county's fiscal year is June 30 through July 1.

electric vehicles to the county fleet and anticipates installing the charging stations necessary to support them.

In 2012, DVS ordered six Ford Fusion Hybrids utilizing EECBG grant funding covering the incremental cost difference to that of a standard sedan. The vehicles were expected to have arrived in July 2012. The Fairfax County Public Schools are evaluating a hybrid conversion system on one of its school buses; this system, which is offered by ElectroMotive Designs, provides 20 to 100kW of electric power to the conventional drivetrain during acceleration and is designed to pay for itself by reducing operation costs.

DVS continues to seek grant funding for further exploration of hybrid and electric drive vehicles. As other prototype or early production vehicles become available, DVS will consider whether to conduct demonstrations with those vehicles as well.

More information is available at http://www.fairfaxcounty.gov/living/environment/coolcounties/countyefforts_greenvehicles.htm.

4. Green Buildings

In early 2008, the Board of Supervisors adopted the Sustainable Development Policy for Capital Projects applicable to the construction of new county buildings and renovations or additions to existing buildings. The policy provides a framework for preserving and promoting a natural environment, conserving energy, meeting or exceeding air and water quality standards, creating healthy work environments and establishing a community standard for sustainable practices. Under this policy, county projects greater than 10,000 square feet in size are expected to achieve a minimum LEED® Silver certification.[8] Smaller facilities are expected to achieve LEED certification. As of May 2013, the county had a total of 31 green building projects, 14 of which attained certification (12 under the LEED program and two under the Green Globes program). The other 17 projects, all of which have a goal of LEED Silver, are in design or are under construction. In addition, the county managed the LEED Gold Virginia Department of Transportation Administration Building. The Richard Byrd Library attained a LEED Gold rating, making it only the second library in the state to achieve a gold certification; it has since been joined by the Martha Washington and Dolley Madison Libraries. The county's Crosspointe and Great Falls Fire Stations rank among only a few LEED Gold-certified fire stations in the nation. One-time increases in construction costs associated with complying with the policy are offset by annual savings in energy and water bills. Annual savings at seven buildings currently registered and certified are ranging between $9,000 and $12,000 per building. More information is available at http://www.fairfaxcounty.gov/living/environment/coolcounties/county_green_buildings.htm.

5. Parks

The Fairfax County Park Authority, which has its own energy management policy, is committed to programmatically addressing energy management and has begun coordinating energy management initiatives and conservation throughout the 417 parks it manages. It has embarked on an energy-saving retrofit replacement program at its RECenters, nature and visitor centers, buildings, tennis courts and athletic fields to reap long-term, system-wide environmental and cost benefits. Key aspects of that program include lighting retrofits (e.g., the installation of T8 Lamps and electronic ballasts, LED exit signs, occupancy sensors, and compact florescent lamps), motor replacements (e.g., replacing 20 horsepower or larger motors with high-efficiency units) and control installations (web-based wireless control of key mechanical systems that allows automatic run-time scheduling, phased start-up to avoid peak demand utility penalty charges, and remote access). The Park Authority's first major energy project was completed at the Providence RECenter in 2008. Energy use declined 60 percent in those areas receiving new lighting, including the pool area, and overall facility electricity costs declined 20 percent, which translates to a three-year payback for the project. As an added bonus, pool customers prefer the new lighting. Park Authority Energy Management Policy (103.4) is available at http://www.fairfaxcounty.gov/parks/parkpolicy/

Below are some completed energy projects for park facilities:

- Completion of a lighting system project for the Mount Vernon RECenter. This project was completed in three phases, installing building controls for the lighting system, upgrading the building light fixtures and upgrading swimming pool lights. This resulted in improved efficiency and quality of light and reduced energy costs and environmental impacts.

- Completion of athletic fields lighting Web-based control systems for 22 athletic fields at nine sites. All 104 Park Authority fields are now equipped with this control system. This system allows for better field light scheduling and control from a remote location, resulting in improved operational efficiency and reduced energy waste.

- Completion of lighting and Heating/Ventilation/Air Conditioning system improvements for the Area 5 Park Management offices and maintenance shop, including HVAC control, lighting fixtures and lighting control upgrades, resulting in increased efficiency and energy conservation.

- Completion of lighting and HVAC system improvements for the Hidden Oaks Nature Center, including HVAC control, lighting fixtures and lighting control upgrades, resulting in improved energy efficiency and at the same time allowing for the special needs of live animal care.

- Direction of surveys and creation of a chart for temperature set points of the park facilities for efficient use of energy in the facilities, balancing energy conservation with the needs of the customer, including live animal and historic collections.

- Completion of lighting and control system improvements for the Oak Marr RECenter, including pool lighting and control system upgrades and replacement of the pool area skylight, resulting in more natural light, improved energy efficiency and reduced energy costs.

- Completion of lighting and control system improvements for the South Run, Spring Hill, Wakefield and Oak Marr RECenters parking lots, resulting in better energy efficiency, reduced energy waste and better compliance with dark sky needs.

6. Waste Management

The Department of Public Works and Environmental Services has also undertaken innovative energy saving measures to achieve energy savings in many of its industrial plant processes. For example, the Noman M. Cole, Jr. Pollution Control Plant uses methane gas from a county landfill in its sludge-burning process, thereby avoiding the purchase of natural gas and recovering a gas that has a global warming potential that is 21 times that of carbon dioxide. DPWES is using solar energy equipment to power nine remote wastewater flow-monitoring sites and to assist in treating wastewater; its use of solar mixers at the treatment plant is saving about $40,000 a year in energy costs. DPWES is also undertaking a water reuse project to use 560 million and 24 million gallons of reclaimed water from the plant for process and irrigation purposes, respectively; this project avoids the energy use and costs associated with treating the water. Also underway is a project to provide the Energy/Resource Recovery Facility with approximately two million gallons of potable water for process purposes. This project will reduce consumption of potable water at the E/RRF through the reuse of wastewater treatment plant effluent as a substitute. This action will provide both facilities with cost savings of up to 25 percent per year over the cost of potable water. More information is available at http://www.fairfaxcounty.gov/dpwes/wastewater/noman_cole.htm and http://www.fairfaxcounty.gov/dpwes/construction/water_reuse/.

7. Transportation

The county contributes funding for the operations of the Washington Metropolitan Area Transit Authority. In addition, the county's Department of Transportation has a number of initiatives supporting transit use in Fairfax County. The Employer Services Program provides outreach to employers on transportation demand management strategies, including rideshare incentives and promotions, computerized ride matching, carpool incentives such as

preferred parking, subsidies and telework programs. Other DOT efforts include the Connector Bus system, the "RideSources" program, which provides ridesharing information and ride matching assistance to commuters (part of the regional Commuter Connections system), the Community Residential Program, which assists residential communities with the assessment and promotion of alternatives to single occupant vehicle trips and the provision of park-and-ride lots. Employees are eligible to receive a subsidy for transit use of up to $120 per county employee. Also, in 2012, DOT initiated efforts for the conversion of the maintenance and service buildings at West Ox Road for their use of landfill gas for heating. More information is available at http://www.fairfaxcounty.gov/fcdot/.

8. MITRE Study for Electric Vehicle Charging

In August 2011, the MITRE Corporation, per a proffered commitment to sustainability-related work for the benefit of Fairfax County, completed a report titled "Electric Vehicle Charging Infrastructure Recommendations to Fairfax County." The report included several recommendations, with a particular focus on electric vehicle charging-related opportunities associated with redevelopment in Tysons Corner. The MITRE report was transmitted to the Board of Supervisors, which, in turn, referred the report to the Planning Commission for its review and recommendation.

The Planning Commission's Environment Committee has been reviewing the MITRE report and its recommendations. During the several meetings that the committee has held on this issue, the committee has received presentations from: the MITRE Corporation; the Fairfax County Environmental Coordinator (regarding related efforts at the regional level); and three private sector providers of electric vehicle supply equipment. As of the date of preparation of this summary, the committee was considering a number of issues and questions that had been identified during and subsequent to these presentations.

9. Green Building Policy and the County's Comprehensive Plan

In December 2007, the Board of Supervisors adopted an amendment to the Policy Plan volume of the county's Comprehensive Plan that established a green building policy. The policy includes broad support for green building practices and establishes linkages between the incorporation of green building/energy conservation practices and the attainment of certain Comprehensive Plan options, planned uses, and densities/intensities of development. In the county's growth centers, commitments for green building practices sufficient to attain certification through the LEED® program or its equivalent are recommended for certain nonresidential and multi-story multifamily residential proposals (e.g., proposals seeking development at the high end of the planned density/intensity range; development seeking a Comprehensive Plan Option; development involving a change in use from what would be allowed as a permitted use under

existing zoning; development at a planned Overlay Level). ENERGY STAR® Qualified Homes designations are recommended for any other residential development proposed at the high end of the Plan density range.

The aforementioned Policy Plan amendment was adopted with the expectation that it would be reviewed in two years. The Planning Commission's Environment Committee began its review of this policy in November 2009; this review resulted in the completion, in July 2011, of a "strawman" draft Plan amendment that was released for public review and comment. The committee's review of all comments received on this draft was completed in fall 2012, and a Planning Commission recommendation for a Policy Plan amendment was transmitted to the Board of Supervisors in December 2012. The Planning Commission has recommended several changes to the policy, including:

- Clarification of policy language.
- Support for additional green building concepts.
- Updating of green building rating systems recognized by the policy.
- Support for higher levels of green building efforts for higher levels of density or intensity.
- Expansion of the areas of applicability of the policy in growth centers such that it would also apply in industrial areas.
- Other modifications.

The Planning Commission's Environment Committee requested that the Plan amendment be crafted in a manner that would provide flexibility to consider additional public input regarding whether there should continue to be geographic differentiation in regard to green building recommendations and whether additional guidance is needed in regard to green building efforts for public-private partnerships on county property.

The green building Plan amendment was incorporated into the Pilot Comprehensive Plan Amendment Work Program that was adopted on July 9, 2013 by the Board of Supervisors (see the above discussion on Fairfax Forward). Staff is anticipating that a Planning Commission public hearing will be held in spring 2014.

A green building policy should encourage private sector building practices to construct buildings that are more energy efficient. However, it is important to realize that some companies have recognized that energy efficient practices are not only good for the environment but that they also save money, and energy efficient operations are attractive to many consumers. Consequently, it is not hard to find a variety of hotels, commercial offices, grocery stores and other commercial operations that have adopted energy efficient and environmentally sensitive practices in building construction and operations.
As of the preparation of this report, we are aware of one "big box" store in Fairfax County that is applying for LEED certification. This COSTCO store is

located on Richmond Highway and some highlights of things that COSTCO has done include:

- Air doors to keep refrigeration in refrigerated areas.
- Double vestibule for cold climates with air curtains.
- Energy efficient lighting, both indoors and outdoors.
- LED lighting for display cases and refrigeration.
- Anti-sweat controls for refrigeration doors.
- Localized refrigeration sensors to better manage energy requirements.
- Low flow bathroom fixtures.
- Night screens.
- Reflective roof with solar panels.
- Controls to turn lights off inside when skylights provide sufficient indoor lighting.
- Secondary loop refrigeration and reduced use of refrigerants that are greenhouse gases.
- Recycling of cardboard, grease and other materials.
- Construction materials are largely from recycled materials.

For the store that was recently constructed, stormwater management controls have also been established that either filter stormwater runoff through a bioswale or underground filtration system before release to Little Hunting Creek.

E. EDUCATION AND OUTREACH

Climate change is a phenomenon that can have real impacts on our lives, and yet the effects of local actions are more limited than those associated with other environmental problems. Counties across the U.S. are taking steps to reduce GHG emissions and inform people who live and work in these counties. To address this challenge, Fairfax County is exploring the use of social media to facilitate communications and education on climate change. One of the most significant actions that Fairfax County has taken is the establishment of an outreach program to assist Fairfax County residents in understanding the benefits of efforts to improve home energy efficiency, which also reduces GHG emissions.

As discussed in Section D, in October 2009, Fairfax County was awarded a three-year $9.6 million grant under the federal Energy Efficiency and Conservation Block Grant program. Of the 14 funded EECBG projects, one was a residential energy education and outreach program. The terms and conditions of the EECBG award required that federally-funded work on this program be completed prior to the award's October 2012 expiration.

In late 2011, following an open bidding process, the county selected a vendor to assist in the development and branding of the REE&O program and to work closely with the county's Project Management Team overseeing the effort. EQAC supported this outreach effort through participation on the PMT.

Working collaboratively throughout the first three quarters of 2012, the vendor and PMT developed the Energy Action Fairfax pilot program to provide ways for residents to learn about their energy consumption and how to reduce it through improved energy efficiency. Given the limited time horizon, the program was narrowly focused and aimed at homeowners in Fairfax County, particularly those occupying single-family homes and townhouses. The program's direct outreach included presentations at homeowner association meetings, small "audit parties" within selected communities and the distribution of informative brochures at events and fairs. The program also generated stories for local media and created a multi-faceted presence on the county website (www.fairfaxcounty.gov/energyactionfairfax/) that includes tips sheets, checklists and short how-to videos.

In its 2012 Annual Report, EQAC commended this effort and recommended the continuation of energy education and outreach through a follow-on program. Staff is building on the pilot Energy Action Fairfax with a second phase focused on the business community. This second phase is supported by FY2014 funding approved by the Board of Supervisors. Planned elements include direct outreach to small and medium-sized businesses, community events including a spring 2014 conference at the Government Center and business-oriented updates to the Energy Action Fairfax website. Staff anticipates periodic updates to those portions of the website that address residential energy consumption and the resumption of homeowner presentations beginning in fall 2013.

F. REGIONAL COORDINATION

1. Climate, Energy and Environment Policy Committee

The county is well-recognized for its participation in regional environmental and energy initiatives. One such initiative is the Climate, Energy and Environment Policy Committee. CEEPC was created in 2009 by the Metropolitan Washington Council of Government's Board of Directors to provide leadership on climate change, energy, green building, alternative fuels, solid waste and recycling issues and to help support area governments as they work together to meet the goals outlined in the National Capital Region Climate Change Report.

CEEPC includes representatives from COG's 22 member governments, state environmental, energy and transportation agencies, state legislatures, the Air and Climate Public Advisory Committee, federal and regional agencies, electric

and gas utilities, environmental organizations, business organizations and members of the academic community.

a. Climate and Energy Action Plan

In January 2010, CEEPC adopted the 2010-2012 Regional Climate and Energy Action Workplan (http://www.mwcog.org/uploads/pub-documents/pl5eXFs20110630110805.pdf), which identifies short term goals and action items to meet the regional greenhouse gas emissions reduction goals identified in the National Capital Region Climate Change Report.

b. Climate Change Report

Figure I-3 summarizes recent local government efforts to address the local measures that were included as key priorities in the 2010 Workplan. This figure helps to illustrate the extent of cooperative work that is shared by the different local jurisdictions in the Washington, D.C. area. As one of the largest and richest local governments, Fairfax County is not only active but plays a leadership role in many activities related to climate change.
In September 2012, CEEPC formed a workgroup to review the existing action plan and suggest changes for an updated 2013 to 2016 plan. The group suggested that the plan place a greater emphasis on energy efficiency and climate resiliency. The 2013-2016 Climate and Energy Action Plan was adopted in May 2013 (https://www.mwcog.org/environment/climate/Documents/2013-5-22%20Final%202013-2016%20CEEPC%20Action%20Plan.pdf). The new plan includes recommendations for local governments on: greenhouse gas inventories and reduction plans; built environment and infrastructure; renewable energy; transportation and land use; sustainability and resiliency; and public outreach.

c. Workshops and Symposia

In 2012, CEEPC hosted workshops on: energy leadership by local governments across the country; energy efficiency and renewable energy for the defense department and surrounding communities; and innovative energy efficiency finance mechanisms.

Figure 1.3. Climate Action Plan Progress Chart

Local Government	2012 Census Population Estimate[1]	Govt GHG Inventory	Community GHG Inventory	Govt GHG Reduction Plan	Community GHG Reduction Plan	Govt Energy Track/ Benchmark	Energy Efficient Street Light Program	Renewable Energy on Govt Property	Idling Regulations	Commuter Options Program for Govt Workers	Green Fleet Policy
District of Columbia	632,323	●	●	◐	◐	●	◐	●	●	●	◐
Suburban Maryland											
Charles County	150,592	○	○	○	○	●	○	●	○	●	○
Frederick County	173,200	●	●	●	◐	●	●	◐	●	●	◐
City of Frederick[2]	66,382	○	○	○	○	○	◐	NR	●	○	○
Montgomery County	861,466	●	●	●	●	●	◐	●	○	NR	●
City of Gaithersburg[2]	62,794	◐	○	○	○	◐	◐	●	◐	◐	○
City of Rockville[2]	63,244	●	●	●	●	●	●	◐	○	●	◐
City of Takoma Park[2]	17,205	●	●	●	●	◐	◐	●	●	○	●
Prince George's County	760,932	●	●	●	●	◐	◐	●	NR	◐	◐
City of Bowie[2]	56,129	●	●	◐	◐	◐	N/A	●	●	○	●
City of College Park[2]	31,208	●	◐	○	○	◐	●	N/A	N/A	●	N/A
City of Greenbelt[2]	23,541	●	◐	◐	○	●	N/A	●	◐	◐	●
Town of Bladensburg[2]	9,328	○	○	○	○	◐	○	●	◐	◐	◐
Northern Virginia											
Arlington County	221,045	●	●	●	◐	●	●	●	◐	●	●
Fairfax County	1,118,602	●	●	●	◐	◐	◐	●	●	●	●
Loudoun County	336,898	●	●	●	●	●	○	●	◐	●	●
Prince William County	430,289	●	○	◐	○	●	○	●	○	●	◐
City of Alexandria	146,294	●	●	●	●	●	◐	●	●	●	◐
City of Fairfax	23,461	◐	◐	◐	○	◐	◐	○	◐	○	◐
City of Falls Church	13,229	●	●	◐	◐	◐	◐	●	●	NR	●
City of Manassas	40,605	○	○	○	○	◐	◐	●	N/A	NR	●
City of Manassas Park	15,798	○	○	○	○	◐	○	○	○	◐	○
Percent Jurisdictions. Implemented		68%	55%	41%	27%	45%	18%	73%	36%	45%	36%
Percent Jurisdictions In Progress		9%	14%	27%	27%	50%	50%	9%	27%	23%	36%
Implemented + In Progress		**77%**	**68%**	**68%**	**55%**	**95%**	**68%**	**82%**	**64%**	**68%**	**73%**

● - Implemented ◐ - In Progress ○ - Not Started N/A - Not Applicable

[1]Annual Estimates of the Resident Population: 4/1/2010 - 7/ 1/2012 Source: U.S. Census Bureau, Population Division
[2]Population in Maryland cities is included in appropriate county totals.

Source: Metropolitan Washington Council of Governments, Annual Local Government Climate and Energy Survey, 2013

In February, COG hosted a Leadership Symposium titled "21st Century Local Energy Innovation" to highlight best new practices in local government investment in clean energy. The City of Boulder presented on building a municipal utility to secure a higher proportion of renewable energy. The Sonoma County Water Agency presented on sustainability and efficiency initiatives. The DC Sustainable Energy Utility presented its model and how the program promotes the goals of energy efficiency and equitable economic development simultaneously.

In July, COG hosted an Agency and Expert Roundtable on Sustainable Energy and Economic Development, focused on energy efficiency and renewable energy in the defense department, and potential for including surrounding communities in those initiatives. Speakers included representatives of the White House Council on Environmental Quality, Departments of Defense, Navy, Air Force and Army, as well as leaders from national labs and educational institutions.

Also in July, a workshop titled Innovative Financing Tools for Energy Efficient Buildings brought together leaders from banks, law firms and the Department of Energy with consultants and non-governmental organization leaders. Panelist discussed the potential for energy efficiency finance, barriers to deployment and case studies on innovative solutions.

d. Advocacy

CEEPC advocated on federal issues in favor of Property Assessed Clean Energy financing and supporting the use of alternative fuels by the Defense Department in the National Defense Authorization Act. Additionally, CEEPC advocated for a number of state legislative issues, including offshore wind, community net metering for renewables, on-bill finance for energy efficiency upgrades and power purchase agreements for solar energy.

e. Electric Vehicle Planning Initiative

In 2012, CEEPC continued its Electric Vehicle Planning Initiative in partnership with the Greater Washington Regional Clean Cities Coalition, leading to the publication of the report, "Electric Vehicles in Metropolitan Washington" (http://www.mwcog.org/store/item.asp?PUBLICATION_ID=449). The COG Board of Directors endorsed the report in November 2012.
COG's electric vehicle initiatives began with a workshop in early 2011 to examine successful local and regional EV readiness strategies and to begin the conversation on a regional level on how to effectively and collectively deploy electric vehicle transportation technology.
This led to the creation of a stakeholder-driven task force whose mission was to make recommendations for the region and local jurisdictions to

consider in designing and implementing programs to facilitate adoption of electric vehicles. Kambiz Agazi, Fairfax County Environmental Coordinator, served as task force co-chair, and subgroups were formed to address comprehensive planning, zoning, building codes and permitting/inspection, infrastructure siting, energy utility policy and outreach and education.

Task force stakeholders contributing to the process included electric vehicle owners, state and local government staff (transportation and energy planners), electric vehicle original equipment manufacturers, electric vehicle supply equipment suppliers, nonprofit organizations (e.g., Georgetown Climate Center, Electric Drive Transportation Association, Electric Vehicle Association of Greater Washington DC) and electric utility representatives from the three states.

The report provides a comprehensive look at current regional EV readiness and offers recommendations to address barriers to EV use. The report also stresses the benefits of EVs, including reducing greenhouse gases, improving air quality and dramatic fuel costs savings.

Although metropolitan Washington still has a relatively small electric vehicle market, consumer interest in EVs is growing and more models are becoming available. However, the region's charging infrastructure and EV policy frameworks are not yet sufficient to accommodate more widespread adoption of these vehicles. COG's inventory of EV charging stations in the region identified 332 chargers in 133 publicly available charging station locations. In terms of infrastructure, metropolitan Washington lags behind other regions, such as San Francisco and San Diego, in the number of EV charging stations, though this figure is increasing due to stimulus funding and private investment.

Furthermore, the absence of a clear policy framework for EV infrastructure planning – which considers permitting, citing, zoning, utility policy and other issues – exacerbates existing market barriers. The report notes that a streamlined regional strategy would help overcome these obstacles and encourage wider EV adoption.

The top five recommendations from "Electric Vehicles in Metropolitan Washington" to encourage greater EV use in metropolitan Washington are:

1. Regional EV Partnership: A Washington Regional Electric Vehicle Partnership should be formed to develop a business case for EVs and to assess the potential for community return on investment.
2. Incentives: Stakeholders should consider offering incentives such as preferred parking, HOV occupancy exceptions and tax credits to promote EV adoption.

3. Utility Planning and Policy: Electric permitting procedures should identify EV charging station installations and notify electric utilities of their locations.
4. Outreach and Education is needed to promote EV adoption and inform the public of its benefits.
5. Local Government Policy: Comprehensive plans and zoning regulations should guide EV infrastructure development and ensure that the built environment can accommodate future EV charging station installations.

f. Climate Adaptation

In October 2010, EPA awarded the Washington Metropolitan Council of Governments technical assistance through the Smart Growth Implementation Assistance Program. Through the program, EPA is developing a guidebook for adapting to risks from climate change in four sectors: land use; transportation; buildings; and water.

During the process to develop the guidebook, stakeholders identified the need for more specific information about climate trends and anticipated impacts in the National Capital Region and planning implications by sector. To address this need, COG has been coordinating with local university experts to characterize data needs of local decision-makers and hosted a Climate Impacts Symposium on May 21, 2012. There were over 90 attendees plus media at the event. In the morning, climate experts from the University of Maryland and Penn State University discussed what the trends and modeling results are saying about the effects of climate change in our region. Afternoon speakers explored the planning implications of climate impacts for water, land use and transportation planning in the region.

g. Responsible Purchasing Network Regional Membership and Trainings

COG established a Regional Membership to the Responsible Purchasing Network in 2012. The RPN Regional Membership assists COG member jurisdictions in establishing and implementing green purchasing policies and programs. RPN membership in 2012 was provided at no charge to COG member jurisdictions to an unlimited number of local jurisdiction employees.

RPN is an international network of buyers dedicated to socially responsible and environmentally preferable purchasing. RPN's membership base is comprised of over 250 institutional purchasers that represent federal agencies, state and local governments, businesses and nonprofits. RPN provides green purchasing resources and tools that assist members in reaching green purchasing goals and save staff time and money. For instance, RPN's Responsible Purchasing Guides provide detailed guidance

designed to help institutional purchasers identify and buy greener goods and services.

COG has hosted trainings to help orient members with sustainable purchasing principles and inform them how to utilize the RPN membership. On January 18, 2012, COG hosted a "Sustainable Purchasing 101" webinar that included a new member orientation. On September 27, 2012, COG hosted a Sustainable Purchasing Workshop at which RPN trained procurement and environmental stakeholders on environmental products that save money.

h. Built Environment and Energy Advisory Committee

The Built Environment and Energy Advisory Committee was established in 2013 and serves as a technical advisory committee to Climate, Energy and Environment Policy Committee. Membership includes local government energy managers, government staff supporting Green Building initiatives, as well as interested stakeholders. The group serves as a forum for discussion and monitoring of energy and green building issues in the National Capital Region.

The group was formed as a merger of two existing COG committees, the Energy Advisory Committee and the Intergovernmental Green Building Group. Members of both groups recognized that there was an increasing overlap between their core issues, particularly as green building practices are placing a stronger emphasis on alternative energy and energy efficiency.

BEEAC held its first meeting in March 2013. Its monthly meetings have focused on updating regional stakeholders on the status of local green building policies throughout the region. Noel Kaplan, Senior Environmental Planner with the Fairfax County Department of Planning and Zoning, presented the county's green building policy to the group and discussed lessons learned to assist other localities in developing and refining green building programs.

In 2012, EAC and IGBG explored a number of renewable energy, energy efficiency and grid management issues. EAC highlighted a several new technologies, including software programs for energy management, demand response, alternative fuels, geothermal energy, smart meters, fuel stabilizers and sub-metering. The group also received presentations on policies and programs at the local level to increase energy efficiency and renewable energy generation.

IGBG's members focused on green codes, including the International Green Construction Code and the American Society of Heating, Refrigerating and Air-Conditioning Engineers' Standard 189.1. IGBG drafted a letter,

endorsed by CEEPC in November, to the Virginia Board of Housing and Community Development to adopt the 2012 International Energy Conservation Code as the basis for the energy provisions of the Unified Statewide Building Code. Other topics explored by the group included sustainable development for affordable housing and low-income communities, ecodistricts and sustainability/community energy plans in the region.

2. Northern Virginia Regional Park Authority

Three Northern Virginia counties (Fairfax, Loudoun and Arlington) and three cities (Alexandria, Fairfax and Falls Church) participate in the Northern Virginia Regional Park Authority. NVRPA was founded in 1959 and currently operates 25 regional parks on 11,156 acres of land that it owns and leases throughout the region. It also holds conservation easements on 115 parcels covering more than 652 acres.

a. Energy Efficiency Efforts

In 2005, the Northern Virginia Regional Park Authority adopted energy conservation plans for each park and began tracking its carbon footprint. Using the accounting system, instead of just recording utility costs, NVRPA also recorded units of consumption for all fuels, so it could calculate its carbon footprint. While NVRPA's park system has grown dramatically from 19 to 25 parks since 2005, carbon emissions in 2012 were virtually the same as in 2005. In that time period, NVRPA's enterprise revenues grew from $10 million to $16 million, but it has been able to decrease from 350 tons of carbon per $1 million of enterprise revenue to just 235 tons. This reduction was achieved by implementing easily attainable items, such as: efficient lighting and insulation to improve the energy consumption of existing buildings; using a wide range of technologies like geothermal heat pumps, electric and hybrid vehicles, solar panels, programmable thermostats and green building elements that improve efficiency; and having a policy that considers the life cycle costs of the energy-consuming systems. Regional parks in Fairfax County that had the most significant energy reductions were Fountainhead, Sandy Run and Bull Run Marina at 25.58 percent and Meadowlark Botanical Gardens at 12.22 percent.

In November and December 2012, Meadowlark Gardens hosted a walking holiday light show using all LED lights that use only a 10th of the electricity that normal incandescent bulbs use. Upon completion of the season, NVRPA negotiated to purchase renewable energy credits for both its all-LED holiday light shows at Bull Run Regional Park and Meadowlark, to offset their power consumption. This is yet another opportunity to educate the public about carbon footprint and sustainability. Other energy efficiency

efforts of note include the installation of ceiling fans and energy efficient lighting at Pohick Bay's camping cabins and the installation of efficient lighting in the restrooms at Pirate's Cove Waterpark and at the Pohick maintenance shop.

b. Environmental Education and Outreach

NVRPA continues to have a roving park naturalist regularly visit the high-attendance parks such as pools, campgrounds and golf courses, bringing live wildlife and other exhibits and providing programming about nature and the environment. The naturalist also attends events and functions such as the Dominion W&OD Trail Mix, the Walter Mess 5K race and the Friends of the W&OD 10K race.

In 2012, the Northern Virginia Regional Park Foundation gave grants through its Nature Nuts Program to 11 Fairfax County public schools for children to attend environmental education camps at Hemlock Overlook Regional Park. Adventure Links at Hemlock Overlook Regional Park in Clifton offers a variety of outdoor and environmental education, team development programs for public and private schools, religious and community groups, sports teams, corporations, professional organizations and local, state and federal government and military agencies. Also in 2012, Meadowlark partnered with the Volgenau Foundation to provide teacher training and student field trips to Meadowlark Botanical Gardens and Potomac Overlook Regional Park. These trips focus on the natural history of the Potomac River basin, conserving native plants and animals.

The Park Authority partners with REI's adventure school, introducing people to the outdoors at Pohick Bay, Hemlock Overlook and Fountainhead Regional Parks. The Park Authority's naturalists hold regular educational canoe and kayak trips at Pohick Bay, and the roving naturalist conducts environmental programs at Meadowlark Botanical Gardens as well as at Bull Run and Pohick Bay Regional Park campgrounds. Potomac Overlook Regional Park and W&OD Trail staff hosted booths at various county fairs to give environmental information to the public.

The installation of an electric vehicle charging station at Potomac Overlook Regional Park has provided a great education and outreach tool.

c. Stewardship

Occoquan Regional Park hosted two clean up events on the Occoquan River and added five new recycling bins at its picnic shelters and boat ramp. Fountainhead and Bull Run Marina were host sites for the Friend of the Occoquan clean-up days, removing dozens of bags of trash from the reservoir. At Sandy Run Regional Park, rowing crew teams took part in

water clean-up days, removing trash from the Occoquan Reservoir around Sandy Run. New trashcans were installed at Fountainhead and the W&OD Trail to prevent tipping and foraging by wildlife.

Environmental stewardship opportunities for volunteers are available at Meadowlark Botanical Gardens, Potomac Overlook Regional Park, Upton Hill Regional Park, Pohick Bay Regional Park and various other parks on occasion. NVRPA implemented a program that allows youth to access its fee-based park facilities through volunteer service. It has a wide variety of community partnerships in place that encourage groups to take advantage of the regional parks for environmental and historic education and service projects. For current information about the Northern Virginia Regional Park Authority, visit its website, http://www.NVRPA.org/.

G. SMART GROWTH (see also the Land Use and Transportation chapter of this report)

1. Transit-Oriented Mixed-Use Development

Key planning concepts in Fairfax County include the protection of stable, residential neighborhoods from incompatible development and the concentration of new growth in mixed-use growth centers, largely focused around transit opportunities and revitalization areas. Transit-oriented development should serve to reduce, in aggregate, the number of motor vehicle trips and vehicle miles traveled and the associated emissions that would otherwise occur through more traditional suburban development patterns in the region. An increasing focus on TOD over the last 20 years led to the 2007 adoption of a Comprehensive Plan definition for TOD and development guidelines, with a strong emphasis on vehicle trip reduction and pedestrian and non-motorized transportation. Major recent initiatives include: adoption of the Plan for Tysons Corner; adoption of Plan Amendments supporting TOD in the Franconia-Springfield Area and Baileys Crossroads; a high density mixed use concept in Annandale; and the adoption of new zoning districts to facilitate the establishment of mixed use, transit-oriented development in growth centers. As highlighted in the Land Use and Transportation chapter, a number of Plan amendments and special studies are under way; each supports transit-oriented development, housing in activity centers and/or pedestrian-oriented neighborhood commerce. More information is available at http://www.fairfaxcounty.gov/planning/tod.htm.

2. Transforming Tysons

On June 22, 2010, the Board of Supervisors adopted a Comprehensive Plan amendment for Tysons Corner that will turn the area into the county's "downtown." The plan focuses future growth within an easy walking distance of transit. Fairfax County expects that 75 percent of future growth will be within a half mile of the four Metrorail stations. Many offices and homes will be a three to six minute walk from these stations, allowing people to get around on foot, bicycle, bus or subway. The plan, which was creating based on economic, transportation and fiscal analyses, guides growth during the next 20 years while creating a framework for redevelopment beyond 2030. It sets an initial development level of 45 million square feet for office space, which is the highest market forecast for the year 2030. Once this amount of office development is reached, the plan would be updated to allow for additional growth. The plan also encourages mixed use development by allowing residential, hotel and ground floor retail at levels above the 2030 forecast. The plan also provides for the use of district energy--allowing use of energy near the point of generation, which provides opportunities for much greater efficiencies in the use of energy generated.

The Comprehensive Plan amendment establishes the expectation of substantial commitments to energy and water conservation measures for development proposals, especially where rezonings are being sought. As substantial redevelopment is expected in the Tysons area, the plan for Tysons Corner should lead to redevelopment that is more energy and water efficient. More information is available at http://www.fairfaxcounty.gov/dpz/tysonscorner/.

3. MITRE Proffer

Per a proffered commitment received from the MITRE Corporation, MITRE conducted research for the county focusing on flexible building design to accommodate energy efficiency innovations – that is, ways to design buildings now to allow for the future implementation of innovative energy systems that may not be cost effective or otherwise feasible at the present time. The report also provided guidance regarding renewable energy supplies and their potential applicability for new buildings and building retrofits. MITRE's report was transmitted to the Board of Supervisors in May 2013 and has been referred to the Planning Commission for review and recommendation.

4. Lorton Green Energy Triangle

The Lorton area is also undergoing significant growth and development. In 2011, a white paper was developed by an energy industry engineer serving on the board of the Lorton Arts Foundation; the paper describes efforts that could be explored beyond the efforts that are already being pursued (see the next section of this chapter and the Solid Waste chapter) in conjunction with waste management facilities in the Lorton area. For example, landfill gas could be

used in the Lorton Workhouse Art Center, waste heat from the waste to energy facility in Lorton could be used to power major commercial activities and landfills could house a variety of renewable energy technologies (e.g., wind, solar). The planning for the Lorton Green Energy Triangle has involved a number of parties, including the Department of Public Works and Environmental Services. This effort has been recognized by the Chairman's Private Energy Sector Task Force.

These cooperative planning and efforts to make more efficient use of existing energy sources and to create renewable energy within the county is commendable.

H. WASTE MANAGEMENT AND ENERGY EFFICIENCY

1. Waste-to-Energy

The county's Energy/Resource Recovery Facility recovers methane, controls nitrous oxide and generates about 80 megawatts of electricity from solid waste – enough energy to power about 75,000 homes and the facility itself. The sale of this electricity to the local utility generates revenues that partially offset the facility's operational cost. Converting waste to energy at the E/RRF provides a number of benefits in addition to these revenues. Incineration avoids the need to landfill garbage and the resulting production of methane, which traps 21 times more heat per molecule than CO_2, and nitrous oxide, which absorbs 310 times more heat. In addition, waste-to-energy avoids the combustion of coal, oil or gas to produce electricity. The county's Department of Public Works and Environmental Services estimates that the waste-to-energy plant avoids the equivalent of approximately one million tons of greenhouse gas emissions each year. More information is available at http://www.fairfaxcounty.gov/dpwes/trash/dispomsf.htm.

2. Landfill Gas Recovery and Utilization

There are both closed and open portions of the I-95 landfill, with the open portion collecting ash generated by the Energy/Resource Recovery Facility. The county collects landfill gas generated by the closed portion of the I-95 Landfill (which collected solid waste) and the closed I-66 landfill as a substitute for fossil fuel to heat on-site buildings. It has installed a system to use landfill gas from the closed I-66 landfill as a fuel source to heat vehicle maintenance facilities at its West Ox campus, at an initial project cost of approximately $300,000. With annual natural gas savings of between $40,000 and $50,000, the estimated payback for the West Ox LFG project is less than eight years. Installation of a second system at the Bus Operations Garage is under way and was to have been operational by fall 2011. At the I-95 landfill, LFG recovered from a well field is delivered to a series of power stations that produce up to six megawatts of electricity, which is sold to the local utility and is then distributed

to homes. This can power supports about 75,000 homes and saves approximately two million barrels of oil a year. The county's LFG projects reduce its carbon dioxide emissions by more than 300,000 tons each year. More information is available at http://www.fairfaxcounty.gov/dpwes/trash/dispmethrvc.htm .

I. AWARDS AND RECOGNITION

In 2011, the county received the American Planning Association's Daniel Burnham Award for its Comprehensive Plan for the Tysons Corner Urban Center. Its energy-specific awards include designation by the U.S. Environmental Protection Agency as an *Energy Star Partner*, a *Green Power Partner* for its green purchasing and a *Landfill Methane Outreach Program Community Partner of the Year*; it also has received the Public Technology Institute's *Solutions Award* in the Sustainability category for its plug-in hybrid vehicle fleet trial.

Other climate and energy related awards include:

- Tree Preservation Award (Fairfax County Tree Commission): Dolley Madison Library (Jan. 18).

- Community Appearance Awards (Community Appearance Alliance of Northern Virginia): Superior Performance Award to Dolley Madison Library and the Great Falls Volunteer Fire Station.

- American Public Works Association - Mid-Atlantic Chapter "Best Project" Awards:
  - Dolley Madison Library.
  - Projects $5 Million to $25 Million - Structures Category.
  - I-66 Transfer Station Operations Center.
  - Projects Less than $5 Million - Structures Category.

- 2013 Design Award (Northern Virginia Chapter of the American Institute of Architects): Dolley Madison Library - 2013 Jurors' Special Citation in Institutional Architecture.

- National Association of Counties: Government Center Innovative Stream Restoration - "Best in Category" Achievement Award, "Environmental Protection and Energy" category.

- National Association of Clean Water Agencies: 2013 Platinum Peak Performance Award: Noman M. Cole Pollution Control Plant.

J. COMMENTS

1. EQAC is pleased that the county has hired an Energy Manager and that the county is realizing significant savings on energy since his arrival. EQAC looks forward to additional reporting and analyses that show opportunities for further efficiencies in energy conservation.

2. EQAC commends the county for updating an inventory of greenhouse gas emissions for Fairfax County facilities and for designing a GHG reporting program for county that allows for GHG emissions to be more easily combined with reporting of other jurisdictions.

3. EQAC commends the county for recognizing the importance of reducing the community's GHG emissions and for soliciting bids for a countywide education and outreach program that would cut GHG emissions. EQAC feels that this effort has been productive and encourages the county to continue this work.

4. EQAC commends the county for participation in regional efforts to reduce GHG emissions and improve energy efficiency. Certain GHG programs, such as transportation related programs, district energy and reporting of carbon footprints require intergovernmental cooperation.

K. RECOMMENDATIONS

1. While the county has promoted the incorporation of energy efficient certification, such as LEED at the Silver level or higher, EQAC recommends that the Board of Supervisors also promote periodic (e.g., bi-annual) evaluation of the GHG footprints for buildings and facilities. Such a step would be a natural follow up action to education and outreach that has been started in 2012 for residential energy use and that is envisioned for the commercial sector. While EQAC is encouraged that plans are being developed that would address this recommendation, additional work will be needed before this recommendation can be fulfilled. We are hopeful that the work of the Energy Manager will help with the implementation of this recommendation.

2. EQAC recommends that Fairfax County continue to fund a program to serve as follow-on to the Energy Action Fairfax. The EAF program completed a small number of outreach events and audits and developed a website and educational videos. The program educated county residents on energy conservation and greenhouse gas emission reductions. EQAC feels that it would be beneficial if the program was to continue. Given the significant efforts and expenditures made by the county to get this program started, it would be most cost-efficient to continue the program at this time rather than stop it and then try to re-start it at some future date.

3. Given the importance of the work of the private sector, the EQAC strongly supports the continuation of work started by the Chair's Energy Task Force be continued through the Energy Alliance.

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ANNUAL REPORT ON THE ENVIRONMENT

CHAPTER II

LAND USE AND TRANSPORTATION

I. LAND USE AND TRANSPORTATION

A. OVERVIEW AND ISSUES

This chapter considers the environmental aspects of land use and transportation, both separately and as they relate to each other from an environmental perspective. As detailed in this chapter, the county has very little vacant land left. As the county approaches "buildout," the focus of land use across the county is shifting from new development to revitalization and redevelopment. Each acre in the county becomes more valuable every day. The desire to maximize land utilization or productivity puts a strain on all types of land, from residential to commercial to parkland.

While the amount of available land has decreased, the Plan potential has been increasing. The potential is the number of units that can be built in the county according to the current Plan. It changes as requests are evaluated and adopted by the board. Since 1989, there have been over 124,500 new townhouses and multifamily units and over 8,000 single family homes added to the Plan. This clearly demonstrates the increased intensity planned for the county.

In May 2012, the county issued a new report entitled *State of the Plan—An Evaluation of Comprehensive Plan Activities Between 2000-2010*[1]. This report describes changes that have been happening in our approach to planning as the county transitions over time. Excerpts are included in this chapter, but the full report provides details beyond the summaries referenced herein.

At the same time, transportation systems across the county and metropolitan region are becoming increasingly congested. During rush hour, most highways in the county receive a failing grade for peak hour level of service. Over the past 15 years, highway construction in the Washington area outpaced population growth[2], yet congestion has still increased. This is due to increased per capita vehicle mileage that puts severe strains on the transportation infrastructure. According to the Texas Transportation Initiative, our region is the most congested in the country. In 1982, the average metropolitan resident spent 16 hours in congestion; by 2011 that ballooned to 67 hours wasted in congestion. That can be translated into $3.8 billion, 179 million hours and 85 million gallons of gas in lost productivity and wasted fuel.[3]

During 2012, much progress was made on transportation mega-projects, including the Dulles Rail, I-495 Express Lanes and I-95 high-occupancy toll lane expansion, also known as the 95 Express Lanes project. These projects are visible to anyone who moves about the county. The impact they will have on transportation is still to

[1] http://www.fairfaxcounty.gov/dpz/projects/state_of_the_plan.pdf
[2] "Where We are Growing", Southern Environmental Law Center, 2002
[3] Texas Transportation Initiative, 2012 Urban Mobility Report

be seen, but they have potential to transform how large numbers of people move about the county. The intersection of Metrorail and the new Tysons Corner plan are examples of transitional thinking[4] that combines land use and transportation into a new planning paradigm for the county. Tysons Corner will soon have four new Metrorail stations in an urban core that has plans to increase the number of residents from 17,000 to 100,000 and double the number of jobs from 100,000 to 200,000.

The I-495 Express Lanes, which are now open, and the future I-95 Express Lanes are a more traditional approach to increase capacity of highways. The unique aspect of these projects is congestion demand pricing to control the amount of congestion on express lanes. There is a potential to get environmental benefits by providing transit options using the express lanes, because transit moves more people per vehicle and the congestion pricing should allow transit to run on a predictable schedule. On the other hand, the extra capacity down I-95 may induce development outside the county with the associated commuting to the county that increases the vehicle miles traveled, which is a negative environmental impact.

Public transportation systems are becoming increasingly important to the county and region. Metrorail is the second largest rail transit system and Metrobus is the fifth largest bus network in the nation. Every day Metro carries nearly 20 percent of all rush-hour trips in the metropolitan area, carrying as many people each day as 1,400 miles of new traffic lanes — equivalent to an 11 percent expansion of the region's road system. From a purely environmental standpoint, Metrorail and Metrobus eliminate more than 10,000 tons of pollution each year and save the region from using 75 million gallons of gasoline each year.[5] Public transit is clearly an important part of the future.

The buildout of the county's land use plan combined with the overload of the transportation infrastructure will continue to increase as the county population increases. In 2006, the county released a comprehensive demographic study, *Anticipating the Future: A Discussion of Trends in Fairfax County.* The report presents much needed data to plan for the future and incorporate future population and trends. It clearly points out that higher density residential development in Fairfax County and its neighboring jurisdictions will increase traffic congestion. This density, however, will make public transportation alternatives more viable.

As noted throughout this Annual Report, pressures from growth throughout the county directly affect the environment and consequently affect quality of life, health and natural experiences. The Comprehensive Plan specifically provides strategies and practices that can address land use and transportation together. Mixed-use development is an important tool to combine residential and commercial development to "enhance the sense of community" and to "increase transportation efficiency." It provides an opportunity for residents to live and work in the same

[4] Doug Carter citing Rick Smyre's term at the Evolution of Fairfax Lecture, June 27, 2012.
[5] Washington Metropolitan Area Transit Authority, http://www.wmata.com/community_outreach/kids_zone/

area, thus reducing transportation needs while increasing the population density to support local businesses and mass transit.

The Board of Supervisors highlighted the effects of growth and congestion in its vision paper: *Environmental Excellence for Fairfax County, A 20-Year Vision.* A variety of tools were emphasized, including mixed use development and low impact development. In addition, problems that at first seem tangential to the environment, such as neighborhood disruption through tear-down development and low income housing, were raised. Teardowns are becoming more common across the county, as single family homes are replaced with larger homes. The lack of low-income housing means workers cannot afford to live and work in Fairfax County and need to commute from outside the county, which exacerbates problems of both pollution and congestion. Furthermore, this situation skews the affordable housing debate, because it undercounts the number of households needing affordable housing across the metropolitan region.

The county faces great challenges from the combined effect of:

- Land use constraints that result from reaching build-out and transitioning from a growth focus to redevelopment.
- Transportation systems strained by congestion and getting further constrained by sprawl beyond the county.
- Population growth that will require additional residential and commercial facilities and transportation options.

Over the past 10 years, the county has made great strides in integrating land use and transportation planning and decision making, as evidenced by many of the programs and projects detailed in this chapter. The challenge will always remain, however, in part because the county and individual landowners have primary authority for land use while the state has primary authority for transportation. The issues stemming from state control over practically all of the roads in the county will remain a major stumbling block. The challenge will also remain as an effect from the necessity of breaking down complex issues in order to manage them, to the point of establishing organizational structures based on the pieces, but not having the resources or authorities to put them back together in a comprehensive manner. The I-95 Express Lanes introduce yet another wrinkle, with a private corporation building a significant for-profit component to our infrastructure.

Environmental stewardship and high quality of life demand a holistic systems approach to the inevitable urbanization of Fairfax County. The silver lining is that urbanization, to be sustainable – environmentally, socially and economically – demands the same.
This chapter provides:

- Background on current trends and concepts.
- An overview of planning technology.

- A discussion of county land use characteristics and planning tools.
- An overview of major transportation programs.
- A section that demonstrates the county's integration of land use and transportation through ongoing projects and programs.

The chapter closes with sections on environmental stewardship, accomplishments and EQAC's comments and recommendations.

1. Trends and Concepts

The Department of Planning and Zoning has the lead responsibility for land use planning in the county. Over the past several years, there has been a concerted effort to improve how the county plans for development and redevelopment. This culminated in 2012 with the Fairfax Forward[6] project to modernize the planning process. In the past, the Comprehensive Plan was updated every several years through a process known as the Area Plans Review. The APR process reviewed new changes to the plan initiated by private parties. Over time, the APR process was augmented by special studies that addressed the full array of changes necessary to revitalize a neighborhood. The special studies were much more effective, and running both processes was a burden on our professional resources.

The most significant special study covered Tysons Corner. The Board of Supervisors appointed the Tysons Land Use Task Force in 2005 with a very ambitious charge to consider the redevelopment of the "downtown" for Fairfax County. The task force met for over five years and published "Transforming Tysons: Vision and Area Wide Recommendations" in 2008. The vision was assigned to the Planning Commission, which, in turn, appointed a special task force to craft language for a Comprehensive Plan Amendment. The task force worked with staff, the Tysons Land Use Task Force and the community to propose an amendment that was formally adopted by the board in June 2010.

The scope of Tysons Corner required new and creative approaches. The task force consisted of appointees who represented a wide swath of stakeholders. It included developers, landholders and residents, as well as advocates for neighboring communities, distant communities, affordable housing, the arts, the environment, transportation, biking, accessibility and others. The task force worked together with professional assistance from county staff, a world-recognized urban design firm, experts in transportation and modeling and advisors on communications.

Technology was incorporated throughout the process with models and digital mockups that showed massing and expected growth projections. These were shared with members of the community to help them visualize the proposed vision. With the plan approved, new mechanisms will need to be adopted that

[6] http://www.fairfaxcounty.gov/dpz/fairfaxforward.htm

encourage and monitor the vision and provide the ability to monitor the macro effects and provide mitigation options to make sure the reality aligns with the vision.

Fairfax Forward is a much needed program to address the transition from build-out to revitalization. Several essential concepts that may be incorporated are described in the following sections. These concepts reflect the interconnections of land use and transportation, as well as factors such as housing, economic development and quality of life.

a. Sustainability

The most holistic of the concepts is *sustainability*. The U.S. Environmental Protection Agency's website[7] defines sustainability as follows:

> *The traditional definition of sustainability calls for policies and strategies that meet society's present needs without compromising the ability of future generations to meet their own needs.*
>
> *The 1970 National Environmental Policy Act (NEPA) formally established as a national goal the creation and maintenance of conditions under which humans and nature "can exist in productive harmony, and fulfill the social, economic and other requirements of* ***present and future generations of Americans****"* [emphasis added].
>
> *The concept of sustainable development was described in a 1981 White House Council on Environmental Quality report: "The key concept here is sustainable development. If economic development is to be successful over the long term, it must proceed in a way that protects the natural resource base of developing countries."*
>
> *Over the past 30 years, the concept of sustainability has evolved to reflect perspectives of both the public and private sectors. A public policy perspective would define sustainability as the satisfaction of basic economic, social, and security needs now and in the future without undermining the natural resource base and environmental quality on which life depends. From a business perspective, the goal of sustainability is to increase long-term shareholder and social value, while decreasing industry's use of materials and reducing negative impacts on the environment.*

Sustainability harmonizes the concepts of *Sprawl* and *Smart Growth*. Sprawl is the very evident unrestricted growth out from the core of a city or a county. In the 1970s, Fairfax was one of the nation's fastest growing counties. Today that rapid growth is happening beyond Fairfax County, in

[7] http://www.epa.gov/sustainability/basicinfo.htm

Loudoun and Prince William counties. As of 2003, Loudoun County was the fastest growing county in the nation, averaging 12.6 percent growth per year. This outer county sprawl directly affects Fairfax County through increased road congestion, changing property values and inefficient use of Fairfax County's infrastructure.

Establishing a community definition of sustainability can focus understanding of the concept. The City of Alexandria has a detailed plan that it is currently executing--it is the model that Reston is currently following. Supervisor Hudgins has pointed to the sustainable communities program developed by the Obama administration. The program livability principles are available at: http://www.sustainablecommunities.gov/aboutUs.html.

Smart growth is the antithesis of sprawl; it can be defined as environmentally-sensitive land development with the goals of minimizing dependence on auto transportation, reducing air pollution and making infrastructure investments more efficient. The Coalition for Smarter Growth lists the following principles for Smart Growth:

- Mix land uses.
- Take advantage of compact building design.
- Create housing opportunities and choices.
- Create walkable communities.
- Foster distinctive, attractive communities with a strong sense of place.
- Preserve open space, farmland, natural beauty and critical environmental areas.
- Strengthen and direct development toward existing communities.
- Provide a variety of transportation choices.
- Make development decisions predictable, fair and cost-effective.
- Encourage community and stakeholder collaboration in development decisions.

Reston and the Orange Line corridor through Arlington are good examples of smart growth.

b. New Urbanism

New Urbanism is a design movement that is going beyond smart growth into community building based on traditional urban centers. New Urbanists strive to improve land use by focusing on walkable communities and town centers.[8] A walkable community reduces the distance between where people are and where they want to go.

[8] Charter of the New Urbanism at: http://www.cnu.org and http://www.cnu.org/charter

An important New Urbanist concept to encourage consistent planned development in a community is called **Form Based Codes**. These codes define an appropriate form of development, that is, how it should look rather than function (for example, how a building looks rather than its use for commercial or residential purposes). Such codes also provide incentives for developers to adopt them. They have been successfully adopted as part of the Columbia Pike revitalization in Arlington County. The community worked through a series of **charrettes** with a planning consultant to create a vision for the new "pike." Form Based Codes provide clear direction on the adopted vision, while incentives encourage developers to adopt the form as the Pike is redeveloped. In particular, developers who follow the codes have an expedited review and approval process.

The county has been adopting the use of **facilitated planning** for many of the special studies. The Tysons Corner Task Force utilized a private consultant, PB Placemaking, to facilitate community sessions. The Urban Land Institute has been assisting with the several other studies.

c. Development concepts

More specific concepts apply to particular situations. **Infill** and **Clustering** are ways to increase density in a neighborhood. Infill is the process of filling in larger lots with multiple or larger housing and is a technique to reduce urban sprawl.[9] Infill development can provide new housing or commercial development on vacant or underutilized sites within developed areas, taking advantage of existing infrastructure. While infill provides increased land utilization, it also has the potential to increase the environmental impact upon the infilled community. Particular concern should be paid to the impacts of infill, such as increased stormwater runoff and heating due to additional impervious surface and loss of tree canopy.

Clustering provides residential development that allows homes to be built close together with the remaining acreage left as open space in perpetuity. Generally, homes are sited on smaller lots, with the remaining land dedicated to open space. In most cases, the density of homes in a cluster development is the same as what would have been built on the entire site; the development is just configured differently. The challenge with clustering is the lack of public trust that the open space will remain open.

Multimodal transportation refers to a transportation strategy that incorporates multiple forms of transportation. Multimodal transportation encourages the use of walking, biking or public transit for transportation instead of the sole use of the automobile. The use of multimodal

[9] Greenbelt Alliance, Smart Infill; Creating More Livable Communities in the Bay Area, at http://www.greenbelt.org/research-news/publications/smart-infill/

transportation involves an increase in the accessibility of all transit options as well as the increase in transportation options.

Transit Oriented Development or Design is another approach to creating walkable, livable communities. TOD encourages increased multi-use density around transit centers. The goal of TOD is to promote walking, biking or transit as a means of getting to work or the store instead of by car. By focusing development around transit centers, ideally communities will have increased transit ridership, less traffic, reduced pollution and a better quality of life.

Transportation Demand Management is typically associated with a TOD proposal. TDM is a plan to reduce automobile trips that cause congestion. Some elements of a TDM plan include easier and safer pedestrian access, local amenities, and shuttle service.

Low Impact Development is an approach that reduces the impact of development on a site. The goal of LID is to better integrate the natural environment with the built environment. LID techniques are intended to mimic an area's natural hydrology to manage stormwater on site, thereby reducing adverse downstream impacts.[10] For example, LID will reduce the amount of impervious surface on a site and reduce the amount of stormwater runoff leaving the site. LID tends to be relatively economical and is flexible enough to be applied to different types of landscapes.

Green Building is another approach to lowering the impact of development by designing structures to conserve resources and using technology that is more efficient. Green roofs can be built with succulent plant gardens that absorb water during rain storms and gradually release it back to dramatically reduce runoff and stream pollution. One of the first green projects in the county was the green roof at the Providence District Supervisor's office.

High Occupancy Toll Lanes are a tool to ease traffic congestion in urban areas. The idea behind HOT lanes is to open High Occupancy Vehicle lanes up to single occupant vehicles that pay a toll. The price of the toll varies, depending on the time of day and amount of traffic. An additional benefit of HOT lanes is that they can provide additional revenue to pay for other transportation improvements[11], such as rebuilding aging bridges over the Beltway.

[10] Low Impact Development Center at: http://www.lid-stormwater.net/background.htm
[11] U.S. Department of Transportation, Federal Highway Administration, A Guide for Hot Lane Development at http://ntl.bts.gov/lib/jpodocs/repts_te/13668.html

2. Macro Considerations

Many decisions in the county that affect land use and transportation are made on a micro level. That is, they affect a single parcel or neighborhood. The macro effect of many small changes has a great impact on the county environment. These macro consequences are lost in the day-to-day planning and construction that happens across the county. As higher densities and infill occur, their effects are cumulative and significant. For example:

- Small neighborhoods with stable environmental footprints are being transformed with larger houses. These newer houses bring additional impervious surface through larger roofs and additional pavement. They also displace trees that protect the parcel with a green canopy, which provides shade, air cleansing and light dampening, and provide haven for birds and wildlife. While the effect of a single home is small, the macro effect on community channels more runoff and pollution into the watershed, increases the ambient temperature and displaces wildlife.

- Large scale development, such as that contemplated by the ongoing special studies, brings additional residential and commercial density to a region. By including all facets of a large scale development impact into a special study, the increased density can be combined with infrastructure investments that improve the community and environment.

a. Understanding Macro Changes

These macro effects are going to become more pronounced with the county build out and change from development to redevelopment. The lessons learned from special studies and from the results of similar projects across the nation need to be incorporated into our planning process. Up to now, regional aggregations and averages were sufficient to predict development impacts. The Concept Map for Future Development, included in the Comprehensive Plan, has done a good job guiding decisions and projecting impact at a broad macro level. Moving into the future, tools are necessary to provide a finer resolution of real time changes that can be quickly aggregated into a macro view.

These new tools should combine the county's geographic information system capability with the existing planning and zoning databases. The data are readily available at a parcel level, but the ability to view the data and use the data to model macro effects is not possible. Understanding and modeling the macro changes happening across the county will help provide insight to the Board of Supervisors and Planning Commission as they deal with micro decisions.

b. Creative approaches

The county also needs to consider creative approaches to address these macro effects. One way to avoid macro consequences is to reduce the impact of micro decisions. For example:

- Modifying the Public Facilities Manual to encourage Low Impact Development can protect streams and mitigate the micro impact of infill development.

- Providing incentives for green roofs can protect streams and decrease heat generation from asphalt roofs. This encouragement will be a win-win for the county and for developers.

- Utilizing Transportation Demand Management plans can mitigate unforeseen impacts of development. The TDM plan included in the Fairlee/Metro West rezoning set the standard for TDM in the county. As this development is completed and fully occupied, the results of the TDM plan will be monitored and adjusted as necessary.

- Continuing to develop comprehensive plans for multi-modal transportation alternatives can reduce transportation impacts of additional density. The pedestrian and bicycle programs are excellent examples of building a long term strategy that can be implemented as opportunities arise.

These creative approaches begin to mitigate micro changes that combine into unexpected and often unintended larger problems.

c. Additional Macro Considerations

The sections above focus on changes caused by development and redevelopment. There are also macro effects generated by non-development changes, such as work patterns, mixed-use opportunities and economic considerations that affect the county environment.

Telecommuting, or **telework**, reduces or eliminates the traditional commute to the office. Teleworkers work from home or at local work centers that provide infrastructure for a community of workers. This reduces pressure on the transportation network without building physical infrastructure. The county has an aggressive telework program in place for county employees.

Mixed-use development brings work, play and home closer together, reducing the distance for trips and commutes. Mixed use is proliferating across the county, providing economic growth with less congestion than traditional separated communities.

Economic factors, such as increasing or decreasing property values, also affect the overall county environment. Low-income residents are struggling to find affordable housing near their jobs in the county and frequently choose to live outside the county. This negatively impacts the transportation system. As property values rise, homeowners choose to expand their residences rather than relocate. As they decrease, the tax base shrinks, adversely affecting such quality of life factors as a healthy environment, excellent schools and functional transportation systems, which may send communities into decline.

The Board of Supervisors has specifically raised **affordable housing** and **infill development** as an environmental concern in its Environmental Vision.

Macro considerations need to be better understood and modeled as the county increases in density. Traditional models did not need to consider macro changes, and the resolution and quality of data is insufficient for planning and protecting the environment. Dealing with the proliferation of small changes across the county will take creative approaches using all available tools, including the Comprehensive Plan, the Public Facilities Manual, special ordinances and public outreach.

B. TECHNOLOGY TO UNDERSTAND THE COUNTY

Fairfax County is a recognized leader in utilizing technology to better understand, explain and predict changes within our borders. The centerpiece of the technology is its Geographic Information System managed by GIS & Mapping Services, which is a branch of Fairfax County's Department of Information Technology. It is tasked with developing, maintaining, coordinating and distributing GIS/mapping data and technology to Fairfax County government agencies and residents. GIS provides a capability to "see" the county through maps, imagery and other geospatial data and helps analysts discover relationships between and among sets of computer-readable, geographically referenced data. To complement the GIS, the county has assembled a comprehensive digital inventory of the 395 square miles within our borders. These investments in information technology and GIS are paying dividends in increased staff productivity using more and better data.

The **Virtual Fairfax** 3-D application is a wonderful example (http://www.fairfaxcounty.gov/gis/virtualfairfax/) of the power of digital technology. EQAC strongly applauds the county for making Virtual Fairfax available to residents on the Internet. Virtual Fairfax has been upgraded to support new enhancements to 3-D building and terrain rendering. Besides being fascinating to fly through our neighborhoods, it is very practical for boards and commissions to visualize proposed changes and make more informed decisions and

recommendations. One new feature includes the inclusion of Tysons Corner comprehensive plan intensity zones.

Another example of Fairfax County success is in providing Internet mapping and information reporting applications is My Neighborhood (http://www.fairfaxcounty.gov/gisapps/myneighborhood/default.aspx) Its intended use is to let users know what features and facilities are available in and around their neighborhoods. Through the My Neighborhood application, you can find information about parks, schools, libraries, fire stations and other public facilities in your neighborhood. Map types allow you to see different layers of information about the same area, and reports contain detailed information about a specific area.

Over the past several years, EQAC has advocated for an enhanced IT capability for managing and monitoring land use. Our original recommendations in this area focused on updating the 1970s mainframe-based Urban Development Information System. In 2005, the Integrated Parcel Lifecycle System debuted--IPLS combines parcel based information from various county agencies with the GIS. Many agencies work on parcels for a particular period, but IPLS allows that full lifecycle to be captured across agencies. Layering these data on the GIS allows for a visualization of how land in the county is used and how it changes over time. Through work with the county's Department of Information Technology, EQAC has become more familiar with capabilities and possibilities for using GIS. There are three attributes that must be in place for the technology to be effective:

- The GIS and IPLS capability—these are the technical systems that gather, move, manipulate and display information based on geographic location.

- Data that are geographically located, also called spatial data—this is an expensive component that needs to be constantly updated as the county changes. There are many sources of data, from aerial imagery to U.S. census data to county records, which need to be transformed into useable information.

- Models and applications that can use the data to prepare for future scenarios and advanced visualization tools to help with decision making. The Visual Fairfax 3-D application is an example that leverages the GIS and data to help make informed decisions.

The next sections cover each of these topics in more detail.

1. GIS and Integrated Parcel Lifecycle System

The IPLS is now available and staff has been doing outreach to train users across agencies on how to leverage the capability. IPLS data are accessible to all county staff via GIS clients (ArcMap) and Oracle clients (SQLplus, Toad, SAS, etc.). The main transformation is that IPLS provides users with GIS data

that can be used for customized analysis. Prior systems would produce a report that summarized the data. This opens new possibilities for understanding and innovating with information.

The current parcel data include:

- Housing Units.
- Households.
- Population.
- Development Pipeline.
- Gross Floor Area.
- Housing Value.
- Existing Land Use.

Data are spatially enabled and can be analyzed with the GIS tools. The information managed by IPLS is used by the county to help determine services and service provision levels, respond to state and federal reporting requirements and respond to regional initiatives such as transportation planning, air quality modeling and other programs of regional significance. One example of the increased resolution the system provides is enhanced demographic forecasts that take advantage of parcel characteristics such as age of structure, location, steepness and other features. County staff can evaluate 30-year demographic forecasts including low, high and "most likely" estimates. Staff is also able to produce reports in a GIS environment using user-defined geographies. Reports can be generated for population density, population forecasts, housing starts and completions, vacant land and underutilized land.

The uses of these data clearly go beyond the scope of EQAC but illustrate the interconnectedness of the systems. EQAC's recommendation was narrowly focused on improving the county's land use planning capability to enable better integration of land use and transportation. It turns out that many other organizations and departments also benefit from this capability.

EQAC commends the Department of Neighborhood and Community Services for its leadership and advocacy on the IPLS. EQAC also congratulates its predecessor agency, the Department of Systems Management for Human Services, on receiving the 2007 GIS Excellence Award for the Best GIS Integration or Application Development.

One of the benefits of tracking information at the parcel level is that very detailed analysis can be accomplished. However this granularity highlights the fact that the existing categories are no longer appropriate, especially as the county adopts more transit-oriented designs that incorporate mixed use development. Parcels in a mixed use development cross categories and parcels with multiple stories of mixed use further complicate simple analyses.

With IPLS in place, the county needs to develop an updated reporting methodology to accurately reflect the land use across the county. IPLS provides a base to analyze parcel information, but there is a considerable task remaining to synthesize that information and turn it into useful land use reports.

2. Data

The GISs are only as reliable as the data they process. The county has acquired significant data and maintains these data on a regular basis. Prior EQAC recommendations focused on enhancing different types of data, and the following in particular:

- Planimetric data—features you can see, such as buildings, driveways, pools, railroads, ponds and trees.

- Oblique imagery—creating three-dimensional images and incorporating them into the planning process.

- Natural Resource data – identification of resources that should be considered during environmental and conservation planning efforts.

a. Planimetric Data

"Planimetric data" are features of the built and natural environment visible in aerial photography, including impervious surfaces. Planimetric map data provide information on the topographic features such as roads, buildings, and water bodies that are visible and identifiable on aerial photographs, which can be compiled into map features through photogrammetric or surveying procedures. Typical map features include roadway feature details as roads, sidewalks, streets, highways and alleys including curb lines, edge of paved surfaces and general feature details such as building footprints, building types, etc.

Prior to initiating a project to update the planimetric data layer, an informal survey of the county's GIS users identified a wide range of needs for updated planimetric data, including public safety, planning, transportation, public facility and park purposes. Therefore, this is far greater than an "environmental" initiative. The implications and benefits of this action are manifold and cut across numerous agency and disciplinary lines.
In 2013, the county completed a four-year effort to update the planimetric data in the county's GIS. The previous update took place in 1997. For this project, 15 planimetric data features, locations, and attributes were updated:

- Airports.
- Buildings.
- Building Additions.

- Hydrography areas and edges.
- Sidewalk centerlines.
- Recreational features.
- Storage tanks.
- Major Transportation areas and edges.
- Minor Transportation areas and edges.
- Contours.
- Spot elevations.
- Digital Terrain Models.

Below are project statistics on features added or updated:

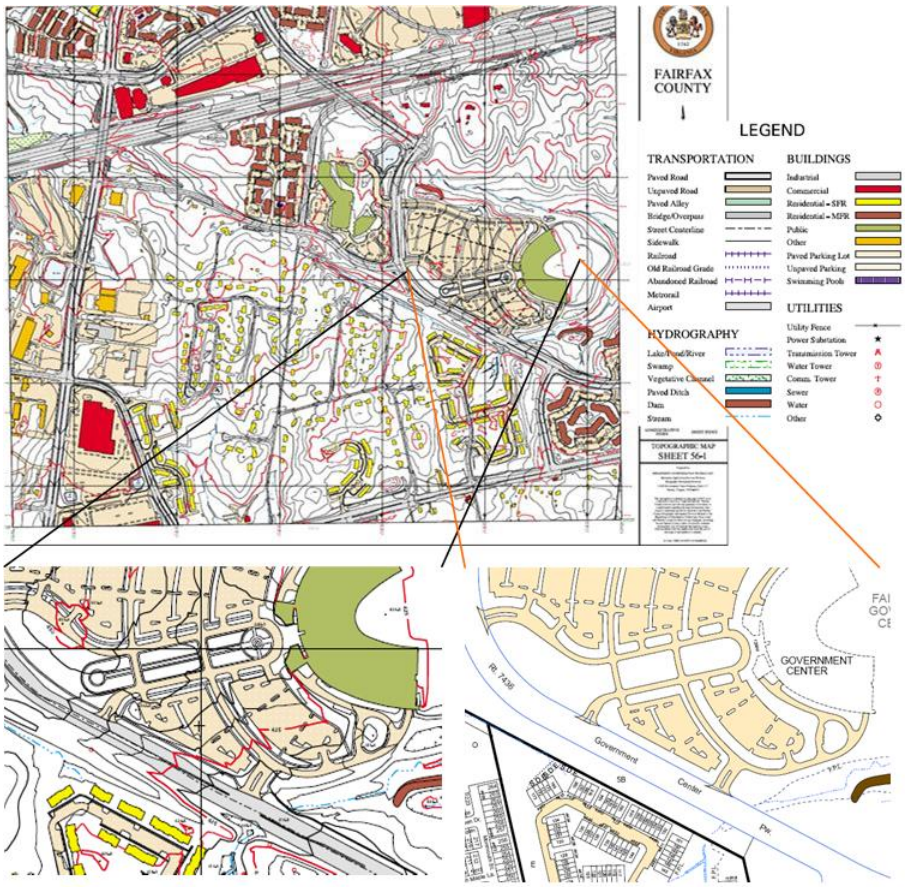
- 120,880 buildings (76 percent are residential)
  - 308 are multi-story garages (new feature)
- 262,851 paved driveways (new feature)
- 5,618 unpaved driveways (new feature)
- 4,083 miles of sidewalks
- 258,229 building additions (deck, patio, pool, other) (new feature)
- 6,300 recreational features (tennis, basketball courts, other) (new feature)
  - 1,318 Tennis courts
- 248,601 new spot elevations
- 136,357 miles of 2' contours (new feature. Previously had 5' contours)
- 5,190 linear miles of hydrography
- 703 storage tanks were added (new feature).

The total features in all the planimetric layers combined (including DTM) is 17,642,802. The 1997 version contained 3,771,137 features.

b. Oblique Imagery

Oblique imagery is taken from an aircraft at an angle rather than straight down. The images can then be processed by software to show the sides of buildings and structures and measure their heights. The primary users of the oblique imagery are agencies such as the Department of Public Works, the Department of Tax Administration and public safety agencies to reduce field time in assessing and planning. Figure II-2 is a sample oblique image of the Government Center. Figure II-3 shows the results of converting these images into 3-D models using the Virtual Fairfax 3-D viewer.

Figure II-1. Planimetric Information—
Fairfax County Government Center



Planimetric data—building outlines, road centerlines, utilities

Map data—streets and addresses

Oblique imagery begins to enable three-dimensional models and can have wide applicability beyond the county operations to public participation. In particular, the reviews of site- and area-specific Comprehensive Plan Amendments can benefit from better understanding three-dimensional areas around sites subject to proposed amendments.

Looking into the future, it could be possible to accept land-use proposals with three-dimensional Computer-Aided Design and Drafting data. The CADD models can be combined with 3-D buildings derived from oblique data to provide accurate 3-D representations of the changes. In effect, the county could begin examining proposals using fly-through technology overlaid on ground truth. This would be much more illustrative than artistic interpretations.

Figure II-2: Oblique Imagery—Fairfax County Government Center

[

Figure II-3: Virtual Fairfax 3-D Model—Fairfax County Government Center

The county has oblique imagery collection in the current information technology plan. There is a new oblique imagery contract in place, replacing the one that expired in August 2012. EQAC recommends that the county continue to gather these data and to expand the use of 3-D analysis in planning.

c. Natural Resource Data

County staff held a series of discussions to determine which agencies currently possess ecological data and whether or not other agencies could utilize various ecological data as a shared resource. These data include Resource Protection Areas, wetlands, vegetative communities, hydric soils, tree cover and open space as well as archaeological and cultural resources. The Fairfax County Park Authority has spearheaded the effort to identify data resources and to develop analysis models to evaluate these data. Once appropriate models and protocols have been developed, they may be used in the future to identify areas that could be targeted for conservation or protection. Currently, the final product of this endeavor is envisioned as a model that will allow county staff to evaluate ecological resources. Also included will be a detailed report listing data sources needed and a plan to consolidate these data and recommendations on the applicability and appropriateness of the model and its limitations.

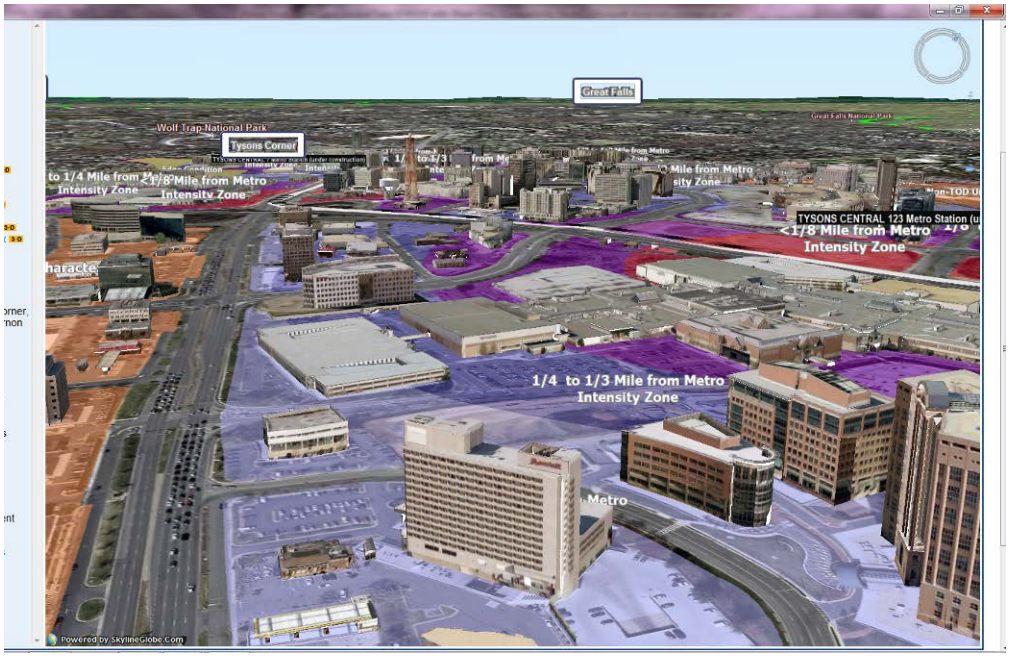
3. Models and Visualization

While the GIS and new data provide valuable insight by which to view the county, they do not necessarily provide new information. Models are computer programs that analyze the data and create reports or projections of future scenarios. The county regularly uses transportation and traffic models to analyze congestion. Some of this information is reviewed in this chapter.

Computer models are complicated and expensive. However their use is becoming more important and expected for the special study planning approaches that are under way. The Tysons Land Use Task force relied on traffic projections for several development scenarios, and the results of these models weighed heavily in the decision to adopt the 2010 Comprehensive Plan for Tysons Corner.

The county made great strides in visualization tools available to the public with the Virtual Fairfax 3-D application. EQAC expects this application to greatly enhance the work of Area Plans Review task forces and encourages all new development proposals to include data sets compatible with Virtual Fairfax. Some sample screenshots of the Tysons Corner area are shown in Figure II-4 below. The second figure shows the proposed new density overlain on the existing conditions. Note that the 2-D screenshots are a poor substitute for the actual 3-D application.

Figure II-4: Virtual Fairfax--Tysons Corner Area



C. LAND USE

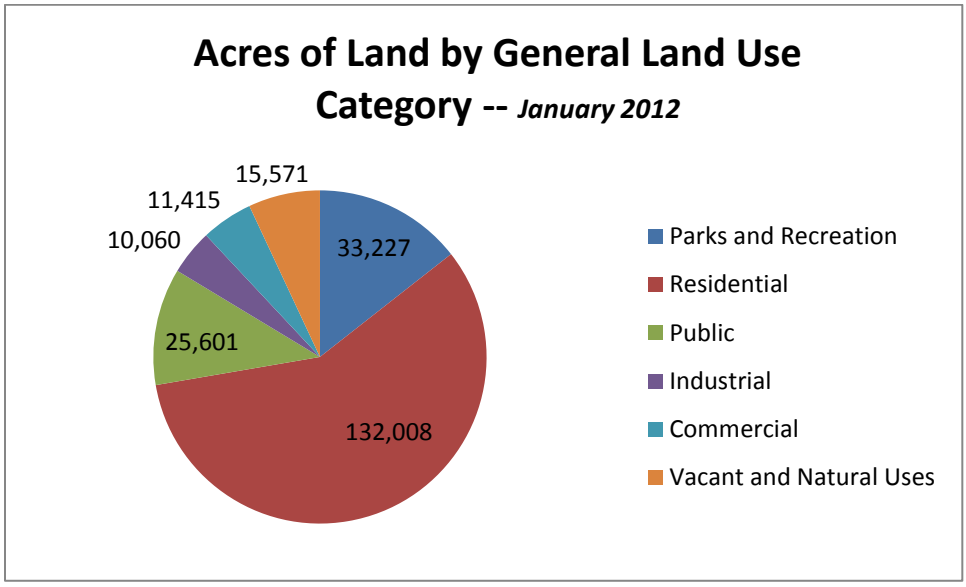
Land Use and Transportation will be examined separately in this and the next section; they will then be discussed with respect to their systemic interrelationships in section E. The information for this section was identified in the Fairfax Forward work program and presented to the public through the *State of the Plan—An Evaluation of Comprehensive Plan Activities Between 2000-2010* and the Plan amendments that updated the Comprehensive Plan and the Concept for Future Development Map.[1] The underlying data are primarily stored in the Integrated Parcel Lifecycle System.

1. How Is Land Used In Fairfax County?

Fairfax County has 227,929 total acres of land, excluding areas in roads, water or small areas of land unable to be zoned or developed. Those acres are organized into the broad categories identified in Figure II-5.

- Residential—acres dedicated to living. Residential acres are measured by the number of dwelling units per acre. For example, a low-density neighborhood has a DU/AC from .1 to .5, a suburban neighborhood ranges from 1-20 and an urban center has a core DU/AC of 35-60.

Figure II-5: Existing Land Uses in Fairfax County



Source: Fairfax County Department of Neighborhood and Community Services, 2012 http://www.fairfaxcounty.gov/demogrph/Lusebut.htm . Note: Land in Towns of Clifton, Herndon and Vienna included. Total acreage figures do not include areas in roads, water or small areas of land unable to be zoned or developed.

[1] Staff Report for Plan Amendment S11-CW-2CP, April 26, 2012

- Commercial/Retail—acres developed for people to work or shop. Commercial space is measured by looking at the Floor Area Ratio, which is the ratio of gross floor area to the size of the lot. For example, an FAR of 0.5 means that a single story building can cover half the lot, a two-story building can cover 1/4 of the lot and a four-story building can cover 1/8 of the lot. FAR does not include other impervious surfaces, such as parking lots.

- Industrial—acres zoned for industrial use. Industrial space is measured by FAR.

- Parks and Recreation—acres dedicated to public enjoyment and recreation.

- Public—acres owned by the public but not for parks or recreation. This includes: Fort Belvoir; Dulles Airport; the campus of George Mason University; county government facilities such as fire stations, landfills, police stations, training facilities, schools and government centers; and other publicly-owned properties.

- Vacant—acres currently unused, either natural or vacant, but zoned for residential, industrial or commercial uses.

2. Land Use Planning

The Fairfax County Comprehensive Plan is required by state law to be used as a guide in decision-making about the built and natural environment. Sections of the Comprehensive Plan are updated periodically to incorporate amendments adopted by the Board of Supervisors. The Web edition of the Comprehensive Plan is the most up-to-date:
http://www.fairfaxcounty.gov/dpz/comprehensiveplan/

Major Plan revisions took place in 1975 and 1991. The 1991 Plan, which was the foundation for the current 2013 edition, was developed around 18 Goals for Fairfax County (a 19th goal was added later). The 2011 edition of the Fairfax County Comprehensive Plan consists of the Policy Plan, four Area Plans, the Plan map, and the Transportation Plan map. The Policy Plan has eleven functional sections plus a Chesapeake Bay Supplement. The functional sections, with links to their websites, are:

- Land Use
- Transportation
- Housing
- Environment
- Economic Development
- Heritage Resources
- Public Facilities

- Human Services
- Parks & Recreation
- Revitalization
- Visual and Performing Arts
- Chesapeake Bay Supplement

a. Concept Map for Future Development

In 1990, the county's Concept Map for Future Development was developed to guide projects. The map was revised in 2012 to reflect changes in the Plan potential and align with amendments since 1990. This updated map identifies 30 mixed-use centers, which are the focus for change in the county (Figure II-6).

Currently, the Policy Plan is reviewed by functional sections. The Parks and Recreation section was reviewed in 2003. The Transportation Section was reviewed in 2005 with recommendations presented in 2006. A comprehensive review of the complete Policy Plan is not anticipated in the future due to the overall complexity of the complete document.

b. Area Plans Review

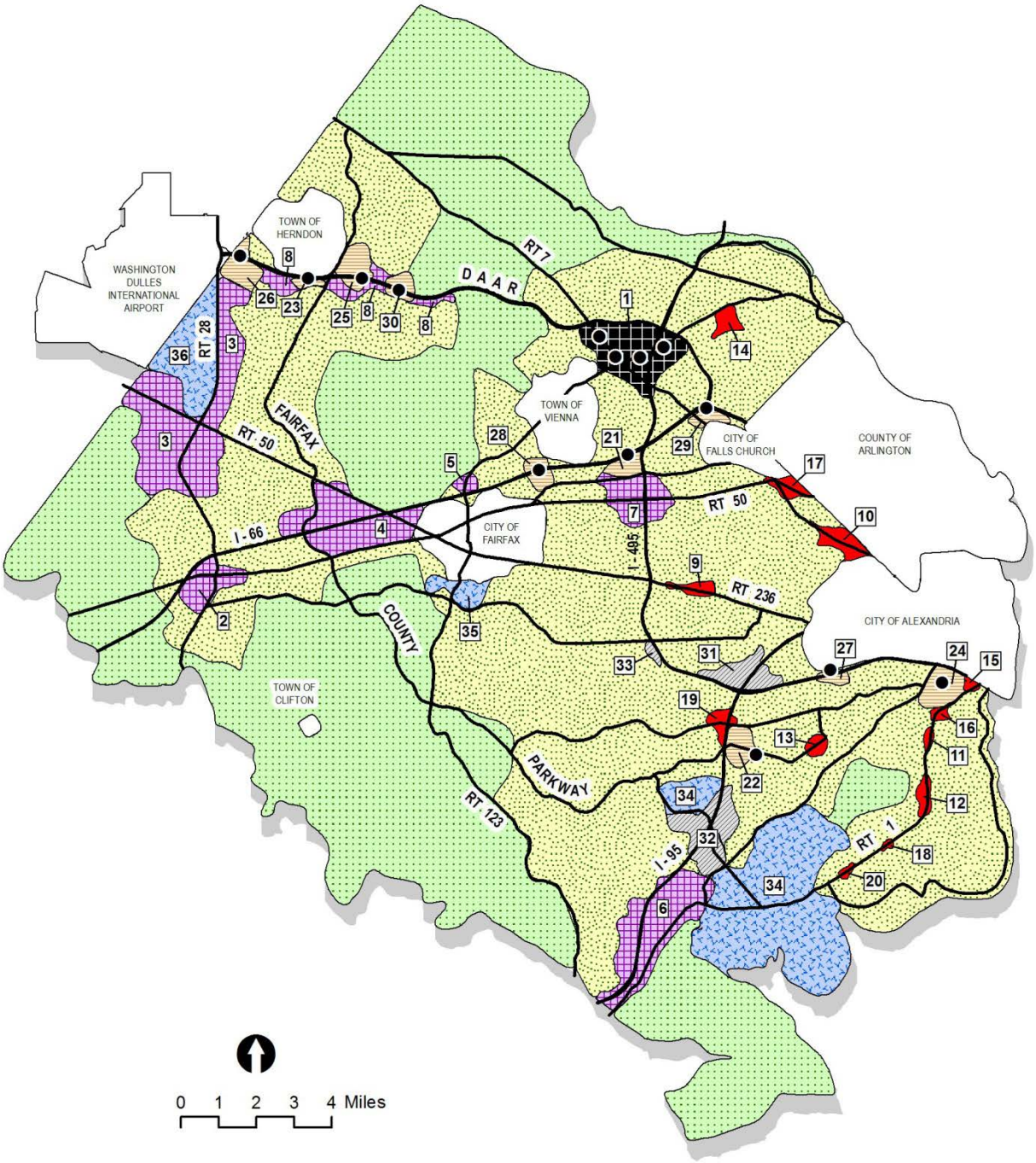
The Area Plans Review process, which has been supplanted by the Fairfax Forward effort (see the discussion below), was a community-wide review of site specific changes proposed to the Area Plan volumes of the Comprehensive Plan. The APR process was organized by the supervisor districts.

The APR task force for each district was appointed by the district supervisor. Each task force reviewed proposed changes at a public meeting and submitted a recommendation to the Planning Commission. This was accompanied by a staff recommendation that may or may not have concurred with the task force recommendation.

APR nominations spanned the county. Whereas the plans for Urban Centers, Suburban Centers and Transit Station Areas are comprehensive in scope, the APR nominations were opportunistic. Each nomination was analyzed thoroughly by staff to consider factors such as impacts on transportation, education and environmental resources of the individual nominations. The cumulative effects--the macro considerations, however, were not analyzed.

Such a concern was the motivation to defer nominations in Tysons Corner and appoint a task force to look at comprehensive changes.

Figure II-6: Concept Map for Future Development



CONCEPT FOR FUTURE DEVELOPMENT MAP

LOCATIONS OF MIXED-USE CENTERS

Urban Center
1. Tysons Corner

Suburban Centers
2. Centreville
3. Dulles (Route 28 Corridor)
4. Fairfax Center
5. Flint Hill
6. Lorton-South Route 1
7. Merrifield
8. Reston-Herndon

Community Business Centers
9. Annandale
10. Baileys Crossroads
11. Beacon/Groveton
12. Hybla Valley/Gum Springs
13. Kingstowne
14. McLean
15. North Gateway
16. Penn Daw
17. Seven Corners
18. South County Center
19. Springfield
20. Woodlawn

Transit Station Areas
21. Dunn Loring
22. Franconia/Springfield
23. Herndon-Monroe
24. Huntington
25. Reston Parkway
26. Route 28/CIT
27. Van Dorn
28. Vienna
29. West Falls Church
30. Wiehle Avenue

LOCATIONS OF LARGE INSTITUTIONAL AND INDUSTRIAL AREAS

Industrial Areas
31. Beltway South
32. I-95 Corridor
33. Ravensworth

Large Institutional Land Areas
34. Fort Belvoir (Main Post and North Area)
35. George Mason University
36. Washington Dulles International Airport

LEGEND

- Tysons Corner Urban Center
- Suburban Center
- Community Business Center
- Transit Station Area
- Industrial Area
- Large Institutional Land Area
- Suburban Neighborhood
- Low Density Residential Area
- Major Road
- Metro Station

The northern portion of the county, which includes Dranesville, Hunter Mill, Providence and Sully districts, was reviewed in 2009. The South County APR was reviewed in 2010.

c. Fairfax Forward

EQAC's 2012 *Annual Report on the Environment* recommended that "the county prioritize the Fairfax Forward Work Plan" and that "the county establish a stakeholder task force to work with the Fairfax Forward team to build familiarity and support for the new approach." This recommendation has been addressed, although through a different means than that suggested by EQAC last year.

On July 9, 2013, the Board of Supervisors adopted the Fairfax Forward process to supplant the previous Area Plans Review process. The centerpiece of this new process is a Comprehensive Plan Amendment Work Program through which current and future planning studies will be considered. The initial three-year work program that was adopted by the board is considered to be a "Pilot Comprehensive Plan Amendment Work Program." A multi-year calendar identifies planning activities that are contemplated beyond the three-year work program; this calendar will help inform future reviews of the work program. Per the board's action on July 9, there will be a review, after two years, of the efficiency, effectiveness, accessibility and impact of the new process and the pilot work program.

While the Area Plans Review process for consideration of amendments to the Comprehensive Plan is no longer available, the new process continues to provide the Board of Supervisors with the option to authorize the consideration of amendments that are not identified on the work program. This process will also be reviewed after two years.

The process leading to the adoption of Fairfax Forward included considerable public outreach efforts. While a stakeholder task force was not established, the extensive outreach efforts that were pursued ensured that there was ample opportunity for all interested parties to gain an understanding of, and contribute to, the development of the work program. Public outreach included community meetings (generally one in each supervisor district) at significant milestones in the process. Staff also met with: Planning Commission members; the Planning Commission's Policy and Procedures Committee; members of the Board of Supervisors; and board-appointed advisory committees, including EQAC and the Community Revitalization and Reinvestment Advisory Group. A community focus group met in May 2013 to discuss public outreach in the new process and will be convened in the future to continue work on this topic. Information about Fairfax Forward was made available, and continues to be available, at the Fairfax Forward website (www.fairfaxcounty.gov/dpz/fairfaxforward),

and resources were made available for any interested party to submit comments electronically through the website and email (DPZFairfaxForward@fairfaxcounty.gov).

The adopted Comprehensive Plan Amendment Work Program and Estimated Long Term Plan Review Schedule are available for review at www.fairfaxcounty.gov/dpz/fairfaxforward, as is additional information about Fairfax Forward.

d. Recent Special Studies and Selected Amendments to Area Plans

Plan Amendments that have been recently adopted by the Board of Supervisors can be found at http://www.fairfaxcounty.gov/dpz/comprehensiveplan/planadopted.htm.

e. District Planning Processes

Several supervisor districts have advisory boards or committees to advise on changes to the Plan within the district. One of the most unique is the Lee District planning process that has been in place since 1976. This interjects a step before the public hearing at the Fairfax County Planning Commission. All land use cases (rezonings, special exceptions and changes to the Comprehensive Plan) are presented to the Lee District Land Use Advisory Committee. The committee asks questions, makes comments, etc. When all the information is available, the committee votes to either recommend approval or denial of the application. The Lee District Planning Commissioner participates in these meeting and typically supports the committee decision at the Planning Commission public hearing.

3. Land Use History and Buildout Projections

The Comprehensive Plan contains land use recommendations for all of the land in the county. When the concept plan was conceived in 1990, there was a significant amount of vacant land, so it could address changes across the county. That vacant land has been steadily decreasing as shown in Table II-1. In 2012, with only approximately 6.2 percent vacant and much of that fragmented, the decisions are much more constrained. Significant planning changes require decisions that will most likely affect existing developed land.

4. The State of the Plan, 2000-2010

The aggregate acreage available in the county is relatively constant, with occasional changes as land is converted to other uses, such as roads and drainage ponds. The Comprehensive Plan capacity, however, is constantly increasing as new density is allocated across the county. This occurs primarily by increasing the Floor Area Ratio and allowing higher buildings to be built that have additional capacity in the same acreage.

Table II-1 Vacant Land in Fairfax County			
Year	**Vacant Land (acres)**	**Total Planned Land (acres)**	**Percent Vacant**
1980	75,550	234,744	32.2 percent
1985	66,685	232,941	29.2 percent
1990	45,042	230,678	19.5 percent
1995	37,006	229,366	16.1 percent
2000	29,529	228,541	12.9 percent
2007	17,117	228,240	7.5 percent
2010	14,943	227,228	6.6 percent
2012	13,972	226,991	6.2 percent

Source: Fairfax County Department of Systems Management for Human Services (IPLS), 2007 and Fairfax County Department of Neighborhood and Community Services, 2010 and 2012

Planned land does not generally include public roads and water

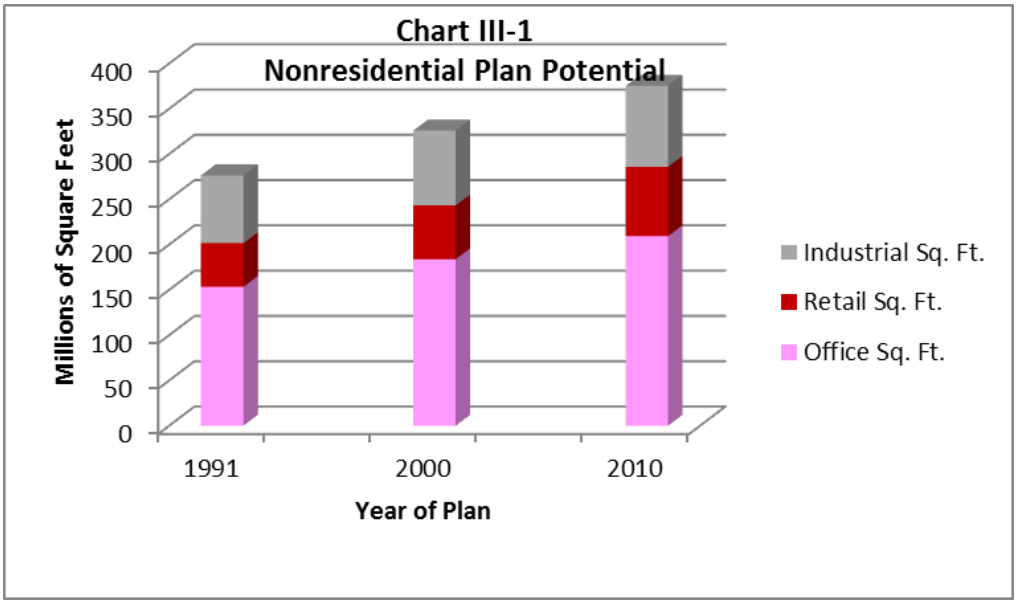
Note: Some of the decrease in vacant land between 2000 and 2007/2010/2012 is due to a change in the definition of vacant land. Areas previously classified as vacant but owned by tax exempt entities such as houses of worship and private schools are no longer included as vacant land.

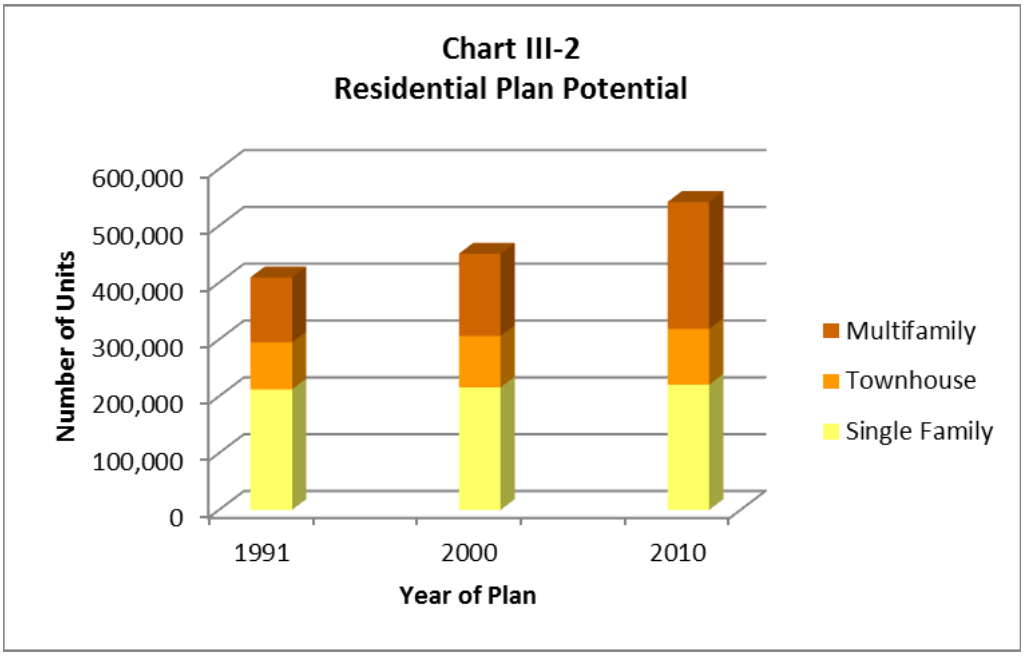
In 2012, the county published a comprehensive review of changes to the Plan over the past 10 years. The study notes that "Between 2001 and 2010, there were a total of 284 amendments adopted to the Area Plans. Of these, 221 or 78 percent were located in the county's activity centers." As changes are made to the Plan, the key metric available for growth is the ***Plan potential***. This tracks the amount of space that can be built. The increase over the past 20 years is shown in Figure II-7. With the observation that the county is close to build-out, with only 6.2 percent vacant space available, the Plan potential increases through redevelopment that allows bigger and taller buildings that are closer together. In the residential sense, this means more multi-family complexes. In the nonresidential space, it means higher office buildings with multiple uses.

As part of the State of the Plan review, the authors identified several themes that emerged from all 284 Plan amendments. These themes are:

1. *Encouragement of Intensity and Land Use Flexibility in Mixed Use Centers.*
2. *Protection of Low Density Residential Neighborhoods.*
3. *Avoid Re-Planning Industrial Areas.*
4. *Expansion of Medical Facilities.*
5. *Revision of Policy Plan Regarding Acquisition of Land for Public Parks.*
6. *Environmental Policy Issues in Area Planning Process.*

Figure II-7: Nonresidential and Residential Plan Potential





Source: *State of the Plan—An Evaluation of Comprehensive Plan Activities Between 2000-2010.*

The themes and trends clearly show that Fairfax County can continue to grow and accommodate new population and businesses into the future. But as we grow, important values are reflected in how and where that growth occurs. The most valuable areas for growth are mixed-use centers. These have been identified in the plan and infrastructure has been planned to support these areas. At the same time, we are focused on protecting residential neighborhoods. The ability to have high density development in close proximity to low density

residential is an emerging pattern that is very effective when planned near Metrorail stations. The area most adjacent to the Metrorail stations is ideal for high density. Surrounding neighborhoods have the advantage of a vibrant neighborhood that is nearby while residents of high density developments can adopt a more urban lifestyle that has amenities and opportunities within walking distance. Examples of this pattern are nearby in the Arlington Orange Line corridor, but they are also happening in Fairfax County.

Industrial and medical themes highlight different priorities. Medical services are desired by the population as it grows both in number and age. Industrial areas are important to support the infrastructure; these include landfill, quarry and other uses. By focusing development in the mixed use areas, it is possible to maintain industrial uses in the face of increasing Plan potential. The amendments to the Plan allow industrial uses to be viable as growth continues, without many of the conflicts that happen when residential uses encroach on industrial areas, which otherwise would force industry to relocate further out.

Parks and environmental themes reflect the value that the residents place on these resources. The Fairfax County Park Authority has and deserves a place in comprehensive planning. Among the important environmental initiatives over the past 10 years were the adoption of the county's watershed management plans and the augmentation and clarification of the Environmental Quality Corridor policy to preserve ecologically sensitive habitats.

5. A Fairfax County Example: Merrifield Suburban Center

The Merrifield Suburban Center is just starting to emerge as a vibrant transit-oriented place in the county. An EQAC member who is a co-author of this chapter used to live near the Gallows Road and Lee Highway intersection; he reports that the changes in Merrifield have created a new destination, a new place that he looks forward to visiting. The area boasts a new urban scale Target store (the nation's first with a fourth floor) that is surrounded by a new arts-focused movie theatre, bubbling fountains and retail shops.

The transition from a sleepy intersection to a transit oriented center has, however, been a long journey. After several uncoordinated amendments were passed in the 1990s, a visioning workshop was convened on June 10, 1998, followed by a formal task force that created the Merrifield Concept of Future Development. Over the next 14 years, this vision was doubted and debated, but over time it gained momentum and has persevered. Merrifield, like all suburban areas, has unique challenges and, in this particular case, significant advantages, including:

- A Metrorail station that serves as the as the infrastructure foundation for the area. The value of a Metro stop cannot be overstated as an anchor for a new suburban area.

- Close proximity to the Beltway and U.S. Route 50 to augment the transit anchor.

- A committed district and supervisor (actually two supervisor champions over the 14 years) with commitments to the long term vision.

- Large property tracts that are the basis for large scale projects. Other areas face fragmented land ownership that requires additional cooperation.

- Development of a street grid. This is essential to build the urban connections and cross connections between parts of the community.

These challenges and advantages have combined to create a transformed place with new residents and amenities. The lessons of Merrifield should be captured to help repeat this success across the rest of the county.

D. TRANSPORTATION

This section examines transportation, transportation decision making in Fairfax County, and significant transportation trends and projects. Discussions of transportation and the environment typically start with automobiles and the negative environmental impacts of cars. As congestion and density increase, however, single occupancy cars cannot be packed densely enough to move everyone about effectively. This is happening in Fairfax County, where the transportation discussions are increasingly focused on multi-modal and public transit options that provide a better balance of options suited for particular needs.

The transition towards multi-modal and public transit options brings many environmental improvements. They include: reducing air pollution caused by automobiles and traffic congestion; reducing water pollution caused by roadway and parking lot runoff and construction; reducing noise pollution caused by on-road vehicles; reducing energy consumption required to operate motorized vehicles; and the healthy sensation of personal mobility.

Since 1999, there has been a procession of large transportation projects (the “mega projects”) across the county. The Wilson Bridge replacement was the first mega project, followed by the I-95/I-495/I-395 “mixing bowl,” then the combination of the Silver Line Metrorail extension and the I-495 Express Lanes. The mega-transportation projects are expensive, designed for a long time, and impact many constituents. The agencies responsible for building the mega projects have delivered them on time and budget with the promised improvements in both capacity and safety.

These mega projects, however, need to be balanced with regular maintenance of the existing infrastructure. An important policy identified by the Coalition for Smarter

Growth is "fix-it-first," to ensure that all state maintenance needs are met and to direct funding to fixing problems on existing roads and transit prior to funding new construction.[13] This policy highlights the competition among transportation funding priorities. Projects that were once new require ongoing maintenance. New projects need to be judged by their ability to enhance the existing network and to maximize their potential to support comprehensive plans for the growing into the future. Some of these factors include:

- Does the project address an engineering necessity, such as the Wilson Bridge replacement?
- Does the project fix a design or congestion problem, such as the mixing bowl and changes to the I-66/I-495 interchange?
- Does the project add capacity to the core of the network, such as the Beltway express lanes and the Silver Line?
- Does the project encourage or induce new development, such as the original Beltway and Dulles Toll Road that focused new growth further out in the county.

Induced development is an important concept, especially as the county addresses redevelopment and buildout. Induced development happens when transportation capacity is added to an undeveloped area and consequently encourages growth in that area. In Fairfax County, the objective is to increase density in the mixed use centers, not to add new growth to stable areas outside of the growth centers. This means providing transportation options and dense networks like a street grid that allow better flow within the centers. By aligning transportation and land use, the system becomes more efficient and effective.

Many resources illustrating a move towards multi-modal transportation projects and principles are available:

- Wiehle Avenue/ Reston Parkway Metrorail Station Access Management Study: http://www.fairfaxcounty.gov/fcdot/sam_study.htm.
- Tysons Station Access Management Study.
- Fairfax Connector ten year Transit Development Plan (which serves as the main guide for service expansion and changes in Fairfax County): http://www.fairfaxcounty.gov/fcdot/tdp.htm/.

[13] http://www.smartergrowth.net/news-parent/press-releases/joint-statement-in-support-of-a-fix-it-first-jobs-first-sustainable-stimulus/

- The Countywide Transit Network Study is looking future transit needs for the entire transit network, connecting present/future destinations and determining what type of transit best serves different areas: http://www.fairfaxcounty.gov/fcdot/2050transitstudy/.

- A seven-minute video presentation has been prepared on sustainable transportation in Tysons. http://www.youtube.com/watch?v=4xAPeDF5veo&feature=youtu.be

Resources listing important trends and experiences from other jurisdictions are also available:

- The Institute of Transportation and Development Policy has created a scoring system to rate Transit Oriented Development: http://www.itdp.org/library/publications/the-tod-standard-draft .

- Fairfax Advocates for Better Bicycling is focusing on the need for good bicycle infrastructure in mixed-use, transit-oriented developments. The county is going through a difficult transition, in that it is promoting this type of development in the context of big suburban roads. A prime example is the Mosaic District surrounded by Lee Highway and Gallows Road. Both of these roads are not friendly for pedestrians or bikes. http://www.fabb-bikes.org.

- The National Complete Streets Coalition has provided a wealth of information regarding the complete streets concept. http://www.smartgrowthamerica.org/complete-streets

1. How do People and Things Move About Fairfax County?

There are numerous options for people and things to move about the county.

- Private, motorized transportation is one of the most significant elements of transportation that has a major effect on the environment and is most closely related to land use and development. In modern times, people have become more reliant on the use of automobiles for business, pleasure and various daily functions and activities. The urban sprawl that has been experienced in Fairfax County and outer suburbs has greatly influenced this problem, causing major congestion on roadways, particularly during rush hour as many individuals are commuting long distances to and from their jobs.

- Rail and bus transit via Metro and connector services has long been looked upon as a means of reducing traffic congestion and thereby creating a positive impact on pollution and air quality. It also has a direct relationship to land use planning and development because rail transport centers are ideal locations for business and housing developments. Bus traffic includes school buses, most of which are transporting students during rush hour periods.

- Commercial vehicular transportation, mainly trucks and buses, are another serious factor impacting the environment. Trucks, whether they are local, inter-county or interstate, are serious contributors to the environmental crisis. In addition to many of them using "dirty" diesel fuel, they also have a negative impact on traffic congestion.

- Non-motorized transportation opportunities, namely walking and biking, have been looked upon as viable alternatives for reducing traffic congestion and improving air quality. Not having sufficient infrastructure for walking and biking is a major impediment to expanding non-motorized options. Over the past several years, these options have started to become more common in urban areas, notably in the District of Columbia. This component has an important relationship to land use planning and development in order to ensure that adequate facilities (walking and biking trails) are included in the plans.

- "Virtual transportation" has surfaced in recent years as another viable alternative to motorized transportation. Modern technology has created opportunities for people to work out of their homes, using computers for telecommuting and e-commerce to perform their jobs. If these techniques become a more widely accepted means of performing one's job, it would have a significant positive impact on reducing pollution and improving air quality. Fairfax County is a leader in this field with the Fairfax County Government Telework Program.

While there are many options, they are not equally utilized. The U.S. Census tracks the modes used by people to get to work each day. The 2011 data show that of the 580,430 workers, 16 years and over, who live in Fairfax County:[14]

- 73.4 percent drove alone to work in a car, truck or van. (single-occupant vehicles)
- 8.9 percent of those workers commuted via carpool or vanpool. (high occupancy vehicles)
- 9.9 percent used Public Transportation (excluding taxicabs).
- 1.8 percent walked to work.
- 1.1 percent used other means.
- 4.8 percent worked at home. *(This number may not fully represent the true number of teleworkers in Fairfax County.)*

[14] *Source: 2011 American Community Survey 1-year estimate. Area: Fairfax County.*

Across all modes, the mean travel time to work is 32.9 minutes. The Metropolitan Washington Council of Governments has noted [1]:

> *"Nearly three-quarters of Fairfax County resident workers commute to work by driving alone, compared to 68 percent of the Washington region's workers. Seven percent of Fairfax County's resident workers use public transportation, compared to 11 percent of the Washington region's workers. Thirteen percent of resident workers of both Fairfax County and the Washington region use car pooling as a means of transportation to their jobs.*
>
> *Of the 350,714 owner-occupied housing units in Fairfax County, 4% (14,207 housing units) do not have vehicles. For renter-occupied housing units, approximately 9% do not have vehicles."*

An interesting statistic on commuter patterns is that over 50 percent of the residents in Fairfax County work in Fairfax County (see Table II-2), with another 16 percent working in the District of Columbia. Similarly, most of the workers in Fairfax County live in Fairfax County (see Table II-3); however over 80,000 workers commute to jobs in Fairfax County from Prince William and Loudoun counties. Only 12,000 workers commute to the county from the District of Columbia.

Table II-2
Where Do Residents of Fairfax County Go to Work?

Workplace	Number of Commuters from Fairfax County	Percent of Total Commuters from Fairfax County
Fairfax Co, VA	302,425	54.76%
District of Columbia	90,207	16.33%
Arlington Co, VA	48,242	8.74%
Alexandria City VA	31,716	5.74%
Montgomery Co, MD	16,722	3.03%
Loudoun Co, VA	21,041	3.81%
Fairfax City, VA	17,904	3.24%
Prince George's Co, MD	9,948	1.80%
Prince William Co, VA	9,620	1.74%
Falls Church City, VA	4.446	0.81%

Source: http://www.census.gov/population/metro/data/other.html -- Residence County to Workplace County Flows for the United States and Puerto Rico Sorted by Residence Geography: 2006-2010

[1] *Source: January 2006 publication "Fairfax County and the Washington Region: A Look at Economic and Demographic Characteristics" (p.5)*

Table II-3 Where Do Workers in Fairfax County Come From?		
Residence	**Number of Commuters to Fairfax County**	**Percent of Total to Fairfax County**
Fairfax Co, VA	302,425	58.32%
Prince William Co, VA	55,692	10.74%
Loudoun Co, VA	55,044	10.61%
Montgomery Co, MD	21,585	4.16%
Arlington Co, VA	22,064	4.25%
Prince George's Co, MD	17,861	3.44%
Alexandria City, VA	15,028	2.90%
District of Columbia	12,777	2.46%
Stafford Co, VA	8,005	1.54%
Fauquier Co, VA	5,542	1.07%
Manassas City, VA	2,528	0.49%
Total	518,551	100.00%
Source: *Residence County to Workplace County Flows for the United States and Puerto Rico Sorted by Residence Geography: 2006-2010*		

Electric Vehicles

Electric vehicles offer an alternative to traditional gasoline vehicles. In August 2011, the MITRE Corporation, per a proffered commitment to sustainability-related work for the benefit of Fairfax County, completed a report titled "Electric Vehicle Charging Infrastructure Recommendations to Fairfax County." The report included several recommendations, with a particular focus on electric vehicle charging-related opportunities associated with redevelopment in Tysons Corner. The MITRE report was transmitted to the Board of Supervisors, which, in turn, referred the report to the Planning Commission for its review and recommendation.

Per that report, *"Plug-in vehicles feature prominently in the vision for a livable, sustainable Tysons Corner. They promise cleaner, quieter transportation that is less dependent on the political stability of other parts of the world, but they come at the price of being a fundamentally different way of powering the automobile fleet. Charging will largely be done over long periods of time at distributed locations, rather than at particular fueling stations. As Tysons Corner evolves from a suburban office park to an urban center, the evolution to an electric automotive fleet will affect urban layout, building design, and utility services."*

The report recommends that the county encourage developers to build the infrastructure to support electric vehicle charging, then phase in the actual devices and parking reservations as the technology becomes accepted.

2. Transportation Decision Making

Fairfax County's transportation decisions are complicated by the interrelationships of federal, state, regional, sub-regional and local entities involved in transportation planning and funding. Local initiative in addressing transportation needs is further limited because the Commonwealth of Virginia owns and maintains every public road in the county, even subdivision cul-de-sacs. These roads are maintained by the Virginia Department of Transportation.

In 2013, a new transportation funding plan was approved in Virginia. This action increased funding for transportation from an additional $392 million in FY 2014 to $817 million in 2018, for a total of almost $3.3 billion. In addition, the regional funding has been provided for Northern Virginia ($1.6 billion over five years) and Hampton Roads ($1.1 billion over five years). In Northern Virginia, 30 percent of funds go to localities and 70 percent of funds are for regional projects approved by the Northern Virginia Transportation Authority. Funds can be used for road construction, projects that reduce congestion and public transportation projects that expand capacity.

In Virginia, the **Commonwealth Transportation Board** has final approval authority over the six-year transportation program for the entire state. Under guidance of the CTB, the Virginia Department of Transportation is responsible for building, maintaining and operating the state's roads, bridges and tunnels.

The **Northern Virginia Transportation Authority** is charged by the Virginia General Assembly with preparing a regional transportation plan for Northern Virginia, including transportation improvements of regional significance. NVTA published TransAction 2040—Northern Virginia Transportation Plan, November 2012[16] with the following goals:

- Provide an integrated, multimodal transportation system.
- Provide responsive transportation service to customers.
- Respect historical and environmental factors.
- Recognize the linkage between transportation and land use.
- Incorporate the benefits of technology.
- Identify funding and legislative initiatives needed to implement the Plan.
- Enhance Northern Virginia relationships among jurisdictions, agencies, the public, and the business community.

[16] http://www.thenovaauthority.org/trans2040overview.html

The goals require balancing of various interests, but the priority of multi-modal systems and respecting environmental factors highlights the importance of integrating transportation with land use and environmental quality.

A further description of the interplay of planning and funding of projects between agencies in the metropolitan Washington area can be found in "A Citizens Guide to Transportation Decision-Making in the Metropolitan Region," (May 30, 2008), which is available from the Transportation Planning Board of the Metropolitan Washington Council of Governments.[17]

For Fairfax County, the transportation goals are included in, and promulgated through, the Fairfax County Comprehensive Plan. Those projects that are to be funded by county resources are included in the county's Capital Improvement Program. However, transportation projects that are to be funded through state and federal funding are included in the Virginia Department of Transportation's six-year transportation program.

The Fairfax County Department of Transportation is re-starting the "County Dialogue on Transportation" to get public input regarding the transportation projects now that state funding is available. Currently, there are several public meetings to be scheduled at which a list of projects for consideration, along with an information sheet for each project, would be discussed. It is likely that there will be an on-line survey provided. FCDOT intends to present a report and program recommendation to the Board of Supervisors' Transportation Committee for discussion.

a. Urban vs. Rural standards

An example of decision making can be seen in the designation of urban street standards and applying them in county urban centers. EQAC supported such a principle in a formal memo earlier in 2013 (see Appendix B of this report). Overall, the community has been advocating for a series of improvements that include narrower lanes, pedestrian/bicycle paths on either side of the road, tree buffers between the street and path, reduced speed limits and safe crossings. The county has had success using road diets, which slim down roads to make them more appropriate for urban traffic. These were implemented on Lawyers Road in Reston.

The Virginia Department of Rail and Public Transportation has developed statewide guidelines for multi-modal planning and design at the regional, community and corridor scales.[18] The guidelines are now in final draft form and can be downloaded from DRPT's website at: www.drpt.virginia.gov/activities/MultimodalSystemDesignGuidelines.aspx.

[17] http://www.mwcog.org/store/item.asp?PUBLICATION_ID=82

Correspondence from William C. Cuttler, PE, VDOT District Construction Engineer, 7/9/13

Fairfax County staff has been meeting with VDOT and with DPRT for the past 13-14 months to develop formal urban street standards. VDOT created an appendix to its road design manual that will adopt state-wide urban design standards. Concurrently, DRPT is working towards adoption of its Multimodal System Design Guidelines. VDOT is adopting the DRPT guidelines into the Road Design Manual by reference. The county is developing its multimodal system map and identifying urban activity centers in accordance with the draft DRPT guidelines. The end result will be a multimodal system plan for Fairfax County that will be reviewed by DRPT and approved by VDOT; this plan will allow for implementation of the VDOT Road Design Manual urban design standards for areas that qualify as urban activity centers per the DRPT guidelines. This work is expected to be completed by early 2014.[19]

b. Comprehensive Transit Plan/Transit Development Plan[20]

In 2008, Fairfax Connector completed a ten year Transit Development Plan, which has served as the main guide for service expansion and changes in Fairfax County. Fairfax Connector is currently working on the follow up document, which will be heavily affected by the changes in the Dulles Corridor (Reston, Tysons, and Herndon) and growing population in the southern portion of the county.

In February 2013, FCDOT released a Request for Proposals for the Comprehensive Transit Plan, a five-year update to the 10-year aspirational TDP. The RFP included the development of a financially-constrained six-year TDP as required by the Virginia Department of Rail and Public Transportation, as well as the development of an updated compliance program to meet the revised Title VI compliance requirements released in October 2012 by the Federal Transit Administration. FCDOT recommended awarding the contract to the team led by TranSystems, Inc. and a purchase order was issued in June 2013. The CTP/TDP update will include:

- Data collection: Review relevant prior and current studies; collect and analyze current operating data; collect and analyze stop-by-stop bus boarding and alighting counts.

- Public opinion research: Conduct on-board passenger attitudinal survey; conduct telephone survey of county residents, primarily non-users of bus service; utilize other research tools such as focus groups.

[19] Transportation Information for EQAC 2013, Kris Morley-Nikfar, FCDOT & Updated June 8, 2011, Dan Southworth, FCDOT
[20] Ibid

- Public outreach: Conduct meetings with elected officials; conduct meetings with public advisory groups; conduct meetings with local civic, business and residential groups; conduct meetings with the general public; maintain the project Web page on the county website; utilize other Web-based tools.

- Service recommendations: Review service changes since completion of 2009 FCDOT TDP; review performance of current services; recommend changes to current services as appropriate; recommend new services as appropriate.

- Capital project/asset recommendations: Review current capital projects and assets; recommend new capital projects and assets to support service recommendations.

- Implementation plan and TDP: Develop a financially constrained implementation plan for service and capital recommendations; draft the TDP for DRPT based on DRPT requirements.

- Updated Title VI Compliance Program: Develop a revised Title VI program for Fairfax Connector that would comply with new FTA guidance in this area.

3. Non-motorized and Public Transportation[21]

The following sections describe FCDOT programs related to multimodal and public transportation.

a. Walking – the Pedestrian Program

The board has directed FCDOT to lead the effort to improve bicycle and pedestrian safety and mobility, including constructing bicycle and pedestrian improvements in high-priority areas of Fairfax County.

Fairfax County's Pedestrian Program was started in 2002, following a spike in pedestrian fatalities. Through FY 2016, the board has designated over $110 million in federal, state and county funding to construct over 300 high-priority bicycle and pedestrian improvement projects throughout the county. These include projects on major roadways, in activity centers, providing access to Metro stations and completing neighborhood missing links. From FY2008 through FY2013, the county has completed construction on 92 sites/segments; nine are under construction and another 70 are under design.

[21] Ibid

Major sidewalk projects are complete along Route 1, Route 29 and Route 236. Pedestrian intersection improvements are complete along Route 7, Route 28, Route 29, Route 50, Route 123, the Fairfax County Parkway and Old Keene Mill Road. Pedestrian and bike access are being constructed on most of the bridges crossing the I-495 Express Lanes project and will improve some of the worst barriers to pedestrian and bicycle movement in Fairfax County.

The Pedestrian Program also has a role in pedestrian education and outreach in Fairfax County. Fairfax County is the local government funding leader for regional Street Smart Pedestrian and Bicycle Safety Media campaigns, which have used television, radio, print and bus advertising to promote safety awareness responsibilities of drivers and pedestrians. The Pedestrian Program Manager, Bicycle Program Coordinator, Bus Stop Coordinator, Pedestrian/Bicycle Planner and Pedestrian Outreach Coordinator are all involved in community outreach. The Fairfax County Department of Transportation coordinates with other facility resources and departments as appropriate.

The Fairfax County Police Department conducts pedestrian safety enforcement in high pedestrian crash areas countywide. In addition, Fairfax County is one of the few jurisdictions in Virginia permitted to install "Yield to Pedestrians in Crosswalk $100 - $500 Violation Fine" signs. Fairfax County has installed and maintains over 1,800 of these signs at 455 intersections.

VDOT administers the Transportation Alternatives Program (formerly the Transportation Enhancement Program) for qualifying activities. At its June 2013 meeting, the Commonwealth Transportation Board allocated FY2014 funds to sponsors in Fairfax County:

- $400,000 to Fairfax County for the continuation of the Mason Neck Trail along Gunston Road to connect Pohick Bay Golf Course and the Mason Neck State Park main entrance.

- $119,347 to Fairfax County for construction of Cross County Trail to connect Occoquan Regional Park and the Laurel Hill Greenway.

- $172,000 to the Town of Vienna for pedestrian improvements at the Vienna station and W&OD trail.

- $281,000 to the Town of Clifton for streetscape and pedestrian safety improvements on Main Street.

- $150,000 to the Town of Herndon for streetscape and pedestrian improvements in Historic Herndon.[22]

b. Biking --The Fairfax County Comprehensive Bicycle Initiative

The county's Comprehensive Bicycle Program is managed through the Department of Transportation. The program's primary goal is to make bicycling a viable transportation mode and to make Fairfax County bicycle-friendly and safe.

The Bicycle Master Plan and the bicycle parking guidelines are both important. The parking guidelines need to expand on the success of the county's new secure bicycle parking facilities at Silver Line stations and other county park-and-ride/transit facilities. Funding for implementation of both capital and non-capital elements of the county's bicycle master plan is required. The county should consider implementation of "Bike Fairfax!"--a program for encouraging/promoting bicycling as a transportation mode, education and outreach.

As directed by the Board of Supervisors, a major goal was the development and printing of the first "Fairfax County Bicycle Route Map," issued on May 16, 2008, "Bike to Work Day." The map defines a network of preferred as well as less preferred on-road bike routes that enable bicyclists to traverse the county. The county printed about 6,000 copies in the initial print job and another run of approximately 41,000 as a result of demand for the maps. The Fairfax County Department of Transportation was also awarded a transportation enhancement grant for fiscal year 2010 to complete a bicycle map that highlights a route along historic Civil War sites in Fairfax County. An electronic "Bike Fairfax Interactive Map" can be accessed at http://www.fairfaxcounty.gov/fcdot/bike/bikemap/.

Major activities and achievements include:

- Fairfax County Bicycle Master Plan: Approved in 2010 by the Board of Supervisors, work began in August 2010 to create a bicycle master plan for Fairfax County. This study will provide guidance for the planning and implementation of bicycle facilities as well as policies and programs influencing cycling in the county and increasing the cycling modal split.

  In order to address the accelerated comprehensive planning efforts in Tysons Corner, the project was broken into two phases. Phase I focused on the greater Tysons area including segments of McLean, Merrifield and Vienna; Phase II will encompass the rest of Fairfax County. Phase I

Correspondence from William C. Cuttler, PE, VDOT District Construction Engineer 7/9/13

was completed in early 2011; Phase II began in April 2011 and is currently scheduled to go before the Board of Supervisors in early 2014.

- Enhanced Bicycle Parking: Efforts to expand and enhance bicycle parking countywide are continuing. Installation of 150 new bicycle racks is almost complete. Ten new bicycle lockers were recently installed at the Reston Town Center transit center and ten lockers were installed at the courthouse complex and made available to employees who bike to work. Bicycle lockers are currently located at the following transit facilities: Sunset Hills Park and Ride; Herndon-Monroe Park and Ride; Reston Town Center Transit Center; and Reston South Park and Ride.

  As part of the Silver Line expansion of Metrorail, staff is working closely with WMATA and developers on bicycle parking facilities at the new stations. The Reston-Wiehle station will include a secure bicycle parking room capable of parking over 200 bicycles, including space for bicycle-related retail use and future bicycle sharing.

  Work was initiated on the expansion of the Stringfellow Road Park and Ride Lot. This expansion will include new secure and covered bicycle parking facilities as well as enhanced trail and sidewalk connections.

  FCDOT bicycle staff provides technical assistance to schools, shopping centers and commercial property owners on the proper installation/location of bicycle racks. Draft Fairfax County bicycle parking guidelines, standards and specifications will be released soon, providing additional guidance to both the development community as well as government agencies responsible for the design, installation and maintenance of bicycle racks and bicycle parking facilities.

- On-Road Bicycle Lane Initiative: FCDOT has teamed up with VDOT's Traffic Engineering and Maintenance to retrofit roadways with new on-road bicycle facilities. Most of these new segments of bike lanes are accomplished as part of VDOT's summer repaving program. Roadways recently completed include: Soapstone Drive; Sleepy Hollow Road; Lewinsville Road; Sully Park Drive; Dolly Madison Boulevard (southbound only); and Gallows Road Phase II.

- Connecting the County: As part of the original four priorities established by the Board of Supervisors, several projects were completed or initiated during 2010. Projects that were completed this year include:

  - Construction was completed in May 2012 on the Pohick Stream Valley Rail-Trail, a joint project of FCDOT and the Fairfax County

Park Authority. This 1.5 mile segment of shared use path connects the Burke Virginia Rail Express Station to the Burke Village area. The next phase (designated the Liberty Bell Trail) is funded and currently in the design phase and will extend this trail to Burke Road and the Rolling Road VRE Station.

- Construction was completed on the Trap Road Bike/Pedestrian Bridge over the Dulles Toll Road. This was a joint project among Fairfax County, VDOT, and the Federal Highway Administration.

- Bike the Sites Bicycle Route Map: In late 2010, FCDOT received authorization to create a bicycle route map defining a family friendly bicycle route centered on historically significant sites in the western area of Fairfax County. The map will provide information about these sites and define public parking where bicyclists can begin their journey. The project was funded with a Federal Transportation Enhancement grant and projected to be complete in April 2014.

c. VDOT Pedestrian/Bicycling Facilities and Safety[23]

VDOT administers the Safe Routes to School Program, a federally funded program to promote safe walking and bicycling to school by students, including those with disabilities. The SRTS Program offers funding grants for three different project types: (1) Infrastructure Projects; (2) Activities and Programs Projects; and (3) Quick Start Non-infrastructure Activities. On the latter funding program, 16 elementary schools in Fairfax County have received grants. More information is at: www.virginiadot.org/programs/ted_Rt2_school_pro.asp.

VDOT continues to ensure that biking remains an integral component of Virginia's multimodal transportation system and is proud to be a local sponsor of Bike to Work Day events promoted by the Washington Area Bicyclist Association and Commuter Connections.

In collaboration with county staff and partnering organizations, several initiatives have been implemented affecting bicyclists and pedestrians:

- Funding and support has been provided to the county's Department of Transportation for upgrading existing, or constructing new, bus shelters at various locations in the county.
- New and improved bike and pedestrian facilities have been provided on nine reconstructed bridges for the I-495 Express Lanes Project to connect with existing bike/pedestrian facilities.

[23] Ibid, 26

- A new Telegraph Road to Eisenhower Path connector over I-95/I-495 was constructed as part of the I-95/Telegraph Road interchange reconstruction project.
- A separated path crossing of I-95 will be included with I-95 Northbound Flyover Ramp to Fairfax County Parkway (presently in design).
- Counts are being taken of non-motorized crossings over interstate highways; this information can be used to justify pedestrian bridges or the addition of sidewalks, paths and shoulders on new or reconstructed bridges on the interstate highway system.
- Bicycle signal detection has been implemented at the intersection of Soapstone Drive and South Lakes drive in Reston.
- Bicycle lockers are available for an annual rental fee at several VDOT park-and-ride lots to assist with bicycle parking for commuting.
- Two percent of the VDOT's road paving funds is dedicated to adding shoulders on northern Virginia roadways at locations that will improve bicycle safety and travel. VDOT also collaborates with Fairfax County to identify pavement striping and bike-lane signage opportunities to add on-road bicycling facilities.

Additional resources about bicycling and walking are available at: www.virginiadot.org/travel/nova-mainBicycle.asp.

d. Bus Stop and Shelter Improvement Programs

A comprehensive inventory and study of all bus stops in Fairfax County identified undesirable bus stop conditions for priority action. The board identified $2.5 million from the general fund and $7.75 million in the 2007 Transportation Bond for improvements to the priority stops identified in the study. A total of 272 sites have been completed since the bus stop improvement program began. There are currently 122 sites in project development, 78 in design/land acquisition and10 under construction.

FCDOT is engaged in a public/private partnership to improve bus stops and increase the number of bus shelters in the county. This program is expected to raise $50,000 (less shared construction cost) in FY 2014 through the sale of advertising space on bus shelters. The contractor sells advertising space to subsidize construction, maintenance, and operation of bus shelters and will share a percentage of the surplus revenues with the county. Sixty-five existing bus shelters have been retrofit with advertising, and 36 newly installed sites have been completed. There are currently 63 sites being scoped for new shelter and infrastructure improvements for FY 2014. The program has raised $103,815 in revenue to date.

e. Express (HOT) Lanes Bus Service

In January 2013, FCDOT implemented the first of three new express bus routes to Tysons Corner, beginning with Burke Centre-Tysons Route 495. The second two Express routes, Route 493 from Lorton, and Route 494 from Springfield, launched in March 2013. All three routes operated free of charge for their first four weeks of operation. Additionally, free-ride coupons were mailed to households in Burke and were published in local newspapers. Accompanying the launch of all three routes was an aggressive marketing campaign designed to target employees in Tysons who live in Burke, Lorton and Springfield, as well as to target local homeowners' associations and community groups. Staff made a recommendation to the board to temporarily reduce the fares on the routes from the express fare of $3.65 to the base fare of $1.60, effective July 1, 2013. In addition, staff will, at the end of 2013, be redesigning the circulation patterns in Tysons to accompany the new Metrorail service and will be closely monitoring ridership and performance data until that time.

4. Transportation Demand Management, Alternatives and Outreach[24]

The county has integrated Transportation Demand Management strategies into the land development process and has standardized this program. TDM proffers promote alternatives to single occupant vehicle trips. These proffers contain commitments to provide TDM services, goals for percentage trip reduction, and remedies or penalties for non-attainment of proffered goals. The TDM proffer coordinator negotiates proffers and monitors implementation and performance of existing proffers. A comprehensive and standardized program for TDM was endorsed by the Board of Supervisors in the past year. In FY 2013, TDM proffers were committed for new developments in Reston, Fairfax, Tysons, Merrifield, Huntington and Mount Vernon. Proffer monitoring continues for properties throughout the county. The implementation of this new effort has been going smoothly, particularly in Tysons Corner. Overall, the standardized agreements for TDM proffers have been seen as a benefit by all involved parties when compared to the previous method of securing TDM commitments.

As of summer 2013, 523 Fairfax County employers have implemented Transportation Demand Management programs; 244 of those are at level three or four, which means they have implemented benefits or programs that significantly help to reduce single-occupant vehicle trips. Outreach to businesses to encourage employee transportation benefits programs this year reached 651 new employers, impacting thousands of employees and commuters.

[24] Ibid

Arlington County uses Mobility Lab to operate its Transit Demand Management programs; surveys with the local business community are conducted regarding the transportation networks and the perceived benefits: http://mobilitylab.org/2013/04/30/2012-arlington-business-leaders-study/

a. Transportation Services Group Programs and American Community Survey Data

The combined transportation demand management programs and outreach efforts of the FCDOT Transportation Services Group, along with programs sponsored by the Metropolitan Washington Council of Governments Commuter Connections program, have allowed the county in fiscal year 2013 to continue to reach tens of thousands of people who live or work in Fairfax County with messages about environmentally friendly transportation options.

A description of the Employers Service Program can be found on the county's website at: http://www.fairfaxcounty.gov/fcdot/Employer.htm.

- The RideSources program received 945 on-line applications from commuters looking for car- or vanpool matches last year. Over 240 program participants were registered. RideSources staff assisted the regional Guaranteed Ride Home program by adding 348 commuters.

- Within Fairfax County government, 209 employees participate in the Commuter Benefits Program, taking public transportation to work, and 1,665 eligible county employees teleworked at least one day a week. The county also provides reserved parking spaces for carpools and vanpools at some facilities.

- Information about transportation options such as the HOV and Express Toll lanes, RideSharing, Guaranteed Ride Home, car sharing, using bus and rail and teleworking is disseminated at outreach events throughout Fairfax County. In total, FCDOT-TSG participated in over 60 events within the community, such as town fairs, employer fairs, and public meetings.

- FCDOT's- Transportation Services Group, in partnership with the Center for Urban Transportation Research, has designated seven additional Fairfax County employers and three new sites as "Best Workplaces for Commuters" in FY 2013. This raises the total number of recognized sites in Fairfax County to 29. The employers were recognized by the Board of Supervisors in December 2012 for the broad range of transportation options offered to their employees. The "Best Workplaces for Commuters" program, managed by the National Center

for Transit Research at the University of South Florida, provides employers who meet the National Standard of Excellence in commuter benefits with national recognition and an elite designation for offering outstanding transportation options to employees.

- The Fairfax County Transportation Services Group also continues outreach efforts, including congestion mitigation and support for BRAC construction and relocation efforts.

- Fairfax County is working with the VDOT Mega Projects and the Employer Solutions Team to provide transportation alternatives to employers impacted by I-495 and I-95 Express Lane and Rail to Dulles construction. These ongoing activities have given the Employer Services and RideSources teams additional exposure to decision makers with many of the top corporations and organizations in Fairfax County.

- The Fairfax County Community Residential Services Program, recently re-branded as the Commuter Friendly Communities Program, has partnered with over 230 multi-family complexes, area developers and civic organizations to promote telecommuting and the use of mass transit, carpools, vanpools, biking and walking instead of drive-alone commuting.

- The Fairfax County Transportation Services Group also supports Transportation Management Associations and other organizations that assist commuters and the community, including the Dulles Area Transportation Association, LINK of Reston Town Center, TyTran in Tysons Corner and the Transportation Association of Greater Springfield.

- The Fairfax Connector has made several improvements to reduce emissions: reducing auto shutdown from 10 minutes to five minutes; switching from tires filled with air to nitrogen; reducing the average age of the Fairfax Connector fleet to 2.8 years; and purchasing Mini-hybrid buses (all buses purchased since 2009 are classified as Mini-hybrids for a total of 148 Mini-hybrids). The Maintenance and Service buildings at West Ox have been converted to Landfill Gas for heat.

b. Fairfax County Telework Initiative and Employer Services Program[25]

Fairfax County has a teleworking option for the county staff. Increased interest in telework is evident in the number of employees who participate in training sessions, ask for information via email and phone and sign up for telework. Managers have expressed an interest in telework as a way to continue business operations during inclement weather or emergencies. The

[25] E-mail from Catherine Chianese, Assistant Fairfax County Executive, Sept 7, 2011

county's active partnership in regional efforts to expand telework keeps it current on best practices and identifies the county as a resource for businesses on teleworking.

With respect to the county's telework program, the number of participants has increased from 138 in December 2001 to over 1,000 by 2005 (thereby meeting a goal that was set based on the Metropolitan Washington Council of Governments' goal of having 20 percent of the regions' eligible workforce teleworking by 2005). There are currently 1,665 participants in 2013. Based on information provided to EQAC previously regarding the 2005 telework goal, it is estimated that county teleworkers potentially saved roughly 80,000 commuting hours and 2.5 million commuting miles in a year. The county will continue to emphasize telework as an important component of its Continuity of Operations Planning, in order to ensure that county workers have the tools to work from remote sites.

c. Tysons Metrorail Station Access Management Study

In order to create a multimodal access management plan for the soon-to-open Metrorail stations in Tysons Corner, as well as to get the public to begin thinking about how they will reach the stations, the Board of Supervisors approved funding for the Tysons Metrorail Station Access Management Study project on June 1, 2009. The ultimate objective of the study was to create a document that can be used as a tool for the board to make funding decisions on multi-modal transportation improvement projects, specifically to access the Metrorail stations in Tysons Corner, as funding becomes available.

A TMSAMS Advisory Group was formed to guide the study through its completion, determine what information to present to the public, how best to present the information and how to collect public input. Representing a broad spectrum of interests, the TMSAMS Advisory Group consisted of: representatives from each of the BOS district offices that include and encompass Tysons Corner; residents from each of these districts; bicycle advocates; representatives from the business and development community; and staff from the Fairfax County Park Authority, the Fairfax County Office of Public Affairs and the office of the Chairman of the Board of Supervisors. It was staffed by the Fairfax County Department of Transportation. Along with the Comprehensive Plan for the Tysons Corner Urban Center, the TMSAMS Advisory Group selected three recently completed Fairfax County Department of Transportation studies to provide the basis for recommended alternative mode transportation improvements in the TMSAMS effort. These studies are: the Fairfax County Transit Development Plan; the Tysons Corner Sidewalk Analysis; and the Tysons Corner Bicycle Master Plan.

The Perspectives Group, a private public-outreach consulting firm with extensive Tysons related experience, conducted a comprehensive public involvement process for TMSAMS. This public involvement process included a total of four initial public meetings, approximately 20 key stakeholder interviews and the development of a TMSAMS website with an online survey. This highly successful public involvement process resulted in over 250 people attending one of the four public meetings and over 1,900 people participating in the TMSAMS online survey.

After this extensive public involvement process was complete, The Perspectives Group compiled the results of the input collected and produced the TMSAMS Final Report, including summaries from all areas of the outreach effort. Section six of the report highlights the top ranked bus transit, pedestrian and bicycle facility improvement recommendations (specifically improving access to the four new rail stations) from the Comprehensive Plan for the Tysons Corner Urban Center, the Fairfax County Transit Development Plan, the Tysons Corner Sidewalk Analysis and the Tysons Corner Bicycle Master Plan. A final public meeting, with over 95 people in attendance, was held on October 4th, 2011 to present the findings of the TMSAMS public outreach effort.

Also included in this report are recommendations from the TMSAMS Advisory Group for additional improvements, additional analysis and increased use of technological innovations to address transportation related issues not covered by the FCDOT studies that were incorporated into the TMSAMS effort. As previously stated, the ultimate objective of this study is to create a document that can be used as a tool for the Fairfax County Board of Supervisors to make funding decisions on multi-modal transportation improvement projects to access the Metrorail stations in Tysons Corner. In order to reach this objective, FCDOT staff conducted a thorough assessment of the priorities and recommendations contained in the TMSAMS Final Report and developed the "FCDOT Staff Recommend List of TMSAMS Projects and Associated Cost Estimates" document as well as the "Staff Responses to TMSAMS Advisory Group Recommendations" document. These documents were approved by the Board of Supervisors during the board's May 22nd, 2012 meeting and are available on the TMSAMS website by using the following link: http://www.fairfaxcounty.gov/fcdot/tmsams/.

5. Major Transportation Projects[26]

The following section provides updates on the major transportation programs across the county in 2013.

[26] Transportation Information for EQAC 2013 Kris Morley-Nikfar, FCDOT

a. Status of Dulles Rail Project

The Dulles Corridor Metrorail Project has completed over four years of construction along the extension between I-66 at the Dulles Connector Road and Wiehle Avenue in Reston. Approximately 93 percent of the construction activity is complete, with major work efforts on the alignment along the entire line, tunnel construction along Route 123 between International Drive and Route 7 in Tysons Corner, and at all five stations. The date of Silver Line, Phase 1 passenger service will be determined by the Washington Metropolitan Area Transit Authority. As of summer 2013, passenger service is projected to start in late December 2013.

The DCMP has been working closely with landowners in Tysons Corner to accommodate requests by landowners to provide for direct connections to the Metrorail system. At Spring Hill Station, the entry pavilion on the east side of the station will be relocated into the proposed development by Cherner at the intersection of Route 7 and Spring Hill Road. An SAIC request for a direct connection to the entry pavilion on the east side of Greensboro Station has been approved. An agreement has been reached with Tysons Corner Center to adapt the south side entry pavilion at Tysons Corner Station to accommodate the development conditions placed in its approved rezoning.

The transit oriented, mixed use development adjacent to Wiehle-Reston East Station is continuing on schedule. The excavation for the commuter parking garage began in April 2011 and was expected to have concluded in July 2013. Coordination with MWAA occurs on a bi-weekly basis to ensure the Wiehle development and the rail station construction and pedestrian bridge will open on time and without issue. Comstock Partners is completing construction on the mixed-use development as well as a below-grade 2,300 space commuter parking garage, 12 bus bays, 45 kiss-and-ride spaces and 150 secure bicycle spaces for the Metrorail station. The project will include approximately 1.3 million square feet of office, retail and residential uses; 19.5 percent of the residential units will be affordable dwelling units. The Metrorail facilities will be operational when the DCMP opens for passenger service. The commuter parking garage will be owned and maintained by Fairfax County with operational support by WMATA.

The Metropolitan Washington Airports Authority has completed 100 percent Preliminary Engineering and the Independent Cost Estimate for Phase 2 of the Dulles Corridor Metrorail Extension (Wiehle-Reston East Station west to Dulles International Airport and Loudoun County). Fairfax County, Loudoun County and MWAA have committed to participate in Phase 2. Phase 2 will be constructed for MWAA by Capital Rail Constructors, a joint venture between Clark Construction and Kiewet International. The Phase 2 contract was awarded in May 2013 with Notice

to Proceed anticipated in July 2013. Completion of Phase 2 of the Silver Line is expected in summer 2018, with passenger service beginning in late 2018.

On February 23, 2010, the Board of Supervisors approved a Special Exception Amendment for expansion of the West Falls Church Service and Inspection Yard to accommodate rail car storage and maintenance for Phase 1 of the DCMP extension to Wiehle Avenue. The amendment approved the expansion of the yard capacity by 42 rail cars and the addition of more maintenance bays in a new annex building. As part of the approval, MWAA and the WMATA constructed a new storm water management detention pond and rehabilitated the existing stream traversing the property. In addition, a $10 to $12 million sound cover box in under construction over the eastern most curved track in the yard to reduce 'wheel squeal' that occurs as rail cars are moved within the yard. These improvements will be implemented to coincide with the initiation of Silver Line, Phase 1 passenger service.

A Silver Line Phase 1 bus service coordination plan is being developed and coordinated by staff from the various service providers impacted by the DCMP: Fairfax Connector; Metrobus; the Potomac and Rappahannock Transportation Commission; Loudoun County Transit; and MWAA – Washington Flyer. Staff is coordinating bus routes, bus bay assignments and other operational elements related to bus service to and from Phase 1 stations.

Fairfax Connector Dulles Rail Bus Service Plans: Between January and May 2013, FCDOT staff conducted a significant public outreach effort to gather input on the Silver Line Bus Service Plan. In June 2013, FCDOT finalized the bus service plan to support the opening of Phase I of the Silver Line; the plan was approved by the Board of Supervisors in June 2013. The service changes are expected to take place concurrently with the opening of the Silver Line, which is currently anticipated for December 31, 2013. A substantial part of the plan is the implementation of a short-term circulator bus system within Tysons, called the Tysons Circulator (routes 422, 423 and 424), which will provide a frequent bus connection from the new Silver Line stations in Tysons to the employment centers. These circulator routes will connect to the new stations in Tysons, as well as to the feeder bus service from McLean, Vienna and the Route 7 corridor. Another major component of the Silver Line bus service plan is the redesign, modification and addition of new routes in the Dulles Corridor, feeding the Wiehle-Reston East Metrorail Station. In total, approximately 40 percent of all Fairfax Connector bus service will change in FY2014.

b. I-95 Express Lanes

The Virginia Department of Transportation is partnering with Fluor-Transurban to develop a new I-95 Express Lanes project that will run from Garrisonville Road in Stafford County to Edsall Road in Fairfax County.

This new project will create approximately 29 miles of Express Lanes on I-95. This project will add capacity to the existing HOV Lanes from the Prince William Parkway to the vicinity of Edsall Road and will improve the existing two HOV lanes for six miles from Route 234 to the Prince William Parkway. A nine-mile reversible two-lane extension of the existing HOV lanes from Dumfries to Garrisonville Road in Stafford County will help to alleviate the worst traffic bottleneck in the region. As a separate project, plans are also being advanced to construct a direct ramp from the existing HOV lanes on I-395 to Seminary Road, which will connect the Mark Center site to this expanded regional transit and HOV network. The ramp will be restricted to transit and HOV use only.

VDOT held the Design Public Hearings for the I-95 Express Lanes between Edsall Road in Fairfax County and Garrisonville Road in Stafford County on September 26, 28, and 29. VDOT has responded to all comments received. The Federal Highway Administration issued a finding of no significant impact on December 5, 2011. VDOT and Fluor-Transurban have come to a principle agreement and have finalized the agreement with the Concessionaire. The design of the project is complete, and VDOT has approved a noise wall study. Construction on all four phases of the project is ongoing and is 33 percent complete.

The Express Lanes project will directly link the I-95 HOV lanes to new express lanes on the Capital Beltway, creating a free-flowing network spanning more than 40 miles and providing direct HOV and transit service to major Virginia-based employment centers including Tysons Corner, Merrifield, Fort Belvoir and Quantico. The project will also relieve one of the worst traffic bottlenecks in the region, where the existing HOV lanes currently end at Route 234 in Dumfries. Carpools with three or more people, vanpools and transit vehicles will have free access to the express lanes network. The express lanes will keep traffic moving by using dynamic tolling that will adjust tolls based on real-time traffic conditions, video technology to identify accidents, a series of electronic signs to communicate with drivers and state troopers to ensure enforcement. These strategies will help maintain travel speeds, make travel times more predictable and significantly reduce the number of violations. Construction of the project is expected to support more than 8,000 jobs.

c. Express Lanes on the Beltway

Completed in November of 2012, this project includes fourteen miles of new high-occupancy toll lanes (two in each direction) on I-495 between the Springfield Interchange and just north of the Dulles Toll Road. These HOT lanes allow the Beltway to offer HOV-3 connections with I-95/395, I-66 and the Dulles Toll Road for the first time. Buses, carpools and vanpools with three or more people, and motorcycles can ride in the new lanes for free. Vehicles carrying one or two people can either travel for free in the regular lanes or pay a toll to ride in the HOT lanes. Tolls for the HOT lanes change according to traffic conditions, which will regulate demand for the lanes and keep them congestion free - even during peak hours.

In addition to providing new travel choices, this project also makes a significant contribution to the Beltway's 45-year-old infrastructure, replacing more than 50 aging bridges and overpasses, upgrading 10 interchanges and improving bike and pedestrian access. This project was made possible through a public-private partnership between the Virginia Department of Transportation and Fluor-Transurban.

d. Columbia Pike Streetcar Project

Fairfax and Arlington Counties undertook the Pike Transit Initiative to consider the development of an advanced transit system connecting the Pentagon/Pentagon City area with Baileys Crossroads. In May 2006, the Fairfax County Board of Supervisors endorsed the "Modified Streetcar Alternative" recommended in the Columbia Pike Transit Alternatives Analysis as the preferred transit alternative for the Columbia Pike corridor. The endorsement allowed the project to advance to the next phase of project development in which the project team developed a financial strategy. The project team decided to enter the New Starts/Small Starts program (through the Federal Transit Administration) to assist with financing the construction of the project.

Currently, the Pike Transit Initiative (also known as the Columbia Pike Streetcar Project) has entered the environmental documentation stage. A letter from the FTA agreed with the initial recommendation by the counties and its consultants that the environmental documentation needed for this project is an Environmental Assessment. As part of the EA, the project team also evaluated four alternatives. There is an Alternatives Analysis that was combined with the EA. The four alternatives are: no build; enhancing the existing bus service with additional buses; replacing some of the existing buses with articulated buses; and replacing some of the existing buses with a streetcar system. As part of the combined AA/EA document, the EA will determine the environmental impacts, ultimate alignment, minor preliminary engineering, a financial strategy and a project sponsor/operator that will

advance the project through full engineering, construction and operation. The 2005 total capital costs and operating costs for the board-adopted modified streetcar alternative have been updated in the AA/EA document. The capital cost (in 2016 dollars) ranges from $242-$261 million and the annual operating cost (in 2016 dollars) ranges from $22.5-$29.6 million. The draft AA/EA was approved by the FTA to be released for public comment. Funding for this project is anticipated from FTA, local and state transportation fund fees and taxes, as well as other options. The public comment period went from May 22, 2012 to June 21, 2012 with two public meetings: June 6 (in Arlington County) and June 7 (in Fairfax County). A final determination on the environmental impacts is not expected to be issued until preliminary engineering has been completed and FTA has selected the project to receive federal funding.

The Arlington and Fairfax County boards reaffirmed the modified streetcar alternative as the preferred alternative and accepted the Alternative Analysis/Environmental Assessment on July 24, 2012 and July 31, 2012, respectively. In September 2012, Arlington and Fairfax Counties submitted an application to enter the FTA Small Starts program. Arlington County submitted the application on behalf of both counties, as there can only be one project sponsor. Fairfax County is a partner with Arlington County on the project. In April 2013, the FTA notified Arlington County that the project was not approved into the Project Development phase at this time, for two reasons:

1) The project was likely to exceed the $250 million threshold that is the upper limit for a Small Starts project. Therefore, this project should be judged as a New Starts project.

2) The introduction of a new transportation authorization act: Moving Ahead for Progress in the 21st Century (MAP-21). This changed the funding program for major transit investments.

The counties were notified that that project would need to be evaluated under the MAP-21 requirements, which went into effect in October 2012, after the application to enter the Small Starts program had been submitted.

Currently, and during the review period by the FTA, the counties are working on a memorandum of agreement that would allow for additional planning and environmental work to continue. This is to complete the planning phase, and environmental work, that are still outstanding so the project can receive a Finding of No Significant Impact, meaning there are no significant environmental impacts as documented in the AA/EA. Additionally, the MOA will also contain a modified split in the costs between the counties to complete the planning, environmental and subsequent engineering work. Fairfax County's commitment under the old

MOA and environmental phase was 20 percent, with Arlington County covering the remainder. Fairfax County's commitment for capital and operating expenses will be determined at a future date. The MOA was approved by the Fairfax County Board of Supervisors in July 2013.

Updates on the Columbia Pike Streetcar project can be found on the following link: http://www.columbiapikeva.us/streetcar-transit

e. Richmond Highway Widening through Fort Belvoir

Richmond Highway will be widened to six lanes between Telegraph Road and Mount Vernon Memorial Highway (approximately 3.4 miles, including the segment within Fort Belvoir). The project will include intersection improvements and provisions for bicycles, pedestrians and current transit; right of way will be reserved for future high-quality transit. The Federal Highway Administration completed National Environmental Policy Act compliance through preparation of an Environmental Assessment, with Fairfax County preparing Preliminary Engineering documents in support of the EA. The Design-Build project, administered by FHWA in cooperation with the county, VDOT and U.S. Army Garrison Fort Belvoir, issued a Request for Qualifications in April 2012 and issued a Request for Proposal for a design/build contract to qualified contractors upon completion of the NEPA documentation (July 2012). The Design-Build contract was awarded in April 2013. Target completion of the project is mid-2016.

f. Roadway Improvement Program and Four-Year Transportation Program

In 2004 and 2007, voters approved bond referenda totaling $165 million for roadway, transit, pedestrian and bus stop improvements throughout Fairfax County. Approximately $71 million in bond funds were directed to roadway improvements, and the county initiated a Four-Year Transportation Program. In addition, funds raised through the Commercial and Industrial Revenue Tax are utilized for transportation and transit improvement projects. Significant bond and C&I funds have been utilized to supplement federal and VDOT-managed projects in order to move them to construction. These include the Stringfellow Road widening, the Fairfax County Parkway/Fair Lakes Parkway/Monument Drive interchange, Route 29/Gallows Road intersection improvements, Centreville Road widening and BRAC-related roadway improvements, such as the extension of Mulligan Road and widening of Telegraph Road.

Through FY2013, all major and spot roadway improvement projects noted in the first 4YTP, managed by the county, have been completed. Of the major and spot roadway improvement projects noted in the second 4YTP which are managed by the county, two have been completed and six are

under design. Lorton Road, the largest of these projects, is scheduled for bid advertisement in October 2013. Additionally, five major and spot roadway improvement projects, funded by C&I revenue, are currently under design, four are under construction and three are complete

The first 4YTP (2004 to 2007) included several major roadway projects that are being managed by VDOT, which are not yet complete. The Beltway Express Lanes project was completed in December 2012; the Route 29/Gallows Road Intersection Improvement was completed in November 2012; the Stringfellow Road widening project is under construction and is scheduled for completion in December 2014.

The second 4YTP (2008 to 2011) included three VDOT-managed projects that are still in construction: the Springfield Interchange Phase VIII (part of the Beltway Express Lanes project) was completed in December 2012; the Telegraph Road interchange (part of the Woodrow Wilson Bridge project) was completed in March 2013; and the Fairfax County Parkway/Fair Lakes Parkway/Monument Drive interchange project was nearing completion as of the date of preparation of this report.

6. Mitigation of Highways to Wetlands and Streams[27]

Due to the linear nature of highway construction projects, the presence of environmental resources varies from project to project. Impacts to stream and wetland resources on a given project are minimized to the extent feasible. For unavoidable impacts, federal/state water quality laws and regulations may require compensatory mitigation. Wetlands creation is one form of compensatory mitigation for wetland impacts. For stream impacts, stream restoration is a compensatory mitigation; natural stream channel design principles are utilized to the extent possible

Within Fairfax County's watersheds, VDOT has created approximately eight acres of wetlands (seven acres non-tidal and one acre tidal) and restored 2,635 linear feet of streams as compensatory mitigation for unavoidable construction project impacts. These were from the Fairfax County Parkway, the Route 28 widening, the Roberts Parkway bridge overpass, the Springfield Interchange Improvements, the Route 29 bridge replacement over Big Rocky Run, the Richmond Highway widening and the Woodrow Wilson Bridge Replacement. On the recently completed I-95/ Telegraph Road interchange improvement project, VDOT finished creation of 1.71 acres of tidal wetlands and 0.63 acre of non-tidal wetlands near the confluence of Taylor Run and Cameron Run (in the City of Alexandria). Additionally, 0.36 acre of stream restoration of relocated tributary to Cameron Run was completed. As required under the water quality

[27] Ibid, VDOT 26

permits authorized for this project, these mitigation sites will be monitored for five years to ensure their successful establishment.

On April 10, 2008, the Environmental Protection Agency and the U.S. Army Corps of Engineers jointly issued a Federal Mitigation Rule giving preference first to mitigation banks, second to in-lieu funds and third to permittee-responsible mitigation as compensatory mitigation for minor impacts to aquatic resources. The Virginia Department of Environmental Quality also recognizes this preference hierarchy presented in the rule. VDOT now purchases wetland and stream credits from approved mitigation banks to compensate for unavoidable impacts to wetlands and streams in lieu of constructing mitigation sites. To date, VDOT has purchased slightly more than 30 wetland mitigation credits and 2,085 linear feet of stream credits.

County staff has previously expressed preferences for compensatory mitigation to be within Fairfax County; however, the opportunity for VDOT to purchase approved credits is limiting. The county can explore strategies with federal and state regulators for establishing mitigation banks to sell approved credits for public works projects.

Since 1990, VDOT has been meeting its stormwater requirements by treating 858.55 acres of impervious road surface area through a system of 190 stormwater basins throughout the county. This acreage for treatment is expected to increase when new stormwater regulations become effective in 2014.

E. THE INTERRELATIONSHIP BETWEEN LAND USE AND TRANSPORTATION

The above sections presented “Land Use” and “Transportation” as separate environmental issues. The focus of this section is on the interrelationship between land use and transportation. Throughout this chapter, three fundamental challenges are addressed:

- The county is rapidly approaching build-out and is transitioning from a growth focus to redevelopment.
- The county transportation systems are strained by congestion and getting further constrained by sprawl beyond the county.
- The county will continue to grow in population and prosperity, putting more pressures on the environmental quality and quality of life, which are underpinnings of that growth and prosperity.

The concentration of development according to the Concept Map for Future Development necessitates that land use and transportation planning and policies evolve and interrelate together. New places will need to provide residential, commercial and transportation options for more people, under challenging constraints, while increasing environmental stewardship. These places will enable future growth through denser and mixed use development, efficient transportation options, such as Metrorail and HOV and lifestyle options such as telecommuting and flex-work.

Throughout the world there are examples of large cities that have managed to continue growing without sacrificing the environmental quality that we treasure. But to do so requires sophisticated planning that combines many facets of the community. Conversely, when land use and transportation decisions are made in isolation, they will exacerbate the problems of build-out and congestion and negatively impact quality of life.

Growth/ redevelopment is a long term process. Planning is the first step, and the county has made great progress improving the tools and processes for decision making and bringing systems into near-real time thought the GIS. The next step is the laws governing development through the zoning ordinance. The ordinance needs to be continually updated to incorporate new technologies and better practices for building high quality and efficient structures. This includes standardizing practices, such as Transportation Demand Management proffers, and incorporating urban focused zoning regulations, such as maximal parking restrictions in transit station areas. The final step is active encouragement of development where it is most appropriate.

Fairfax County's role in the redevelopment and reinvestment of the older commercial areas specifically supports environmental goals by reusing previously developed land, utilizing and enhancing existing services and utilities, and reducing development pressure on the county's remaining greenfields. Redevelopment provides an opportunity to replace or upgrade existing land uses and transportation networks with modern efficient systems that often have less environmental impact. The Comprehensive Plan and the Sustainable Development Policy for Capital Facilities provide guidance for incorporating the U.S. Green Building Council's LEED® standards in the design and construction of buildings and landscapes. These encourage efficient use of energy and water resources to minimize short and long term impacts on the environment and building occupants.

1. Zoning Ordinance Amendment Work Program

In the past, EQAC focused on planning, but zoning is an important factor in the overall development process. Zoning defines the requirements that affect all aspects of a development, including land use and transportation. This section reviews environmentally-focused aspects of the Zoning Ordinance Amendment Work Plan.

- Open Space. Staff is reviewing the open space definition to determine if clarification is necessary and whether the methodology used in open space calculations should be modified. Full open space credit is currently given for all stormwater ponds, but it may not be appropriate to give full credit for an unenhanced dry pond, as these facilities are generally considered undesirable from a usable open space and visual perspective. In addition, staff is considering requiring more detailed information on the type and location of the proposed open space in conjunction with zoning application and site plan submissions.

- Planned Development Districts. A number of issues pertaining to the planned development districts are under consideration, including additional submission requirements to obtain more detailed information on the existing site, proposed development and the surrounding area. In addition, the purpose and intent sections and general and design standards would be modified to place a greater emphasis on environmental protection and tree preservation.

- Parking Reductions in Transit Oriented Areas. In order to reduce energy consumption, improve air quality, reduce the amount of impervious surfaces and encourage the use of mass transit, there is an item on the 2013 Priority 1 ZOAWP to consider applying parking maximums and a reduction of the minimum parking requirements due to transit oriented areas and/or transportation demand provisions. This item has been addressed in the Tyson Corner area with the adoption of the new Planned Tysons Corner Urban District on June 22, 2010 and will be addressed in other areas as part of the PDC and PRM District Amendment that is tentatively scheduled for public hearings in early 2014.

2. Encouraging Redevelopment and Revitalization

The Comprehensive Plan recognizes that reinvestment in communities is necessary to maintain their vitality. The Fairfax County Office of Community Revitalization facilitates strategic redevelopment and investment opportunities in older commercial activity centers and across the county. In general, recent revitalization plans support compact, walkable, mixed-use centers which reduce the need for automobiles, increase access to transit and support other modes of transportation like bicycling and walking. For more information, go to www.fcrevit.org. Much of the discussion below regarding revitalization projects has been taken from this website and from guidance provided to EQAC directly from OCR.

3. Revitalization Projects

Tysons Urban Center

By 2050, the 2,100 acre Tysons Urban Center will be transformed into a walkable, sustainable, urban center that will be home to up to 100,000 residents and 200,000 jobs. Tysons is envisioned to become a 24-hour urban center where people live, work and play; where people are engaged with their surroundings; and where people want to be. There are economic costs and benefits associated with the redevelopment of Tysons; there are also non-monetary benefits such as cleaner air, better water quality, sustained economic vitality and improved quality of life that will result from the implementation of the Tysons vision. To achieve this vision, it will be necessary to implement strategies that will reduce resource use and dependency, decrease detrimental environmental impacts and enhance the environment. Effective land use and transportation policies create the basic foundation for the sustainable Tysons, and redevelopment efforts will provide opportunities to build upon this foundation.

The concept of transit-oriented development is being promoted for Tysons. TOD is a land use pattern which emphasizes compact, dense, walkable neighborhoods focused around transit stops. National studies have shown that TOD provides increased transit ridership. TOD also improves the efficiency and effectiveness of transit service investments significantly and has proven to lower annual household rates of driving for those living, working and/or shopping within transit station areas. By providing safe and easy pedestrian access to transit, TOD has produced lower rates of air pollution and energy consumption. TOD can also reduce rates of greenhouse gas emissions. Further, aggressive transportation demand management programs, including parking management, are critical to achieving goals in the reduction of vehicle miles traveled.

The redevelopment of Tysons is being pursued in a manner that should reduce greenhouse gas emissions in accordance with the Cool Counties Climate Stabilization Initiative adopted by the Fairfax County Board of Supervisors. Innovative energy efficiency and conservation strategies are being incorporated into all redevelopment projects. Tysons has a unique opportunity to become a leader in environmental stewardship through protecting and improving the existing man-made and natural environments. Improvement through enhanced stormwater management and promotion of green buildings and a green network of parks and open spaces will all contribute to this stewardship.

Stormwater Management - The Fairfax County Comprehensive Plan calls for the use of Low Impact Development techniques such as rain gardens, vegetated swales, porous pavement and vegetated roofs. It also calls for the retention of the first inch of rainfall on-site and for stormwater management measures equivalent to the current LEED stormwater design credits.

Green Buildings - The Plan calls for all new residential buildings to achieve LEED certification, or an equivalent green building standard. Office and other nonresidential buildings are expected to achieve the higher standard of LEED Silver or equivalent.

Green Network - As new development occurs, a variety of urban parks, plazas, open spaces and recreational facilities will be created. These will be connected by a "greenway" - a network of trails for pedestrians and bicyclists. The park plan includes a central signature park, a large multipurpose park, multiple urban parks, stream valley parks and trails.

Policies, experiences and lessons from Tysons are anticipated to be used as models for other portions of the county.

Tysons Partnership

In 2010, OCR worked with stakeholders in Tysons to form the Tysons Partnership. The Tysons Partnership is dedicated to an inclusive and collaborative process to achieve the successful redevelopment of Tysons into a pedestrian-oriented and economically vibrant urban place. The Tysons Partnership is a membership organization representing employers, landlords and developers, retail and hospitality representatives and resident organizations; it also has non-voting participation from the county, professionals/consultants and neighborhood organizations. The Tysons Partnership is organized into six councils: Marketing and Branding; Transportation; Public Facilities and Community Amenities; Urban Design and Planning; Finance; and Sustainability Initiatives. Since its incorporation in 2011, the Tysons Partnership has continued to focus efforts on transportation (circulator, grid of streets), transportation infrastructure financing, urban design and the provision of public facilities.

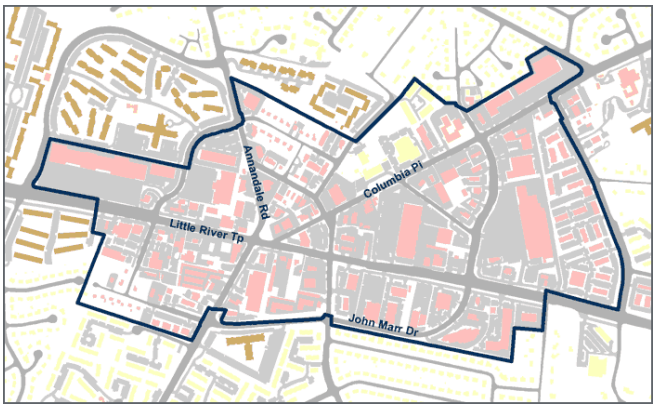
Tysons Corner Urban Design Guidelines

In January 2012, the BOS endorsed the Tysons Corner Urban Design Guidelines that provide area-wide recommendations to transition from an auto-oriented suburban location into a cohesive, functional, pedestrian-oriented and memorable urban destination. Grounded in the Comprehensive Plan core principles, the guidelines address the pedestrian realm, building and site design and interim conditions to define distinct identities and characteristics for the various neighborhoods. The guidelines have been used successfully by each of

the pending and approved applications to inform the siting, building design and master planning of each project.

As projects move into the site planning phase, OCR is reviewing site plans for conformance with the urban design elements of the proffered development plans, including streetscapes, building design and materials, site furnishings, signage, street lighting and other pedestrian realm elements.

Annandale CRD



The 200 acre Annandale CRD is located around the junction of Columbia Pike and Route 236. The Annandale business core is a culturally diverse hub that contains more than two million square feet of commercial space, including shops, restaurants and service businesses that draw customers from throughout the Washington, D.C. metropolitan area.

Annandale Community Business Center Comprehensive Plan Amendment

Informed by previous analysis and the May 2010 Annandale Transportation Study that provided transportation plan recommendations, the Fairfax County Comprehensive Plan, adopted in July 2010, outlines several objectives related to future redevelopment of the Annandale CBC, including all of the Annandale CRD. The Plan uses a new form-based approach that provides flexibility by using building form and height to guide development instead of the more traditional floor area ratios. The land use guidance recommends a proactive and comprehensive transformation of the existing, suburban form into a walkable, urban and active mixed-use center. Innovative urban design, streetscape, placemaking and context-sensitive techniques are also included. These techniques will enhance the pedestrian presence, integrate a diversity of land uses and create a distinct built form that better relates to the streetscape. The built form will relate to a network of usable and public urban plazas and parks at a variety of scales and functions and to planned transit services and facilities. These design and transportation elements will contribute to and establish a cohesive and unique identity; together they will support revitalization efforts in Annandale.

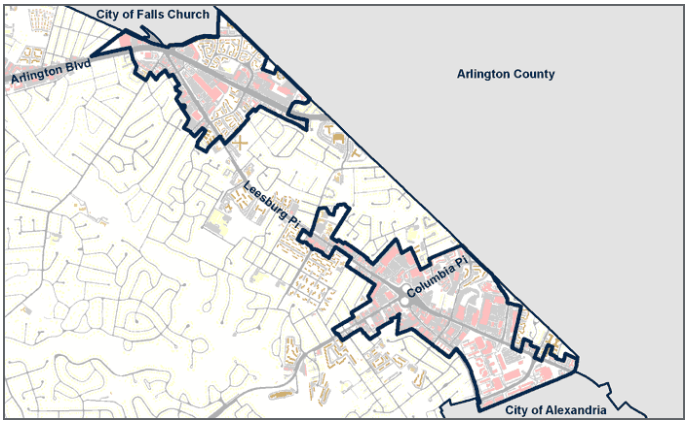
Annandale Urban Design Guidelines

In May 2011, OCR, in collaboration with the Annandale Central Business District Planning Committee, produced the Annandale Urban Design Guidelines

to provide design direction to enhance the visual quality of the Annandale CBC. The guidelines will be primarily used by an owner or developer of a property within the CBC who is considering developing a new building or improving an existing building. The organization of the guidelines corresponds to the two elements of Plan's urban design concept: 1) Building and Site Design; and 2) Streetscape Design. The guidelines expand upon the urban design concept by breaking down these two elements into their individual components and by providing specific design suggestions for incorporating each component into development proposals.

The guidelines conclude with a list of resources that should be referenced during the design, development review and permitting processes.

Baileys Crossroads/Seven Corners CRD



The 700-acre Baileys Crossroads/Seven Corners CRD is located at the eastern edge of Fairfax County. The Baileys Crossroads/Seven Corners CRD includes two dynamic business centers which capitalize on their close proximity to Arlington County, the City of Alexandria and downtown Washington, D.C. Commercial and retail activity is concentrated along Columbia Pike (Route 244) and Leesburg Pike (Route 7). The core of the district includes Skyline Center, national chains and a diverse array of locally owned stores and restaurants. Neighborhoods of single-family homes and apartments house the diverse population. Great redevelopment opportunities exist for Baileys Crossroads and Seven Corners; a more urban character that is more pedestrian and transit-accessible is envisioned.

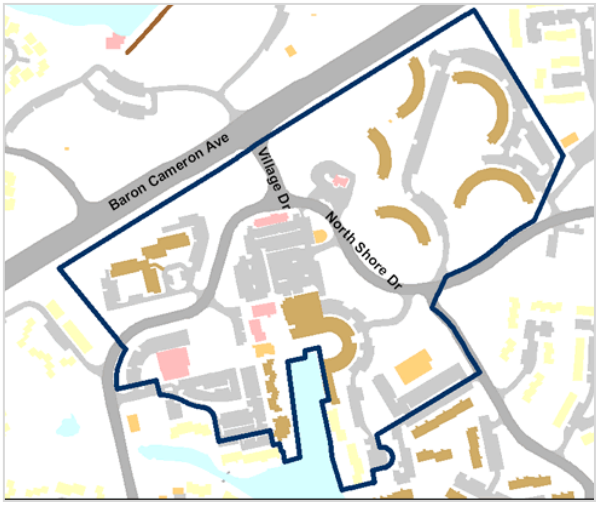
<u>Baileys Crossroads Community Business Center Comprehensive Plan Amendment</u>

On July 13, 2010, the Board of Supervisors approved the Baileys CBC Plan Amendment, which covers approximately 530 acres, including portions of the CRD. This Plan Amendment sets forth a concept for future development that encourages a transition from a predominately retail environment to one that balances retail, office, residential, civic uses and open space. The plan also supports redevelopment of a "Town Center" to take advantage of the proposed transit stops for the Pike Transit route from the Pentagon to Skyline. The recommended transportation improvements are intended to balance land use with infrastructure and to provide intermodal connectivity. Guidance regarding open space and urban design is also provided in the new plan.

Seven Corners

Fairfax County is undertaking a re-assessment of the Seven Corners area. A planning process is under way that provides the community with an opportunity to develop a vision for the future and to formulate recommendations and strategies for achieving the vision. After a series of public workshops in spring 2012, the Mason District Supervisor's office formed a community Task Force in fall 2012 to assist in the development of recommendations. It is envisioned that these recommendations will ultimately be incorporated into the Comprehensive Plan. The Task Force is expected to complete its final land use and transportation recommendations by spring 2014.

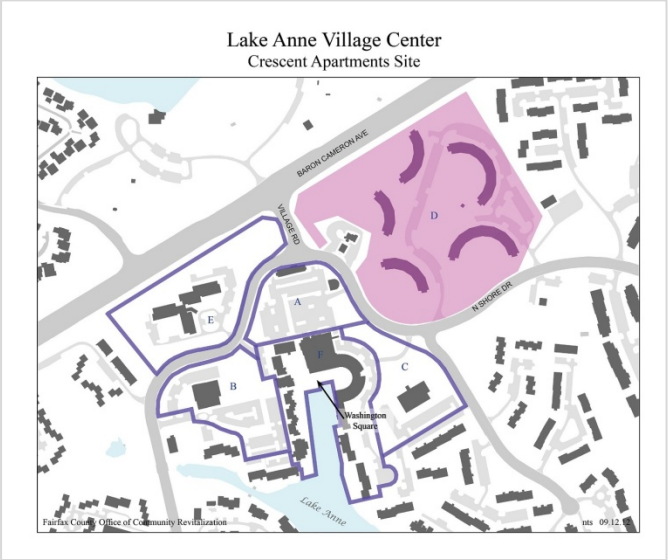
Lake Anne Village Center CRA



The 45-acre LAVC CRA, which includes the Historic Overlay District, is bounded by Baron Cameron Avenue (Route 606) to the north, Lake Anne to the south, North Shore Drive to the west and Moorings Drive to the east.

Crescent Apartments Property Redevelopment

The 16.5-acre Crescent Apartments property is located within the LAVC CRA on Cameron Crescent Drive. In February 2006, the county purchased the Crescent property as part of the efforts to encourage and guide the revitalization of the LAVC and to preserve affordable housing. In 2009, the Board of Supervisors adopted an amendment to the Comprehensive Plan that provides guidance on the mix of uses and intensities recommended to foster the redevelopment of the LAVC.



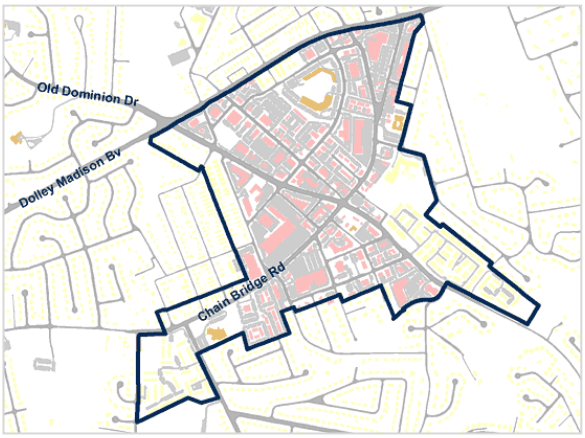
On February 9, 2012, the county released a Request for Proposal under the Public-Private Education and Infrastructure Act of 2002 for the redevelopment of the Crescent Apartments property. The RFP encouraged potential offerors to partner with owners of adjacent land units within the LAVC to achieve a comprehensive redevelopment plan that aligns with the vision as set forth in the Comprehensive Plan, including the preservation of affordable housing,

the creation of additional workforce housing and an innovative development that would serve as a catalyst for the revitalization of the LAVC. It is anticipated that a developer will be selected in 2013, followed shortly thereafter by a zoning application to effectuate implementation of the vision for the LAVC.

Commercial Reinvestment Plan

Completed in April 2011, the Commercial Reinvestment Plan provides short and long term reinvestment strategies for LAVC non-residential uses, which are intended to increase the viability of the LAVC as a mixed-use center and to facilitate the longer-term community goal of redeveloping the property adjacent to Washington Plaza with compatible mixed-use development. CRP recommendations pertaining to administration, organization and marketing events and promotions are being successfully implemented by stakeholders.

McLean CRD



The 265-acre McLean CRD is centered at the intersection of Chain Bridge Road and Old Dominion Drive in Fairfax County, Virginia.

McLean Utilities, Streetscape, and Gateway Signage

Focused around the key intersection of Chain Bridge Road and Old Dominion Drive, the McLean Utilities project will remove overhead utility lines along Chain Bridge Road to Laughlin Avenue, and extending along Old Dominion Drive to Center Street. In 2013, the ductwork and installation of utility provider cable was completed. The utility providers are in the process of changing over services to the underground system and removing the overhead lines and poles. The project, which will improve the physical character and reliability of service within the McLean CRD, is anticipated to be complete in 2013.

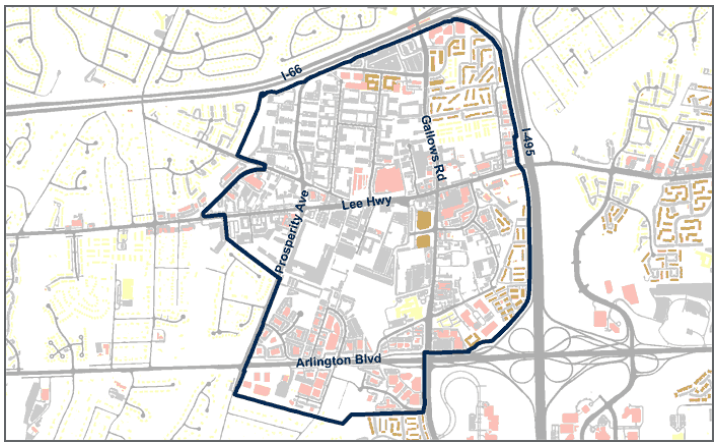
The McLean Streetscape Project, along Chain Bridge Road from Redmond Drive to Curran Street, is being coordinated with the Chain Bridge Road Corridor Enhancement Project, which will redesign the Chain Bridge Road/Old Dominion Drive intersection and construct pedestrian and streetscape improvements; it is also being coordinated with the McLean Signal Replacement Project. Anticipated to be completed in 2015, the streetscape projects will include new pavers, lights and landscaping, all in accordance with the McLean Design Standards. New mast arms and signals, which will be installed at the intersection of Chain Bridge Road and Old Dominion Drive, as part of the McLean Signal Replacement project, are now under design.

Current Conditions

McLean Utilities and McLean Signal Replacement Projects Concept

The installation of a of a McLean gateway sign, and landscaping within the median along Old Dominion Drive at the entrance to the McLean downtown Area, are also anticipated to be complete in 2013.

Merrifield CRA



With the Dunn Loring-Merrifield Metrorail station and regional and local access from I-66, I-495, Route 29, Route 50 and Gallows Road, the 775-acre Merrifield CRA is one of the most centrally located and easily accessible areas in Fairfax County.

<u>The Merrifield Suburban Center</u>

On June 11, 2001, the Board of Supervisors adopted an amendment to the Comprehensive Plan that created the Merrifield Suburban Center. The vision for the Merrifield Suburban Center includes two core areas: one focuses on development near the transit station and the second a town center south of Route 29. A new “Main Street” would connect the two core areas.

Merrifield is envisioned to be a thriving mixed-use area attracting new residents, while also supporting the surrounding existing neighborhoods. This evolution is under way as recent mixed-use developments have brought additional residential, retail and office space while also providing amenities such as improved pedestrian connections and open space with the construction of several projects near the Dunn-Loring Metro Station. These include Halstead II, Avenir Place, Square 1400 and Vantage. On April 27, 2009, the board

created the county's first Community Development Authority for the proposed Mosaic at Merrifield development.

Mosaic District CDA

In 2011, OCR continued to lead a county staff and consultant team that partners with the developer (Edens) of the Mosaic at Merrifield development. The Mosaic District CDA is the first and only CDA in the county.

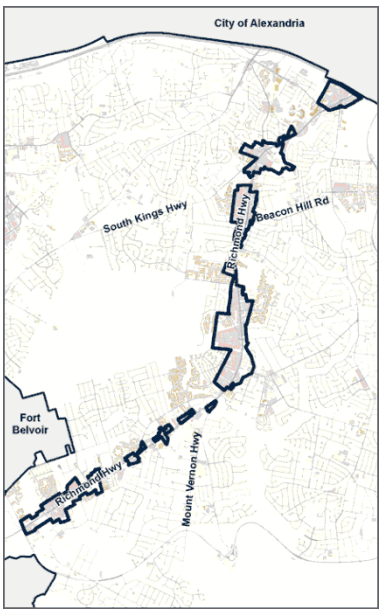
In June 2011, bonds were sold to:

- Fund a 30 million dollar portion of the public facilities to be constructed on the site through a 30-year bond to be issued by the CDA, whose debt service will be paid by a self-assessment.
- Fund a 42 million dollar portion of the public facilities to be constructed on the site (road improvements, parks and a small portion of the parking garage) through a 22-year bond also issued through the CDA whose debt service will be paid through incremental real estate tax revenues. Liability for the debt service will be secured by the CDA, not the county.

Construction of the first phase of the project was completed in fall 2013 with the successful opening of an urban-model Target, a movie theatre, a hotel, a variety of retail, a new park and townhomes. Second and third phases of the project are currently under construction and include apartments, condominiums and additional retail.

Richmond Highway Corridor CRD

The Richmond Highway CRD is located along a 7.5-mile segment of Richmond Highway from the Capital Beltway in the north to Fort Belvoir in the south. The Richmond Highway CRD, which encompasses 700 acres, is not continuous; it consists of six CBCs which include: North Gateway; Penn Daw; Beacon/Groveton; Hybla Valley/Gum Springs; South County Center; and Woodlawn. Each commercial area can generally be characterized as predominately local-serving retail, with a mix of stand-alone retail as well as strip commercial centers.



Southeast Fairfax Development Corporation

Since 1981, the SFDC has had a Memorandum of Understanding with the Fairfax County Board of Supervisors; the MOU outlines the goals of the SFDC and the terms and conditions for its receipt of funds from the BOS. The SFDC is a public/private non-profit economic development corporation established to guide and assist businesses with locating or expanding onto the Richmond Highway corridor and to work with county efforts to facilitate revitalization of the Richmond Highway corridor. The SFDC is focused on three key areas: marketing; economic restructuring; and urban design.

Penn Daw Comprehensive Plan Amendment

On April 10, 2012, the BOS adopted an amendment to the Comprehensive Plan for a 15-acre land area west of North Kings Highway and south of School Street, as well as the adjacent triangular-shaped land area located east of North Kings Highway and west of Richmond Highway.

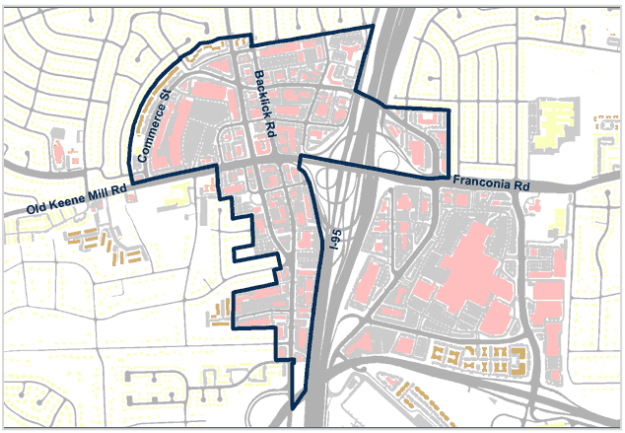
The amendment added an option that provides for a maximum of 735 dwelling units and a minimum of 40,000 square feet of retail. The redevelopment option supports the goal of directing growth along the corridor of the CBC and limits commercial encroachment into the surrounding stable neighborhoods. The BOS adopted another amendment to the Comprehensive Plan for the Penn Daw CBC on December 10, 2012, for the parcels bounded by North Kings Highway, North Shields Avenue and Jamaica Drive (except for a few parcels on Richmond Highway at the northeast portion of the land-unit) that provides an option for mixed-use development up to 1.8 FAR.

As a result of these Plan amendments, three rezonings have been filed; two have been approved by the BOS and one is pending. The City View project, located at North Kings Highway and Poag Street, was approved on July 7, 2012 for 245 multi-family residential dwelling units. This project is currently under construction. Across the street from the City View project where the Fast Eddies restaurant is located, is the site of the Grand at Huntington project. The BOS approved the rezoning on June 4, 2013, which will result in the redevelopment of the existing retail uses and four single-family homes into 275 multi-family dwelling units and 18,000 square feet of retail. The third rezoning is for the Penn Daw Shopping Center. The applicant seeks to redevelop the existing 132,000 square foot shopping center with 397 multi-family and 34 townhouse dwelling units and 31,000 square feet of retail for a total FAR of 1.4 over the 10.45 acre site.

The Beacon at Groveton development opened in September 2012. It contains 290 multi-family dwelling units and 10,000 square feet of retail, and there is a later phase of office development planned. Currently, approximately 50 percent of the residential dwelling units have been leased. This development represents

the first mixed-used development of its type to occur on the Richmond Highway Corridor.

Springfield CRD



The 250-acre Springfield CRD consists of a variety of retail, commercial, office and residential activities clustered at the Franconia Road - I-95 Interchange, accessed via the Old Keene Mill Road, Backlick Road and Commerce Street roadway network. The rebuilt I-95 Interchange, ramps and Metro access at the Franconia-Springfield Transit Station provide the Springfield CRD tangible market benefits attributed to its prime location and regional transportation advantages.

New vision and redevelopment opportunities were adopted in the Springfield Connectivity Plan Amendment, which was approved in January 2010. The Comprehensive Plan changes included raising planned land use intensities within the CRD to spur redevelopment, new transportation infrastructure improvements and detailed guidance with respect to urban design, streetscape and placemaking concepts. The transformation of the central business area into a walkable village town center convenient to well-located and maintained neighborhoods continues to advance.

A number of older and/or vacant retail structures have been removed and replaced with new uses or updated structures, such as a Homewood Suites as well as a new commuter parking facility. In coordination with the Lee District Supervisors Office and the Greater Springfield Chamber of Commerce, a number of pedestrian improvements are being made to increase the safety and functionality of roadways in the CRD, including providing a pedestrian refuge area across Commerce Street, correcting safety concerns at two intersections, improving trail connections for bicyclists and replacing non-compliant bus shelters.

<u>Springfield Mall</u>

Redevelopment plans to transform the Springfield Mall into a mixed-use town center were approved by the Board of Supervisors in 2009. The first phase of construction is currently under way and includes: renovation of the interior retail

space; significant structural changes to the exterior façade facing Loisdale Road; repair and improvement of existing surface and structured parking; and improvements along Frontier Drive to improve pedestrian, bicycle and vehicular movement between the Mall and the Franconia-Springfield Metro Station.

The projected 20-year build out of the approximately 80-acre site includes the renovation of the 2.1 million square foot Springfield Mall as well as the addition of over 2,000 residential units, office, retail and hotel uses throughout the site. The vision for the Springfield Town Center is for a walkable community where people can live, work, shop, and enjoy entertainment and community activities.

4. Region Forward Coalition

In 2011, the Metropolitan Washington Council of Governments' Board of Directors established the Region Forward Coalition to replace the Metropolitan Development Policy Committee. The coalition is charged with the implementation of the goals, targets and indicators of the Region Forward report. That report sets forth regional goals, a compact agreement and targets and indicators to measure success related to accessibility, sustainability, prosperity and livability. The coalition is comprised of: elected officials from each of COG's member local governments; senior local government staff members; and representatives of business, civic, advocacy and philanthropic organizations.

During calendar year 2012, the region's planning directors and the Region Forward Coalition worked to complete the new regional map of activity centers. This was the second major update to the centers map, which was last approved in 2007. The previous map was the technical basis for several targets to support Region Forward – specifically the amount of commercial and residential development foreseen in the centers – and is widely used by the Transportation Planning Board and other key transportation partners in the region such as WMATA. The new Activity Centers map was adopted by the COG Board in January 2013 and identifies a total of 141 centers, including 26 in Fairfax County. COG staff, a consultant team and members of the Region Forward Coalition are also currently completing work on the Activity Centers Strategic Investment Plan which analyzed 95 of the centers to develop place and people typologies and recommendations.

The new activity centers map is available at: http://www.mwcog.org/store/item.asp?PUBLICATION_ID=455.

In February 2013, the planning directors and the Cooperative Forecasting Subcommittee completed the compilation of the draft Round 8.2 Cooperative Forecasts of employment, population and household growth to 2040. The draft 8.2 Forecasts will be used by the National Capital Region Transportation Planning Board in this year's Air Quality Conformity Analysis of the

Financially Constrained Long-Range Transportation Plan and Transportation Improvement Program.

5. Summary

Ensuring that the activity centers are vital and that they attract investment and growth is critical to the success of Fairfax County's growth strategy. This is reflective of concern for sustainability and efficiencies in the provision of infrastructure and facilities and consistent with the Washington Council of Governments' Region Forward 2050 plan.

Fairfax County is expected to increase both population and jobs by about 225,000 over next 20 years, and new infill development and redevelopment will be much more complicated to effectuate than the initial development within the county. There will be changes imposed on existing residents and businesses and impacts that are both real and perceived. By continuing to integrate land use, transportation and sustainable planning, the county can change and grow without sacrificing our quality of life.

F. ACCOMPLISHMENTS

As the chapter authors have participated in land use and transportation discussions over the past 10 years, the county has continuously impressed us with consistency, foresight and progress in the face of economic and political challenges. While there is still much to be done, we are pleased to recognize that several recommendations have been completed at the same time that several very long term projects are coming to fruition.

1. State of the Plan and the Evolution of Fairfax

EQAC has long advocated for an update to the *State of The Plan, An Evaluation of Comprehensive Plan Activities between 1990-1995 with an Assessment of Impacts through 2010* (published in 1996). The update was published this year. Notable is the process by which data were gathered for the report using applications that leveraged IPLS and GIS. This report summarizes the changes to Plan potential that enables the county to continue growing beyond build-out.

In 2012, the Chairman of the Board of Supervisors, the Fairfax Federation and the Chamber of Commerce hosted a fascinating lecture series on the Evolution of Fairfax: changes to the county in the past, present and the future. The series is available for replay at: http://www.fairfaxcounty.gov/chairman/evolution.htm.

In 2013, the same hosts followed with an Evolution of Transportation evening. Together, the events provide a valuable archive and prediction of the future for

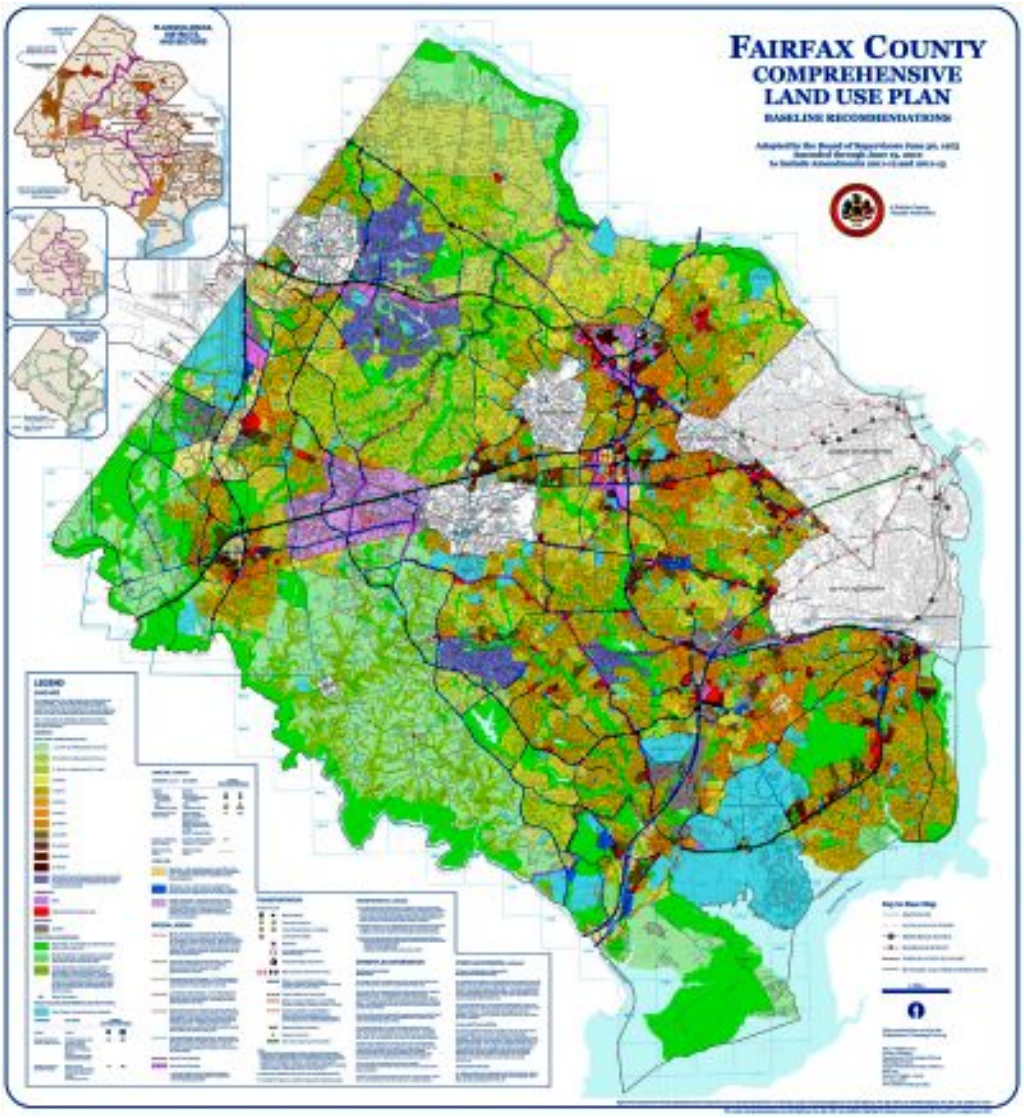
land use and transportation in Fairfax County. The evening is available for replay at:
http://www.fairfaxcounty.gov/chairman/evolution-of-transportation.htm

2. Update to the Comprehensive Plan Map

The Comprehensive Plan map was updated by the Board of Supervisors on June 19, 2012 and is available on the Internet at:
http://www.fairfaxcounty.gov/dpz/comprehensiveplan/compplanmap.htm.

A copy of this map is shown as Figure II-8.

Figure II-8. Comprehensive Plan Map



Last year, EQAC recommended that changes to the Comprehensive Plan be quickly incorporated on the Plan map. This update and the timely publication of approved amendments make it easier and faster to find the latest information about the Comprehensive Plan. The Plan map is now an electronic document, and it will be updated on-line as amendments to the Plan are adopted.

3. Merrifield Town Center Opening

This year saw the Merrifield Town Center continue to expand. The first concept planning for the new projects occurred nearly 18 years ago as a mixed-use transit oriented barbell. The new Mosaic development along with the Halstead Complex and the Trammel Crowe development at Dunn Loring Metro are the anchors for an exciting community. EQAC commends the county and its partners for revitalizing this community from a sleepy intersection into a modern transit oriented development.

4. Green Buildings

The county is becoming a leader in building green buildings and has adopted Comprehensive Plan policy that includes broad support for green building practices and establishes linkages between the incorporation of green building/energy conservation practices and the attainment of certain Comprehensive Plan options, planned uses and densities/intensities of development, particularly in the county's growth centers.

EQAC commends the county for its commitment to green buildings and the Sustainable Development Policy for Capital Projects that requires building to achieve LEED certification. As of May 2013, the county had a total of 31 green building projects, 14 of which attained certification (12 under the LEED program and two under the Green Globes program). The other 17 projects, all of which have a goal of LEED Silver, are in design or are under construction. In addition, the county managed the LEED Gold Virginia Department of Transportation Administration Building. We are also encouraged to see seven complete projects exceeding the sustainability goal—these were awarded LEED Gold certification. We hope that the county will further its leadership with some projects striving for Platinum certification.

G. COMMENTS AND ONGOING CONCERNS

1. Progress on Major and Mega Projects

The county continues to see progress on mega projects. These include the I-495 Express Lanes and Beltway widening, the Dulles Corridor Rail Project. EQAC has made recommendations in the past expressing concern about the complexity and interaction of these efforts and the impact on localities. To date they have

kept on schedule and will provide new options for transportation across the county. We remain concerned that all mitigations promised for these projects be completed to restore the environment to pre-construction conditions and replace the canopy that was removed during construction.

EQAC encourages continued funding for studies on improving transportation and multi-modal options within and between urban centers, especially along the Richmond Highway corridor.

2. Improve Transit Utilization

EQAC encourages the county to continue working to improve transit utilization through a systematic plan that includes multiple options within a community. For example, the Virginia Railway Express Burke Centre EZ Bus provides a convenient alternative to commuting to the Burke Centre VRE station. This can be combined with pedestrian improvements, more connector bus options and biking trails that together provide a diverse transportation plan.

3. Affordable Housing

EQAC commends the Board of Supervisors for adopting "The Housing Blueprint: A Housing Strategy for FY 2011 and Beyond." There are many land use and transportation efforts under way with significant relevance to the county's housing goals. EQAC suggests that the county:

a. Continue to expand options for affordable housing by investing and partnering appropriately in locations that will need increased affordable options as the economy rebounds.

b. Identify vacant offices and homes in locales with good transit options and coordinate with the real estate industry to aid in marketing those properties, thereby supporting new tenants with quality of life perquisites, improved commuting options and better residential/commercial or mixed use utilization.

c. Coordinate with agencies and businesses to inform prospective/new workers of opportunities for desirable commutes and local housing amenities.

H. RECOMMENDATIONS

1. Comprehensive Planning

Background

The Fairfax County Comprehensive Plan is a fundamental document for Fairfax County that has been continuously updated as the county has grown and transitioned from a rural/suburban county to a mixed-use urbanizing community. There have been two comprehensive plan reviews, first the "*State of The Plan, An Evaluation of Comprehensive Plan Activities between 1990-1995 with an Assessment of Impacts through 2010*" (published in 1996) and more recently the "*State of the Plan, An Evaluation of Comprehensive Plan Activities between 2000-2010*" (published in 2012). These documents explain the changes happening over the past 37 years and how the county has responded to the changes and expanded our potential to continue growing into the future.

In particular, the summary and conclusions of the latest report bear repeating:

Future planning challenges are likely to continue to become more complex. The Comprehensive Plan will need to balance new development and redevelopment with maintaining and improving the quality of life for all residents. In terms of the environment, improving the quality of life will include implementation of countywide stormwater management plans and recommendations. In terms of the economy, continued efforts to increase the supply of housing in activity centers are needed to improve the jobs/housing balance. Lastly, in terms of the community, challenges include continuing to extend the county's system of trails, parks and recreational facilities."

EQAC endorses the conclusions of the evaluation. EQAC also endorses efforts to focus on revitalization through the Office of Community Revitalization (established in 2007) and the Fairfax Forward project that succeeds the APR Retrospective as a new, holistic, and integrated approach to plan future development. These changes address the complexities of build-out and redevelopment and bring together the best information and tools to make wiser and more effective decisions.

Recommendations

a. The new Fairfax Forward planning process is the right step forward to update our planning practices. With Fairfax Forward being such a new process for the county, EQAC recommends that:

   (i) Fairfax Forward be identified as the preferred long term process to update with Comprehensive Plan and completely replace the APR process.

(ii) All the processes necessary to sustain Fairfax Forward be established now, rather than waiting for the current Work Program to be completed. This includes:

- The mechanisms to continuously update and improve the Fairfax Forward program.
- The process for identifying and prioritizing future work programs.
- The means of engaging the public and encouraging meaningful public participation in the program.

b. EQAC recommends that the county work to integrate social media into the planning process and other outreach efforts. This allows community participation through the Internet technologies and is more cost effective and far reaching then traditional media and outreach. The concept of a virtual town-hall meeting with community participation and instant feedback is now possible. Social media is very powerful for encouraging and educating people about alternative transportation options.

c. EQAC recommends that the county leverage the geographic information system in comprehensive planning, that GIS technology be incorporated directly into the planning process and that the use of modeling be expanded to help understand future conditions and scenarios.

d. EQAC recommends that the county continue to refine and formalize the process for revitalization, especially in mixed-use centers. There are several success stories across the county, such as Merrifield, that have been through a sustained transformation and have a wealth of lessons learned. Topics such as transportation modeling, land consolidation, public/private partnerships, mixed use development and transit connectivity apply across the county. Capturing these techniques into processes to reapply will increase the success of the new revitalization efforts. EQAC supports an evaluation of revitalization incentives and better understanding of incentive effectiveness.

e. This year EQAC submitted a resolution urging that urban design standards be applied to mixed-use centers; EQAC reiterates this recommendation. The urban standards are driving the potential in Tysons Corner and can apply equally well to all transit areas, as well as Suburban Centers and Community Business Centers. Urban standards are designed to improve the environment, quality of life, balance and safety of a well-planned mixed-use place.

2. Data and Modeling

EQAC is an advocate of the county GIS and the Integrated Parcel Lifecycle System. These applications have proven their value in understanding the county and providing quantitative information to a variety of users.

a. EQAC recommends that nonresidential data be comprehensively integrated into a GIS based life-cycle system. Residential data are effectively captured and available for many applications via the Integrated Parcel Lifecycle System. Nonresidential data exist in disparate systems, such as zoning and site planning, but have not been fully brought into the lifecycle planning process and cannot be used for applications such as forecasting or plan revisions.

b. EQAC continues to recommend that the Comprehensive Plan be reflected and modeled in the GIS. Applications such as the internal Comprehensive Plan Potential and the Comprehensive Plan Amendment applications (used to gather data for the State of the Plan report) are very useful for understanding the real time status of the Comprehensive Plan. These applications should be available to the public on the Comprehensive Plan website.

c. EQAC recommends that the county acquire new data sources and incorporate them into the business process. Planimetric data have proven to be both cost effective and transformative. The county has an opportunity to acquire multi-spectral imagery which also has the potential to greatly enhance our knowledge of the county for answering questions such as tree species identification and tree canopy density.

3. Transportation

This year the General Assembly passed legislation raising additional revenue for transportation. As the county enters a community dialogue to prioritize the allocation of these funds, EQAC recommends that the county provide priority for non-motorized/multi-modal transportation options. The county has been developing a comprehensive bicycle master plan that is ready for implementation. This complements requirements for pedestrian facilities in mixed-use centers. Proper implementation of the non-motorized/multi-modal master plan needs to include:

- Implementation of the bicycle master plan. Bicycle paths provide healthy and effective options to move about the county and between connected destinations.
- Expanded bicycle parking guidelines modeled on successful programs such as the new secure bicycle parking facilities at Silver Line stations and other county park-and-ride/transit facilities.

- Funding for implementation of both capital and non-capital elements of the county's bicycle master plan.
- Implementation of an outreach and education program for encouraging/promoting bicycling as a transportation mode. This could be called "Bike Fairfax!"
- Engagement of the private sector. One example of this can be seen in New York City, where CitiBank underwrites 100 percent of the cost of a bikeshare program. This could work today in several suburban and transit centers.

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ANNUAL REPORT ON THE ENVIRONMENT

CHAPTER III

AIR QUALITY

III. AIR QUALITY

A. OVERVIEW OF AIR QUALITY IN FAIRFAX COUNTY

1. Introduction

Through a federal-state-regional-local partnership, the quality of our air is monitored for specific contaminants and actions are taken against those who cause the contamination level to exceed allowed limits. Fairfax County's major responsibility involves participation and coordination with regional organizations on plans intended to reduce air pollution and improve air quality. More recently, the county has also taken a leadership role beyond the limits of its traditional air quality partnership; it has helped formulate and has subsequently adopted a program to reduce gases that may be the cause of global climate change. With regard to traditional air quality matters, Fairfax County has demonstrated a continuing commitment to being an active partner in improving the region's air quality.

a. Budget Impacts

Due to the overall budget constraints in the county over the past several years, the Board of Supervisors made significant reductions in the budget for the Health Department, which ended the county's Air Quality Monitoring Program. The air quality planning functions will continue to be done on a limited basis by staff from the Health Department's Division of Environmental Health. On July 1, 2010, the Virginia Department of Environmental Quality assumed full responsibility for air quality monitoring in Fairfax County.

During 2010, EQAC, along with several other parties, had many discussions with DEQ on the ramifications of shutting down air quality monitoring stations for which Fairfax County could no longer provide funding. EQAC examined a report provided by the State Advisory Board on Air Pollution, called "Evaluation of Virginia's Air Monitoring Network; November 30, 2009." The Metropolitan Washington area, which includes Fairfax County as well as other parts of northern Virginia, such as Arlington County and Alexandria, portions of Maryland and the District of Columbia, has a total of 13 air monitoring sites, which exceeds the U.S. Environmental Protection Agency's minimum requirement for the region.

In April 2010, EQAC submitted a recommendation to the Board of Supervisors that the board provide comments to DEQ regarding its annual air monitoring network review. Specifically, EQAC recommended that the board request that DEQ include one or more of the four existing Fairfax

County monitors in its future monitoring plans. Given the historically higher level of ozone concentrations at the Mount Vernon station, as compared to other county-run stations, EQAC recommended that the board request that DEQ include the Mount Vernon station in the regional monitoring plans. At that time, similar requests were made by Representative Gerry Connolly (to EPA) and the Air and Climate Public Advisory Committee (to DEQ). The board referred this issue to its Legislative Committee, which discussed the matter in September 2010; EQAC's recommendation was not provided to DEQ.

b. Update on Air Quality Regulatory Changes

i. Cross State Air Pollution Rule

On May 12, 2005, EPA promulgated the Clean Air Interstate Rule, which required reductions in emissions of oxides of nitrogen and sulfur dioxide from large fossil fuel fired electrical generating units. The U.S. Court of Appeals for the D.C. Circuit ruled on petitions for review of CAIR and CAIR Federal Implementation Plans, including their provisions establishing the CAIR NO_X annual and ozone season and SO_2 trading programs. On July 11, 2008, the court issued an opinion vacating and remanding these rules. However, parties to the litigation requested rehearing of aspects of the court's decision, including the vacatur of the rules. On December 23, 2008, the court remanded the rules to EPA without vacating them. The December 23, 2008 ruling left CAIR in place until EPA issues a new rule to replace CAIR in accordance with the July 11, 2008 decision.

On July 6, 2011, EPA finalized the Cross State Air Pollution Rule. This rule, which replaced CAIR beginning in 2012, requires 27 states in the eastern half of the United States to reduce power plant emissions. EPA also issued a supplemental proposal for six states to make summertime NO_X reductions. This supplemental proposal, when finalized, would bring the total number of states participating in the program to 28. CSAPR is estimated to reduce 2005 emissions from electrical generating units by 6,500,000 tons of SO_2 annually and 1,400,000 tons of NO_X annually in covered states. These estimates represent a 71 percent reduction in SO_2 and a 52 percent reduction in NO_X from 2005 levels.

On December 30, 2011, the U.S. Court of Appeals for the D.C. Circuit issued a ruling to stay the CSAPR pending judicial review. On August 21, 2012, the court vacated CSAPR, ordering EPA to "continue administering CAIR pending the promulgation of a valid replacement" (EME Homer City Generation, L.P. v. EPA, No. 11-1302). Therefore, CAIR remains in place and enforceable until replaced by a valid rule. On June 24, 2013, the U.S. Supreme Court issued an order granting

petitions from EPA and other groups for review of the D.C. Circuit Court's vacatur of CSAPR. The case is expected to be taken up in the court's 2013-2014 term.

ii. Industrial/Commercial/Institutional Boiler Maximum Achievable Control Technology

On January 31, 2013 (78 FR 7138), EPA finalized the revised ICI boiler MACT for major sources (subpart DDDDD of 40 CFR Part 60), and on February 1, 2013 (78 FR 7488), EPA finalized the revised ICI boiler MACT for area sources (subpart JJJJJJ of 40 CFR Part 60). EPA estimated that implementation of the revised rulemakings would reduce emissions nationwide from these source categories by 18,000 tons per year of particulate matter and 580,000 tpy of SO_2.

iii. Mercury and Air Toxics Rule

On December 16, 2011, EPA finalized national Clean Air Act standards to reduce mercury and other toxic air pollution from coal and oil-fired power plants. The final rule established power plant emission standards for mercury, acid gases and non-mercury metallic toxic pollutants that will: prevent 90 percent of the mercury in coal burned in power plants from being emitted to the air; reduce by 88 percent the acid gas emissions from power plants; and cut power plant SO_2 emissions by 41 percent beyond the reductions expected from CSAPR. These reductions are expected in the 2016 time frame. DEQ has received an extension request from American Electric Power regarding its Clinch River and Glen Lyn Power Stations, both of which are coal fired electrical generating facilities. The extension request announced the company's plans to: retire the coal fired units at Glen Lyn Power Station; retire Unit 3 at Clinch River Power Station; and switch fuels to natural gas at Unit 1 and Unit 2 at Clinch River Power Station. These changes, expected in the 2015-2017 timeframe, should improve air quality in all downwind areas.

iv. Outer Continental Shelf Permitting

Section 328 of the CAA requires the regulation of air pollution sources located on the Outer Continental Shelf. States may request the permitting authority for those sources located within 25 miles of the coast, and Senate Bill 659 (2010) directed DEQ to do so. This delegation must be accomplished in two phases. First, EPA conducts a consistency evaluation and adopts the state regulations into 40 CFR Part 55. Once that has been accomplished, a state may request EPA to delegate those requirements back to the state. Both parts were

completed in fiscal year 2012, and DEQ is now the air permitting authority for any projects within 25 miles of the Virginia coast.

v. General Permits

Pursuant to legislation adopted during the 2009 General Assembly session, DEQ was directed to develop two new general permits. One general permit is for specific sources that generate electricity during emergencies, including Independent Systems Operator-declared emergencies. This general permit applies to sources above the minor source permitting exemption levels but below the major source permitting exemption levels. The second general permit applies to generators that are used for load curtailment, demand response or peak shaving. Sources have the option of getting a general permit or a minor NSR permit. Both of these general permits went into effect in August 2012.

vi. Improving Air Quality - Greenhouse Gas Pollution

On March 21, 2011, EPA published a deferral for sources that emit CO_2 from biomass processes such as wood combustion. The deferral is in effect until July 21, 2014. The EPA deferral was adopted into the Virginia regulations by the State Air Pollution Control Board and went into effect on November 9, 2011. Sources that would have been major only because of their CO_2 emissions from biomass will not have to go through the major New Source Review permitting process until the deferral expiration. The deferral applies only to CO_2 emissions and does not apply to other GHGs.

c. Update on National Ambient Air Quality Standards for Major Criteria Pollutants

i. Atmospheric Ozone

In March 2008, EPA tightened the eight-hour ozone NAAQS from 0.08 ppm to 0.075 ppm for both primary and secondary ozone standards, but the standard was challenged by a coalition of environmental and health advocacy groups. On January 6, 2010, EPA made a proposal to strengthen the eight-hour “primary” ozone standard, designed to protect public health, to a level within the range of 0.060-0.070 ppm. EPA also proposed to strengthen the seasonal “secondary” standard, designed to protect sensitive vegetation and ecosystems, including forests, parks, wildlife refuges and wilderness areas, to a level within the range of 7-15 ppm-hours (cumulative peak-weighted index). On September 2, 2011, EPA announced the withdrawal of the proposed rule due to presidential mandate.

On April 28, 2008, EPA announced that the Metropolitan Washington area (including the District of Columbia and portions of Virginia and Maryland) met the 1991 one-hour ozone NAAQS by the required attainment date of November 15, 2005. Since then, EPA has revoked the one-hour ozone standard, although some areas still have continuing obligations under that standard ("anti-backsliding").

On May 21, 2012, EPA published final designations for areas under the 2008 Ozone NAAQS. The Metropolitan Washington, D.C. area was designated nonattainment for this standard, with a classification of marginal. The area must comply with the 2008 Ozone NAAQS by December 31, 2015.

ii. Fine Particulate Matter--$PM_{2.5}$

Effective December 14, 2009, EPA announced that the Metropolitan Washington non-attainment area for the 1997 $PM_{2.5}$ NAAQS had attained the 1997 $PM_{2.5}$ NAAQS. This determination was based on 2004 - 2006 data; the region has continued to meet the attainment standard to date and to show improvement.

The Technical Advisory Committee of the Metropolitan Washington Air Quality Committee developed a redesignation request and maintenance plan for this standard, which included new interim and out-year mobile source budgets. DEQ submitted these documents to EPA on June 3, 2013. These documents must be approved by EPA before the area will be considered attainment for the 1997 $PM_{2.5}$ NAAQS.

On September 21, 2006, EPA promulgated a more stringent $PM_{2.5}$ standard, a daily standard of 35 $\mu g/m^3$ and an annual standard of 15 $\mu g/m^3$. On October 8, 2009, EPA designated all of Virginia, including Northern Virginia, as attaining this standard.

On December 14, 2012, EPA finalized an update to the $PM_{2.5}$ NAAQS, setting the annual health standard at 12 $\mu g/m^3$. The Northern Virginia/Metropolitan Washington D.C. area is complying with this new standard, and the area is expected to be designated as being in attainment when designations and classifications are published in the 2014 timeframe.

iii. Nitrogen Dioxide--NO_2

On January 22, 2010, EPA strengthened the health-based NAAQS for NO_2 to a new one-hour NO_2 standard of 0.10 ppm. The standard also requires monitoring that occurs near roads, community-wide NO_2 concentrations and low income or minority at-risk communities. This

level will protect people against adverse health effects associated with short-term exposure to NO_2, including respiratory effects. It became effective on April 12, 2010. EPA also retained the annual average NO_2 standard of 0.053 ppm.

iv. Sulfur dioxide--SO_2

On June 2, 2010, EPA strengthened the primary NAAQS for SO_2 by establishing a new one-hour standard of 0.075 ppm. The new standard is the three-year average of the 99th percentile of the annual distribution of daily maximum one-hour average concentrations. EPA revoked the two existing primary standards of 0.14 ppm evaluated over 24-hours and 0.03 ppm evaluated over an entire year because these standards will not add an additional public health benefit. All monitoring data for the Commonwealth of Virginia show compliant measurements. EPA did not revise the existing secondary SO_2 NAAQS of 0.50 ppm over a three-hour average that is set to protect public welfare, including effects on soil, water, visibility, wildlife, crops, vegetation, national monuments and buildings. EPA assessed the need for changes to the secondary standard under a separate review. Under the new standard, facilities with significant emissions of SO_2, many of which are electrical generating units, will be required to demonstrate compliance with the standard no later than 2017.

v. Lead

On November 12, 2008, EPA issued a final rule that revised the primary and secondary NAAQS for lead and associated monitoring requirements. The effective date of this standard was January 12, 2009. The primary standard is set at 0.15 $\mu g/m^3$ (in a rolling three-month average) to protect health. A secondary standard is set at the same level to protect the public welfare, including the environment. The revised standards are 10 times more stringent than the previous standards and will improve health protection for at-risk groups, especially children. This decision marked the first time the lead standards have changed in 30 years. By October 2011, EPA was to have designated areas that have to take additional steps to reduce lead air emissions. States will have five years to meet the new standards after designations take effect.

2. Air Quality Status in Northern Virginia

a. Air Compliance Program

Air pollutants are emitted by stationary sources, such as power plants, gasoline service stations and dry cleaners, as well as by mobile and area sources, such as automobiles, trucks and other highway activities. EPA

tracks the emission of air pollutants from stationary sources, including sources in Fairfax County. Some of these emissions are discharged through smoke stacks and some emerge from the source without treatment. All are regulated under law. Virginia DEQ's air compliance program conducts inspections of facilities within Fairfax County and records information on violations in the state's database (Comprehensive Environmental Data System).

b. Update on County and Regional Air Quality Data

i. Ozone State Implementation Plan

EPA designated the metropolitan Washington region as moderate nonattainment for the eight-hour ozone standard of 0.08 ppm in April 2004. The Clean Air Act requires states to develop and implement ozone reduction strategies in the form of a State Implementation Plan. The SIP is the state's "master plan" for attaining and maintaining the NAAQS. The region had a deadline of June 15, 2010, to meet the eight-hour ozone standard. Air quality data from 2008-2010 demonstrate compliance with the 0.08 ppm eight-hour ozone standard in the Northern Virginia area. EPA published a determination that the area attained the 1997 eight-hour standard on February 28, 2012. However, the area will remain designated as a nonattainment area until a redesignation request and maintenance plan for the 1997 eight-hour standard is submitted to EPA and EPA approves the request for redesignation.

On March 20, 2013, EPA proposed to approve the attainment demonstration in the region's State Implementation Plan for the 1997 ozone standard.

Ground-level ozone is a precursor to smog and can cause breathing problems for those sensitive to smog, especially those with asthma (some use the term smog as a colloquial name for ground level ozone). Figures III-1 through III-3 and Table III-1 present regional air quality trends as they relate to the eight-hour ozone standard. Table III-2 presents a summary of the 2012 exceedances for ozone at the Fairfax County monitoring site (located in Lee District Park). Monitors in the metropolitan region recorded data on 21 days during the 2012 ozone season when ozone values were above the 0.075 ppm standard. Various studies have shown that, during certain meteorological episodes, pollution from outside the Washington metropolitan area can cause ozone exceedances in the area. The design value for 2012 (2010-2012) is 87 ppb, above the 1997 ozone standard of 85 ppb and above the current standard of 75 ppb.

As noted above, the metropolitan Washington, D.C. area was designated nonattainment for the 2008 ozone standard, with a classification of marginal. With the region's design value above both ozone standards (1997 and 2008), the MWAQC Technical Advisory Committee is preparing a Reasonable Further Progress plan in anticipation of not meeting the 2015 attainment deadline for the 2008 standard.

EPA is expected to publish an update to the 2008 ozone standard in 2014.

ii. Fine Particulate Matter State Implementation Plan

Virginia submitted its $PM_{2.5}$ SIP in April 2008, as required by the Clean Air Act. In October 2008, EPA proposed a "clean data determination" for the metropolitan Washington region in regards to the 1997 $PM_{2.5}$ NAAQS. This determination alleviated certain requirements of the Clean Air Act on the region, such as the implementation of certain inventory requirements. Fine particulate air monitoring data has continued to show good improvements over the past several years, and more improvements are expected due to the installation of upwind control devices. Figures III-4 and III-5 present regional air quality trends (annual and 24-hour, respectively) as they relate to the $PM_{2.5}$ standard.

Subsequently, Virginia requested the withdrawal of the 1997 $PM_{2.5}$ NAAQS attainment SIP on January 23, 2012 to ensure that transportation conformity requirements could proceed smoothly.

In May 2013, MWAQC approved a Redesignation Request and Maintenance Plan for $PM_{2.5}$. The commonwealth submitted the request and maintenance plan to EPA Region 3 in June 2013. The area will remain a nonattainment area for the 1997 $PM_{2.5}$ NAAQS until EPA approves the plan. The redesignation request and maintenance plan are needed to ensure that the progress the region has made in meeting and far exceeding the NAAQS is recognized with an attainment/maintenance designation.

iii. Additional Monitors for NO_2 and Other Pollutants

Virginia DEQ provided an update on the status and plans for conducting monitoring for NO_2 in Fairfax County, noting that the agency is working to install a new NO_2 monitor, to be used to assess compliance with the roadside monitoring aspect of the revised NAAQS for NO_2. There are plans to install three new NO_2 monitors in Virginia, based on information about the average annual daily traffic count. For northern Virginia, DEQ is considering placement of the monitor on property of

the Virginia Department of Transportation in the area near the Springfield I-95/I-395/I-495 interchange. Current plans call for the monitor to become operational by January 2015.

DEQ may also install additional roadside monitors for carbon monoxide and $PM_{2.5}$, depending on what is included in EPA's revised NAAQS for those pollutants. These projected changes to the air monitoring network in northern Virginia will be included in the Annual Monitoring Network Plan, which is sent by DEQ to EPA by July 1 of each year. This report contains information on the air monitoring network, including projected changes for that calendar year. This report is posted on DEQ's air quality Web page each year to receive public comment on all aspects of the network plan. DEQ also posts an Annual Monitoring Data Report on the Web page, which contains the monitored results for the previous calendar year.

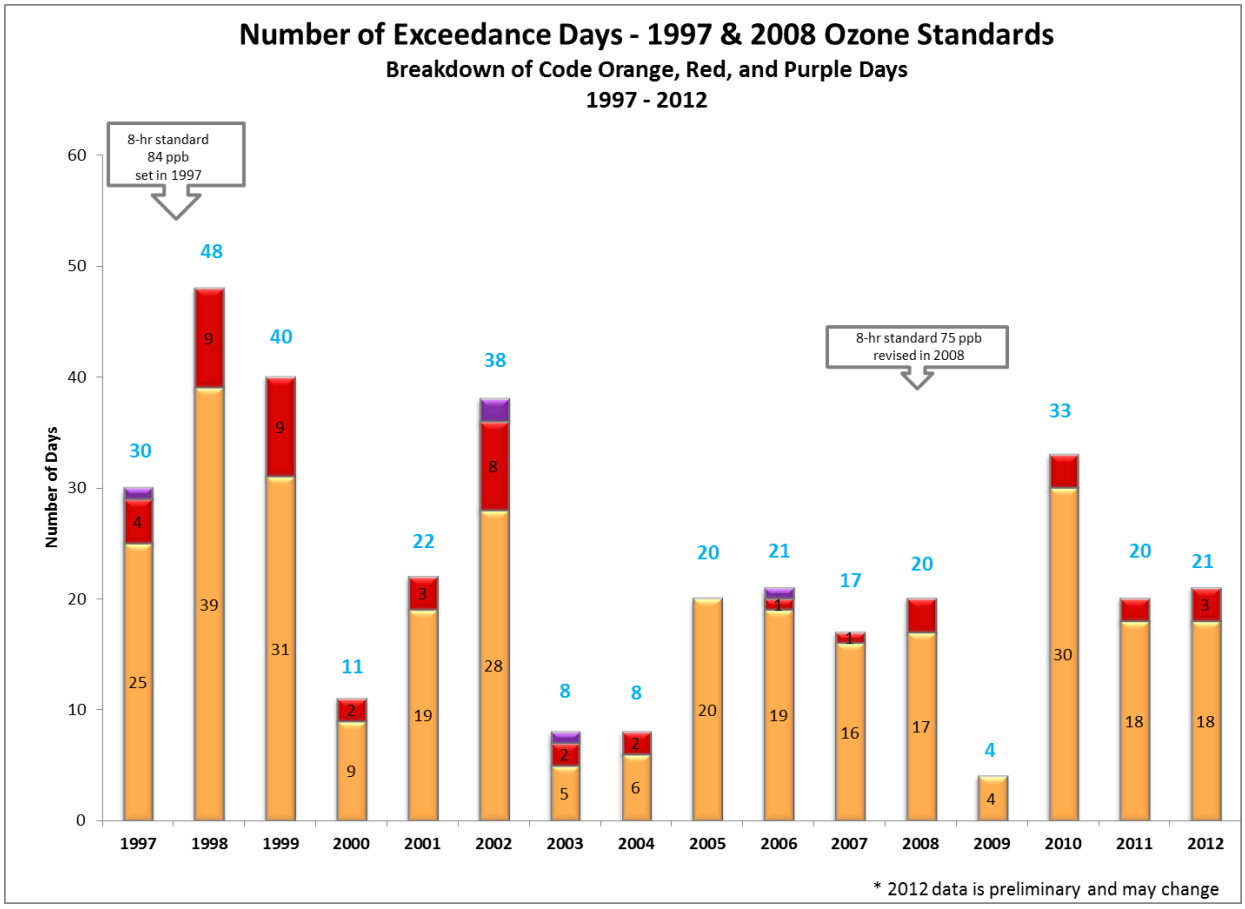
iv. Emissions from Motor Vehicles

One of the key issues related to ozone nonattainment and other air quality concerns is the use of motorized vehicles and their emissions. There is extensive use of motor vehicles in Fairfax County, including a significant number that do not pass the required emissions testing. Figure III-6 shows the daily vehicle miles traveled in Fairfax County, illustrating that slightly less than 27 million vehicle miles were traveled daily in 2012, a slight decrease from the number for 2011.

The Fairfax County Department of Transportation provided the following information (based on 2011 data) for the 580,430 workers, 16 years and over, who live in Fairfax County:

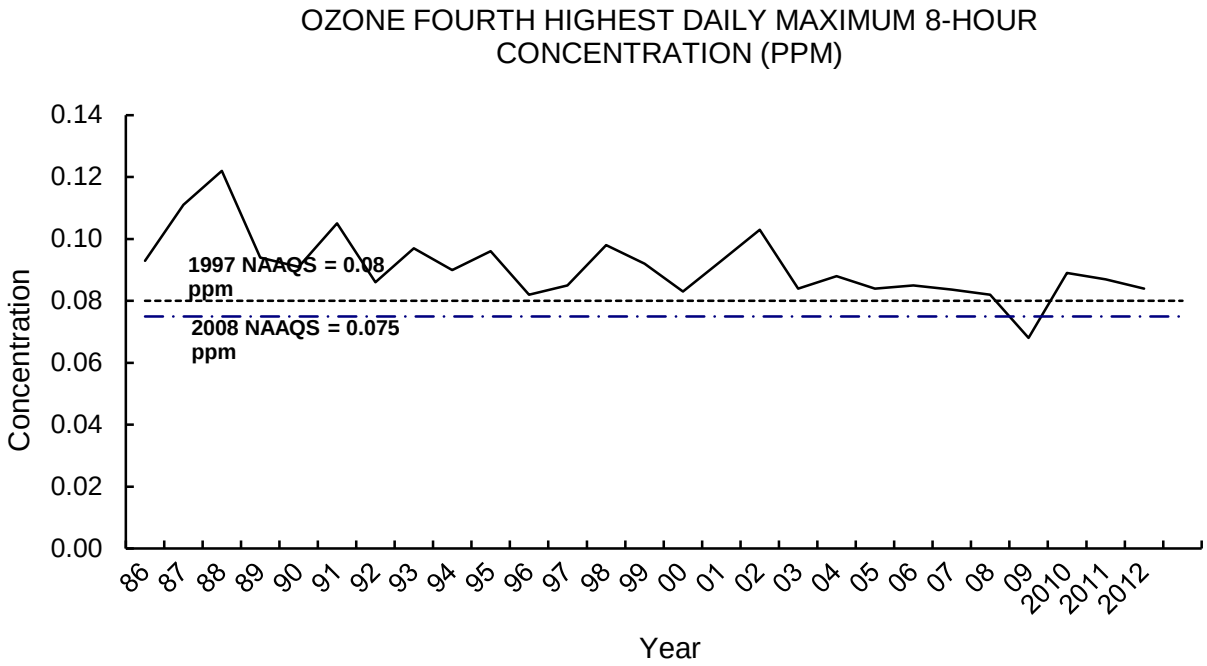
- 73.4 percent drove alone to work in a car, truck or van.
- 8.9 percent of those workers commuted via carpool or vanpool.
- 9.9 percent used public transportation (excluding taxicabs).
- 1.8 percent walked to work.
- 1.1 percent used other means.
- 4.8 percent worked at home (this number may not fully represent the true number of teleworkers in Fairfax County).
- Mean travel time to work: 32.9 minutes.

Figure III-1. Air Quality Trends in Relation to the Eight-Hour Ozone Standard (relative to 0.075 ppm 2008 NAAQS Standard)
OZONE EXCEEDANCE DAYS



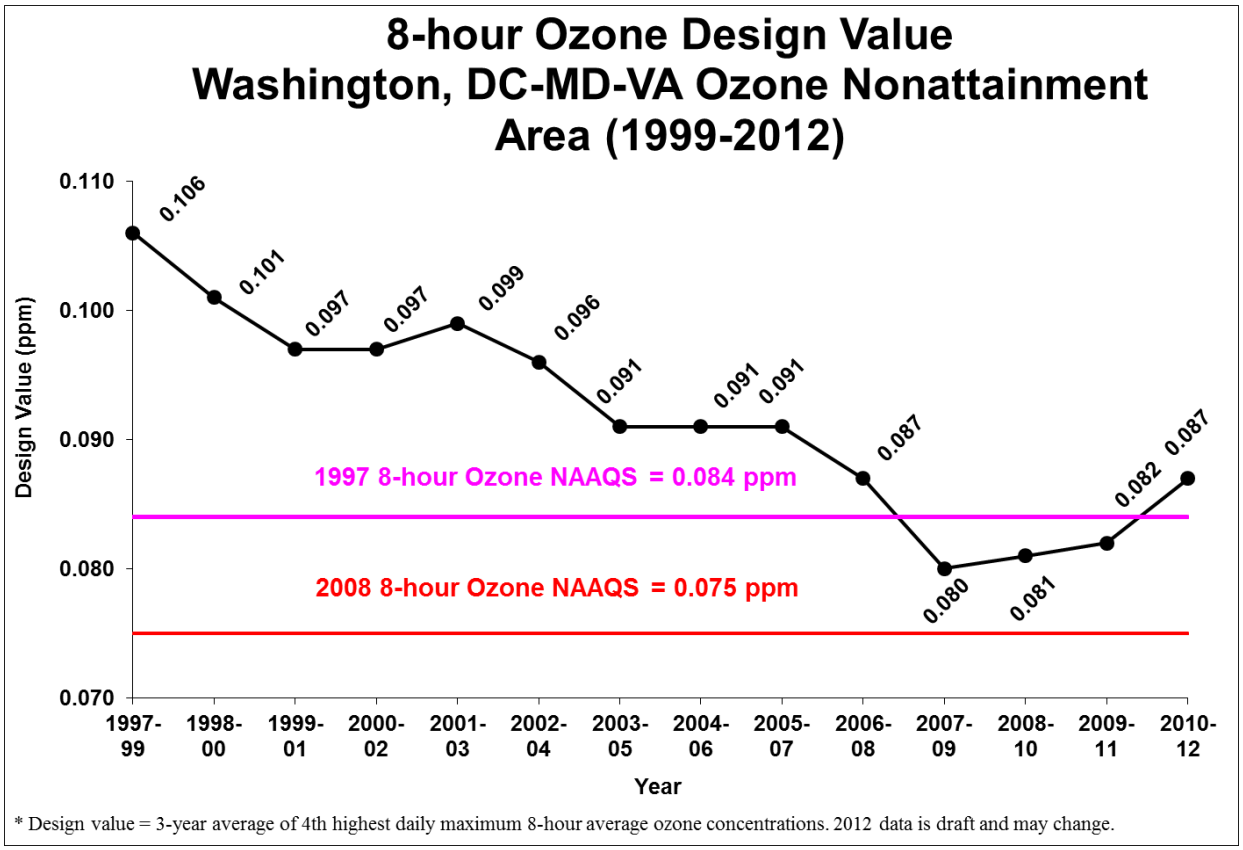
SOURCE: Metropolitan Washington Council of Governments. 2012 data are preliminary and are subject to change.

Figure III-2. Air Quality Trends in Relation to the Eight-Hour Ozone Standard, Fairfax County
(Fourth Highest Daily Maximum Compared to Both 1997 and 2008 NAAQS, ppm)



SOURCE: Fairfax County Health Department; Virginia Department of Environmental Quality

Figure III-3. Air Quality Trends in Relation to the Eight-Hour Ozone Standard (Three-Year Mean of Ozone Fourth Highest Daily Maximum Eight-Hour Concentration, ppm)



Source: Metropolitan Washington Council of Governments. 2012 data are preliminary and are subject to change.

Table III-1. Regional Eight Hour Ozone Exceedances – 2012 (Relative to 0.075 ppm 2008 NAAQS Standard)

Date	Maximum Values in the Metropolitan Statistical Area (Maximum 8-Hour Ozone ppm)	Number of Stations That Exceeded the Standard
5/31/2012	0.081	1
6/10/2012	0.087	9
6/19/2012	0.084	6
6/20/2012	0.086	9
6/21/2012	0.096	10
6/22/2012	0.078	2
6/28/2012	0.078	2
6/29/2012	0.111	14
7/3/2012	0.081	3
7/4/2012	0.08	3
7/5/2012	0.091	8
7/6/2012	0.106	9
7/7/2012	0.082	6
7/8/2012	0.086	8
7/17/2012	0.09	8
7/18/2012	0.076	2
7/19/2012	0.087	10
7/26/2012	0.076	1
8/1/2012	0.077	1
8/23/2012	0.076	1
8/24/2012	0.078	2

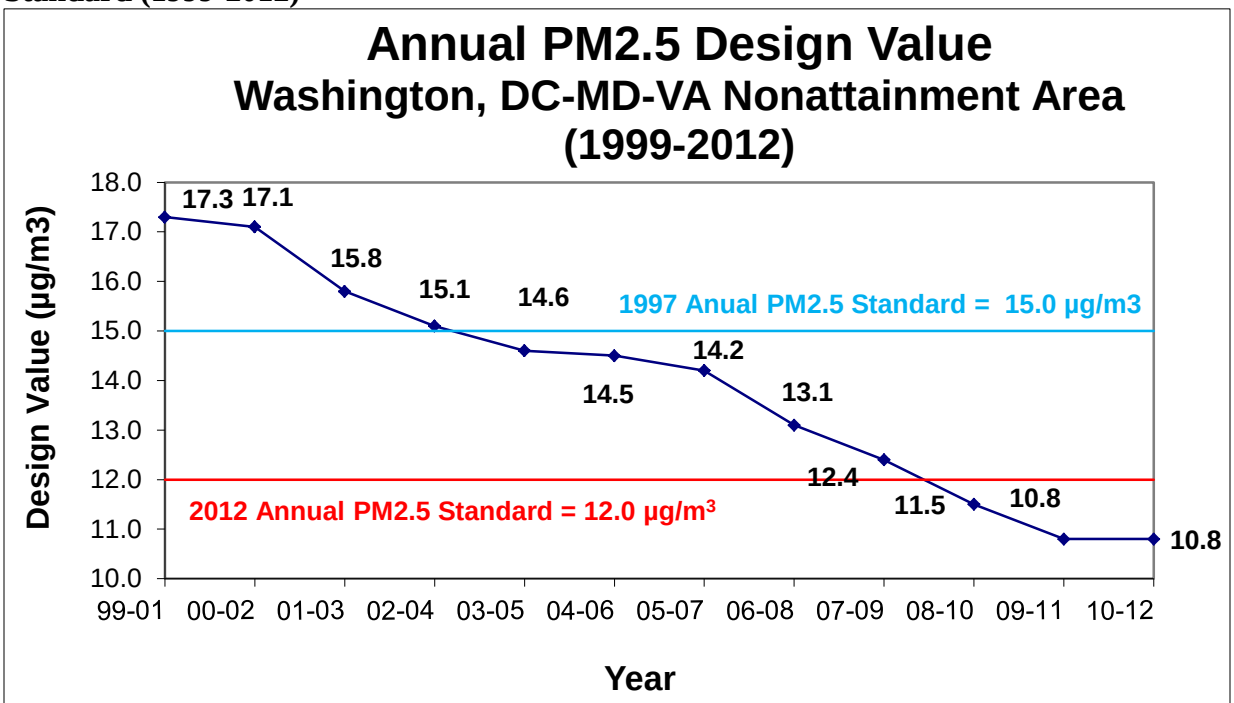
Source: Metropolitan Washington Council of Governments. 2012 data are preliminary and are subject to change.

Table III-2. Summary of the 2012 Exceedances for Ozone at the Fairfax County Monitoring Site (Located in Lee District Park)

Location	Date (in 2012)	Time	Value (ppb)
Lee District Park	July 6	1100	106
Lee District Park	June 29	0900	97
Lee District Park	June 21	1000	96
Lee District Park	June 20	1100	84
Lee District Park	July 17	0900	81
Lee District Park	July 19	1100	79
Lee District Park	June 10	0800	78
Lee District Park	June 19	1200	77
Lee District Park	August 1	1100	77
Lee District Park	July 3	1000	76
Lee District Park	July 7	1000	76
Lee District Park	July 8	0800	76

Source: Virginia DEQ

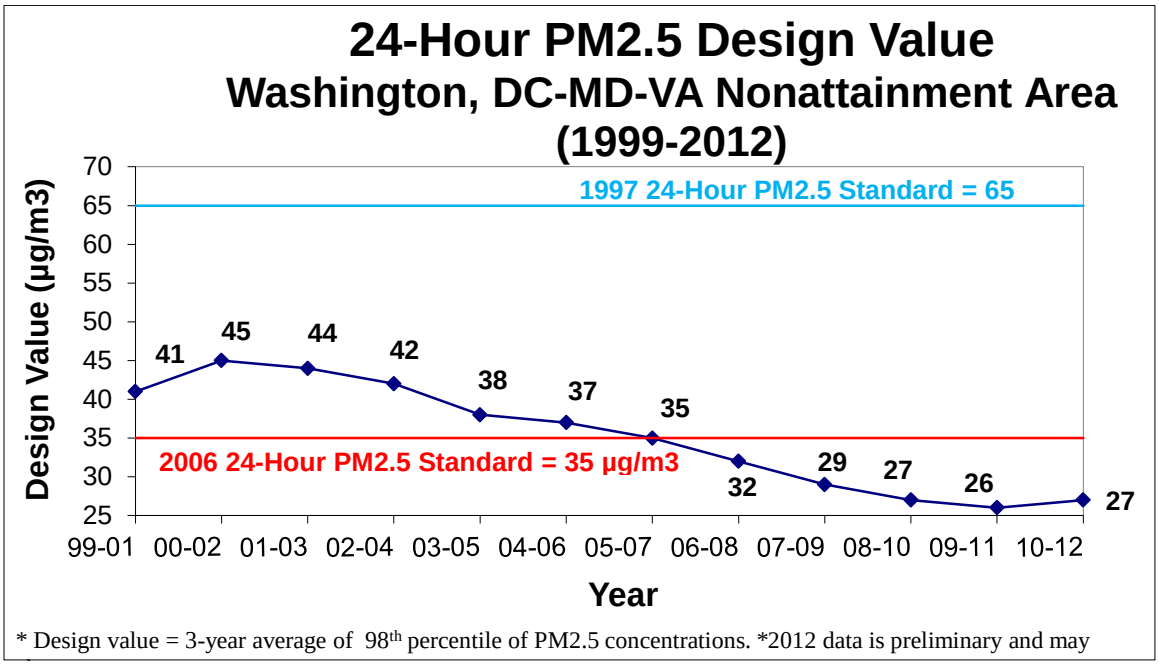
Figure III-4. Regional Air Quality Trends in Relation to the Annual $PM_{2.5}$ Standard (1999-2012)



* Design value = 3-year avg of annual mean PM2.5 concentrations. *2012 data is preliminary and may change.

Source: Metropolitan Washington Council of Governments. 2012 data are preliminary and are subject to change.

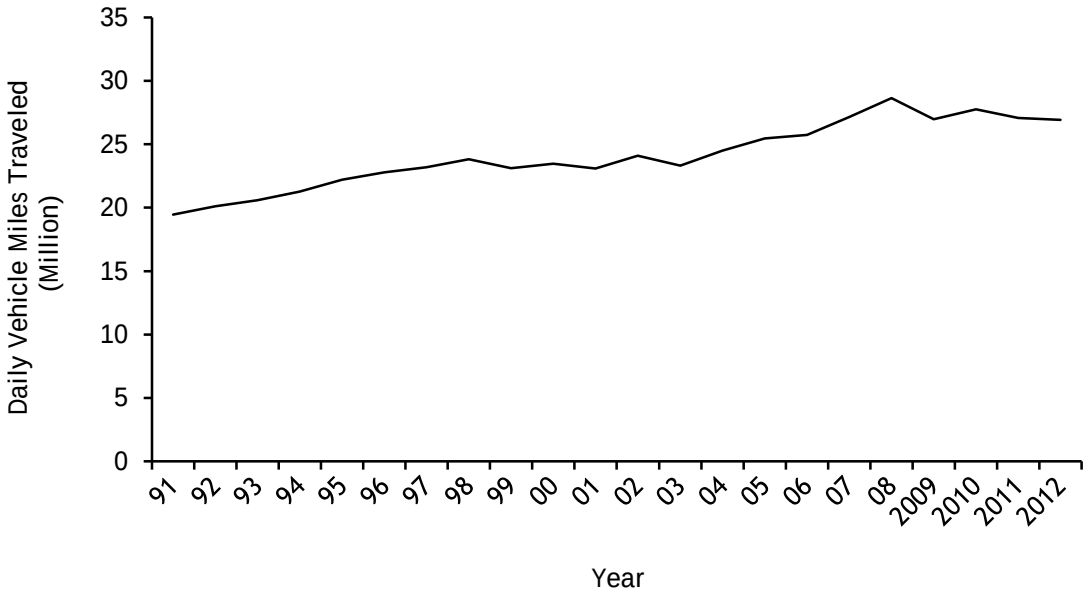
Figure III-5. Regional Air Quality Trends in Relation to the 24-Hour $PM_{2.5}$ Standard (1999-2012)



Source: Metropolitan Washington Council of Governments. 2012 data are preliminary and are subject to change.

There are several proposed changes to the motor vehicle inspection and maintenance program in northern Virginia that will occur in 2013 and later. The major change will be an expansion of the "Clean Screen" program whereby the cleanest vehicles, as determined by remote sensing observations, will have the option of purchasing a Clean Screen pass or getting a regular test at an emissions inspection station. It is anticipated that there will be no negative impact on the overall effectiveness of the emissions inspection program as a result of this change. Other anticipated changes to the program involve testing equipment, which should improve customer convenience. There has been no adverse impact on the IM program due to state budget cuts since the program is funded through registration fees.

Figure III-6. Daily Vehicle Miles Traveled in Fairfax County (Millions)



Source: Virginia Department of Transportation

v. Alternatives to Use of Motor Vehicles

The Fairfax County Board of Supervisors has directed the Fairfax County Department of Transportation to lead the effort to improve bicycle and pedestrian safety and mobility, including constructing bicycle and pedestrian improvements in high-priority areas of Fairfax County. Through FY 2016, the board has designated over $110 million in federal, state and county funding to construct over 300 high-priority bicycle and pedestrian improvement projects throughout the county. These include projects on major roadways, in activity centers, providing access to Metro stations and completing neighborhood missing links. From FY 2008 through FY 2013, the county has completed construction on 92 sites/segments, nine are under construction and another 70 are under design.

The Virginia Department of Transportation administers the Safe Routes to School Program, a federally funded program to promote to children, including those with disabilities, to walk and bicycle safely to school. The SRTS Program offers funding grants for three different project types: (1) Infrastructure Projects; (2) Activities and Programs Projects;

and (3) Quick Start Non-infrastructure Activities. On the latter funding program, 16 elementary schools in Fairfax County have received a grant. Further information is available at: www.virginiadot.org/programs/ted_Rt2_school_pro.asp.

VDOT continues to ensure that biking remains an integral component of Virginia's multimodal transportation system; it is a local sponsor of Bike to Work Day events promoted by the Washington Area Bicyclist Association and Commuter Connections. Efforts to make alternative transportation modes (biking and walking) safer and more attractive are critically important to addressing the air quality issues in the Washington metropolitan area and should be commended. For example, these types of initiatives can serve to reduce the county's status as being in nonattainment for ozone.

In collaboration with county staff and partnering organizations, several initiatives that affect bicyclists and pedestrians have been implemented by VDOT:

- Funding and support to the county's Department of Transportation for upgrading existing or constructing new bus shelters at various locations in the county.

- New and improved bike and pedestrian facilities on nine reconstructed bridges for the I-495 Express Lanes Project to connect with existing bike/pedestrian facilities.

- A new Telegraph Road to Eisenhower Path connector over I-95/I-495, constructed as part of the I-95/Telegraph Road interchange reconstruction project.

- A separated path crossing of I-95 that will be included with I-95 Northbound Flyover Ramp to Fairfax County Parkway (presently in design).

- Counting how many non-motorized users cross over interstate highways so this information can be used to justify pedestrian bridges or the addition of sidewalks, paths and shoulders on new or reconstructed bridges on the interstate highway system.

- Implementation of bicycle signal detection at the intersection of Soapstone Drive and South Lakes Drive in Reston.

- The provision of bicycle lockers, available for an annual rental fee, at several VDOT park-and-ride lots to assist with bicycle commuting.

- Dedication of two percent of VDOT's road paving funds to adding shoulders on Northern Virginia roadways at locations that will improve bicycle safety and travel. VDOT also collaborates with Fairfax County to identify pavement striping and bike-lane signage opportunities to add on-road bicycling facilities.

Additional resources about bicycling and walking are available on VDOT's website at: www.virginiadot.org/travel/nova-mainBicycle.asp

VDOT administers the Transportation Alternatives Program (formerly the Transportation Enhancement Program) for qualifying activities. At its June 2013 meeting, the Commonwealth Transportation Board allocated FY 2014 funds to sponsors in Fairfax County:

- $400,000 to Fairfax County for the continuation of the Mason Neck Trail along Gunston Road to connect Pohick Bay Golf Course and the Mason Neck State Park main entrance.

- $119,347 to Fairfax County for construction of Cross County Trail to connect Occoquan Regional Park and the Laurel Hill Greenway.

- $172,000 to the Town of Vienna for pedestrian improvements at the Vienna station and Washington & Old Dominion trail.

- $281,000 to the Town of Clifton for streetscape and pedestrian safety improvements on Main Street.

- $150,000 to the Town of Herndon for streetscape and pedestrian improvements in Historic Herndon.

Applications for FY 2015 federal Transportation Alternatives Program are due this November. More details are available at: www.virginiadot.org/business/prenhancegrants.asp.

B. MAJOR PUBLIC AGENCY RESPONSIBILITIES

1. Introduction

Although compliance with National Ambient Air Quality Standards and resulting air quality management responsibilities is a function of federal law, in Fairfax County and in other major metropolitan areas in Virginia these responsibilities have been split between the Commonwealth of Virginia and the regional lead planning organization as defined by Section 174 of the Clean Air Act. Fairfax County holds a seat on, and the county staff is required to support, the lead planning organization for the metropolitan Washington area, the

Metropolitan Washington Air Quality Committee. Members of MWAQC and all lead planning organizations are appointed by the governors of affected jurisdictions to represent areas included in air quality planning requirements. MWAQC works with state departments of transportation and transit providers in identifying transportation needs and priorities. The Transportation Planning Board makes transportation investment decisions for the metropolitan area and, by default, for the individual regions encompassed within MWAQC.

2. Commonwealth of Virginia

a. Virginia State Air Pollution Control Board

This board is authorized to propose policies and procedures for air quality regulatory programs, including emissions standards for landfills and vehicles.

b. Department of Environmental Quality

This department is responsible for establishing or adopting standards for air quality, as well as for performing air quality monitoring, stationary source inspection, new and existing source permitting and vehicular inspection and maintenance programs. Air quality enforcement is handled by DEQ.

c. Virginia Department of Transportation

This department is responsible for planning, developing, delivering and maintaining transportation for the traveling public.

3. Region – The Metropolitan Washington Council of Governments, the Metropolitan Washington Air Quality Committee and the National Capital Region Transportation Planning Board

COG is the Metropolitan Washington regional planning group that works toward solutions to regional problems related to air and water quality, transportation and housing. COG also manages other programs such as those responsible for forecasting demographic changes. MWAQC, which is a part of COG, partners with the air agencies to assist in the development of air quality plans as noted in Section 174 of the Clean Air Act. The authority of MWAQC is derived from the certifications made by the governors of Virginia and Maryland and the mayor of the District of Columbia. In Virginia, the roles of organizations like MWAQC, which function as local planning organizations under Section 174 of the Clean Air Act, are described in *The State Air Pollution Control Board's Regulations for the Control and Abatement of Air Pollution*, specifically at 9 VAC 5-151-70 et seq.

MWAQC was established to work cooperatively with state air agencies to conduct interstate air quality attainment and maintenance planning for the Metropolitan Washington region. Members are appointed and Fairfax County currently has three members of the Board of Supervisors on the committee. The Transportation Planning Board serves as the designated metropolitan planning organization for the Washington region and is responsible for regional transportation planning and conformity. The TPB is staffed by the Department of Transportation Planning, which is part of COG. Members of the TPB are appointed, and Fairfax County currently has four members of the Board of Supervisors sitting on the TPB. TPB and MWAQC work together on air quality and transportation issues. COG is also responsible for issuing air quality indices on a weekly basis. County staff from the Health Department attends MWAQC meetings to support the Fairfax County members.

a. MWAQC Technical Advisory Committee

This committee was established to advise and assist MWAQC in planning for and maintaining the region's air quality. Fairfax County is represented on the TAC by staff from the Health Department's Division of Environmental Health along with a member from the Fairfax County Federation of Citizens Associations. Members research, review and discuss technical issues and documents at monthly meetings to develop information and recommendations that are submitted to MWAQC members for their review and approval.

b. Interstate Air Quality Council

On May 31, 2005, Virginia Governor Mark Warner, Maryland Governor Robert Ehrlich, Jr., and D.C. Mayor Anthony Williams signed a Memorandum of Understanding creating the Interstate Air Quality Council. The council consists of six members: the secretaries of the environment and transportation from each of the three governments. The IAQC provides overall guidance and streamlined planning to ensure the states and the District meet their shared goals of improved air quality, including compliance with new federal standards for ozone and fine particulates, and efficient transportation. The IAQC works in concert with the air quality and transportation committees of COG to achieve its goals.

c. Forecasting Subcommittee

This subcommittee considers how to monitor and report the new eight-hour ozone standard and how to devise guidelines for issuing health alerts during the ozone season.

d. Attainment Subcommittee

This subcommittee considers evidence for the case that the Washington nonattainment area can attain the eight-hour ozone standard with the control measures already adopted.

e. Conformity Subcommittee

This subcommittee reviews Air Quality Conformity Determinations prepared by the TPB to ensure that regional transportation plans are consistent with plans to improve air quality. This includes verifying that estimated emissions from mobile sources, such as cars, trucks and buses, do not exceed the mobile budget, a cap on regional mobile emissions contained in the region's air quality plan.

f. Air Quality Public Advisory Committee

This committee was established to provide a way to brief residents on actions pending before MWAQC. This committee functions as an important source of feedback from the public on air quality concerns in the metropolitan area. The Air Quality Public Advisory Committee recently changed its name to the Air and Climate Public Advisory Committee to reflect the committee's mission that includes climate and energy policy as well as air quality issues.

g. Control Measures Workgroup

This workgroup was established to research control measures and develop a plan of emission reducing control measures for the region to implement in an effort to reach attainment for ozone.

4. MWAQC - Summary of Regional Air Quality Planning Efforts in 2012 and Anticipated Activities of MWAQC in 2013

a. MWAQC Committees

MWAQC met five times during the fiscal year. Continued operation of the MWAQC regional process was possible throughout the year due to the operation of the Executive Committee and the Technical Advisory Committee. The Executive Committee discussed issues and guided staff between full MWAQC meetings.

b. Citizen Support

MWAQC maintains an Air and Climate Public Advisory Committee in order to provide a conduit through which citizens can be briefed and

comment on the actions before MWAQC. The ACPAC continued to provide comments on how regional air quality information could be made more accessible to the public audience.

c. Overview of MWAQC Activities

- $PM_{2.5}$ Redesignation Request & Maintenance Plan: MWAQC developed a redesignation request and maintenance plan for the 1997 $PM_{2.5}$ NAAQS. DEQ submitted these final documents to EPA on June 3, 2013. These documents included mobile vehicle emissions budgets for $PM_{2.5}$ and NO_X for 2007, 2017 and 2025.

- Attainment Modeling: MWAQC staff also participated in the emissions inventory conference calls organized by the Mid-Atlantic Regional Air Management Association on a regular basis to keep track of the inventories currently being developed at MARAMA for the regional photochemical modeling. Staff also provided data inputs to MARAMA for developing the emissions inventories. Staff also kept track of various emissions control measures and rules being developed by the Ozone Transport Commission as part of the 2008 ozone standard (75 ppb) implementation plan.

- Transportation Conformity/Mobile Emissions Analysis: MWAQC commented on the transportation conformity analysis (2012 Constrained Long-Range Transportation Plan and 2013-2018 Transportation Improvement Program), which was developed in association with MWAQC. Conformity was tested against the approved eight-hour reasonable further progress, attainment year, and contingency mobile budgets in the region's ozone SIP, winter carbon monoxide (CO) mobile budgets in the CO maintenance plan, and the base year 2002 interim emissions test ("build no greater than 2002" test) based on the base year 2002 emissions in the region's $PM_{2.5}$ SIP. The above conformity analysis showed current and future mobile emissions lower than the ozone and winter CO mobile budgets and lower than the 2002 $PM_{2.5}$ emissions, which is the required test. MWAQC cautioned TPB that a more stringent federal standard for ozone is expected soon and urged state and local governments to maintain their commitments to emission reduction measures.

- Air and Climate Public Advisory Committee: ACPAC received briefings on: electric vehicle issues; the solar cooperative movement in the region; the Regional Climate Adaptation Guidebook; air quality forecasting; regional transportation issues as they relate to air quality; regional climate/energy legislative priorities; and more. The Air Quality Public Advisory Committee actively engaged in advising on the development of the 2013-2016 CEEPC Action Plan and climate/energy

priorities, draft regional transportation priorities, and regional outreach campaign ideas.

- Climate Change and Air Quality Technical Support: MWAQC staff provided technical support to the Climate Energy Environment Policy Committee, created in 2009 to implement recommendations in COG's Climate Change Report. Staff worked with area utilities on a format for reporting progress on regional climate and energy initiatives. Staff received data from utilities in 2012 for calendar year 2013 electricity and natural gas consumption. The data are used to measure progress on reducing greenhouse gas emissions from the 2005 baseline. In 2012, the Regional Tree Canopy Work Group continued to develop a Tree Canopy Management Strategy, which is expected to be released in early 2014.

d. MWAQC FY 2014 Work Program

MWAQC and the states will continue to lay the groundwork for meeting the 2008 ozone NAAQS, including developing a draft rate of progress plan for the Washington, DC-MD-VA region.

In FY 2013, MWAQC Core Program tasks include:

- Plan for ozone control measures, SIP for 2008 Ozone NAAQS.
- Develop ozone inventories for new SIP.
- Track attainment modeling for ozone SIP.
- Support multi-pollutant, multi-sector control strategy for ozone SIP.
- Use MOVES model in transportation conformity.
- Develop MOVES mobile inventories for ozone SIP.
- Track local government Supplemental Measures (formerly Voluntary Bundle) in the Annual $PM_{2.5}$ and Ozone SIPs.
- Track EPA's designation process for SO_2 standard for the Washington region.
- Quantify benefits of local energy efficiency projects for SIP credit
- Develop tracking metrics for regional greenhouse gas emissions inventory.
- Coordinate air quality planning with state and local Clean Energy Programs.
- Review transportation conformity analyses for ozone, fine particles and carbon monoxide.

C. STEWARDSHIP OPPORTUNITIES

Residents of Fairfax County have many opportunities to contribute to improvements in air quality. While some of the Metropolitan Washington area ozone problem originates outside of the area and is beyond the control of Virginia, Maryland and the District of Columbia, there are many aspects of our daily lives that can affect the quality of our air. A significant contributor to air quality issues is vehicle miles traveled. As discussed above, Virginians drive many millions of miles each year. Reducing the amount of driving, as well as the use of other combustion devices, especially during times where ground-level ozone is of concern (e.g., on hot days with lots of sun and little or no wind), can help to improve air quality. Examples of actions that can be taken include: carpooling; taking mass transit; reducing or postponing lawn-mowing; paving and outdoor painting; limiting vehicle idling; bringing a lunch to work; avoiding drive-thru windows; and refueling after dark.

The following are tips provided on the Clean Air Partners website (www.cleanairpartners.net):

Small Changes Make A Big Difference

Begin the day right. Check today's air quality forecast and modify your plans if unhealthy air quality is predicted. Protect yourself and others in your care, by taking the appropriate actions. Making small changes in your lifestyle at home, at work, and on the road can make a big difference.

At Home:

- *Postpone mowing and trimming or use electric garden equipment.*
- *Postpone painting or use water-based paint instead of oil-based paint.*
- *Replace your charcoal grill with a propane gas grill.*
- *Choose ENERGY STAR™ appliances and lighting.*
- *Cut back on heating and air conditioning when you can and turn off lights and appliances when not in use.*
- *Clean heating filters each month.*

At Work:

Employers have a unique opportunity to make a difference. They can promote programs that help employees make positive lifestyle changes. For example, employers can encourage staff to use public transportation or carpool. Employers also can give employees the option of working from home. Encourage employees to sign up for AirAlerts, a free service that delivers air quality information straight to their inbox http://www.cleanairpartners.net/airalert.cfm.

On the Road:

- *Keep driving to a minimum.*
- *Fill up your gas tank during evening hours. Avoid spilling gas and "topping off" the tank. Replace gas tank cap tightly.*
- *Have your car tuned regularly by replacing the oil and air filter, and keep tires properly inflated and aligned.*
- *Carpool or use public transportation when possible.*
- *Combine your errands into one trip.*
- *Avoid revving or idling your engine.*
- *Avoid long drive-through lines; instead, park your car and go in.*
- *Looking for a new vehicle? Consider purchasing a fuel-efficient model or a hybrid that runs on an electric motor and gasoline engine.*

D. COMMENTS

1. EQAC performed extensive follow up with DEQ and others about Fairfax County's plans to cease the operation of the four ozone air quality monitors and has expressed concerns about the elimination of those ozone monitors. In April 2010, EQAC provided a recommendation that the Fairfax County Board of Supervisors provide comments to DEQ regarding its Annual Air Monitoring Network review. Specifically, EQAC recommended that the Board of Supervisors request that DEQ include one or more of the existing Fairfax County ozone monitors in its future monitoring plans. Given the historically higher level of ozone concentrations at the Mount Vernon station, as compared to the other county-run stations, EQAC recommended that the Board of Supervisors request that DEQ include the Mount Vernon station in the regional monitoring plans. The board referred this issue to its Legislative Committee, which discussed the matter in September 2010; EQAC's recommendation was not provided to DEQ. EQAC plans to continue to follow this issue over the course of the next several years as additional data become available.

2. EQAC appreciates that Health Department staff from the Division of Environmental Health will continue to perform limited air quality planning duties. This includes participation in and attendance at Metropolitan Washington Council of Governments' Air Quality Committee meetings and meetings of the Technical Advisory Committee and subcommittees. In addition, Health Department staff will: collaborate with other local, regional and national air quality organizations, such as Clean Air Partners; provide support to address board matters related to air quality and the environment; coordinate with other county agencies on efforts to reduce air pollution and perform annual county survey to assess progress toward SIP commitments; serve on county groups and committees such as Environmental Coordinating Committee and Environmental Improvement Program Action Group; perform legislative reviews; and participate in outreach events and encourage county residents and others to take voluntary actions to improve air quality.

3. EQAC supports the efforts of Fairfax County, VDOT, and the Commonwealth Transportation Board to provide funding to programs that further the availability and use of non-motorized transportation alternatives for Fairfax County. This includes the efforts by the Fairfax County Board of Supervisors, which has directed FCDOT to lead the effort to improve bicycle and pedestrian safety and mobility, including constructing bicycle and pedestrian improvements in high-priority areas of Fairfax County. Through FY 2016, the board has designated over $110 million in federal, state and county funding to construct over 300 high-priority bicycle and pedestrian improvement projects throughout the county. These include projects on major roadways, in activity centers, providing access to Metro stations and completing neighborhood missing links. Further, efforts by VDOT to dedicate two percent of its road paving funds to adding shoulders on Northern Virginia roadways at locations that will improve bicycle safety and travel are appreciated.

E. RECOMMENDATIONS

None.

F. REFERENCES

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ANNUAL REPORT ON THE ENVIRONMENT

CHAPTER IV

WATER RESOURCES

IV. WATER RESOURCES

A. ECOLOGICAL OVERVIEW

Water resources include streams, ponds, lakes and groundwater. These resources serve as sources of drinking water, recreation, stormwater conveyance and habitat for numerous organisms. These water bodies can be significantly impacted by land disturbances and surface runoff. Over the past decade, Fairfax County has demonstrated a strong commitment to restore and protect its water resources through a variety of management efforts and public outreach initiatives. Unless water resources are managed properly, increasing demands put on watersheds, such as rapid development, can create many problems.

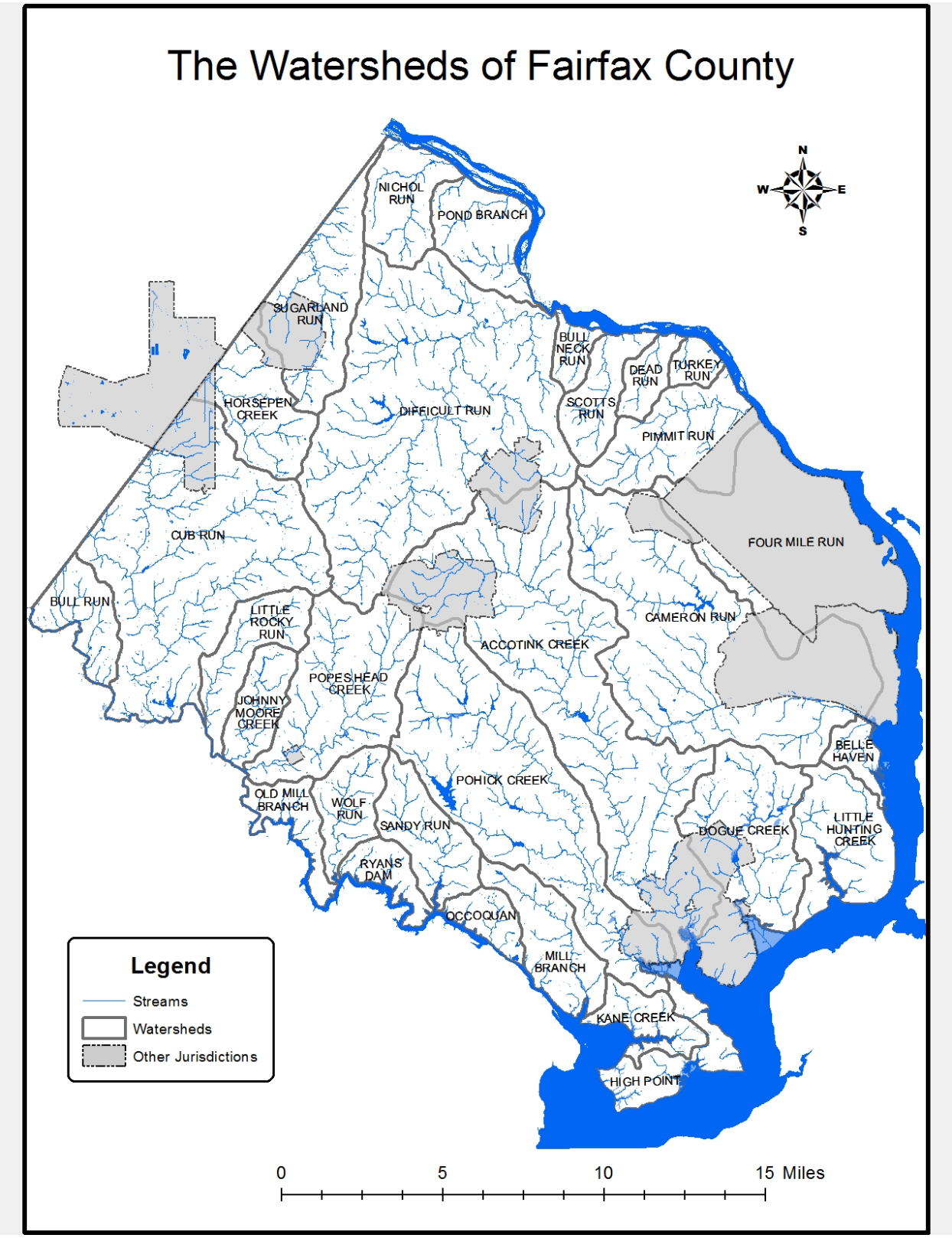
1. Watersheds

A watershed is a discrete area of land that drains to a common stream, river system or larger body of water. Watersheds include both surface water and groundwater. Everyone lives in a watershed. Large watersheds typically have sub-watersheds. There are 30 separate watersheds in Fairfax County (Figure IV-1). The largest watershed is Difficult Run (58 square miles) with ten streams that drain into the main stream, Difficult Run, which, in turn, drains into the Potomac River. The Potomac River watershed is a sub-watershed of an even larger watershed, the Chesapeake Bay watershed, which has an area of 64,000 square miles and includes portions of the states of New York, Pennsylvania, Delaware, West Virginia, Maryland and Virginia as well as the District of Columbia. All Fairfax County streams are in the Potomac River watershed and subsequently the Chesapeake Bay watershed.

2. Streams

Fairfax County is criss-crossed by a number of streams, often called runs or creeks. These streams are important aquatic habitats. Rainfall soaks into the earth and drains to low points in the surrounding land, and then emerges from the ground as seeps, springs and trickling headwaters. These small streams join with others in the same drainage area to create a stream system. There is a natural progression in size from the smallest tributaries to the largest rivers into which they eventually flow. Perennial streams flow throughout the year and intermittent streams flow only part of the year. There are approximately 860 miles of perennial streams in Fairfax County. One-third of the land in the Fairfax County Park system, approximately 7,000 acres, is comprised of stream valleys. These stream valleys are significant corridors for wildlife and the county trails system.

Figure IV-1: Fairfax County Watershed Map



The bottom, or bed, of a stream can consist of boulders, cobbles, gravel, sand and/or silt. The type and amount of substrate in a stream makes up the in-stream habitat. Within a stream are shallow, fast flowing areas called riffles. Dissolved oxygen levels are high because water is flowing over rocks, mixing air into the tumbling water. Alternating with riffles are deeper pools and runs where flows slow and particles of inorganic and organic matter fall to the bottom and oxygen levels are reduced. Streams support a diverse community of plants and animals that spend all or part of their life cycles in the water.

The aquatic food chain begins with leaves and other decaying plant and animal material called detritus. These materials are carried into the stream from the surrounding forests and fields by wind and water runoff. Aquatic vegetation such as algae is also an important food source. Benthic (bottom–dwelling) macro (large) invertebrates (without a back-bone) eat this organic matter. Benthic macroinvertebrates include aquatic insect larvae such as stoneflies, mayflies, caddisflies and true flies as well as snails, clams, aquatic worms and crustaceans such as crayfish. Fish, birds and other streamside wildlife, such as frogs, salamanders and small mammals, eat these macroinvertebrates.

3. Riparian Buffers

The area of trees and other types of vegetation adjacent to and lining the banks of streams is called a stream buffer or a riparian area. These areas are essential for healthy streams. The temperature in a stream greatly affects how much oxygen it can hold. Since cooler water holds more oxygen, shade providing trees and vegetation are vital along the edges of streams to help maintain cooler water temperatures so the water will hold more oxygen.

Tree cover provides food and shelter when leaves and branches fall into a stream. Streamside forests offer food, nesting sites and protection to a great diversity of wildlife, including birds, turtles, beaver and snakes. Tree roots help stabilize stream banks and provide cover for fish, crayfish and aquatic insects. Riparian areas help slow down and filter runoff. Excess nutrients carried in runoff are absorbed by vegetation.

B. IMPACTS ON WATER RESOURCES

1. Point and Nonpoint Source Pollution

Water pollution originates from either nonpoint or point sources. Nonpoint sources include surface runoff, atmospheric deposition and groundwater flow. Because of their diffuse and intermittent nature, nonpoint source pollution is difficult to control. Nonpoint source pollutant loads are greatest following rainfall and high flow events. A significant part of the nonpoint source load consists of nutrients, including nitrogen and phosphorus (organic matter, fertilizer), which stimulates algal growth. Other nonpoint source pollutants are sediment (from erosion, construction sites, eroded stream banks, road sand), toxics (oil, paint, pesticides, chemicals and metals), pathogens and bacteria (animal waste, failing septic systems and leaking sewer systems) and trash.

Point sources are specific locations that discharge pollutants such as a discharge pipe. Because they are relatively constant and provide a steady flow of pollutants, they are easier to monitor and control. In the Potomac River watershed, most point sources are wastewater treatment plants or industrial discharges. Unlike nonpoint sources, point sources contribute relatively small portions of the nutrient loads during high flows and the majority during low flows.

2. The Effect of Imperviousness

As development occurs, natural areas that once had vegetative cover capable of absorbing water and filtering pollutants are replaced by impervious surfaces such as roads, driveways and buildings. With the increase in impervious surface and loss of vegetative cover, there is a concurrent increase in the amount and speed of stormwater runoff flowing into streams. Increased uncontrolled runoff causes stream erosion, resulting in scouring, down cutting and over-widening of stream channels and loss of streamside vegetation. Loss of shade results in increased water temperatures. During summer storms, runoff from heated impervious surfaces also raises water temperatures. In urban and suburban watersheds, rain flows off impervious surfaces such as parking lots and highways, carrying oil and other automobile wastes into streams. When stream channels become incised from down cutting, they become disconnected from their floodplains. Water cannot get out of the banks onto the adjacent floodplain where flows can be dissipated and drop their sediment loads. High flows stay in the channel, resulting in increased erosion. Silt and sediment from erosion smother the stream bottom and destroy in-stream habitat for sensitive benthic macroinvertebrates.

Simultaneously, this results in an increased number of floods in downstream areas, due to the increased volume of water. Over time, increased erosion, flooding and sediment deposition leads to habitat loss, water quality problems and damage to utilities and infrastructure.

C. SURFACE WATER MONITORING AND ANALYSES

The Fairfax County Department of Public Works and Environmental Services, Fairfax County Park Authority, Virginia Department of Environmental Quality, local water treatment plants and other organizations regularly conduct water quality monitoring and testing. The Northern Virginia Soil and Water Conservation District also collects monitoring information through its volunteer water quality monitoring programs. All of these data help provide a comprehensive understanding of the condition and health of Fairfax County's water resources.

1. Countywide Watershed and Stream Assessments

a. Stream Protection Strategy Baseline Study

The Stream Protection Strategy Baseline Study, published in 2001, provides a holistic ecological base-line assessment of county streams. The study provides information on fish taxa, benthic macroinvertebrates, general evaluation of watershed and stream features and calculations of the percent impervious cover within each watershed. The Stream Protection Strategy Baseline Study can be viewed online at: www.fairfaxcounty.gov/dpwes/environmental/sps_main.htm.

b. 2012 Annual Report on Fairfax County's Streams (now the Stormwater Status Report)

i. Overview of Biological Monitoring

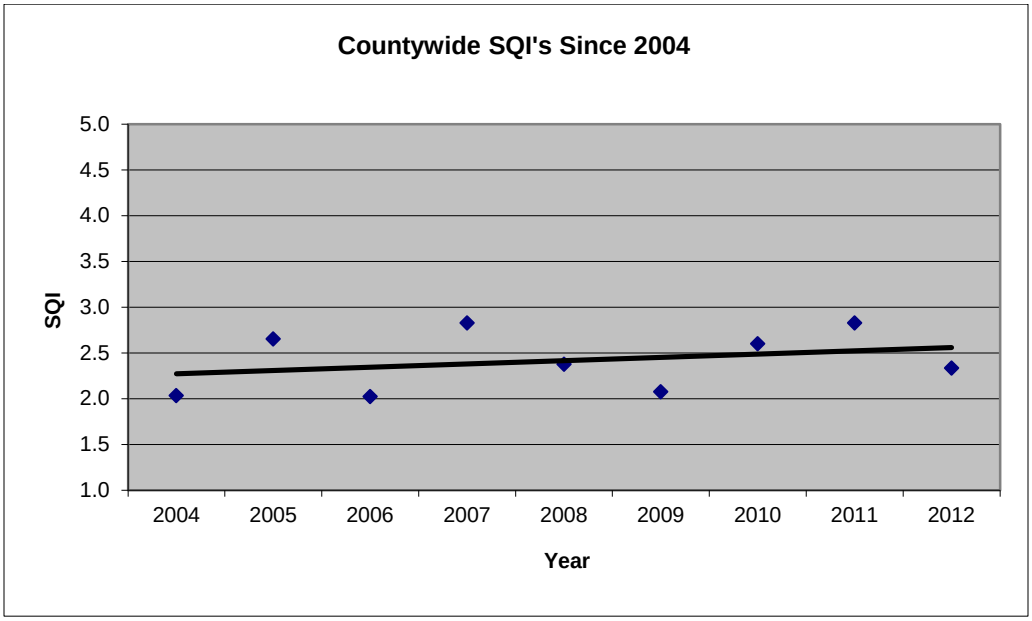
This report provides data from sampling efforts conducted in 2012 and documents overall stream conditions based on the health of fish and benthic macroinvertebrate communities. In addition, the potential human health risk associated with wading or swimming in streams is assessed based on analyses of *E. coli* bacteria.

The Fairfax County biological stream monitoring program includes annual sampling of fish and macroinvertebrate communities in wadeable, non-tidal freshwater streams. Countywide biological monitoring is conducted using a probabilistic design approach, whereby statistically valid inferences may be made about the condition of the county's streams. Each year, all potential sampling sites are stratified by stream order (first through fifth order) and 40 sites are selected randomly for monitoring. At these sites, samples are collected for both benthic macroinvertebrates and fish (once annually) and for *E. coli* bacteria concentration quarterly. Water quality and stream habitat characteristics are also evaluated. The previous year's annual stream reports are available online at http://www.fairfaxcounty.gov/dpwes/stormwater/stormwater_status.htm and http://www.fairfaxcounty.gov/dpwes/stormwater/streams/streamreports.htm . Figure IV-2 presents a summary of trends in a countywide Stream Quality Index.

A total of 52 sites were sampled in 2012: the 39 sites randomly selected in Fairfax County plus 11 Piedmont reference locations in Prince William National Forest Park and two Coastal Plain reference sites in the Kane Creek watershed of Fairfax County. Of the 39 sites selected, 19 were randomly sampled for fish. Results from the 39 randomly selected sites suggest that approximately 62 percent of the county's waterways are in "Poor" to "Very Poor" condition based on a decrease in biological integrity of streams and 58 percent are in "Poor " to "Very Poor" based on fish sampling in 15 streams. This is a decrease in the

biological ratings compared to previous years. This may be a result of the random site selection (it is possible for a group of lower quality sites to be chosen in some years). Over the past nine years, a small increase in the benthic Index of Biological Integrity scores has emerged. As future sampling results are added, a trend in biological integrity should begin to emerge.

Figure IV-2: Trends in the Countywide Stream Quality Index



Source: 2012 Fairfax County Stormwater Status Report

The 2011 Stream Quality Index showed an increase in overall stream quality from 2010. This year's data reflect a downward trend. This index will be reported annually to evaluate long-term trends in the overall health of streams. As more data are reported annually, emerging trends can be identified with greater certainty.

The 2012 Stormwater Status Report states the following [note—some of this discussion is paraphrased]:

> *Over the past nine years, a small increase in the benthic IBI scores has emerged. As future sampling results are added, a trend in biological integrity should begin to emerge.*
>
> *Benthic IBI has been calculated in the past by comparing data collected in the county against the reference data collected that same year. Now that there are enough years' worth of reference data available, the Benthic IBI is calculated using the cumulative reference data collected over the past five years. This process will reduce the variability in the*

> *IBI created by yearly disturbances to the reference sites (i.e. drought). This change is the reason previous years' reports show different SQIs than the ones shown in* [figure IV-2].

The monitoring program is part of the framework to establish a baseline to evaluate future changes in watershed conditions. Monitoring results from 2008 through 2012 were reported in Fairfax County Stormwater Status Reports, which may be viewed at http://www.fairfaxcounty.gov/dpwes/stormwater/stormwater_status.htm. Monitoring results from 2005 through 2007 may be found in Annual Reports on Fairfax County Streams at http://www.fairfaxcounty.gov/dpwes/stormwater/streams/streamreports.htm.

In 2012, the Stormwater Planning Division completed its ninth year collecting data for the bacteria monitoring program since acquiring the program from the Fairfax County Health Department. However, the collection of bacteria data was temporarily suspended in 2011 during which time the program was re-evaluated in light of pending regulatory requirements. In January 2012, sampling efforts resumed.

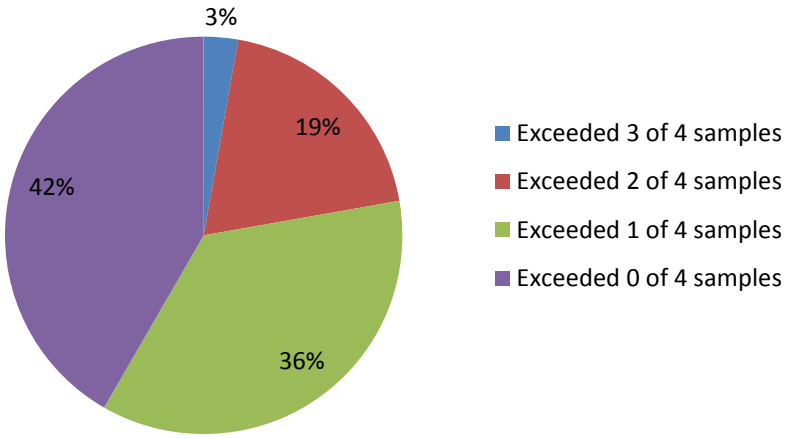
To determine levels of *E. coli* in county streams, grab samples of stream water were taken at 36 sites in 15 watersheds throughout the county. Staff collected samples four times during the year. Sites are normally sampled four times during the year for the bacteria, *E. coli*. Samples are processed at the Fairfax County Health Department laboratory.

According to the Virginia Department of Environmental Quality, the following standard now applies for recreational contact with all surface water:

> *E. coli shall not exceed a geometric mean of 126 per 100 ml of water or exceed an instantaneous value of 235 per 100 ml of water.*

In 2012, 42 percent of Fairfax County's bacteria monitoring locations were consistently below VDEQ's standard of 235 units per 100 ml of water (Figure IV-3). Fairfax County staff concurs with officials from VDEQ and the Virginia Department of Health, who caution that it is impossible to guarantee that any natural body of water is free of risk from disease-causing organisms or injury.

Figure IV-3: 2012 Sampling Sites: Percentage of Samples Exceeding State Standards for *E. coli*



Source: 2012 Fairfax County Stormwater Status Report

ii. Dry and Wet Weather Screening

In 2012, the county selected 106 outfalls in its Municipal Separate Storm Sewer System for dry weather screening and recorded physical parameters at each outfall. Water was found to be flowing at 44 of the outfalls and was tested for a range of pollutants (ammonia, conductivity, surfactants, fluoride, pH, potassium, phenol, copper, and chlorine) using field test kits. . Of the outfalls tested, 23 required follow-up investigations because they exceeded the allowable limit for at least one pollutant. Of the 23 sites that required a retest, 21 have been completed. Upon retesting these sites, 12 continued to exceed the screening criteria, and further testing was conducted in an attempt to track down the source. This track down procedure consisted of using the county's GIS mapping system. A map of the county's storm drainage system was printed from the GIS and used to track the storm network upstream of each site. Staff recorded observations of flowing water and land use, and tested the water where flow was found. This procedure was followed up the network of storm sewer pipes until the source was found or there was no flowing water.

As reported in the 2012 Stormwater Status Report:

> *One of the track downs had very minimal flow and the source could not be determined. One of the sites resulted in finding that a building's cooling tower had sprung a leak and was draining down through the roof drains. The cooling tower has since been fixed and the discharge eliminated. Another trackdown resulted in finding that a cooling tower on a second building had its drain pipe left open. The drain has since been closed which has eliminated the discharge. Another trackdown found that an interior water feature of a building had its drain valve accidentally left open. The building engineer*

closed the valve which resulted in elimination of the discharge. One retest resulted in finding that a T-shirt company located in the City of Fairfax had one of its drains connected to stormwater instead of sanitary. The dye from the company that should have been going to sanitary instead was turning the stream blue. The county and city staff are working with the company to correct the problem. The remaining two trackdowns are from fluoride exceedances and have been followed up to buildings and are assumed to be cooling tower discharges. The remaining 12 trackdowns are currently being investigated and consist of exceedances in pH, copper and fluoride limits.

In 2010, the county solicited a proposal to review and update its Wet Weather Screening and Industrial High Risk Monitoring program. Wet weather screening/monitoring was conducted during 2012 using the previously developed "Wet Weather Site Selection and Screening Plan" (2006). Eight sites have been monitored twice each for the analytes listed in Appendix A of the county's MS4 permit and for metals. The preliminary water quality analysis indicates that the runoff from the eight sites is not a significant source of pollutants to the MS4. The Wet Weather Screening Program selected and field screened 20 sites and will monitor a total of 10 sites. These sites were identified in industrial, commercial and other high risk areas and ranked according to the county land use code and potential to contribute pollutants to the MS4.

c. Physical Stream Assessment

Completed in 2004, the Stream Physical Assessment Study provides field reconnaissance data for the county's watershed management plans including information on habitat conditions, impacts on streams, general stream characteristics and geomorphic classification of stream type. The Countywide Stream Assessment can be obtained by going to http://www.fairfaxcounty.gov/dpwes/stormwater/psa-update.htm or by contacting the Fairfax County Stormwater Planning Division at 703-324-5500. TTY 711

d. Perennial Stream Mapping

In 2003, the Board of Supervisors adopted a revised Chesapeake Bay Preservation Ordinance in order to comply with amendments to the state's Chesapeake Bay Preservation Area Designation and Management Regulations. The ordinance incorporated changes to the designation criteria for Resource Protection Areas to include water bodies with perennial flow, resulting in a significant expansion to the county's RPAs. Fairfax County's Chesapeake Bay Preservation Ordinance is available on-line at: http://www.fairfaxcounty.gov/dpwes/environmental/cbay/.

On November 17, 2003, based on the Perennial Streams Identification and Mapping program conducted by staff of the Department of Public Works and Environmental Services, the Board of Supervisors adopted new Chesapeake Bay Resource Protection Area maps, increasing the amount of stream miles protected by 52 percent (from 520 to 860 miles).

In 2004, the Quality Assurance/Quality Control Study of the Perennial Streams Identification and Mapping was conducted. A total of 10 percent of the streams initially surveyed between 2002 and 2003 were selected for the QA/QC study. The results of the QA/QC Study were presented to the Board of Supervisors in 2005 along with revised Chesapeake Bay Preservation Area Maps, which were approved.

The Fairfax County Stream Classification Protocol, Field Data Sheets, QA/QC study and the county's revised map of Chesapeake Bay Preservation Areas are available online at: www.fairfaxcounty.gov/dpwes/watersheds/perennial.htm.

The countywide RPA map is changed occasionally to update site-specific perenniality classification changes. Additions to the RPA map are approved by the Board of Supervisors. Removal of RPAs is approved administratively through the plan review process.

e. U.S. Geological Survey Monitoring Network

In June 2007, a joint funding agreement between the DPWES Stormwater Planning Division and the United States Geological Survey was signed by the Board of Supervisors. This agreement established a study designed to be an ongoing, long-term (five-10 year) monitoring effort to describe countywide conditions and trends in water-quality (e.g. nutrients and sediment) and water-quantity. Ultimately, the information gathered will be used to evaluate the benefits of projects implemented under the watershed planning program.

The monitoring network designed to fulfill the objectives of the study originally consisted of four automated continuous water-resources monitoring stations and 10 less-intensely monitored sites. This base network was expanded in 2012 and is now comprised of five automated stations and 15 less-intensely monitored sites. Four automated stations were constructed in 2007 and achieved full operational capability in 2008 and a fifth station was constructed in 2012 and became fully operational in June 2013. . Instruments at these stations collect stream flow and water quality (water temperature, pH, specific conductance, and turbidity) data every 15 minutes; data are then transmitted via satellite and posted to a USGS Web page hourly. These automated stations also capture storm event samples to be analyzed for sediment and nutrient concentrations. Additionally, samples are collected monthly at all 20 sites under various hydrologic conditions and analyzed for the same suite of constituents. Nutrient analyses are conducted by the Fairfax County Environmental Services Laboratory and the suspended sediment analyses are conducted by the USGS Eastern Region Sediment Laboratory.

Data for this study are compiled based on the USGS "Water Year," which for 2012 ran from October 1, 2011 through September 30, 2012. Samples from the expanded network began on October 9, 2012, so they are excluded from the data below.

As reported in the 2012 Stormwater Status Report:

Continuous Data Collection

- *Continuous water-quality and streamflow data were collected at the four base network intensive monitoring stations throughout the water year with no significant interruptions in data collection.*

- *Streamflow data were collected at five minute intervals, resulting in as many as 105,000 measurements per year.*

- *Continuous water quality data (water temperature, specific conductance, p, and turbidity) were collected at 15 minute intervals, resulting in as many as 35,000 measurements per year.*

- *All data collected can be accessed online at http://va.water.usgs.gov/projects/goog/fairfax.htm.*

Discrete Data Collection

- *Grab samples were collected monthly at all 14 base network monitoring stations, resulting in 186 samples collected and analyzed (including QA samples). Streamflow and water quality data were measured at the time of sampling and samples were analyzed for nutrients and suspended sediment concentration.*

- *Storm event samples were collected using automated samplers at the four base network monitoring stations. These samples were collected in response to elevated turbidity and streamflow conditions during storms, resulting in the collection of 105 samples that were analyzed for the same suite of nutrients and suspended sediment concentration as the monthly grab samples.*

- *A total of 52manual streamflow measurements were made across the 14 sites to support the maintenance of the streamflow rating curve for each site.*

Preliminary evaluations of general patterns in water-quality conditions have been conducted. Results of these evaluations demonstrate that the nutrient and sediment yields from streams in Fairfax County are comparable with yields measured in other urban/suburban areas of the eastern United States. These evaluations will be furthered to explore relations between environmental setting, land use and water-quality conditions in an upcoming publication.

The monitoring network was expanded in fall 2012 (beginning of 2013 water year) to include one additional intensive monitoring station and five additional less-intense monitoring stations. These stations were added to improve the spatial

distribution of monitoring stations in the county and to incorporate smaller drainages with greater amounts of planned BMP implementation.

Data collected under this study is publicly available online at: http://va.water.usgs.gov/projects/ffx_co_monitoring.htm and http://www.fairfaxcounty.gov/dpwes/stormwater/usgs.htm

2. Volunteer Water Quality Monitoring Programs

The Northern Virginia Soil and Water Conservation District continued its successful volunteer stream monitoring program in 2012. This program supplements the county's stream bioassessment program. The data collected support the findings of the county's program and help to provide trend data. The data can also alert staff to emerging problems. Trained volunteers assess the ecological health of streams using the enhanced Virginia Save Our Streams protocol. Monitoring includes biological and chemical aspects and a physical habitat assessment. NVSWCD provides training, equipment, support, data processing and quality control; there are currently more than 100 certified monitors. Data collected by volunteers are shared with Fairfax County, VDEQ, Virginia Save Our Streams and other interested organizations or individuals. The data help to confirm findings of biological monitoring performed by county staff, provide information on trends and can serve as a first alert in areas where the county may monitor only once in five years. The program also builds awareness of watershed issues among participants.

Approximately 30 volunteers collected data at 25 sites four times during 2012. In addition, 34 public stream monitoring workshops and field trips were held throughout the county and 532 county residents attended. At each workshop or field trip, biological monitoring was performed and information was presented on stream ecology, stormwater runoff, urban hydrology and watersheds. The program builds awareness of watershed issues among the participants.

Volunteer monitors and monitoring sites that had been part of the former Audubon Naturalist Society's Water Quality Monitoring Program have been integrated into the Volunteer Stream Monitoring Program coordinated by NVSWCD.

Reston Association is among the organizations that participate in the monitoring program using the SOS protocol, and it submits data on Reston streams to NVSWCD. Currently, 11 sites are monitored by 24 volunteers.

A monthly *Watershed Calendar*, listing training and other events of interest, is emailed to 1,000 recipients. More information about these events and about the NVSWCD volunteer monitoring program can be found at http://www.fairfaxcounty.gov/nvswcd/monitoring.htm.

3. Fairfax County Park Authority Stream Monitoring

a. Stream Monitoring in Parks

The Fairfax County Park Authority continues to support volunteer stream monitoring programs through its partnership with the Northern Virginia Soil and Water Conservation District.

During 2012-2013, the Park Authority supported ongoing stream monitoring programs at the following parks, with sampling conducted primarily by volunteers:

- Horsepen Run at Frying Pan Farm Park.
- Wolftrap Creek at Foxstone Park, Vienna.
- Old Courthouse Spring in Old Courthouse Stream Valley Park, Tysons.
- Holmes Run Stream Valley Park below Lake Barcroft.
- Holmes Run Stream Valley Park near Roundtree Park.
- Pohick Creek, near the southern end of the Cross-County Trail.
- Accotink Creek at Eakin Park.
- Accotink Creek at Accotink Creek Stream Valley Park.
- Accotink Creek at Lake Accotink.
- Rocky Run at Greenbriar Park.
- Rocky Run at EC Lawrence Park.
- Walney Creek at EC Lawrence Park.
- Piney Branch Stream Valley.
- Colvin Run in Lake Fairfax Park.
- Scotts Run at the Nature Preserve.
- Difficult Run at Tamarack.
- Difficult Run near Great Falls.
- Huntley Meadows.

b. Update on water quality monitoring project in Huntley Meadows Park

Huntley Meadows Park staff conducted water quality monitoring at three sample sites in 2012. All three sites were sampled in both the spring and summer. During years prior to 2011, six sites were sampled--three on Dogue Creek and three on Barnyard Run. However, in 2011 the Watershed Planning & Assessment Branch of the Department of Public Works and Environmental Services took over the analysis of Dogue Creek. Huntley Meadows Park staff will continue sampling the three sample sites along East Barnyard Run. The analysis conducted by the WP&AB of DPWES is a much more complex and detailed assessment than done by site staff at Huntley Meadows Park. The Dogue Creek data are included in the DWPES stream monitoring annual report. The Rapid Bio-assessment II monitoring protocol was used at all three remaining sites sampled by Huntley Meadows Park staff.

With respect to results from the monitoring (see Figure IV-4), Water Quality scores are based on the numbers and tolerance levels of the macroinvertebrate families collected during sampling: scores of zero to eight are unacceptable; nine to 13 are partially acceptable; and 14 to 24 are acceptable. The Barnyard Run watershed includes the Central Wetland, and samples were collected at three different locations: the Central Wetland Inflow, the Central Wetland Reservoir and the Lower Wetland Reservoir. All three sites were sampled in spring 2012; two methods of sampling were pursued in order to ensure that the full extent of fauna at each of the sampling sites was identified accurately. The "live pick" method was a field evaluation of macroinvertebrates, while the "full square" method was a more comprehensive analysis of fauna within randomly-selected "squares" in a grid. For the latter method, the entire square was collected and stored in alcohol for laboratory analysis. Scores for all sites are as follows: For live pick and full square, CWI scored six and nine, CWR scored nine and 12, and LWR scored 12 with no full square sample, respectively.

The sites were once again sampled in the summer with the exception of the LWR location. The LWR site was completely dry during the summer months so a summer sample was impossible to collect. The summer scores for the sites were as follows: for live pick and full square, CWI scored six and six, and CWR scored six with no full square sample, respectively.

4. Virginia Department of Environmental Quality

a. Overview

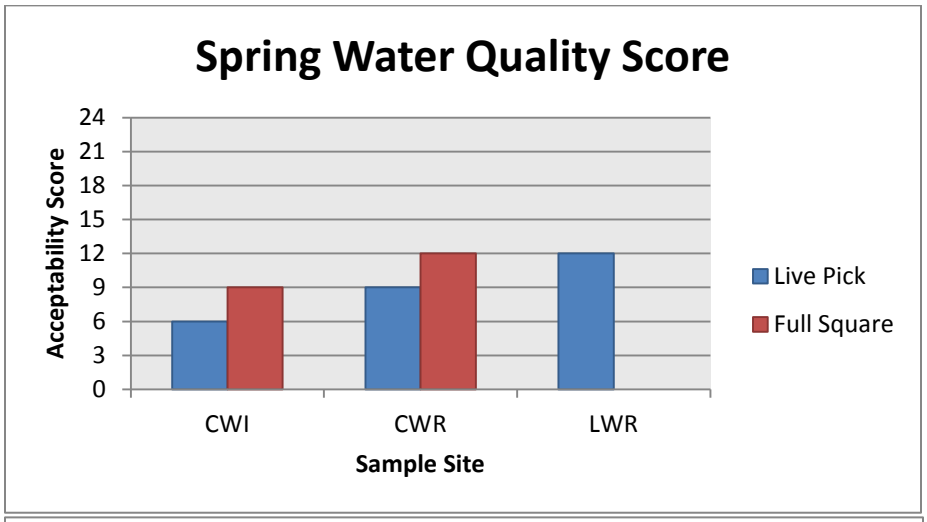
VDEQ performs long-term trend monitoring at 31 stations in 22 water bodies that are either in Fairfax County or border the county:

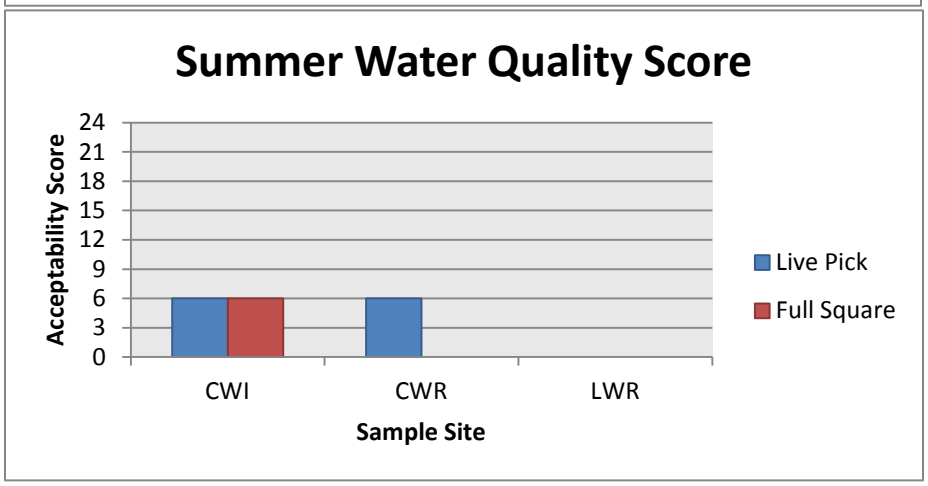
- 13 stations are long term, trend monitoring stations.
- Biological monitoring data were collected at one station.
- 10 stations were sampled to collect data to assist in the development of the Potomac Tributary TMDL.

b. Probabilistic Biomonitoring and Chemical Monitoring Program in Virginia Non-Tidal Streams

VDEQ's probabilistic monitoring program began in spring 2000. This program consists of three sampling components: a thorough examination of the benthic macroinvertebrate community utilizing the EPA's Rapid Bioassessment Protocols; sampling a full suite of chemical parameters in water and sediment; and a physical habitat evaluation at each station. The stations are biologically sampled twice a year. Chemical sampling is performed each spring and fall in conjunction with biological monitoring. The physical habitat evaluation is conducted each fall when the biological monitoring is performed. There were no probabilistic monitoring

Figure IV-4: Water Quality Scores for Huntley Meadows Park Water Quality Monitoring: Spring and Summer 2012





CWI: Central Wetland Inflow; CWR: Central Wetland Reservoir; LWR: Lower Wetland Reservoir

sites in Fairfax County in 2012. Since 2004, as part of the probabilistic program, VDEQ has participated in a grant study with the National Academy of Sciences to collect data on periphyton/algae in freshwater systems. Samples for that study are collected at every probabilistic monitoring station each fall.

5. Potomac River Monitoring

a. Metropolitan Washington Council of Governments Chain Bridge Monitoring Program

Since 1983, the Metropolitan Washington Council of Governments has contracted with the Occoquan Watershed Monitoring Laboratory to operate the Chain Bridge monitoring station on the Potomac River. The purpose of this monitoring station is to measure water quality in the Potomac River as it crosses the fall line and enters the Potomac estuary. Parameters collected include dissolved oxygen, biological

oxygen demand, turbidity, temperature, conductivity, total suspended solids, fecal and total coliform bacteria, chlorophyll-a and nutrients.

The Chain Bridge monitoring station consists of an automated sampler that simultaneously monitors the river stage at Little Falls while directly sampling at Chain Bridge, about 1.5 miles downstream, in response to changes in river flow volume. Base and storm event samples are taken throughout the year.

b. Potomac River Water Quality Monitoring

COG continues to serve as the water quality monitoring coordinator and regional repository for water quality and wastewater data in the Washington metropolitan region, as it has for more than two decades. Presently, COG serves as a repository for physical/chemical water quality data, hydro-meteorological data and wastewater loadings for the COG region, as produced by federal, state, and local government agencies. This includes data from 99 stations on the main stem of the Potomac River and the mouths of its tributaries (Point of Rocks to Point Lookout) and 46 stations in the Anacostia watershed. In addition, more than 33 wastewater treatment plants send their monthly discharge monitoring reports and monthly operating reports to COG. COG supplements these data with flow gage data from the USGS and meteorological data from the National Weather Service

c. Virginia Department of Environmental Quality Monitoring in the Tidal Potomac

VDEQ's Northern Regional Office initiated a long-term water quality monitoring project in the Occoquan River tidal embayment in spring 2005. To better characterize the water quality in the Occoquan River tidal embayment, water quality measurements were made using fixed continuous monitors and grab samples. The water quality monitoring for this study was conducted from April to October 2005. The primary objective of this study was to collect monitoring data throughout the warm season to better characterize the water quality and provide detailed monitoring data to support the development of a Total Maximum Daily Load for pH. A secondary objective of this study was to provide continuous monitoring data to enable a more accurate assessment of the Chesapeake Bay water quality criteria for dissolved oxygen, water clarity and chlorophyll.

In 2007, VDEQ initiated monitoring in the tidal embayment of Pohick Creek. The monitoring period for these areas was conducted from April to October 2007. Data for all of the long-term water quality monitoring deployments were collected using YSI Model 6600 EDS multi-meters. These instruments were configured to measure and store water temperature, pH, dissolved oxygen, turbidity and chlorophyll measurements in fifteen-minute increments. In addition to the continuous monitoring with these meters, water column grab sampling, light attenuation and Secchi depth measurements were performed at each of the stations where the

continuous monitors were deployed. Continuous monitoring was continued at the Pohick Bay station in 2008 and 2009.

6. Update on Potomac River Water Quality

The tidal section of the Potomac River is affected by many sources of pollution. With rapid population growth in the region over the past century, the Potomac River has faced water quality problems such as bacterial contamination, low dissolved oxygen and nuisance algal blooms. The implementation of secondary and advanced wastewater treatment in the National Capital Region has resulted in significant improvements in water quality and ecological conditions in the Potomac Estuary, including healthy dissolved oxygen levels, reduced nuisance algal blooms and the return of important living resources such as largemouth bass and submerged aquatic vegetation.

Results from a summer 2010 news release reviewing (http://water.usgs.gov/nrp/highlights/potomac_update.html) an 18-year study of submerged aquatic vegetation in the tidal Potomac River concluded the following:

- Native SAV cover increased tenfold from 288 to 3,081 acres.
- The overall area covered by SAV in the Potomac (both native and exotic) more than doubled since 1990, increasing from 4,207 to 8,441 acres.
- The diversity of SAV has increased. In 1990 the exotic hydrilla was 10 times more abundant than any other species. In 2007 the abundance of the seven most frequently occurring species were more evenly matched.
- In 1990, more than 80 percent of the total SAV was hydrilla; in 2007 hydrilla declined to 20 percent.
- Results suggest declining fitness of exotic species relative to native species during restoration.

The study was supported by: the USGS National Research Program; the U.S. Army Corps of Engineers, Baltimore; the Metropolitan Washington Council of Government's Aquatic Plant Management Program; and the Fisheries Division of the District of Columbia Department of Health.

The United States Geological Survey monitors water-quality on the Potomac River at Chain Bridge as part of the Chesapeake Bay River Input Monitoring Program.

7. Occoquan River

The Occoquan River straddles the southern border of Fairfax County and the northern border of Prince William County. The river has been dammed near the town of Occoquan. The Occoquan Reservoir, created by the damming, serves as one of two primary sources of drinking water for Fairfax Water, which operates a facility along, and withdraws water from, the reservoir. Because of its use as a drinking water source,

water quality in the reservoir is highly monitored and water from a sewage treatment plant upstream of the reservoir is carefully treated.

a. Occoquan Watershed Monitoring Laboratory

The Occoquan Watershed Monitoring Laboratory has administered a comprehensive hydrologic and water quality monitoring program in the Occoquan Watershed since 1972. The program is jointly funded by Fairfax Water and the six jurisdictions within the watershed. OWML operates nine automated stream monitoring and flow gauging stations located on the major tributary streams of the watershed. These stations record stream flow and automatically collect flow-weighted composite water samples during storm events. Under base flow (non-storm flow) conditions, samples are collected weekly during the spring, summer, and fall seasons, and biweekly in the winter. In late 2006, additional equipment was installed at the stream monitoring station on Bull Run at Virginia Route 28 to continuously monitor dissolved oxygen, temperature, pH, conductance, turbidity and nitrate in the stream. Seven stations in the Occoquan Reservoir are sampled on the same weekly/biweekly schedule. OWML also operates thirteen rain gage stations in the watershed, and two weather stations, including one which provides solar radiation data.

The Lake Manassas watershed monitoring program is funded by the City of Manassas, and has seven stream and eight lake stations at which water and sediment samples are taken. Lake Manassas is currently considered to be a moderately enriched lake.

Synthetic organic compounds have been monitored quarterly in the Occoquan Watershed since 1982. The program is funded by the Fairfax County Health Department and was established under the recommendation of EQAC. Initially, the program monitored water samples, but added quarterly sediment and semi-annual fish samples at stations within the Occoquan Reservoir. The Lake Manassas program, likewise, funds the monitoring of SOCs in the Lake Manassas watershed.

Dr. Adil Godrej, Assistant Director of OWML states

> *The year 2012 was, in many ways, a very good year for the SOC monitoring program, as practically no 'detects' were found for any compound of concern. Even atrazine, which is almost always detected in water samples, was not found in the streams of the Occoquan watershed and the waters of the Occoquan reservoir. It is too soon to tell if this is a long-term good development or not, as so much depends on when a sample is taken. With a quarterly sampling schedule for SOCs, it can be easy to miss sampling at the time when atrazine, for example, would be present, although attempts are made to get to the sampling locations at the right time, especially in spring when atrazine applications are made. If this trend continues for another few years, then we*

can safely conclude that those SOCs that have stopped being detected in samples are not of concern in the Occoquan watershed any more.

Sediment and fish samples taken in 2012 likewise showed no SOCs of concern in them. The most-frequently found family of compounds was the phthalates, but these are ubiquitous in human-occupied areas and none of them was found even close of any level of concern.

As a result, there isn't much to be discussed about the SOC monitoring done in 2012, except that the results were all good: nothing of concern found! It is good to have years like this where there are no dramatic results to discuss.

Water quality in the Occoquan Reservoir has remained stable over the years, and this trend has continued in 2012. The reservoir is, of course, still enriched with nutrients (eutrophic), but the water quality has not deteriorated from what it has been for some time now. The OWML monitoring program serves as a means of providing advance notice should any conditions deteriorate, whether in the short or the long term.

It should be noted that due to budget constraints, the water quality monitoring programs at OWML that are funded either wholly or partially by Fairfax County have been flat-funded for the last five years. OWML managed to preserve the full monitoring program in the first four of these years mainly because staff salaries were frozen for three years, and the purchase of badly-needed replacement laboratory equipment was postponed. In the latter part of 2012, the basic Occoquan Reservoir program and OWML instituted a reduction of some stream and reservoir data collection activities by up to 25%. Currently, the SOC program has been preserved at its full scope, and will continue to be so for fiscal year 2014 (ending June 2014). However, unless some additional funding becomes available, even the SOC program will have to be modified to stay within budget. It is a modest program, overall, that is a very useful indicator of long-term trends with respect to SOCs in the watershed. Reducing sampling from once per quarter, or dropping some stations altogether, will definitely have an impact on this. We continue to hope that some modest additional funding will become available to allow the program to keep up with increasing operational costs.

OWML works on many other projects within the region that have a water focus. The Potomac regional monitoring program, where OWML operates an automated station at Chain Bridge, is performed for the Metropolitan Washington Council of Governments, and has been in continuous operation since 1982.

Over the last decade, OWML staff has developed a complexly linked watershed and reservoir water quality model for the Occoquan Watershed (including Lake Manassas and the Occoquan Reservoir). The model replaced a mainframe model that was developed in the early 1980s, and the simulation period currently extends

from 1988 to 2007. The model is updated to reflect changing land use as the data become available, and improvements to the model are incorporated as new data or research come available. It is anticipated that the next update, incorporating land use data from 2008-2012, will be completed in the first half of 2013. Both the watershed and reservoir components of the model have been used to provide simulations to support reservoir and/or water quality management decisions.

OWML has had a website (www.owml.vt.edu) for some years now, where stakeholders could access near-real-time field data at various stream sites. This website is currently being updated, with a new version expected to be on-line in buy October 2013.

8. Kingstowne Monitoring and Stream Restoration

In 1999, the Department of Public Works and Environmental Services, the Northern Virginia Soil and Water Conservation District, the USDA Natural Resources Conservation Service, the Friends of Huntley Meadows and the Citizens Alliance to Save Huntley formed a partnership to restore a stream in the Kingstowne area, with the help of a grant from the Virginia Department of Conservation and Recreation. The Kingstowne stream is a tributary of Dogue Creek, receives runoff from a 70 acre watershed and is upstream of Huntley Meadows Park.

The Kingstowne Environmental Monitoring Program established two stations along Dogue Creek (referred to as the “Kingstowne” and “South Van Dorn Street” monitoring stations) to assess the effectiveness of controls at trapping sediment and phosphorus in stormwater runoff from the Kingstowne development and to inform the partners of detrimental effects of upstream development on Huntley Meadows Park. Though estimates of annual sediment and phosphorus loads fluctuated from year to year, the monitoring data showed reductions in both constituents over the long term. As of 2010, the estimated long-term average sediment removal efficiency of controls was 82.9 percent. The mean annual phosphorus removal efficiency in 2010 was 34.2 percent.

Calendar year 2010 concluded water quality sampling at Kingstowne and South Van Dorn station to fulfill USACE permit requirements and monitoring and maintenance plan goals.

9. Gunston Cove Aquatic Monitoring Program

Gunston Cove is an embayment of the tidal freshwater Potomac River located in Fairfax County about 12 mi (20 km) downstream of the I-95/I-495 Woodrow Wilson bridge. The cove receives treated wastewater from the Noman M. Cole, Jr. Pollution Control Plant and inflow from Pohick and Accotink Creeks which drain much of central and southern Fairfax County. The cove is bordered on the north by Fort Belvoir and on the south by Mason Neck. Due to its tidal nature and shallowness, the cove does

not seasonally stratify vertically, and its water mixes gradually with the adjacent tidal Potomac River mainstem.

The primary objective of this George Mason University program is to determine the status of the ecological communities and physical-chemical environment in the Gunston Cove area of the tidal Potomac for evaluation of long-term trends. This helps provide the basis for well-grounded management strategies to improve water quality and biotic resources in the tidal Potomac. Monitored since 1984, data from Gunston Cove and the nearby Potomac River provide valuable information regarding long-term trends; this information will aid in the continued management of the watershed and point source inputs.

Data from 2010 report (November 2011) generally reinforced the major trends which were reported in previous years. First, phytoplankton algae populations in Gunston Cove have shown a clear pattern of decline since 1989 (although chlorophyll values increased somewhat in 2008).

Accompanying this decline have been more normal levels of pH and dissolved oxygen, increased water clarity and a virtual cessation of cyanobacteria blooms such as *Microcystis*. The increased water clarity has brought the rebound of submerged aquatic vegetation, which provides increased habitat value for fish and fish food organisms. The SAV also filters nutrients and sediments and itself will inhibit the overgrowth of phytoplankton algae. This trend is undoubtedly the result of phosphorus removal practices that were initiated in the late 1970s at the Noman M. Cole, Jr. wastewater treatment plant. This lag period of 10-15 years between phosphorus control and phytoplankton decline has been observed in many freshwater systems, resulting at least partially from sediment loading to the water column, which can continue for a number of years. Gunston Cove is now an internationally recognized case study for ecosystem recovery due to the actions that were taken and the subsequent monitoring to validate the response.

In short, due to the strong management efforts of the county and the robust monitoring program, Gunston Cove has proven an extremely valuable case study in eutrophication recovery for the Chesapeake Bay region and even internationally.

For a copy of the "Ecological Study of the Gunston Cove 2010" Final Report, use http://digilib.gmu.edu:8080/dspace/bitstream/1920/7401/1/GCExecSummary2010.pdf, or contact R. Christian Jones, Professor and Project Director at George Mason University.

10. Total Maximum Daily Loads

Under the Clean Water Act, states are required to monitor water quality and assess compliance with water quality standards every two years. Water quality standards designate uses for waters and define the water quality needed to support each use. There are six designated uses for surface waters in Virginia: aquatic life; fish

consumption; public water supplies (where applicable); shellfish consumption; swimming; and wildlife. Several subcategories of the aquatic life use have been adopted for the Chesapeake Bay and its tidal tributaries. If a water body contains more pollutants than allowed by water quality standards, it will not support one or more of its designated uses. Such waters have "impaired" water quality and are listed on Virginia's 303(d) list as required under the Clean Water Act. If monitoring data indicate that a water body does not meet water quality standards, the water body is listed as impaired and a Total Maximum Daily Load must be developed. A Total Maximum Daily Load is a watershed-specific plan for bringing an impaired water body into compliance with the Clean Water Act goals. A 1999 Consent Decree required the state to develop TMDL plans for all impaired streams listed on the 1998 303(d) Impaired Waters List by 2010.

In 2012, VDEQ added E. *coli* TMDLs for the Sugarland, Mine and Pimmit Run watersheds and benthic impairments TMDLs for Holmes and Tripps Run. The TMDLs were scheduled to have been finalized in early 2012, but are still in draft form.

a. Fairfax County Stream TMDLs

To date, the following TMDLs have been established in Fairfax County and have assigned reductions to the county's MS4:

Bacteria (Fecal Coliform and/or E. coli):
- Accotink Creek.
- Four Mile Run.
- Bull Run (includes Cub, Johnny Moore and Little Rocky Runs).
- Pope's Head Creek.
- Difficult Run.
- Hunting Creek (includes Cameron Run and Holmes Run).

Sediment (Benthic Impairment):
- Bull Run (includes Cub, Johnny Moore and Little Rocky Runs).
- Pope's Head Creek.
- Difficult Run.

PCBs: Tidal Potomac (includes Accotink Creek, Belmont Bay, Dogue Creek, Four Mile Run, Gunston Cove, Hunting Creek, Little Hunting Creek, Occoquan River and Pohick Creek).

Water Quality Assessments are performed by the Virginia Department of Environmental Quality and are available at: http://www.deq.virginia.gov/Programs/Water/WaterQualityInformationTMDLs/WaterQualityAssessments.aspx.

i. Accotink Creek TMDL

Accotink Creek was first listed as impaired on the 1996 303(d) List of Impaired Waters for not meeting the aquatic life use due to poor health in the benthic biological community. This impaired segment of Accotink Creek stretches from the confluence of Calamo Branch with Accotink Creek and extends downstream to the start of the tidal waters of Accotink Bay (7.35 miles). This segment was listed in Attachment A, Category 1 (Waters Listed on Part 1 of Virginia's 1998 303(d) Report) of the 1999 Consent Decree. An additional segment of Accotink Creek was listed as impaired on the 2008 303(d) List of Impaired Waters for not meeting the aquatic life use. This impairment extends from the confluence with an unnamed tributary to Accotink Creek, located in the upstream corridor of Ranger Park, and continues downstream until the confluence with Daniels Run (0.85 miles).

While sediment was identified as the pollutant of concern that is causing the benthic impairment, EPA used flow as a surrogate for sediment in establishing the TMDL. The TMDL called for a 48.4 percent overall reduction in in-stream flows in Accotink Creek. Utilizing a flow approach to the TMDL would not stabilize or reverse the evolution that has already occurred in Accotink Creek. This evolution has taken place in response to increased urbanization and development in the watershed, and flow reduction alone will not reverse its impacts or address the impairment that originally triggered development of the TMDL. Stream restoration is also required in order to stabilize the eroded banks, reconnect the stream to its floodplain, reduce in-stream erosion and restore habitat.

In July 2012, the county and the commonwealth challenged the flow TMDL in U.S. District Court. In January 2013, the court issued its decision that EPA is authorized to regulate pollutants using TMDLs, and that sediment is a pollutant, but flow is not. The flow TMDL was remanded to EPA for reconsideration. It is important to note that the court’s decision applies only to the use of non-pollutants (such as flow) as surrogates for pollutants (such as sediment) in TMDLs. It is not a blanket prohibition on the regulation of stormwater.

In March 2013, EPA decided not to appeal the court’s decision and asked the commonwealth to develop a replacement TMDL. A schedule for development of the new TMDL has not yet been established.

ii. Four Mile Run TMDL

Due to high levels of fecal coliform bacteria, Four Mile Run was listed in 1996 and 1998 on the 303(d) Impaired Waters List. Although only the very upper reaches of Four Mile Run are located in Fairfax County, it is important to note the existence of a TMDL study for Four Mile Run and the participation of Fairfax County in the Four Mile Run TMDL study and implementation plan.

The Four Mile Run Fecal Coliform Study, which identified the sources of fecal coliform bacteria in the watershed using DNA testing, was completed in 2000. The study found that waterfowl contribute almost one-third (31 percent) of those bacteria that could be matched. Eighteen percent of the bacteria originated from humans, 13 percent from dogs, six percent from deer, 19 percent from raccoons and 13 percent from other sources. Bacteria from humans appear to be highly localized. There were indications that, without regard to specific host animals, *E. coli* bacteria seem to regenerate, through cloning, within the storm drains and stream sediments, which in turn perpetuates bacteria levels.

In 2002, the bacteria TMDL study for Four Mile Run developed by the Northern Virginia Regional Commission and the Virginia Department of Environmental Quality was approved by the EPA. NVRC, under a grant from VDEQ, worked with four jurisdictions (Fairfax and Arlington counties and the cities of Falls Church and Alexandria) to develop an implementation plan for the TMDL study. Completed in 2004, the plan focuses on reducing bacteria contamination from human and pet sources in the watershed and includes several initiatives from community outreach efforts to large capital projects. The plan can be viewed on-line at: http://www.novaregion.org/index.asp?nid=394.

NVRC continued to provide jurisdictions participating in the Four Mile Run Management Program with annual projections of the effectiveness of local programs for controlling stormwater runoff in the channel, both to prevent flooding and limit pollution. The Four Mile Run Watershed Management Program is NVRC's oldest continuously active program, and has a long and interesting history. This NVRC Program has been at the cutting edge in urban watershed management for nearly two decades and continues to remain at the forefront. Recently, NVRC has begun the process to revise the watershed modeling and develop new understanding of this urban watershed. Discussions with the Federal Emergency Management Agency regarding the flood mapping update continue to be a priority for the jurisdictions. NVRC will be a resource for the jurisdictions as the new mapping challenges emerge.

As part of the Four Mile Run Program, NVRC continued to serve as secretariat for the Runoff Board and its committees, performed research tasks and provided liaison with state, federal and local agencies. NVRC conducted analysis and modeling studies for the program and worked with FMR TAC members to identify modeling needs for the watershed and innovative corporation to facilitate new modeling of FMR. NVRC performed technical modeling analyses for Four Mile Run member governments upon request, to determine adequate levels of stormwater management, associated with land use changes, needed to prevent flooding in a regional flood control channel.

NVRC continued to work with local governments to execute the U.S. EPA approved Total Maximum Daily Load Implementation Plan for bacteria in Four

Mile Run. The TMDL Implementation Plan developed strategies to address the issues and concerns uncovered during the TMDL study. The Implementation Plan requires extensive coordination with watershed local governments and other stakeholders.

iii. Hunting Creek, Cameron Run, Holmes Run – Bacteria TMDLs completed in 2010

Hunting Creek was listed as impaired for bacteria in Virginia's 2008 305(b)/303(d) Water Quality Assessment Integrated Report (VDEQ, 2008) due to exceedances of the state's water quality criteria for *E. coli* bacteria. The segment was first listed as impaired for fecal coliform bacteria on Virginia's 1998 303(d) List, and was included in Attachment A of the 1999 Consent Decree. Cameron Run was listed as impaired for bacteria in Virginia's 2008 305(b)/303(d) Water Quality Assessment Integrated Report (VDEQ, 2008) due to exceedances of the state's water quality criteria for *E. coli* bacteria. The segment was first listed as impaired for *E. coli* bacteria on Virginia's 2006 Integrated List. Holmes Run was listed as impaired for bacteria in Virginia's 2008 305(b)/303(d) Water Quality Assessment Integrated Report (VDEQ, 2008) due to exceedances of the state's water quality criteria for *E. coli* bacteria. The segment was first listed as impaired for fecal coliform bacteria on Virginia's 2004 Integrated List.

All three impaired segments are located within the Potomac River basin (USGS Cataloging Unit 02070010) in the City of Alexandria and Fairfax County, Virginia. The impaired segment of Holmes Run extends from the confluence of Holmes Run and Backlick Run upstream to the mouth of Lake Barcroft, covering approximately 3.58 miles. The impaired segment of Cameron Run extends from the head of tide at approximately the Route 611/241 (Telegraph Road) bridge crossing, upstream to the confluence of Holmes Run and Backlick Run, covering approximately 2.08 miles. The impaired segment of Hunting Creek extends from the confluence with the Potomac River at the state boundary, to the upstream limit of tidal waters at the Route 611/241 (Telegraph Road) bridge crossing, covering approximately 0.526 mi^2.

In order to meet the *E. coli* geometric mean water quality criterion of 126 cfu/100 ml, the following bacteria reductions are required for Holmes Run and Cameron Run:

- 100 percent reduction of the human sources (failed septic systems and sanitary sewer overflows).
- 83 percent reduction of the edge-of-stream loadings from runoff, interflow and groundwater discharge.
- 50 percent reduction of the direct instream loading from wildlife.

In order to meet the *E. coli* geometric mean water quality criterion of 126 cfu/100 ml in Hunting Creek, the following bacteria reduction are required:

- 100 percent reduction of the human sources (failed septic systems and sanitary sewer overflows).
- 83 percent reduction of the edge-of-stream loadings from runoff, interflow and groundwater discharge in non-tidal Cameron Run.
- 98 percent reduction of the edge-of-stream loadings from runoff, interflow and groundwater discharge in Hooff Run.
- 50 percent reduction of the direct instream loading from wildlife.
- 80 percent reduction of the load from City of Alexandria's combined sewer overflow Outfall 002.
- 80 percent reduction of the load from City of Alexandria's CSO Outfalls 003 and Outfall 004.

This TMDL was approved by EPA on November 10, 2010.

iv. Potomac River Tributaries – Bacteria TMDL

A PCB TMDL has been established for the Tidal Potomac River. Information on TMDL development in Virginia is available on VDEQ's website: http://www.deq.virginia.gov/Programs/Water/WaterQualityInformationTMDLs/TMDL/TMDLDevelopment.aspx

Several streams in Fairfax County have been identified as impaired on the Clean Water Act §303(d) list for not supporting the primary contact recreation use due to elevated levels of *E. coli* bacteria. Portions of Sugarland Run, Mine Run and Pimmit Run are included in the Potomac River Tributaries Bacteria TMDL. The impaired portion of Sugarland Run extends from the confluence with Folly Lick Branch downstream to the confluence with the Potomac River. The impaired reach of Mine Run extends from the confluence with an unnamed tributary to Mine Run downstream to the confluence with the Potomac River. The impaired portion of Pimmit Run extends from the headwaters of Pimmit Run downstream to the confluence with the Potomac River.

A draft TMDL was presented at the final public meeting in December 2011. In order to meet the *E. coli* geometric mean water quality criterion of 126 cfu/100 ml, the draft TMDL identified the following bacteria reductions:

Sugarland Run:

- 100 percent reduction of failed septic systems.
- 100 percent reduction of direct deposition of livestock waste into the stream.
- 96.6 percent reduction of nonpoint source agricultural loads.
- 96.6 percent reduction of nonpoint source urban loads.

Mine Run:

- 100 percent reduction of failed septic systems.
- 100 percent reduction of direct deposition of livestock waste into the stream.
- 78.5 percent reduction of nonpoint source agricultural loads.
- 78.5 percent reduction of nonpoint source urban loads.

Pimmit Run:

- 100 percent reduction of failed septic systems.
- 100 percent reduction of direct deposition of livestock waste into the stream.
- 99.2 percent reduction of nonpoint source agricultural loads.
- 99.2 percent reduction of nonpoint source urban loads.

The draft TMDL has not yet been finalized.

b. Chesapeake Bay TMDL

EPA established the Chesapeake Bay TMDL in December 2010. In order to provide reasonable assurance that the Chesapeake Bay TMDL can be achieved, EPA required states and the District of Columbia to develop Watershed Implementation Plans that document how each jurisdiction will partner with federal and local governments to achieve and maintain water quality standards. Phase I of the Virginia WIP was approved by EPA in December 2010 and established target loads by sector and watershed. The final Phase II WIP was submitted to EPA on March 30, 2012 and does not include explicit allocations to local communities due to issues identified with using the Chesapeake Bay Watershed Model at the local scale. The WIP does include local strategies aggregated at the state scale and organized by source sector (agriculture, urban/suburban, on-sire wastewater, forest lands and resource extraction). Implementation of the urban/suburban strategies will take place through permits in MS4 communities including Fairfax County.

At the request of local governments and the Virginia Department of Conservation, NVRC continued to host a series public of meetings between the Department and local stakeholders to discuss the Phase I and Phase II Watershed Implementation Plan and the Virginia Assessment and Scenario Tool which allows users to rapidly develop scenarios with varying best management practices.

NVRC also coordinated regional review and comments on the Commonwealth of Virginia's Chesapeake Bay Phase II Watershed Implementation Plan. NVRC participated in a planning district commission-coordinated grant proposal funded by the Department of Conservation and Recreation entitled "Coordinated PDC Approach to the Virginia WIP for Cleanup of the Chesapeake Bay." The grant was a result of a joint application that provided a very critical and important service of facilitation and coordination between the Department of Conservation and Recreation staff and member local governments. Through the DCR grant, the participating PDCs provided a venue for dialog where the local governments became better informed to make critical and important decisions related to the five

WIP deliverable outcomes DCR has requested of local governments. The partnering PDCs' joint grant intended to allow for a coordinated Chesapeake Bay Watershed-wide approach, but allowed for flexibility for localities to use local information and existing program capacity to inform the development of Virginia's Phase II Watershed Implementation Plan.

NVRC participated as a member to the Department of Conservation and Recreation's Stakeholder Advisory Group on the development of Virginia's Chesapeake Bay Phase II Watershed Implementation Plan. The charge of the SAG was to provide guidance and recommendations to the Secretary of Natural Resources during the development of the Chesapeake Bay TMDL Phase II Watershed Implementation Plan. NVRC also participated on a regulatory advisory panel, at the request of the Department of Environmental Quality, to consider amending the Water Quality Management Planning Regulation (9 VAC 25-720-10) to include the concept of regulating flow as part of the TMDL process. NVRC continues to participate on a regulatory advisory panel at the request of the Department of Environmental Quality to consider amending the Water Quality Management Planning Regulation to identify unused nutrient waste load allocations assigned to dischargers within the Shenandoah-Potomac River Basin. These WLAs may then be transferred to offset additional allocations assigned to certain other dischargers who the State Water Control Board determines did not receive an equitable share of the total basin allocation, thereby maintaining the basin point source nutrient load cap and protecting water quality within the river basin and the Chesapeake Bay. NVRC developed a "fact sheet" and website to update localities on the requirements of the new Stormwater Regulations.

Information on the Chesapeake Bay TMDL is available on EPA's website at: http://www.epa.gov/reg3wapd/tmdl/ChesapeakeBay/index.html.

Information on Virginia's WIP process is available on VDEQ's website at: http://www.deq.virginia.gov/Programs/Water/ChesapeakeBay/ChesapeakeBayWatershedImplementationPlan.aspx.

c. Public Participation in the TMDL Process

Public participation is a key component of the TMDL process in Virginia. Public meetings are held at the onset and closure of each TMDL project. Anyone is welcome to attend these meetings. Meetings are advertised through several methods, including published notices in the Virginia Register, announcements in the community calendar of local newspapers, fliers posted at public locations throughout the impaired watershed and through e-mail distribution lists. The purpose of the public meetings is to educate the community about the TMDL process and allow the public to ask questions and provide feedback on how to improve the project. Any questions relating to the TMDL process should be directed to the TMDL Coordinator at the Northern Regional Office of VDEQ: http://www.deq.virginia.gov/Locations/NorthernRegionalOffice.aspx

11. Pond and Lake Monitoring and Management

There are a number of significantly sized private and public ponds and lakes throughout the county. All ponds and lakes in Fairfax County are man-made by excavation and/or the damming of streams. Most of these ponds and lakes serve as stormwater management facilities for developments and have houses along their shorelines. There are also numerous smaller ponds associated with commercial developments, golf courses or farm properties. These open water impoundments provide habitat for a number of aquatic organisms and waterfowl as well as recreational opportunities for humans. Due to increased runoff from development and in-stream bank erosion, these water bodies are often subject to heavy sedimentation, which requires frequent dredging in order to maintain pond or lake depth. Heavy nutrient loading results in large algal blooms during warmer months. Other problems that plague urban ponds and lakes include thermal stratification, reduced water clarity, decreased dissolved oxygen levels, trash and nuisance invasive vegetation.

a. Reston Lakes

The Reston Association, the homeowners association for the planned community of Reston, has an active watershed and lake management program. Four lakes (Audubon, Anne, Thoreau and Newport), as well as two ponds (Bright and Butler), are monitored. Dissolved oxygen, dissolved oxygen saturation, temperature, pH, conductivity, total phosphorus, Secchi depth transparency, chlorophyll a, phytoplankton and zooplankton are monitored. Fecal coliform and E. coli bacteria testing have been conducted in Lake Audubon for annual swimming events. Detailed monitoring information and data can be found in the 2012 Reston Lakes Annual Monitoring Report. This report and other information about Reston's lakes can be obtained by contacting RA's watershed supervisor at 703-435-6560 or visiting the website: www.reston.org under Lake Report.

Purple loosestrife, a noxious weed in Virginia, was well established at Lake Newport and was discovered on the other three lakes in 2008. In 2012, RA staff continued the massive removal of purple loosestrife from the shoreline at all four lakes. RA also removed the large miscanthus ornamental grasses from the dam at Lake Newport to prevent their seeds from propagating the down-slope dam and natural area surrounding the lake. Lake Newport was treated on April 25, 2013 to control water lilies.

In 2011, Lake Thoreau's west cove was dredged and treated to control the spread of yellow floating heart. Lake Thoreau experienced dramatic growth of aquatic plants including Eurasian Water Milfoil, Yellow Floating Heart (both non-native invasive plants) and Floating Leaved Pondweed, which was the most prevalent in summer 2012 and spring 2013. The Floating Leaved Pondweed is a native plant and is typically a beneficial plant for fish habitat and waterfowl food. The Eurasian Water Milfoil is a non-native plant of high concern.

RA's management strategy included treating for Eurasian Water Milfoil, Yellow Floating Heart and Floating Leaved Pondweed along the shoreline and other impacted areas in June of each year, contracting with a licensed aquatic herbicide company, Aquatic Environmental Consultants, Inc., to do the treatment. AEC applied three different herbicides to target the different plants over the course of one day.

RA treats Lake Anne monthly in the summer to prevent blue green algae blooms. Lake Anne is the oldest lake in Reston and has been treated since 2005. Lake Anne's concrete riser structure was repaired in winter 2011.

b. Pohick Watershed Lakes

The six Pohick watershed lakes (Barton, Braddock, Huntsman, Mercer, Royal and Woodglen) are inspected annually for dam structure but are not regularly monitored for biological or chemical parameters.

Beginning in 2011, water quality in Lake Huntsman was characterized to evaluate potential management activities that could be employed in addition to the dredging planned in summer 2013. In 2012, in-lake water quality monitoring continued at Lake Huntsman through the warmer months. Preliminary analysis shows that the lake is highly nutrient enriched and is exhibiting summertime hypoxia at levels deeper than 6-10 feet. Since the initiation of the original characterization study, a solar powered water circulator has been installed in the lake and has had pronounced effects on the low-oxygen conditions occurring in the deeper areas of the lake. Dissolved oxygen is present at much higher concentrations at the deeper levels of the lake, thus allowing occupation of these areas by greater numbers of aquatic plants and animals. Despite the improvement of dissolved oxygen distribution in the lake, there are still excessive levels of nutrients in the lake feeding summertime algae blooms and hindering water quality and limiting sunlight penetration depths.

In 2012, monitoring of recently-dredged Lake Barton commenced. The water quality data collected at Lake Barton will be evaluated in concert with the data from nearby Lake Huntsman. Analysis of these data will focus on the benefits of selected management actions and the potential for these impoundments to be utilized fully as water quality improvement facilities contributing to improved stream health within the Pohick Creek watershed.

c. Lake Barcroft

The Lake Barcroft Watershed Improvement District is a local taxing district authorized under Virginia law for conservation purposes. The WID is responsible for the management of Lake Barcroft and regularly monitors water quality. Due to sediment loading, the lake is in need of dredging. Given the significant amount of sediment that needs to be removed, there are continuous concerns with the lack of

adequate local disposal areas. For more information about Lake Barcroft, contact the Operations Director at 703-820-1300 or see the website: www.lakebarcroft.org.

d. Lake Accotink

Lake Accotink is owned and managed by the Fairfax County Park Authority and is a key feature of Lake Accotink Park. The lake was originally created by construction of a dam across Accotink Creek in 1918. The existing dam was constructed in 1943. Similar to other urban lakes and ponds, Lake Accotink has been significantly impacted by accelerated sedimentation, which has reduced the average depth of the lake to less than four feet. Project funding in the amount of $6.15 million was included in the 1998 Park Bond Program to dredge the lake and make repairs to the dam.

In September 2005, the Park Authority Board approved a contract award to Mobile Dredging and Pumping to hydraulically dredge 161,000 cubic yards of silt from Lake Accotink and pump the material to a property owned by Virginia Concrete for dewatering and disposal. The Department of Public Works and Environmental Services is overseeing the construction contract because of its past experience on other similar type projects.

Mobilization began in October 2005 and the 2.8 mile long slurry pipe line installation was completed in June 2006. Dredging began in July 2006. The project also includes expanding and enhancing existing wetlands. At the Park Authority's request, DPWES performed a preliminary evaluation to determine if the Virginia Concrete disposal site could accommodate additional dredge material above the 161,000 cubic yards currently specified in the contract. Based on this review, up to 204,000 cubic yards of material can be disposed of at the Virginia Concrete site, and DPWES agreed to provide $1,545,000 in additional funding to dredge and dispose of 43,000 additional cubic yards. In June 2006, a major storm caused a significant amount of silt to flow into the marina area, reducing water depth. In combination with the drought conditions, boat access from the marina to the main lake channel has been limited. DPWES has agreed that a portion of the additional 43,000 cubic yards of dredge material could be reprogrammed for dredging in the vicinity of the marina, reducing the dredge amount at the top end of the lake by an estimated 10,000 cubic yards.

Approximately, 195,000 cubic yards of material was removed by project completion in September 2008.

e. Twin Lakes

North Twin Lake Dam

The Fairfax County Park Authority completed a Capital Improvement Project to repair the North Twin Lake dam at Twin Lakes Golf Course. The scope of repair

work included demolishing the existing bridges, spillway structure and outfall channel, raising the dam embankment elevation approximately five feet, and constructing a new concrete spillway structure, armor earthen emergency spillway, outfall channel and cart bridge. The repair work was required by the Virginia Department of Conservation and Recreation in order for VDCR to issue the Park Authority a regular operations and maintenance permit for the dam. The repair work was satisfactorily completed in January 2012, and the design engineer is now preparing the application and as-built drawings required by VDCR to obtain a regular O&M permit.

12. Groundwater Monitoring

The United States Geological Survey maintains a series of wells throughout the nation to monitor groundwater levels and drought. Two wells are located in Virginia; one such well (Site 385638077220101) in Fairfax County has been maintained since 1976. This well provides continuous real-time data that is used to assess ground water levels. Information on this well is available on-line at: http://groundwaterwatch.usgs.gov.

On June 17, 2013, the State Water Control Board adopted final regulations developed by the Department of Quality adding portions of Fairfax County east of Interstate 95 to the Eastern Virginia Groundwater Management Area. The effect if this action is that users who withdraw 300,000 gallons of groundwater in any one month will need a permit. By placing the entire coastal aquifer system under the permit program, the groundwater resource will be managed comprehensively for the first time. The goal of this management is to ensure the commonwealth and its residents get the greatest economic benefit from this resource while maintaining its long term availability and productivity.

Virginia Department of Environmental Quality Leaking Storage Tank Information

With respect to leaking underground storage tanks for regulated tanks (i.e., gas stations) there were 27 open cases and 1,084 closed cases. In 2012, 10 new cases were opened and 10 were closed. In terms of unregulated tanks (i.e. residential heating oil), there are 36 open cases and 1,874 closed cases. In 2012, 67 new cases were opened and 89 were closed.

13. Stream Restoration and Ecosystem Function

The Hydroecology of Flowing Waters group in the National Research Program of the United States Geological Survey is currently conducting a study on two streams in Fairfax County to evaluate the effects of stream restoration on stream ecosystem functioning at low levels of the food chain. By changing the morphology of the stream, restoration activities change the distribution of habitats for primary producers and consumers and the amount of time it takes water to move through those habitats. Restoration activities also change the quantity of light reaching the stream, altering the amount of primary production by algae. Both factors influence the balance between the

production and respiration of organic matter, which in turn strongly influences food web structure and water chemistry. The USGS study focuses on obtaining a fundamental understanding of the linkage between flow, the transport of sediment and organic matter, the physical structure of the stream and the resulting production and respiration of organic matter in a restored section of Accotink Creek, compared to an unrestored section of Upper Difficult Run. Initial efforts are under way to understand how spatial differences in the physical characteristics of these streams control spatial differences in primary production and respiration. Future efforts will involve laboratory and numerical modeling studies to determine how storm flows influence these processes. The study is not yet completed.

D. WATERSHED MANAGEMENT

1. Watershed Master Plans

Between 2003 and 2011, the Stormwater Planning Division of the Fairfax County Department of Public Works and Environmental Services commenced a planning initiative to develop a series of watershed management plans. The plans were developed with the assistance of the community through public meetings and individual plan stakeholder groups. A total of 13 plans, which cover all 30 county watersheds, were developed and adopted by the Board of Supervisors. From this planning effort, more than 1,700 structural and non-structural projects were proposed to help restore and protect our vital natural resources. The overarching goals for the watershed plans are:

1. Improve and maintain watershed functions in Fairfax County, including water quality, habitat and hydrology.
2. Protect human health, safety and property by reducing stormwater impacts.
3. Involve stakeholders in the protection, maintenance and restoration of county watersheds.

In November 2012, the county staff provided a status update of the watershed planning and the broader stormwater management programs to the public. The number of projects selected each year for implementation will be determined as part of the annual budget process. Efforts to include implementation of non-structural projects and policy recommendations from the watershed plans are ongoing.

2. Restoration Efforts

a. Department of Public Works and Environmental Services Stream Restoration and Stabilization Projects—Stormwater Capital Projects

In 2012, the county and its partners continued to implement stormwater management-related capital projects, including 10 flood mitigation projects, 16

stormwater management facility retrofits, seven low impact development projects and three stream restoration projects. Some examples are listed below:

i. Stream restorations

In 2012, the county completed three stream restoration or stabilization projects including one with nonprofit organization and volunteer assistance:

- Sheffield Hunt Outfall and Basin Retrofit. This project restored 940 linear feet of a tributary to Pohick Creek to mitigate stream bank erosion, improve water quality and address safety concerns related to a deeply incised channel and a dam embankment. The existing stormwater management facility downstream of the tributary was also retrofitted for water quality enhancements.

- Government Center Stormwater Retrofit Project: The county formed a unique private-public partnership to restore 1,000 linear feet of the headwaters of Difficult Run and to maintain and enhance three stormwater facilities on the campus of the Government Center. The novel approach employed on this comprehensive project involved hydraulic dredging of a pond and utilizing the dredged pond sediment to fill the degraded channel from which the sediment had eroded. Wetland Studies and Solutions, Inc. donated dredging equipment and staff. The dredged sediments, an otherwise costly material to dispose of, were pumped into custom fabricated geotextile tubes placed in the upstream channel. The restored channel was then built upon the sediment filled geotextile tubes to reconnect the channel to the floodplain. Elements of the design included installation of cascades, cross vanes, J-hooks, step pools, large woody debris, native vegetation and use of a progressive tree protection plan. The project also included retrofits of two detention basins, an outfall stabilization and replacement of the existing recreational trail with a combined use recreation/maintenance access trail to serve six stormwater facilities. Implementation of the project also involved collaboration among eight county agencies. The project improved water quality and habitat through restoration of ecological form and function of the stream corridor. County staff and the Virginia Native Plant Society participated in three volunteer events to salvage trees from within the limits of construction and transplant the trees to other areas of the campus in an effort to increase overall tree canopy cover.

- West Barnyard Run-Huntley Meadows Park Project: This project involved the installation of stormwater blockages made from fallen trees in order to slow down stormwater flows and reduce stream bank erosion and deposition of silt into wetlands. Over 200 native trees and shrubs were planted along the borders of the park's central wetlands to repair damage done by a recent boardwalk construction project.

ii. Detention basin retrofits

Stormwater management facility retrofits are intended to improve water quality and/or quantity control beyond their original designs. Water quality retrofits enhance nutrient uptake and increase the infiltration, uptake and transpiration of stormwater while water quantity retrofits help to reduce downstream flooding and erosion. In 2012, 16 retrofit projects throughout the county were completed for enhanced detention/retention and improved water quality. Specially designed native seed mixes enhanced basin function and vegetation longevity.

iv. Low Impact Development Projects

Seven locations were retrofitted through partnership projects with the Department of Public Works and Environmental Services, Fairfax County Public Schools and the Fairfax County Park Authority employing various techniques for water quality, including the installation of rain gardens, pervious pavement, underground storage, rainwater harvesting, soil amendment, native vegetation and water quality swales.

v. Education and outreach

As part of the Government Center Stormwater Retrofits project, tours were conducted in 2012 to educate county staff, other agencies, civic and environmental groups, homeowner associations and residents on innovative stormwater techniques. Members and staff of the following participated in educational tours of the project:

- Environmental Quality Advisory Council.
- Fairfax County Board of Supervisors.
- Fairfax County DPWES Directors Office.
- Potomac Watershed Roundtable.
- Northern Virginia Soil and Water Conservation District Green Breakfast.
- Fairfax County Office of the County Attorney.
- Fairfax County Department of Planning and Zoning.
- Fairfax County Department Purchasing and Supply Management.
- Fairfax County Waste Water Management.
- Fairfax County Employees for Environmental Excellence.
- Stormwater Retrofitting Workshop for Stormwater Practitioners, by the Chesapeake Stormwater Network and the Center for Watershed Protection.
- Fairfax County Engineers in Training Program.
- Truro Home Owners Association.

b. Riparian Buffer Restoration

Fairfax County continued its countywide riparian buffer restoration project in collaboration with various partners to mitigate stormwater runoff into local streams

and to support the Board of Supervisors' adopted Environmental Agenda. NVSWCD's 2012 seedling sale helped promote urban reforestation, habitat enhancement and water quality protection, selling 7,600 native tree and shrub seedlings. The sale offered a variety of eight seedlings chosen to help homeowners restore their landscapes.

As part of the county's buffer restoration program, Earth Sangha donated and/or installed 899 native woody plant seedlings, 459 native grass and wildflower plants and 26 pounds of meadow seed mix in 2012. Earth Sangha sold at a discount 302 native woody plants and 233 native grass and wildflower plants to Fairfax County Park Authority sites from seedlings grown in its nursery in Springfield. In addition, Earth Sangha donated plants to approximately 25 local schools and 30 other parklands, ecological organizations and homeowner associations.

FCPA, Fairfax ReLeaf and the Virginia Department of Forestry hosted independent stream buffer restorations in the county in 2012. The Park Authority continues to maintain and monitor the previous riparian buffer enhancement projects installed in the last five years. To date, there are 37 projects on parkland throughout the county. These projects have focused on the conversion of mowed grass to areas of native trees and shrubs typical of riparian areas. Park Authority staff completed additional planting projects in Resource Protection Areas unrelated to the county's buffer planting program. Examples of such projects in 2012 include the planting of 165 native shrubs, grasses and forbs at Riverbend Park and the planting of 161 native trees plus 12 pounds of native seed mix at Huntley Meadows Park, with support from Earth Sangha.

In 2012, Fairfax ReLeaf planted 4,206 trees in Fairfax County through more than 60 projects. Fairfax ReLeaf also distributed 2,514 trees in the county.

VDOF continues to plant riparian buffers in watersheds throughout Fairfax County in support of the county's riparian buffer initiative. In 2012, VDOF worked with volunteers from organizations such as Fairfax ReLeaf, Eagle Scouts, homeowner associations and school groups and planted approximately 5,300 seedlings in the county. The Tree Stewards program, initiated in 2011, is designed to create a cadre of trained volunteers to lead community tree plantings and provide information on the benefits and care of trees. An additional 10 Tree Stewards were trained in 2012.

c. Reston

Reston's multi-year stream restoration project is under way. Reston Association continues to work with Northern Virginia Stream Restoration, L.C., managed by Wetland Studies and Solutions, Inc., to help coordinate the Reston stream mitigation bank. The project is implementing the recommended stream restoration projects outlined in the Reston Watershed Management Plan. A team of regulatory agencies, including the U.S. Army Corps of Engineers and the Virginia Department of Environmental Quality, oversee the progress of the bank.

The groundbreaking for Phase I, which covers 14 miles of stream, occurred on February 12, 2008. As of June 2012, approximately eight miles of stream in the Snakeden Branch, The Glade and Colvin Run watersheds have been restored, fully funded by the Northern Virginia Stream Restoration, L.C.

Engineering design plans are underway for the remaining six miles of stream restoration. Construction of the approved plans will depend on the economy and mitigation credit sales with a goal of beginning in late 2014. For more information on the stream restoration project in Reston visit: http://reston.wetlandstudies.com or www.reston.org.

3. Low Impact Development Techniques

a. Overview

Environmentally sensitive site design and low impact development practices serve to minimize impervious cover and replicate natural hydrologic conditions. The county recommends and encourages "Better Site Design" development techniques and LID practices be used to the full extent allowed by the county's Public Facilities Manual.

In 2012, the Department of Public Works and Environmental Services, the Fairfax County Park Authority, Fairfax County Public School, various nonprofit organizations, individual volunteers and other partners contributed to the design and implementation of seven projects within the county that incorporated one or more LID practices. Partnership projects that result in multiple LID practices being implemented on sites across the county are increasing in number and becoming a major focus of the stormwater program. Numerous projects, with LID components, are currently under way with these partners and are scheduled to be constructed in the coming months. A summary of completed projects, including those with integrated LID practices, is prepared each year and available from DPWES, Stormwater Management.

Six low impact development practices (bioretention basins and filters, vegetated swales, tree box filters, vegetated roofs, permeable paving and reforestation) were developed for inclusion in the Public Facilities Manual in 2006. In 2007, the Board of Supervisors adopted the amendments. The new Virginia stormwater regulations, including a suite of LID practices, are being integrated into the local code and PFM requirements.

b. LID monitoring efforts

DPWES staff continues to monitor and evaluate the quantity and quality of runoff from innovative stormwater management systems installed at Fairfax County government facilities. Rain generally flows directly from impervious surfaces such as parking lots, roads and roofs into receiving streams unless it is intercepted by a

stormwater management facility. The stormwater systems being monitored are designed to retain and absorb much of the stormwater onsite through infiltration and evapotranspiration before it enters into streams and waterways. These systems help replicate what naturally occurs when stormwater is retained by forests, meadows and wetlands long enough to infiltrate into the soil and recharge groundwater.

The stormwater systems being monitored include Providence District Supervisor's Office/Fire Station 30 in Merrifield, Cub Run RECenter, Herrity Building in the Government Center complex and Cinnamon Oaks pond retrofit. A bioretention filter and basin, a rain garden and permeable pavement blocks with underground gravel storage were installed at Providence District Supervisor's Office/Fire Station 30. A bioretention filter and basin with a vegetated swale were installed at Cub Run RECenter. The Herrity building site is located on the roof of the garage structure and demonstrates three types of vegetated roof on a 5,633 square foot area. Wetland cells and benches, a sand seepage storm outfall and organic soil amendment with native landscaping were installed at Cinnamon Oaks pond.

The reports for monitoring in 2008, 2009 and 2010 were finalized in 2011. The data are being further evaluated to determine performance and make design related recommendations. Meanwhile, the monitoring data from 2011 indicates:

- Providence LID system – An average of 80.5 percent of the rainfall that fell within the 0.83 acres that drains to the system. eventually infiltrated into the ground or evapotranspired into the atmosphere. Test results showed that phosphorus, nitrate and total suspended sediment normalized loadings (grams per inch of rain) were reduced by 32 percent, 77 percent and 90 percent respectively.

- Cub Run RECenter LID system – Rain events less than 0.44 inches of rain did not result in any outfall runoff. In larger events, runoff was dependent on rainfall rate, rainfall duration and antecedent dry time, and in some cases up to one inch of rain was retained. The temperature of effluent when compared to that from the parking lot was lowered by an average of 2.76^{o}F. Pollutant load (grams) reduction of phosphorus, nitrate and total suspended sediment was 51 percent, 81 percent and 95 percent respectively.

- Herrity Garage green roof –The green roof typically retained at least the first one-half inch of rain and in some cases retained over an inch of rain. The green roof only received water directly from the rain; no runoff entered the green roof system. Pollutant load reduction is dependent on volume reduction. A control section of the parking structure, equal in area to that of the green roof, was also monitored to compare the runoff load from the green roof to that from the parking area. The pollutant load (grams) reductions of phosphorus, nitrate and total suspended sediment were 17 percent, 27 percent and 86 percent respectively. The majority of the TSS runoff from the control section of the parking lot was from atmospheric deposition of "dirt" on the surface that

washed off when it rained. Green roofs can be an exporter of phosphorus, nitrate and TSS when they are new; however, when they have gone through several growth seasons this no longer occurs or is minimized. The pollutant load reduction percentages apply to the difference between what is in the runoff from the green roof and the runoff from the control side of the parking structure. Green roofs do not filter water that passes through them; they act as a sponge and retain rain that falls on them, later releasing the water to the atmosphere through evapotranspiration. In addition, green roofs reduce the heat island effects seen in typical roofs, provide cooling to the building and have a longer life, thus reducing roof maintenance costs.

- Cinnamon Oaks pond retrofit- Monitoring of the Cinnamon Oaks Pond, in the Horsepen Watershed, began in 2012 to measure the performance of wetland cells and benches, a sand seepage storm outfall and organic soil amendment with native landscaping.

c. LID Public Education and Outreach

There are numerous ways to reach county residents and many methods are employed by the staff of the Stormwater Planning Division of DPWES to inform and educate:

- News releases ("tell and sell" the story to the media).
- Social media (i.e. Facebook and You Tube).
- Pod casts and the "County Conversation" (audio).
- Television public service announcements (video).
- Channel 16 television programs.
- Fact sheets, brochures, newsletters, booklets.
- Slideshare (online PowerPoint presentations).
- Flickr (photo stream).
- Web pages.
- Events (SpringFest, Celebrate Fairfax, homeowner association and project meetings).
- Reports (Stormwater Status Report).
- Personal contact by telephone, email, letter, visit.
- Volunteer opportunities (stream and litter cleanups).
- School programs (Sewer Science).
- Stormy the Raindrop (activity books, puppet shows at events).
- Tours of completed projects (Government Center stream restoration, Herrity green roof).

Popular public education topics included: stream restorations; cigarette butts in the environment; proper disposal of pet waste; natural gardening techniques; completed projects; backyard composting and stream friendly yard care; detention basins and micropools; the Herrity green roof; native plants; permeable pavers; promoting

pollinators; rain barrels; reforestation; how to properly discharge swimming pool water; tree box filters; water quality swales; and tree care tips, among other topics.

Fairfax County addresses non-point source pollution through public education in partnership with surrounding jurisdictions. As a member of the Northern Virginia Clean Water Partners, Fairfax County continued to support the regional stormwater education campaign in 2012. By pooling outreach funds with other jurisdictions to reach a wider audience, the campaign used radio and Internet advertising in an effort to reduce pollution-causing behaviors among Northern Virginia residents.

For the 2012 campaign, the Clean Water Partners expanded the partnership and the campaign reach into D.C. and Maryland by aligning with the Community Engagement Campaign managed by the Metropolitan Washington Council of Governments, and:

- Supported two Metro DC-wide blogs that target dog owners and residential gardeners.
- Transferred the blogs to a blogger platform managed by Google.
- Ran four online quizzes and contests to encourage new blog readers and to further promote campaign messages.
- Conducted an online poll survey of 500 Northern Virginia residents to determine the effectiveness of the blog and the ads, to reveal any changes in behavior and to aid in directing the future efforts of the campaign.

In April 2012, two radio ads featuring messages on the importance of picking up pet waste and general household stormwater pollution reduction measures aired on three popular radio stations, including one Spanish language station a total of 236 times. These ads reached over 54,000 residents and resulted in more than 200 visits to the www.onlyrain.org website.

The Clean Water Partners conducted a mini campaign featuring banner ads that promote alternatives to chemical fertilizer use.

Between September 14, 2011 and August 31, 2012, there were more than: 16 million online advertising impressions; 88,000 blog and Facebook page views; 16,000 online interactions; and 4,000 email/RSS subscribers, Facebook fans and Twitter followers.

Survey highlights include: one-fourth of respondents recalled hearing or seeing advertisements on the Internet or on the radio. Of those who recalled the ads, six percent state they now pick up after their pets more often; 15 percent said that they are more careful with fertilizer; seven percent fertilize fewer times per year; and nearly 77 percent of people surveyed reported that they always pick up after their pet.

The Northern Virginia Clean Water Partners website may be seen here http://www.onlyrain.org/.

d. Green Golf Course at Pohick Bay

The Pohick Bay Regional Park Golf Course on Mason Neck gained recertification as an Audubon Cooperative Sanctuary with Audubon International, with a case study on water conservation and irrigation audit after its irrigation system replacement. The golf course also was designated by the Groundwater Foundation as a Groundwater Guardian Green Site. Pohick Bay is the first golf course in Virginia to achieve this designation and one of only 140 in the country. The Groundwater Foundation provides education and community-based action programs that creatively involve individuals, communities, public and private entities in groundwater conservation and protection. The program recognizes good stewards of groundwater by encouraging managers and superintendents of highly-managed green spaces to implement, measure and document their groundwater-friendly practices. The Pohick Bay Golf Course collects data and documents the environmental impact of its groundwater-friendly practices, such as pounds of fertilizer saved annually by using lower input plants, gallons of water saved annually by using low water/maintenance plant materials, amounts of toxic substances disposed of properly and other related items. Education is built in to the Groundwater Guardian Green Site program, with the park documenting its internal education efforts for site staff and external education for site visitors.

4. Flood Remediation/Reduction Programs

a. Belle Haven Watershed Flood Damage Reduction Study

In September 2003, Hurricane Isabel caused $1.6 billion in damages statewide, more than $10 million of which occurred in Alexandria and Fairfax County. A tidal surge from the Potomac River that was nine feet in height inundated Old Town Alexandria and the Belle View neighborhood of Fairfax County, resulting in “State of Emergency” declarations. In Fairfax County, the New Alexandria and Belle View communities experienced severe flooding from the tidal surge, which damaged more than 200 structures. Both neighborhoods are located in the Special Flood Hazard Area and are vulnerable to future flooding. The SFHA is the Federal Emergency Management Agency’s defined 100-year floodplain. The U.S. Army Corp of Engineers, on behalf of Fairfax County, worked to determine if there were technically-feasible and cost-effective flood damage reduction alternatives for the Belle Haven watershed. To reduce flood damages throughout the entire study area, it was determined that a floodwall/levee combination, with a pumping station for interior drainage, may be feasible. The USACE study evaluated such structural options as levees and flood walls and such flood proofing alternatives as raising and modifying structures. A preliminary investigation was completed and five percent concept-level design alternatives were developed. The USACE is continuing to address National Park Service and community concerns. The USACE last updated cost estimates and cost benefit ratios for several floodwall/levee alignments in October 2012, the most expensive alternative being approximately $35 million.

b. Huntington Flood Remediation Project

In June 2006, the Huntington community experienced flooding from Cameron Run which affected more than 160 homes. The flood waters exceeded the Federal Emergency Management Agency 100-year floodplain elevation by approximately three feet. The community also experienced additional flooding in September 2011. Fairfax County contracted the United States Army Corps of Engineers to determine the contributing factors of the flooding and to develop a design to protect the Huntington community. The USACE completed conceptual flood mitigation plans in April 2009, which included a levee along Cameron Run. The estimated cost for the levee project is $30 million. On November 6, 2012, the Fairfax County voters approved a stormwater bond referendum that included funds to design and construct the levee and pump station proposed by the USACE in its 2009 study. The scope of work will include design and construction administration services for the levee and pump station. Construction of the levee will also require utility relocations, acquisition of land rights on adjacent properties and significant public outreach. ARCADIS U.S., Inc. was selected as the design consultant and began work in June 2013. The project is expected to take five to seven years to complete.

5. Support Programs

a. Northern Virginia Soil and Water Conservation District

The Northern Virginia Soil and Water Conservation District is a political subdivision of the Commonwealth of Virginia that has the same boundaries as Fairfax County. The district's goal is to promote clean streams and protected natural resources. NVSWCD works to lessen the impacts of urban/suburban activities on land and water resources in Fairfax County by working with government agencies, industry and the general public and providing technical assistance and outreach programs.

NVSWCD provides information, educational programs, volunteer opportunities and newsletters to residents on many aspects of water quality, erosion and drainage, nonpoint source pollution and stream health. NVSWCD reviews and provides comments to the county's Department of Planning and Zoning on rezoning and special exception applications, with particular attention to the properties of soils, the potential for erosion, the impact on drainage, stormwater management and the surrounding land uses and environment. The district has partnered with many groups to implement several stream restoration and low impact development projects.

NVSWCD presented two rain garden workshops during 2012. The workshops covered rain garden function, design, location, costs, construction, maintenance, planting and materials. The workshops were attended by 59 county residents and industry professionals.

NVSWCD coordinated a regional rain barrel initiative for Northern Virginia with neighboring jurisdictions. Eight "build-your-own" rain barrel workshops, four pre-made rain barrel sales and one "train the trainer" event attracted a total of 324 county residents and resulted in the distribution of 405 barrels. NVSWCD continued to partner in an Artistic Rain Barrel program to renew interest in rain barrels and other best management practices. Twenty teams of students painted and decorated rain barrels, which were auctioned at an Earth Day event.

NVSWCD coordinated two "build-your-own" composter workshops using surplus barrels from the rain barrel program. Thirty participants constructed thirty tumbler-style composters.

In addition, NVSWCD organized the Watershed Friendly Garden Tour in June 2012, showcasing low impact development practices including green roofs, porous pavers, rain gardens, composting, rain barrels, native species, wildlife habitat and more, inspiring visitors to adopt these practices in their own yards and schools.

b. Virginia Department of Forestry

In 2011, the Virginia Department of Forestry partnered with volunteers from organizations such as Fairfax ReLeaf, the Boy Scouts of America,, homeowner associations and school groups and completed 24 community tree plantings in the county. Volunteers donated 1,587 hours and planted 2,333 trees in these 24 events. Eleven of the tree plantings were along streams and added 925 feet of riparian buffer.

In an attempt to expand outreach and education and planting efforts, the Department of Forestry initiated a Tree Stewards program. The Tree Stewards program is designed to create a cadre of trained volunteers to lead community tree plantings and provide information on the benefits and care of trees.

The Virginia Department of Forestry assists Fairfax County with the Agricultural and Forestal District Program, which provides tax incentives for landowners with 20 acres or more of land in agricultural and forest management.
VDOF also writes Stewardship Plans for forestland owners and Neighborhood Forest Management Plans for homeowners and civic associations. As a matter of course, these plans include an assessment of water quality issues such as erosion, pet waste and fertilizer use.

c. Reston Association

The Reston Association, the homeowners association for the large, planned community of Reston (population >60,000), has an active watershed and lakes management program that focuses on the monitoring and improvement of water quality. RA manages and monitors four lakes (Audubon, Anne, Thoreau, and Newport) and two ponds (Bright and Butler).

RA is actively involved in public education and innovative approaches to erosion and drainage control. Examples of watershed management practices in Reston include water quality monitoring, stream bank and shoreline stabilization, erosion abatement, fisheries monitoring, algae and invasive aquatic weed control, waterfowl management, trash removal, dredging and riparian buffer restoration.

- RA hosted a **Stream Monitoring Workshop** on March 30, 2013 with 20 people getting certified as stream monitors. Leah Miller, Clean Water Program Director at the Izaak Walton League of America, Inc., led the program with monitoring of Snakeden Branch at the Walker Nature Education Center.
- At RA's **Spring Festival** in May, residents rented boats at Lake Audubon, learned about stream monitoring, and tried their hands at fishing at the lake.
- RA hosted two **Make Your Own Rain Barrel Workshops** in 2011, two in 2012 and one in 2013 where over 120 barrels were made and distributed.
- In June, RA participated in the **Clean the Bay Day** hosting two **Lake Cleanups** on Lake Audubon, and Lake Thoreau where 51 people got on boats or walked to clean approximately five miles of shoreline and collected an estimated 460 pounds of debris (36 bags). Beer cans and water bottles were the most common items collected with lipstick, fireworks, a lampshade, buckets and a bag full of pants as the most unusual items collected. A patio chair, cushion and logs were the largest items collected.
- In October 2012, RA hosted the **Fall Stream Watershed Cleanup** where 20 volunteers collected a total of 41 bags of trash.
- In March, RA hosted the third annual **Reston Kid's Trout Fishing Day** where 222 kids ages 2-12 enjoyed catching rainbow trout from the restored Snakeden Branch stream between Soapstone and Lake Audubon.
- In September 2012, RA, in partnership with U.S. Geological Survey, conducted a stream monitoring program in Snakeden Branch for South Lakes High School 11th graders.
- RA participated in the **Beaver Pond Watershed Experience Field Trip** for Langston Hughes Middle School 7th graders at The Glade stream valley; this program taught students about stream restoration and the benefits of the riparian area. RA also worked with LHMS **Earth Force Club** on stream monitoring.

6. Reston Storm Water Trail

The Reston Association received a grant for $8,500 from the Chesapeake Bay License Plate fund, $4,000 from Fairfax Water and a donation from Deloitte LP to implement a self-guided Storm Water Trail in Reston that serves as a guide to help community associations, residents and youth to better understand stormwater management. It also encourages individuals to implement at least one of the demonstrated techniques to protect water quality from nonpoint source pollution and to buffer storm runoff. The Storm Water Trail is complete and established.

The Storm Water Trail includes best management practices/low impact development techniques, including an infiltration sidewalk that uses porous paver bricks. Also

included is a rain garden that collects water from the gutter and downspouts at Brown's Chapel; it filters the water through a mixture of sand, topsoil and leaf mulch before conveying the drainage into a gravel layer, a drainage swale, a garden planted with low-maintenance native species that grow well in the Northern Virginia area and a rain barrel that will be used to collect and conserve rainwater to be used to water the gardens in between rainstorms.

The Storm Water Trail helps satisfy the goal outlined in Reston's watershed plan of expanding environmental education opportunities in the watersheds of Reston. On-site controls have been implemented that include low impact development technologies to reduce stormwater runoff volumes and peak flows and to implement best management practices and retrofits to take advantage of natural stormwater infiltration that is provided in natural stream valleys.

Reston's watershed master plan is available online at: https://www.reston.org/ParksRecreationEvents/Nature/NaturalResources/Watershed/WatershedMasterplan/Default.aspx?qenc=HzT9ACzZbNs%3d&fqenc=nvONwrgxjZ6oyRuamln6yw%3d%3d.

7. Organized Countywide Cleanups

Staffs from the Stormwater Planning Division, Solid Waste Management Program, Wastewater Management, Fairfax County Park Authority and the Northern Virginia Soil and Water Conservation District continued to support large and small-scale volunteer cleanups coordinated by the Alice Ferguson Foundation, Clean Virginia Waterways and Clean Fairfax.

Clean Fairfax reports that, last year, the organization worked with over 1,200 volunteers at 85 assisted cleanups, picking up over 67,000 pounds of trash, on and around Fairfax County's roads, parks and side streets.

As reported by the Alice Ferguson Foundation, in spring 2013, approximately 86 sites were established throughout the county for the foundation's annual Potomac River Watershed Cleanup. These cleanups were advertised in the Solid Waste Management Program's e-mail subscription for public school teachers and FCPA's Parktakes Magazine, as well as on the Internet. Cleanups were conducted at numerous state, county and local parks, schools, the county wastewater treatment plant and other locations. The Alice Ferguson Foundation reports that, in Fairfax County, more than 2,200 volunteers removed an estimated 89,500 pounds of trash. An estimated 12,000 plastic shopping bags were counted, as were 217 tires. Region-wide, a total of 14,586 volunteers removed 312 tons of trash and debris from 633 cleanup sites throughout Washington, D.C., Maryland, Virginia, West Virginia and Pennsylvania. The 312 tons of trash collected during the cleanup included 1,314 tires, 193,800 beverage containers, 27,200 plastic bags and 27,400 cigarette butts.

Clean Fairfax made 50,000 impressions (i.e., Web hits, tweets, Facebook) with its online content about litter and the environment.

The Alice Ferguson Foundation's "Bridging the Watershed" program is an outreach program that is implemented in partnership with the National Park Service; it has served 14 schools and around 475 students in Fairfax County. BTW is designed to promote student academic achievement, personal connections with the natural world, lifelong civic engagement and environmental stewardship through hands-on curriculum-based outdoor studies in national parks and other public lands. The curriculum includes the following topics: litter; water quality; invasive species; runoff and sedimentation; and how park history affects current environmental issues. Fairfax County schools have visited the following parks as part of this program:

- George Washington Memorial Parkway—Dyke Marsh (three schools) and Great Falls (three schools).
- National Mall and memorial parks (two schools).
- Prince William Forest Park (six schools).

Twenty-three teachers in Fairfax County have been active in BTW between 2010 and 2012 with 11 going through BTW training during the same period. More information is available at www.BridgingTheWatershed.org.

Additional activities of Clean Fairfax and the Alice Ferguson Foundation are highlighted in the Solid Waste chapter of this report.

According to Clean Virginia Waterways, a total of 801 volunteers participated in the International Coastal Cleanup in Fairfax County during September and October 2012. At 36 sites, 17,421 pounds of trash and marine debris were removed. Plastic bags, beverage bottles, food wrappers and containers, and litter from recreational activities and fast food consumption (i.e. cups, plates, forks etc.) were the most commonly collected trash items in the county.

FCPA organized and/or assisted with a number of stream cleanups in 2012:

- Riverbend Park: three watershed cleanups with a total of 140 people.
- Fairfax Trails and Streams cleaned Pimmit Run stream valley on a regular basis along with two big cleanups spring/fall.
- Burke **Lake** Park: High school cross country teams organized a lake shore cleanup day and collected approximately 50 bags of lake shore trash. Several patrons also collected lakeside trash.
- Lake Accotink Park: Staff organized two Watershed Clean-up Days on April 14 and October 13, 2012, attracting more than 130 volunteers. The Mobile Crew removed 17.9 tons of debris from the lake at the marina in April and 40.5 tons in November.
- Throughout the year, Lake Accotink Park supported numerous individual and small-group volunteers who collected trash in the park. Friends of Accotink

Creek organized bi-annual cleanups at twelve points along Accotink Creek, in Fairfax County and Fairfax City parks. Northern Virginia Kayak Club conducted an Earth Day clean-up of the lake.

- Huntley Meadows Park: Over 100 bags of trash were removed from the park during five separate stream cleanups in 2012 that included Dogue Creek, Barnyard Run and Little Hunting Creek watersheds.

NVSWCD and the county's Solid Waste Management Program assisted in a cleanup of Little Hunting Creek in April 2012 where 139 volunteers picked up 245 bags of trash, 27 tires and 49 shopping carts.

Reston Association coordinated two major stream cleanups during 2012 with 141 volunteers collecting approximately 175 bags of trash. RA also sponsored two lake cleanups on May 23 and June 2, 2012, during which 46 volunteers removed trash and debris from six miles of shoreline along Lakes Anne, Thoreau and Audubon.

The Lake Barcroft Water Improvement District collected litter from the lake; the litter was subsequently moved offsite by the Solid Waste Management Program. These actions keep trash and other debris from moving downstream and into the Potomac River.

In 2012 the multi-agency trash workgroup (consisting of representatives from the Stormwater Planning Division, Solid Waste Management Program, NVSWCD and Clean Fairfax) continued to test and refine the Trash Assessment For Improved Environments stream condition assessment protocols and data forms. As part of a cooperative effort to evaluate litter problems prior to a stream restoration project in Flatlick Branch, NVSWCD completed a TAFIE survey in a 100-foot reach within the project site. Surveyors counted 193 pieces of trash, mostly plastics. Six bags of trash were removed. Valuable information about the types and probable sources of trash was also recorded. Phase I of this stream restoration project will occur in 2013. The workgroup plans to reach out to retailers/vendors located near the site to raise awareness of the litter issue and encourage support for the upcoming restoration project.

Other TAFIE assessments conducted in 2012 included sites at Accotink/Royal Thomas Way (spring and fall), Providence REC Center (spring and fall), Huntley Meadows (spring) and Shaw Park Court (fall).

During 2012, the workgroup outlined a public education plan for TAFIE for 2013. TAFIE forms and guidance were provided to elementary schools by request and to individuals seeking volunteer services for the Virginia Master Naturalist certification program.

The county continued to promote the voluntary Virginia Adopt-a-Stream Program implemented by the Virginia Department of Conservation and Recreation. Links to

information about the program are included on the county's Web pages dedicated to litter and volunteer stream cleanups.

E. STORMWATER MANAGEMENT, ENFORCEMENT AND INSPECTIONS

1. VPDES Municipal Separate Storm Sewer System Permit

Fairfax County's Virginia Pollutant Discharge Elimination System Municipal Separate Storm Sewer System permit (known as the "MS4 permit") requires the county to prevent the discharge of pollutants such as oil, fertilizer, pet waste and trash from the stormwater management system into waterways to the maximum extent practicable.

The permit also prohibits non-stormwater discharges into the storm drain system, such as from illicit sanitary sewer connections or illegal dumping. It also requires storm event monitoring and assessment of the effectiveness of stormwater controls being used in the county.

The MS4 permit is issued to the county as a whole and elements of the stormwater management program are implemented by a broad range of county agencies and partners. The Stormwater Planning Division and the Maintenance and Stormwater Management Division manage the majority of stormwater management program elements, including comprehensive watershed management planning, long term biological monitoring, infrastructure mapping, inspections and maintenance, retrofitting developed areas with water quality control facilities and public outreach and education. Inspections of privately owned stormwater management facilities are conducted on a regular basis (every five years). Water quality is monitored at selected stormwater outfalls four times per year (seasonally). Outfalls are monitored during dry weather to determine the presence of illicit discharges.

The Virginia Department of Conservation and Recreation took over administration of the MS4 permit program as part of the Virginia Stormwater Management Program in 2005. In July 2006, the county submitted its MS4 permit reapplication to DCR. The county's current MS4 permit expired in January 2007; however, the county is operating under an administrative continuance of the existing permit while the state and EPA work on reissuing the permit. County staff has been working with DCR and other municipalities on clarification of the new permit requirements. In April 2011, the county responded to DCR's fifth preliminary draft permit. The latest preliminary draft includes incorporation of Fairfax County Public Schools into the countywide permit, as well as new requirements related to MS4 program plan updates, watershed management plans, inventory control, nutrient management plans, industrial and high risk runoff stormwater management at county facilities, monitoring, public outreach, employee training and development of TMDL action plans.

On June 8-9, 2011, EPA Region 3 representatives and their consultants conducted an on-site compliance inspection of the county's MS4 program. The inspection focused on Structural and Source Controls, Construction Site Runoff, Industrial and High Risk Runoff, and Illicit Discharge and Improper Disposal components of the permit program. Representatives of the Department of Public Works and Environmental Services, Department of Vehicle Services, Fire and Rescue Department, Fairfax County Park Authority, Health Department, Department of Transportation and the County Attorney's Office participated in the inspection.

The county received a formal report on the results of the inspection from EPA in June 2012, and an Administrative Order in November 2012. The AO directed the county to take steps to address aspects of the Industrial and High Risk Runoff and Construction Site Runoff inspection programs. The county responded to the AO on November 30, 2012 and identified the steps being taken to attain compliance with the AO.

The steps related to include the Industrial and High Risk Runoff inspection program include:

- Development of a standard operating procedure to identify and control pollutants in stormwater discharges from industrial and high-risk facilities.
- Development of a database of industrial and high-risk facilities that will be used to prioritize inspections associated with the IHRR program.
- Development of a spreadsheet to track facilities holding Virginia Pollutant Discharge Elimination System permits for discharges of stormwater associated with industrial activity.
- Development of new educational materials to assist other county agencies with recognizing and reporting IHRR during their inspections.
- Two new positions for the purpose of conducting IHRR inspections.

The steps related to the Construction Site Runoff inspection programs include:

- Updates to the site inspection database (Site Inspections 2000 or SI2K) and the Inspector's Handbook to require documentation in SI2K of:
  - Location information and comments regarding compliance or noncompliance for erosion and sediment control inspections.
  - Any verbal communications regarding erosion and sediment control inspections.
  - The content of the comments for erosion and sediment control inspections.
  - Revisions to the inspector's copy of the plan regarding any minor changes in the erosion and sediment control features made during construction. (Major revisions currently require formal submission of a plan revision, and are reviewed by county engineering staff and appropriate outside agencies for compliance with state and local regulations.)
- These updates to SI2K and the Inspector's Handbook will be followed by annual training with the inspectors to ensure that revisions result in a change in practice in the field.

The county is working diligently with the state to obtain a new permit. Fairfax County MS4 annual reports can be viewed on-line at: www.fairfaxcounty.gov/dpwes/stormwater/ms4permit.htm.

2. Regional Stormwater Management Pond Program

Since the early 1980s, the county's Public Facilities Manual has included a provision that encourages the concept of regional stormwater management. As opportunities arose, major developers and county staff pursued regional stormwater management primarily through the development process. A plan identifying the most appropriate locations for regional facilities was needed to improve this process.

The Regional Pond Subcommittee, an ad hoc subcommittee of the Fairfax County Environmental Coordinating Committee, reviewed the county's stormwater management plan and developed recommendations. The Board of Supervisors tasked the subcommittee in January 2002 to examine the role of regional ponds as well as other alternative types of stormwater controls as watershed management tools. The report, which identified 61 recommendations to improve Fairfax County's stormwater management program and to clarify the role of regional ponds, was submitted to and accepted by the Board of Supervisors. The Regional Stormwater Management Plan is being replaced as countywide watershed management plans are being implemented.

Although innovative stormwater management practices are being explored and applied throughout the county, construction of regional ponds continues to be an option used by the county to retrofit areas needing stormwater controls.

3. Stormwater Management Facilities and Infrastructure

In 2012, Fairfax County inspected 374 of the 1,541 county-owned stormwater management facilities and 664 of the 3,720 privately maintained stormwater facilities.

The Maintenance and Stormwater Management Division of DPWES inspects and maintains all county-owned and operated stormwater management facilities and Best Management Practice facilities and infrastructure. Pond inspections occur on a biannual basis and are balanced by fiscal year, which exceeds the permit requirement to inspect all county-maintained facilities at least once during the term of the permit. MSMD inspects and oversees private maintenance agreements for privately owned stormwater management facilities. MSMD also inspects privately-maintained facilities at least once during the term of the permit (every five years). As part of the private facility inspections, MSMD oversees private maintenance agreements.

In 2012, MSMD continued its maintenance program for county stormwater management facilities. Maintenance can include repairs to stormwater management facility structures and removal of sediment. During 2012, the county cleaned and/or mowed 1,289 dam embankments, including 50 regional ponds which were maintained four times each during the calendar year. Cleaning involves removing trash, sediment

and debris from the trash rack, control structure and all inflow channels leading to the control structure. At each stormwater management facility, deposited sediment is removed from the trickle ditch upstream from the control structure and deposited offsite. The cleaning helps keep the facility functioning properly by conveying water and performing the BMP function as designed. The county completed 3,856 work orders, including: un-blocking stormwater management ponds and pipes to avoid flooding or damaging infrastructure; channel and pond cleaning; mowing; weeding; planting; outfall repair; stream restoration and bank stabilization; trail maintenance; graffiti removal; snow removal; sign repairs/installation; and responses to complaints.

In addition to routine maintenance inspections, county staff with expertise in dam design and construction continues to perform annual inspections of 19 state-regulated dams in the county (owned by DPWES) to identify any safety or operational items in need of corrective action and to ensure that the dams satisfy state safety requirements. A work program was established and implemented to correct deficiencies and address maintenance items discovered during inspections. Critical items such as the stability of the dam embankment and the function of the water control structures are addressed on a priority basis.

As the SWM concept continues to shift its focus from flood control to water quality and environmental enhancements, the county's public maintenance inventory of Low Impact Development facilities has grown to 203 facilities, including: bioretention gardens; green roofs; permeable pavers; vegetated swales; tree box filters; and infiltration trenches.

In 2012, MSMD met with the Fairfax County Sheriff's department about using the Community Labor Force crews to help maintain Fairfax County's public low impact development stormwater facilities. A partnership was created between the two agencies, and the CLF work crews were tasked with maintaining roughly 39 publically maintained LID facilities.

In 2012, MSMD continued implementation of its infrastructure inspection and rehabilitation program. Staff inspected 2,200 pipe segments and 4,000 storm structures with video and photo documentation. Under the rehabilitation program, more than 50 miles of pipe were videoed, documenting the existing structural and service conditions of the interior of the storm system. These efforts represent 292 miles, or 23 percent of the storm drainage network, being screened through walking and/or video documentation for obvious deficiencies. In addition, more than 5,100 feet of storm pipe in the county's inventory were rehabilitated or repaired through replacement or by lining entire pipe segments using cured-in place pipe lining methods

In addition to SWM and storm drain infrastructure assessments and maintenance, MSMD: removes snow and performs street sweeping operations on county facilities; responds to flooding complaints; maintains county trails; performs graffiti removal; mows the grass on blighted properties; and maintains an electronic database of facilities including plans, maps, inspection reports, and maintenance history. Many emergencies

are responded to in the middle of the night and most fixes take place with minimal disruption to Fairfax County residents' daily lives.

Much of the stormwater infrastructure in Fairfax County is reaching the end of its useful life; as the system ages it will be critical to maintain adequate inspection and rehabilitation programs to avoid infrastructure failures and ensure the functionality of stormwater treatment systems. In addition, it is critical for MSMD to implement cost effective solutions such as trenchless pipe replacement technologies, naturalizing stormwater management facilities and creating efficiencies through partnerships with other county agencies such as Fairfax County Public Schools and the Park Authority.

MSMD is increasing its stormwater management infrastructure replacement program, has created a more comprehensive LID maintenance program and continues to rehabilitate a number of older stormwater management dams and other critical facility components. In addition, MSMD and the Department of Code Compliance are continuing to enhance the private stormwater facility enforcement program to ensure all non-functional stormwater facilities are restored to their original design.

4. Erosion and Sediment Control

DPWES continues to make improvements to the county's erosion and sediment control program, resulting in a greater emphasis and a higher quality of inspection services. DPWES developed a quality assurance program and trained field specialists on how to handle erosion and sediment control violations. DPWES also developed a prioritized inspection program, in accordance with guidelines established by the Virginia Department of Conservation and Recreation, that will consider slope, soil type, proximity to streams and extents of buffer areas to determine an overall rating for any given site. In March 2008, the Virginia Department of Conservation and Recreation approved the county's program, finding it to be "fully consistent with the requirements of the Virginia Erosion and Sediment Control Law and Regulations."

In 2012 a total of 710 E&S plans for projects that would disturb a land area of 2,500 square feet or more were submitted and approved for construction. Written reports listing these individual sites were provided on a monthly basis to Virginia Department of Conservation and Recreation.

In 2012, 26,617 E&S inspections were performed through the county's Alternative Inspection Program on all sites under construction. Those E&S inspections represented 54.7 percent of the 48,622 total site inspections that were performed by Site Development and Inspection Division personnel. The site inspections total also included 2,160 projects that were inspected for purposes other than strictly E&S control (e.g., pre-construction, streets, sanitary sewer, storm sewer, and project release).

In 2012 SDID wrote 605 "2030" E&S control reports, which identify the E&S control deficiencies developers must correct within five days. Failure to comply within the specified time frame can result in issuance of a violation to the developer. SDID issued

69 violations in 2012 and 54 of those were later cleared. The remaining 15 violations are extended until the required corrections are made or court action is initiated. SDID held 202 escrows for either landscaping or stabilization issues.

The Land Disturbance and Post Occupancy Branch of DPWES-Land Development Services investigates complaints alleging violations of the Fairfax County's Erosion and Sediment Control Ordinance (Chapter 104). The branch also investigates complaints alleging violations of the county's Chesapeake Bay Preservation Ordinance (Chapter 118 of the County Code). In 2012, the branch received 247 total complaints. In most instances there was either no violation or there was timely compliance if a violation was cited. The branch issued 24 Resource Protection Area violation notices and 38 land disturbance violation notices. The branch undertook 20 criminal proceedings to ensure compliance, with two proceedings resulting in fines issued by the court.

5. Illicit Discharges

The Fire and Rescue Department's Fire and Hazardous Materials Investigative Services section aggressively enforces County Code Chapters 62, 105 and 106 in conjunction with the Department of Public Works and Environmental Services and the Department of Planning and Zoning. FHMIS also issues criminal citations during investigations of hazardous materials incidents. Chapter 62 establishes that the Fire Marshall and all permitted members of the Fire Marshall's staff have police powers to investigate and prosecute certain offenses, including offenses related to storage, use and transportation of hazardous materials and hazardous waste, as well as environmental crimes. Chapters 105 and 106 contain provisions that address illicit discharges to state waters and the county's storm drainage system. Procedural Memorandum No. 71-01, Illegal Dump Site Investigation, Response, and Cleanup, outlines the process of follow-up action for non-emergency incidents of illegal dumping; establishes action under County Code Chapter 46, Health or Safety Menaces; and provides referrals for action on complaints that are neither public health hazards nor regulated.

In 2012 the section received 552 complaints involving hazardous materials. The actual spill, leak or release of hazardous materials into the environment occurred in 231 of these cases. Of these 231 releases, 168 involved petroleum based products. There were 31 hydraulic oil spills/releases (mostly from trash trucks), 12 gasoline releases, 51 fuel oil or home heating oil releases and 33 diesel fuel releases. The remainder consisted of a variety of materials including, paint, antifreeze, cleaners, various gases, various chemicals and mercury. There were 28 incidents where the release of hazardous materials impacted storm drains or surface waters. The section tracked 35 sites for both short and long term remediation. The vast majority of these releases were small scale with the exception of an overturned gasoline tanker truck that caught fire and released approximately 8,500 gallons of gasoline into a storm drain system.

The Sanitary Sewer Infiltration Abatement Program conducts wastewater flow measurements and analysis to identify areas of the wastewater collection system with

excessive inflow/ infiltration problems, and uses closed circuit television to inspect trunk sewer mains in an effort to specifically identify defective sewer lines for repair and rehabilitation. In 2012, 208 miles of old sewer lines and approximately 12 miles of new sewer lines were inspected, resulting in the identification of sanitary sewer lines and manholes needing repair and rehabilitation. In 2012, approximately 31 miles of sanitary sewer lines were rehabilitated, bringing the total length of sewer lines repaired over the past ten years to approximately 214 miles.

The Sanitary Sewer Extension and Improvement Program addresses pollution abatement and public health considerations and provides sanitary sewer services to areas identified by the Department of Health as having non-repairable or malfunctioning septic systems. In 2012, four Extension and Improvement projects were completed, consisting of approximately 5,360 feet of eight-inch gravity sanitary sewer, approximately 3,863 feet of 1.5-inch to 2.5-inch diameter low-pressure sanitary sewer (including six individual grinder pumps) and sanitary sewer connections for 68 existing homes and three vacant properties.

6. Wetlands Impacts

In 2012 the Northern Regional Office of the Virginia Department of Environmental Quality received 28 applications to impact surface waters in Fairfax County. A total of 26 new Virginia Water Protection Wetland Permits were issued. Compensation for impacts to surface waters was proposed to be provided through the purchase of bank credits and on-site stream restoration or riparian buffer enhancement.

F. WASTEWATER TREATMENT

Wastewater is primarily treated two ways in Fairfax County. In most cases it is collected from homes and commercial sites and carried through the sanitary sewer pipe system to large treatment facilities that release the treated waters into local waterways. For a small percentage of Fairfax County residents, wastewater is treated on-site via septic systems where the water infiltrates into ground and ultimately reaches groundwater.

1. Treatment Facilities

a. Upper Occoquan Service Authority

The following information has been provided by UOSA:

UOSA operates an advanced water reclamation facility in Centerville, Virginia and serves the western portions of Fairfax and Prince William counties, as well as the cities of Manassas and Manassas Park. The water reclamation plant includes primary-secondary treatment followed by advanced waste treatment processes: chemical clarification, two-stage recarbonation with intermediate settling, multimedia filtration, granular activated carbon adsorption, chlorination for

disinfection and dechlorination. The plant's rated capacity is 54 million gallons per day.

UOSA operates under a Virginia Pollutant Discharge Elimination System Permit, which is issued by the Virginia Department of Environmental Quality. The permit limits and 2012 plant performance are listed in Table IV-1.

Table IV-1. UOSA Permit Requirements and 2012 Performance

Parameter	Limit	Performance
Flow	54 mgd	30.1 mgd
Fecal Coliform	<2/100 mg/l	<1./100 mg/l
Chemical oxygen demand	10.0 mg/l	<2.8mg/l
Turbidity	0.5 NTU	<0.1 NTU
Total Suspended Solids	1.0 mg/l	<0.1 mg/l
Total Phosphorus	0.1 mg/l	<0.1 mg/l
Surfactants	0.1 mg/l	0.033 mg/l
Total Kjeldahl Nitrogen	1.0 mg/l	0.32 mg/l
Dissolved Oxygen	>5.0 mg/l	>7. 0mg/l
Dechlorination Chlorine Residual (mg/l)	Non detect	Non detect

Source: Upper Occoquan Service Authority

The influent highest rolling 30-day flow was observed during the 30-day rolling period ending on June 12, 2012 at 36.1 mgd. The UOSA Plant continues to produce high quality reclaimed water.

UOSA produces and treats two types of residuals: biosolids from conventional treatment and lime solids from chemical treatment. UOSA produces Exceptional Quality biosolids utilizing a dryer-pelletizer process. EQ biosolids have commercial potential in the agricultural and horticultural markets. As back up to the EQ biosolids process, UOSA produces Class B biosolids through a combination of digestion and dewatering followed by lime stabilization. Class B biosolids are applied to agricultural land. Thickened lime residuals are gravity thickened and dewatered on the recessed chamber filter presses. All lime solids are landfilled on site in a permitted industrial landfill owned by UOSA. UOSA's lime solids are registered with the Virginia Department of Agriculture and Consumer Services as an industrial co-product for use as a soil amendment. However, because agricultural lands are located in areas far away from UOSA, their distribution is not currently cost effective.

b. Noman M. Cole Jr. Pollution Control Plant

The NMCPCP, located in Lorton, is a 67 million gallon per day advanced wastewater treatment facility that incorporates preliminary, primary, secondary and tertiary treatment processes to remove pollutants from wastewater. The original plant, which began operation in 1970 at a treatment capacity of 18 million gallons a

day, has undergone three capacity and process upgrades to meet more stringent water quality standards. After treatment, the wastewater is discharged into Pohick Creek, a tributary of Gunston Cove and the Potomac River. The plant operates under a VPDES permit. The plant is required to meet effluent discharge quality limits established by the Virginia Department of Environmental Quality. Table IV-2 presents the facility's performance and current effluent monthly limitations.

In 2012, 55,942 wet tons of sludge were generated and incinerated. Inert ash from the process was disposed of in a monofill at the county's I-95 campus.

Table IV-2
NMCPCP Permit Requirements and 2012 Performance Averages

Parameter	Limit	Performance
Flow	67 mgd	37.57 mgd
$CBOD_5$	5 mg/l	< 2 mg/l
Suspended Solids	6 mg/l	1.4mg/l
Total Phosphorus	0.18 mg/l	0.08 mg/l
Chlorine Residual	0.008 mg/l	< 0.008 mg/l
Dissolved Oxygen	6.0 mg/l (minimum)	8.4 mg/l
pH	6.0-9.0 (range)	7.0
E. coli Bacteria	126/100 N/MCL*	1 N/MCL*
Ammonia Nitrogen	1.0 – 2.2 mg/l (seasonal)	< 0.12 mg/l
Total Nitrogen (Annual)	7 mg/l	4.22mg/L

*Geometric mean
Source: Fairfax County Department of Public Works and Environmental Services

Water Reuse Project

The purpose of the project is to provide treated effluent that can be used by various users in lieu of potable water as allowed by state regulations. The Water Reuse project includes the design and construction of approximately 20,000 linear feet of water reuse main, an elevated water tank, a pump station upgrade at the Treatment Plant, a wastewater pump station upgrade at the county's Energy/Resource Recovery Facility, an irrigation pump station upgrade at the Laurel Hill Park Golf Course and an irrigation system at the Lower Potomac ball fields. The project will reduce the treatment plant effluent discharge into Pohick Creek by providing approximately 560 million gallons per year to E/RRF for use in its cooling towers and approximately 24 million gallons per year to the Lower Potomac ball fields and Laurel Hill Park golf course for irrigation purposes, for a total of 584 million gallons per year. The notice to proceed on the reuse project was issued on December 23, 2009. The project went online April 5, 2012

2. Septic System Permitting and Repairs

a. Overview

An estimated 21,371 homes and business are served by on-site sewage disposal systems in Fairfax County. Over 700 of these systems are alternative sewage disposal systems, which require regulating the operation and maintenance on the part of the home owner. The county's Health Department reported that in 2012, 107 New Sewage Disposal Permits were issued for single family residences. There were 86 new sewage disposal systems installed—41 (47.7 percent) were alternative type systems and 45 (52.3 percent) were conventional systems. There were 792 sewage disposal system repair permits issued; repairs ranged from total replacement of the system to minor repairs such as broken piping or pump replacement. There were 5,466 septic tank pumps outs.

The Health Department mailed 14,957 flow diversion valve reminder notices in 2011. The notices are sent to homeowners on the anniversary of the installation of their septic system to remind them to turn their flow diversion valve once a year. It reminds them to pump out their septic tank every three to five years.

In 2011, 1,467 non-compliance letters were mailed to owners of homes that have not pumped out their septic tank during the five year period required by County Code. If homeowners fail to comply, a follow-up letter is mailed to them informing them that action will be taken under the regulations to insure their septic tank is pumped out as required.

b. Septic system failures

i. Overview

There are challenges to sustainability of existing onsite sewage disposal systems through proper use, maintenance and upkeep by the homeowner. There remains a concern for future failing septic systems. There are also challenges associated with the increasing reliance on alternative systems.

There are 33 properties permitted for pump & haul as a result of a failing onsite sewage disposal system with no area for replacement or availability of public sewer.

Areas of the county with marginal or highly variable soils that have been deemed unsuitable for onsite sewage disposal systems in the past are now being considered for development utilizing alternative onsite sewage disposal technology. In addition, alternative systems are becoming the norm for developers who want to maximize lot yield from properties that are not served by the sanitary sewer system. Alternative on-site systems require more aggressive maintenance on a regular schedule for the systems to function

properly. Some require maintenance contracts as part of the permitting process. Homeowners are really not aware of their responsibilities for maintaining these systems. Education from the private sector and government sector is essential.

To address concerns about the management of onsite sewage disposal systems, Health Department staff and representatives from American Water/Applied Water Management conducted a study to examine the feasibility of establishing an onsite sewage disposal management entity in Fairfax County. If deemed feasible, the entity would be responsible for ensuring that proper and timely system maintenance is performed on all onsite sewage disposal systems. This project was completed in a four phased approach. Phase four of final technical report was provided to Health Department at the beginning of FY 2010. The Health Department has been reviewing the report as to its applicability to legislation approved by the Virginia General Assembly in 2009 and 2010. The legislation specifically required the State Health Department to adopt *Emergency Regulations for Alternative Onsite Sewage Systems* that establish performance requirements, maintenance requirements and reduced vertical soil setbacks distances to restrictions for all Alternative Onsite Sewage Systems. Emergency regulations were adopted on April 7, 2010.

ii. Summary/Status of present amendments to Chapter 68.1 of the Fairfax County Code

No changes have been made to Chapter 68.1 of the Fairfax County Code. The new Regulations for Alternative Onsite Sewage Systems have gone into effect; these regulations establish permanent operation and monitoring requirements for alternative onsite sewage systems. Chapter 68.1 will be reviewed for possible future amendments to address changes that may be necessary to comply with statutory codes related to alternative onsite sewage systems.

Due to concerns expressed from the General Assembly and the small business caucus, the Virginia Department of Health is examining the extent to which direct service delivery in the onsite sewage program may be privatized. VDH has engaged the University of Virginia Institute for Environmental Negotiation to undertake a stakeholder process to examine privatization and offer consensus-based recommendations on how the agency should proceed. The stakeholder group will include both VDH and private sector onsite sewage practitioners, local government representatives, homeowners and other interested parties who can provide different perspectives. The Division of Environmental Health is monitoring this process to determine the potential impacts to the Onsite Sewage & Water program in Fairfax County.

iii. Environmental stewardship

The Division of Environmental Health has fact-sheets, brochures and CDs dealing with operating and maintaining sewage disposal systems properly. In addition, Environmental Health Specialists provide presentations to homeowner associations, realtors, schools and other interested persons or organizations on protecting the environment, groundwater and public health through proper operation and maintenance of sewage disposal and water well systems.

3. Sanitary Sewer Maintenance, Repairs and Rehabilitation

The Wastewater Collection Division within the Department of Public Works and Environmental Services manages the county's operation and maintenance program for the sanitary sewer system, which includes:

- Approximately 3,380 miles of gravity sewers and force mains.
- 63 wastewater pumping stations.
- 57 permanent flow metering stations.
- 11 rain gauge stations.
- 135 grinder pump and associated pressure sewer systems.

a. Closed Circuit Television Inspection

Closed circuit television inspection is used to inspect trunk sewer mains to identify defective lines in need of repair and/or rehabilitation. In 2012, 208 miles of old sewer lines and 12.4 miles of new sewer lines were inspected using CCTV. All new inspections are recorded in the Enterprise Asset Management system and are used in work order planning and management.

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b. Sewer Rehabilitation

The use of trenchless technologies for sewer rehabilitation continues to be a major initiative for both gravity and pressure lines. These technologies provide significant cost savings over traditional open cut repairs, with the additional benefits of reduced disruption to citizens, the surrounding environment and traffic. In 2012, 165,950 linear feet of 8" through 15" diameter sewers were rehabilitated using cured-in-place pipe repair, and 14 dig-ups and 36 trenchless point repairs (top-hats) were completed. Additionally, 47 manholes were rehabilitated. Over the past 10 years, 213.8 miles of sewer lines have been rehabilitated.

c. Sewer Maintenance

The Sewer Maintenance group continues to integrate and optimize the sewer maintenance activities of WCD. Staff reviews and evaluates procedures, programs, work completed to date and equipment needs. Staff also plans for any additional work necessary to improve upon WCD's reduction of sewer overflows and

backups. Continual adjustments are being made to the inspection and cleaning priorities in order to establish the most effective schedules for the field staff. In 2011, 388 miles of sewer were pressure cleaned, 73 miles were mechanically cleaned using rodders, and 290 miles were visually inspected. The work orders are planned and managed using a Web-based asset management system.

G. DRINKING WATER

The county's water supply comes from the Potomac River, the Occoquan Reservoir, Goose Creek, community wells and private wells. Fairfax Water withdraws water from the Potomac River near the James J. Corbalis Water Treatment Plant and from the Occoquan Reservoir at the Frederick F. Griffith Water Treatment Plant. Fairfax Water provides drinking water to most Fairfax County residents. Fairfax Water also provides drinking water to the Prince William County Service Authority, Loudoun Water, Virginia America Water Company (City of Alexandria and Dale City), Town of Herndon, Fort Belvoir and Dulles Airport. The City of Fairfax receives its water from the Goose Creek Reservoir in Loudoun County, and the City of Falls Church buys its drinking water from the Washington Aqueduct's Dalecarlia Plant on the Potomac River.

By early 2014 it is expected that both the City of Fairfax and Falls Church systems will be a part of Fairfax Water. Fairfax Water provided 54,986 million gallons of drinking water in 2012.

With the exception of some wells, water must be treated prior to use.

Fairfax Water provided 54.986 billion gallons of drinking water in 2012.

Federal regulations require water suppliers to provide annual reports on the quality of the drinking water to their customers through the Consumer Confidence Report Rule. The current Water Quality Report is available for review on the Fairfax Water website at http://www.fairfaxwater.org/water/water.htm.

Table IV-3
Fairfax Water -Water Supply Sources, 2012

Sources	Gallons (in billions)
Occoquan Reservoir (Lorton/Occoquan)	23.333
Potomac (Corbalis)	31.513
Wells	0.000
Purchased	0.040
Untreated	.1
TOTAL	54.986

Source: Fairfax Water

1. Wells

The Fairfax County Health Department has developed and maintains an extensive data base and GIS layer of all water well systems installed in the county. The Health Department permits and inspects all new well construction, existing well repairs and well abandonments. In 2012 there were 149 new well permits, 44 well repairs and 137 Water Well Abandonments issued. There were 44 Geothermal Well Permits issued.

The Virginia State Health Department Office of Drinking Water regulates 44 public well water supplies in Fairfax County. The operators of these systems are required to conduct quarterly water sampling and analysis.

Fairfax Water no longer operates public wells.

There are approximately 13,930 single family residences and businesses that are served by individual well water supplies in Fairfax County.

2. Source Water Assessments

The 1996 Amendments to the Safe Drinking Water Act provided for source water assessment and protection programs designed to prevent contamination to drinking water. Under SDWA, states are required to develop comprehensive Source Water Assessment Programs that identify areas that supply public tap water, inventory contaminants and assess water system susceptibility to contamination. Fairfax Water has completed an inventory of potential sources of contamination and a survey of land use activities within the Potomac and Occoquan Watersheds.

Fairfax Water's Source Water Assessment is available on-line at: www.fairfaxwater.org.

3. Treatment Facilities

a. Occoquan Reservoir Facilities

The Frederick P. Griffith, Jr., Water Treatment Plant, sourced by the Occoquan Reservoir, came on line in 2006 and has a current capacity of 120 million gallons per day. The plant is designed for a future capacity of 160 mgd. In addition to flocculation and sedimentation, the Griffith Plant includes advanced treatment processes of ozone disinfection and biologically active, deep bed, granular activated carbon filtration. Chloramines are used for final disinfection. Residual solids from the water treatment process flow into a nearby quarry with the decant water being discharged in compliance with a Virginia Pollutant Discharge Elimination System permit.

b. Potomac River Facilities

The James J. Corbalis, Jr., Water Treatment Plant, sourced by the Potomac River, has a current capacity of 225 mgd. The plant is designed for an ultimate capacity of 300 mgd. The plant uses ozone as a primary disinfectant, flocculation-sedimentation, biologically active filters with carbon caps and chloramine final disinfection. Residual solids from the water treatment process are dewatered and land applied off site.

4. Drinking Water Quality Monitoring

Federal regulations require water suppliers to provide annual reports on the quality of the drinking water to their customers through the Consumer Confidence Report Rule. The current Water Quality Report is available for review on the Fairfax Water website at www.fairfaxwater.org, and includes much of the following information.

a. Disinfection by-Products

Trihalomethanes are by-products of chlorination water treatment and are suspected carcinogens at elevated levels. The 2012 distribution system averages continue to be below the federally mandated Maximum Contaminant Levels for total trihalomethanes. In addition to the trihalomethanes, haloacetic acid levels, another by-product of chlorination, continue to be below the required maximum contaminant level. The presence of chlorine in drinking water supplies remained below the required Maximum Residual Disinfectant Level.

b. Metals

Fairfax Water also tests for the following regulated elements: aluminum, antimony, arsenic, barium, beryllium, cadmium, calcium, chromium, copper, iron, lead, manganese, magnesium, mercury, nickel, potassium, selenium, silver, sodium, thallium and zinc. The levels of these metals in 2012 continued to be below their MCLs. The concentration levels for unregulated metals were within the expected range. Test results for these and other constituents are available on-line at: http://www.fairfaxwater.org.

c. *Cryptosporidium*

Cryptosporidium is a microbial pathogen sometimes found in surface water throughout the United States. Although filtration removes *Cryptosporidium*, the most commonly used filtration methods cannot guarantee 100 percent removal. Fairfax Water consistently maintains its filtration process in accordance with regulatory guidelines to maximize removal efficiency. Fairfax Water's monitoring indicates the occasional presence of these organisms in the source water. Current test methods do not help determine whether the organisms are dead or if they are capable of causing disease.

Ingestion of *Cryptosporidium* may cause cryptosporidiosis, an abdominal infection. Symptoms of infection include nausea, diarrhea and abdominal cramps. Most healthy individuals can overcome the disease within a few weeks. However, immuno-compromised people, infants, small children and the elderly are at greater risk of developing life-threatening illness. Fairfax Water encourages immuno-compromised individuals to consult their doctors regarding appropriate precautions to take to avoid infection.

Cryptosporidium must be ingested in order to cause disease. It may be spread through means other than drinking water, such as other people, animals, water, swimming pools, fresh food, soils and any surface that has not been sanitized after exposure to feces.

Fairfax Water has completed monitoring of the Potomac River and Occoquan Reservoir for compliance with the EPA Long Term 2 Enhanced Surface Water Treatment Rule. EPA created this rule to provide for increased protection against microbial pathogens, such as *Cryptosporidium*, in public water systems that use surface water sources. Fairfax Water's monitoring program began in 2004 and involved the collection of two samples from water treatment plant sources each month for a period of two years. Once monitoring for compliance with the LT2ESWTR was complete, Fairfax Water continued to monitor for *Cryptosporidium* at water treatment plant sources.

Under the LT2ESWTR, the average *Cryptosporidium* concentration determines whether additional treatment measures are needed. A *Cryptosporidium* concentration of 0.075 oocysts/Liter will trigger additional water treatment measures. Fairfax Water's raw water *Cryptosporidium* concentrations consistently remain below this threshold.

d. Emerging Water Quality Issues

An emerging water quality issue of particular media interest is a group of compounds including: (1) pharmaceuticals and personal care products; and (2) endocrine disrupting compounds. While the presence of these substances in source and drinking water has been a recent issue of national interest, to date research has not demonstrated an impact on human health from these compounds at the trace levels discovered in drinking water.

There are tens of thousands of compounds that are considered potential endocrine disrupting compounds or pharmaceuticals and personal care products. In establishing a protocol for monitoring these compounds, Fairfax Water carefully considered the most prudent use of its resources when developing the list of compounds to test for in raw and treated water. Fairfax Water looked at influences in the Potomac and Occoquan River watersheds (industrial, agricultural uses, etc.) to determine which compounds are most likely to be present in the raw water. Fairfax Water then looked at the treatment process to determine which compounds

would not be readily removed through treatment. Finally, the list was narrowed to look at which compounds can be measured in water. This provided an initial list of 20 compounds that were most likely to be present. In 2010, Fairfax Water again performed a comprehensive review, which included the current project results as an additional part of the database of information. Based on this review, an updated list of 25 compounds is currently being tested on a routine basis.

Fairfax Water tests its source waters, the Potomac River and the Occoquan Reservoir, and its treated water, delivered to homes and businesses. Samples are sent to an independent laboratory specializing in this type of analysis. As expected, trace amounts of a few compounds were found in the Potomac River and Occoquan Reservoir sources. Trace amounts of three compounds were also found in the treated water at a very low frequency. To date, research shows no indication of human health concern at the levels found in Fairfax Water's source or treated waters. To view the results from Fairfax Water's monitoring of these compounds and learn more about emerging water-quality issues, visit the Fairfax Water website at http://www.fairfaxwater.org/current/monitoring_program.htm or call 703-698-5600, TTY 711.

The analytical methods used in this study have very low detection levels—typically 100 to 1,000 times lower than state and federal standards and guidelines for protecting water quality. Detections, therefore, do not necessarily indicate a concern to human health but rather help to identify the environmental presence of a wide variety of chemicals not commonly monitored in water resources. These findings complement ongoing drinking-water monitoring required by federal and state regulations.

Fairfax Water provides highly advanced treatment for the water served to its customers. A study conducted by the Water Research Foundation concluded that using a combination of ozone and granular activated carbon is very effective in removing broad categories of endocrine disrupting chemicals, personal care products and pharmaceuticals. Fairfax Water uses both ozone and granular activated carbon at both of its treatment plants as part of its multi-barrier water-treatment approach that also includes coagulation, sedimentation, filtration and disinfection. Additional information about Fairfax Water's treatment process and water quality is available at www.fairfaxwater.org/water/index.htm.

e. Special Perchlorate Monitoring Study

Perchlorate is a naturally-occurring as well as a man-made compound. Its presence in drinking water is currently unregulated and utilities are not required to monitor for it. In mid-2007, Fairfax Water began voluntarily participating in an EPA-funded, 12-month non-regulatory perchlorate sampling project for the Potomac River. EPA initially established a reference dose of 24.5 parts per billion for perchlorate and beginning in 2009 has proposed an interim health advisory of 15 ppb. A reference dose is a scientific estimate of a daily exposure level that is not

expected to cause adverse health effects in humans. The reference dose concentration was used in EPA's efforts to address perchlorate in drinking water and to establish the interim health advisory.

The source and treated water samples collected in 2007 and 2008 from Fairfax Water's Potomac River treatment plant showed only trace amounts of perchlorate at levels less than 1.1 parts per billion, far below the EPA reference dose level of 24.5 ppb or the interim health advisory of 15 ppb. Based on EPA's research, the levels of perchlorate observed in the Potomac plant waters are not considered to be a health concern. If you have special health concerns, you may want to get additional information from the EPA at www.epa.gov/safewater/contaminants/unregulated/perchlorate.html or contact the EPA's Safe Drinking Water Hotline at 800-426-4791, TTY 711.

f. Special Hexavalent Chromium Monitoring Study

A report released by the Environmental Working Group in 2010 spurred interest in chromium in drinking water, specifically hexavalent chromium. Chromium is a naturally occurring metal found in soils, plants, rocks, water, and animals.

There are two common forms of chromium: chromium III and chromium VI. Chromium III is an essential human dietary element found in vegetables, meats, fruits, grains and yeast. Chromium VI, also known as hexavalent chromium, is generally produced by industrial processes such as steel manufacturing and pulp mills. It can also be generated by converting natural deposits of chromium III to chromium VI.

Total chromium, which is a measure of the sum of both chromium III and chromium VI, is a regulated compound in drinking water. The current maximum level of total chromium allowed in drinking water is 100 parts per billion. Fairfax Water routinely monitors for total chromium. The tests to date show that our water is consistently below the detection limit of five parts per billion.

In January 2011, Fairfax Water began conducting a special monitoring study by performing quarterly testing for hexavalent chromium in our raw (untreated), finished (treated) and distribution waters. To learn more about the 2011 data results for hexavalent chromium, visit Fairfax Water's website at www.fairfaxwater.org/water/chromium.htm.

g. Tap Water Monitoring

In 2012, Fairfax Water monitored 3,307 taps for coliform bacteria. The monthly monitoring results were within EPA required limits. Fairfax Water also monitored surface source water and finished drinking water for 42 volatile organic compounds and 40 synthetic organic compounds. Low levels of atrazine and metolachlor, were detected in the source waters, and none was detected in finished waters. Total

trihalomethanes, a subset of volatile organic compounds, as discussed above, were detected at low levels in the finished water as expected in a chlorinated system.

Fairfax Water has been testing for lead and copper in customer tap samples in accordance with EPA's lead and copper rule since 1992 and has consistently tested below the action level established in the rule. In 2011, the 90th percentile value for lead was 0.80 parts per billion, compared to the EPA action level of 15 ppb. For copper, the 90th percentile value in 2011 was 0.116 part per million, compared to the EPA action level of 1.3 ppm. The next required collection for the EPA lead and copper regulation will occur June – September 2014. Additional information on these programs and more can be found at: www.fairfaxwater.org.

5. Regional Cooperative Water Supply Agreements

In order to protect the Potomac River ecosystem during low flow periods, the three major water utilities in the Metropolitan Washington Area (Fairfax Water, Washington Aqueduct and Washington Suburban Sanitary Commission) became signatories to agreements that lay out the rules for water allocations. Two upstream dams, Jennings-Randolph on the Potomac River and the Savage River Dam, along with Seneca Lake in Montgomery County, Maryland have been constructed; releases from these reservoirs can be used to augment natural river flows during times of drought. The suppliers provide funding for operations and maintenance for a third reservoir, Savage Reservoir, which is used to match a portion of water supply releases from Jennings Randolph.

While the Potomac River has flows that average above 7,000 million gallons per day, flows well below that have also been observed, usually in late summer and early fall. The lowest recorded flow in this region was 388 mgd at Little Falls in September during the drought of 1966. This is an adjusted figure that does not include the withdrawal allocation of 290 mgd (e.g., with that adjustment, the flow was actually 98 mgd).

In 1978, the three major metropolitan water utilities, including Fairfax Water, signed the Low Flow Allocation Agreement, which creates a protocol for allocation of water from the Potomac during periods of low water when the possibility of demand exceeding supply exists.

In 1982 the Metropolitan Washington Area water suppliers and the Interstate Commission on the Potomac River Basin signed the Water Supply Coordination Agreement. The main goal of the agreement is to maintain adequate flow in the river so that water supply and flow-by needs are met and to reduce the risk of requiring allocations as defined in the LFAA. The WSCA promotes a sharing of benefits, risks, and resource costs. All parties agree to optimally utilize the off-Potomac Occoquan and Patuxent Reservoirs to meet water supply demands. The Cooperative Water Supply Operations Section of the ICPRB was established by the WSCA to perform necessary modeling, forecasting, and coordination of drought activity.

The current environmental flow recommendations are 300 mgd downstream of Great Falls and 100 mgd downstream of Little Falls. In 2002, the Maryland Department of Natural Resources revisited this issue of the flow level necessary to support aquatic habitat in the Potomac River and was unable to replicate the methodology used to create the present low flow requirements in the agreement. Droughts that occurred in 1999 and 2002 called attention to the concern that these flow regimes, derived by the 1981 study (which was conducted during a period without extreme low flows), needed to be revisited in light of new scientific methods and low-flow information. During the drought of 2002, the Maryland Department of Natural Resource's Power Plant Siting Program assembled teams of biologists from its staff and Versar, Inc., with assistance from Montgomery County, Maryland and the Interstate Commission on the Potomac River Basin, which performed habitat assessments during that year's low flow conditions.

On April 8, 2003, the Maryland Power Plant Research Program and the Interstate Commission on the Potomac River Basin sponsored a one-day workshop with a panel of nationally recognized experts on habitat assessment to investigate and develop methods to evaluate the environmental flow-by requirements. Their conclusion of the present low-flow agreement is that: "Existing biological data and understanding are inadequate to support a specific, quantitative environmental flow-by." At this workshop, members of the special panel collectively considered and debated the various methodologies applicable to the Potomac River to address the flow-by issue. The final product of the workshop is a set of recommendations for 1) the best method or approach, given current financial resource limitations, to address the Potomac Flow-by Study objectives and the level of confidence associated with their recommendations and 2) an alternative long-term method or approach which could better accomplish those objectives, yet might exceed current resources or available data, and recommended guidelines for achieving the objectives in a longer time-frame.

In September 2003, the Maryland Department of Natural Resource's Power Plant Siting Program issued a report entitled Habitat Assessment of the Potomac River From Little Falls to Seneca Pool (Final Document #PPAD-03-1), which provided substantial background information describing the history of current low-flow requirements, a review of the studies conducted to support those requirements and a report on habitat assessment conducted during low-flow conditions in 2002. The assessment included development of a habitat map, a field survey of habitat types and measurements of hydraulic and water quality conditions, spanning the period of July through October 2002 when flows were as low as 151 million gallons per day at the gage at Little Falls Dam.

In November 2004, ICPRB convened an update meeting to discuss recent developments in USGS mussel studies and further defining desired hydrological regimes.

Full reports on these activities can be viewed at: www.esm.versar.com/pprp/potomac/default.htm.

A symposium hosted by the Nature Conservancy at the National Conservation Training Center in Shepherdstown, West Virginia on September 24-25, 2010 drew together 70 scientists and interested individuals representing a broad spectrum of interest to continue work on the low-flow issue. The final large river flow needs report is now available at: Potomac Basin Large River Environmental Flow Needs.

The State Water Control Board's Water Supply Planning Regulation (9 VAC 25-780) requires all cities and counties in the commonwealth to submit water supply plans to the Virginia Department of Environmental Quality. Each water supply plan must include a description of existing water resources and water use, projected demands, a description of water management actions/conservation measures, segment of need for future supplies and alternative analysis and local government resolution approving the plan. Fairfax County is participating in a Regional Water Supply Plan, which was required to be submitted to VDEQ by November 2011.

a. Interstate Commission on the Potomac River Basin Cooperative Water Supply Operations

ICPRB plays several important roles in providing for the region's current and future water supply needs. The Cooperative Water Supply Operations Section facilitates the coordination of resources among the three major water utilities (including Fairfax Water) during times of low flows in the Potomac River. The Water Resources Section also provides technical water resources management assistance to the jurisdictions throughout the basin. Low flow conditions in the Potomac River in 2010, due to a combination of low summer rainfall, high temperatures and low ground water levels, necessitated release of water from the upstream reservoirs to augment flow in the Potomac River. It is unlikely that releases will be needed for the remainder of 2013.

In October 2007, ICPRB worked with the region's utilities and the U.S. Army Corps of Engineers to conduct several test releases from upstream reservoirs. These test releases provided useful data on how the river behaves during droughts and will help to make drought management activities more efficient in the future.

ICPRB annually coordinates a weeklong drought management exercise that simulates water management operations and decision making under drought conditions for the Metropolitan Washington area. Annual simulation allows for renewal of coordination procedures with the water suppliers and other agencies, opportunities for public education and outreach and review and improvement of operational tools and procedures.

Information on water supply status, recent streamflow, reservoir storage, water supply outlooks and precipitation maps can be found in the publications section of the ICPRB website, www.potomacriver.org.

Every five years since 1990, the section for Cooperative Water Supply Operations on the Potomac of ICPRB has conducted a 20-year forecast of demand and resource

availability on behalf of the three major water utilities in the Washington D.C. Metropolitan Area (including Fairfax Water). The most recent study has two parts to it. The first part evaluates demand forecast, analysis of current resources and evaluation of alternative resources. The second part factors in the effects and impacts of climate change to this equation. Different possible climate change scenarios for the region were evaluated using climate change models and the results were incorporated into the water utility planning model to better help forecast future demands and the constraints that need to be overcome to meet the demands. The first part of the 2010 study is available at: http://www.potomacriver.org/publicationspdf/ICPRB10-01.pdf

The second part of the 2010 study pertaining to climate change is available at: http://www.potomacriver.org/publicationspdf/ICPRB13-07.pdf

b. Potomac River Drinking Source Water Protection Partnership

The Potomac River DSWPP is a voluntary association of water utilities and government agencies focused on protecting drinking water sources in the Potomac River basin. Fairfax Water, a founding member since its formation in 2004, has been actively involved in the leadership of the partnership. The partnership aims to identify priorities for source water protection, to establish coordinated dialogue between water suppliers and government partners, to promote information sharing and to encourage coordinated approaches to water supply protection measures in the basin. It has been effective in providing the utilities and the government partners with a stronger voice and more effective position on numerous watershed protection efforts and has been instrumental in advocating for stronger source water protection efforts. The partnership works through various workgroups involved in issues that are important and relevant to source water protection. Pathogens, emerging contaminants, early warning/emergency response, urban issues, agricultural issues and water quality data are some of the issues being addressed by existing workgroups in the partnership. The partnership was also recognized in the National Water Program by the Environment Protection Agency in 2008 as a best practice. More information on the partnership can be found at:

http://www.potomacdwspp.org/index.php?option=com_content&view=article&id=1:about-dwspp&catid=37:about-dwspp&Itemid=28

c. Metropolitan Washington Council of Governments

In response to the droughts of 1998 and 1999, MWCOG brought together a task force in May 2000 to coordinate regional responses during droughts to reduced availability of drinking water supplies. The plan consists of two components: (1) a year-round plan emphasizing wise water use and conservation; and (2) a water supply and drought awareness and response plan. The CO-OP section of the Interstate Commission on the Potomac River Basin handles the administration of the coordinated drought response for water withdrawals from the Potomac River and during low flows. Additionally, the Cooperative Water Supply Operations

Section works with MWCOG and the Drought Coordination Committee to assist in providing accurate and timely information to residents during low-flow conditions. http://www.mwcog.org/environment/water/watersupply/current_conditions.asp

In coordination with the water utilities in the Washington area, including Fairfax Water, a Water Emergency Response Plan was developed and completed in 2005; the plan was updated in 2009. The plan provides communication and coordination guidance to area water utilities, local governments and agencies in the event of a drinking water related emergency. The plan replaced the 1994 Water Supply Emergency Plan.

The plan includes four conditions of water supply: 1) Normal, focusing on a year-round program emphasizing "Wise Water Use;" 2) Watch, where the Potomac River basin is in a drought of level D1 as defined by the National Oceanographic and Atmospheric Administration; 3) Warning, when combined storage in Jennings Randolph and Little Seneca reservoirs is at less than 60 percent of capacity, triggering voluntary water use restrictions; and 4) Emergency, when the probability of meeting water supply demands during the following 30 days is 50 percent or less, triggering mandatory water use restrictions. These drought levels were adopted by the COG Board of Directors in June 2000 and represent a concerted effort to coordinate interjurisdictional drought response.

COG held a regional Drought Coordination and Response Plan workshop on April 4, 2013. Participants included COG staff, the Interstate Commission on the Potomac River Basin, the Maryland Department of the Environment, VDEQ, the National Oceanographic and Atmospheric Administration, the U.S. Geological Survey, the Middle Atlantic River Forecast Center, local governments and regional utilities. The main purpose of the workshop was to review the “Drought Watch” trigger and consider modifications to it. Additional information is available on the COG website: http://www.mwcog.org/environment/water/water_workshops.asp

A revised regional Drought Coordination and Response Plan and also a revised Water Supply Emergency Plan should be completed by June 30, 2014.

MWCOG put forward a report on the effects of climate change in the National Capital Region in November 2008. The report identified potential impacts of climate change on the water resources of the region and contains recommendations to help reduce and control emissions that contribute towards climate change. It also identified goals for climate change adaptations and mitigation. The report is available at: http://www.mwcog.org/uploads/pub-documents/zldXXg20081203113034.pdf

In 2009, the Climate, Energy and Environment Committee was established to help meet the goals outlined in the Climate Change Report. The CEEPC Action Plan identifies short term mitigation and adaptation related targets and strategies to facilitate achieving the long-term goals. CEEPC is currently working on reassessing the action plan with a climate assessment study. This report provides

more case studies and outlines more policy solutions than the previous climate change report in 2008. The draft report is available at: http://www.mwcog.org/uploads/committee-documents/bV1bWFxe20130516135550.pdf

d. Northern Virginia Regional Commission Water Supply Plan

The State Water Control Board's Water Supply Planning Regulation (9 VAC 25-780) requires all cities and counties in the commonwealth to submit water supply plans to the Virginia Department of Environmental Quality. The Northern Virginia Water Supply Plan, a regional plan as allowed under the regulation, includes more than 20 local governments including Fairfax County. NVRC completed development of a regional water supply planning effort. This is in response to the commonwealth's enactment, in 2005, of the Local and Regional Water Supply Planning Regulation (9 VAC 25-780-10) and was a result of a multi-year project that involved most (at least 21 of 23) of the localities and the water utilities in Northern Virginia. The draft Final Plan was delivered to the Department of Environmental Quality in March 2012 for the commonwealth's review prior to submission to the State Water Control Board.

NVRC has received an official notification from VDEQ. The plan has been deemed to be compliant with the water supply planning regulation, pending completion of several items.

The Northern Virginia Regional Water Supply Plan is available at: http://www.novaregion.org/index.aspx?NID=1214

6. Lifting the Ban on Uranium Mining

There has been in place in Virginia a ban on uranium mining statewide since 1982. However there are now legislative or/and gubernatorial efforts underway to lift the moratorium.

EQAC received presentations on this issue from Dan Holmes, Director of State Policy with the Piedmont Environmental Council, and Stephen Walz, the Director of Energy Programs at the Northern Virginia Regional Commission and formerly the Director of the Virginia Department of Mines, Minerals and Energy. An area of focus of these presentations was reports on uranium mining in Virginia that had been prepared by the National Academy of Sciences, Fairfax Water, Chmura Analytics, Virginia Beach and RTI Socioeconomic. EQAC has had the opportunity to review these reports.
The Chmura study indicates that the adverse economic impact under the worst case scenario is significantly greater than corresponding positive impact in the best case scenario. It appears from these studies that future substantive failure of a uranium mining site would require significant economic support from all the residents of Virginia for remediation and would potentially result in contaminated water resources for very significant periods of time.

At this time, the only uranium deposits that appear to be potentially economically viable for mining are in Pittsylvania County, where mining would have no impact on Fairfax County. The concern exists, though, that there are other uranium occurrences in Virginia, and that past uranium mining lease agreements were established in Fauquier County, within the Occoquan watershed.

The Occoquan Reservoir is one of the county's primary sources of drinking water, and the quality of this drinking water source can be adversely affected by activities occurring within its watershed. There are serious concerns about the lifting of the moratorium in light of numerous and substantial questions and concerns regarding the potential for adverse environmental impacts to Virginia and the Occoquan Reservoir if uranium was to be mined or milled within the Occoquan watershed.

It is EQAC's view that it would be premature to lift the moratorium on uranium mining in Virginia or draft regulations pertaining to uranium mining without first addressing concerns identified by the National Academy of Sciences in its report

7. Environmental Stewardship

a. Occoquan Shoreline Easement Policy

In December 2005, Fairfax Water adopted a revision to the Occoquan Reservoir Shoreline Easement Policy, which places limits on what may be done within the utility's easement surrounding the reservoir. The policy prohibits construction of any structures other than piers and floats. Removal of any vegetation, storage of fuels or chemicals, application of pesticides and placement of debris are also prohibited in this area. Shoreline stabilization projects are allowed with prior permission from Fairfax Water and pertinent federal, state and local agencies. Vegetative practices are required unless technical considerations justify hardened practices. The policy is intended to protect the reservoir's riparian buffer. A copy of the policy is available at: http://www.fairfaxwater.org/water/shoreline_easement_policy.htm.

b. Water Supply Stakeholder Outreach Grant Program

Fairfax Water offers grants to qualified organizations that undertake water supply education or watershed protection projects. Projects eligible for grants include educational efforts, source-water protection efforts, water quality monitoring projects and Occoquan Reservoir stabilization projects. The project must address issues within areas served by Fairfax Water or watershed lying in Fairfax, Loudoun, Prince William or Fauquier Counties. Eligible education projects may include seminars, programs or displays on hydrology, water treatment processes, distribution, nonpoint source pollution, erosion and sediment control, water quality monitoring or any related topic. Eligible watershed protection projects may include stream restoration projects, nonpoint source pollution management projects or other activities aimed at improving water quality within Fairfax Water's watershed.

Since beginning the program in 2000, Fairfax Water has awarded 79 water supply stakeholder outreach grants totaling $355,377.

More information about the grant program is available at: www.fairfaxwater.org/outreach/grants.htm

H. REGULATIONS, LAWS AND POLICIES

1. 2013 Virginia General Assembly Legislation

HB 2190 (Cosgrove) Stringency of stormwater management ordinances

Establishes a procedure for state review of the stringency of local stormwater ordinances. The bill requires localities within 30 days of the adoption of a more stringent stormwater ordinance or requirement to submit a letter report to the Department of Conservation and Recreation. The letter report is to include an explanation as to why the more stringent ordinance or requirement is necessary. In addition, within 90 days of the ordinance's adoption, a landowner or his agent can request the Department of Conservation and Recreation to determine whether the ordinance or requirement meets the standards of the state law. The department has 90 days to make such a determination.

SB 1279 (Hanger) Consolidation of water quality programs

Moves several water quality programs currently administered by the Department of Conservation and Recreation to the Department of Environmental Quality. The Department of Environmental Quality and the State Water Control Board will have oversight of water quality planning and laws dealing with stormwater management, erosion and sediment control and the Chesapeake Bay Preservation Areas. The Virginia Soil and Water Conservation Board will have continuing responsibility for oversight of the soil and water conservation districts and of resource management planning. The Virginia Soil and Water Conservation Board will continue to be responsible for administration of the flood prevention and dam safety laws. The board will continue to be staffed by the Department of Conservation and Recreation.

HB 1448 (Hodges) Financing for repairs to failed septic systems

Authorizes a locality, by ordinance, to create a loan program to enable the repair of property owners' failed septic systems. Any such ordinance is required to describe the arrangement of the loan program, including any partnership with a planning district commission, and is permitted to provide for the repayment of the loan through water or sewer billings, real property tax assessments or other billings. The bill authorizes other features of a loan program and permits a locality to set a minimum ownership interest or minimum level of proof of ownership of the property for situations in which it is

extremely difficult or impossible to identify all of the people who have an ownership interest in the property.

2. Buffer Protection for Headwater and Intermittent Streams

On February 25, 2008, the Board of Supervisors adopted an amendment to the Policy Plan to strengthen Comprehensive Plan guidance regarding the protection and restoration of streams and associated buffer areas along stream channels upstream of Resource Protection Areas and Environmental Quality Corridors. This new guidance augments the Environmental Quality Corridor policy by explicitly encouraging stream and buffer area protection and restoration in these headwaters areas. On July 27, 2010, the EQC policy was further amended to clarify circumstances under which proposals for disturbances to EQCs should be considered favorably.

3. The Virginia Chesapeake Bay Preservation Act and Regulations

The Virginia Chesapeake Bay Preservation Act was passed as part of Virginia's commitment to the second Chesapeake Bay Agreement's goals to reduce nonpoint source phosphorus and nitrogen entering the bay. In November 2004, the Board of Supervisors adopted an amendment to the Comprehensive Plan to ensure it was consistent with the act and satisfied all requirements. The amendment included revisions to text in the environment section of the Policy Plan as well as the incorporation of a Chesapeake Bay Supplement. In March 2005, the Chesapeake Bay Local Assistance Board determined that the Comprehensive Plan, as amended, is fully consistent with the Chesapeake Bay Preservation Act and Regulations.

The Chesapeake Bay Exception Review Committee was formed to hear requests for exceptions to the Chesapeake Bay Preservation Ordinance. The committee is comprised of 11 county residents appointed by the Board of Supervisors--one member from each magisterial district and two at-large members. As part of the exception review and approval process, public notice and a public hearing are required

The Chesapeake Bay Program is a cooperative arrangement among three states (Virginia, Pennsylvania and Maryland), the District of Columbia and the federal government (represented by the Environmental Protection Agency) for addressing the protection and restoration of the water quality, habitats and living resources of the Chesapeake Bay and its tributaries. Each state determines how it will meet the various commitments, and the approaches to implementation often vary greatly among states. All streams in Fairfax County are tributaries of the Potomac River, which flows into the Chesapeake Bay.

4. Virginia Stormwater Management Program—Stormwater Management Regulations (4VAC50-60)

As required by of the Code of Virginia, beginning July 1, 2014, local governments will become the Virginia Stormwater Management Program authorities. Prior to this date, this responsibility belonged to the Virginia Department of Conservation and Recreation. The commonwealth will maintain oversight of local programs to ensure that all applicable state regulations are applied and enforced. This oversight responsibility will now lie with the Virginia Department of Environmental Quality. Any town that does not adopt its own stormwater program will be subject to the program of the county within which that town is located.

Each county and city in northern Virginia is preparing a stormwater management ordinance consistent with the requirements of Virginia's stormwater regulations. The VSMP General Permit for Discharges of Stormwater from Construction Activities will continue to be the vehicle by which land disturbing activities are monitored for compliance with the provisions of the Virginia Stormwater Management Act and associated regulations. While the local jurisdiction will administer the VSMP, developers/contractors will continue to obtain VSMP permit coverage *from the state* following the process outlined on the fact sheet.

Also, the Virginia Soil and Water Conservation Board approved new stormwater management regulations. Compliance with these new rules will be required by the 2014 VSMP permit and the localities' Stormwater Management Ordinances, both of which take effect July 1, 2014. The main regulatory changes are summarized in Table IV-4.

The *Virginia Stormwater Management Handbook* is being updated to reflect the new regulations and design criteria. The *Handbook* will be available online, by chapter. Until the final version is published, practitioners can access approved Best Management Practice specifications at the Virginia Stormwater BMP Clearinghouse: http://vwrrc.vt.edu/SWC/PostConstructionBMPs.html. Under the old stormwater regulations, specific BMP utilization within a jurisdiction was primarily at the discretion of the locality. Under the new regulations, the BMP must be listed on the clearinghouse. Also, the VSMP permit will require fully enforceable maintenance agreements for stormwater controls (structural and non-structural best management practices). The agreements will be deeded to run with the land and will allow for inspections and maintenance to occur that will ensure the long-term function of stormwater controls.

The Stormwater Management Regulations contain the following noteworthy provisions regarding grandfathering:

Projects may proceed through construction under the old technical criteria for stormwater management, if one of several circumstances applies. These are:

- Projects for which there is plan approval status dated July 1, 2012 or before, but for which no VSMP permit is obtained before July 1, 2014.
  Documentation may take the form of a locality approved plan, plat, zoning approval or other approved document determined permissible under the locality's ordinance.
  Any modification to said locality-approved document may call into question the eligibility of the project to be grandfathered.
  Construction must be complete by June 30, 2019.
- Projects with government bonds or public debt financing before July 1, 2012.
- Projects that obtain 2009 VSMP permit coverage before July 1, 2014 have two five-year permit cycles (until June 30, 2024) to be completed, if permit coverage is maintained.

Table IV-4
New Stormwater Management Regulations: Changes to Stormwater Technical Criteria

Criteria	Old Regulations	New Regulations
Land Use	Impervious cover only	Impervious cover + Forest/Open Space + Managed Turf
Event	0.5 inches of runoff from the impervious cover only	1.0 inches of rainfall from the whole site
New Design Criteria	Average land cover condition/technology based	0.41 pounds per acre per year Total Phosphorus
Redevelopment	10 percent reduction in Total Phosphorus	Land disturbance of less than one acre: 10 percent reduction in Total Phosphorus
		Land disturbance of one acre or more: 20 percent reduction in Total Phosphorus
Compliance	Simple Method	Runoff Reduction Method
Water Quantity	Varied	Criteria for: manmade conveyance systems; restored conveyance systems; and natural conveyance systems

5. Dam Safety Regulations

In December 2010, the Virginia Department of Conservation and Recreation amended its Impounding Structure Regulations to conform with legislative changes made by the General Assembly which further defined the dam classification system, streamlined and

improved the hydrologic and hydrologic design requirements for dams and instituted provisions to improve emergency action plans to facilitate responses to dam breaks.

In 2010, DCR also issued a number of guidance documents to assist dam owners and industry professionals to gain a better understanding of the regulations. The guidance documents include information on agricultural exemptions, crediting of certificate fees, dam ownership and roadways on or below dams. DCR continues to develop several other related guidance documents that outline policies on low hazard structures, dam break inundation zone mapping, incremental damage analysis and hazard potential classification.

In November 2012, DCR again amended its Impounding Structure Regulations in response to Virginia Senate Bill 1060, which became effective on July 1, 2011, and allows DCR to provide financial assistance for hazard class determination and other engineering requirements to certify a dam. It also provides for some flexibility in hazard class determination and permits DCR, through the Virginia Soil and Water Conservation Board, to develop a general permit for the regulation of low hazard dams. The regulations also include simplified dam break procedures for low hazard facilities and make it unnecessary to develop dam breach inundation maps for low hazard dams that do not impact offsite properties.

Fairfax County DPWES is responsible for the operation and maintenance of 19 state regulated dams. DPWES continues to work through the Virginia Municipal Stormwater Association to promote improvements to these guidance documents. For further information on the Virginia Impoundment Structures Regulations visit: http://www.dcr.virginia.gov/dam_safety_and_floodplains/index.shtml

6. Summary/Status of Amendments to Chapter 68.1 of the Fairfax County Code on Alternative Septic Systems

In 2008, legislation was passed requiring the Virginia Department of Health to accept designs from professional engineers that are outside the prescribed site, soil and design requirements of the Sewage Handling and Disposal Regulations. Designs must be compliant with standard engineering practice, performance requirements established by the Board of Health, and horizontal setback requirements necessary to protect public health and the environment.

In 2009, legislation was passed directing VDH to adopt Emergency Regulations for Alternative Onsite Sewage Systems to specifically address three issues relative to alternative onsite sewage systems that are silent in the SH&DR: Performance standards for the design of new alternative systems; minimum setback requirements from these systems to environmentally sensitive receptors; and operation and maintenance requirements. The emergency regulations were in effect from April 7, 2010 until October 7, 2011. Legislation was also passed clarifying a locality's power to regulate alternative onsite sewage systems by prohibiting their use. Pre-emption clauses in

legislation state that the locality shall not prohibit the use of alternative onsite sewage systems and shall not exceed maintenance standards that exceed state requirements.

On December 7, 2011, the Regulations for Alternative Onsite Sewage Systems were adopted. These "permanent" regulations are similar to the Emergency Regulations with a few major changes based on feedback from engineers, soil consultants, operators, system owners and regulators.

No changes have been made to Chapter 68.1 of the Fairfax County Code while implementing the new policies and procedures resulting from all the recent legislation and the changes to regulation.

7. Overview of Proposed Exceptional State Waters Designation for a Segment of Bull Run and the Possible Pursuit of a Virginia Scenic Rivers Designation

In 2011, the National Park Service submitted a petition to the State Water Control Board requesting designation of a segment of Bull Run as an Exceptional State Water. The nominated segment was from the northern end of Manassas National Battlefield Park boundary downstream to the Interstate 66 bridge over the stream. The designation would have prohibited new or increased discharges into this segment of the stream, including storm sewer discharges associated with Municipal Separate Storm Sewer System permits. The Virginia Department of Environmental Quality convened an advisory panel to bring together interested parties to discuss this proposal and its potential implications. At an advisory panel meeting, interested parties discussed the Exceptional State Waters program as well as the Virginia Scenic Rivers program, which is a nonregulatory recognition program that is administered by the Virginia Department of Conservation and Recreation.

Subsequent to the advisory panel meeting, the National Park Service requested a withdrawal of its petition. In June 2012, the State Water Control Board accepted this request and withdrew its Notice of Intended Regulatory Action for the Exceptional State Water designation. Since that time, focus has shifted to the possible designation of Bull Run as a Virginia Scenic River. In August 2012, the National Park Service hosted a meeting at the Manassas National Battlefield Park at which there was an informal discussion regarding the Scenic Rivers program and its potential applicability to Bull Run; Fairfax County staff attended this meeting, as did a member of the Virginia Board of Conservation and Recreation and members of staff from Prince William and Loudoun Counties, the Northern Virginia Regional Park Authority, the Northern Virginia Regional Commission, Fairfax Water and the Virginia Department of Conservation and Recreation. As any Scenic River proposal would ultimately require support from the boards of supervisors of all affected localities, Fairfax County staff is coordinating with Prince William County staff on this idea, and other parties involved in the August 2012 meeting will likely be consulted if and when this idea moves forward.

I. STEWARDSHIP OPPORTUNITIES

There are numerous actions that county residents can and should take to support water quality protection.

1. Disposal of Household Hazardous Wastes

Medicines, paints and other toxics should NOT be flushed down toilets and should NOT be dumped down storm drains. Instead, they should be taken to one of the county's household hazardous materials collection sites.

Putting hazardous household wastes in the trash or down the drain contributes to the pollution of surface waters. The Fairfax County Solid Waste Management Program is responsible for the county's Household Hazardous Waste Management Program, where county residents are given the opportunity to properly dispose of hazardous waste (such as used motor oil, antifreeze and other automotive fluids) at no charge. The SWMP has two permanent HHW facilities that are open every weekend and holds community household hazardous waste collection events on occasion at other locations around the county.

For a list of common household hazardous materials and how to dispose of them, go to http://www.fairfaxcounty.gov/dpwes/trash/disphhw.htm.

2. Septic System Pumpouts

Septic systems must be pumped out every five years—it's the law! Residents with questions or with problems with their septic systems should call the Fairfax County Health Department at 703-246-2201, TTY 711.

3. Yard Management

Residents are encouraged to get soil tests for their yards before fertilizing and then to apply fertilizers and pesticides responsibly. Grass should not be cut to the edge of a stream or pond; instead, a buffer should be left to filter pollutants and provide wildlife habitat.

The Northern Virginia Soil and Water Conservation District can advise homeowners on problems with ponds, eroding streams, drainage, problem soils and other natural resource concerns. More information about managing land for a healthier watershed Is available from the NVSWCD publications "You and Your Land, a Homeowner's Guide for the Potomac River Watershed" (http://www.fairfaxcounty.gov/nvswcd/youyourland/ and the "Water Quality Stewardship Guide" (http://www.fairfaxcounty.gov/nvswcd/waterqualitybk.htm).

Advice regarding drainage and erosion problems in yards can be provided by the technical staff of the Northern Virginia Soil and Water Conservation District. NVSWCD can assess the problems and advise on possible solutions. Interested parties can send an e-mail to NVSWCD at https://www.fairfaxcounty.gov/contact/mailform.aspx?ref=9990 or call 703-324-1460.

4. Volunteer Opportunities

There are numerous opportunities throughout the year to participate in stream cleanups, storm drain labeling, volunteer water quality monitoring and tree planting projects. Interested parties can send an e-mail to NVSWCD at https://www.fairfaxcounty.gov/contact/mailform.aspx?ref=9990 or call 703-324-1460. Additionally, DPWES-Stormwater Management provides links to information about these popular volunteer programs on its website at http://www.fairfaxcounty.gov/dpwes/stormwater/. EQAC also commends the efforts of the Alice Ferguson Foundation and encourages residents, employers and employees in Fairfax County to participate in these initiatives. Visit the foundation's website at www.Fergusonfoundation.org for further information.

5. Reporting Violations

Vigilance in reporting activities that threaten water quality is important to the protection of water resources.

Sediment runoff from construction sites can be reported to Fairfax County's Code Enforcement Division at 703-324-1937, TTY 711; e-mail reports can also be filed at https://www.fairfaxcounty.gov/contact/mailform.aspx?ref=70003.

Improper disposal of motor oil, paint or other materials into streams or down storm drains should be reported through a phone call to 911. This is particularly important if the substance being dumped can be identified as motor oil or another toxic substance but also applies to any other substance; assumptions regarding the contents of the materials should not be made. Callers to 911 should be prepared to provide specific information regarding the location and nature of the incident. If the person dumping materials into the stream or storm drain has a vehicle, the tag number should be recorded.

Storm drains are for stormwater only, NOT motor oil, paint, or even grass clippings.

If dumping is not witnessed but is instead suspected, and if no lives or property are in immediate danger, the suspected incident can be reported to the Hazardous Materials and Investigative Services Section of the Fire and Rescue Department at 703-246-4386, TTY 711. If it is unclear as to whether or not there may be a danger to life or property, 911 should be called.

A more comprehensive table addressing how to report environmental crimes is provided immediately following the Scorecard section of this report.

6. Pet Wastes

The Northern Virginia Clean Water Partners continued its Dog Blog and Facebook pages for dog owners. During 2012, the blog and Facebook pages had more than 88,000 views, up from about 24,000 views in 2011. Based on the success of the 2010 and 2011 contests, the organization held the Third Annual Dog Blog Essay Contest. Eleven non-profit organizations submitted an entry into the "Bark Your Piece" contest, which resulted in 10,360 votes. The three winning organizations received $5,000 in grants to use toward veterinary care, spaying and neutering, dog food and pet owner education.

In April 2012, two radio ads featuring messages on the importance of picking up pet waste and general household stormwater pollution reduction measures aired on three popular radio stations a total of 236 times; included among the stations was one Spanish language station. These ads reached an estimated 54,563 Northern Virginia residents and resulted in over 200 visits to the website, http://www.onlyrain.org.

J. NOTABLE AND ONGOING ISSUES

1. EQAC commends the county for developing and adopting amendments to the Public Facilities Manual's provision for adequate drainage that require analysis of adequacy of outfalls during the construction phase. This is another enforcement tool that will protect streams during the construction phase. However, EQAC cannot over-emphasize the importance and need for increased monitoring of predevelopment stormwater management controls and for enforcement action to ensure inadequate controls are corrected prior to construction and, if necessary, during construction.

2. EQAC continues to support the full funding and implementation of the comprehensive countywide watershed management program. EQAC strongly endorses the ongoing work of county staff on the watershed planning and public outreach efforts and the comprehensive stream monitoring program. EQAC continues to support continued assessments of watersheds and development of a stream protection and restoration program that has adequate sustainable funding. EQAC continues to stress that equal importance should be devoted to environmental protection, restoration and monitoring as compared to infrastructure improvement and maintenance.

3. EQAC commends the county for its existing stream protection requirements for perennial streams. EQAC thanks the Board of Supervisors for its efforts to protect intermittent and headwater streams by the establishment of protective buffers. While the end result of the

inquiry was NOT to move forward, the process did heighten awareness of the importance of intermittent streams.

4. EQAC is pleased to note the MS4 requirement to develop a long-term watershed monitoring program to verify the effectiveness and adequacy of stormwater management goals and identify areas of water quality improvement or degradation is being implemented. While EQAC is pleased to note the long term monitoring of several sites, we also understand that a comprehensive countywide program to monitor effectiveness can be cost-prohibitive.

5. Given the anticipated increase in the number of small individual low impact development facilities that will be installed throughout the county, EQAC recognizes that the county will have an additional challenge of developing a program to track, inspect and ensure adequate maintenance of these LID facilities.

6. There has been in place in Virginia a ban on uranium mining statewide since 1982. However there are now legislative or/and gubernatorial efforts underway to lift the moratorium. At this time, the only uranium deposits that appear to be potentially economically viable for mining are in Pittsylvania County, where mining would have no impact on Fairfax County. The concern exists, though, that there are other uranium occurrences in Virginia and that past uranium mining lease agreements were established in Fauquier County, within the Occoquan watershed.

   Because the Occoquan Reservoir is one of the county's primary sources of drinking water, EQAC does have concerns about the lifting of the moratorium in light of numerous and substantial questions and concerns regarding the potential for adverse environmental impacts to Virginia and the Occoquan Reservoir if uranium was to be mined or milled within the Occoquan watershed. It is EQAC's view that it would be premature to lift the moratorium on uranium mining in Virginia or to draft regulations pertaining to uranium mining without first addressing concerns identified by the National Academy of Sciences in its report.

7. EQAC is pleased to note the number of innovative and significant stream restoration projects and LID installations the county has undertaken in recent years.

K. COMMENTS

EQAC commends the Board of Supervisors for its actions of the past few years, initially authorizing one penny of the real estate tax to be dedicated to the stormwater management program in FY 2006 and establishing a Stormwater Service District in FY 2010 that is currently funded at two pennies of the real estate tax. Stormwater funding has increased from the original amount of $17.9 million for FY 2006 to $40.2 million for FY 2014. In FY 2010, however, this amount decreased to about $10.3 million due to the creation and structuring of the Service District as a funding mechanism halfway through the fiscal year.

The Board of Supervisors' adoption of the FY 2014 Stormwater Service District tax rate of 2.0 cents has allowed Stormwater Management to increase stormwater infrastructure replacement, create a more comprehensive low impact development maintenance program and rehabilitate a

number of older stormwater management dams as well as other critical components. Much of the stormwater infrastructure in Fairfax County is reaching the end of its life cycle, and as the system ages it will be critical to maintain adequate inspection and rehabilitation programs to avoid infrastructure failures and ensure the functionality of stormwater treatment systems. It is also critical for Stormwater Management to implement cost effective solutions such as trenchless pipe rehabilitation technologies, naturalized stormwater management facilities and partnerships with other county agencies such as Fairfax County Public Schools and the Fairfax County Park Authority to help protect and improve local streams.

The county's existing stormwater conveyance infrastructure includes over 1,600 miles of pipes, man-made ditches, channels and swales. This infrastructure conveys stormwater to over 850 miles of perennial streams and about 400 miles of non-perennial streams in the county. The majority of the stormwater control facilities and pipes were constructed 35 or more years ago. Prior to the board providing a dedicated penny to stormwater in FY 2006, there had never been consistent funding to proactively inspect or reinvest in these stormwater systems. When the video inspections of the inside of pipes were first undertaken in FY 2007, over five percent of the system was identified as being in a state of failure and another 10 percent in need of rehabilitation. With the recently adopted Stormwater Service District tax rate, it is estimated that the reinvestment cycle for stormwater infrastructure has been reduced from well over 1,000 years to about 200 years.

In addition to the conveyance system, the county owns and maintains roughly 1,500 stormwater management facilities, ranging from large flood control lakes to LID techniques such as small infiltration swales, tree box filters or rain gardens. Again, prior to providing a dedicated funding source, there was not funding for reinvestment in these LID facilities.

Nineteen of the county's stormwater management facilities have dam structures that are regulated by the state. The county must provide rigorous inspection and maintenance of these 19 facilities in order to comply with state requirements and significant upgrades to the emergency spillways have been required in some cases.

In addition to supporting infrastructure reinvestment, the capital program funds critical capital projects from the watershed management plans including: flood mitigation projects; stormwater management pond retrofits; implementation of low impact development techniques; and stream restoration projects. It is important to note that these projects are necessary to address current community needs, mitigate the environmental impacts of erosion and comply with the county's Municipal Separate Storm Sewer System MS4 permit. The benefits of these projects include: reducing property damage due to flooding and erosion; reducing excessive sediment loading caused by erosion; improving the condition of streams; and reducing nutrient and sediment loads to local streams, the Potomac River and the Chesapeake Bay.

The county must meet the federally mandated requirements of its MS4 permit. Fairfax County and Fairfax County Public Schools are combining their MS4 responsibilities into a single permit that will be administered by the county. Following development by the state, the new permit will be forwarded to the U.S. Environmental Protection Agency for approval. Recent permits that have been approved or issued for public hearing by the EPA have included aggressive

requirements to retrofit significant amounts of impervious area, such as school and county buildings and parking lots, with more effective stormwater controls. We are anticipating that these extensive additional requirements also will be included in the new MS4 permit that is issued to Fairfax County.

It has been estimated that the annual cost to comply with current and anticipated stormwater regulatory requirements and to implement a sustainable infrastructure reinvestment program would likely be between $80 and $100 million per year. EQAC supports meeting these challenging requirements through a phased approach that builds capacity over a period of time that can be based on success and experience and should result in a more cost effective and efficient program.

L. RECOMMENDATIONS

1. EQAC recommends that Fairfax County continue to adequately fund and implement its ongoing stormwater program, which includes dam maintenance, infrastructure replacement, water resource monitoring and management, watershed restoration and educational stewardship programs. EQAC realizes the funding for the stormwater program will come entirely from funds generated through the Service District rates. EQAC also realizes that there is a need for increasing capacity within the Department of Public Works and Environmental Services to provide these services.

   EQAC recommends that the Stormwater Service District rate be increased in FY 2015 by at least one-quarter penny, from a rate of 2.0 cents per $100 assessed real estate value to 2.25 cents per $100. EQAC understands that this increase would not fully meet stormwater management needs and therefore suggests that additional increases be continued each fiscal year until adequate funding to support the program is achieved. This would, once again, result in more funding for modest watershed improvement programs and a somewhat more realistic infrastructure replacement timeline. We realize that there will be a need for additional increases in funding for water quality projects to meet future permit conditions, and for infrastructure reinvestment, as the system is continually growing and aging.

2. Fairfax County is preparing a Stormwater Management Ordinance in response to state regulations requiring localities to adopt ordinances and take over reviews and inspections for Virginia Stormwater Management Program general permits relating to stormwater runoff from construction sites effective July 1, 2014. **EQAC has recommended that this new Stormwater Management Ordinance maximize stream protection and lessen no current protection, in order not to have an adverse impact on the environment**.

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ANNUAL REPORT ON THE ENVIRONMENT

CHAPTER V

SOLID WASTE

V. SOLID WASTE

A. ISSUES AND OVERVIEW

The Fairfax County Solid Waste Management Program continues to effectively manage solid waste recycling, collection and disposal within the county through the operation of existing programs, implementation of the County Solid Waste Management Plan and code compliance activities. As it has for many years now, Fairfax County's recycling rate exceeds the Virginia minimum requirement of 25 percent. The program achieved a recycling rate of 51 percent last year. As always, the county has also met the 930,750 tons annual waste delivery obligation to the Energy/Resource Recovery Facility, which is located at the county's I-95 Landfill complex and owned and operated by Covanta Fairfax, Inc.

The program continued to provide waste collection and recycling services to over 44,000 homes in designated County Sanitary Districts. The program also moved a daily average of 120 tractor-trailer loads of municipal solid waste from the I-66 Transfer Station to the Energy/Resource Recovery Facility and other appropriate disposal locations.

1. Energy/Resource Recovery Facility and Landfill Capacity

The E/RRF continued to serve as the primary disposal location for the county's municipal solid waste, processing approximately 947,000 tons of waste in FY 2013. The county bypassed 36,062 tons of waste to a municipal solid waste landfill due to scheduled and unscheduled maintenance at the facility. Approximately 30 percent of waste processed by the E/RRF was from neighboring jurisdictions, including Prince William and Loudoun Counties and the District of Columbia.

2. Solid Waste Management Plan Implementation

The 20-year Solid Waste Management Plan was approved by the Board of Supervisors in 2004 and revalidated in 2010. Highlights of the plan include the following:

a. Environmental Stewardship

The Solid Waste Management Program achieved the following goals and objectives for 2013:

- The installation of landfill gas heating systems for new bus repair garage and other buildings at the I-66 Landfill was completed.

- The continued development of an energy plan concept for an inactive area of the I-95 Landfill, to be known as the Green Energy Triangle, in partnership with Envirosolutions, Inc., the owner of the adjacent construction and

demolition debris landfill. The GET envisions an array of alternative energy projects including solar panels and windmills.

- Monthly e-waste collection events for residents--over one million pounds were collected in 2012.

- Dedication of the wastewater reuse project to provide 1.3 million gallons per day of effluent from the Noman M. Cole, Jr. Pollution Control Plant for use as cooling water to the E/RRF.

- Improvements in non-ferrous metals recovery and installation of equipment to remove additional ferrous metals from ash generated from the combustion of refuse.

- Further recovery of ferrous metals from ash emanating from the Arlington/Alexandria Energy Resource Recovery Facility.

- Continued in-kind and financial support of various outreach events and programs to support environmental stewardship in Fairfax County including SpringFest, Fall for Fairfax and education programs at about 200 Fairfax County public schools and other community events.

- About 31,801 tons of construction and demolition debris delivered to the I-66 Transfer Station were transported to a construction and demolition debris recycling facility rather than to a landfill for disposal. Unrecyclable but combustible materials from the CDD recycling facility were backhauled to the E/RRF for processing.

b. Compliance Assistance for Non-Residential Properties

The Solid Waste Management Program has amplified its compliance assistance program to help business owners and operators understand their responsibilities with respect to solid waste management. The focus of these efforts has been to educate business owners about how to comply with the county's solid waste ordinance to prevent enforcement actions.

c. Remote Household Hazardous Waste Collection Events

In addition to its permanent collection sites at the I-66 and I-95 complexes that are open to residents every weekend, the Solid Waste Management Program held four remote household hazardous waste collection events in 2012. Household hazardous waste disposal is conducted at no cost for county residents.

3. Solid Waste Disposal Fee

The contract waste disposal fee, offered to companies that sign agreements with the county, was $53.00 per ton in FY 2013 but will be increased to $54.00 per ton in FY 2014, the first increase in two years. Disposal fees support all solid waste public benefit programs such as household hazardous waste disposal and electronics recycling, personal document shredding, enforcement of the county's solid waste ordinance and solid waste education. The base solid waste disposal fee remains at $60.00 per ton for FY 2014. A complete list of fees for various materials is posted on the county's website and at the facilities.

B. PROGRAMS, PROJECTS AND ANALYSIS

1. Waste Disposal Program

a. Overview

The Fairfax County Solid Waste Management Program is responsible for providing the municipal solid waste disposal capacity for both private- and public-sector waste collectors countywide. This is accomplished through a network of facilities and programs including:

- The I-95 Landfill Complex and Recycling & Disposal Center.
- The I-95 Energy/Resource Recovery Facility.
- The I-66 Transfer Station Complex and Recycling & Disposal Center.
- The Household Hazardous Waste Program.
- Other relevant services.

Each element of this network is described under a separate heading below.

b. I-95 Landfill Complex and Recycling & Disposal Center

The I-95 Sanitary Landfill was opened by the District of Columbia in 1972. The county assumed operational responsibility for the facility in 1982. The facility accepted municipal solid waste for disposal through 1995. Since that time, only incinerator ash has been disposed in the landfill. Various environmental protection efforts are currently being undertaken as discussed below.

i. Groundwater Monitoring and Remediation

Groundwater protection standards were originally established for the I-95 Sanitary Landfill on November 20, 2000, through an amendment to the facility permit. In accordance with Waste Management Regulation 9 VAC 20-81-260(C)(3), an Assessment of Corrective Measures report was submitted to the Virginia Department of Environmental Quality in August 2002 as the

groundwater protection standards were exceeded for some constituents. VDEQ commented on the ACM and the county addressed VDEQ's comments by submitting a revised ACM and Corrective Action Plan on April 30, 2004.

On February 4, 2011, VDEQ issued an amendment to the I-95 Sanitary Landfill Solid Waste Permit. That amendment included approval of the Corrective Action Plan prepared to address the noted exceedances of certain groundwater protection standards in landfill monitoring wells.

The Corrective Action Plan specifies the required groundwater remediation approaches:

- Monitored natural attenuation (no action but continued monitoring) is specified for two areas where the groundwater quality is already improving.

- Enhanced bioremediation is specified for three areas where groundwater quality has not improved. Enhanced bioremediation involves the injection of a food-grade Hydrogen Releasing Compound, similar to molasses, into the groundwater in these areas.

- A preliminary injection was completed in June 2011 to evaluate the transmission of the HRC, to evaluate the initial effectiveness of the remedy and to provide data that could be used to refine the proposed injection grid.

- A full round of injections was completed in August and September 2012 to fulfill the permit mandated Corrective Action Plan and to further enhance the overall response of the preliminary injection.

A Corrective Action Monitoring Plan approved as part of the 2011 permit amendment required installation of eight additional performance and sentinel monitoring wells. This work was completed in January 2011 in anticipation of permit issuance. The Corrective Action Monitoring Plan establishes the procedures and criteria by which the results of the Corrective Action Plan are to be observed. The Corrective Action Plan activity is required to show reasonable reduction in the concentration of the targeted compounds after one year.

Sufficient progress was shown at two out of three injection zones within one year of the preliminary injection to warrant continuing the prescribed active remedy at these locations. Slow groundwater flow at the third location appeared to limit the transmission of HRC to the performance wells, resulting in insufficient evidence to evaluate the remedy. Additional injections were continued as prescribed at this location since the effectiveness of the remedy

was uncertain and to allow more time for transmission of the HRC. This activity was completed in 2012.

Once every three years, a Corrective Action System Evaluation report will be submitted to the Director, VDEQ. The report summarizes the Corrective Action Plan activity and progress toward attainment of the groundwater protection standards for each remediation zone, and will be due to VDEQ in February of 2014.

ii. Landfill Closure

Capping of the municipal solid waste section of the landfill (an area of 260 acres) was completed during 2008. Phases I and II of the closure of this section were completed by placing a synthetic cap over an area of 125 acres. Phases III and IV of the closure consisted of capping 135 acres of landfill with a thick, low permeability soil layer to minimize surface water infiltration. The capping work on some of the side slopes of the Area Three Lined Landfill (the ashfill) was completed during 2008 by using a synthetic landfill cap. Small areas will be capped throughout the life of the landfill as they reach their final fill grade.

The closed areas of the landfill will require attention and maintenance for many years to come, but also provide the opportunity for interim use. A review by a consulting engineer identified a number of uses that could occur on the property at this time, including additional green energy development through solar power. This solar project is a collaborative public/private effort called the Green Energy Triangle. This initiative will maximize sustainability opportunities in the Lorton area.

iii. Landfill Gas System and Environmental Compliance Activity

The I-95 Landfill operates a large landfill gas collection system, with over 350 installed wells extracting landfill gas for energy recovery. Approximately 2,300 cubic feet per minute of this gas is distributed to a variety of energy recovery systems, including the six-megawatt Michigan Cogeneration System electric generating facility and the three-mile landfill gas pipeline that provides fuel as a substitute for natural gas at the Noman M. Cole, Jr. Pollution Control Plant. The initial term of the agreement expired in December 2012. The county and Landfill Energy Systems signed an amendment and 10-year extension of the original contract signed in 1992. The amendment sets new terms that prioritize gas delivery to the Noman Cole plant and returns revenue to the county based on electricity sales and renewable energy certificates.

County staff has also converted space heating at the landfill maintenance shop to use landfill gas as the fuel source (the original heating system used bottled propane gas). This conversion is currently saving approximately $5,000 per

year in heating costs and received a national award from the U.S. Environmental Protection Agency.

During this reporting period, the county continued its solid compliance history with Virginia's air pollution, landfill gas control, solid waste management and storm water management regulations, as well as the Environmental Protection Agency's Greenhouse Gas Reporting Rule. The county annually submits reports to VDEQ or the EPA, compiling the following:

- Ground water quality monitoring data.
- Surface water quality data.
- Landfill gas system gas monitoring and operational data.
- Greenhouse gas monitoring data.

The county also compiles landfill methane gas surface emissions and facility perimeter monitoring data in accordance with Virginia Solid Waste Management regulations. VDEQ and EPA have found all submittals to be in compliance.

iv. Ash Landfill

The E/RRF combustion process reduces the processed waste to 10 percent of its original volume and approximately 25 percent of its original weight. Therefore, ash disposal requires significantly less landfill space than the disposal of unprocessed municipal solid waste. Incinerator ash from the E/RRF, a similar Covanta facility serving the City of Alexandria and Arlington County and from the Noman Cole Plant, are all disposed of at the I-95 Ash Landfill (Area Three Lined Landfill). Ash is placed in a double-composite lined landfill, controlled by state-of-the-art leachate collection and detection systems. The collected leachate is transported to the Noman Cole plant for treatment. Approximately 900 tons of ash is currently placed in the ash landfill each day.

The ash landfill has been constructed in four phases. Phases I and II have reached capacity and an intermediate cover has been placed on these areas. Construction of Phase IIIA of the ash landfill was completed during March 2008 and is the currently active landfill cell. Phase IIIB construction was completed in February 2013. The estimated remaining life for disposal of ash in the combined Phase I, II and III footprint is approximately 18 years. If necessary, the county could utilize additional permitted capacity, Phase IV, which could extend the life an additional 10 - 15 years.

The E/RRF's suite of pollution control equipment includes a dolomitic lime system that chemically treats the ash to reduce the potential of mobilizing metals that may leach from the ash after landfilling. The ash is tested twice per year using the Toxicity Characteristic Leaching Procedure, as specified in federal regulations. During FY 2013, analysis of the ash by a certified

laboratory found the ash to be non-hazardous, demonstrating that all parameters analyzed are within the limits for all regulated constituents and that the ash is non-hazardous waste.

Cadmium is a constituent of concern in the ash generated by the combustion of municipal solid waste. To reduce the potential for cadmium to be introduced into the E/RRF, the Solid Waste Management Program supports and actively publicizes efforts to collect rechargeable nickel-cadmium batteries separately for recycling. Through a partnership with the Rechargeable Battery Recycling Corporation, large retailers such as Wal-Mart, Radio Shack and Best Buy are collecting old batteries as new ones are sold. The batteries are recycled at a permitted waste management facility specifically designed to recover these metals. This effort is anticipated to significantly reduce the amount of cadmium present in E/RRF ash. Electronics recycling also assists in reducing metals concentrations in the ash.

v. Recycling and Disposal Center

The Recycling and Disposal Center allows county residents and small businesses to bring their municipal solid waste and recyclables directly to the I-95 Complex for disposal. The center offers a full range of recycling opportunities as well as household hazardous waste disposal service. Recycling of paper, cardboard, cans and bottles is free to residents and businesses.

c. Energy/Resource Recovery Facility

i. Overview

Operations at the Energy/Resource Recovery Facility continue to meet or exceed accepted industry standards, as evidenced by the annual independent engineering report prepared by Dvirka and Bartilucci Consulting Engineers in November 2012. This report states that: "CFI (Covanta Fairfax, Inc.) has complied with the requirements of the Service Agreement, as amended, and has complied with the Facility's various environmental permit and regulatory obligations."

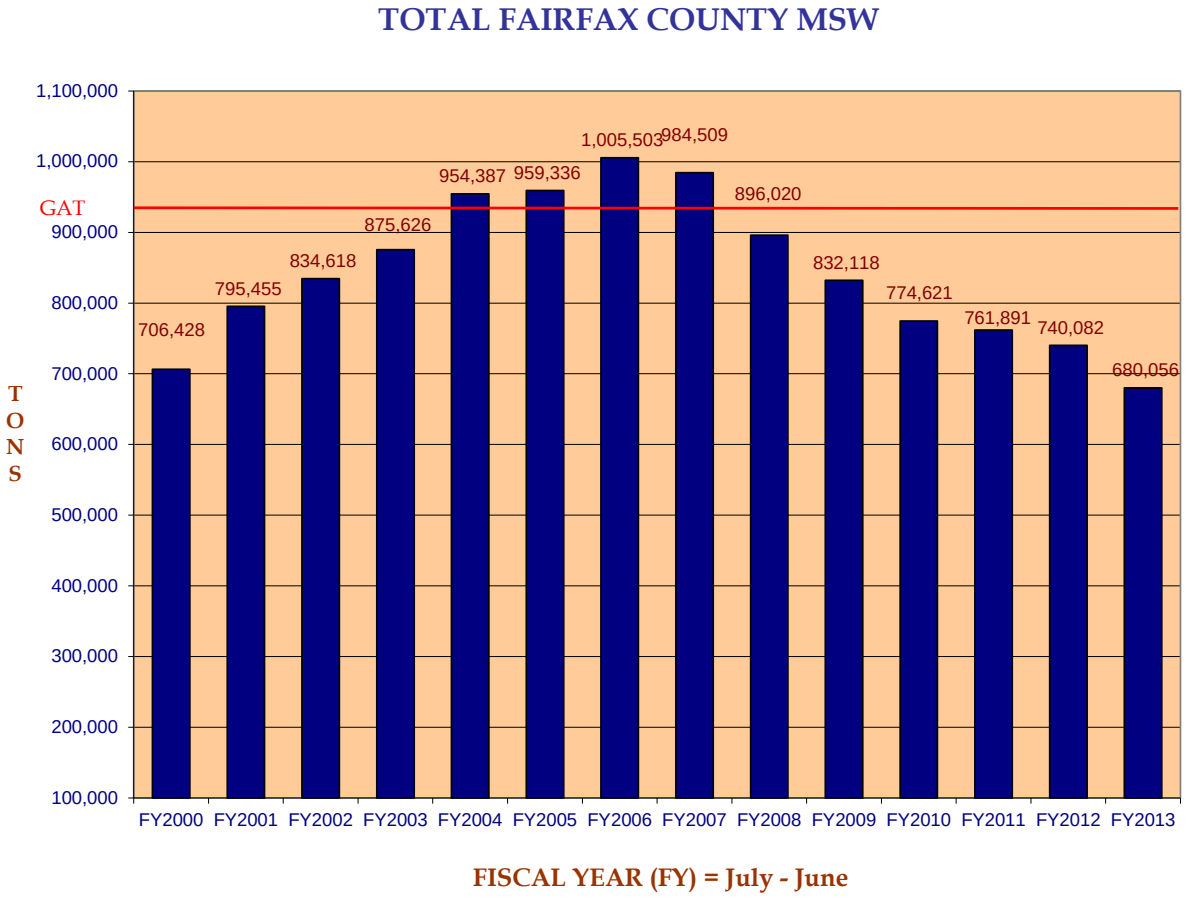
Since 2008, when CFI was released from the E/RRF's federal output limit of 80 megawatts, the plant now generates an additional 1-4 MW of electricity during peak periods, which is sold at premium prices on the PJM regional energy

market (extra revenues being shared with Dominion Virginia Power, which facilitates the sale). Revenue from the sale of the "extra" electricity is used to keep the disposal fees low.

ii. Quantity of Waste Processed

The county guaranteed to provide, and the E/RRF agreed to process, at least 930,750 tons of municipal solid waste per year. In FY 2013, the E/RRF processed approximately 947,000 tons of waste delivered on the county's behalf (over 86,000 tons per month). Approximately 727,000 tons of this waste (70 percent) originated in Fairfax County, with the remainder coming primarily from Prince William County and the District of Columbia. Figure V-1 provides the total waste generated, including that processed at the E/RRF and the amount bypassed to alternate disposal. The quantity of Fairfax County waste generated is decreasing, mostly due to reduced waste generation and increased recycling.

Figure V-1. Total Fairfax County Municipal Solid Waste FY 2000-2013



iii. Air Quality

The E/RRF's continuous emissions monitoring systems sample flue gas from the combustion process and alerts CFI operating personnel when monitored emissions are approaching the concentration limits specified in the facility's air pollution control permits. Permit exceedances must be reported to VDEQ, with an explanation as to the circumstances of the event and proposed solutions, as warranted. The E/RRF continues to meet its air permit limits, with most parameters well below their regulatory limits. Table V-1 presents stack emissions as documented by an independent lab test in June 2013 and reported to VDEQ.

Table V–1
Energy/Resource Recovery Facility Emissions Results
June 2013

Constituent	Permit Limit	Average E/RRF Result
Sulfur Dioxide (SO2)	29 ppm	4.75
Carbon Monoxide (CO)	100 ppm	3.75
Nitrogen Oxides (NOx)	205 ppm	183.0
Hydrochloric Acid (HCL)	29 ppm	4.40
Particulate Matter (PM)	27 mg/dscm	1.42
Mercury (Hg)	0.080 mg/dscm	.0018
Lead (Pb)	0.44 mg/dscm	.0030

ppm = parts per million mg = milligram
Dscm = dry standard cubic meter

Covanta Fairfax Inc., Annual Determination of Compliance with Permitted Emission Limits and 40 CFR, Subpart Cb Report, (COV Report No. 3640 Volume 1), pages 12-15 for testing conducted May 28-June 8, 2013

iv. Materials Recovery

In addition to recovering energy from municipal solid waste, metals are recovered from the ash residue and recycled. In FY 2013, 24,668 tons of ferrous metal and 2,110 tons of non-ferrous metal were recycled from the ash.

d. I-66 Transfer Station & Recycling and Disposal Center

The I-66 Transfer Station handles approximately 70 percent of the county's municipal solid waste destined for disposal. The transfer station consolidates waste delivered by individual residents and businesses, and also private sector and county collection vehicles, into large transfer trailers. These trailers are hauled over the road to a final disposal site, primarily to the E/RRF. Primary benefits from this type of transfer system are a reduction in the number of vehicles traversing the county to reach the final disposal point and reduced operating costs for the county's solid waste management system as a whole. Further, the transfer station plays a pivotal role when waste needs to bypass the E/RRF.

VDEQ regularly inspects the transfer station; the facility was found to be in full compliance during all inspections in FY 2012.

i. Transfer Operations

The main role of the transfer station is to move waste collected in the northern and western parts of the county to the E/RRF in the south. The facility also uses private trucking companies to augment its transportation fleet.

The county vehicle fleet, including the transfer trucks at the transfer station, now uses ultra-low-sulfur diesel fuel and exhaust after-treatment systems. These changes reduce air pollution emissions as much as possible, while performing the mission of transporting waste.

An automated truck wash system was installed in the truck wash building. The state-of-the-art system better recovers and recycles water, discharging minimal amounts to the sewer while reducing manpower requirements to wash large vehicles. Other county vehicles, including waste collection vehicles, are washed here as well.

In FY 2009, a project was completed to convert space heaters to landfill gas fuel from natural gas supplied from the local supplier at the Department of Vehicle Services facility near the closed I-66 Landfill. In FY 2012, a project was completed where landfill gas lines were extended to a nearby bus garage owned by the Washington Metropolitan Area Transit Authority and a repair shop related to the transfer station. The landfill gas is also used to heat the new operations center at the transfer station, which was completed in November 2011.

ii. Recycling and Disposal Center

The transfer station complex also has one of the county's two Recycling and Disposal Centers where residents and small businesses self-haul their waste and recyclables. The facility has undergone significant modernization to accommodate growing local demands for recycling and disposal services. New scales and scale houses with improved weighing technology and redesigned entrances and exits were installed to improve customer service and increase capacity.

e. Household Hazardous Waste Program

The Household Hazardous Waste and the Conditionally Exempt Small Quantity Generator collection programs are operated by the Solid Waste Management Program. The statistics about the program results are provided in the Hazardous Materials chapter of this report.

f. Other Relevant Activities

All solid waste collection companies operating in Fairfax County must obtain a Certificate to Operate and permits for individual vehicles, both issued by the Solid Waste Management Program. An integral requirement of these permitting programs is that collectors must demonstrate they comply with all applicable provisions of Chapter 109.1, the county's solid waste management ordinance.

The Solid Waste Management Program has responsibility for enforcing Chapter 109.1 and for resolving any potential violations observed by program staff. In addition to this responsibility, the program also coordinates with other county agencies as necessary to lead enforcement of relevant provisions of other chapters of the county code related to the solid waste management aspects of public health menaces, nuisance noise and landfill debris.

2. Waste Reduction and Recycling Programs

a. Overview

The Fairfax County Solid Waste Management Program is responsible for implementing the countywide recycling program. The Virginia Department of Environmental Quality established regulations that require all municipalities in the commonwealth to recycle a certain minimum percentage of the total volume (by weight) of Municipal Solid Waste generated in the jurisdiction. These regulations are codified as 9 VAC 20-130-10 and Fairfax County is responsible for meeting a 25 percent requirement. Smaller communities, with low population or low employment statistics, are required to meet a lower threshold, set at 15 percent. Reports documenting the recycling rate for the preceding calendar year are required to be sent to VDEQ each year in the spring. Fairfax County's recycling rate for

calendar year 2012 was 51 percent, which represents a full 26 percentage points above the required rate of 25 percent.

Chapter 109.1 requires annual reports on the tonnages of recyclables collected by a broad spectrum of businesses and commercial establishments, material recovery facilities and other entities that operate in the county. These reports are compiled to calculate the countywide recycling rate. Figure V-2 depicts the historical quantities of recyclables collected in the county since 2000. Since the recycling program's inception in 1988, the county has recycled over 8.5 million tons and continues to exceed the state-mandated requirement.

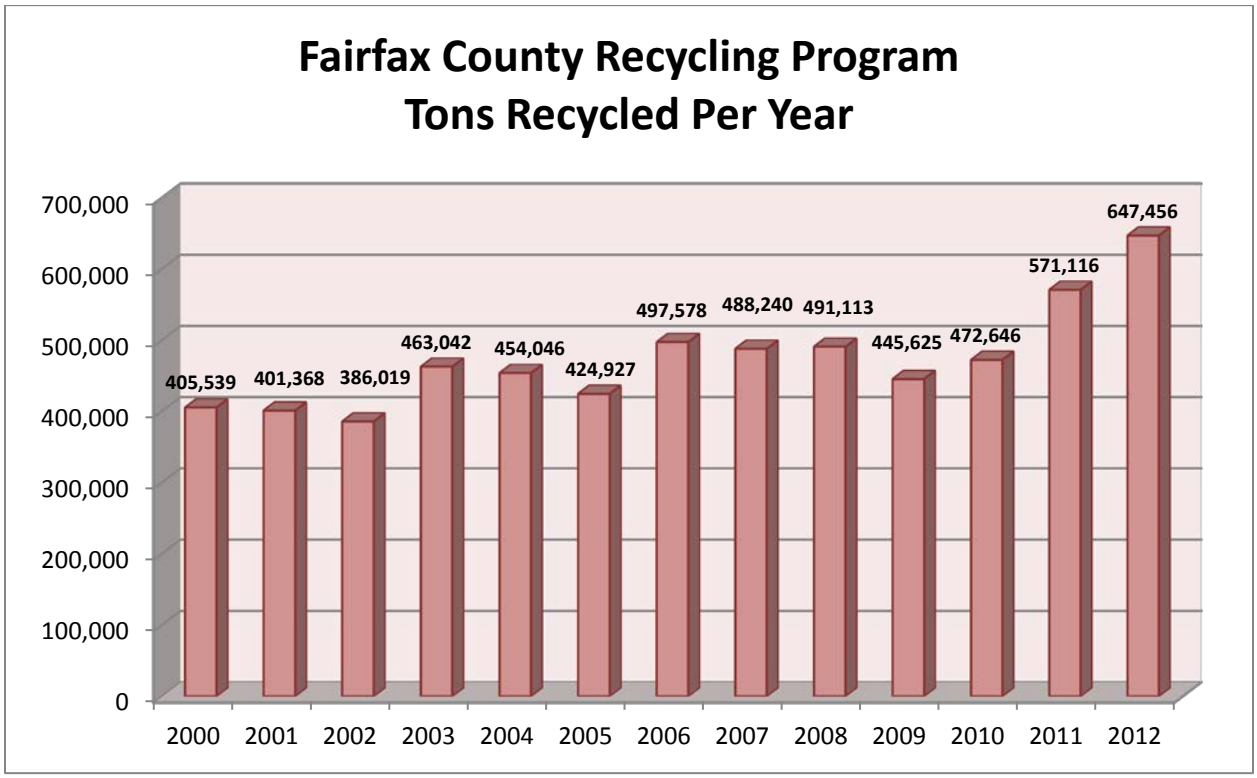


Figure V-2 - Historical Quantities of Materials Recycled in Fairfax County

Chapter 109.1 of the Fairfax County Code requires residents to separate recyclables from trash and place them separately at the curb for collection. Recyclables that must be collected at the curb include: metal food and beverage containers; glass bottles and jars; plastic bottles and jugs; mixed paper; cardboard; and yard waste.

Recycling of mixed paper and cardboard is required for all nonresidential properties in the county. All nonresidential entities that generate a principal recyclable material other than mixed paper and cardboard are required to recycle that material in addition to the mixed paper and cardboard.

Recycling of mixed paper and cardboard is required for all multifamily buildings in existence prior to July 2007.

Recycling of mixed paper, cardboard, metal food and beverage containers, glass bottles and jars and plastic bottles and jugs is required for all multifamily buildings constructed *after* July 2007. Appliances from these properties are also required to be recycled.

Recycling of mixed paper and cardboard is required for all schools and institutions.

All construction and demolition contractors are required to recycle cardboard.

b. Major Program Elements in FY 2012

i. Compact Fluorescent Lamps

The management of compact and other fluorescent lamps from residences in the county is addressed in several ways. CFLs and other fluorescent lamps can be taken to either of the county's Household Hazardous Waste facilities at the I-66 Transfer Station complex in Fairfax or the I-95 Landfill complex in Lorton. Both of the facilities recycle these lamps at no charge to county residents. Advertising placed in print media for the e-waste recycling events, known as *Electric Sunday*, has emphasized the fact that fluorescent lamps can be recycled during these events. Participation in the e-waste collection events has resulted in increased participation in the county's household hazardous waste program, resulting in the collection of increased amounts of fluorescent lamps for recycling. Information detailing these recycling opportunities is on the county website at: http://www.fairfaxcounty.gov/dpwes/recycling/mat-light.htm. This portion of the website also provides information about other organizations in the county that are accepting CFLs for recycling.

ii. E-Wastes

In FY 2012, the Solid Waste Management Program continued its *Electric Sunday* program whereby, on one Sunday each month, residents can bring their e-wastes, including televisions, for recycling to either the I-66 Transfer Station or the I-95 Solid Waste Complex.

In CY 2012, eleven *Electric Sunday* events were held where residents recycled obsolete and/or broken computers and peripherals as well as televisions. In CY 2012, about 1.3 million pounds of obsolete electronics,

including televisions, were collected for recycling from Fairfax County residents.

c. Review of Collection and Recycling Programs

In addition to county-wide recycling program management, the Solid Waste Management Program is responsible for:

- Collection of refuse and recyclables from about 44,000 residences, primarily on the east side of the county in designated Sanitary Districts.
- Collection of refuse and recyclables from county-owned properties.
- Seasonal curbside vacuum leaf collection for about 25,000 residences.
- The management of eight Recycling Drop-Off Centers.
- Removal of oversized piles of trash through the *Clean Streets Initiatives* and *MegaBulk* programs.
- Refuse removal due to evictions and other court orders.
- Assistance in the removal of materials damaged by storms, floods or other emergency situations.
- Public outreach and education on recycling, household hazardous waste and solid waste management.

The *Megabulk* program was originally established for county refuse and recycling customers in Sanitary Districts to collect oversized piles of refuse and yard debris. Customers schedule this service and pay an additional fee for the collection of oversized quantities of materials that are not part of the basic level of service for routine weekly collections. The service is now available to residents countywide for a fee, based upon equipment and personnel availability.

Working in conjunction with the Fairfax County Health Department, the Solid Waste Management Program's *Clean Streets Initiative* is designed to address complaints from residents about piles of refuse that are placed in neighborhoods where the property owner does not take responsibility for its timely removal or where no responsible party can be found. Under this initiative, the property owner is notified that the refuse must be removed and if he or she fails to do so or otherwise cooperate, the Solid Waste Management Program removes the refuse and bills the owner for removal of the material. If the property owner refuses to pay that bill, a lien is placed on the property.

By 2012, the distribution of rolling carts for recycling was completed to all of the county's 44,000 residential refuse and recycling collection customers. These containers allow residents to recycle cans, bottles, paper and cardboard in the same container that can be rolled to the curb. The containers also have lids to prevent recyclables from littering the neighborhood. The containers are sized at 65 gallons and provide more collection capacity than the former containers. The containers used previously were sized at 18 gallons and even though each customer had two bins, this equated to only 36 gallons of capacity. Therefore, the new containers provide almost double the capacity for the collection of recyclables.

These new containers have been outfitted with radio frequency identification tags. The RFID tag allows the county to attach the serial number of the cart to an individual address in order to ensure that each residence has the appropriate containers. The RFID tag is read using a hand-held device that scans the tag and records its location (using geographic positioning technology) and connects it to the address to which the container was delivered. In this fashion, the location of the carts can be tracked in order to maintain each cart at a particular address to protect the significant financial investment made to purchase the carts for 44,000 customers.

The Division of Solid Waste Collection and Recycling invested in a new customer service software system to better serve residents in 2011. The system has proven to be a reliable solution and is a vast improvement over what was previously in place. The new system is a Web-based tool hosted on a server maintained by the contractor which provides the software. The software was purchased to promote improved tracking and scheduling of customer service requests. It allows for the entire history of service at a particular location to be archived in the system so customer service representatives may see the entire service history at an individual address. It provides more information about the service request to be entered into the system which operates on a series of drop-down menus providing ease of use for customer service representatives.

i. Yard waste

Recycling of yard waste (brush, leaves and grass) is required for all residential properties in Fairfax County and collection of that yard waste is required to be provided as part of the base level of service by all permitted collection companies operating in the county from March 1 through December 24 of each year. Yard waste recycling is suspended in the months of

January and February because very few leaves and virtually no grass are generated during that part of the year.

Townhouse communities may apply to the county for approval of an alternative yard waste recycling system. The reason for this flexibility is lawns are typically small and these communities contract with landscaping firms to maintain common areas. Approximately 300 townhouse communities have approved alternative recycling systems for yard waste.

Woody materials, referred to as brush, comprise a significant portion of the yard waste collected in the county. Brush is managed at either the I-66 or I-95 facility and is ground into mulch. The mulch from these facilities is available free to county residents who can self-haul the material to the end use location. Typically, mulch is used as a top-dressing around decorative plantings to reduce weed growth and maintain soil moisture.
Leaves and grass comprise the balance of the yard waste managed in the county. This material is generally collected in bags or by curbside vacuum collection and is sent to either of two composting facilities where the material undergoes biological decomposition to turn it into compost. Typically, compost is used as a soil amendment or substitute. In CY 2012, a little under 244,000 tons of yard waste were recycled in Fairfax County.

Leaves collected in the fall by the county for customers receiving (and paying for) curbside vacuum leaf collection are ground during the vacuuming process. These ground leaves are taken to several Fairfax County parks where the ground leaf mulch is available for use by the Park Authority and by residents who can haul it away themselves for use in their yards.

ii. Recycling Drop-Off Centers

Fairfax County operates eight Recycling Drop-Off Centers at various locations throughout the county. These are unmanned facilities, open 24 hours and there is no fee to use them. In CY 2012, about 3,600 tons of recyclables were collected in the drop-off centers. Recycling Drop-Off Centers continue to play an important role in supporting recycling in the community, serving patrons in multifamily units and small businesses.

iii. Recycling by county agencies

All county agencies receiving refuse collection and recycling services from the Solid Waste Management Program participate in the county recycling program. In CY 2012, county agency locations recycled approximately 1,000 tons of material. The program provides containers for the collection of bottles and cans (plastic bottles, aluminum beverage cans and glass bottles) from buildings owned and occupied by Fairfax County and its employees. Recycling collection containers have been placed in all of the county's larger office buildings and

most of the smaller agency buildings in areas where beverages are sold and consumed like cafeterias and conference rooms.

iv. Document shredding

Fairfax County offers residents the opportunity to shred personal documents at certain locations around the county, usually in conjunction with electronic recycling events or household hazardous waste collection events. This service is offered to help residents protect their personal financial information while directing the shredded paper to a recycling facility. In CY 2012, 10 document shredding events were held and approximately 228,000 pounds of personal documents were shredded.

v. Public Education and Outreach

Public education and outreach are key components of any successful municipal recycling program. To that end, the Solid Waste Management Program has focused on developing creative education programs that take advantage of its partnerships with county agencies, Fairfax County Public Schools, community organizations, commercial businesses and privately-owned collection companies. Outreach programs consist of: activities and displays at county festivals; support and publicity for several events specifically dedicated to recycling; public speaking opportunities; and technical support in the research of recycling technologies and issues.

The Solid Waste Management Program continues to work closely with the Northern Virginia Regional Commission on a regional public information program entitled "KnowToxics." The purpose of this program is to educate business owners about their responsibility to comply with federal and state regulations that require proper disposal or recycling of spent fluorescent lamps, rechargeable batteries and computers and related electronics. The program is centered on its website (www.KnowToxics.com), which provides a resource where businesses can learn how to legally and appropriately manage these materials.

In March 2013, Fairfax County partnered with NVRC to create a training program to educate solid waste managers in the Northern Virginia area about the proper management of universal waste, a subcategory of hazardous waste, regulated by EPA and VDEQ. This was a "train-the-trainer" event where the attendees have been trained to be able to teach the course to other individuals, especially commercial property managers. This event attracted over 60 attendees who completed the course.

The Solid Waste Management Program has also continued a rechargeable battery recycling program, in collaboration with the Rechargeable Battery Recycling Corporation Program. RBRC is an industry-funded program where rechargeable batteries can be collected and sent for recycling at no charge.

Collection boxes for rechargeable batteries are now located at offices of all members of the Fairfax County Board of Supervisors and at major county buildings. A complete listing of collection locations is on the county website at: http://www.fairfaxcounty.gov/dpwes/recycling/mat-bat.htm

The Fairfax County Solid Waste Management Program partnered with the Metropolitan Washington Council of Governments to produce the Builder's Guide to Refuse and Recycling.

The Solid Waste Management Program continues to be a prime sponsor of Fall for Fairfax. This event provides a great opportunity to conduct public outreach and disseminate technical guidance and practical information on using the county's solid waste management system.

The Solid Waste Management Program is a proud financial sponsor of the annual Earth Day/Arbor Day celebrations promoted by Clean Fairfax. The program also supports the Johnie Forte, Jr. Environmental Scholarship, which awarded fifteen $500 grants to applicants from the Fairfax County Public Schools. Details of the Johnie Forte, Jr. grant program are available on Clean Fairfax's website at: http://www.cleanfairfax.org. Over the years, Clean Fairfax has awarded over $85,000 worth of grants through the Johnie Forte program.

The Solid Waste Management Program also supports Fairfax County's Employees for Environmental Excellence. The group meets monthly and works on projects designed to encourage county employee participation in recycling and other environmental protection activities. It also supports the FEEE website available in the county's Intranet where information about recycling in county buildings is provided.

The program also uses the Internet by posting pertinent information about timely subjects on the program's website. Information about the program's involvement in community events, as well as new information about solid waste matters, can be found at: www.fairfaxcounty.gov/living/recycling.

Staff continues to update the Solid Waste Management Program's website to improve its ease of use for residents and businesses. Information is continuously updated to help county residents, solid waste industry companies and schools access forms, data and publications about the program.

The program also published an electronic "listserv" to county collection customers to automatically send updates to customers on the program and to provide updates regarding service changes due to inclement weather. A similar "listserv" tool was developed to give vacuum leaf collection customers the most up-to-date information on the exact dates that the leaf collections would be conducted on their streets in order to ensure that residents would have time to rake their leaves to the curb.

3. Composting

Composting in Fairfax County currently consists of backyard composting programs as detailed in the county's Solid Waste Management Plan.

While it is EQAC's view this is a great start to a successful program, there are further gains in the area of composting to be made. The waste stream is changing and a large part of this is due to separating recyclables. Separating food waste would capitalize on current programs and enhance composting in county recycling efforts.

Americans all across the country waste food and the residents of Fairfax County are no different. Clean Fairfax cites that Americans waste 35 percent of their fish, 33 percent of their meat, and 20 percent of their vegetables.

This is an incredible amount of waste that, for the most part, is unnecessary. Education would follow the mantra of reduce, reuse and recycle, focusing on reduction. Stopping food waste at the source is paramount. Behavior change is difficult at best and educating the public on food waste is the first step to changing behavior. An informed population would understand the cost implications associated with not only over-purchasing at the local grocer, but also the environmental impact when the trash is tossed.

Using a process of separation, food waste can be eliminated from the waste stream. Curbside pickup would support residential collection and larger scale pickup would support institutional needs. Placing food waste into a composting program provides a useful product in comparison to traditional burning and ash production, which must be managed into the future.

4. Clean Fairfax

Clean Fairfax Council, now known as Clean Fairfax, is a private, nonprofit (501(c)(3)) corporation dedicated to educating residents, students and businesses in Fairfax County about litter prevention and recycling. Clean Fairfax focuses on environmental education provided to students and adults throughout the county. Clean Fairfax continues efforts of updating the educational and interactive programs for students, community service opportunities for students (i.e., support at the council's office or organizing clean ups), classroom presentations and presentations to homeowner associations and other groups.

A key effort of the council is the sponsorship of spring and fall cleanups. These cleanups rely on volunteers who desire to clean up a certain area of the county. The council asks volunteers to plan their cleanup by selecting a site, gathering volunteers and setting a date and time. Clean Fairfax supplies all the necessary tools provided (gloves, trash bags, recycling bags, vests and safety tips) for a successful cleanup. A follow-up form is available on the Clean Fairfax website to track progress, tally volunteer hours and trash pickup tonnage. Last year, Clean Fairfax worked with over 1,200 volunteers at 85 assisted clean ups, picking up over 67,000 pounds of trash, on and around Fairfax County's roads, parks and side streets. Clean Fairfax also organizes periodic clean-up projects around the Government Center, with Fairfax County employees and area businesses.

Clean Fairfax continues to organize and lead the Earth Day/Arbor Day event, now called SpringFest Fairfax, in partnership with the Department of Public Works and Environmental Services, the Fairfax County Park Authority, Fairfax Water, Fairfax Connector and Lorton Arts Foundation. Clean Fairfax now combines workshops and community service elements with this event. This past year at its new location at the Workhouse Arts Center in Lorton, over 3,000 children and families attended this all day event. Other major projects for the upcoming year include outreach on reducing residents' compliance on plastic grocery bags, promoting small scale, backyard composting and providing services and workshops at Fairfax County Farmers Markets.

Clean Fairfax's Executive Director works directly with many county staff members on litter control and recycling education issues and serves on the cross-agency Litter Task Force.

Clean Fairfax reaches Fairfax County residents by e-newsletters, Facebook and Twitter as well as an environmental blog updated twice weekly at www.cleanfairfax.org.

There are many other programs offered by Clean Fairfax, including programs beyond litter prevention and control. For more information, please visit the website at www.cleanfairfax.org or the SpringFest Fairfax website at www.springfestfairfax.org

5. Alice Ferguson Foundation

The nonprofit Alice Ferguson Foundation was established in 1954. While chartered in Maryland, it has implemented programs throughout the Potomac River watershed, with benefits to the main stem of the river as well as tributaries in Washington, DC, Maryland, Pennsylvania, West Virginia and Virginia. As stated on its website, the foundation's mission is "to provide experiences that encourage connections between people, the natural environment, farming and the cultural heritage of the Potomac River Watershed, which lead to personal environmental responsibility."

In April 2013, the foundation held its 25th annual Potomac River Watershed Cleanup. A total of 14,586 volunteers removed 312 tons of trash and debris from the region at 633 cleanup sites throughout Washington, D.C., Maryland, Virginia, West Virginia and Pennsylvania. The 312 tons of trash collected during the cleanup included 1,314 tires, 193,800 beverage containers, 27,200 plastic bags and 27,400 cigarette butts.

Other programs implemented by the foundation include:

- Trash Free Potomac Watershed Initiative: This is a program to reduce trash, increase recycling and provide education regarding trash issues in the watershed.

- Potomac Watershed Trash Treaty: As of summer 2012, this treaty commits 112 signers to achieving a "Trash Free Potomac by 2013" and to: support and implement regional strategies aimed at reducing trash and increasing recycling; increase education and awareness of the trash issue throughout the Potomac watershed; and reconvene annually to discuss and evaluate measures and actions addressing trash reduction. Fairfax County was one of the founding signers of the treaty in 2005.

- Potomac Watershed Trash Summit: The foundation convenes this meeting annually to provide a venue for key stakeholders to collaborate on strategies to eliminate trash from waterways, communities, streets and public lands, including regional public policy, model best management practices, business actions and public education.

- Enforcement: The foundation worked in partnership with the Metropolitan Washington Council of Governments' Police Chief Committee on "Litter Enforcement Month," which provided a focus on litter-related crimes and raised awareness of the harmful effects trash has on communities and the environment.

There are numerous other programs and initiatives that are implemented by the foundation; the reader is encouraged to visit the foundation's website at www.fergusonfoundation.org.

C. RECOMMENDATION

1. EQAC recommends investigation of furthering composting efforts to collect food waste and properly eliminate it from the waste stream by routing it into a process whereby composted material would produce a useful product.

REFERENCES

Much of the narrative and illustrations were supplied by the Solid Waste Management Program of the Department of Public Works and Environmental Services. EQAC also acknowledges Clean Fairfax and the Alice Ferguson Foundation for the information each organization provided.

Additional citations for the section on composting are as follows:

Clean Fairfax, 2012, "What Do We Want? Food Composting! When Do We Want It? NOW!" http://www.cleanfairfax.org/2012/05/15/what-do-we-want-food-composting-when-do-we-want-it-now/, accessed October 15, 2013.

Fairfax County Department of Public Works and Environmental Services, 2004, Solid Waste Management Plan, 2004-2024, Chapter 8 - Yard Waste, http://www.fairfaxcounty.gov/dpwes/swmp/chapter-8.pdf, accessed October 15, 2013.

ANNUAL REPORT ON THE ENVIRONMENT

CHAPTER VI

HAZARDOUS MATERIALS

V. HAZARDOUS MATERIALS

A. ISSUES AND OVERVIEW

1. Overview

Fairfax County hazardous materials issues have not changed much in the last few years. Although the resources that address hazardous materials have been reduced during the budget challenges of the past few years, the county has adapted and become more efficient and effective. Fairfax County is relatively "clean" but we have our share of problems. The main concerns are hazardous materials incidents involving spills, leaks, transportation accidents, ruptures or other types of emergency discharges. Secondary is the use and disposal of hazardous materials in either daily household activities or by small quantity commercial generators. The final concern is the clean-up and regulation of hazardous materials.

Although the news media reports industrial and transportation related hazardous materials incidents, there is a general lack of awareness by the public of health and safety risks associated with the use, storage and disposal of common household hazardous materials. Educating the public on the implications of these hazardous materials on peoples' lives remains a significant goal.

The discarding of older model televisions, as well as computer monitors and peripherals requires continued effort to help keep lead from entering the solid waste system. Compact florescent light bulbs contain small amounts of mercury; they therefore must be disposed of properly when the bulbs are used as well as if they are broken. With the 2012 mandatory change to compact florescent light bulbs, proper disposal will become a bigger issue.

FY 2010 budget impacts that had direct impact on environmental programs: reorganization of the Hazardous Materials and Investigative Services Section and the loss of the Local Emergency Planning Committee Coordinator. The HMIS reorganization did not involve any reduction in service or mission objectives for the section. Resources were reallocated to better distribute workload and address concerns for officer safety and staffing. The duties of the LEPC Coordinator were reassigned to the alternative placement Lieutenant assigned to the Hazardous Materials Technical Support Branch. The long-term impact for the loss of the LEPC Coordinator was realized in 2012, when the alternative placement Lieutenant retired.

The Fire and Rescue Department purchased Tier II Manager Software in an effort to compensate for the loss of the LEPC Coordinator position. This allows for Web-based entry of Tier II information by submitting facilities. The most significant advantage of this software is that it automatically generates the

Hazardous Material Emergency Response Plan for the critical hazard facilities. This system now has over 500 total facilities in the system. Tier II reviews are planned for County facilities between January and March 2014. (13)

The Fire and Hazardous Materials Investigative Services section initiated a new records management system in 2012 called Fire Files. This new RMS combines previously collected data from the county's Hazardous Materials Complaint Database and the Fire Investigations Case Files now into one single records management system.

2. Hazardous Materials Incidents

a. Overview of 2011 Hazardous Materials Incidents

In 2012, the Fire and Rescue Department's Fire and Hazardous Materials Investigative Services section received 552 complaints involving hazardous materials. This is compared to 585 in 2011, 782 in 2010, 735 in 2009, 418 in 2008 and 288 in 2007. 2011 and 2012 were the first years recently that there were actually decreases in complaints. Of the 552 complaints, 231 were reported spills, leaks or releases of hazardous materials into the environment, which is a substantial reduction of the consistent frequency in recent years (i.e. 331 in 2011, 335 in 2010, 303 in 2009 and 330 in 2008). Of these 231 releases, 168 involved petroleum based products. There were 31 hydraulic oil spills/releases (mostly from trash trucks), 12 gasoline releases, 51 fuel oil or home heating oil releases and 33 diesel fuel releases. The remainder consisted of a variety of materials including, paint, antifreeze, cleaners, various gases, various chemicals and mercury. There were 28 incidents where the release of hazardous materials impacted storm drains or surface waters. The section tracked 35 sites for both short and long term remediation. The vast majority of these releases were small scale with the exception of an overturned gasoline tanker truck that caught fire and released approximately 8,500 gallons of gasoline into a storm drain system. The section also staffs the Hazardous Materials and Fire Investigations Mobile Lab. The Mobile Lab was requested to address no hazmat incidents and one fire event in 2012.

Section personnel maintain relationships with the major pipeline companies and blasting companies that operate in Fairfax County in an effort to reduce risks and increase response capabilities should emergency incidents occur with these operations. (1)

b. Hazmat Response Team Information

The Fire and Rescue Department maintains a well-equipped hazardous materials response team for emergency response. The primary unit operates out of Fairfax Center Fire Station 40. There are four satellite stations

located throughout the county in support. These stations are located at Fire Station 1 in McLean, Fire Station 11 in Penn Daw, Fire Station 19 in Lorton and Fire Station 26 in Springfield. These units are strategically positioned to provide rapid response and adequate coverage throughout Fairfax County. Response personnel are trained and equipped to initiate product control and mitigation measures to prevent or minimize the adverse environmental impact and damage. All units are staffed 24 hours per day, seven days per week. (1)

The Hazardous Materials Response Team responded to 399 calls in 2012, which is similar to 2010 and 2011 but is a decline from past years (i.e. 381 in 2012, 402 in 2010, 814 in 2009 and 994 in 2008). The team responded to a myriad of incidents including methane/propane gas emergencies, transformer fires, overturned gasoline/ethanol tank trucks, weapons of mass destruction investigations for suspicious packages or white powder, mercury events, chemical odors or spills, petroleum releases, the dumping of hazardous materials and various other Department of Transportation HazMat-class events. (1)

In addition to the efforts of the Operations Division and Hazardous Materials Investigative Services Section personnel, the Fire and Rescue Department maintains a contract with a major commercial hazardous materials response company to provide additional support for large-scale incidents. The Fire and Rescue Department has stressed its commitment to protecting the environment and residents through proper enforcement of the Fairfax County Fire Prevention Code and through rapid identification, containment and cleanup of hazardous materials incidents.

The Fire and Rescue Department, in conjunction with the Fairfax Joint Local Emergency Planning Committee, maintains an online software program called Tier 2 Manager. This program allows companies that use, store or manufacture chemicals in the county to report this information electronically to the department and FJLEPC so that the community and first responders will be aware of these chemicals within the community as required by the Emergency Planning and Community Right to Know Act. Emergency planners and response personnel have instant access to chemical inventories and Emergency Response Plans for each facility deemed to be a Critical Hazard Facility. Additionally, Emergency Response Plans are developed for critical infrastructure facilities such as sewage and water treatment plants and bulk petroleum storage facilities. (1)

3. Hazardous Materials in the Waste Stream

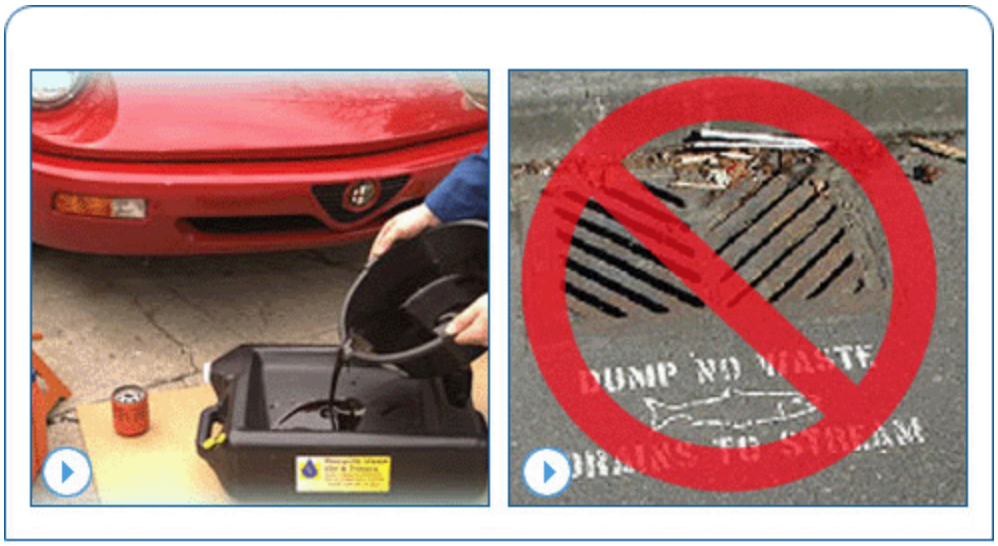
The disposal of household and small quantities of non-household hazardous materials into the waste stream continues to be a concern. Unlike hazardous materials incidents, the immediate impact is not as dangerous. However, the long-term impact can be just as severe. Sometimes hazardous materials are dumped illegally, which leads to stream and groundwater pollution and soil contamination. Household hazardous wastes are products used in and around the home that are flammable, corrosive, reactive or toxic. These hazardous materials potentially can cause a safety problem if various household chemicals become mixed when disposed of with the regular trash. By disposing of household hazardous wastes separately in the appropriate manner, these materials can be properly handled and packaged to minimize exposure to potentially harmful chemicals and decrease the likelihood that these chemicals will enter the environment.

a. Used Automotive Oil and Fluids

Millions of do-it-yourselfer motorists change their own oil. Some of the oil is disposed of properly at a used-oil recycling center. But much used motor oil is being disposed of in garbage cans, sewers, storm drains and backyards – practices that can contaminate soil, local streams, rivers, bays and beaches. One gallon of used motor oil, if not disposed of properly, can contaminate one million gallons of water. (4)

As a part of its ongoing effort to educate all Americans on environmental responsibility, the U.S. Environmental Protection Agency launched "You Dump it, You Drink It" **(**"Si lo tira, se lo toma"**)**, a Spanish-language campaign. Despite the fact that about half of all automotive mechanics in the United States are Hispanic, little if any Spanish-language materials exits for the automotive repair industry and those consumers who change their own motor oil. EPA hopes to fill this void through a wide-scale distribution of these materials, which include posters, brochures and bumper stickers. These materials are available to download from the EPA website. (5)

Recycling of petroleum products is less well known than for other products. The recycled used motor oil is used for many purposes. The primary use is to refine it into a base stock for lubrication oil. The secondary use of used oil is to burn it for energy. If you recycle just two gallons of used oil, it can generate enough electricity to run an average household for almost 24 hours. (4)



Many service stations, repair facilities and quick lubes will accept used oil and used oil filters.
(The American Petroleum Institute-The Oil Recycling Process website: www.recycleoil.org [4])

b. Dumping into Storm Drains

Storm drains carry stormwater runoff from streets (see the Water Resources chapter of this report). This water is not treated and goes directly into local streams. All streams in Fairfax County eventually flow into the Potomac River, which empties into the Chesapeake Bay. Anything dumped down a storm drain will follow the same path as the stormwater runoff. (6)
The cleaning up of animal wastes and the disposal of such wastes down storm drains, as well as the disposal of leaves down the storm drains, are attempts at doing a service that have the effect of introducing pollutants directly into county streams. There are deliberate disposals of chemicals, oils and other items into the storm drains as "out-of-site, out-of-mind." In either situation, there is a misperception that the storm drains are part of the county sewage system and that the disposal of materials down these drains does not provide a direct impact to the environment.

4. Pipelines

The following was reported by the Fairfax Joint Local Emergency Planning Committee:

"More than 3,000 companies operate some 1.9 million miles of natural gas and hazardous liquid pipelines in the United States. The pipeline network includes 302,000 miles of natural gas transmission pipelines operated by 1,220 firms, and 155,000 miles are hazardous liquid transmission pipelines

operated by 220 outfits. In addition to transmission pipelines, 94 liquefied natural gas facilities operate in the United States."

Pipelines traverse Fairfax County, carrying refined petroleum for two companies and natural gas for three companies. The Office of Pipeline Safety in the U.S. Department of Transportation regulates pipeline design and the construction, operation and maintenance of pipelines to ensure safe transportation of hazardous liquids and natural gas. (7)

5. Rail Transport of Hazardous Materials

Chemicals and materials that are hazardous have regularly been transported by rail. While having chemicals and hazardous materials transported by rail keeps them off the highways, accidents or leaks have been, and continue to be, a cause for concern. Additional concerns have been introduced as a result of the September 11, 2001 terror attacks, new ethanol transfer stations and the future shipments of nuclear radioactive waste throughout the country.

The July 18, 2001 CSX Train fire in a Baltimore, Maryland tunnel was an unintended incident involving a train car with hazardous materials and had wide-range, long-term consequences. Major sections of the downtown were closed, businesses were impacted, Orioles' games had to be rescheduled, and portions of a major street were closed for five weeks. (3)

The July 2001 Baltimore tunnel fire immediately got woven into debate of whether nuclear waste could be transported safely to Nevada. Studies in 2003 were performed to determine what would have happened had the train been carrying nuclear waste. Conclusions differed. A state analysis concluded that a cask carrying radioactive spent fuel would have been breached by temperatures inside the Howard Street Tunnel. Escaping radioactive particles would have contaminated 32 squares miles, increased the chances of cancer deaths for up to 28,000 people and cost $13.7 billion to clean up. The Nuclear Regulatory Commission said the nuclear waste canister would have endured the fire "and the health and safety of the public would have been maintained." (3)

Rail through Fairfax County is in the eastern and southern portions of the county and does not include tunnels. Residents are generally not located as close to the rails in Fairfax County as in other jurisdictions. However, some hazardous materials, alone or in combination, when released can affect areas up to miles from the initial site of the incident. It is conceivable that Fairfax County residents could be impacted with hazardous materials from a rail incident in another jurisdiction.

B. PROGRAMS, PROJECTS AND ANALYSES

1. Fairfax Joint Local Emergency Planning Committee

Local Emergency Planning Committees are required by Section 301[c] of Title III of the Emergency Planning and Community Right-to-Know Act, a freestanding provision of the Superfund Amendments and Reauthorization Act of 1986. The main thrust of SARA is to identify and clean up waste sites that are potentially toxic. Title III has two important provisions: 1) it provides for emergency response planning to cope with the accidental release of toxic chemicals into the air, land and water; and 2) the community right-to-know provisions of Title III help to increase the public's knowledge and access to information on the presence of hazardous chemicals in their communities and releases of these chemicals into the environment. Under Title III, states are required to organize into planning areas and to establish local Emergency Planning Committees.

The FJLEPC is comprised of representatives of the city of Fairfax, the county of Fairfax, the town of Herndon and the town of Vienna. Committee members include local government officials, police, fire and rescue officials, environmental and governmental planners, public health professionals, hospital officials, public utility and transportation officials, representatives of business organizations, professional societies, civic organizations and the media. These representatives meet six times per year. The FJLEPC: (1) collects information about hazardous materials; (2) develops and updates, on an annual basis, the Hazardous Materials Emergency Response Plan; and (3) provides information to the public about the use, storage and manufacture of hazardous materials. The plan also contains notification procedures in the event of an incident, on site means of detecting incidents, evacuation routes, clean-up resources and identification of parties responsible for the site. The annual plan is exercised regularly. The most recent plan was produced on April 14, 2011. Member organizations have been focused on many exercises ranging from community response to incidents at the Upper Occoquan Sewage Authority and the Fairfax City tank farm to active shooter incidents at hospitals and many schools.

FJLEPC provides education and outreach to the public. Information is disseminated through public meetings, brochures, newsletters and a website: www.lepcfairfax.org. The newsletter, which is mailed to civic and homeowner associations, focuses on emergency preparedness, disaster planning and fireworks safety. FJLEPC produced a video about shelter in place. The video is available through any of the Fairfax County public libraries as well as online through the county's "video on demand" service at www.fairfaxcounty.gov/cable/channel16/vod.htm. (8) LEPC members are available to speak to businesses or residents' groups, as requested.

2. Railroad Transportation Plan

The CSX Transportation has a hazardous material emergency response plan, "Community Awareness Emergency Planning Guide" dated October 2008. A written copy of that plan is on file with the Fairfax County Fire & Rescue Hazmat Station 40. (12)

At www.csx.com CSX reports that each year it moves over 350,000 tons of hazardous materials and has a low number of incidents. For every billion ton-miles of hazardous materials transported, trucks (which operate over inherently more dangerous highways) are involved in 16 times as many accidents as the rails. CSX has achieved a 99.9 percent success rate for safe transportation of hazardous materials. CSX has been involved with years of hearings and legal proceedings concerning the safety with urban rail transportation of certain hazardous materials. Among these is the re-routing of trains around Washington D.C. (9).

3. Storm Drain Education Program

The Northern Virginia Soil and Water Conservation District has coordinated storm drain education in Fairfax County for over a decade. The goal of the program continues to be educating the community about the water quality impacts of storm drain dumping. Pollution that enters our water resources through storm drains is called nonpoint source pollution because it comes from all our homes and communities. Nonpoint source pollution is the leading cause of water quality deterioration in the Chesapeake Bay. During FY 2013, 448 volunteers worked in their communities, logging over 1,500 hours, to carry out 26 projects. These volunteers included scout groups, middle and high school students and homeowner associations. As a result, 11,844 households in Fairfax County received nonpoint source pollution prevention education. This included information about how to properly dispose of pet waste, used motor oil, fertilizer, antifreeze and other hazardous materials. Following the education campaign, volunteers labeled 2,688 storm drains, thereby providing an on-going reminder to not dump anything in storm drains. Check NVSWCD's website to learn more about the Storm Drain Education Program and how civic and community groups can have their local drains marked (http://www.fairfaxcounty.gov/nvswcd/stormdrained.htm). (6)

NVSWCD also publishes a quarterly newsletter, Conservation Currents, for Fairfax County residents. Articles are available at the NVSWCD website on hazardous waste reduction, including an article entitled "Healthy Homes, Healthy Communities: Household Hazardous Waste Reduction in Fairfax County." The article includes information on how to determine which home products are hazardous waste and provided information on safe disposal. (6)

Pictures of storm drain marking by local volunteers (provided by NVSWCD (6))

A relatively new group of local governments and utilities called the Northern Virginia Clean Water Partners has launched an effort to educate the public about how to prevent water pollution. The group includes the counties of Fairfax, Arlington, Loudoun, Prince William and Stafford; the cities of Alexandria, Fairfax and Falls Church; and the towns of Dumfries, Herndon, Leesburg and Vienna. Other members of the partnership are Fairfax Water, Loudoun Water, the Northern Virginia Regional Commission and the Virginia Department of Environmental Quality Coastal Zone Management Program. (2)

The logo, and theme, for the Northern Virginia Clean Water Partners (2)

Each spring, NVCWP launches a campaign to remind residents that they can reduce the amount of polluted storm water reaching waterways. The group plans surveys to help quantify the effectiveness of the campaign. It also wants to determine how aware Virginians are of storm water pollution and the behaviors that cause it. A recent survey found that after hearing the radio spot, 12 percent of respondents would be more careful with fertilizer, nine percent would pick up after their pet more often and nine percent said they would recycle their motor oil. (2)

As a member of the Clean Water Partners, Fairfax County participates in the annual storm water education campaign. Print, video and Web-based products (www.onlyrain.org) have been developed to aid in raising awareness about behaviors leading to non-point source pollution and the actions residents can take to protect local and regional water quality. (6)

To learn more about NVCWP, check its website at: www.onlyrain.org.

4. Household Hazardous Waste Program

As a part of the suite of recycling and disposal services offered to Fairfax County residents, the county's Solid Waste Management Program operates two permanent Household Hazardous Waste collection facilities, one at the I-66 Transfer Station and the other at the I-95 complex. Information on the locations, hours of operations and types of wastes accepted and how to dispose of the wastes can be found on the county's website at www.fairfaxcounty.gov/dpwes/trash/disphhw.htm or by calling a recorded 24 hour information line at 703-324-5068.

I-66 TRANSFER STATION
Thursday/Friday/Saturday:
8:00 a.m. – 4:00 p.m.
Sunday: 9:00 a.m. – 4:00 p.m.

I-95 LANDFILL
Thursday/Friday/Saturday:
8:00 a.m. – 4:00 p.m.

The I-95 Landfill HHW site is also available on the Sundays when the facility is hosting electronic "e-waste" recycling events.

The HHW program is one of the county's premier pollution prevention programs. The program receives its funding through the Solid Waste Management Program fees that users of the county's disposal facilities pay to properly and legally dispose of refuse in Fairfax County. In FY 2013, materials delivered by residents for disposal or recycling primarily consisted of antifreeze, motor oil, lead acid batteries and latex paint. The Solid Waste Management Program also hosts four remote HHW events per year.

Monthly events are held for recycling of obsolete electronics in order to keep regulated heavy metals used in the manufacture of this type of equipment out of the county's waste-to-energy facility. These monthly events, known as *Electric Sunday*, are conducted at the I-66 Transfer Station complex or the I-95 Landfill complex.

In FY 2013, 28,723 users participated in the HHW program, disposing of 573,760 pounds of HHW. Program details are provided in Table VI-1 below (11).

Table VI-1 Fairfax County Household Hazardous Waste Program: Record of Fiscal Year Disposal			
Fiscal Year	**Participation (# of users)**	**HHW (pounds)**	**Cost per household**
FY 2013	28,723 households	562,285	$23.07
FY 2012	26,889 households	423,275	$25.30
FY 2011	21,909 households	416,110	$25.62
FY 2010	23,110 households	350,815	$27.11
FY 2009	19,951 households	404,896	$32.66
FY 2008	22,112 households	452,552	$30.59
FY 2007	21,958 households	428,064	$27.77
FY 2006	21,471 households	440,076	$26.32
FY 2005	22,866 households	411,315	$18.84
FY 2004	18,600 households	373,220	$22.92
FY 2003	16,140 households	359,840	$23.30
FY 2002	16,272 households	368,060	$20.97
FY 2001	15,312 households	356,275	$18.75
FY 2000	15,564 households	330,325	$18.33

Source: Fairfax County Department of Public Works and Environmental Services, Solid Waste Management Program.

5. Commercial Hazardous Waste

In FY 2013, the Solid Waste Management Program conducted three Conditionally Exempt Small Quantity Generator waste collection events at the I-66 Transfer Station Complex. A CESQG is, according to federal hazardous waste regulations, any business that generates less than 220 pounds or 27 gallons of hazardous waste per month. The Solid Waste Management Program staff operates the event using the services of a permitted hazardous waste management contractor. The CESQGs pay a disposal fee for the hazardous material they bring to these events. This fee is generally lower than what it would cost to have a permitted hazardous waste management contractor collect and appropriately manage the waste at an individual business location. This reduces the costs for CESQG businesses in the county to comply with federal and state environmental regulations. Hazardous waste generators that generate more than the 220 pounds per month are required by federal and state laws and regulations to properly dispose of the hazardous waste that they generate. In FY 2013, 74 companies participated in the three CESQG events. Information about the CESQG program and a list of permitted hazardous waste disposal companies are available on the county's website at www.fairfaxcounty.gov/dpwes/trash/disphazcomm.htm.

The Solid Waste Management Program also spearheaded development of the Know Toxics program, managed regionally by the Northern Virginia Regional Commission staff and its Waste Management Board, www.KnowToxics.com

(11). This project is a web-based tool that provides information on the types of hazardous wastes generated by businesses, their responsibilities to properly dispose of hazardous waste a permitted hazardous waste disposal facility and information on permitted hazardous waste disposal facilities.

6. Rechargeable Battery Recycling

In addition to the Solid Waste Management Program's battery collection activities described in the Solid Waste chapter of this report, the program collects, at its household hazardous waste facilities, rechargeable batteries that contain regulated heavy metals. Non-rechargeable household batteries are not accepted by the program and can be safely thrown away because of the Mercury-Containing and Rechargeable Battery Management Act of 1996, which required the reformulation and removal of mercury from use in the manufacture common alkaline batteries. Nickel-Cadmium and other rechargeable batteries (commonly found in cell phones and all other hand-held electronic devices, cordless tools and appliances, cameras and toys) are also accepted by the household hazardous waste program. The program has put rechargeable battery collection boxes at the Fairfax County Government Center and each of the Board of Supervisors' offices, and program staff collects these batteries on a routine basis. A complete listing of collection locations is on the county website at: http://www.fairfaxcounty.gov/dpwes/recycling/mat-bat.htm.

Additionally, any person, business or other entity can use the services of Call2Recycle.org. This is an industry-funded product stewardship initiative where the manufacturer of a product known to contain hazardous constituents pays for the collection and appropriate disposal of the item at the end of its useful life. Program users sign up on-line and they will receive a cardboard box with a prepaid shipping label. The user fills the box with rechargeable batteries after being placed into individual plastic bags (to prevent arcing and potential fires in shipping). The user calls for pickup by UPS, which will send the container to a permitted hazardous waste disposal facility, as previously stated, at no charge to the user. The Solid Waste Management Program strongly encourages users of rechargeable batteries to use this free program to responsibly manage their batteries.

7. Remote Household Hazardous Waste Events

As an adjunct to the permanent household hazardous waste facilities, and as described in the Solid Waste chapter of this report, the Solid Waste Management Program continued the remote HHW program in FY 2012, with four events scheduled and paid for by the Solid Waste Management Program. Similarly, three hazardous waste collection events targeted for businesses were also conducted. EQAC commends the county for finding the resources to continue these events and urges the county to continue to schedule and publicize at least three to five of these events per year in the future.

In FY 2013, the eleven Electric Sunday events were held monthly (except December) to provide residents with opportunity to properly manage and recycle their obsolete electronics including televisions. Over 1.3 million pounds of electronics were collected for recycling. To better serve residents throughout the county, three events are now held at the I-95 Landfill complex, with the remaining eight held at the I-66 Transfer Station complex. (16)

8. Fluorescent Lights

Americans bought 290 million compact fluorescent light bulbs in 2007--this information comes from the Association of Electrical and Medical Imaging Equipment Manufacturers' website, and the same statistics are still there. That's 20 percent of all light bulbs sold in the United States and almost double the sales from a year earlier. (13) Compact fluorescent light bulbs have become popular for residential use due their energy savings potential. Sales of incandescent light bulbs began to be phased out in 2012. (10) However, the compact fluorescent light bulbs contain minute quantities of mercury, which classify them as household hazardous wastes when they are disposed. These types of lights are accepted from residents for proper disposal at both of the county's HHW facilities. Fluorescent lights are also collected during Electric Sunday events.

Small businesses that generate less than the regulated quantity of fluorescent lights may bring them to the business hazardous waste collection events. Other larger businesses that generate regulated quantities of these materials must comply with federal and state regulations regarding their proper disposal or recycling of the lights (11).

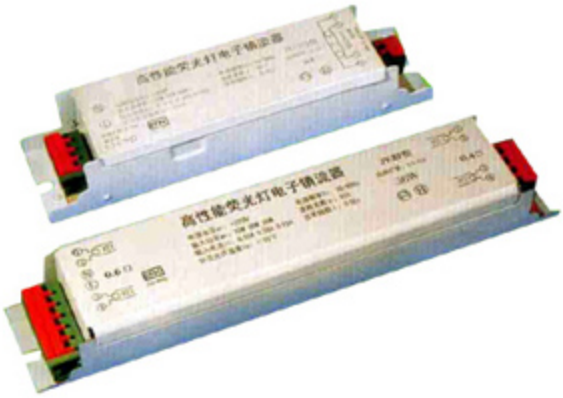
The following Fluorescent Bulb Reference Guide has been taken from a website from the Northern Virginia Regional Commission's and Northern Virginia Waste Management Board's "KnowToxics" campaign. (15)

Fluorescent Bulb Reference Guide

- Any bulb with the (Hg) symbol **cannot** be disposed of in the trash
- These bulbs contain mercury and must be reclaimed or recycled through an appropriate facility
- The following table shows a sample of typical fluorescent and High Intensity Discharge bulbs that contain mercury and the names often used for them:

Type of Bulb	What it might look like...
Fluorescent tubes: This includes 4-footers, 8-footers, T-12s, and T-8s	
Low mercury "green tips"	
High intensity discharge (HID)	
Compact fluorescents	
Neon	

U-tubes	
Circulars	
Mercury vapor	
High pressure sodium	
Low pressure sodium	
Ultraviolet	

Electronic Ballasts	

A brochure about the value of using fluorescent lights and how to recycle them is available on Fairfax County's website. The brochure's instructions on how to handle a broken compact fluorescent light bulb are consistent with the guidelines given by the Environmental Protection Agency including sealing the broken material in two plastic bags and placing outside with the regular trash collection. However, Maine's Department of Environmental Protection did a study in 2008 comparing clean-up methods and warned that the Environmental Protection Agency's recommendation of plastic bags was the worst choice, as vapors well above safe levels continued to leach from the bags. Maine's Department of Environmental Protection now recommends a sealed glass jar as the best repository for a broken bulb. Whether disposing in plastic bags or glass jars, if vapors above safe limits are still present when disposed of with regular trash, can this lead to potential problems in the future? Disposing of these light bulbs is also being looked at by other areas of the country, including crushing the light bulbs in a machine that uses negative pressure ventilation and a mercury-absorbing filter, and in the northwest part of the United States households have the option of disposing these light bulbs in the same way they dispose of other solid waste. (14)

9. Pre-Disaster Recovery Plan

Much of the following discussion has been taken from a county website addressing the development of a Fairfax County Pre-Disaster Recovery Plan (http://www.fairfaxcounty.gov/oem/pdrp/).

Fairfax County is susceptible to a variety of natural hazards, including floods, hurricanes and tornadoes, as well as man-made hazards such as terrorist acts and accidental releases of hazardous materials. Some of these events have the capacity for catastrophic local and regional impacts. Following a major disaster, complex issues with impacts far beyond county government will arise. The local economy may falter due to supply-chain disruptions, infrastructure failures, business closures and/or inaccessible work-places. There will likely be population displacement, housing shortages and rebuilding issues and potential social and psychological impacts. While the effects of disasters are wide ranging and cannot be predicted, pre-event planning can position Fairfax County to recover from a major incident. Methodical, thoughtful pre-event planning can establish priorities, decision-making structures and procedures and recovery goals. These can focus and accelerate the recovery process during the stressful and often fraught post-disaster period.

A Pre-Disaster Recovery Plan will provide Fairfax County with a single reference for guiding policy and action during recovery from a significant natural or human-caused disaster. The plan will allow the government to support the private and nonprofit sectors as the community works together to restore the economic base, neighborhoods, social fabric and other elements over the long-term.

A draft Fairfax County Pre-Disaster Recovery Plan was released for public review and comment in November 2011. Included in the plan was an organizational structure and identification of roles and processes for a recovery agency. Several Recovery Support Function branches were identified within this structure, including a Natural and Cultural Resources RSF Branch. The PDRP outlines the structure of this branch as well as anticipated pre-disaster planning activities.

In January 2012, the Board of Supervisors endorsed a final Pre-Disaster Recovery Plan, and the plan was tested through a table-top exercise in February 2012. Approximately 85 people participated in this exercise; participants included representatives of county agencies, local nonprofit organizations and the Virginia Department of Emergency Management. An After-Action Report/Improvement Plan is available for review at http://www.fairfaxcounty.gov/oem/pdrp/ffx-pdrp-ttx-feb10-2012.pdf.

C. REPORTING ENVIRONMENTAL CONCERNS AND ISSUES

Environmental issues affect everyone living and working in the county. All environmental concerns and events negatively impacting the county should be reported. In past years, this chapter presented a list of contact information relating to environmental crimes. This list has been removed from this chapter and is now presented in the introductory section of this report, after the presentation of the "Scorecard."

D. LEGISLATIVE UPDATE

On December 19, 2007, the Energy Independence and Security Act of 2007 was signed. Among other things, this began the phase out of the incandescent light bulb from the U.S. market in 2012. Although this is not new legislation, its impact is beginning to result in an increase of household hazardous waste and will increase significantly in the next few years. (10)

E. STEWARDSHIP

What is considered hazardous materials has changed in recent decades. It used to be primarily industrial releases or transportation of chemicals used with industrial work. Hazardous material then came to include terrorist attacks, some household chemicals used for cleaning and chemicals used for yard work. Now hazardous material includes items that individuals use in everyday life such as rechargeable batteries for cell phones and power tools as well as the compact fluorescent light bulb. Proper management of discarded electronics has become an area of increasing concern. In response to this concern, the county implemented the Electric Sunday program and has diverted significant quantities of electronics from disposal to recycling. Stewardship for the storage, use of, and disposal of hazardous materials is no longer solely an industry issue; it now belongs to individuals and with more than a million individuals in Fairfax County, household hazardous waste will continue to increase.

F. COMMENT

1. FY 2010 budget reductions eliminated the Environmental Hazards Investigation Section of the Fairfax County Department of Health, which had provided valuable services by responding to complaints about mold, radon, asbestos and indoor air quality, managing the Tier II Reporting Program and assisting the Fire and Rescue Department and the Fairfax Joint Local Emergency Planning Committee with responses to hazardous materials incidents. Since 2010, these duties were supported

by two individuals, one of whom has retired and the other who is over-tasked and will retire in the near future. Many activities, such as active community outreach and a focus on mold, radon, asbestos and indoor air quality have had to be scaled back due to the lack of a dedicated position. EQAC feels that, in the future, when budgetary conditions allow, these functions should be restored, either within the Department of Health or within the Fire Marshal's Office.

G. RECOMMENDATION

None

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8. An example of Video on Demand from Fairfax County is the link to "Fairfax Joint Local Emergency Planning Committee Produces Shelter in Place Video" at http://166.94.9.135/news/2005/05167.htm

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ANNUAL REPORT ON THE ENVIRONMENT

CHAPTER VII

ECOLOGICAL RESOURCES

VII. ECOLOGICAL RESOURCES

This chapter summarizes the status of ecological resources and the actions of public agencies and stakeholder groups in the management and preservation of these resources.

A. ISSUES AND OVERVIEW

Open space and natural habitat continue to be reduced in Fairfax County, primarily because of development (both residential housing and commercial buildings) and road building. As this resource is reduced, increased emphasis must be placed on protecting, preserving and enhancing the remaining open space and natural habitat in Fairfax County.

Fairfax County contains a total of 227,883 acres of land (excluding roads and water). Of this total, 33,227 acres (14.6 percent) were in parks and recreation as of January 2012. Another 15,571 acres (6.8 percent) were vacant or in natural uses. This compares to the approximately 26,700 acres (11.7 percent) that were vacant or in natural uses as of January 2003. However, not all this acreage can be considered as open space that is valuable for natural habitat. First, the park acreage consists of active recreation (ball fields, etc.) as well as passive recreation (stream valley parks, nature centers, etc.) Ball fields, while greatly needed in Fairfax County, do not do much for protecting natural habitat. In a like fashion, much private open space consists of mowed areas and isolated trees (not woodlands). Again, this does little for protecting natural habitat. Both active recreation areas and private open space, however, if properly designed can help the environment by reducing storm water runoff (by allowing storm water to infiltrate into the soil).

Second, while vacant land is often wooded, this land is subject to development. Considering the continuing rapid pace of development in Fairfax County, much of this land will soon become residential space, office space, retail space, etc., and not provide much in the way of protecting natural habitat. In 1980, vacant land accounted for 32.2 percent of the total land in Fairfax County. By 1990, this had dropped to 19.5 percent and the figure was 6.2 percent as of January 2012.

Therefore, Fairfax County needs to undertake stronger efforts in order to protect, preserve, and enhance the environmentally sensitive open space in the county. These efforts should include the establishment of a countywide Natural Resource Inventory, followed by a countywide Natural Resource Management Plan. Additionally, the county needs an aggressive program seeking easements on privately owned environmentally sensitive land and, as opportunities arise, to purchase environmentally sensitive land.

Recently, two significant efforts have occurred that should help in the county's preservation and protection of natural resources. First, as reported in the 2004 Annual Report on the Environment, the Fairfax County Board of Supervisors adopted an environmental vision for Fairfax County – *Environmental Excellence for Fairfax County: a 20-Year Vision*. This vision cuts across all activities in Fairfax County and outlines

guidelines that hopefully will be followed in future planning and zoning activities in Fairfax County.

Second, as also reported in the 2004 Annual Report on the Environment, the Park Authority approved the Natural Resource Management Plan for park properties. Park Authority staff began revision of this agency Natural Resource Management Plan in fall 2012. The Park Authority staff will hold a public review in fall 2013 and hopes to adopt the revised Natural Resource Management Plan by January 2014. If this plan is implemented, improved preservation and protection of environmentally sensitive land should be the result.

EQAC continues to commend a number of organizations for their activities in protection, preservation and enhancement of environmentally sensitive areas. These organizations include: the Northern Virginia Soil and Water Conservation District, the Virginia Department of Forestry, the Northern Virginia Conservation Trust, Fairfax ReLeaf, the Fairfax County Restoration Project, the Fairfax County Department of Public Works and Environmental Services and the Fairfax County Park Authority and its staff. EQAC especially commends the Fairfax County Board of Supervisors for its vision and activities in environmental areas.

EQAC also commends those residents of Fairfax County who give donations and time to a number of county organizations involved in environmental activities. EQAC encourages such volunteer activity. The following paragraphs describing organizations' activities mention opportunities for such stewardship.

B. PROGRAMS, PROJECTS AND ANALYSES

1. The Fairfax County Board of Supervisors

In past years, this chapter of the Annual Report mentioned various organizations and programs supporting environmental efforts in Fairfax County. However, the Fairfax County Board of Supervisors, while mentioned many times, did not have a section in this chapter. This changed in the 2005 Annual Report when a section was included on the board. The actions and decisions of the BOS do affect the county's natural resources. These actions and decisions include land use planning and zoning, transportation planning, allocation of staff resources, etc. The BOS has enacted a number of policies that do benefit the environment and many of these policies are embedded in county ordinances and the Policy Plan. However, there never had been an overarching vision dealing with the environment. This has now changed. As reported in the 2005 Annual Report on the Environment, the BOS has now adopted such an overarching vision -- *Environmental Excellence for Fairfax County: a 20-Year Vision*. This vision is organized into six sections that cut across all areas in the county:

- Growth and Land Use.
- Air Quality and Transportation.

- Water Quality.
- Solid Waste.
- Parks, Trails, and Open Space.
- Environmental Stewardship.

Some recommendations in this document that impact ecological resources include:

- Create more community parks for active and passive recreation – open spaces with native vegetation to sustain local wildlife and to create areas for walking, meditating or bird watching.
- Continue to acquire open space before it is too late through direct purchase or conservation easements to create more trails, connect trails and provide passive and active recreation areas.
- Provide adequate resources to maintain and appropriately develop our parks for passive and active recreation.
- Encourage conservation easements for open space and trails either to private organizations, such as the Northern Virginia Conservation Trust and The Potomac Conservancy, or to government agencies like the Fairfax County Park Authority or the Northern Virginia Regional Park Authority.
- Encourage organizations, for example, those that work on stream monitoring and stream valley restoration, to involve schools and residents of all ages in their work.
- Encourage community-based watershed stewardship groups and help them to work with all stakeholders to protect, enhance and improve the natural resources, and hence, the quality of life in their watersheds.
- Establish an aggressive program of community groups to adopt natural areas such as parks, trails, and stream valleys.

The document can be viewed at:
http://www.fairfaxcounty.gov/living/environment/eip/bos_environmental_agenda.pdf

This document is very significant in its potential for protection, preservation, and restoration of the county's natural resources. EQAC continues to commend the Board of Supervisors for adopting this vision and for the steps it is taking to implement these recommendations.

2. Department of Public Works and Environmental Services

In past years, this chapter of the Annual Report included a section on Department of Public Works and Environmental Services. This section covered stream restoration projects and low impact development practices. However, this topic is also covered in the Water Resources chapter of this Annual Report and will not be repeated here.

3. Fairfax County Park Authority

The Fairfax County Board of Supervisors created the Fairfax County Park Authority in 1950, authorizing the Park Authority Board to make decisions concerning land acquisition, park development and operations. As a result, Fairfax County has a system of parks that serve a number of uses, including active recreation such as sports, historic sites and buildings and preserving environmentally sensitive areas such as forests and stream valley lands. For current information on the county's parks, visit the FCPA website at http://www.fairfaxcounty.gov/parks/.

a. Acquisition of Park Land by FCPA

Between July 2012 and June 2013, the Park Authority added 69 acres to its parkland inventory. This brings the parkland inventory to a total of 24,726 acres as of June 2013.

FCPA purchased the following properties:

- On June 4, 2013, the Park Authority purchased 1.2 acres of land from Southern Trust Mortgage LLC as an addition to Old Colchester Park and Preserve.

FCPA acquired the following property through transfers:

- On December 21, 2012, the Fairfax County Board of Supervisors transferred 9.5 acres to the Park Authority as an addition to Lincoln Lewis Vannoy.

- On March 18, 2013, the Board of Supervisors transferred 0.34 acres to the Park Authority as an addition to McLean Central Park.

- On May 29, 2013, the Board of Supervisors transferred 27.3 acres to the Park Authority adjacent to Autumn Willow Drive.

FCPA acquired the following property through donations:

- On December 21, 2012, the Park Authority received a 13.7 acre addition to the Paul Spring Stream Valley Park from Mr. John McPherson, Jr.

- On December 21, 2012, the Park Authority received an 8.9 acre donation from the Kings West Swim Club, Inc. for the creation of a new park named Rabbit Branch Park.

FCPA acquired the following property through dedications:

- On March 26, 2013, MHI-Huntington LLC dedicated 6.4 acres to the Park Authority as an addition to Huntington Park.

- On April 30, 2013, Georgelas-Tysons Metro west LLC dedicated 1.2 acres to the Park Authority as an addition to Raglan Road Park.

FCPA did not acquire any properties during this period through land exchanges.

b. Natural Resource Management Plan

In past reports, EQAC recommended that the Fairfax County Board of Supervisors develop and implement a countywide Natural Resource Management Plan. EQAC noted that in order to do this, two tasks need to be accomplished first: complete a countywide baseline natural resource inventory; and adopt a unified natural resource conservation policy.

EQAC's past recommendation on developing a countywide Natural Resource Management Plan has been partially fulfilled by FCPA. On January 14, 2004, the Park Authority Board approved the Natural Resource Management Plan for Park Authority property. The NRMP contains seven elements:

- Natural Resource Management Planning.
- Vegetation.
- Wildlife.
- Water Resources.
- Air Quality.
- Human Impact of Parklands.
- Education.

The complete NRMP can be viewed at http://www.fairfaxcounty.gov/parks/nrmp.htm.

Some of the highlights of FY 2012 included:

- Natural Resource Management Planning Program
  - There were significant staff changes in the Natural Resource Management and Protection Branch in the last year: In January 2012 the branch manager position was vacated and subsequently filled in March 2012. The Senior Natural Resource Specialist position was vacated and filled in April. Both of these positions were filled through promotion. The Natural Resource Specialist Position was vacated in April 2012 and was filled in September 2012.
  - It is estimated that, under the 2004 Natural Resource Management Plan, it would cost $8 million per year and require dozens of staff to fully manage natural areas on parkland. This includes $3.5 million for natural resource management as well as $4.5 million per year for an invasive plant removal program.
  - Staff began revision of the agency Natural Resource Management Plan in fall 2012 with significant input from stakeholders, including the

Environmental Quality Advisory Council. A 65 percent draft revision was presented to the Park Authority Board and stakeholders in May 2013. Staff will hold public review in fall 2013 and hopes to adopt the revised NRMP by January 2014. EQAC anticipates that the revised plan will still need a similar amount of money to fully implement the plan.

- Staff continued to promote the concept of natural capital to include: (1) incorporation into the agency's revised Natural Resource Management Plan and strategic plan; and (2) support for resource management funding efforts, including a commitment for the use of bond funds for natural resource management.

- Policy and Best Practices
  - Staff drafted a parkland ranking protocol to prioritize natural areas by resource quality and sensitivity. The protocol was applied on two park planning projects: Old Colchester Park Natural Resource Management Plan; and Riverbend Park Master Plan. Ultimately, protocol development will involve the capture and analysis of ecological data in a geodatabase using ArcGIS 10. Agency staff will work to adopt the protocol as standard practice in FY15.

- Resource Assessment and Planning
  - Implementation of the Non-Native Invasive Plant Assessment and Prioritization protocol continued. Over 2,000 acres of parkland have been assessed with the NNIAP protocol. This is an increase of 1,300 acres from last year.
  - Staff provided training on Resource Management Division sites so that simple natural resource plans can be developed (called Natural Resource Action Plans).
  - A study began in May 2012 to assess impacts of radio-controlled aircraft on breeding birds at Poplar Ford Park; this study is being done in partnership with Dr. Andrew Dolby of the University of Mary Washington.

- Resource Management
  - The seventh year of the Invasive Management Area program was completed in 2012. The program has 40 active sites and in calendar year 2012, 2,160 volunteers donated 5,472 hours of work in support of habitat restoration at IMA sites. This is the greatest number of volunteers and volunteer hours since IMA began.
  - Over 580 trees and shrubs were planted on parkland in calendar year 2012.
  - Restoration of 750 linear feet of Wakefield Run in Wakefield Park should be completed by winter 2013-2014. The project is a partnership among the Park Authority, the Northern Virginia Soil and Water Conservation District, DPWES Stormwater and others. Initial funding came from compensation funds from the Virginia Department of Transportation for land taken from the park for the I-495 Express Lanes project. The bulk of the funding is coming from DPWES Stormwater, and a $35,000 contribution from

Virginia Dominion Power and a $5,000 grant from Fluor-Lane. The Friends of Accotink Creek has been an important project partner for education and outreach. NVSWCD is the project lead for design and construction.

- Natural resource management is underway at Old Colchester Park and Preserve. Significant resource inventory and planning resulted in a contractor-developed Natural Resource Management Plan. A non-merit staff member was hired in 2012 to oversee implementation of this plan. Fairfax Master Naturalists and other volunteer partners have assisted in resource management activities and a managed deer hunt was held in winter 2012-2013. The Park Authority Board committed $320,000 from the Vulcan Quarry fund dedicated to Old Colchester for the natural resource management plan implementation in FY14-FY16.
- In January 2012, the Park Authority Board committed $340,000 to conduct a multi-year pilot study to develop a landscape-scale forest management model at Ellanor C. Lawrence Park. The project began in May 2012 and will run through 2014. A project logo was developed: Helping Our Land Heal: a Natural Capital Stewardship Model. Staff has completed initial assessments with the assistance of partners (including the Virginia Department of Forestry) and has begun resource management efforts.

- Collaborations—The Fairfax County Park Authority:
  - Continued to collaborate with the Virginia Department of Forestry on a number of initiatives to include two deer browse exclosures at Huntley Meadows and Riverbend Parks, forest ecology outreach education and the Park Authority's prescribed burn management program.
  - Worked with the Virginia Department of Agriculture and Consumer Services and Virginia Department of Forestry to collaborate on biocontrol for mile-a-minute, a non-native, invasive plant.
  - Continued partnership with Earth Sangha, a local nonprofit organization.
  - Worked with the county Wildlife Biologist to train a diverse group of residents, business community members and public staff on Wednesday, April 6 to correctly oil Canada Goose eggs. The content of the training session was similar to that delivered in previous years by county staff and by volunteers from Geese Peace.
  - Collaborated with the Northern Virginia Soil and Water Conservation District to: coordinate and provide support for numerous stream clean up locations for the Potomac Watershed Clean Up; assess stormwater facility performance at Ossian Hall and Patriot Parks; construct a rain garden at the Packard Center; design stream improvements at Wakefield Park; and review Park Authority and external projects to improve design and water quality benefits.
  - Worked with Department of Public Works and Environmental Services to: provide input for the county's Municipal Separate Storm Sewer System permit implementation and annual report; provide input on the final five watershed management plans; review and coordinate stream stabilization and pond retrofit projects on parkland; and act as a liaison for stream

assessments, development plan review, permitting for IMA and Earth Sangha projects in Resource Protection Areas, relocation of fish from Huntsman Lake to Lake Mercer in advance of lake dam repair and dredging and restoration plan development and installation for construction projects on parkland by the Park Authority and others.
  - Continued participation in the Fairfax County Restoration Project as a member of the Leadership Team.
  - Continued coordination and support for Audubon Society of Northern Virginia research efforts to include the annual Christmas Bird Count and Breeding Bird Survey.
  - Worked closely with staff from the Virginia Department of Game and Inland Fisheries on deer management, Walney Pond and Lake Accotink fishery assessments, renovation of Burke Lake dam and relocation of fish from Brookfield Pond in advance of construction activities.

- Stewardship and Education—The Fairfax County Park Authority:
  - Continued working with volunteers and local media to educate residents about non-native invasive plant issues on and off park property.
  - Published the latest stewardship brochure, "Family Backyard."
  - Developed a new portable exhibit on backyard wildlife.
  - Continued, though its Stewardship Education Team, outreach efforts and launched an awareness campaign about Family Wildlife-friendly back yards, including an outreach in each district of Fairfax county.
  - Continuation of participation in the Envirothon program for high school students and in the Master Naturalist programs in Fairfax and Arlington counties.
  - Renewed partnership with Fairfax County Public Schools and George Mason University for providing meaningful watershed education experiences in Fairfax County parks. Over 4,000 seventh graders attended the programs by FCPA staff, and that many or more attended the GMU-run program at FCPA sites.

The Park Authority made a great step forward with the adoption of the NRMP. Additionally, as the above paragraphs show, the Park Authority continues moving toward implementation of the plan. However, more resources (people and funds) need to be devoted to the implementation of the plan, and it is anticipated that more resources will also be needed to implement the revised plan. Furthermore, inventories of all parks need to be accomplished. The inventory needs to be extended to cover all of Fairfax County so that future planning for acquisition of sensitive lands can take place.

Unfortunately, insufficient staffing and funding are limiting implementation of the NRMP. The Fairfax County Park Authority staff lacks a number of functions and capabilities in regard to the NRMP: natural land managers; ecologists; restoration specialists; water resource specialists; wildlife specialists; planners; and project

managers. EQAC supports increased funding for this purpose. Resources devoted to the protection of the environment need to be increased.

c. Status of green infrastructure/natural resource mapping efforts

The goal of this project is to develop a framework for modeling ecologically-significant resources to support land use and development decisions in Fairfax County. This information will also be used as needed by FCPA to provide for informed land acquisition decisions as well as to support park planning processes. The successful achievement of this effort will satisfy a long-standing EQAC recommendation.

This project, conducted by PlanGraphics, Inc. in partnership with George Mason University, was completed in December 2009. The final product includes an assessment of other green infrastructure and natural area models; evaluation of existing data; and recommendations for model options including costs of development and data acquisition. Development of the model for the entire county will be considered based upon results of this study and availability of funding. The ideal model would cost up to $2 million and requires dedicated technical staff and funding for model and data maintenance.

Initial work on the creation of a natural resource protection zone model has begun. Current work focuses on implementing more robust field data collection techniques along with the digitizing of previously collected data to build a geodatabase of spatial natural resource information. An initial model utilizing readily available county data is under development with a more refined version planned once more detailed data have been collected in the field.

d. Invasive Plant Control Efforts

Invasive plants are a problem because they can out-compete and replace native species. This change in vegetation disrupts the life cycles of many flora and fauna that depend on native vegetation. The Park Authority's Strategic Plan includes a strategy to develop invasive plant guidelines for consideration by the Environmental Coordinating Committee as a countywide standard.

Invasive plant control projects occur at over 56 park sites throughout the county. The Resource Management Division's nature centers, such as Ellanor C. Lawrence Park, Huntley Meadows Park and Riverbend Park also work collaboratively with the Invasive Management Area program to remove the most highly invasive plant species from selected areas of parkland.

The partnership with Earth Sangha, a local nonprofit organization, continues to be a highlight of invasive plant control efforts at both the Marie Butler Leven Preserve and Wilburdale Park. In addition, in 2012, Earth Sangha donated native plants to restore areas previously controlled for invasive plants throughout the Park

Authority. Overall, Earth Sangha contributed thousands of volunteer hours to park projects.

The Invasive Management Area program began its eighth year by celebrating Take Back the Forest in April and May 2013. During those two months, over 700 volunteers logged 1,700 hours. The Take Back the Forest program won first place in the Special Event category and Best in Show for all government programs at the 2013 annual conference for the National Association of Government Communicators. Take Back the Forest was funded for a second year with a $15,000 grant from REI. Take Back the Forest encompassed other special events such as Global Youth Service Day, Virginia's Annual Invasive Plant Removal Day, Earth Day and Arbor Day.

The IMA program continues to capture the enthusiasm of volunteers for unstaffed parks. There are currently 37 sites with 40 active volunteer leaders. Over 25,000 volunteer hours have been contributed to the IMA program since its inception in 2005. On average, more than 3,000 volunteer hours are donated by approximately 1,000 participants a year. The program works on plots of parkland, typically less than one acre in size, to remove priority invasive species and restore native vegetation where needed. Significant reductions of non-native invasive species at program sites have been documented, with an average of a 24 percent reduction in cover. Extensive training of volunteer leaders, careful selection of sites and species and a coordinated plan of environmental monitoring will allow program partners to continue to learn from this project. At a minimum, invasive species removal should be planned on three year cycles, with the first three years including aggressive removal and pesticide use if necessary so that following years' management can be at a maintenance level. A short summary is available: http://www.fairfaxcounty.gov/parks/resource-management/IMA/IMA-annualrpt.htm

The Early Detection Rapid Response volunteer program, a program to detect new non-native invasive plant populations, surveyed over 200 acres in 130 hours at 15 parks.

An outgrowth of the Invasive Management Area program has been the state-wide Invasive Plant Removal Day. On May 5, 2013, the IMA program participated in the fifth annual statewide event and one countywide event. Events were held at nine IMA sites, with 80 volunteers participating. These volunteers logged 175 hours and collected 66 bags of invasives.

Staff contracted with Invasive Plant Control, Inc. to apply selected and careful herbicide treatments for the removal of invasive plants. IPC treated 450 acres of parkland from January to December 2012. This included both areas where volunteers provided the manual removal of priority species and areas that had been treated during the previous year.

The Non-Native Invasive Plant Assessment and Prioritization project was completed in 2009. This project took a hands-on approach to the non-native invasive species issues as they occur in Fairfax County. Products of the plan include an assessment and prioritization tool kit, 12 best management practice recommendations and an operations plan for how to continue to make progress with managing non-native invasive species. This plan is fully benchmarked and annotated, creating a defensible strategic plan that will allow for prioritization of where and what are needed for invasive management in Fairfax County. At several training sessions, NRMP staff has shared the assessment and prioritization tool kit with other natural resource managers from Anne Arundel County, Maryland, Arlington County, Virginia, the City of Bowie, Maryland and Loudoun County, Virginia. During summer 2012, two interns were hired and surveyed over 1,000 acres of parkland using the NNIAP, and approximately 2,000 acres have been surveyed to date.

A critical component of any invasive control effort will always be outreach and education. A field guide, *Non-Native Identification and Control*, was published in 2008 and is now available for sale. Over 500 copies of the books have been sold or provided to partners free of charge. The full color, 150+ photographs help the reader determine if they have a non-native invasive plant and what to do about it. The book was recognized with the highest honors by the Communicator Awards and the MarCom Awards.

Staff continues to work with partner organizations: Earth Sangha; Northern Virginia Soil and Water Conservation District; Virginia Department of Forestry; Virginia Cooperative Extension; Fairfax ReLeaf; Northern Virginia Conservation Trust; the Virginia Native Plant Society, Pawtomack Chapter; Fairfax Master Naturalists; DPWES; and others to provide technical assistance regarding invasive species removal, and where possible, on-the-ground removal of invasives from parkland.

EQAC continues to commend the volunteers and the Park Authority staff who are cooperating in removing invasive species; however, an increased effort should be established using dedicated funds for this purpose.

e. Riparian and Bioengineering Projects

The Fairfax County Park Authority, along with and in partnership with other agencies, continues to work on stream stabilization/bioengineering projects. See the Water Resources chapter of this report for descriptions of these projects.

The Park Authority continues to maintain and monitor the previous riparian buffer enhancement projects installed in the last seven years. To date there are 35 projects on parkland throughout the county. These projects have focused on the conversion of mowed grass to areas of native trees and shrubs typical of riparian areas. In 2012, one of FCPA's partner organizations, Earth Sangha, maintained and enhanced

riparian plantings at Roundtree Park, Rutherford Park and Rocky Run (Awbrey Patent).

f. Environmental Stewardship

FCPA offers a number of opportunities for volunteers, and EQAC encourages county residents to take advantage of these opportunities. Information about these opportunities is available at http://www.fairfaxcounty.gov/parks/volunteer/. More information about FCPA and its programs is available at: http://www.fairfaxcounty.gov/parks/resources.

Many of the stewardship activities that occur on parkland could not take place without the efforts of many volunteers and partners. Groups and individuals participate in a wide range of volunteer opportunities in environmental stewardship on parkland, from becoming a permanent volunteer for the Park Authority to one-off events. In FY13, volunteers contributed over 26,000 hours to natural resource stewardship activities on parkland.

Specifically, volunteers engage in programming, leading walks and tours, writing fliers or brochures, answering the phone when a resident calls with an environmental question and/or hands-on resource management. FCPA partners with local agencies and nonprofits in two different annual stream clean-up events, although many individuals and friends groups participate in more regular clean-ups along certain sections of stream throughout the year. FCPA also has habitat restoration events, including invasive plant removal and native species planting that attract day participants and more committed volunteers, e.g. the IMA Volunteer Leaders. Wildlife monitors work on birds and salamanders and everything in between, often in coordination with a long-term wildlife monitoring program such as the Virginia Bluebird Society. The Fairfax Master Naturalists have taken on some of these projects or created new opportunities to contribute hundreds of hours to Park Authority sites. FCPA continues to offer many of its environmental stewardship opportunities for youth to get involved in their local parks to include as permanent volunteers, as students for their community service hours and scouts for Eagle and Gold Award projects. FCPA encourages its volunteers, be they individuals, groups, students or scouts, to propose ideas of how they can help steward the parks.

g. Fairfax County Park Foundation

Fairfax County residents can donate to the Fairfax County parks through the Fairfax County Park Foundation. The Fairfax County Park Foundation is a 501(c)(3) not-for-profit organization and donations are tax deductible to the fullest extent allowed by law. The foundation's mission is to raise funds to support the parks and land under the stewardship of the Fairfax County Park Authority. Less than half of the Park Authority's annual operating funds come from tax support. The foundation's goal is to bridge the gap between income from tax support and user fees and the

cost to operate, maintain and preserve the county's park system. Those interested in giving tax-deductible donations to the foundation can contact the foundation at:

Fairfax County Park Foundation
12055 Government Center Parkway
Fairfax, VA 22035
(703) 324-8581
SupportParks@aol.com
http://www.fairfaxparkfoundation.org/

4. Northern Virginia Regional Park Authority

Three Northern Virginia counties (Fairfax, Loudoun and Arlington) and three cities (Alexandria, Fairfax and Falls Church) participate in the Northern Virginia Regional Park Authority. NVRPA was founded in 1959 and owns and operates 25 regional parks and owns 11,236 acres of land throughout the region. It also holds conservation easements on 115 parcels covering more than 652 acres.

a. Acquisition

NVRPA's recent acquisition activities in Fairfax County include: the purchase, at below-market value, of 10 acres on the Potomac River in Great Falls for watershed protection; receipt of 1.8 acres of donated open space on Mason Neck adjacent to Pohick Bay Regional Park Golf Course; and finalizing a no-cost acquisition of the 20-acre Webb Sanctuary in Clifton from the Audubon Naturalist Society.

b. Planning & Development

NVRPA adopted a new Five Year Strategic Plan for 2012-2017, setting the agency's conservation and environmental priorities for the next five years, among other short-range objectives. The 2007 Strategic Plan included goals that envisioned the growth of parkland, and the result was that NVRPA grew by over 450 acres in the last five years. The 2012-2017 Strategic Plan is the result of a year-long process of assessing NVRPA's place in Northern Virginia and plotting a path for continued growth and improvement. It included input from the public and from leaders of NVRPA's member jurisdictions, NVRPA board members and staff from each NVRPA department, with a focus on the park needs surveys of residents in Northern Virginia.

One Strategic Plan Goal is to enhance natural resource conservation in riparian areas, with objectives of: protecting parklands along major waterways for watershed quality and to preserve plant and animal habitat; expanding riparian buffers by planting trees or creating no-mow zones along waterways to enhance water quality and wildlife habitat; using low impact techniques when developing new park facilities; and developing partnerships with conservation organizations and volunteer programs to provide greater stewardship of significant resources.

Another environmental goal is to actively assess opportunities to acquire additional properties, with objectives of: expanding public parkland to meet the open space and recreation needs of Northern Virginia's growing population; acquiring properties to meet NVRPA mission and land selection criteria with a focus on partnerships; and seeking opportunities to add new member jurisdictions where there are chances to preserve more land for the region.

c. Sustainability

The single use mountain bike trail at Fountainhead Regional Park experienced significant erosion and trail widening in many locations as a result of unsustainable alignments, steep grades, poor flow, overuse and riders going off the trail to find less challenging routes. In order for the Fountainhead mountain bike trail to maintain value as a recreational trail system, it became imperative to address design flaws and ongoing erosion. Working in partnership with the local mountain biking club Mid-Atlantic Off-Road Enthusiasts, in 2012 NVRPA applied for and was awarded a Virginia Recreational Trails Program grant to fund improvements to the advanced loop on its mountain bike trail at Fountainhead Regional Park. Improvements to the beginner and intermediate trail loops were completed in February 2012. Implementation of the advanced loop enhancements will complete the project. The new trail is designed using the International Mountain Bicycling Association sustainable trail building standards to route segments along contours with appropriate switchbacks, rather than running straight down slope without proper drainage controls. All new trail tread is out-sloped five percent, or when water flows down the trail for short lengths it is directed to a water diversion facility. The project includes filter strips, which are vegetated areas downslope of the trail corridor intended to treat sheet flows coming off the tread. Filter strips function by slowing down flow velocities, filtering out sediments and providing an opportunity for infiltration into the underlying soils. The project design includes grade reversals, in-sloped turns, armored fords, stone pitching, turf block pavers and terraces, and these techniques help keep water off the trail and riders on the trail to reduce erosion and enhance sustainability.

Pohick Bay Regional Park continued improvements on its trail system to protect the Pohick Bay tributaries and watershed, by restoring poorly designed trails and stream crossings and relocating unsustainable trail segments to maintainable areas. The work is being funded by a grant from the Bureau of Land Management, in partnership with improvement of its trail system at Meadowood Recreation Area across Gunston Road from Pohick Bay Regional Park. After a year-long planning process, implementation of the Pohick trail system rehabilitation began in 2012, with nearly 8,000 feet of trail being relocated to ecologically sound alignments. In addition, Sandy Run Regional Park sponsored an Eagle Scout project to make erosion repairs and install water bars on trails near the Occoquan Reservoir.

d. Vegetation Management

In 2012, NVRPA again partnered with Dominion Virginia Power for its "Trail Mix" community service program along the Washington & Old Dominion Trail; this program highlights environmental stewardship. The events featured invasive plant removal along the trail within Fairfax, Loudoun and Arlington Counties. NVRPA regularly offers invasive removal along the W&OD Trail as a Scout project option, along with the planting of butterfly gardens. A favorite area to work is near the Gallows Road intersection in Dunn Loring. The W&OD Trail staff selectively applies herbicides to the park's fence lines for invasive vines and woody plants such as tree of heaven, mile-a-minute vine and oriental bittersweet, allowing natives to fill in the gaps. Invasive plant control efforts also continued at Occoquan Regional Park, Bull Run Shooting Center and Meadowlark Botanical Gardens.

NVRPA co-sponsored, with Fairfax County's Urban Forestry Department, the county's "SpringFest" for Earth Day and Arbor Day at Occoquan Regional Park and the Lorton Workhouse. The Fairfax County Department of Public Works and Environmental Services is awarding NVRPA for its work on planting trees at Occoquan to increase the riparian buffer.

Pohick Bay Regional Park implemented a riparian project at the marina that included installation of rain gardens, native tree and grass plantings and other erosion control measures between the vending building and the shore launch. These tree planting efforts are part of implementing NVRPA's 2012 Strategic Plan initiatives.

Meadowlark Botanical Gardens and Pohick Bay Regional Park continue cooperative programs with the Audubon Society of Northern Virginia and the Northern Virginia Bluebird Society on topics including birding, native plant culture and gardening with deer.

e. Environmental Education and Outreach

NVRPA continues to have a roving park naturalist regularly visit the high-attendance parks such as pools, campgrounds and golf courses, bringing live wildlife and other exhibits and providing programming about nature and the environment. The naturalist also attends events and functions such as the Dominion W&OD Trail Mix, the Walter Mess 5K race and the Friends of the W&OD 10K race.

In 2012, the Northern Virginia Regional Park Foundation gave grants through its Nature Nuts Program to 11 Fairfax County public schools for children to attend environmental education camps at Hemlock Overlook Regional Park. Adventure Links at Hemlock Overlook Regional Park in Clifton offers a variety of outdoor and environmental education, team development programs for public and private schools, religious and community groups, sports teams, corporations and

professional organizations, as well as local, state and federal government and military agencies. Also in 2012, Meadowlark partnered with the Volgenau Foundation to provide teacher training and student field trips to Meadowlark Botanical Gardens and Potomac Overlook Regional Park. These trips focus on the natural history of the Potomac River basin, conserving native plants and animals.

The Park Authority partners with REI's adventure school, introducing people to the outdoors at Pohick Bay, Hemlock Overlook and Fountainhead Regional Parks. The Park Authority's naturalists hold regular educational canoe and kayak trips at Pohick Bay, and the roving naturalist conducts environmental programs at Meadowlark Botanical Gardens as well as at Bull Run and Pohick Bay Regional Park campgrounds. Potomac Overlook Regional Park and W&OD Trail staff hosted booths at various County fairs to give environmental information to the public

f. Stewardship

Occoquan Regional Park hosted two clean-up events on the Occoquan River and added five new recycling bins at its picnic shelters and boat ramp. Fountainhead and Bull Run Marina were host sites for the Friend of the Occoquan clean-up days, removing dozens of bags of trash from the reservoir area. At Sandy Run Regional Park, rowing crew teams took part in water clean-up days, removing trash from the Occoquan Reservoir around Sandy Run. New trash cans were installed at Fountainhead and the W&OD Trail to prevent tipping and foraging by wildlife.

Environmental stewardship opportunities for volunteers are available at Meadowlark Botanical Gardens, Potomac Overlook Regional Park, Upton Hill Regional Park, Pohick Bay Regional Park and various other parks on occasion. NVRPA implemented a program that allows youth to access its fee-based park facilities through volunteer service. It has a wide variety of community partnerships in place that encourage groups to take advantage of the regional parks for environmental and historic education and service projects. More information can be found at http://www.nvrpa.org/park/main_site/content/volunteer. For current information about the Northern Virginia Regional Park Authority, visit its website, http://www.NVRPA.org/.

5. Fairfax ReLeaf

Fairfax ReLeaf is a nonprofit (501(c)(3)), non-governmental organization of private volunteers who plant and preserve trees in Northern Virginia, preserve native habitat and educate the public about the benefits of trees. Staff and volunteers appreciate and support the county's goals to increase the tree cover in Fairfax County.

Tree plantings:

- Improve the appearance of roadways, parks, schools and private land in Fairfax County.
- Improve air quality.
- Reduce heat island effects.
- Reduce noise.
- Preserve human and wildlife habitats.
- Reduce energy use.
- Reduce surface runoff and improve water quality.

Fairfax ReLeaf planted and distributed 6,720 trees in calendar year 2012. Nearly 1,000 volunteers spent over 2,500 hours planting tree seedlings, removing invasive species and maintaining planting sites. Highlights of the organization's 2012 plantings were:

- The planting of 1,860 trees in riparian area.
- The planting of 1,680 trees on homeowner association and private property.
- The planting of 768 trees in parks, including private, county and national parks.

Fairfax ReLeaf provided many opportunities for community groups to serve Fairfax County in 2012. These included 10 Lions Club events, five Eagle Scout projects and three school group plantings. ReLeaf led four corporate workdays, where employees from workplaces such as Nodal Exchange, Northrop Grumman, Level Three and Winchester Homes gave their time to improve Fairfax County. Fairfax ReLeaf also conducted two workshops to prepare individuals to lead plantings.

In 2013 Fairfax ReLeaf will continue its park and homeowner association plantings while increasing partnerships with agencies such as Northern Virginia Soil and Water Conservation District and Fairfax County Stormwater Planning Division.

Fairfax ReLeaf offers a number of opportunities for stewardship. For further information on Fairfax ReLeaf, visit its website at http://www.fairfaxreleaf.org. The organization can be reached at:

Fairfax ReLeaf
12055 Government Center Parkway
Suite 703
Fairfax, VA 22035
Telephone: (703) 324-1409
Fax: (703) 631-2196
Email: trees@fairfaxreleaf.org

6. Northern Virginia Conservation Trust

Past EQAC reports recommended that the Fairfax County Board of Supervisors form public-private partnerships for the purpose of obtaining easements on environmentally sensitive land. EQAC pointed out that entities such as The Nature Conservancy use easements very successfully as a way of protecting environmentally sensitive properties. With the signing of a Memorandum of Understanding on June 20, 2001 between the Fairfax County Board of Supervisors and the Northern Virginia Conservation Trust, such a public-private partnership now exists. The partnership is now in its 11th year.

NVCT was founded in 1994 as the Fairfax Land Preservation Trust. In 1999, the trust changed its name to The Northern Virginia Conservation Trust to better reflect the regional scope of the service area. NVCT is a 501(c)(3) nonprofit land trust dedicated to preserving and enhancing the natural and historic resources of Northern Virginia. NVCT also has formed public-private partnership with Arlington County and the City of Alexandria and owns properties or easements in Arlington, Fairfax, Loudoun, Prince William and Stafford counties and in the cities of Alexandria and Fairfax. NVCT was one of a handful of the first land trusts accredited throughout the country by the Land Trust Accreditation Commission.

NVCT began a restructuring of its staff in late 2012 in order to better use its resources to accomplish its goals of implementing its Strategic Plan, protecting land with conservation value and connecting existing green spaces to the extent possible. NVCT's new Executive Director, Peggy Stevens, reported for duty on August 5, 2013. Peggy comes to Northern Virginia after five years as Executive Director of the Westport Land Conservation Trust, serving a coastal farming community in southeastern Massachusetts.

From the time NVCT accepted its first easement in 1999 through June 2012, NVCT has preserved over 685 acres of open space in Fairfax County through easements, fee simple ownership and partnerships. While no new acreage has been added since the last Annual Report on the Environment, NVCT has several ongoing projects in Fairfax County, including a trails project in Clifton and an extensive property known as Belmont Bay in the southern area of the county. In total, NVCT has over 500 acres in the pipeline in Fairfax County – all at some stage of discussion with owners who are willing to place easements on their properties. NVCT continues to seek new opportunities as well. Working with the Department of Planning and Zoning, the Park Authority, the Board of Supervisors and other conservation organizations, NVCT is committed to finding and working with conservation-minded landowners to increase the long-term "green footprint" in Fairfax County.

Tables VII-1, VII-2 and VII-3 provide details on the existing properties. Figure VII-1 presents a map of these properties.

Table VII-1. Easements Obtained by the Northern Virginia Conservation Trust

District	Location	Acreage	Recordation
Braddock	Annandale	2.6	5/28/2004
Dranesville	Great Falls	5.6	12/1/2000
Dranesville	Great Falls	5	12/22/2005
Dranesville	Great Falls	14.07	7/3/2003
Dranesville	Great Falls	4.2	12/22/1999
Dranesville	Great Falls	5.1	8/14/2001
Dranesville	Great Falls	5	12/28/2000
Dranesville	Great Falls	5	7/18/2001
Dranesville	Great Falls	5	8/14/2001
Dranesville	Great Falls	24	12/28/2011
Dranesville	Clifton	5.3	5/27/2003
Dranesville	McLean	62.7783	11/20/2006
Dranesville	McLean	7.7717	11/20/2006
Dranesville	McLean	1.9	12/14/2005
Dranesville	McLean	41	12/27/2005
Dranesville	McLean	6	8/1/2002
Dranesville	McLean	5.03	12/18/2006
Dranesville	McLean	5.0	3/8/2011
Hunter Mill	Vienna	0.39	3/28/2003
Lee	Alexandria	3.98	1/8/2008
Mason	Alexandria	1.58	12/27/2002
Mt. Vernon	Lorton	33.73	5/18/2002
Mt. Vernon	Alexandria	0.4	
Mt. Vernon	Alexandria	0.92	6/20/2003
Mt. Vernon	Mason Neck	9	12/19/2003
Mt. Vernon	Alexandria	0.34	6/6/2005
Mt. Vernon	Alexandria	0.83	11/19/2008
Providence	Falls Church	1	4/14/2004
Providence	Falls Church	2.5797	3/10/2003
Providence	Falls Church	1.98	3/10/2003
Providence	Falls Church	1.56	3/10/2003
Providence	Falls Church	1.12	3/10/2003
Springfield	Springfield	0.87	10/30/2002
Springfield	Springfield	0.77	11/26/2002
Sully	South Riding	226	12/19/2003
Sully	Fairfax	1.51	7/17/2003
	Total	**4990**	

EQAC AR, E-mail from Whit Field, Vice President and General Counsel, Northern Virginia Conservation Trust, Fairfax County, Virginia, to Noel Kaplan, Department of Planning and Zoning, Fairfax County, Virginia, June 23, 2011.

Table VII-2. Fee Simple Properties Owned by the Northern Virginia Conservation Trust			
Property/District	**Location**	**Acreage**	**Recordation**
Clifton Property/Dranesville	Clifton	8.66	Gift 6/2003
Davenport/Pimmit Run/ Dranesville	McLean	1	Gift 8/2000
Mason	Springfield	0.001	Gift 3/2005
Little Hunting Creek/ Mt. Vernon	Alexandria	2.01	Gift 2002
	Total	**11.671**	

EQAC AR, E-mail from Whit Field, Vice President and General Counsel, Northern Virginia Conservation Trust, Fairfax County, Virginia, to Noel Kaplan, Department of Planning and Zoning, Fairfax County, Virginia, May 23, 2011.

Table VII-3. Land Turned Over to Local Government and Associated Acreage			
Property/District	**Location**	**Acreage**	**Recordation**
Bannister Outlots/Springfield	Springfield	0.6	12/2001
Pimmit Run Trail off Brookhaven		1.0	6/2008
	Total	**1.6**	
Assisted Acreage			
Property/District	**Location**	**Acreage**	**Recordation**
Turner Farm/Dranesville	Great Falls	17	1998/99
FCPA Elklick/Sully	South Riding	157	12/2003
	Total	**175.2**	

EQAC AR, E-mail from Whit Field, Vice President and General Counsel, Northern Virginia Conservation Trust, Fairfax County, Virginia, to Noel Kaplan, Department of Planning and Zoning, Fairfax County, Virginia, May 23, 2011.

NVCT also has a public outreach program. NVCT continues to be an active partner and initiator of public engagement to connect people to the importance of land conservation, both on the many reasons to protect land and the many ways to care for and manage land once it is protected. In October 2012, NVCT held a Landowner Workshop in the Fairfax County Government Center to educate Fairfax County landowners about the tax and other benefits of conservation easements and about NVCT's partnerships with the Northern Virginia Soil and Water Conservation District and the Audubon Society of Northern Virginia on backyard habitats. In February 2013, NVCT Board Chairman Pat Coady made a presentation about NVCT's efforts in the county to the Fairfax County Board of Supervisors' Environmental Committee, chaired

by Supervisor Penny Gross. In March 2013, Mr. Coady spoke to the Green Breakfast (sponsored by NVSWCD) about land conservation opportunities and potential tools (transfer of development rights, bequests and grants) in addition to conservation easements. In April 2013, NVCT participated at Fairfax County Earth Day, held at the Workhouse Arts Center in Lorton, and interacted with many Fairfax County residents about its conservation efforts. In May 2013, NVCT held a Landowner Workshop at George Mason University in Manassas--it was principally aimed at landowners in the area of the Bull Run headwaters, both in Fairfax and Prince William Counties, and included attorneys, conservation professionals and financial advisors. The themes were how conservation easements work, the background on how land trusts operate, forest conservation and the tax advantages (federal, state, and local) of properly formulated conservation easements. The full-day workshop afforded attendees four continuing legal education credits, as well as credits for foresters and financial professionals.

NVCT staff and several board members spoke to several homeowners' groups in Fairfax County during the year about our mission, how they might assist NVCT in locating land to protect, and reasons why landowners might consider conservation as an option for their property's future.

NVCT continued to be active in the area of invasive plant removal in Fairfax County and in general public education. Over 25 *explore and restore* events were held in Fairfax County during fiscal year 2013, usually in cooperation with one or more conservation organizations.

EQAC encourages all landowners whose property contains environmentally sensitive land such as wetlands, stream valleys and forests to consider contacting NVCT and learning more about easements. If these landowners grant easements, they will not only protect sensitive land, but can realize some financial benefits. A perpetual easement donation that provides public benefit by permanently protecting important natural, scenic and historic resources may qualify as a federal tax-deductible charitable donation. Under the Virginia Land Conservation Act of 1999, qualifying perpetual easements donated after January 1, 2000 may enable the owner to use a portion of the value of that gift as a state income tax credit. Fairfax County real estate taxes could also be reduced if the easement lowers the market value of the property.

As can be seen by the paragraphs above, NVCT offers many opportunities in stewardship for Fairfax County residents. Additional information on NVCT can be found on its website, http://www.nvct.org.

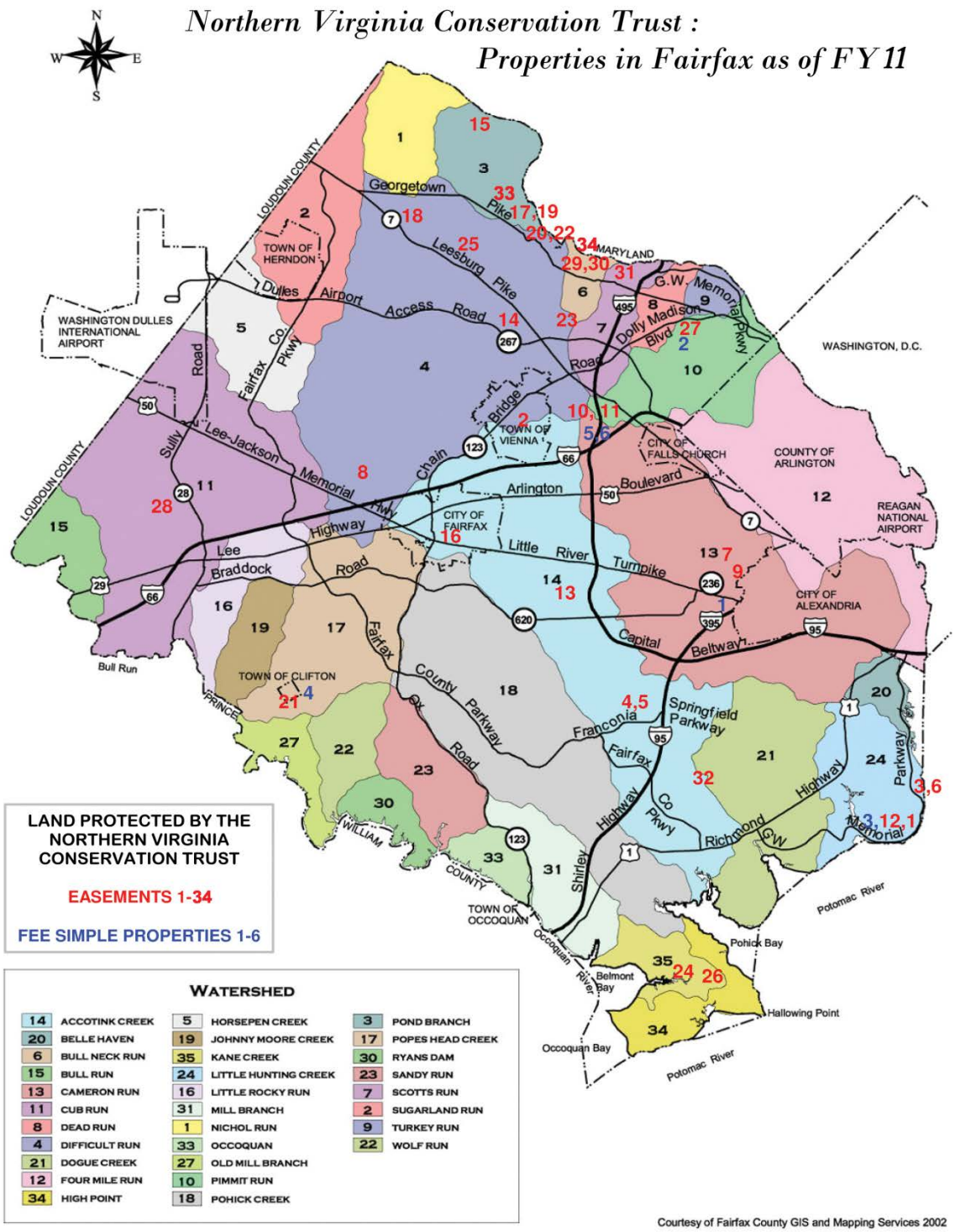

Figure VII-1. NVCT Properties in Fairfax County as of FY2011

EQAC AR, E-mail from Whit Field, Vice President and General Counsel, Northern Virginia Conservation Trust, Fairfax County, Virginia, to Noel Kaplan, Department of Planning and Zoning, Fairfax County, Virginia, May 23, 2011.

7. The Nature Conservancy

The Nature Conservancy has a very successful program of obtaining easements from property owners for conservation. Its program was the inspiration for EQAC's past recommendations for Fairfax County to seek conservation easements as a measure of protecting ecological valuable property. (This recommendation led to the public/private partnership with the Northern Virginia Conservation Trust mentioned above.) The Nature Conservancy does not hold any easements in Fairfax County at present; however, it owns one preserve (the Fraser Preserve) of approximately 233 acres on the Potomac River. For further information on The Nature Conservancy, see http://www.nature.org.

8. The Potomac Conservancy

Other organizations also hold easements in Fairfax County. This and the following paragraphs report on these organizations. One of these is the Potomac Conservancy. This organization was formed in 1993 by individuals concerned about inappropriate development, clear cutting and other activities that were beginning to have a negative impact on the unspoiled character of the Potomac gorge. This led to the formation of the nonprofit land trust now known as the Potomac Conservancy. The conservancy was incorporated on August 24, 1993 in Maryland as a nonprofit corporation. The conservancy is registered in Maryland, Virginia and West Virginia, and is an easement holder in Maryland's Conservation Reserve Enhancement Program.

The Potomac Conservancy currently holds easements of four properties in Fairfax County. These properties total 13.46 acres with 0.14 of that being river frontage. For further information on the Potomac Conservancy, see http://www.potomac.org.

9. The McLean Land Conservancy

The McLean Land Conservancy was formed to promote and foster the preservation, protection, conservation and balanced use of the McLean area's unique natural, cultural, recreational and historic resources. The conservancy's main objective is to preserve open green space.

MLC has worked to raise awareness of the value of protecting natural resources. A healthy balance of land use will maintain and enhance the character and quality of life in McLean, as well as the economic sustainability of the region in the face of rapid build-out.

MLC is a 501(c)(3) land trust organization that was incorporated in the Commonwealth of Virginia in January 2000 and recently became a "full-fledged" land trust in Virginia, with the ability to hold conservation easements. As a result, the conservation easements MLC identified and negotiated before July 2004 were deeded to Fairfax County, but with MLC assigned as the easement monitor.

MLC has concentrated on the preservation of riparian buffers on privately owned land. Successful projects include the protection of one acre adjacent to the headwaters of Four Mile Run, important because the health of the headwaters is critical to the health of a stream, and 2.77 acres on Pimmit Run in a pristine wooded area. These two easements are held by Fairfax County but monitored by MLC.

MLC holds a 16-acre conservation easement on Scotts Run in McLean. This important property is vital for the health of Scotts Run, which provides stormwater drainage for Tysons Corner.

10. The National Park Service

Another holder of conservation easements in Fairfax County is the National Park Service. NPS holds 38 easements covering 326.67 acres. A future Annual Report on the Environment will provide more details on these easements.

11. The Virginia Outdoors Foundation

The Virginia Outdoors Foundation was created by an Act of the Virginia General Assembly (Chapter 18 of Title 10.1) in 1966 and is both a state agency and an independent instrumentality. VOF is also a public foundation and can "…accept, hold, and administer gifts and bequests of money, securities, or other property, absolutely or in trust, for the purposes for which the Foundation is created." A good summation of the VOF legislative charge may be that it is steward of the natural and cultural heritage land resources of Virginia on behalf of present and future residents.

The primary mechanism for accomplishing VOF's mission is the perpetual open space easement. As of May 2013, VOF holds easements on nearly 675,000 acres in over 100 local jurisdictions across the commonwealth. These easements protect a wide variety of natural resources, including farm and forest land, natural areas, watershed areas, rural historic districts and the settings for historic homes, scenic views, lands adjacent to public parks and game preserves.

The Virginia Outdoors Foundation currently holds seven easements in Fairfax County as shown in Table VII-4.

Additional information about VOF can be seen at its website: http://www.vofonline.org/.

Table VII-4. Easements Held by the Virginia Outdoors Foundation in Fairfax County		
Original Donor*	**Acreage**	**Date Recorded**
Thayer	59.33	10/30/1969
American Horticultural Society	8.15	10/03/1978
McCormick-Goodhart	26.665	06/13/1988
McCormick-Goodhart	5.25	06/13/1988
McCormick-Goodhart	n/a	02/29/2000
McKee-Bennett	20.47	12/28/1990
Ridder and Andrews, Jr., trustees	7.858	12/23/1998
Total Acreage under Easement	**127.723**	

Source: *Virginia Outdoors Foundation*, Attachment to email, Virginia Outdoors Foundation, from Erika Richardson, Stewardship Specialist, Virginia Outdoors Foundation, Warrenton, Virginia, to Noel Kaplan, Department of Planning and Zoning, Fairfax County, Virginia, May 22, 2013.

***** Note that the original donors listed may not be the current landowner of record as the eased property may have been sold since the deed of easement was recorded.

12. Northern Virginia Soil and Water Conservation District

The Northern Virginia Soil and Water Conservation District continues to provide leadership in the area of bioengineering techniques in streambank stabilization and in the general area of erosion and stormwater control. NVSWCD works in partnerships with other agencies and organizations. For example, it has partnered with the Fairfax County Park Authority, Virginia Department of Forestry, the Fairfax County Department of Public Works, the Reston Association and the Friends of Accotink Creek.

The Little Pimmit Run II Stream Restoration was completed in early 2012. This project restored a total of 170 linear feet of eroded stream bank that threatened an exposed 21-inch sanitary sewer main in the northeastern part of Fairfax County. Building on an adjacent successful project, this stream restoration stabilized the stream bank and drainage channel using rock vanes, step pools, floodplain benching and revegetation. The funding for this project was a unique combination from Fairfax County and adjacent property owners. NVSWCD managed the design, permitting and construction, as well as the outreach and coordination with the community that facilitated the construction of the project.

Another effort in the Accotink Creek watershed involved another unique partnership among many county agencies, businesses, and the public. The Wakefield Stream Restoration project is a partnership among NVSWCD, Fairfax County Park Authority, Fairfax County DPWES, Dominion Virginia Power, Fluor/Transurban, the Friends of Accotink Creek, the Braddock District Supervisor's Office and the Mid-Atlantic Off-

Road Enthusiasts. Located within Wakefield Park, this 800 linear foot project begins at the outfall under I-495 and ends at the confluence of the creek with the mainstem of Accotink Creek. This highly unstable stream yields large amounts of sediment due to significant stream bed and bank erosion after storm events. To bring attention to the project and to the issues facing the watershed, the partners worked together to host a competition to name the creek and connect it to the broader community. Don Waye, a Burke resident, submitted the winning entry. The design is based on natural channel design concepts and includes a number of in-stream best management practices to provide stable bed and bank and habitat. The Fairfax County Park Authority engaged NVSWCD in coordinating the design. Fairfax County DPWES will pay for the majority of construction, with additional contributions made by Dominion Virginia Power and Fluor/Transurban. Construction is anticipated to begin in fall 2013.

NVSWCD received a grant from the U.S. Fish and Wildlife Service for an "In-Stream Structural BMP/Wetland Enhancement" project. The project is located in Huntley Meadows Park along Barnyard Run, in the Dogue Creek watershed. Due to streambed and bank erosion, Barnyard Run serves as a major source of sediments for the main Huntley Meadows wetland. The project includes four in-stream blockages along approximately 500 linear feet of Barnyard Run. It is designed and built to trap sediments from entering the main wetland and re-connect the stream to its floodplain during high intensity rainfall events. The blockages design was based on the structure of the existing natural blockages within Barnyard Run. The project was completed in February 2013. Over the next three years, NVSWCD will monitor the stream where these BMPs are located for stability and effectiveness. Annually, NVSWCD will prepare a longitudinal profile of the stream where these blockages are located

All of these projects were supported by local environmental groups and are examples of successful partnerships.

The Fairfax County Chesapeake Bay Preservation Ordinance and Agricultural and Forestal District Ordinance require land in agricultural use to have a soil and water quality conservation plan. In 2011, soil and water quality conservation plans were prepared for 96 parcels on 945 acres. These included 38,102 linear feet of Resource Protection Area, primarily stream buffers. All plans help landowners to comply with the county's Chesapeake Bay Preservation Ordinance.

NVSWCD provided technical assistance to the county's Code Enforcement Division and to a landowner by preparing a plan for a property cited for County Code violations. Technical assistance included the development of a reforestation plan to correct illegal clearing of a Resource Protection Area by the previous landowners. NVSWCD secured funding through the U.S. Fish and Wildlife Service to complete the project, which resulted in the planting of over 3,000 seedlings, shrubs, and grasses. Volunteers through Fairfax ReLeaf contributed their time toward the project as well.

NVSWCD designed built, or supported the implementation of two rain gardens in partnership with several agencies. In memory of late Sally Ormsby, a Northern

Virginia Soil and Water Conservation District board member, NVSWCD has designed and built a bioretention facility at Packard Center in Annandale Virginia. The rain garden is approximately 250 square feet and receives runoff from Packard Center roof, sidewalks and the surrounding lawn and controls 1.0 inches of rain during a storm event. The total area that drains into the rain garden is 4,150 square feet, with 1,150 square feet being impervious. The rain garden was a partnership among NVSWCD, FCPA, Merrifield Garden Center and Earth Sangha.

The Sidney Lanier Middle School rain garden is a partnership among Land and Waters Inc., City of Fairfax, Fairfax County DPWES Stormwater Planning Division and NVSWCD. The rain garden cell is located at a corner of the school's parking area next to Bevan Drive in City of Fairfax. Land and Water received a National Fish and Wildlife Foundation grant for to build the rain garden. The Rain garden, completed in June 2013, treats a drainage area of 16,000 square feet, mostly impervious. The surface area of the rain garden captures the first 0.5 inch of any rainfall event. The rain garden has been designed to enable students to use the rain garden for experiments on water quality. NVSWCD surveyed the site, designed the facility, prepared material and cost estimates, helped with selecting the contractor and helped with construction oversight.

NVSWCD's annual seedling program emphasizes the role of vegetation in preventing erosion, conserving energy and decreasing and filtering stormwater runoff. Seedlings planted in riparian areas also help to protect stream channel stability and stream water quality, as well as improving the surrounding habitat. This seedling program offered residents a package of native tree and shrub seedlings for a small cost. In spring 2013, a variety of 6,750 native seedlings were sold at a small cost to promote urban reforestation, habitat enhancement and water quality protection. The theme was Restore and Beautify Your Property, which offered a mix of sturdy trees that can withstand heavy storms, plants that provide screening and tolerate a range of conditions and some of our region's most beautiful native trees and shrubs. Packages included species of shrubs and small trees and packages of tree seedlings.

NVSWCD is the local sponsor of Envirothon, a hands-on competition among high school teams to demonstrate their knowledge of natural resources – forestry, soils, wildlife, aquatic ecology – and special issue topics, such as urban-rural interface and recreational stress on natural resources. In 2013, six teams of local high school students (representing Centreville, Langley and Marshall High Schools and Hidden Pond Nature Center) participated in the year-long training in soils, aquatics, forestry, wildlife, estuaries and a special topic, which this year was focused on stormwater management. The team from the Hidden Pond Nature Center swept the competition, winning the local, regional and state events. The team's success earned it a trip to the national Envirothon competition in Bozeman, Montana, where the team competed against teams from all 50 states and Canada. There, they placed 15th overall and first in the special topic of Pasture and Rangeland Management.

In 2011, NVSWCD began a new program to enable residents to build their own tumbler-style composters, using olive and pickle barrels, most of which had slight flaws

and could not be used for the rain barrel program. Throughout 2013, over 40 participants built frames using recycled wood, added a rod for rotating the barrel, drilled aeration holes and took home 30 composters.

At the bi-monthly Saturday morning Green Breakfasts, interested residents, county officials and agency staff, state legislators, students, members of the business community and representatives of local nonprofits and environmental groups discuss environmental topics, share information and network. Each breakfast begins with a presentation.

Conservation Currents, the NVSWCD quarterly newsletter, includes many articles related to ecological resources. In 2013, NVSWCD published three editions of *Conservation Currents*. Topics included: backyard chickens; stormwater ponds; energy efficiency and renewable energy; stream health; preventing fertilizer and pesticide pollution; wildlife conservation; and updates on NVSWCD and Fairfax County programs and activities. 2,200 copies are sent mainly to homeowners associations, which are encouraged to reprint articles in their newsletters. Copies are distributed to libraries and offices via the county courier system. There also is a growing list of e-subscribers, and many articles are posted on the NVSWCD website.

The county provided funding to NVSWCD to continue the expertise of a soil scientist. During the past year, the soil scientist has continued to facilitate the transition from the old to the new Fairfax County Soil Survey. Descriptions of all 119 soils have been published in the *Description and Interpretive Guide to NRCS Mapped Soils in Fairfax County*. The new soil survey has been integrated into the county's geographic information system. Maps showing soil types layered over county property maps have been created for each tax grid in the county. These maps are available to the public through the Digital Map Viewer on the county website. The soil survey information is also available online at two U.S. Department of Agriculture-Natural Resources Conservation Service websites: the soil map and tabular data are available at the Web Soil Survey website; and tabular data alone is available at the Soil Data Mart website. The tabular and map data available at the USDA-NRCS websites are much broader and more extensive than that found on the county website, but the data on the county website is more specific to the needs of Fairfax County residents and the maps include county property information.

A reformulation of the soil problem classes has been completed and applied to all soil types in the new survey. The new problem classes more closely resemble those used in Loudoun and Prince William Counties so as to cause less confusion for private industry. One major difference is that disturbed soils, which are mapped only in Fairfax County, have their own separate problem class.

The soil scientist and staff from DPWES are collaborating on updating codes and procedures, notifying industry and ensuring a smooth transition to using the new survey. The soil scientist has made presentations to several groups, including the Engineering Standards Review Committee, and, with Code Analysis staff, attended the

Planning Commission and Board of Supervisors meetings to answer questions regarding Public Facilities Manual revisions. In June 2011, the Board of Supervisors approved the new survey as the official Fairfax County Soil Survey.

The Soil Scientist also collaborated on minor revisions to the shrink-swell layer and the Marumsco soil layer and with erosion susceptibility ratings for Urban Land soils, which will be used by Site Inspection. He worked with the Health Department to make minor revisions to the asbestos soil layer. The newly digitized Fort Belvoir soils map was added to the county maps and uploaded to the county GIS. In May 2013, NVSWCD and DPWES collaborated to conduct a two-day *Field Soil Morphology Course* for professional engineers. Those who took the course and passed the certification are allowed to determine the water table year-round, using soil morphology. County guidelines were revised to reflect this new process.

The soil scientist continues to assist with providing technical assistance to homeowners, homeowner associations, the development and construction community and county staff on soils-related matters and on infiltration practices. During 2011, soils information was provided to 77 consultants, engineers, realtors and homeowners. Special infiltration studies were conducted for seven county and NVSWCD projects. Guidance on interpreting soils information continues. Also, technical assistance is provided to solve problems on both private and public lands.

Fairfax County and NVSWCD are members of the Potomac Watershed Roundtable, a regional government-resident forum founded in 2000 whose purpose is to enhance communication, collaboration and cooperation on environmental concerns, especially water quality issues and ecological resources, among the various local governments and stakeholder interest groups residing on the Virginia side of the middle and lower Potomac River watershed. Members include nine counties, five cities and towns, six soil and water conservation districts, two members of the General Assembly, Planning District Commissions, Water and Wastewater Utilities and representatives of several stakeholder interests – Environmental, Agriculture and Forestry, Fishing and Boating, Development, Construction and Real Estate, Waste Management and Recycling and Citizens of the Watershed. Fairfax County Supervisor Penny Gross serves as the current chair, and NVSWCD provides administrative support and financial administration.

The roundtable meets quarterly throughout the lower Potomac watershed to share technical information, strategies, programs and policies. Topics have included water quality and quantity, nonpoint source pollution, nutrients, stormwater regulations, land-use planning, best management practices, innovative techniques and land conservation. Topics in 2013 included: the Chesapeake Bay Commission; Oysterculture; Integrated Shoreline Evaluations; the Green Energy Triangle in Fairfax County; the Healthy Waters Initiative in Loudoun County; an overview of the Interstate Commission on the Potomac River Basin's work, Uranium Mining in Virginia; and Chesapeake Bay

Heritage and the Northern Neck. Information about the roundtable is available at www.potomacroundtable.org.

13. Fairfax County Wetlands Board

If you own property on the waterfront in Fairfax County, you may need a permit from the Fairfax County Wetlands Board before you build or make improvements on your property. These activities, known as land disturbing activities, often require a permit if done in an area that has been identified as a tidal wetland. Land disturbing activities that may require a permit from the Wetlands Board include the following:

- Any construction project on or adjacent to a tidal body of water.
- Any construction project in which fill material is placed in or near tidal wetlands.
- Projects designed to protect property adjacent to shorelines.

The Center for Coastal Resources Management of the Virginia Institute of Marine Science estimates that Fairfax County's tidal shoreline is approximately 111.85 linear miles. The county's tidal shoreline within the coastal plain extends from Cameron Run on the north, traversing south along the Potomac River and extending to the Occoquan Reservoir on the south where the tidal influence terminates at the dam.

The Wetlands Board jurisdiction is that area between mean low water and mean high water in non-vegetated wetland environment and between mean low water and the equivalent of 1 1/2 mean high water in a vegetated environment. Since 2010, after the Board of Supervisors adopted the beach ordinance, the Wetlands Board has also reviewed tidal projects which impact beach areas. Beach can extend beyond or it can be contiguous with non-vegetated tidal wetland area.

To assist localities in implementing the state policy which requires localities in Tidewater Virginia to incorporate coastal resource management guidance into the locality's comprehensive plan, the Virginia Institute of Marine Science has developed Comprehensive Coastal Resource Management Portal. The portal is designed to provide guidance and resources to local governments with implementing the "living shoreline" policy. To implement a state law, the Virginia Marine Resources Commission is working to create a general permit to encourage living shoreline approaches to shoreline stabilization projects that affect tidal wetlands. VIMS is planning education and outreach to local board members and staff on the use of the portal for decision-making guidance. The Wetlands Board welcomes VIMS's guidance and has adopted a living shorelines policy, available at http://www.fairfaxcounty.gov/dpz/environment/finallivingshoreline.pdf

On March 28, 2013 the Wetlands Board reviewed the status of the board's Mitigation Compensation Policy and funds and the Memorandum of Understanding that the Wetlands Board has maintained with the Northern Virginia Regional Park Authority to

hold the wetland mitigation compensation funds. The board's mitigation policy can be found at
http://www.fairfaxcounty.gov/dpz/environment/wetlands/mitigation_compensation_policy_adopted.pdf.
The board hopes to hold a public outreach meeting in fall 2013 to inform community members about the state law, wetlands ordinance, wetlands permitting and Wetlands Board policies and practices. The board is seeking Supervisor Gerry Hyland's help in organizing this meeting. The board hopes a public workshop will help educate shoreline property owners, contractors and the general public about wetlands permitting and hopes that this effort will encourage property owners to seek permits prior to tidal wetland disturbances

The Wetlands Board has received two permit requests for 2013. Those applications will be reviewed when they are complete. The Wetlands Board continues to work on several wetlands ordinance violations.

Board members have attended training workshops at the Virginia Institute of Marine Science in Gloucester, Virginia, other meetings and had a canoeing field trip in Little Hunting Creek in June. Wetlands Board Chair Glenda Booth was invited to be a member of the Virginia Institute for Marine Science Council and began service in June by attending her first meeting in Wachapreague, Virginia. Ms. Booth continues to participate on a committee established by the Virginia Marine Resources Commission to develop guidance for local wetlands boards to implement Senate Bill 964, now law, which directs VMRC to develop and implement a general permit to authorize and encourage the use of living shorelines as the preferred alternative for stabilizing tidal shorelines.

For further information, contact the Wetlands Board at:
Fairfax County Wetlands Board Staff
Department of Planning and Zoning, Planning Division
12055 Government Center Parkway, Suite 730
Fairfax, VA 22035-5504
(703) 324-1210
http://www.co.fairfax.va.us/dpz/environment/wetlands.htm

14. Virginia Department of Forestry

The Virginia Department of Forestry has provided forestry-related services in Fairfax County for over 60 years. VDOF is also participating in several efforts aimed at improving riparian zones. In these efforts, VDOF partnered with the Northern Virginia Soil and Water Conservation District, the Department of Public Works and Environmental Services, the Fairfax County Park Authority and Fairfax ReLeaf.

Despite continued difficulties with the commonwealth's budget, VDOF will continue to be able to provide technical assistance to Fairfax County in its environmental initiatives, but little in the way of direct material or funding support. Reduced competitive funding will be available through Water Quality Improvement Fund grants

to support riparian plantings and tree related storm water management projects. VDOF may also be able to support tree planting with donated seedlings.

The Virginia Department of Forestry is the lead state agency in meeting Virginia's riparian buffer commitments to the Chesapeake Bay Program. In 2006 Urban Tree Canopy goals were added to the Bay Program's buffer strategy, recognizing the diminished water quality value of riparian forests in urban areas where upland storm water is conveyed directly to streams and bypasses the riparian forest. One way to view it is that street gutters and storm drains are manmade extensions of the natural stream network, so all trees are effectively riparian trees. In 2011 the Virginia Department of Forestry provided project leadership and technical support to tree planting efforts in partnership with Elementary School Children, private landowners, Fairfax ReLeaf, and the Potomac Conservancy.

The Virginia Department of Forestry participates in the Fairfax County Arbor Day on the last Saturday in April each year. The county earned again, for the 30th year, the Tree City USA award. This award is given for having a planting plan, having a management plan, having a Tree Board/Commission and sponsoring an Arbor Day Celebration. The award is applied for by the Fairfax County Urban Forest Management Division and is given through the State Department of Forestry. Tree seedlings are distributed by VDOF to people attending the Arbor Day celebration. In 2012, 340 donated short leaf pine seedlings were distributed for planting by volunteers in their communities.

The Virginia Department of Forestry sponsored a drop-off site in Fairfax County for the Growing Native project. This project involves the collection of tree seeds (acorns, hickory nuts, black walnuts etc.) which are transported to VDOF nurseries where the seeds are planted and seedlings are grown. In 2012, approximately 6,000 pounds of seeds (mostly acorns) were collected. Each year, 500-700 seedlings are given to volunteers for planting on public lands in Fairfax County.

The conservation of the forested land base in Fairfax County is a part of the VDOF plan. The Fairfax County office works closely with the Fairfax County Department of Planning and Zoning to review Agricultural and Forestal District applications. A&F District forest management plans are prepared by VDOF; these efforts support the management of forested land for conservation purposes. One new A&F plan covering 21 acres was prepared in 2012. VDOF also wrote three Neighborhood Forest Management Plans and provided less formal advice to a number of Home Owners Associations, Civic Groups and citizens. All plans and advice provided by the VDOF are informed by the water quality and conservation benefits of protecting and maintaining forests and street trees.

The Virginia Department of Forestry also helps protect water quality and forest resources in the county by reviewing and commenting on rezoning applications and development plans. VDOF reviewed 60 applications and plans in 2012. In addition VDOF annually inspects dry hydrants to make sure they are available to fight wildfires in the county.

The department maintains an active public education and outreach program. Audiences range from school groups to adults. Topics range from general discussion of the importance of urban forests for environmental quality to technical training in planning and installing rain gardens and forested riparian buffers. In 2011, VDOF conducted 65 talks on the general benefits of urban forests and riparian buffers.

In an attempt to expand outreach and education and planting efforts, the Department of Forestry initiated a Tree Stewards program in 2011. The Tree Stewards program is designed to create a cadre of trained volunteers to lead community tree plantings and provide information on the benefits and care of trees. A second class of Tree Stewards was trained in 2012. Twenty-four Tree Stewards reported 840.25 hours of volunteer service including invasive plant removal, tree planting and education and outreach activities.

In addition to outreach and education and writing plans, the Virginia Department of Forestry provides technical assistance to land owners in managing trees, forests and other natural resources. This ranges from care and diagnosis of landscape trees to assisting with prescribed burns to improve native habitat. The Department assisted with or conducted five burns in the county in 2012, mostly with the Fairfax County Park Authority, but also burned the meadow at the American Horticultural Society headquarters.

The Virginia Department of Forestry website (www.dof.virginia.gov) contains many pages on forest management and urban forestry. Topics range from tree identification to proper planting under power lines. The pages contain information developed by VDOF and links to many other sources of information on urban forestry and tree care.

15. Virginia Department of Transportation

As required by federal and state laws and regulations, the Virginia Department of Transportation mitigates unavoidable impacts to water resources within Fairfax County that occur during highway construction projects. Highway construction projects can potentially impact wetlands and streams. These resources are identified early in the project development process so avoidance and minimization measures can be considered. Given the linear nature of highway projects, some impacts are often inevitable. Federal/state water quality laws and regulations may require compensatory mitigation for permanent impacts to these resources. Wetlands creation is one form of compensatory mitigation for wetland impacts. For stream impacts, stream restoration is a compensatory mitigation; natural stream channel design principles are used to the extent possible.

VDOT created approximately eight acres of wetlands (seven acres non-tidal and one acre tidal) and restored 2,635 linear feet of streams in Fairfax County's watersheds as compensatory mitigation for unavoidable impacts from highway construction projects including the Fairfax County Parkway, the Route 28 widening, the Roberts Parkway

bridge overpass, the Springfield Interchange improvements, the Route 29 bridge replacement over Big Rocky Run, the Richmond Highway widening and the Woodrow Wilson Bridge Replacement. On the recently completed I-95/Telegraph Road interchange, VDOT recently finished creation of 1.71 acres of tidal wetlands and 0.63 acres of non-tidal wetlands near the confluence of Taylor Run and Cameron Run. Additionally, 0.36 acres of stream restoration for a relocated tributary of Cameron Run was completed.

VDOT acknowledges the county's preference to compensate for wetland and stream impacts within its watersheds; however, on April 10, 2008, the Environmental Protection Agency and U.S. Army Corps of Engineers jointly issued a Federal Mitigation Rule giving preference first to mitigation banks, second to in-lieu funds and third to permittee responsible mitigation as compensatory mitigation for minor impacts to aquatic resources. Subsequent to this rulemaking, the Virginia Department of Environmental Quality directed staff to recognize the preference hierarchy presented in the Rule. As a result, VDOT purchases wetland and stream credits from approved mitigation banks to compensate for unavoidable impacts to wetlands and streams instead of creating on-site and off-site mitigation sites near its construction projects. To date, VDOT has purchased slightly more than 30 wetland mitigation credits and 2,085 linear feet of stream credits.

Since 1990, VDOT has been meeting its stormwater requirements by treating 858.55 acres of impervious road surface area through a system of 190 stormwater basins throughout the county. This acreage for treatment is expected to increase when new stormwater regulations become effective in 2014 (see the Water Resources chapter of this report for more information).

Landscaping contributes much more than just visual aesthetics; trees support filtering of air and stormwater pollutants/sediments, slowing the erosive acceleration of stormwater runoff, lowering stormwater runoff temperatures from heated impervious surfaces and screening of headlight glare and street light trespass onto residential properties at night. Many of these benefits are consistent with discussion topics elsewhere in the *Annual Report* and VDOT has included landscaping on several road construction projects to enhance context-sensitive road design.
Recent or current projects with landscaping and/or architectural treatments include:

- Route 29/Gallows Rd intersection improvement.
- Langley Fork scenic pull-off and parking area (Georgetown Pike).
- I-95/Telegraph Rd interchange reconstruction.
- Stringfellow Rd widening from Route 50 to Fair Lakes Blvd.
- Route 7 widening from Rolling Valley Drive to Reston Avenue.
- I-66 Spot Improvement #2 – Westbound Acceleration/De-acceleration lane.
- I-495 Express Lanes landscaping and reforestation.

VDOT's Wildflower Program is funded through revenue fees paid for wildflower license plates at the Virginia Department of Motor Vehicles. In Fairfax County, there

are approximately 3.5 acres of right-of-way in four locations maintained as perennial wildflower meadows. Warm season, native grass species are also used in VDOT's roadside seed mix specifications on its construction projects where opportunity exists to take advantage of low maintenance requirements. Targeted control of invasive vegetation is a large part of VDOT's roadside vegetation management program to promote the growth of more desirable species.

VDOT actively participates on the Board of Directors for the Community Appearance Alliance of Northern Virginia--an organization dedicated to improving the visual quality between created and natural environments in northern Virginia

16. Virginia Department of Environmental Quality

In 2012 the Northern Regional Office of the Virginia Department of Environmental Quality received 28 applications to impact surface waters in Fairfax County. A total of 26 new Virginia Water Protection Wetland Permits were issued. Compensation for impacts to surface waters was proposed to be provided through the purchase of bank credits and on-site stream restoration or riparian buffer enhancement.

17. Urban Forestry

a. Realignment of the Urban Forestry Program

In accordance with recommendations contained in the Tree Action Plan, during CY 2010, DPWES leadership determined that the Urban Forest Management Division's affiliation with the Stormwater Business Area would provide significant opportunities for mutual mission support and optimal alignment for implementing Tree Action Plan programs. In July 2012, the Urban Forest Management Division was officially realigned within the Department of Public Works and Environmental Services from the Land Development Services Business Area to the direct supervision of the Deputy Director with oversight over the Stormwater and Wastewater Business Areas. UFMD will remain located within the Herrity Building in order to continue daily interaction with LDS and the Department of Planning and Zoning during the review of proposed site plans and zoning cases. However, while the conservation of trees during land development will continue to be a major focus the foreseeable future, it anticipated that UFMD will begin devoting more time and resources to implementing programs and projects identified in the Tree Action Plan and helping the community and county agencies to manage and protect their tree and forest resources.

b. Tree Canopy Analysis

In fall 2012, UFMD entered a data exchange agreement with Casey Trees Foundation in order to obtain an updated remote sensing analysis that quantified countywide tree canopy levels based on 2011 high-resolution satellite imagery and LIDAR data. Casey Trees contracted with the University of Vermont Spatial

Analysis Laboratory to produce a seven-class land classification of Fairfax County and other jurisdictions in Northern Virginia. In exchange for Fairfax County's high resolution satellite imagery, Casey Trees Foundation was given rights to use the resulting land classification data as part of a larger regional tree canopy analysis for the greater Washington D.C. area. In return, Fairfax County received a highly accurate tree canopy analysis free of charge. The seven-class land cover classification delineates: (1) tree canopy; (2) shrub/grass; (3) roadways; (4) buildings; (5) waterways; (6) impervious surfaces; and (7) bare soil. For purposes of this document, the seven-class land cover classification will be referred to as the "2012 Tree Canopy Analysis."

An accuracy assessment conducted by the county's Geographic Information System staff revealed that a user of the new tree canopy map would find that 94.0 percent of the time, a visit to an area mapped as tree canopy truly is of that class. The other six percent of the time, the user would find that tree canopy in the map is actually grass/shrub. By remote sensing standards, 94.0 percent accuracy is very accurate. The methodology used by the Vermont Spatial Analysis Laboratory to classify the tree canopy and other land covers is considered state of the art. The use of LIDAR to detect surface feature height is particularly useful in distinguishing trees from other types of vegetation such as shrubs and grass. Previous remote sensing techniques using just multispectral imagery produce significantly higher error rates when used to distinguish trees from other vegetation types. In addition to LIDAR data, the 2011 satellite imagery utilized in the analysis is considered very high resolution (0.46 centimeter, or 18.1 inches per pixel spatial resolution) and includes eight spectral bands, three of which have been added to enhance vegetation analyses. By contrast, the spatial resolution of the satellite imagery used in the 2003 tree canopy analysis was 2.8 meters (110 inches or 9.2 feet) per pixel and was limited to four spectral bands. The finer spatial resolution of the 2011 imagery resulted in 37.6 times the ground sampling rate of the 2003 imagery. These figures demonstrate that the remote sensing technologies and data sources used in vegetation analyses have improved tremendously over the past decade, resulting in an increased ability to detect much smaller pockets of tree canopy and to more easily distinguish trees from closely related vegetation.

i. Findings of 2012 Tree Canopy Analysis

The new analysis indicates that 53percent of the county's land mass was covered by tree canopy in fall 2011 (the date of the most recent imagery acquisition). This figure is much higher than those produced by previous remote sensing analyses, which indicated that the county's tree/forest canopy coverage was 43 percent in 2003 (conducted by UFMD) and 42 percent in 2011 (conducted by the National Oceanic and Atmospheric Administration). In addition to a countywide figure, the 2012 Tree Canopy Analysis provides canopy coverage for all 30 major watersheds. The analysis also provides a theoretical canopy gain for each watershed, which could prove useful in setting

meaningful watershed-based canopy goals. See table VII-5 below for watershed-specific data.

Table VII-5. Tree Canopy Watershed-Specific Data

Watershed	Percent of Existing Tree Canopy Coverage	Potential Canopy Gain in Acres	Percent Gain over Exiting Canopy Coverage
ACCOTINK CREEK	49.8	11134	34.2%
BELLE HAVEN	42.9	741	42.2%
BULL NECK RUN	71.1	345	23.1%
BULL RUN	59.3	1508	39.3%
CAMERON RUN	42.8	10586	37.3%
CUB RUN	43.1	11320	42.9%
DEAD RUN	54.9	612	31.3%
DIFFICULT RUN	57.9	11755	31.8%
DOGUE CREEK	52.9	4476	36.3%
FOUR MILE RUN	34.6	7719	39.6%
HIGH POINT	86.8	480	12.3%
HORSEPEN CREEK	33.7	2968	46.3%
JOHNNY MOORE CREEK	65.7	1076	32.0%
KANE CREEK	84.1	455	14.9%
LITTLE HUNTING CREEK	53.0	2334	32.6%
LITTLE ROCKY RUN	45.1	1879	40.1%
MILL BRANCH	44.1	2652	47.5%
NICHOL RUN	72.7	1206	24.6%
OCCOQUAN	62.4	691	32.9%
OLD MILL BRANCH	87.6	308	11.2%
PIMMIT RUN	51.6	2645	32.7%
POHICK CREEK	58.1	6570	28.6%
POND BRANCH	71.5	1375	25.8%
POPES HEAD CREEK	68.8	3068	25.4%
RYANS DAM	92.5	155	6.7%
SANDY RUN	74.9	1096	21.1%
SCOTTS RUN	50.8	1168	30.6%
SUGARLAND RUN	43.2	3631	40.9%
TURKEY RUN	67.6	342	26.6%
WOLF RUN	76.3	807	21.4%

Source: *Urban Forestry*, attachment to email from Michael Knapp, Director Urban Forest Management Division, Land Development Services Department of Public Works and Environmental Services, Fairfax County, Virginia to Noel Kaplan, Department of Planning and Zoning, Fairfax County, Virginia,, September 23, 2013.

Fairfax County's tree canopy can be described as an *Urban Forest* and divided into two major categories: *Forest Canopy* and *Urban Tree Canopy*. *Forest Canopy* represents naturally-occurring forest or woodland communities consisting of trees, understory plants, groundcover, soils and a host of mutually dependent organisms including soil microbes, arthropods, reptiles, birds and mammals. *Urban Tree Canopy* represents a blend of naturalized, exotic and landscaped trees found in urban settings. These two canopy types occur in virtually all land uses and on both public and private lands. Because of their relative size, prior remote sensing canopy analyses were effective at identifying *Forest Canopy*. The data sources and techniques used in the 2012 Tree Canopy Analysis enabled a substantial increase in the detection of relatively small pockets of *Urban Tree Canopy*, and the increased ability to differentiate among trees, shrubs and herbaceous vegetation.

Although advances in remote sensing technology appear to have facilitated the detection of much higher canopy levels than previous indicated (up to a 19 percent increase over the tree canopy level detected in 2003), some of the unexpected gain may in fact be attributable to various natural, cultural and socio-economic influences present over the past decade. An explosion in the number of invasive trees (such as Callery pear and Tree of Heaven) along transportation and utility corridors has contributed large areas of canopy in areas once occupied by other vegetation types. In addition, the reduction in active construction sites associated with the economic downturn of the past five -years may have substantially reduced the level of canopy loss typically associated with land clearing activities. Lastly, it is estimated that nonprofit and governmental tree planting programs associated with the county's 30-year canopy goal, coupled with increased community awareness about the benefits of trees, has resulted in the planting of a substantial number of trees--possibly as many as 250,000 trees have been planted over the last decade.

ii. Additional Application of 2012 Tree Canopy Analysis

The current tree canopy level and possible gain data presented in the previous table will have direct application in the Tree Action Plan's recommendation to set tree canopy goals on a watershed basis. In 2013, UFMD, in cooperation with county GIS and Stormwater Planning staff, will use a software tool called Hydro to project the impacts of tree canopy on water quality and flood and stormwater mitigation. The i-Tree Eco software application is designed to use field data from complete inventories or randomly located plots throughout a community along with local hourly air pollution and meteorological data to quantify urban forest structure, environmental effects and value to communities. Baseline data from Hydro can be used for making effective resource management decisions, developing policy and setting canopy goals. UFMD prepared the following sequence of actions to guide this project, which will eventually be used to set tree canopy goals for all 30 major watersheds. This work is expected to be completed in CY 2014:

1. Use 2012 Tree Canopy Analysis data to benchmark tree canopy levels for each of the 30 major watersheds in Fairfax County.
2. Use Hydro software to project the model tree canopy gain/loss on water quality and stormwater flows.
3. Share output hydrographs and nutrient uptake datasets with Stormwater Planning and get assistance putting these data into current TMDL and MS4 regulatory processes and needs. Use feedback as a rational basis for setting preliminary canopy goals at the watershed level based on water quality and stormwater regulatory needs.
4. Use canopy gain/loss modeling and parcel level analysis to proof viability of preliminary watershed canopy goals.
5. If needed, adjust watershed canopy goals to reflect available planting space, demographics, comprehensive plan potential for land use change, etc.
6. Use watershed goals to identify critical forests tracts to preserve and properties to target for reforestation.
7. Aggregate watershed tree canopy goals into a countywide goal.
8. Investigate the feasibility of embedding watershed goals and overall canopy goals into county's land use policies/ordinances and comprehensive plan language.
9. Target specific property owners to engage and partner with on reforestation and conservation efforts.
10. If possible, embed reforestation and related best management practices in Municipal Separate Storm Sewer Permit and Watershed Improvement Plans as credited measures.
11. Monitor success with periodic ground sampling and/or remote sensing studies.
12. Periodically adjust goals canopy goals based on results of ground sampling and remote sensing studies.

iii. Implications of Tree Canopy Analysis

The 53 percent tree canopy level indicated by the 2012 Tree Canopy Analysis exceeds the 45 percent goal adopted by the Board of Supervisors in 2007. UFMD presented this information to the board's Environmental Committee in October 2013. Recommendations for a revised canopy goal are likely to feature a "no-net-loss" approach or a modest canopy gain over a 10 to 20 year period. Both paths will still require funding for tree planting programs and a continuation of robust tree conservation efforts during the land development process.

In light of the serious environmental, ecological and socio-economic pressures that currently threaten the county's tree and forest resources, UFMD is likely to recommend a shift away from just *quantitative* canopy goals to the development and implementation of *qualitative* forest management goals and metrics that

will be critical to efforts to ensure the long-term health and vitality of our urban forest.

c. Pressures on Trees and Forests

The following topical areas below provide an overview of the major pressures that are affecting tree and forest resources. Although these threats are very serious, our community still has time and sufficient expertise to successfully address them; however, they will require significant levels of staffing and fiscal resources, and in some cases significant political will to tackle.

i. Forest Fragmentation

The Society of American Foresters defines *fragmentation* as "the process of dividing large tracts of contiguous forest into smaller isolated tracts surrounded by human modified environments." This is a form of habitat fragmentation that can lead to serious and irreversible degradation of forest ecosystems and their ability to provide ecosystem services.

Fragmentation can decrease interior size of forests to a point that limits its functionality as habitat for wildlife, including birds. In addition to reductions in habitat value, there are impacts to native plant communities. Much like animals, plants often have specific habitat needs that can easily be undermined by the effects of fragmentation. When sections of a forest are removed, plant species that occur along the new forest edge can decline in vigor and/or disappear. Fragmentation often leaves the forest interior more susceptible to aggressive invasive species that can destroy or severely alter habitat value and biodiversity. Areas with high edge to area ratios are more susceptible to invasive plant infestations as well as other negative impacts, such as overpopulation of white tail deer.

Most of the forest communities in Fairfax County area have been degraded by the spread of invasive plants and other detrimental factors as a direct result of fragmentation. One of the most important challenges to maintaining present level of forest canopy will be determining which tracts have retained ecological functionality, and how to maintain that quality through active management.

ii. Impact of Deer Browse on Forests

A relatively recent explosion in white-tail deer populations is causing extensive damage to forests ecosystems throughout the Washington metropolitan area. Deer are an edge species that benefits from the forest fragmentation that accompanies land development. Deer find it easy to locate food sources in residential and commercial uses that are found adjacent to or nearby forested properties. This is the primary reason that deer populations can far exceed the levels normally sustained by healthy forested tracts. Deer are grazers that

naturally feed on herbaceous and woody plants that occur within four to five feet of the forest floor. Data from various sources obtained in Fairfax County strongly suggest that deer browse is causing high mortality in tree seedling populations. If this phenomenon is not addressed in the near future it could have serious implication for the structure, composition, ecological functionality and health of future forests and their continued ability to deliver multiple environmental, ecological, social and economic services to surrounding human communities.

Excessive deer populations are not just traffic safety and human health considerations. The potential for deer browse to result in severe forest degradation and to reduce the environmental health and quality of life in our community strongly suggests that the county's deer management program must be increased in size and scope in order to ensure that future generations will continue to enjoy the same levels of benefits currently provided by our urban forest.

iii. Impacts of Invasive Plants on Forests

Biological invasions are now a planet-wide phenomenon, affecting ecosystems in most biomes including all forest and woodland communities found in Fairfax County. Human-related movement of organisms has caused a massive alteration of species ranges and migration patterns. In some ecosystems, invasions by alien organisms and diseases have resulted in extinction of native species along with large losses of ecosystem services. In the United States, invasions by non-native plants, animals and microbes are thought to be responsible for 42 percent of the decline of native species now identified as endangered or threatened. Fairfax County is not immune to this pressure. Invasive plants have escaped, or been introduced, into our native plant communities from many sources. Japanese Stiltgrass, wavy-leaf basket grass, porcelain berry and mile-a-minute weed are just a few of the invasive plants that out-compete native trees and shrubs by reducing the availability of light, water, nutrients and space. The threats posed by invasive plants to biodiversity and to ecosystem processes may eventually translate into economic consequences that stem from environmental degradation and reductions in ecological services.

iv. Climate Change

Observed changes in climate have already affected natural systems in other parts of the world. Changes in species distributions, population sizes, reproduction and migration timing, as well as an increase in the frequency of pest and disease outbreaks, have been observed, especially in forest ecosystems. Changes in weather patterns are affecting forest ecosystems across the United States. The presence of higher level of CO_2 has been shown to change growth rates of both plants and the organisms that feed on plants or use them for habitat. Warmer temperatures along with genetic selection are allowing some

cold sensitive plants, such as kudzu, to expand their range more fully into Fairfax County.

v. Changes to Weather

Local weather patterns can be affected by climate change. The frequency and strength of storm events have been predicted to increase over time due to climate change impacts. Longer, hotter drought periods occurring at atypical times along with severe winter storms accompanied with heavy ice and snow will probably increase mortality rates, which is likely to translate into increased numbers of high-risk tree conditions and produce undesirable ecological effects such as increased opportunities for invasive plant species, diseases and insects. An increase in tree failure rates will require budget planning for cleanup, safety pruning and replanting. Milder winter temperatures are likely to affect the timing of the important internal biological processes of significant numbers of native plant species, which can affect their long-term health. Frequent inundation from intense or prolonged rain events can also predispose trees to failure through destabilization of the soils that root systems are anchored to.

vi. Forest Pests

The suppression and management of current forest pests (such as Gypsy Moth and Emerald Ash Borer) are discussed later in this section; however it should be noted that several significant forest pests that have not reached Fairfax County are impacting relatively close areas of the country.

Asian Longhorn Beetle is a prime example of a pest that has significant potential to cause serious damage to Fairfax County's urban forest. ALB was first discovered on several hardwood trees in the United States in Brooklyn, New York, in August 1996. ALB is believed to have been introduced into the United States from wood packing material accompanying cargo shipments from Asia. ALB was later detected in Chicago, Illinois, in July 1998. The Secretary of Agriculture declared an emergency in order to combat the infestation with regulatory and control actions. In October 2002, the beetle was found in Hudson County, New Jersey, and then in Middlesex and Union Counties, New Jersey, in August 2004. In August 2008, ALB was discovered in Worcester County, Massachusetts, and in July 2010, ALB was found in Suffolk County, Massachusetts. Most recently, ALB was confirmed in Clermont County, Ohio, in June 2011.

This insect is difficult to monitor and can be expensive to treat. Once detected, the preferred control is to remove or chemically treat all ALB host material within a radius of up to ½ mile of infested hosts. ALB can cause mortality to a wide-range of native and introduced tree species. Trees in the maple, willow and elm families are some of its preferred hosts. The Maple family (red maple, silver maple, sugar maple, box elder, etc.) alone represents

approximately 20 percent (4.4 million trees) of Fairfax County's total tree population, which is currently estimated at 22 million. Although ALB has not been detected in Fairfax County, if it was to appear, it could cause very serious ecological and economic damage. Modern trade patterns and commercial shipping methods coupled with inadequate pest inspection programs at the national level almost guarantee that additional forest pests will continue to enter the country. This probability necessitates that Fairfax County continue to support and fund a strong forest pest management program.

d. Tree Preservation during the development of Public Facilities

On March 22, 2011, the Board of Supervisors' Environmental Committee directed staff to develop specific actions to implement goals and strategies in the Tree Action Plan. In response to this directive, staff from UFMD and the Department of Planning and Zoning started to draft amendments to the Public Facilities section of the Policy Plan volume of the Comprehensive Plan. The draft amendments are intended to enhance tree preservation and landscaping/buffering on new or re-developed county public facilities. It is anticipated that this amendment will go forward for consideration during FY 2014.

e. Implementation of Tree Action Plan

In 2006, UFMD in conjunction with the Fairfax County Tree Commission developed, and the Board of Supervisors endorsed, the Tree Action Plan. The Tree Action Plan is a 20-year strategic plan for the conservation and management of the county's tree and forest resources. Over the past year, UFMD staff continued progress towards goals and executing strategies of the plan is currently engaged in numerous strategies associated with 11 out of the 12 core recommendations of the Tree Action Plan.

f. Strengthened Partnership with Fairfax ReLeaf, Inc.

Staff from UFMD holds a position of the Fairfax ReLeaf board. This year's involvement includes:

- Support for GIS analysis of homeowner association land for Fairfax ReLeaf planting activities.
- Strengthening partnerships with the Stormwater Planning Division and Fairfax ReLeaf, Inc. to develop potential planting sites at Stormwater Planning Division projects and facilities.
- Supporting development of planting beds to grow larger tree sizes.
- Attendance and participation at board meetings.

g. Active Participation in the Northern Virginia Urban Forestry Roundtable

.

UFMD regularly participates in the planning of quarterly Northern Virginia Urban Forestry Roundtable meetings to present and discuss urban forest management issues of concern to all jurisdictions in Northern Virginia.

h. Tree City USA Award

For the 30th year, Fairfax County received the TREE City USA award at the SpringFest (Earth Day/Arbor Day) event held this year at the Lorton Workhouse Arts Center grounds. UFMD staff prepares the application each year for this award.

i. Tree Planting at Fairfax County Facilities

Staff from UFMD, in concert with staff from the Wastewater Collection Division, planted native trees at the recently retrofitted stormwater management pond at the Wastewater Collection facility on Freds Oak Road.

j. Strengthen Partnership With the Stormwater Planning Division

UFMD staff has strengthened the working relationship with the Stormwater Planning Division, providing assistance with tree preservation consultation, plan review, project scoping, attending pre-construction meetings, review of projects during implementation and review of final projects at completion. Projects include stream restoration, stream rehabilitation and retrofit and new stormwater facilities.

k. Upgrades and Improvements to the 'Trees' Web Page

UFMD staff continues to improve and upgrade the 'Trees' web page. Some of the upgrades and improvements include:

- Restructure 'Tree' web page to be more "user friendly."
- Provide various Public Service Announcements.
- Prepare "slideshare" programs available to the public regarding various tree health-related topics.

UFMD staff continues to respond to internal and external feedback regarding its Web page and make appropriate upgrades and improvements to provide superior communication with internal and external customers.

l. Outreach and Increased Public Awareness

UFMD continues to provide education and outreach programs regarding trees and the urban forest at several venues including:

- Provide educational programs to homeowners associations, scouting groups, school groups, summer school groups, summer camps and garden clubs.
- Participate in the Mt. Vernon Town Hall Meeting and Lake Barcroft Earth Day.
- SpringFest (Earth Day/Arbor Day).
- Celebrate Fairfax County.
- Fall for Fairfax.
- "Green Fire."
- 4H Fair.
- Green Industry Professional Field Day.

m. Tysons Core Team

Staff from the Urban Forest Management Division continues as a member of the Department of Planning and Zoning's Tysons Core Team. UFMD staff actively participates in the Tysons Core Team meetings. Participation includes reviewing all proposed rezoning applications associated with the Planned Tysons Corner zoning district, attending Planning Commission hearings with PTC applications and, in consultation with the Office of Community Revitalization, contributing to the creation of the Tree Space Designs and Planting details of the Tysons Corner Urban Design Guidelines.

n. Tree Commission Activities

Tree Commission Chair Harry Glasgow stepped down from his position with the Tree Commission after the November 2012 meeting. Bob Vickers, Tree Commissioner for the Dranesville District was nominated and accepted the position of Chair of the Tree Commission at the December 2012 Tree Commission Meeting.

The Tree Commission is currently revising and improving the Tree Preservation and Planting Awards Program. The revised and improved program should be ready for launch in fall 2014.

Chairman Vickers and Commissioner Quigley attended a public hearing of the Planning Commission regarding the proposed Comprehensive Plan Amendment for telecommunications facilities. Chairman Vickers presented the Tree Commission's concerns regarding the lack of concern for tree preservation and requested staff to consider tree preservation for screening during planning and implementation of proposed cell towers. In addition, the chairman recommended landscape screening at ground level facilities rather than simply developing cell sites in wooded areas.

As part of the 2012 Land Conservation Awards Program, UFMD staff prepared nominations to the Tree Commission of potential candidates for the Tree Preservation and Planting Awards. Awards for tree preservation are presented to recognize those builders, developers, engineers and contractors who have done an outstanding job of preserving trees on a project they have constructed. Tree planting and landscaping awards are presented to recognize builders, developers,

landscape contractors and landscape architects who have done an outstanding job of planting trees on the site to ensure compliance with the 10-year tree canopy requirements and to enhance the aesthetics of the project. The Tree Commission awarded the 2012 Tree Preservation and Planting Awards to the following:

- The "Nature House" at the Walker Nature Center, Hunter Mill District: Tree Preservation.
- The Dolley Madison Library, Dranesville District, Tree Preservation.
- The Valleybrook Montessori School of Northern Virginia, Inc., Mason District: Tree Preservation.

o. Friends of Trees Awards

The Tree Commission presents the Friends of Trees Award annually to individuals and organizations that have demonstrated superior actions in preserving, protecting or planting trees. These year's recipients were:

- Jessica Strother.
- Harry Glasgow.
- Tabitha Eagle.
- Level 3 Communications.
- Northern Virginia Soil and Water Conservation District.

The awards were presented at "SpringFest" held at the Lorton Workhouse Arts Center.

p. 2012 Forest Pest Management Activities

i. Gypsy Moth Caterpillar

The gypsy moth was first detected in Fairfax County in 1981. To avoid the environmental, economic and health hazards associated with this pest, the Board of Supervisors enacted an Integrated Pest Management program to control the gypsy moth. The purpose of the program is to reduce gypsy moth populations below defoliating levels. The goal of the program is to minimize the environmental and economic impacts of the pest by limiting the amount of tree mortality and use of pesticides in the environment. The control methods considered annually are:

- Mechanical: the gypsy moth egg mass search, scrape and destroy campaign and burlap banding for gypsy moth caterpillars. These are volunteer involvement programs.
- Biological: the release and monitoring of gypsy moth parasites and pathogens.
- Chemical: the aerial and ground applications of Diflubenzuron and *Bacillus thuringiensis* on high infestations.

- Educational: the self-help program and lectures to civic associations and other groups.

In calendar year 2012, gypsy moth caterpillar populations remained very low. There was no measurable defoliation reported in Fairfax County or elsewhere in the Commonwealth of Virginia. The reason for the extremely low gypsy moth populations in Fairfax County and other areas is due to effective control programs in past years and the fungal pathogen *Entomphaga maimaiga*. The gypsy moth staff will continue to monitor populations; treatment was not planned for 2013. It is important to note that gypsy moth populations are cyclical in nature and it is not uncommon for outbreaks to occur following dormant phases.

ii. Fall Cankerworm

The fall cankerworm is native to the United States and feeds on a broader range of trees than the gypsy moth. Periodic outbreaks of this pest are common, especially in older declining forest stands. The area of the county that has had the most severe infestations of fall cankerworm was in the Mount Vernon and Lee magisterial districts. The result of the winter 2012– 2013 monitoring effort indicated that 2,000 acres of treatment were required in spring 2013. These areas were to have been treated by helicopter and with the pesticide Bt. It is expected that populations of this pest will remain high and treatment is expected in the near future.

iii. Emerald Ash Borer

The emerald ash borer (*Agrilus planipennis*) is an exotic beetle from Asia and was discovered infesting ash trees in the state of Michigan in 2002. This beetle is known to attack only ash trees and can kill trees in as little as two years. In July 2008, two infestations of emerald ash borer were discovered in Fairfax County in the Town of Herndon and in the Newington area. The U.S. Department of Agriculture's Science Advisory Council has recommended that no eradication action be taken in Fairfax County. This decision was made due to the extent of the infestations and due to the fact that similar eradication attempts in other U.S. states have failed. Since July 11, 2008, a federal order has quarantined Fairfax County for Emerald Ash Borer. This means that all interstate movement of ash wood and wood products from Fairfax County is regulated, including all hardwood firewood, nursery stock, green lumber, waste, compost and chips from ash trees. During summer 2012, the Virginia Department of Agriculture and Consumer Services found evidence of EAB in many other areas of the state. As a result of these discoveries, the entire state is now subject to state and federal quarantines. Trapping efforts since 2008 have revealed that the beetle can be found in many areas of the county. The Forest Pest Program has appointed an Urban Forester as its Emerald Ash Borer Outreach Coordinator. This staff member is responsible for educating the

public on how to deal with the impending death of many thousands of ash trees. Education efforts emphasize how to hire a private contractor to remove dead and dying trees and how to properly apply pesticides that might keep trees alive.

iv. Hemlock Woolly Adelgid

Hemlock woolly adelgid is an insect that infests and eventually kills hemlock trees. Staff is considering various control options for this pest. Possible control options include pesticide treatments and release of predatory insects that feed on HWA.

v. 1000 Cankers Disease of Black Walnut

In August 2010, a fungal disease was detected in black walnut (*Juglans nigra*) in Tennessee. During spring 2011, this disease was identified near Richmond, Virginia. This disease and the beetle that spreads the disease are native to the western United States. In its native range, this disease causes minor damage to western walnut species. Unfortunately, eastern walnut trees are very susceptible to the disease. Trees die within a few years of infestation with the beetle/fungus. Staff is monitoring the development of this disease and has petitioned the Virginia Department of Agriculture and Consumer Services to include this pest/disease to the list of pests that can be controlled by service districts in Virginia. Staff established trapping sites for this pest during summer 2012. Results of this trapping effort proved that the beetle and fungus are found in Fairfax County. Following this discovery, the Virginia Department of Agriculture placed a quarantine around Fairfax County that prohibits the transportation of walnut wood products. Staff will continue to monitor walnut tree health and educate homeowners on this condition.

18. Agricultural and Forestal Districts

Landowners may apply to place their land in special Agricultural and Forestal Districts that are taxed at reduced rates. A&F Districts, which are created by the Commonwealth of Virginia, must have 200 or more acres. A&F Districts of local significance, governed by the Fairfax County A&F District ordinance, must have at least 20 acres and must be kept in this status for a minimum of eight years.

Fairfax County's policy is to conserve, protect and encourage the development and improvement of its important agricultural and forestlands for the production of food and other agricultural and forest products. It is also Fairfax County policy to conserve and protect agricultural and forestlands as valued natural and ecological resources that provide essential open spaces for clean air sheds, watershed protection, wildlife habitat, aesthetic quality and other environmental purposes. The purpose of the Local Agricultural and Forestal District program is to provide a means by which Fairfax County may protect and enhance agricultural and forest lands of local significance as a viable segment of the Fairfax County economy and as an important economic and

environmental resource. All district owners agree to no intensification of the use of their land for the life of the district.

Since the 2010 EQAC Annual Report on the Environment, there have been some changes to the A&F Program as shown in Table VII-6.

Table VII-6: Change in Local and Statewide A&F Districts from January 1, 2010 to August 31, 2012

Magisterial District	No. of Local Districts		No. of Statewide Districts	
	2010	2012	2010	2012
Dranesville	14	13	1	1
Mt. Vernon	3	3	1	1
Springfield	21	21	0	0
Sully	4	4	0	0
Total	42	41	2	2

Fairfax County 2012 Agricultural & Forestal District Annual Statistical Report, August 1, 2012, Attachment to email from Brent Krasner, Senior Staff Coordinator, Zoning Evaluation Division, Department of Planning and Zoning, Fairfax County, Virginia, to Noel Kaplan, Department of Planning and Zoning, Fairfax County, Virginia, May 28, 2013.

As can be seen in the above figure, there was a change in Dranesville District, resulting in a loss of one Local District during this reporting period. This was due to the withdrawal of Salona, a loss of 52.3 acres. This was partially compensated by the addition of 5.08 acres to Eagle District I in Dranesville District, resulting in a net loss of 47.22 acres.

19. Gunston Cove Ecological Study

The Gunston Cove Ecological Study was included in this chapter in previous years. It also was in the Water Resources chapter. This year, it will be in the Water Resources chapter only.

20. Fairfax County Department of Planning and Zoning

As an outgrowth of the 2000 Infill and Residential Development Study, Department of Planning and Zoning staff is reviewing the open space definition that is applied in the Zoning Ordinance to determine if clarification is necessary and whether the methodology used in open space calculations should be modified. Although full open space credit is currently given for all stormwater management ponds, staff is considering not giving full credit for an unenhanced dry pond, as these facilities are generally considered undesirable from a usable open space and visual perspective. In

addition, staff is considering requiring more detailed information on the type and location of the proposed open space in conjunction with zoning application and site plan submissions. The open space item is on the proposed 2013 Priority 2 Zoning Ordinance Amendment Work Program, which means that the item will be maintained on a list for future prioritization.

21. Fairfax Chapter of the Virginia Master Naturalist Program

Formed in 2006, the Fairfax Chapter of the Virginia Master Naturalist Program provides local residents with naturalist training and then connects them with volunteer stewardship, citizen science and outreach opportunities in parks and natural areas. The process for becoming a certified Virginia Master Naturalist takes from six to 12 months. Two times a year, approximately twenty candidates are selected for a class. They begin with a 60-hour basic training course, which is a combination of classroom lectures and field work that grounds them in natural history and forest and aquatic ecology. Subject matter experts from the Northern Virginia Regional Park Authority, Fairfax County Park Authority, Virginia Department of Forestry, Virginia Tech, Northern Virginia Soil and Water Conservation District, EPA and National Academy of Sciences make up the faculty. Master Naturalists are expected to provide much-needed support to the many environmental organizations striving to protect natural resources in Fairfax County. To be certified, graduates must provide 40 hours of volunteer service and receive eight hours of advanced training each year.
In 2012, 118 FMN members provided 7,270 volunteer hours to program partners and other organizations. Seventy-one members received Virginia Master Naturalist certification by providing 40 hours or more of volunteer service and completing eight hours of advanced training; 31 members have reached the cumulative 250-volunteer-hour mark, while 11 have contributed over 500 cumulative volunteer hours. The Fairfax County Park Authority recognized two members of the program: Bob Dinse was honored as an “Outstanding Volunteer” for his Invasive Management Area work at Mason District Park and for his work at Hidden Oaks; and Murjan Hammad was honored as part of the Envirothon Team for efforts to promote natural resource stewardship and management to children at Hidden Pond Nature Center. Further, the Alice Ferguson Foundation honored Betsy Martin with the Potomac Champion Award for cleanup work on Little Hunting Creek. At Hidden Oaks Nature Center, FMN volunteers and FCPA park naturalists led small groups in hands-on activities focusing on watersheds, pond study, stewardship, stream study and meeting live snakes, turtles and a toad. Every seventh-grader at three diverse Fairfax County middle schools participated in a Meaningful Watershed Education Experience program. It reached well over 1,000 students over eight days in April-May and five days in October.

The Fairfax Master Naturalist chapter successfully ran two basic training classes in 2012 and just finished another in May 2013, recruiting 60 new members. This brought the number of trained volunteers to 227. With 176 current members, FMN provided over 7,000 hours of volunteer service in 2012, of which 1,643 hours were in education and outreach, 1,317 in citizen science projects and 2,307 in stewardship efforts. FMN members provided 1,923 hours of volunteer service to FCPA, of which just over 300

was with the Invasive Management Area program, in both removal and Early Detection-Rapid Response activities.

For more information see the program's website: (http://www.virginiamasternaturalist.org/fairfax.html)

22. Fairfax County Restoration Project

With the help and guidance of the Fairfax County Office of Public/Private Partnerships, The Fairfax County Restoration Project began in April 2008. Although the FCRP was formed in response to deforestation along the Capital Beltway/495 Express Lanes project, it quickly widened its scope to environmental issues throughout Fairfax County. As a core group of community organizations, businesses and government staff coalesced, it became evident that another environmental organization that would compete for funding and volunteer time was not needed. What was and is needed is a focal point for a community of practice where organizations and individuals interested in environmental restoration in Fairfax County can meet, share information and take collaborative action. FCRP was chartered to help foster a collaborative approach to environmental restoration in Fairfax County.

In 2011, FCRP began considering a media campaign to raise awareness of the relationship between runoff and pollution. A primary focus of the campaign was to be how replacing turf with trees and other plants could reduce runoff and improve water quality. FCRP became aware that The Chesapeake Club had already developed a similar campaign called www.plantmoreplants.com, which the organization felt was very well done and extremely effective. Working with the Club and Chairman Bulova's office, FCRP was able to bring the campaign to Fairfax County. Beginning in fall 2012, Cox Communications has placed the ads in its normal public service announcement schedule. FCRP is now streaming the video clips through its website to further promote the message. Supporting materials developed by The Chesapeake Club have been distributed at functions and are available to any of FCRP's partner organizations, and banners can be seen at retail & landscaping outlets. Ad buys are being done collectively throughout the state to further the message.

Originally forecast for spring 2011, Reforest Fairfax was finally launched on October 13, 2011. Reforest Fairfax is a tree-gifting program designed to help replenish the tree canopy and to help the county achieve its tree canopy goals. For each $35 gift purchased, five seedlings are planted by Fairfax ReLeaf during a spring or fall planting season. An on-line locator is available so once the trees are planted the location of the gifts can be identified. There is also an optional on-line registry for supporters of the program. The program can be accessed at http://www.fcrpp3.org/reforestfairfax/. In 2012 the total reached 49 gifts purchased and 245 trees planted.

FCRP developed partnerships with Xpedex, an International Paper Company, McCabe's Printing Group, the Northern Virginia Soil & Water Conservation District, Eze Solutions and Fairfax ReLeaf in order to create the Reforest Fairfax Program.

Once again, Transurban provided a grant to support the program's initial development. Merchandising items to further support the program are currently being developed.

FCRP facilitated discussion among Virginia Megaproject partners, Fluor-Transurban and VDOT, Supervisor Foust and Fairfax County staff to develop more environmentally comprehensive strategies for some of the stormwater ponds being constructed as part of the 495 Express Lanes. Discussions focused on the grading design within the ponds and a mixture of compost and seed that will create habitat for native species. There was agreement that five of the twenty-six planned ponds will be upgraded with the recommended compost and seed mix while the remaining nineteen ponds will receive only the seed mix as far as the supply lasts. At this writing, compost sightings have been reported and the process of the upgrades has begun.

C. STEWARDSHIP OPPORTUNITIES

The Fairfax County Park Authority offers a number of opportunities for volunteers and EQAC encourages county residents to take advantage of these opportunities. Information about these opportunities is available at http://www.fairfaxcounty.gov/parks/volunteer/ . More information about FCPA and its programs is available at: http://www.fairfaxcounty.gov/parks/resources.

Fairfax County residents and other interested parties can donate to the Fairfax County parks through the Fairfax County Park Foundation. The Fairfax County Park Foundation is a 501(c)(3) not-for-profit organization and donations are tax deductible to the fullest extent allowed by law. The foundation's mission is to raise funds to support the parks and land under the stewardship of the Fairfax County Park Authority. Those interested in giving tax-deductible donations to the foundation can contact the foundation at:

Fairfax County Park Foundation
12055 Government Center Parkway
Fairfax, VA 22035
(703) 324-8581
SupportParks@aol.com
http://www.fairfaxparkfoundation.org/

Environmental Stewardship opportunities for volunteers are available at Northern Virginia Regional Park Authority sites, including Meadowlark Botanical Gardens, Potomac Overlook Regional Park, Upton Hill Regional Park and Pohick Bay Regional Park More information can be found at http://www.nvrpa.org/park/main_site/content/volunteer.

Fairfax ReLeaf offers a number of opportunities for stewardship. For further information on Fairfax ReLeaf, visit its website at http://www.fairfaxreleaf.org. The organization can be reached at:

Fairfax ReLeaf
12055 Government Center Parkway
Suite 703
Fairfax, VA 22035
Telephone: (703) 324-1409
Fax: (703) 631-2196
Email: trees@fairfaxreleaf.org

The Northern Virginia Conservation Trust offers many opportunities in stewardship for Fairfax County residents. Additional information on NVCT can be found on its website, http://www.nvct.org. Landowners whose property contains environmentally sensitive land such as wetlands, stream valleys and forests can also participate in environmental stewardship. If these landowners grant easements to NVCT, they will not only protect sensitive land, but can realize some financial benefits. A perpetual easement donation that provides public benefit by permanently protecting important natural, scenic and historic resources may qualify as a federal tax-deductible charitable donation. Under the Virginia Land Conservation Act of 1999, qualifying perpetual easements donated after January 1, 2000 may enable the owner to use a portion of the value of that gift as a state income tax credit. Fairfax County real estate taxes could also be reduced if the easement lowers the market value of the property.

For stewardship information on the Potomac Conservancy, see http://www.potomac.org.

D. COMMENTS

1. The Fairfax County Board of Supervisors has endorsed the goals and actions within the Tree Action Plan, adopted a new tree canopy cover goal for the county of 45 percent coverage by the year 2037 and adopted a tree conservation ordinance to strengthen tree preservation policies and procedures. In addition, trees were identified as a special area of interest in the FY 2008 Environmental Improvement Program. An analysis of high-resolution satellite imagery and LIDAR data indicates that 53 percent of the county's landmass was covered by tree canopy in fall 2011 (the date of this most recent imagery acquisition). This figure is much higher than those produced by previous remote sensing and also exceeds the 45 percent goal. Some of the unexpected gain may be attributable to an explosion in the number of invasive trees (such as Callery pear and Tree of Heaven) along transportation and utility corridors--this has contributed large areas of canopy in areas once occupied by other vegetation types. Such invasive trees should not count toward the tree canopy cover goal.

   EQAC commends the Board of Supervisors for its progressive approach to improving the retention and expansion of this valuable ecological resource. It is imperative that these

programs not be allowed to weaken or be given less priority in future years. EQAC believes that continued emphasis of tree actions in the Environmental Improvement Program document is necessary to assure continued emphasis and eventual meeting of goals.

2. In past Annual Reports, EQAC recommended that the Board of Supervisors emphasize public-private partnerships that use private actions such as purchase of land and easements by existing or new land trusts to protect forests and other natural resources, including champion/historic trees. With the signing of a Memorandum of Understanding between the Board of Supervisors and the Northern Virginia Conservation Trust, such a public-private partnership came into being. Thus, EQAC's recommendation has been satisfied. EQAC continues to commend the Board of Supervisors for this action and recommends continued support for this partnership.

3. In past Annual Reports, EQAC recommended that the Board of Supervisors develop and implement a countywide Natural Resource Management Plan – an ecological resources management plan that can be implemented through the policy and administrative branches of the county government structure. Two necessary tasks should be accomplished first -- prepare and adopt a unified Natural Resource Conservation Policy, and complete a countywide Baseline Natural Resource Inventory. EQAC notes that slow progress is being made in this area by the Fairfax County Park Authority staff in its efforts to establish a natural resources baseline inventory. The FCPA has developed a countywide green infrastructure map that appears to be a basis for a Natural Resource Inventory. Additionally, the Urban Forest Management Division is continuing efforts to devise a countywide map for use as a layer on the county's GIS that will delineate the distribution of naturally occurring and landscaped vegetation. However, these efforts must be supplemented by an inventory of the county that accounts for flora and fauna. EQAC also notes the accomplishment of the Park Authority in preparing and publishing a Natural Resources Plan for management of the county's parks and urges the Park Authority to fully implement this plan. Additionally, EQAC notes that the Park Authority has taken some steps in implement the plan, but much more needs to be done. EQAC fully supports these efforts, urging that they culminate in a countywide Resource Management Plan. EQAC's intent is that Fairfax County should have all the tools in place (the policy and the data) to create a plan that will support the active management and conservation of the county's natural resources.

4. While recurring funding to implement the Natural Resource Management Plan has not been secured, progress has been made in identifying positions within the Park Authority. Three new merit positions were created in 2011 in the Natural Resource Management and Protection Branch (converted from limited term positions). Two are being held vacant and can be filled as soon as funding is available as part of the Phase 1 implementation approach. The third position is the Invasive Management Area Volunteer Coordinator position. In addition, in 2011, the Natural Resource Management and Protection Section was reclassified as a branch and the manager's position was upgraded accordingly. Finally, the Park Authority continues to be successful in obtaining project-specific funding for resource management. In addition to funding for IMA, several other projects have been

funded including work at Old Colchester Park and Preserve, Ossian Hall, Fitzhugh and Wakefield Parks. In addition, NRMP staff kicked off a new natural resource restoration project at Ellanor C. Lawrence Park using bond, proffers and telecommunication fee funds in 2012. The 2012 bond included $1 million for natural capital stewardship. In 2013, Park Authority staff has been working with a wide range of stakeholders to revise the agency Natural Resource Management Plan. The new plan will be more closely focused on adaptive management of natural capital for biodiversity. It should be adopted by December 2013 or January 2014.

EQAC commends the Park Authority in finding funding for IMA projects. EQAC also commends the Park Authority in upgrading the Natural Resource Management and Protection Section to a branch and establishing new positions. EQAC suggests that the Park Authority fill all vacant positions as soon as feasible.

E. RECOMMENDATION

1. The Fairfax County Park Authority approved a Natural Resource Management Plan in 2004. This partially fulfilled a long-standing EQAC recommendation to develop and implement a countywide Natural Resource Management Plan. The Park Authority is currently preparing a revised Natural Resource Management Plan, and it is anticipated that, as was the case for the previous plan, substantial staff and monetary resources will be needed to implement the plan that will ultimately be adopted. For the 2004 plan, FCPA staff estimated that full implementation would require approximately $8 million per year and dozens of staff positions. This included about $3.5 million to focus on general natural resource management and $4.5 million for a non-native invasive plant control program. A more phased approach to funding would have allowed FCPA to begin to manage 10 percent of parklands and set up the program to be phased in over time. Phase 1 with this approach would have required $650,000 and six positions. It is anticipated that similar needs will be identified for the new plan. EQAC strongly feels that a Natural Resource Management Plan needs to be implemented. Therefore, EQAC recommends that the Board of Supervisors provide sufficient funding to implement an initial phase for natural resource management efforts and that the Fairfax County Park Authority Board apply this funding accordingly. EQAC recognizes that in today's budget climate, such increased funding may be difficult to achieve. However, EQAC recommends some increase in funding by the Board of Supervisors. And, once the county's budget problems are eased, EQAC further recommends that the Board of Supervisors increase funding as a high priority. Ultimately, this increased funding should support the full implementation of the Natural Resource Management Plan.

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ANNUAL REPORT ON THE ENVIRONMENT

CHAPTER VIII

WILDLIFE AND THE ENVIRONMENT IN FAIRFAX COUNTY

EQAC has largely carried forward the information that was presented in the "Wildlife and the Environment in Fairfax County" chapter from the 2012 Annual Report on the Environment, although the concluding portions of each section (recent activities and issues of note; comments; recommendations) have been updated where appropriate. EQAC anticipates that a more complete update will be provided in next year's Annual Report.

VIII-1. IMPACTS OF DEER IN FAIRFAX COUNTY

A. OVERVIEW

The adverse impacts of white-tailed deer in Fairfax County are readily recognized as a problem by many of its residents. While the "problem" is seen from a variety of perspectives, there is a general consensus that the root cause is "overabundance" of deer in many local areas. There is also a general public perception that a deer management program is needed to address the "problem."

The road to an acceptable deer management solution, however, is not so easily determined. Some of the factors essential to a solution are subject to strenuous debate and attract a wide spectrum of opinion. For example, what is the optimum population level, and if population reduction is required, what means shall be used? The sport hunting community, recreational nature lovers, residential property owners, environmental preservationists and animal rights/welfare groups have widely differing viewpoints on these issues.

B. BACKGROUND

1. Are Deer Overabundant in Fairfax County?

Caughly (1981) defined four contexts in which the term "overabundance" can be understood when referring to an animal species population. These definitions have since been widely used by most serious scholars in the wildlife management field and by public administrators responsible for wildlife management programs.

1. When the animals threaten human life or livelihood.

2. When the animals depress the density of, or destroy, particular favored species.

3. When the animals are too numerous for their own good.

4. When their numbers cause ecosystem dysfunction.

Where does Fairfax County stand vis-a-vis these four criteria? The available data strongly (even overwhelmingly) suggest that:

1. We experience an unacceptable number of deer-vehicle collisions resulting in deaths, injuries and major property damage. Owners of commercial agricultural and nursery enterprises suffer substantial damage.

2. In many areas of the county, deer routinely leave their enclaves of "natural" habitat to forage in nearby gardens and yards, causing widespread damage to

landscaping and thus major economic loss to property owners. Through voracious browsing, deer are rapidly eradicating numerous threatened and endangered botanical species from the "natural" habitat. In addition, this loss of plant habitat is adversely affecting numerous vertebrate and invertebrate species of smaller physical size, such as many bird species, that are unable to compete with large herbivores for plant-based food sources.

3. Data for Fairfax County, based on Virginia Department of Game and Inland Fisheries assessments spanning ten years, indicate that its various deer herds showed a single individual in excellent condition, a very few in good condition, most about evenly split between fair and poor condition and a few emaciated individuals. This shows quite clearly that no longer can the available habitats meet the minimum nutritional requirements that would maintain the deer population in sound health. A 125-pound deer requires approximately 6.5 pounds of forage per day, or some 2,370 pounds of vegetation per year.

4. Many of our parklands and stream valleys show severe browse lines, nearly total eradication of understory and loss of numerous botanical species upon which the continuous process of woodland regeneration is dependent. These changes in turn lead to the inevitable loss of a wide variety of animal species. Thus, our remaining natural ecosystem is being severely deformed through the eruption of a single species that has become overdominant in the food chain.

According to each of Caughly's four criteria, it is apparent that Fairfax County has a serious overabundance of deer. In recognition of the public perception of a significant problem, the Board of Supervisors directed county staff to develop a plan for deer management. In October of 1997, county staff contracted with a consulting firm to "study and review existing data on deer, deer-habitat interactions, deer-human conflicts, and deer management proposals within the county." Staff also asked the consultants to recommend suitable methods for addressing the various problem areas. These studies and recommendations were presented in the Consultant’s Report (Natural Resource Consultants, December 1997). In 1998, the county created a new position and appointed a Wildlife Biologist who had broad experience with Fairfax County parks and parkland issues. In the summer of 1999, the county executive convened an ad hoc Deer Management Committee of experts and stakeholders to discuss and evaluate the plan drawn up by the staff and the early implementation efforts. The report of this committee and its recommendations were forwarded to the Board of Supervisors in September, 1999 in advance of the season of peak deer problems, which occurs in the fall. The Board of Supervisors approved recommended measures to reduce the deer population to more sustainable and less destructive levels. Since then, the deer management program has made substantial progress in achieving significant population reductions in some of our most threatened parklands.

2. A Description of the Problem

a. Data on Deer Abundance in Fairfax County

To begin this discussion, the terms overabundance and overpopulation should be distinguished. Overabundance refers to population levels that have adverse impacts on the community and other species, while overpopulation refers to population levels of the species that are an imminent danger to itself through disease and starvation. This latter phenomenon is responsible for the population eruption and subsequent collapse of deer herds that has been a topic of scientific study for the past 70 years. While the following information supports a conclusion that deer are overabundant in Fairfax County, neither the data nor experts from a variety of sources have indicated that a level of overpopulation exists, though the relatively poor health of much of the county's deer herds suggest that we may be approaching overpopulation.

Data from the Virginia Department of Game and Inland Fisheries deer density surveys in Fairfax County parks prior to the county's deer management program showed deer densities from 90-419 deer/sq. mile (Table VIII-1-1).

Table VIII-1-1
Deer Density Baseline Surveys

Location	Est. Deer/Square Mile
Huntley Meadow Park	90-114
Riverbend Park	213
Meadowlark Gardens Park	90-115
Bull Run Regional Park	419
Fort Belvoir	90
Mason Neck NWR	-

(Source: W. Dan Lovelace, Wildlife Biologist, Virginia Department of Game and Inland Fisheries.)

While many of the data are limited, taken collectively, the observations of professional park staff, poor health of evaluated deer and high deer densities indicate that deer are overabundant and are negatively impacting the ecology of sizeable areas of Fairfax County. More recent, but fragmentary, data for a

number of parks show deer population densities several times larger than maximum carrying capacities. Unfortunately, there are few reliable data available for densities and extent of damage on private lands and the adjacent small islands and corridors of natural habitat. Even though the information available is primarily anecdotal, it is voluminous, and there is a general public perception of a significant and growing problem of deer overabundance.

b. Causes of Overabundance in Urban/Suburban Areas

i. Urbanization/Changes in Habitat

Over recent decades, Fairfax County has transformed from a largely agrarian and woodland area to a multifaceted employment, residential and retail area. Over 1,080,000 people reside in the 395 square miles of the county. Of these 395 square miles, about 140 square miles are wooded and open land and some three square miles are remaining agricultural land. This change from an agrarian area to a developed one has markedly decreased the amount of land usually regarded as suitable for deer habitat and has changed their food sources and movement patterns. This urban/suburban habitat of the county provides a fairly good nutritional base for deer, including manicured lawns, athletic fields, college campuses, golf courses and landscaped residential communities.

Overabundance is particularly common where the course of development has left protected "islands" or "corridors" of deer habitat in or near urban and suburban areas. As the development process reduces the area of natural habitat, deer are forced into these remaining islands and corridors at very high population densities. Because the deer then deplete the forage plants in these enclaves, they venture out into the surrounding developed community in search of food. In such situations, conflicts with humans frequently arise in the form of deer-vehicle collisions and depredations on gardens and ornamental plantings (Flyger et al, 1983; Cypher & Cypher, 1988). Moreover, in such situations, natural predators (e.g., wolves, bobcats, mountain lions) have normally long since been eliminated and hunting is usually prohibited.

ii. Loss of Predators

The precolonial levels of deer in Virginia could be attributed to predation by bobcats, black bears, eastern gray wolves and eastern mountain lions, in addition to the number taken by Native American hunters. While none of these predators depended solely on deer, the deer/predator interactions and the added effects of hunters kept the population levels low and well within the carrying capacity of the land. Increasing human populations and land development has virtually eliminated wildlife predators from the county. In the first half of the last century, hunting had reduced the deer population to very low levels. However in the latter half of that century, with growing human population and

reduction of huntable habitats, recreational hunting had almost disappeared in the county. While the number of deer harvested through "Out of Season Kill Permits" has increased in recent years (Table VIII-1-2), the combination of seasonal hunting and out-of-season kill permits does not affect the deer population at sufficient levels to prevent significant deer/human conflicts or ecological damage.

It should be noted that, while the number of out-of-season permits was markedly fewer in 2001, the number of deer taken increased dramatically. A similar pattern occurred in 2003, 2006 and 2010. This is quite consistent with intensification of problems in a smaller number of areas as land clearing for development squeezes the deer population into smaller and more isolated patches of habitat.

c. Problems Created by Overabundance

i. Ecological Impact

Effects of a persistent and overabundant deer population include the loss of biodiversity and a negative effect on ecological and biotic systems. These can be seen in a declining understory (lower height plants and shrubs that serve as a food source for birds) and the appearance of browse lines, which occur when deer eat almost all the vegetation within their reach and the woods develop a "line" at the top of their reach. While few detailed deer/forest impact studies have been performed in the county, in a report to the Animal Services Division, Fairfax County Police Department, the Superintendent of Administration of the Northern Virginia Regional Park Authority noted that "the ever present browse line had now become a common sight in most of our parks. The deer have eaten all of the herbaceous and woody plant growth within their reach. This has eliminated an entire stratum of habitat from the parks."

The browse line and loss of understory are not the only indications of this ecological impact. There is an abundance of technical literature reporting the effects of a high deer population on plant communities when the lower ecosystem carrying capacity (see page 356) is exceeded. However, the apparent poor health of the county's deer indicates a level of deer density that reportedly exceeds even the higher biological carrying capacity. There are also numerous studies documenting the negative effects of overabundant deer on wildlife species. For other vertebrates, this may occur through direct competition for food sources or more often by altering the habitat. For example, in some areas of the county, the number of species of birds has markedly diminished through loss of the necessary habitat due to excessive browsing by deer.

Table VIII-1-2 Out of Season Kill Permits Issued For Deer Damage in Fairfax County Virginia Department of Game and Inland Fisheries		
Year	**Permits**	**Number Taken**
1989	5	25
1990	3	4
1991	19	41
1992	18	43
1993	42	222
1994	31	131
1995	65	193
1996	165	244
1997	147	310
1998	157	297
1999	216	377
2000	197	263
2001	148	398
2002	187	249
2003	173	311
2004	217	279
2005	191	219
2006	168	258
2007	152	245
2008	140	275
2009	182	211
2010	152	403
2011	NA	NA

(Source: Susan Alger, Matt Knox, Mark Pritt, Jerry Sims, and John Rohm, Virginia Department of Game and Inland Fisheries.)

As noted in the 1997 Consultant Report and throughout the scientific literature, "the consequences of a persistent, overabundant deer problem can be long-term loss of biodiversity and negative impact to functioning ecological and biotic processes." We have already begun to see a loss of biodiversity that is beginning to lead to a loss of ecosystem stability, with far more widespread and serious effects than just the shorter-term effects of overabundant deer.

ii. Property Loss and Damage (Vehicular, Plantings)

Nationally there are 1.5 million deer-vehicle collisions annually that cause more than $1 billion in damage and kill several hundred people. In a prior year, the Insurance Institute for Highway Safety ranked Virginia as the state with the seventh largest number of such collisions. The IIHS data showed the average insurance claim for vehicular damage was $2,600, but with injuries the total average claim rose to $11,000. The Fairfax County Police Department does an excellent job of analysis of the data on deer-vehicle collisions that require a police presence in their aftermath or that are otherwise reported. The numbers appear to have increased, but the data (Table VIII-1-3) do not show a consistent trend. For those accidents tabulated from January 1998 through 2002, the average damage per vehicle was about $2,300. Over a five year period from January 1998 through 2002, the Virginia Department of Transportation picked up 4,507 carcasses of deer killed in vehicular collisions from rights-of-way in the county. In 2002, VDOT picked up 1,057 deer carcasses from the roadway and immediately adjacent right-of-way in Fairfax County, which represents a small increase from earlier years. This increase most likely represents normal variation from year to year. Data for the first six months of 2011, as compiled by State Farm, a major insurance company, show that deer-vehicle collisions resulted in property damage with an average cost of $3,171.

Police and highway experts estimate that only 20-25 percent of deer impacting vehicles die at the scene (i.e., on the road itself or in the right-of-way); many receive injuries that are soon fatal, but die in the woods or in a nearby yard. Thus, a reasonable estimate would indicate some 18,000-22,500 deer-vehicle collisions in the county during the 1998-2002 period. One can reasonably infer that many, if not most, of these collisions result in property damage to the vehicle. In addition to those crashes that required a police presence, in 2002 there were 1,057 reported deer-vehicle collisions, and in 2003 the number increased to 1,371 reported collisions.

County personnel report an increasing number of complaints of damage to native and ornamental plants in Fairfax County. Referring again to the “Out of Season Kill Permits Issued for Deer Damage” (Table VIII-1-2), an indication is given of homeowner attempts to address property loss primarily thought to be ornamental in nature. Further, although numerous deer management programs are available, such as planting less preferred species and fencing, the effectiveness of these methods declines dramatically with increased deer densities, leading to declining food sources and willingness of deer to eat even undesirable plants. These activities may also tend to increase vehicular incidents, as deer must look farther afield for food sources.

Table VIII-1-3 Deer-Vehicle Collisions in Fairfax County				
Year	**Non Injury**	**Injury Crashes**	**Fatal Crashes**	**Total**
1993	154	6	0	160
1994	149	10	0	159
1995	127	6	0	133
1996	157	20	0	177
1997	168	17	1	186
1998	144	23	0	167
1999	177	18	1	196
2000	144	17	0	161
2001	143	22	0	165
2002	122	10	0	132
2003	160	19	0	179
2004	122	14	1	137
2005	151	13	1	165
2006	115	14	0	129*
2007	133	19	0	152*
2008	114	16	0	130
2009	N/A	N/A	N/A	N/A
2010	102	18	0	120
2011	NA	NA	NA	NA

* 41 and 43 percent of these crashes occurred in October and November
(Source: Report 1993-2001, Michael Uram, FCPD; 2002-2004, 2006 Earl Hodnett, former county Wildlife Biologist; 2005, Emily Yance-Houser, FCPD; 2008, 2010 Brandi Horita, FCPD.)

iii. Disease

Another problem associated with deer overabundance is the prevalence of Lyme Disease. See Section VIII-4 below in this chapter for a discussion of Lyme Disease.

C. ISSUES IN ADDRESSING THE PROBLEM

To effectively manage the deer population, the implications and interrelationships of population dynamics, carrying capacity, public opinion and methods for management must be understood and incorporated into the program.

1. Understanding Population Dynamics

The concept of population dynamics is crucial to understanding the current problem and the development of a workable solution. There are no simple mathematical models that can be applied to determining the growth of the population of a species in a particular area, and the least complex deer management models and programs based on solely on nutritional deer carrying capacity (see section on carrying capacity below) consider neither the deer population's interactions with the human population nor its interactions with a biodiverse ecosystem.

One important concept to understand is that of home range. Deer show a strong attachment to a home range, and it has been shown that deer forcibly relocated often die of malnutrition even if food is accessible in their new habitats. When natural dispersal from the home range occurs, it is usually the younger males that migrate. This has four implications for Fairfax County deer management:

1. Deer often occupy a home range that can include both a park and the surrounding community or islands and corridors of "natural" habitat plus the yards and gardens of adjacent residential communities.

2. A dramatic decrease of the deer in one area will not necessarily result, in the short term, in an increased dispersal of deer from other areas into the depleted area, with a consequent lessening of population density in those other areas.

3. Deer cannot be eliminated from the county under today's conditions, because the deer surviving in surrounding home ranges will, in the long term, undergo natural dispersal and repopulate the depleted areas. This implies that parks and the surrounding areas must be managed as a unit and that solving the problem in one area does not automatically translate to another area.
4. The recent emergence of epizootic hemorrhagic disease, a viral disease fatal to deer but posing no threat to humans, may be a significant factor in natural reduction of the deer population over the next several years. EHD has sometimes been implicated as a significant factor in the boom-bust cycle observed within deer populations that have been the subject of long-term study. Within the past year, 53 deer fatalities due to EHD have been diagnosed in the southeastern portion of the county, and these diagnosed cases probably represent only a small fraction of those succumbing to the disease. Weather, the size and compactness of deer herds and the overall health of the deer play a major role in EHD transmission. Thus, it is not possible to predict the future course of this disease within the county, except to note that it usually takes several years to run its course within a deer population and we appear to be in the early stages of an outbreak.

Other concepts that affect population dynamics include compensatory reproductive responses, survival and predation. Again, it must be noted that deer management is not a simple mathematical equation; it must take into account many biological and behavioral factors, many of which are not fully understood, especially in an environment such as Fairfax County. For example, in many cases, as the size of an animal population decreases, the number of offspring increases, despite the fact that food is becoming less adequate. This phenomenon leads to the population eruption-crash cycles that are widely discussed in the scientific literature. More complete data and an improved understanding of the unique characteristics of Fairfax County must be collected and considered as the management program evolves.

2. Determining Carrying Capacity Goals

Carrying capacity is the level of a population that can be supported by an ecosystem or tolerated by the community. To determine the appropriate population level as a goal for a management plan, it is essential to distinguish among the following:

1. Biological carrying capacity, i.e., a species specific level that is primarily concerned with the population that can be supported with the available nutritional resources

2. Cultural carrying capacity, i.e., a level that is driven by human concerns (the population that can be tolerated by the community at large)

3. Ecosystem carrying capacity, i.e., the population level that can be supported by an ecosystem without disturbance of its stability or reduction of its biodiversity.

The biological carrying capacity is a traditional view that has been widely used by fish and game departments where a primary concern is to maintain adequate stocks of deer for sport hunting, but it does not adequately account for the effects of relatively high population levels on the ecosystem in which the species resides. The cultural carrying capacity is defined by Ellingwood and Spingnesti (1986) as the maximum number of deer that can coexist compatibly with local human communities before conflicting with some human interest. This level is driven by human values, economics and desires independent of ecological considerations. DeCalesta (1998) used the term diversity carrying capacity in a more restrictive sense than ecosystem carrying capacity, but both concepts consider the maximum species population density that does not negatively impact diversity of fauna or flora, including diversity of habitat structure as well as species richness. He contends that deer impacts on biodiversity occur at population densities well below traditional definitions of ecosystem carrying capacity.

Thus, biological carrying capacity is the highest population density and is considerably in excess of cultural carrying capacity (human societal tolerance), which in turn accepts notably higher densities than ecosystem carrying capacity. Finally, diversity carrying capacity has the smallest maximum population density.

3. Considering Public Opinion

Goals for management and methods to use to reach those goals are very different issues; consensus or conflict among groups of constituencies may occur at either or both levels. Goals may vary from a biological carrying capacity level that meets hunting concerns to a much lower carrying capacity level based on an ecological or biodiversity perspective. Cultural carrying capacity may run the gamut of levels, depending on the varying values and tolerances of different constituencies within the community. Even where there is agreement on the level of deer density desired, the methods to reach those goals may be in dispute. Some groups may have a zero-tolerance for lethal means, whereas others may readily support managed hunts or sharpshooters.

As indicated in the 1997 Consultant Report, deer control action by the county should not be undertaken until it is determined that there is sufficient community and political support for it. Again, the need for data, this time in the form of public opinion surveys, is stressed. Additionally, the need to adequately educate the public about the issues is needed to ensure well-informed constituent responses. This is one of the purposes of the extensive tutorial that forms the beginning of this section ---- to give the general public sufficient information on deer population biology that they can make a well-informed judgment.

D. METHODS FOR DEER POPULATION MANAGEMENT

1. Population Reduction Approaches

a. Let Nature Take its Course - Eruption/Collapse

This approach is based on using no human intervention to affect the deer population one way or the other. This has been studied by wildlife biologists for more than half a century. The findings are that the population goes through an eruptive phase with explosive population growth until it is far above biological carrying capacity. This is followed by eruptions of parasitic and infectious diseases (such as EHD) and by large-scale starvation, which causes the population to crash to perhaps 15-25 percent of its peak level. Thereupon, the herd recovers to begin the cycle anew. Some study populations have been followed through five or six successive cycles. Although the deer population of Fairfax County can be considered to be in the early stages of the eruptive phase, it is well short of a peak. Public concerns about the current and expected future impacts on the community rule this out as an option.

b. Lethal Methods

i. Managed Hunting

Experiences with managed hunts over the past several years indicate they have been highly cost effective, in that revenue has exceeded costs for personnel and materials. This is in sharp contrast to their initial use in 1998, when costs were high and relatively few deer were taken. The dramatic upturn in the learning curve is very encouraging. Necessarily, managed hunts are conducted primarily in parkland, and while the amount of deer population reduction in these local areas is no doubt ecologically beneficial, in terms of absolute numbers it has been insufficient to make an immediate noticeable difference in the overall problem.

ii. Archery Hunting

Archery hunting has proven an effective and acceptable means of deer control in residential areas where use of firearms is deemed too hazardous. Archery is a quiet and short-range method, with most deer being taken within less than 100 feet. During the 1998 public hunting season, 789 deer were taken in Fairfax County, of which 597 were taken by archery and the remainder by shotgun. In 1999, archery accounted for 686 of the total of 1,046 deer, and in 2000 accounted for 626 of 1,028 deer. With out-of-season kill permits, archery can be used year-round, even in residential neighborhoods. In 2003, the organized Urban Archery Program harvested 119 deer and an additional 854 were taken with archery equipment by individuals.

iii. Traditional Public Hunting

Under current restrictions outlined by VDGIF, the above figures show that traditional public hunting is not sufficient to address the problem, based on hunters' limited access to deer habitat and preference for antlered deer. Moreover, the habitat that is accessible is not where the major problem areas are located.

iv. Trap and Kill

This method has usually been conducted by darting with anesthetics and dispatching the animal by gunshot or a lethal drug. The former is less effective than sharpshooters while the latter leaves the meat unfit for human consumption. The use of drop nets and stun guns is explained in the 1997 Consultant Report as a possible lethal method. This method allows for release of non-targeted males and results in meat uncontaminated by drugs but is very cost inefficient.

v. Sharpshooters

The use of professional animal control personnel, police experts, or qualified and experienced volunteers has been proved to be a safe, cost-effective and successful means of management if lethal methods are employed. Earlier experience with this method in Fairfax County has led to significant refinements and greatly improved cost-effectiveness, with a cost per deer taken ranging from $4.15 to $22.97. The most recent data indicate a cost of $29.58 per deer taken. In the 2007-2008 season, 76 does and 43 bucks were taken by sharpshooters, for a total of 119 deer. Once again, the number of deer removed from the population by this method is not sufficient to have more than a modest local effect. However, the sharpshooter program has been so effective in our larger parks that vegetation has begun to recover and the focus can now shift to some of our smaller parks.

vi. Reintroduce Predators

The reintroduction of the usual species of deer predators into an urbanized setting such as Fairfax County is biologically unworkable and publicly unacceptable.

c. Nonlethal Methods

i. Trap and Relocate

Experiments with this approach have been largely unsuccessful due to high initial mortality (up to 85 percent) of the relocated deer. Moreover, there are few locations within a reasonable distance of this area that would accept relocated deer, since most nearby areas have similar problems. The use of drop nets and stun guns is suggested in the 1997 Consultant Report as a possible method for deer capture. More traditional methods use anesthetic darts. This method is considered infeasible for Fairfax County.

ii. Contraception

Steroidal/hormonal contraception has proved very costly and difficult to implement and only very marginally effective. Immunocontraception (where the female's immune system is stimulated so as to prevent fertilization of eggs), on the other hand, holds some promise for deer management, but it is currently in an experimental stage. The Humane Society of the United States has conducted field studies at the enclosed National Institute of Standards and Technology site in Montgomery County, but due to difficulty with marking deer, the Humane Society is not yet conducting studies for free-ranging deer such as those in Fairfax County. The recent technical literature discusses

requirements for sites chosen for pilot tests. All indications are that this is not a near term solution for the county but might hold promise for limiting populations in the future, once populations have been reduced to desired levels.

2. Conflict Mitigation Approaches

Conflict mitigation is directed toward reducing the direct impacts of deer on the human population and thereby increasing the tolerance of the community for the existing deer population.

a. Supplemental Feeding

Conceptually, this approach is supposed to divert deer from the landscape plantings in gardens and yards. Supplemental feeding might somewhat improve the health of the existing deer population but would almost certainly drive it to even higher levels. Thus, consideration of this approach would be counterproductive for Fairfax County, since it does nothing to reduce the excess deer population.

b. Fencing

Fencing is only rarely effective, since deer are noted for leaping even eight foot fences. Thus, fencing is a costly and ineffective solution, especially when deer are seeking out preferred plant species.

c. Repellants

In the past repellants have had limited success and are generally costly and most require frequent replenishment. Also, many of them have odors that are no more acceptable to humans than they are to deer. However, repellants containing denatonium benzoate have been used very successfully by commercial tree farms and are now available through retail nurseries. Denatonium benzoate is the bitterest-tasting substance known to science and is usually compounded in a polymer latex emulsion (such as Tree Guard™) which is sprayed on plants and will last for approximately three months and will not wash away in rains. Because it is simply bitter-tasting and not poisonous, it may be safely used on any vegetation not destined for human consumption.

d. Roadside Reflectors

Roadside reflectors divert light from vehicle headlights toward the sides of the roadway and are intended to frighten the deer away from the road, thereby reducing the likelihood of vehicle collisions. The method is potentially most useful in the evening and early morning hours when the majority of deer-vehicle collisions occur. While expensive, this technique has shown some limited promise in tests. The Virginia Department of Motor Vehicles gave the county a $40,000 grant to

conduct studies of the effectiveness of roadside reflectors. The first test site was a section of Telegraph Road that has had a high incidence of deer-vehicle collisions. The initial results show limited promise but are confounded by three other factors: (1) construction activity in the area may have driven many deer away; (2) a high incidence of epizootic hemorrhagic disease that may have naturally reduced the population; and (3) an archery hunting program at Fort Belvoir that definitely reduced the population in that area. The county staff identified and began testing at additional test sites, but these also had problems that rendered data interpretation extremely difficult.

e. Underpasses

Construction of underpasses has been suggested as a way of providing deer with a safe means of getting to the other side of busy roads. Not only is it exceedingly costly, but there are no data available now or expected in the future that would pinpoint likely sites. Consequently, this approach is regarded as wholly impractical for Fairfax County.

f. Use of Less-Favored Plants

Landscaping with plant species that are less favored by deer has been advocated as a way of reducing depredation of yards and gardens. However, as Cypher & Cypher (1988) and numerous other wildlife biologists have shown, when deer populations exhaust the preferred plant species, they readily turn to those less-preferred. Thus, in the short term this approach might seem to work, but longer term experience indicates that it is relatively ineffective.

E. PUBLIC EDUCATION PROGRAM NEEDS

As noted above, an educated public that has an understanding of the population dynamics of deer, the concepts of carrying capacity, the different management options and an understanding of the various values of the community in addressing ongoing management is essential to the successful implementation of a deer management program. The recommended public education program should encompass the following:

- The county Deer Management website already serves as a primary vehicle for making much of the information mentioned below more readily available and updatable. See: http://www.fairfaxcounty.gov/living/animals/wildlife/management/deer-management.htm

- Develop pamphlets that are easily read, easily mailed, available through various county offices and through the local Supervisors' offices. These should include information on:

  - Deer and deer biology.
  - Ecosystem and population dynamics in general, and as they relate to the interaction between deer and other species of both plants and animals.
  - Methods of population management, including their relative feasibility and cost-effectiveness for achieving both short-term and long-term goals.
  - The deer management program.
  - Permits required for implementation of private control measures.
  - Fencing and repellents.
  - Safe driving and how to avoid deer on the road.
  - Lyme disease and its prevention (See Section VIII-3 of this report).
  - Who to contact for additional information.

  However, given the continuing shift from print material to website availability of information, much of the above may be more efficiently made available by the latter means.

- Establish networking among the following agencies for provision of consistent public information:

  - Fairfax County Government offices.
  - Fairfax County Supervisors district offices.
  - Fairfax County Wildlife Biologist.
  - Fairfax County Animal Services Division.
  - Nature Centers.
  - Health Departments.
  - State agencies, particularly Virginia Department of Game and Inland Fisheries and the Virginia Department of Transportation.
  - The Humane Society.

- Compile and make available a comprehensive bibliography of literature on deer management in urban environments. (The references attached to this section provide a limited example.) Make this information available to schools, civic and technical groups and interested individuals.

- Establish an archive of evidence documenting how deer can change the characteristics of a landscape. This should show:
  - Habitat characteristics before deer damage.
  - Habitat characteristics during and after deer damage.
  - Habitat characteristics during regeneration after deer population is reduced.

- Statistics and trends for vehicle/deer collisions, number of injuries/fatalities and types of damage.

- Create a visual display of the above for use at schools, fairs, libraries, etc., and develop presentations for use at public meetings and meetings of civic groups.

- Establish a county self-service telephone number for wildlife problems and public information. This could be a menu-driven hotline that would direct people to the proper location on the information network or to the appropriate county office.

F. PUBLIC AGENCY RESPONSIBILITY

The Animal Services Division of the Fairfax County Police Department has been assigned primary responsibility for deer management by the Board of Supervisors. However, due to the legal concept that ownership and disposition of wildlife is vested in the Commonwealth, the Virginia Department of Game and Inland Fisheries exercises significant regulatory and permitting functions that affect Fairfax County's deer management activities. The county Wildlife Biologist and the Animal Services Division, in coordination with applicable land-holding agencies (e.g., Northern Virginia Regional Park Authority, Fairfax County Park Authority) and other public authorities, implements the Integrated Deer Management Plan on public lands. In addition, the county Wildlife Biologist and the Animal Services Division advise private business and residents in addressing deer management on privately owned parcels in Fairfax County. Deer management on federally owned tracts of land within Fairfax County (e.g., Mason Neck National Wildlife Refuge, Fort Belvoir, etc.) is the responsibility of the respective federal agencies and is subject to the applicable federal policies and regulations.

G. PROGRAM IMPLEMENTATION ACTIVITIES

An Integrated Deer Management Plan was developed by county staff subsequent to the Consultant Report received in December, 1997. The Board of Supervisors in November, 1998 directed that program implementation activities commence. Subsequently, in summer 1999, the county executive convened a Deer Management Committee comprised of experts and various stakeholders to evaluate the plan and initial implementation efforts and to prepare recommendations for the Board of Supervisors for further implementation of the plan during the fall and winter of 1999-2000. This committee initially met annually to review progress in program implementation and to make recommendations on additional approaches. The county Wildlife Biologist and the Animal Services Division of the Police Department prepare the annual Fairfax County Deer Management Report to the Board of Supervisors that contains extensive data on the program. Additional material is provided on the county website http://www.fairfaxcounty.gov/living/animals/wildlife/management/deer-management.htm.

On December 8, 1997, the Fairfax County Board of Supervisors approved managed hunts for Riverbend Park and the Upper Potomac Regional Park, both in the Dranesville District. Plans by the county Wildlife Biologist and the Animal Services Division were approved by the Northern Virginia Regional Park Authority and the Fairfax County Park Authority for four managed hunts for each of the two locations. The hunts were planned for January and February of 1998. The managed hunts conducted in 1998 were largely unsuccessful in achieving planned program objectives and had associated costs that were difficult to justify. However, some of these costs could be attributed to greater-than-necessary safety measures that experience now indicates would not be needed in the future. In contrast, four managed hunts, involving 132 hunters, conducted in the fall and winter of 1999-2000 were very cost effective, with 195 deer taken at a cost per animal of $9.51. The seven managed hunts conducted in the fall and winter of 2000-2001 involved 223 hunters, who took a total of 351 deer at a cost per animal of $17.94. Of the 351 deer taken, 222 were donated to a program that feeds needy families. For 2001-2002 hunt season, the program returned a profit of $7.28 per animal because the permit fees collected exceeded program costs. This was also true in the 2002-2003 season, with a profit of $79.60 per animal taken.

The sharpshooter program, which utilizes Police Department Special Operations Division tactical teams, has been cost-efficient from the outset. These teams must engage in extensive marksmanship training on a regular basis in order to maintain the required proficiency. Instead of practicing on a target range, they are utilizing this required training time in a field setting with the deer more closely resembling operational targets. The harvested deer are collected by a charitable organization that provides meals to the needy. Even in the early part of the learning curve, this program has shown satisfactory harvest rates. Whereas, similar programs in most mid-Atlantic jurisdictions have harvests listed in hours per deer taken, Fairfax County in 2000 had a harvest rate of 1.54 deer per hour. From late December, 1999 through late January, 2000, fourteen sharpshooting sessions over a total of 41 hours were conducted, with a total harvest of 89 deer at a cost of $4.15 per animal. In the same period of 2000-2001, there were 23 sharpshooter sessions, totaling 94.75 man-hours, which took 146 deer, at a cost per deer taken of $22.97. In the 2002-2003 season, the sharpshooter program took 248 deer. In 2001, the cost per animal rose to $44.99 if all costs were attributed solely to the Deer Management Program, but this would be fallacious due to the fact that this activity also represents proficiency training for the police tactical units which must be conducted anyway. A major reason for this increase in cost per animal is that most of the sites in a given year represented repeat visits to locations first addressed in previous years. As the herd population density decreases, the time expended on each animal increases, and this is further increased by the increased wariness of the surviving members of the herd. The most recent data indicate a cost of $29.58 per deer taken. In the 2007-2008 season, 76 does and 43 bucks were taken by sharpshooters, for a total of 119 deer. Thus, the costs are very much in line with expectations and will drop once again as more new sites are brought into future years' mix of new and old locations.

Clearly, the managed hunt and sharpshooter programs must be conducted largely in parkland due to safety considerations, but this is also where some of the most substantial

benefits are to be achieved. From the outset, the Northern Virginia Regional Park Authority has taken a position of active involvement and has reaped corresponding benefits. It is very important that the Northern Virginia Regional Park system continue to be a full participant in these efforts, otherwise the regional parks will act as a reservoir for deer herds that will emerge to adversely impact nearby residential communities and Fairfax County parks.

The Fairfax County Park Authority has been actively involved and availed itself of the clear benefits offered by the program to the ecology of its parks. The FCPA reported in June, 2003 significant regeneration of the vegetative understory in two of our parks that were among the most overgrazed and have had herd reduction measures used for two successive years. This degree of success is very encouraging, and it is planned that the FCPA will continue its active involvement in the program and thereby exercise the ecological stewardship that is so necessary to the biotic health of our parks and parkland. By mid-year 2004, the thinning of the herd in several of our larger parks had led to significant regeneration of vegetation so that the emphasis will now shift to smaller parks and those that have not yet had program activities implemented.

Out-of-season kill permits have, for some years, been one of the few legal avenues open to private property owners to permanently remove deer that are causing serious damage to their properties. Such permits are issued by the Virginia Department of Game and Inland Fisheries after verification of the damage. Generally, however, permits are only issued for holders of larger property parcels because of safety considerations. Fairfax County should work in coordination with the VDGIF to make these permits available on a wider basis to qualified residents.

Archery hunting is quite effective in suburban areas since it is much safer than the use of firearms due to the short range of the projectiles. In addition to those residents who have the necessary skills and equipment, there are several commercial firms that offer specialized deer removal services. In one recent year, 1,085 deer (up from 854 deer during the previous year) were harvested using archery equipment. Another 158 (up from 119) deer were taken under the county's Urban Archery Program. This reduction of the county's deer herd by 1,243 individuals demonstrates the effectiveness of archery as a tool in meeting program goals and as a method that can be safely employed in even heavily populated areas. Under the guidance of the county Wildlife Biologist, a countywide archery program has just been implemented that will make permitted archery services more readily available to residents in neighborhoods and to smaller commercial parcels where firearms are not permitted or are not practical.

The use of roadside reflectors (strieter-lite technology) that reflect automobile headlights into wooded areas bordering the roadside has been suggested as a method of discouraging deer from crossing roadways in the evening and early morning hours, when most deer-vehicle collisions occur. In mid-November, 1999, the Board of Supervisors approved $10,000 for a pilot program to test strieter-lite reflectors in selected locations. In addition,

a grant of $40,000 was received from the Virginia Department of Motor Vehicles for testing and evaluation of this technology at several locations in Fairfax County. Unfortunately, all of the test locations experienced confounding factors such as roadway modification, adjacent development, deer herd reduction through hunting and disease, etc, that made it difficult to draw reliable inferences from the collected data. In addition, the manufacturer of the reflectors has apparently discovered that the initial design was reflecting light in a part of the spectrum to which deer's eyes are relatively insensitive, and the design is now being changed. Such inferences as can be drawn from the data suggest that there is only a slight reduction in deer-vehicle collisions due to the use of reflectors. This conclusion appears to be borne out by tests in other eastern areas where there was an absence of confounding factors. The tests in Fairfax County have shown this technology to have so little promise that it cannot be recommended for continuance.

Even though Fairfax County has not conducted a pilot project to test the feasibility of immunocontraception, this technology has shown a limited potential for the future. A program being conducted by the Humane Society of the United States on the fenced campus of the National Institute of Standards and Technology in Montgomery County is being carefully monitored for possible applicability to Fairfax County. After the deer population has been reduced to generally acceptable levels, this methodology might provide a feasible method of sustaining these levels in some local herds for the long term, but with the important caveat that it appears workable primarily on closed, fenced parcels. In mid-November, 2000, the Board of Supervisors approved $10,000 to develop a pilot demonstration program on deer contraception, but results of this technology have shown almost no promise for long term applicability.

H. CONCLUSIONS

The need for a comprehensive deer management program for Fairfax County is not in serious dispute. However, there is perhaps a somewhat wider array of opinion about the appropriate context for determining carrying capacity level for the management program and the particular methodologies to employ in reaching program goals.

As noted in much of the reference literature, deer have traditionally been viewed as livestock and woodlands and meadows as pasture. Deer management models and programs have been based largely upon nutritional deer carrying capacity that does not consider issues of biodiversity, altered natural processes, natural herd demographics and behavior, or adverse impacts on mankind. The discrepancy of views can be seen in comparing a report by the Virginia Department of Game and Inland Fisheries with the Consultant's Report. The VDGIF report states that deer densities ranging from 90-419 deer per square mile have been reported in various county parks and that ideal deer densities are 15-20 deer/sq. mile of suitable habitat. However, the 1997 Consultant Report and much of the scientific literature argues that a deer density of no more than 8-15 deer/sq. mile is required to meet a biodiversity goal of deer management. Many of the assumptions upon

which the Integrated Deer Management Plan for Fairfax County is based require adjustment based on continued environmental assessment of the county and to meet more precisely defined ecological goals.

It is evident that, while deer in Fairfax County have not reached a state of overpopulation (as earlier defined), they are near biological carrying capacity as shown by their poor physical condition and their relentless foraging outside their "natural" habitat. It is equally evident that, for the majority of residents, deer have greatly exceeded cultural carrying capacity in terms of representing a serious vehicular hazard and their depredations on both private landscaping and our public parklands. There is now substantial evidence documenting the fact that ecological and biodiversity carrying capacities have long since been exceeded.

In light of the Environmental Quality Advisory Council's role as an advocate for protection of environmental quality, it is EQAC's view that a biodiversity approach is needed in Fairfax County. However, as cautioned in the 1997 Consultant Report, EQAC too cautions against attempts to move responses forward without adequate data, clearly articulated plans and education and consensus building of major stakeholders. While moving quickly may assuage the concerns of some vocal groups, a true solution must address the problem with a long-term approach, considering the needs of all major stakeholders. The overall management approach must address an ecological goal that is based on sound science and also considers the value system of an educated community.

All of these caveats having been noted, the problem is of such proportions that every feasible approach must be employed not only to keep the burgeoning deer population in check, but more important, to systematically reduce it to sustainable levels. It is evident that the current managed hunt and sharpshooter programs have reached an admirable level of cost-effectiveness but are not reducing the countywide deer population at a rate sufficient to achieve the recommended biodiversity carrying capacity. The newly enhanced archery program should be of significant help but must be evaluated for effectiveness, especially over the first 2-3 years. Thus, it is incumbent upon the Board of Supervisors to continue to take increased and decisive action to address this problem over the long term, while recognizing that it is not going to be possible to please all of the people all of the time. It is likewise essential that the Fairfax County Park Authority continue its active participation in the deer management program in order to exercise the necessary stewardship of the ecological well-being of the county's parklands, which now constitute nearly 10 percent of the land area of the county. The regeneration of parkland where the program has been implemented for several years shows clearly the benefits to be derived and makes it possible to schedule other parks for program activities.

I. RECENT ACTIVITIES AND ISSUES OF NOTE

- The county Wildlife Biologist position became vacant in 2008 and there was a considerable lapse in program activities until a suitable replacement could be identified and brought aboard. At the same time the nationwide recessionary environment severely impacted the county budget and caused additional reductions in program activities. The county Wildlife Biologist position has now been filled by a highly qualified individual who has conducted a thoroughgoing assessment of the wildlife management programs and introduced some additional activities.

- However, despite these difficulties the deer management program was able to conduct some managed hunts and sharpshooter events. The Park Authority on its separate federal permit was able to oil substantial numbers of goose eggs.

- The Wildlife Biologist and the Director of Animal Services have conducted an extensive program review in order to maximize the ongoing effectiveness of the program and the most efficient application of fiscal resources.

- An archery program has been implemented, which will make it possible to address deer control in residential areas where discharge of firearms is prohibited.

- EQAC feels that it is essential to maintain the programs for controlling the deer population. Otherwise: (1) each year we will lose ground and the damage to key vegetation will increase; and (2) the diet of the excessively large deer herd will become less adequate and the health of the individual members of the herd will suffer.

J. COMMENTS

The comments and recommendations provided below address only the first section of this chapter (deer management issues). A comment and a recommendation addressing geese issues and comments addressing coyotes and wildlife borne disease issues are found beginning on pages 380, 384 and 393, respectively.

1. While limited program activities were conducted during the vacancy in the position of Wildlife Biologist it is apparent that there was considerable additional damage to the vegetation of the vital understory throughout the county.

2. Due to the current recessionary environment in which the county has been operating, it was necessary to cancel the Assistant Wildlife Biologist position that had been authorized but not yet filled. It is hoped that economic recovery will make it possible to restore program staff to an appropriate level.

3. Public understanding and perceptions of the deer management program were assessed through a survey conducted in mid-2010. The results of the survey are available on the county website http://www.fairfaxcounty.gov/living/animals/wildlife/deer-management-survey-results.htm.

K. RECOMMENDATIONS

There are three recommendations for continuance of activity in the deer management program:

1. Managed hunts should be continued as they have become both cost-effective and efficient in reducing excesses in the deer herd.

2. The sharpshooter events should be continued because they are both humane and cost-effective.

3. The newly begun archery program should be continued as a means of controlling deer depredation of vegetation on residential properties where firearms cannot be used.

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Emily Yance-Houser, Fairfax County Police Department.

Susan Alger, Virginia Department of Game and Inland Fisheries.

Matt Knox, Deer Biologist, Virginia Department of Game and Inland Fisheries.

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VIII-2. IMPACTS OF GEESE IN FAIRFAX COUNTY

A. OVERVIEW

Canada geese, once almost exclusively migratory, have to an increasing extent become year-round residents in Fairfax County. Although these resident populations are not evenly distributed throughout the county, many of our ponds and lakes, both large and small, and their adjacent shore areas have been occupied as permanent habitat. Geese have also become an increasing problem on parkland, golf courses and similar facilities. The problem is not so much the animals *per se* but rather the fecal contamination they bring to our water bodies and watercourses and their fouling of grassy open areas. Geese wastes are a well-documented source of fecal coliform bacterial contamination, which has reached alarming levels in many ponds, lakes and reservoirs, even those forming part of our domestic water supply. An additional problem is the damage resident geese cause to our marshes, where they feed on sprouting plants so voraciously that some once plentiful botanical species have all but disappeared. Addressing these problems inevitably requires reducing the goose population, but this is complicated, because geese are protected by federal migratory waterfowl laws.

B. BACKGROUND

1. Origins of the Goose Problem in Fairfax County

In earlier times, the Canada goose was a strictly migratory bird with its nesting range in wilderness areas of Canada and its winter range well to the south of our area. Geese passed through our area twice a year on their migrations. By the late 1960s, some Canada geese had begun to establish resident populations in this region. This is thought to have begun with birds that were propagated to stock local hunting preserves. Since that time, local Canada goose populations have undergone a dramatic upsurgence. This increase now includes numerous populations of geese that have become permanent residents in the mid-Atlantic region rather than migrating. These permanent populations have become quite obvious in many parts of Fairfax County. Wildlife biologists estimate that the Canada goose population is increasing at about 15 percent annually, which indicates that problems associated with resident goose populations soon will increase to critical levels unless remedial actions are undertaken.

2. Environmental Impact of Geese

A primary impact of geese is environmental pollution, particularly pollution of streams, ponds and lakes with fecal coliform bacteria from their wastes. The magnitude of the problem is illustrated in two examples below.

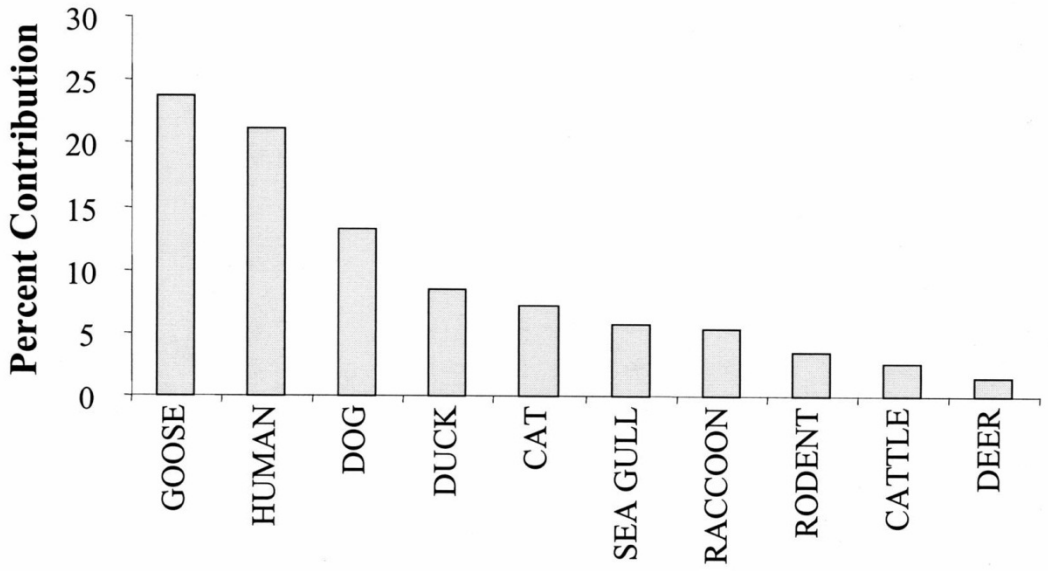
Several years ago, when the Evans Farm property in McLean was in the process of being rezoned for residential development, the farm pond, which was a prominent feature of the site, was extensively sampled to determine if it contained significant levels of pollution. It was known that a resident population of Canada geese was a major contributor to any pollution of the pond. Depending on where the water samples were taken in the pond, the levels of fecal coliform bacteria were found to be from 21 to 27 times those allowable in surface waters in the Commonwealth of Virginia. Drainage from this pond passed through an under-the-road culvert to a much larger pond on the other side of the highway that had two families of resident geese. This pond had fecal coliform counts about three times the allowable level.

More recently, an environmental pollution study was conducted to determine the total maximum daily load of fecal coliform contamination that should be permitted in a portion of Accotink Creek that feeds Lake Accotink. Federal Environmental Protection Agency standards indicated that 98 percent of current levels of pollution should be eliminated, a truly draconian expectation. DNA tests to determine the sources of the extant fecal coliform bacteria pollution revealed that anseriform waterfowl (i.e., geese and ducks) accounted for 32 percent and other wildlife for about 17 percent of the total (see Figure VIII-2-1). With waterfowl being federally protected species and other wildlife largely beyond our control, half of the current pollution load is effectively beyond the power of the county to eliminate in the near term.

Another major impact of resident geese is significant alteration of the ecology of our marshlands. While migratory geese visited marshes on their twice-yearly trips through our region, the stopovers were brief and were timed so that plants had either not yet sprouted or had matured sufficiently that they were not destroyed by feeding activity. However, populations of resident geese are permanent voracious foragers that feed on newly sprouting plants to the point that some plant species are nearly eliminated from the habitat. This is particularly true of plants such as wild rice, which reseed themselves annually and provide food to many animal species. When all of the sprouting plants are consumed before they can mature and produce seeds, there will be no new plants the following year. For example, where wild rice was once an abundant species, many of our marshes are now nearly devoid of it. Thus, because of the ways in which geese change the ecology of marshes they have caused loss not only of key plant species but also of the animal species that are dependent on those plants.

Figure VIII-2-1

Sources of Fecal Coliform Pollution in Accotink Creek



C. ISSUES IN ADDRESSING THE PROBLEM

1. Goose Population Biology

Canada geese are large birds weighing 20-25 pounds, with a life expectancy of some 20 years. Geese mate for life and remain together as pairs year-round. If one of the pair dies or is killed, the other will find a new mate. Mating season is from early February through early April, with nesting season from late March through mid May. Geese begin to nest at three years of age. Eggs are laid approximately one per day until there is an average of five eggs per nest. Incubation (sitting the eggs) does not begin until all eggs have been laid. Eggs not being incubated are cool to the touch. Incubation time is 28-30 days. Normally, all eggs hatch on the same day. Maturation of goslings occurs from early May to early July.

Geese prefer isolated sites near water to nest, with small islands being a favored location. Nests usually are built on the ground in the open, but occasionally are located in brushy or marshy areas if flooding is not a problem. If chased from their accustomed area or if the nesting area has too many pairs, they will find alternative sites, sometimes farther away from water, sometimes near other ponds in the vicinity, and occasionally on rooftops or other unlikely locations.

Migration is a learned process with which resident geese have not become familiar. Geese return to the general area of their birth to nest, sometimes to the exact site and at least to a nearby pond or lake. Migratory geese nest in Canada while geese nesting in our area are resident geese that were born here. Whereas migratory geese have a flight range of 2,000-3,000 miles, resident geese rarely venture more than 100-200 miles and then only in search of food, water, or safety. Migratory geese do not become resident unless they are injured and can no longer fly for long distances.

Molting season runs from early June to late July. Flight feathers are lost in June and the birds are unable to fly for several weeks, but by early August new flight feathers are fully developed and all birds (except for those injured) are able to fly again. During the molting period, geese need to be near water so they can escape from predators by swimming. They also need an easily accessible food supply during this time.

Natural predators of geese include foxes, raccoons, large owls, snapping turtles and, more recently, coyotes.

2. Considerations of Public Opinion

Many residents find considerable aesthetic reward in having a few geese in areas where they can be observed and feel that the presence of such attractive wildlife creates a pleasant ambience. While this may be true, many others find the fouling of yards, open space and water bodies to be unacceptable, especially where geese congregate in appreciable numbers. Moreover, most of the public is unaware, or at best only dimly aware, of the extent to which geese are major polluters of our ponds, lakes and reservoirs, including some of our water supply sources. As the general public becomes better informed about the pollution aspects of goose populations, greater consensus on remedial approaches should result.

3. Federal Limitations on Remedial Action

Geese, as migratory waterfowl, are protected by federal laws administered by the U.S. Fish and Wildlife Service. Therefore, population reduction by lethal measures applied to adult or juvenile geese is generally not an option. In situations where adult birds are creating an extreme nuisance, the Department of Agriculture Wildlife Service can send staff to round up and relocate them. However, the Fish and Wildlife Service does issue permits for egg addling (including egg oiling) programs as a means of population stabilization. The permitting program was revamped in 2007 so that any landowner can now obtain an egg addling permit from the U.S. Fish and Wildlife Service online. Whereas Fairfax County used to hold such a permit for programs anywhere in the county under supervision and/or monitoring by the county Wildlife Biologist, its permit now covers only county-owned land. The Fairfax County Park Authority has its own egg addling permit applicable to its parklands. Use of trained Border Collies to harass

geese into leaving an area is not regulated so long as they do not directly attack or kill the geese.

D. METHODS FOR POPULATION MANAGEMENT

Population management methods that utilize immediate population reduction are severely limited due to stringent federal regulations against killing geese once they are hatched. However, the methods outlined below are permissible and accepted approaches to controlling goose populations. Population stabilization, coupled with measures that discourage geese from future nesting in an area, has proved effective in longer term reductions of population. Quite recently, the Park Authority conducted an experimental managed hunt on a county-owned privately-managed golf course in which course personnel obtained regular hunting licenses that allowed an individual to take, using shotguns, six geese per day in the regular goose hunting season. The results were encouraging and suggest that hunts thus conducted might well be an attractive method for the future on county-owned properties of sufficient size.

1. Population Stabilization

Egg addling and egg oiling are quite effective in preventing eggs from hatching. Strictly speaking, egg addling is vigorous shaking of the egg at a fairly early stage in order to homogenize the contents. This will prevent further development of the egg. Egg oiling coats the surface of the shell with a vegetable oil such as corn oil, which will prevent oxygen from getting to the interior of the egg. This also is effective in halting further development of the egg. Sometimes both methods are referred to as "egg addling." When a clutch of eggs is thus treated, the goose will continue to attempt to incubate them for the normal period, but they will fail to hatch, thus limiting the population to the adult geese already present.

2. Population Exclusion

Most nuisance abatement measures are based on population exclusion. For example, trained Border Collies have been successfully employed to herd geese away from areas where they constitute a nuisance. The geese soon learn to avoid areas patrolled by the dogs, regarding them as unsafe, and they move to other areas where they do not feel threatened. This method of control has been particularly effective in large, relatively open areas such as golf courses. The major negative aspect of this method is the impact on adjacent properties. When the dogs herd the geese off of one property, they necessarily go to the one next door or in the near vicinity. However, if a pair of geese have already made a nest and if dogs are not present all of the time, the geese quickly learn that the can return to their nest. Thus, while one locale is benefited, adjacent locales are afflicted through transference of the problem.

3. Special Foraging Areas

In some cases, an area can be set aside where a small population of geese can be resident without creating an undue nuisance. However, in such cases the aesthetic appeal of having the geese nearby must be balanced by adequate consideration of the water pollution and other waste problems created.

4. Landscaping Modifications

Altering landscaping can sometimes be an effective tool in discouraging geese from congregating near ponds. Bushy plantings, reeds and tall grasses, strategically placed around a pond, will be perceived by geese as a hiding place for predators, thus discouraging them from using that area.

5. Repellents

There are commercially available, nontoxic chemical repellents that discourage geese from eating grass. The disadvantage to this approach is the necessity for frequent reapplications, since each time the grass is mowed most of the repellent is removed along with the clippings.

6. Prohibition of Feeding

Feeding geese encourages them to become resident and to congregate in areas where a "free lunch" is provided. This exacerbates the very nuisance that one is attempting reduce. Also, feeding bread and various kitchen scraps is harmful to the geese's health even though they will avidly feed on such items.

7. Combined Approaches

Clearly, combinations of several of the above approaches can be far more effective than their use individually. For example, the use of trained Border Collies together with landscaping modifications can be quite effective in creating an "undesirable" habitat. If egg oiling is added to this for the few nests that may be established, significant reductions in usage of this area in following years can be achieved.

8. Immuno-contraception

Immuno-contraception has been proposed for controlling Canada goose populations. However, it is inherently fraught with even greater limitations and disadvantages than is this technique with respect to deer populations. Therefore, it is not a subject for serious consideration for Fairfax County.

E. PUBLIC EDUCATION PROGRAM NEEDS

Public awareness of both the pollution problems caused by geese and of the mating and nesting cycle of geese is the key to being able to effectively address the "goose problem." At present, insufficient attention has been given by the public media to the pollution aspects of the problem. Since this pollution creates significant public health risks, the problem needs coverage on the county website and through informative bulletins to local homeowners associations.

F. PUBLIC AGENCY RESPONSIBILITY

The office of the county Wildlife Biologist within the Animal Services Division of the Fairfax County Police Department has been assigned primary responsibility for management of geese by the Board of Supervisors. However, due to the fact that Canada geese are federally protected waterfowl, the U.S. Fish and Wildlife Service exercises significant regulatory and permitting functions that govern Fairfax County's geese management activities. Fairfax County was the first local jurisdiction in the nation to be granted a master permit for egg addling programs and is thereby authorized to train residents, as individuals or groups, to conduct egg addling under its monitoring and control. Except for federally issued hunting permits, intentional killing of hatched geese by humans is prohibited by federal law. In cases where it is necessary for adult geese or hatchlings to be removed from an area, this activity is conducted by the staff of the U.S. Department of Agriculture - Wildlife Services under permit from the U.S. Fish and Wildlife Service.

The population stabilization (egg oiling) program is highly cost effective since, once trained, all labor intensive activities are performed by local citizen volunteers. The only staff activities required are training, monitoring and reporting under the terms of the federal permit.

G. PROGRAM IMPLEMENTATION ACTIVITIES

Goose management programs have been implemented at a number of locations in Fairfax County. Among the locations where goose control measures have been implemented, formerly under the blanket county permit and now under individual permits, are:

1. Annandale
   a. Northern Virginia Community College - population stabilization and nuisance abatement, 11 years.
   b. Pinecrest Community - population stabilization and nuisance abatement, ten years.
   c. Pinecrest Golf Course - population stabilization and nuisance abatement, ten years.

2. Centreville
   a. Franklin Farms - population stabilization, 11 years.
   b. Westfields - population stabilization, ten years.

3. Fairfax County
   a. Lake Barcroft - population stabilization and nuisance abatement, 12 years.
   b. Fairfax County Parks - population stabilization, 12 years.
   c. Copeland Pond - population stabilization and nuisance abatement, 11 years.
   d. Brook Hills - population stabilization and nuisance abatement, 12 years.
   e. Waters Edge - population stabilization and nuisance abatement, ten years.

4. Oakton
   a. Fox Lake - population stabilization, ten years.

5. Reston
   a. Reston Community - population stabilization, 11 years.

6. Vienna
   a. Trinity School - population stabilization, 11 years.
   b. Champion Lake - population stabilization, ten years.

All of these programs have demonstrated reasonable degrees of success in stabilizing populations. In some cases, populations have actually declined over time due to efforts to discourage geese from further attempts to nest there.

In 2002, there were 275 eggs addled under the county permit and 952 under the separate Fairfax County Park Authority permit. In 2003, there were 255 eggs addled at 61 nest sites under the county permit and 819 eggs at 139 nest sites under the FCPA permit. In 2004, due to staffing limitations, there were ten eggs from two nests addled under the county permit and 674 eggs from 123 nests under the Park Authority Permit. In 2005 there were 1,403 eggs addled from 243 nests under the FCPA, but none under the county permit, again due to staff limitations. In 2006, the FCPA program addled 1184 eggs in 235 nests and the county program addled 299 eggs. In 2007, the FCPA program addled 509 eggs in 109 nests. In 2008, the FCPA program addled 451 eggs in 115 nests and the county program 246 eggs in 49 nests. In 2009, the FCPA program addled 522 eggs in 123 nests and the county program 282 eggs in 56 nests. In 2010, the FCPA program addled 439 eggs in 137 nests and the county program 197 eggs in 43 nests. The smaller numbers in those last four years were attributable to the dispersal of geese as the result of prior years' activities.

H. CONCLUSIONS

While geese in small numbers are regarded by many as a pleasant addition to the local ambience, large resident goose populations in many areas of the county constitute a major environmental nuisance and public health risk. Resident goose populations tend to congregate near ponds, lakes and slow-flowing streams, which leads to contamination of these water bodies with high levels of fecal coliform bacteria. In addition, they foul the grassy open areas in the vicinity with their feces. The high growth rate of the resident goose population and the limitations on methods of control have raised pollution to levels that are not only environmentally unacceptable but that now constitute a significant public health concern.

While the programs currently in place to address these problems are good, they need to be replicated much more widely in additional areas of the county. Moreover, more intensive public information campaigns and community outreach efforts are badly needed to actively involve a larger number of individuals and community organizations in population control programs. The office of the county Wildlife Biologist is not adequately staffed to conduct and/or supervise these critical functions. This staffing limitation is very unfortunate, since geese are a major contributor to pollution of the streams and water bodies that are sources of drinking water and are used for recreational purposes and the county is facing increased restrictions in the Total Maximum Daily Load of pollutants that may be present in our surface waters.

I. COMMENT

The comment and recommendation provided below address only the second section of this chapter (geese management issues). Comments and recommendations addressing deer management and comments addressing coyotes and wildlife borne disease issues are found beginning on pages 368, 384 and 393, respectively.

1. The Park Authority has recently held exploratory discussions to examine the feasibility of using managed shotgun hunts for reduction of resident goose populations and the regulatory limitations that may be applied to this approach. An initial pilot test has been conducted on a county-owned privately-managed golf course. This approach has considerable promise for efficiently meeting FCPA control needs and should be expanded and fully supported.

J. RECOMMENDATION

1. EQAC strongly recommends that the goose management program be continued, particularly the public outreach and training activities so that a cadre of volunteers can be created to provide the labor to do the actual egg-oiling that is the principal control measure. In addition, the shotgun hunt pilot test conducted by the Park Authority should be expanded into an established program.

ACKNOWLEDGMENTS

EQAC gratefully acknowledges the following individuals that have provided data and information included in this report:

Charles Smith, Manager, Resource Management Branch, Fairfax County Park Authority.

Earl Hodnett, former Wildlife Biologist, Animal Services Division, Fairfax County Police Department.

Charles Smith, Resources Management Division, Fairfax County Park Authority.

VIII-3. COYOTES IN FAIRFAX COUNTY

A. OVERVIEW

There have recently been a growing number of reports of coyotes in the Washington metropolitan area, particularly in the western portions. They have begun to invade habitats such as Rock Creek Park, and there have been sightings in Falls Church. Contrary to some public perceptions of coyotes as vicious predators without redeeming features, there are distinct pulses as well as minuses to having them around.

B. BACKGROUND

Biologically, the coyote, *Canis latrans*, is another member of the dog and wolf family. The historical range of the coyote was from the western foothills of the Rocky Mountains to the Mississippi River. In the 1880s they began to spread west and today are endemic all the way to the Pacific shores. In the early 1900s they began to spread eastward and during the last 15 years or so have become established in the mid-Atlantic region. They adapt quite readily to urban and suburban environments as long as there are small semi-secluded habitats from which they can venture forth to hunt and forage. Once they enter an area that meets their habitat requirements they rapidly become endemic and are not easily dislodged. Recently, vertebrate taxonomists have speculated that the eastern coyotes, because of their somewhat larger body size and greater leg-length, may be a wolf-domestic dog hybrid. This possibility has yet to be evaluated definitively.

Coyotes most often hunt and forage as solitary individuals or sometimes as pairs, rarely as packs of several adult animals together. An exception occurs in the case of a female with young pups who are being taught to forage or are led on treks to obtain food from human sources such as improperly stored trash and garbage.

The usual food of coyotes is rodents and other small varmints. Adult coyotes will sometimes prey on small deer fawns but do not attack adult deer because of their size. Occasionally coyotes will opportunistically attack small domestic pets, but this most often occurs when they are foraging for improperly stored garbage and outdoor pet feed dishes around human habitations.

The adult coyotes in our region appear to be somewhat larger and heavier than the typical western coyotes. The reasons for this are not presently understood but it is suspected that there may have been some interbreeding with eastern gray wolves. This larger build has the potential to make them more effective predators of Canada geese and young deer fawns.

C. ADDRESSING THE PROBLEM

The only action required at this time is monitoring the spread of the coyote population and any adverse incidents that may occur.

D. PUBLIC EDUCATION PROGRAM NEEDS

The public should be kept informed about when and where to expect to see coyotes. While coyotes will sometimes prey on small pets, e.g., cats and small dogs and the public needs to be kept informed on measures to prevent this, the public also needs to develop awareness of the beneficial aspects of coyotes in controlling populations of small rodents and excessive numbers of small deer fawns. Coyotes can also play a beneficial role in controlling populations of Canada geese.

E. PUBLIC AGENCY RESPONSIBILITY

The county Wildlife Biologist has the primary responsibility for monitoring the coyote population and addressing public education needs. The Animal Control Division of the Fairfax County Police Department is responsible for impounding animals that are behaving strangely and may be infected with rabies. The Health Department monitors cases where humans have been bitten or scratched.

F. PROGRAM IMPLEMENTATION ACTIVITIES

No program activities are envisioned at this time except for monitoring and public education activities by the county Wildlife Biologist.

G. CONCLUSIONS

Coyotes have become established in parts of Fairfax County and will spread and become endemic over time. The public needs to develop an understanding of the occasional risks to small pets but also needs to be educated about the beneficial control of a variety of rodents and other varmints that coyotes provide. They may be of particular benefit in controlling the goose population since they are a natural predator not subject to the restrictions of the Federal Migratory Waterfowl Act.

H. COMMENT

The comment provided below addresses only the third section of this chapter (Coyotes in Fairfax County). Comments and recommendations addressing deer management and geese, and comments addressing wildlife-borne diseases, are found beginning on pages 368, 380 and 393, respectively.

1. A small number of coyotes are becoming resident in Fairfax County. Currently the potential advantages and disadvantages seem about evenly balanced. Thus, there are no recommendations at this time except that the county Wildlife Biologist should monitor the situation and keep the relevant county agencies and the public informed.

VIII-4. WILDLIFE BORNE DISEASES OF CONCERN IN FAIRFAX COUNTY

A. OVERVIEW

There are a number of zoonotic diseases (those in which wildlife serves as a reservoir) that affect humans. Four such diseases of greatest concern in Fairfax County are West Nile Virus, Lyme Disease, Rabies and the complex of diseases caused by fecal coliform bacteria. The causative agents, modes of transmission and means of prevention are briefly discussed below. A new initiative, the Disease Carrying Insects Program, has been undertaken by the Fairfax County Health Department. The reader is referred to their report on West Nile Virus and the Pilot Tick Surveillance Program for additional details in these areas.

B. BACKGROUND

1. West Nile Virus

West Nile Virus is transmitted to humans and other warm-blooded animals by mosquitoes that have fed on birds infected with the virus. Crows have been particularly implicated as a reservoir species, but it is known that many other bird species are also involved. Mosquitoes are intermediate carriers that convey the virus from birds to humans. There have also been several cases in Fairfax County of horses being infected. The principal intermediate carrier is *Culex pipiens*, the common house mosquito. There is currently no evidence for person-to-person transmission (except in the unusual situation of organ transplants or blood transfusions from infected donors). Some people infected with West Nile Virus apparently experience few, if any, symptoms. Others have mild flu-like symptoms such as low-grade fever, head and body aches, skin rash or swollen lymph nodes. In a few cases such as the elderly, children and those with weakened immune systems, the infection may cause encephalitis (inflammation of the brain tissue), meningitis (inflammation of the brain covering) or, occasionally, death. Encephalitis and meningitis symptoms include rapid onset of high fever, severe headache, stiff neck, muscle weakness and coma. The virus is of recent occurrence in this country, having been first identified in New York in 1999. However, it has now spread to every state in the lower 48. The Centers for Disease Control and Prevention of the U.S. Public Health Service predicts that the west coast will be particularly hard hit because the disease has recently appeared there, and the usual pattern is an eruption of cases the year or two following first appearance. By the end of 2002, CDC had confirmed 161 cases, including 18 deaths, since 1999. For the year 2003, these figures had jumped to 4,156 reported cases and 284 deaths. The

major outbreaks in early 2003 resulted in 2,000 cases in Colorado, 1,000 in Nebraska and 800 in South Dakota. The CDC figures on reported cases show a rapidly increasing incidence. There is almost certainly major underreporting of incidence, since most of those infected apparently have mild symptoms that do not require a visit to the doctor, and even for those actually infected and seeing a physician, the symptoms may be attributed to flu and be insufficient to trigger a report of West Nile without confirmation by serologic tests.

a. Preventive Measures

i. Mosquito Habitat Elimination

An important preventive measure to reduce the chance of infection with West Nile Virus is to eliminate, wherever possible, standing water that provides a breeding habitat for mosquitoes. Any containers such as cans, pails, wheelbarrows, etc., should be emptied and stored in such fashion that water will not collect in them. Bird baths and similar containers should have the water changed every two or three days. Ponds can be stocked with the small fish *Gambusia* that feed on mosquito larvae. There are two species: *Gambusia affinis* and *G. holbrooki*. Both are highly effective in keeping ponds and lakes free of mosquito larvae. *Gambusia holbrooki*, the most common species in the eastern United States, has become endemic in many areas of eastern Virginia and can be readily transplanted from one pond to another.

ii. Insect Repellents

Since it is nearly impossible to completely eliminate the presence of mosquitoes, some of the most effective preventive measures available for mosquito-borne infections such as West Nile Virus and tick-borne Lyme disease are sprays or lotions containing (N,N-diethyl-meta-toluamide). The active ingredient, DEET, was developed by the U.S. Department of Agriculture in 1946, originally for use by the military. The most convenient method of application to the exposed skin is as an aerosol spray. A recent study reported in the *New England Journal of Medicine* showed that the higher the concentration of DEET in the spray, the longer lasting the protection. In the case of mosquitoes, products containing 20 percent DEET were effective for four hours, those with 25 percent DEET were effective for five hours, and those with 35 percent DEET were effective overnight. It is estimated that there have been more than eight billion applications of DEET over the past 50 years with an excellent safety record. However, a study of DEET by pharmacologists at Duke University, reported in the November 2001 issue of the *Journal of Experimental Neurology*, indicated that frequent and prolonged DEET exposure might cause adverse neurological effects. It was recommended that use be limited to preparations containing no more than 30 percent DEET for adults and lower concentrations for children. Anecdotal accounts indicate that there are

repellants other than those containing DEET that some users have found satisfactory, but most medical opinion has rather consistently favored DEET-containing repellants as representing the first choice.

2. Lyme Disease

Lyme Disease, caused by the bacterial spirochete *Borrelia burgdorferi*, is transmitted to humans primarily, if not exclusively, by *Ixodes scapularis*, the common deer tick. Deer ticks are dark brown to black and about the size and shape of a sesame seed. The white-tailed deer appears to be an important reservoir, but rodents are also known to be heavily implicated. Lyme Disease was first identified in Lyme, Connecticut in the mid-1970s when a group of children developed arthritis-like symptoms. Within a few days to several weeks of receiving an infected tick bite, most victims will have a red, slowly expanding "bull's-eye" rash (red in the center, pink at the periphery) and such symptoms as malaise, fever, headache and muscle and joint aches. The longer a case of Lyme Disease persists without treatment, the more severe, debilitating and long lasting the symptoms are likely to be, such as arthritis and neurologic abnormalities. Many of the physicians treating Lyme Disease have found three or four week courses of doxycycline or amoxicillin to be effective treatments for early stages of the disease, but later stages may require intravenous antibiotics for a month or more.

Confirmed cases of Lyme Disease underwent a sharp increase through June, 1997 (Table VIII-4-1). The decrease of the next two years may be attributable to greater public awareness of the threat represented by deer ticks and greater use of proper preventive measures when hiking and working in wooded areas. It is unclear, however, whether a decrease in deer population will lead to a corresponding decrease in Lyme Disease cases, since other animals can act as reservoir species and may inhabit areas within which deer populations decline. However, it is interesting to note that neighboring, semi-rural Loudoun County, which has a large deer population, has the highest per capita incidence of Lyme Disease cases reported in the commonwealth. In 2001, there were 65 cases compared with 29 cases in 1999, according to the Loudoun County Health Department. This suggests a strong upward trend in incidence where there are large populations of white-tailed deer.

a. Preventive Measures

i. Vaccine

In our Annual Report for 1999, we noted that a new vaccine (Lymrix) for the prevention of Lyme Disease had just been released. In our Annual Report for 2000, we noted that there had been adverse reactions to the vaccine and advised

Table VIII-4-1 Reported Lyme Disease Cases Meeting Centers for Disease Control Case Definition Program Fairfax County		
Period Covered	**Reported Cases**	**Contracted outside of Fairfax County**
July 1994-June 1995	14	Not Available
July 1995-June 1996	22	Not Available
July 1996-June 1997	31	Not Available
July 1997-June 1998	16	8
July 1998-June1999	13	9
July 1999-June 2000	50	8
July 2000-June 2001	51	9
July 2001-June 2002	61	33
July 2002-June 2003	87	Not Available
July 2003-June 2004	109	Not Available
****	***	****
2006	102	Not Available
2007	208	Not Available
2008	191	Not Available
2009	260	Not Available
2010	256	Not Available
2011	Na	Not available

**** The reporting period and methodology changed during this time.
(Source: Fairfax County Department of Health)

consultation with your personal physician about the advisability of being vaccinated. As a result of an increasing number of adverse reactions, this vaccine was subsequently withdrawn from the market. While it is true that vaccination of those persons intensively exposed to deer ticks might have been helpful, for the vast majority of the population, consistent use of ordinary preventive measures should be entirely adequate. When engaged in activities

that might result in exposure to deer ticks, proper clothing is a must, preferably long pants tucked into boot tops or spraying the lower legs, trouser bottoms and sock tops with insect repellent, since most ticks are encountered close to the ground.

ii. Insect repellent

The same DEET-containing repellents recommended for mosquitoes (see West Nile Virus above) are also highly effective for ticks. See the discussion of DEET-containing insect repellents in the West Nile Virus section above.

3. Rabies

Rabies is a viral disease that affects the nervous system and may have a post-infection latent period from a number of days to several weeks. During the latent period, between the time of an animal bite and the onset of overt symptoms, the virus is propagated along the nerve fiber sheaths until it reaches critical areas of the brain. While rabies has been present in this area for many years, it exists at a low level with the incidence appearing to cycle over a period of several years. This is attributed to the fact that infection, when it reaches the symptomatic stage, is uniformly fatal. Thus, an infected animal may infect several others and there will appear to be a relatively high incidence, but when those animals die there are fewer carriers for a period of time during which the incidence appears to be lower. We are currently experiencing a periodic upturn in the rabies cycle, particularly among foxes and raccoons. Rabies is transmitted to humans and other mammals through the saliva of an infected animal almost always in the overtly symptomatic stage, which usually only lasts about ten days. During this time, an infected animal usually exhibits aberrant behavior, such as a nocturnal animal being around during the day, exhibiting signs of confusion, showing an unsteady gait, desperately seeking water but unable to drink, often aggressively approaching dogs and humans, etc. The main wildlife reservoirs in this area (and the number of cases in 2002) are raccoons (52), foxes (9), skunks (9) and, to a lesser extent, some bats. Cases from July 1, 2004, to June 30, 2005, were raccoons (29), foxes (13), skunks (5), bats (6) and groundhogs (1). Domestic animals, e.g., dogs and occasionally cats, may act as secondary transmitters of the disease after having contracted it from a wildlife source. The incidence of rabies in animals fluctuates. For example, Fairfax County had 80 cases in 2002, 47 cases in 2003 and has had 52 cases by the end of July in 2004 and 54 cases by the end June in 2005. In CY 2004, 612 animals were tested with 69 testing positive, and through October 2005, 35 of the 480 animals tested were positive. This year a feral cat that bit both an adult and a child tested positive for rabies.

a. Preventive measures

The most important measure for prevention of rabies is to avoid being bitten by or direct contact with an animal that might be infected. If you encounter an animal that is behaving strangely or exhibiting symptoms such as excessive drooling, contact Fairfax County Animal Services Division at **703-830-3310** without delay. This also applies if you find a dead animal that you suspect may have died of rabies. Animal Services will send a professionally trained officer to impound the animal (or carcass) for quarantine and testing. If you are bitten or scratched or come in contact with the animal's saliva, seek immediate medical attention so a determination can be made as to whether you may require a course of preventive inoculations. The protective serum used for such inoculations has been substantially improved in recent years so that fewer doses are required, and those have fewer unpleasant side effects.

4. Fecal Coliform Bacterial Diseases

Fecal coliform bacterial diseases in humans are caused primarily through ingesting or wading or swimming in contaminated water. There are a number of bacteria that can be responsible, but the thing they share in common is being present in the gut and intestinal wastes of a variety of wildlife and domestic animals. The relatively new science of molecular genetic DNA testing has made it possible to reliably identify the particular animals responsible for the pollution of a given water sample. Studies carried out at several sites in Fairfax County indicate that Canada geese living in and about ponds and streams are principal contributors, while ducks, deer, raccoons, foxes and domestic dogs and cats are also significant sources (see Figure VIII-2-1 on page 374). When the wastes from these animal sources are deposited directly into, or washed into, streams and ponds, the pollution can build up to hazardous levels. For example, one pond in the McLean area, inhabited by Canada geese that had become resident, was extensively tested several years ago and was found to have levels of fecal coliform bacterial contamination that ranged from 21 to 27 times the level allowable in surface waters in the Commonwealth of Virginia. Another occasional source of such contamination is from leaks, overflows, or ruptures in the public sanitary sewer system or private septic systems. While illness from such bacteria is usually not life threatening and is readily treated with antibiotics, exposure to waters that one has reason to believe may be polluted should be scrupulously avoided.

Several years ago, budgetary limitations led to consideration of eliminating the county’s Stream Monitoring Program. EQAC intervened in the discussion, pointing out that this monitoring was environmentally critical and not duplicated in any other county programs. As a result, the Board of Supervisors directed that the program be continued. Recently, an agreement has been reached in which the Stream Monitoring Program for bacterial contamination is being reorganized. The collection of samples will now be handled by staff of the Department of Public Works and Environmental

Services responsible for the watershed management program, since they are in the field on a regular basis and it is efficient for them to perform this function. Analysis of the samples will continue to be performed by the Department of Health laboratories. It is felt that this arrangement will provide for better and more efficient monitoring of the health and safety of our streams, lakes and ponds.

a. Preventive measures

There is a general solution to this problem in which pollution of our surface waters is prevented in the first place. The main individual solution to the problem is to avoid disease caused by fecal coliform bacteria by not drinking water from sources whose pollution status is unknown and by not wading or swimming in water that is known to be, or suspected of being, polluted.

C. PUBLIC EDUCATION PROGRAM NEEDS

The Fairfax County Department of Health has available an excellent booklet entitled *Preventing Tick-borne Diseases in Virginia*. They also have a brochure entitled *Rabies and Animal Bites: What you should know and what you should do*. Additional information is available through the Health Department section of the county website http://fairfaxcounty.gov/living/healthhuman/health.htm#environmental

With the recent nearly epidemic explosion of West Nile Virus, there is near certainty of it becoming endemic in our area for the long term. Public education materials, comparable to those noted above, are available from our own county Health Department, especially at http://www.fairfaxcounty.gov/fightthebite. In addition, the Centers for Disease Control and Prevention of the U.S. Public Health Service has some recently-developed materials that are quite good. A new initiative, the Disease Carrying Insects Program, has been undertaken by the Fairfax County Health Department. The reader is referred to their report on West Nile Virus and the Pilot Tick Surveillance Program for additional details in these areas.

Because of the frequently changing levels of pollution in our surface waters, it is not practical to create printed materials identifying those streams and ponds that are affected by fecal coliform bacterial pollution. However, our excellent county website is an ideal way for the public to receive frequent updates on results of the Stream Monitoring Program and notices about waters that should be avoided due to pollution.

The public media generally do a fairly good job of reporting the finding of rabid animals. Such incidents could also be posted on the county website as advisories.

D. PUBLIC AGENCY RESPONSIBILITIES

The primary public agency responsibilities lie in the following areas:

1. Public education.
2. Monitoring of disease incidence.
3. Monitoring of pollution and exposure hazards.
4. Providing animal control services.
5. Providing mosquito abatement, where needed.

The Animal Services Division of the Fairfax County Police Department is responsible for animal control activities, such as impounding animals suspected of being rabid and similar wildlife-related activities. The Stormwater Planning Division of the Department of Public Works and Environmental Services will have responsibility for collection of water samples from streams, lakes and ponds. The Health Department has responsibility for most prevention and public education activities, water sample testing and various monitoring and information gathering programs.

E. HEALTH DEPARTMENT REFERENCE MATERIALS

The Fairfax County Health Department has prepared several excellent brochures to provide information to the public on various animal and insect borne diseases and means for their prevention.

- Ticks and tick-borne diseases in Fairfax County.
- Understanding mosquitos and West Nile Virus.
- The Asian Tiger Mosquito.
- Choosing the right repellent.
- Rabies and Animal Bites: What you should know and what you should do.

The Health Department website, www.fairfaxcounty.gov/living/healthhuman/, has additional information in the section entitled Health.

- Lyme Disease.
- Mosquitos.
- Rabies.
- Environmental health contains information sections on
  - Malaria.
  - Mosquitos.
  - Rabies.
  - The Stream Protection Strategy Program contains information on fecal coliform pollution.

F. CONCLUSIONS

The upsurgence of West Nile Virus and Lyme Disease require continual monitoring and public education and are rapidly becoming serious public health issues. Rabies is a continuing low level, more or less steady-state, problem. Waters polluted by excessive levels of fecal coliform bacteria require mitigation, where possible, and monitoring and posting to warn the public against exposure. Malaria, of which a very few scattered cases have been reported, will require careful monitoring and epidemiologic tracking as well as mosquito abatement.

G. COMMENTS

The comments provided below address only the fourth section of this chapter (Wildlife Borne Diseases of Concern in Fairfax County). Comments and recommendations addressing deer management and geese, and a comment addressing coyotes, are found beginning on pages 368, 380 and 384, respectively.

1. EQAC commends the Board of Supervisors for providing continued active support to the following ongoing programs:

    - The Stream Monitoring Program in which the Stream Protection Strategies Program of the DPWES performs sample collection and field testing and the Health Department performs laboratory testing and analysis functions.

    - Enhanced public education programs and initiatives in key areas, such as control of rabies and of wildlife contributing to pollution of surface waters, epidemiology and abatement of insect borne diseases such as West Nile Virus and Lyme Disease.

    - EQAC commends the Health Department for its excellent public education programs and advocates posting of advisories on the county website when polluted waters are identified.

2. EQAC feels that the Board of Supervisors should monitor these programs by scheduling periodic reports to its Environment Committee by county staff.

3. Recently, there has been an incident of a feral cat that bit both an adult and child and when apprehended by Fairfax County Animal Control was found to have rabies, which necessitated rabies treatment for the victims. Since feral cats often live in small groups they should be closely monitored as a potential rabies hazard.

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Peter Troell, MD, MPH, Epidemiologist, Fairfax County Health Department.

LIST OF REFERENCES

Fairfax County Department of Health. Preventing Tick-borne Diseases in Virginia.

Fairfax County Department of Health. Rabies and Animal Bites: What you should know and what you should do.

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WILDLIFE AND THE ENVIRONMENT IN FAIRFAX COUNTY: SUMMARY OF RECOMMENDATIONS

Impacts of Deer in Fairfax County

There are three recommendations for continuance of activity in the deer management program:

1. Managed hunts should be continued as they have become both cost-effective and efficient in reducing excesses in the deer herd.

2. The sharpshooter events should be continued because they are both humane and cost-effective.

3. The newly begun archery program should be continued as a means of controlling deer depredation of vegetation on residential properties where firearms cannot be used.

Impacts of Geese in Fairfax County

1. EQAC strongly recommends that the goose management program be continued, particularly the public outreach and training activities so that a cadre of volunteers can be created to provide the labor to do the actual egg-oiling that is the principal control measure. In addition, the shotgun hunt pilot test conducted by the Park Authority should be expanded into an established program.

Coyotes in Fairfax County

There are no recommendations at this time except that the county Wildlife Biologist should monitor the situation and keep the relevant county agencies and the public informed.

Wildlife Borne Diseases of Concern in Fairfax County

There are no recommendations at this time, although EQAC has provided comments in this section recommending active support to a number of ongoing programs and to the monitoring of these programs and reporting to the Board of Supervisors' Environmental Committee.

CHAPTER IX

NOISE, LIGHT POLLUTION AND VISUAL POLLUTION

IX-1. NOISE

A. OVERVIEW

Noise is a byproduct of our everyday lives, and noise that one group finds tolerable may be considered noise pollution to another. To some, sounds coming from an airport are the sounds of the economy working and growing, while others feel that this noise deprives them of their privacy and quiet.

Recent studies suggest a growing intolerance among residents and communities for noise associated with airports, traffic, construction and athletic events, etc. The impacts of noise on a community include:

- Diminished privacy and quiet at home or at an outdoor recreation event, vacation or rest site (private cabin at the lake, river or beach).
- Interrupted sleep.
- Interrupted entertainment and conversation.
- Interruptions at work or school.
- Property damage such as broken windows.

Any regulation of noise pollution must be based on scientific findings and not solely on human perception. Noise is measured by scientific instruments that receive the sound and determine its location and intensity as it radiates from the source. The resulting intensity levels and locations allow for noise levels to be regulated when society calls for abatement.

In response to an EQAC recommendation for the development and distribution of educational materials to the public regarding noise issues, county staff has established a website containing information and links addressing noise issues. The site is available at http://www.fairfaxcounty.gov/dpz/environment/noise/. For an explanation of how sound is measured and perceived, see this website.

In the next sections of this report some key noise pollution concerns will be addressed, followed by recommendations to alleviate their impacts.

B. AIRPORT NOISE

1. Operations and Associated Noise Impacts at Ronald Reagan Washington National Airport and Washington Dulles International Airport

a. Overview

Fairfax County is served by Ronald Reagan Washington National Airport (Reagan National) and Washington Dulles International Airport (Dulles). Reagan National and Dulles are vital to the region's overall economy, connecting the Washington area with 140 domestic and international destinations. At Reagan National, most flights are short to mid-range jet aircraft flights operated by major airlines, but at Dulles, all types and sizes of aircraft are found. On a typical day, over 5,000 airplanes will fly in the skies over the Washington region. Most of these flights are to and from Reagan National, Dulles, Baltimore-Washington International Airport or Joint Base Andrews. Many additional flight operations also occur at the many general aviation airfields in the region.

According to the Metropolitan Washington Airport Authority's website, in 2012, total operations at Dulles decreased from their 2011 level by over 15,000, dropping from 327,493 to 312,070. During the same year, operations at Reagan National grew from 281,770 to 288,176.

Flight operations on a typical day at Dulles Airport range from 1,000 to 1,200, with weekday operations typically exceeding weekend day operations by several hundred flights. Most flights operate between 7:00 A.M and 10:00 P.M., with many flights in some hours and a relatively small number in other hours. Peaks are typically at 7 A.M., 12 P.M., 5 P.M. and 8 P.M., with low times at 10 A.M., 2 P.M., 6 P.M. and between 10 P.M. and 6A.M.

Reagan National has fewer flight operations than Dulles, with more than 700 flights on a typical day. Weekday operations are typically greater than weekend day operations. Most flights occur between 7 A.M. and 10 P.M., with a fairly consistent number of scheduled operations for each hour within this period.

Because Reagan National is located near centers of political power and residential areas, aircraft at National are subject to several restrictions. There are four No Fly zones, which are the U.S. Capital, the National Mall, the White House and the Vice President's house at the Naval Observatory. Under the Federal Aviation Administration's High Density Rule, carriers are limited, with some exceptions, to 37 scheduled operations per hour and the commuter carriers to 13 scheduled operations per hour. In addition, Reagan National has one of the strictest noise regulations in place at any major airport in the United States. All aircraft operating between 10:00 P.M. and 7:00 A.M. (with a half hour grace period) must satisfy the airport's nighttime noise limits or face monetary fines of $5,000 maximum per

violation. There are typically five to 10 noise violations each year; in 2012, there were 12.

b. Actions by the Federal Aviation Administration

The Federal Aviation Administration Modernization and Reform Act of 2012 includes several sections that impact how the Federal Aviation Administration handles aviation noise, two of which could potentially impact noise guidelines for Dulles and National Airports. One of these sections, which discusses the acceleration of NextGen technologies through the use of two new Categorical Exclusions under the National Environmental Policy Act, is still under review. The other section, which takes effect in 2015, will prohibit the operation of small jet aircraft not complying with stage 3 noise levels.

A new tool, the Aviation Environmental Design Tool, was made available for purchase by airports in 2012 to assist in preparation of environmental analyses under the National Environmental Policy Act. Neither Dulles nor Reagan National Airport has needed to purchase the AEDT, as these airports rely on consultants who do not need assistance in preparing the analyses.

c. Noise Monitoring

The Metropolitan Washington Airports Authority, which operates both Reagan National and Dulles Airports, has historically monitored aircraft and community noise around the clock at 32 locations in the Washington, D.C. Metropolitan Area. The monitoring equipment has evaluated different sound events and has separated those events likely to have been caused by aircraft from the remaining events, which have been attributed to the community. The Metropolitan Washington Council of Governments' Aviation Policy Committee (formerly known as the Committee on Noise Abatement and Aviation at National and Dulles Airports) and the Airports Authority selected the monitoring sites from recommendations offered by the local governments. Due to the age of the monitoring system, the system had become unreliable and has been replaced.

i. Monitoring Station Locations

The new monitoring system, which includes 40 monitors, became operational at the end of 2008. The original intent was to monitor noise at 40 locations throughout the metropolitan Washington area, with 20 sites for Reagan National and 20 for Dulles, including 15 locations in Fairfax County. Five of the original 40 monitors are not currently in use, including one in Fairfax County that was decommissioned in 2011. It had been at Great Falls Elementary School and monitored primarily Reagan National Airport. The active Fairfax County monitors are listed below, with the site numbers used by MWAA to report data in the "Annual Aircraft Noise Report":

Monitoring locations serving primarily Reagan National:

- Langley Forest, Site #3.
- Marlan Forest, Site #11.
- North Mount Vernon, Site #19.
- Springfield, Site #9.

Monitoring locations serving primarily Dulles:

- Armstrong Elementary School, Site #36.
- Crossfield Elementary School, Site #35.
- Cub Run Elementary School, Site #21.
- Chantilly Post Office, Site #25.
- Floris Elementary School, Site #24.
- London Towne Elementary School, Site #30.
- Pleasant Valley Golf Course, Site #16.
- Union Mill Elementary School, Site #29.
- Virginia Run Elementary School, Site #37.
- Westfield High School, Site #34.

In the 2012 *Annual Report on the Environment*, EQAC noted that there was no plan to replace the decommissioned monitoring station at Great Falls Elementary, as there were few complaints about noise at that site. EQAC recommended that the Board of Supervisors request to MWAA that a replacement site be found. In preparing a response to this recommendation, county staff coordinated closely with MWAA staff, which noted that the relatively low aircraft-related noise levels that had been recorded at the Great Falls site, along with the limited number of complaints from that area, caused MWAA to question whether the tens of thousands of dollars that would have been needed to replace that monitoring station could be justified.

County staff then asked MWAA staff if it might make sense to replace the monitoring station elsewhere in Fairfax County. In response to this idea, MWAA staff noted that there was a relatively recent process through which several new monitoring stations were added to the monitoring network and it was MWAA's view that the needed improvements to the monitoring network were accomplished through that process. MWAA did not, therefore, support the relocation of the decommissioned site elsewhere in the county. In its response to the 2012 recommendation, county staff recognized MWAA's views but also noted that the county's Airports Advisory Committee had not had an opportunity to either consider MWAA's views on the decommissioning of the Great Falls monitoring site or on the relocation of this monitoring station elsewhere in the county. County staff therefore recommended that these questions be referred to the Airports Advisory Committee for review and recommendation. EQAC concurs with this view and is offering a similar recommendation later in this section of the report.

ii. Monitoring Station Locations

Noise levels are displayed in DNL, the day-night annual average sound level, in "A" weighted decibels (dBA)[1]. This 24 hour average takes into account the maximum levels of noise, the duration of each noise event, and the time each noise event occurred. Events occurring between 10:00 pm and 7:00 am are increased by 10 dB to account for increased annoyance normally associated with nighttime noise.

The monitoring system evaluates sound events and separates those events likely to have been caused by an aircraft from the remaining events, which are attributed to the community, and the three DNL values are provided for each site each month:

- Total DNL.
- Aircraft DNL.
- Community DNL

A review of the 2012 noise monitoring data published on the MWAA website shows that, of the 13 monitoring stations in Fairfax County, the highest levels of aircraft noise were recorded at Westfield High School, Site #34. That monitor, which reported reliable data for all 12 months, recorded levels of aircraft noise above 58 DNL for three months. In addition, the consistently high level of community noise at that site caused the combined aircraft + community noise level at that site to generally range from DNL 61 to 63 dBA.

Under the former monitoring system, MWAA had provided quarterly reports to stakeholders as data became available, but under this new system, MWAA posts monthly data for each site in the "Annual Aircraft Noise Report" on its website. In addition, in response to requests, MWAA will reproduce the data into different formats. Contact Mike Jeck at 703-417-8745 or Mike.Jeck@mwaa.com with requests for tailored formats.

The Annual Aircraft Noise Report can be accessed from the home page of the MWAA website, www.MWAA.com, by searching "noise" from the box at the top right of the page.

The Annual Report is usually available in the early part of the year, after all 12 months of data from the previous year have been reported. The 2012 Report, however, was not available until September 2013 because of poor data and communication issues. An unusually high number of monitor failures, due to a variety of issues including vandalism and power outages, produced data that were difficult to interpret. In fact, because monitors placed in the community have been so vulnerable, MWAA is considering replacing the community

[1] For information about A-weighted noise and the DNL noise metric, see the county's "Noise Basics" website at http://www.fairfaxcounty.gov/dpz/environment/noise/noisebasics.htm.

monitors with other noise measurement techniques. The second reason for the report's delay was that the noise data from the monitor at Site #19 in North Mount Vernon were not reported as a result of communication issues. MWAA has been negotiating these issues with the host, and if they cannot be resolved, the monitor will be permanently removed from the site.

After considering formats for reporting noise data, EQAC supports the new policy of posting noise data on a public website in lieu of quarterly paper reports for selected recipients. EQAC recommends, however, that the data be reported as they become available on a quarterly basis, instead of waiting for data from a full calendar year. While EQAC was hopeful that this improvement would be made, a recent review of the MWAA website suggests that it hasn't. EQAC is, therefore, reiterating a recommendation from the 2011 *Annual Report on the Environment* that noise monitoring results be reported on a quarterly basis.

EQAC also strongly believes that MWAA should review and analyze the data to include identifying possible operational approaches that can be pursued to reduce noise. The recent addition of the fourth runway at Dulles in 2008, with the consequent change in flight patterns, should prompt an evaluation of operations on the new runways as they relate to community noise impacts to determine whether or not such impacts would suggest the need for consideration of operational changes. MWAA staff felt strongly that a full year of noise data, with all four runways in operation, was needed before any review could be conducted, and a full year was not available until 2012. Looking at the 2012 noise data from the monitors serving Dulles Airport, MWAA staff sees no significant change in aircraft noise recorded by any of the 10 monitors, and therefore sees no need for an evaluation. However, as previously noted, the 2012 noise data have been unusually unreliable. EQAC feels that a full year of trustworthy data is needed in order to make a valid evaluation, and makes that comment at the end of this section of the report.

A second MWAA system that recently became fully operational is "Airscene," an online noise complaint reporting system that supplements the still-existing phone complaint system.

Airscene can be accessed from the home page of the MWAA website home page by: 1) selecting an airport; 2) selecting "Flight Information" from the bar at the top of the page; 3) selecting "Aircraft Noise and Flight Tracking Data" from the links on the left side of the page; and 4) scrolling down to click on Airscene. Airscene has four tabs (Home, Complaint, Flight Tracking, Contact Us) found on the top portion of the screen, and each tab opens a page with instructions on how to provide or access information. While MWAA is working to resolve compatibility issues for other browsers, at this point, Internet Explorer is required to view Airscene.

To register complaints by phone, call the Noise Complaint Telephone Center at Dulles, 703-572-8215, or Reagan National, 703-417-8020.

Complaints from Airscene and the Telephone Center in 2012 totaled 274 for Dulles, an increase from the 161 received in 2011. For Reagan National, complaints totaled 892, a significant increase from the 505 received in 2011. MWAA notes that perception of noise is indeed subjective, since the number of callers with complaints can vary widely from year to year even though the actual aircraft noise and associated flight paths do not change. Moreover, while two people made 575 of the 892 calls from the Reagan National area, their neighbors may not have made any calls.

Resources: Metropolitan Washington Airports Authority website, www.mwaa.com; Federal Aviation Administration Noise Ombudsman, available at 202-267-0177 or 9-AWA=NoiseOmbudsman@faa.gov.

2. Construction Projects at Dulles International Airport

On October 14, 2005, the Federal Aviation Administration published a Record of Decision for the construction of new runways, terminal facilities and related facilities at Dulles Airport. The publication of this document completed the lengthy Environmental Impact Statement process for this project, providing the Metropolitan Washington Airports Authority with the approval needed to proceed. Two new runways have been authorized: a north-south oriented runway to be constructed parallel to and 4,300 feet west of the westernmost of two existing north-south runways and a runway roughly oriented east-west that will be constructed parallel to and 4,300 feet south of the existing east-west runway.

The new north-south runway, a concrete strip 9,400 feet long and 150 feet wide, was opened for use in November 2008. The entire project includes the new runway, a parallel taxiway, connector taxiways and cross-field taxiways that connect to the terminal and existing airfield areas. With this new runway available to handle traffic, the middle north-south runway was taken out of operation for maintenance purposes when scheduling allowed during the second half of 2009 and on through 2010. In 2011, another major maintenance project continued the disruption, concentrating flights, and noise, on the three available runways.

Construction dates for the fifth runway will be set in the future.

There are many other projects under way at Dulles Airport, including:

- Improvements to the airport roadway system and connections to Route 28 and the Dulles Access Road.
- Rail to Dulles.
- Four new noise barriers to be constructed along residential properties adjacent to the Dulles Connector Road to mitigate traffic noise in conjunction with the Dulles

Metrorail Project along the Dulles Toll Road and Dulles Airport Access Highway. Construction is scheduled to begin in FY13-14.

3. Part 150 Noise Compatibility Planning for Ronald Reagan Washington National Airport

Portions of the following discussion have been excerpted and modified slightly from the website of the Metropolitan Washington Council of Governments.

MWAA prepared a major update of the Noise Compatibility Study for Reagan National. This study, conducted in accordance with the provisions of the FAA's "Part 150" process, was designed to forecast future noise contours at Reagan National and to propose abatement and mitigation actions to reduce community noise impacts. A study report containing a series of recommended noise abatement and mitigation measures was released in September 2004. Noise abatement recommendations include, among other things, the application of improved technology to keep arriving and departing aircraft over the Potomac River up to their designated turning points, an improved distribution of turning points from the Potomac River between five and ten miles south of the river and the improvement of the airport's noise monitoring and flight tracking system. In October 2004, the Fairfax County Board of Supervisors endorsed staff comments concerning these recommendations; the comments were generally supportive of the noise abatement recommendations but recommended a follow-up assessment of the effectiveness of these measures.

Because of the importance of this issue to the community, COG's Committee on Noise Abatement and Aviation at National and Dulles Airports (later known as the Aviation Policy Committee) partnered with MWAA throughout the process of development of the noise abatement and mitigation recommendations. A Part 150 Study Advisory Committee was established to assist and advise the Airport Authority in this study; indeed, the Advisory Committee's recommendations were incorporated into the Part 150 Study document. In all, the Part 150 Study recommended eight noise abatement measures (measures designed to reduce noise impacts) and six noise mitigation measures (measures taken to promote compatibility with and awareness of noise impacts). The recommended noise abatement measures were:

- Efforts supporting the use of advanced navigation technology.
- Two measures addressing the dispersal of flight paths in the area between five and ten miles south of the airport.
- Revision to the Airport Facility Directory reflecting current noise abatement procedures.
- Phasing out of "hushkitted" Stage 3 aircraft.
- Updating the airports' noise monitoring and flight tracking system.
- Establishing a system to report airline compliance with noise abatement measures
- Enhancement of the noise complaint system.

Five of the six mitigation measures were directed toward neighboring localities (e.g., disclosure of noise impacts; building code modifications; noise overlay zoning) and the sixth recommended an expanded MWAA airport noise information program.

MWAA submitted the Part 150 study to FAA, and FAA completed its review of, and issued a Record of Approval for, the Noise Compatibility Program in early 2008. Four of the eight proposed noise abatement measures were approved, and all six of the mitigation measures were approved with the acknowledgment that these measures were beyond the authority of FAA. Four noise abatement measures were disapproved for the purposes of Part 150—in disapproving these measures, FAA noted that the noise exposure model and noise compatibility program for the airport showed "no present or forecasted incompatible land uses within the DNL 65" contour. Effectively, FAA is supporting the use of agency funds only for noise abatement projects that support actions that would be applied in areas inside the DNL 65 dBA contour, with the recognition that MWAA or Air Traffic Control could pursue similar or supportive actions at their discretion (and in the case of noise monitoring and flight tracking, at MWAA's expense). As noted in FAA's Record of Approval, a working group has been formed to develop advanced navigation procedures for arrivals and departures and to encourage the use of this technology, and MWAA has updated the noise monitoring and flight tracking system.

Nevertheless, EQAC continues to share the concerns of communities both north and south of Reagan National regarding noise impacts associated with airport operations and holds that noise impacts do not stop at the DNL 65 dBA model contour shown in the Part 150 study. The DNL 65 dBA contour for Reagan National encompasses a relatively small area that is located largely on airport property and within the Potomac River; some commercial, industrial and governmental areas are also located within this area, as is park land. No residences are located in areas that are currently exposed to, or that are projected to be exposed to, noise impacts of DNL 65 dBA or above. However, there have been significant concerns about airport noise impacts well outside this area, and operational noise abatement procedures have been established to minimize such impacts both north and south of the airport. Deviations to noise abatement procedures north of the airport have been documented by the McLean Citizens Association in collaboration with Congressman Wolf's office. While these impacts have occurred well beyond the DNL 65 dBA contour, they have had a significant and adverse impact to residents of the area.

4. The Aviation Policy Committee/Aviation Policy Liaison

The Metropolitan Washington Council of Governments' Aviation Policy Committee was discontinued effective January 2011, and oversight for regional aviation policy has been returned to the COG board, with The Honorable Mary Hynes, Vice-Chair of the Arlington County Board, serving as Aviation Policy Liaison. Her duties include coordinating with MWAA and coordinating with COG staff in advising the board on aviation policy issues. This appointment represents the best use of limited resources and will maintain the values of the Aviation Policy Committee.

5. Helicopter Noise

Recognizing both the vital need for helicopters in the National Capitol Region and community concerns with the associated noise, COG held a "Helicopter Noise Forum" in September, 2010. The forum included presentations from officials from the FAA and the Military District of Washington and participation from local elected officials and citizens, who expressed interest in identifying improved means for community input regarding helicopter noise. In response, COG asked its Aviation Policy Liaison to work with local elected officials, citizens, and officials from the FAA, the Military District of Washington and other agencies to improve community understanding of the region's helicopter system and flight rules and to work towards a solution that aggregates community noise concerns and is able to trouble shoot to address "hot spots."

To that end, Aviation Policy Liaison Mary Hynes convened a second forum on helicopter noise in February 2011. Representatives from the FAA explained that helicopter flights in the Washington region are under their tight control and are provided airspace only for military, police, news media and medical missions; there are no "joy rides" in the D.C. area. While defending the value of every helicopter flight, the FAA noted that it also tries to mitigate the resulting noise by allowing higher altitude flights when possible. Noise was expected to have been reduced in March 2012, when Advanced Navigational procedures as recommended in the Part 150 Plan were scheduled to have gone into effect. Another noise mitigation policy supported by the FAA is the "Fly Neighborly" Program devised by the Helicopter Association International for all civilian, military and government flights. A community noise portal that could manage helicopter noise complaints and pinpoint 'hot spots" was suggested as a tool to alleviate community concerns. Liaison Hynes noted that, although funds were not currently available to purchase such a system, they are continuing to look for funding opportunities.

During 2012, according to Liaison Hynes, there were fewer community complaints about helicopter noise, suggesting that the helicopter noise forums, combined with the two noise mitigation policies, appear to have been effective.

C. HIGHWAY NOISE

1. Background

As the Washington metropolitan area continues to grow, so does traffic and traffic-related noise, degrading quality of life, especially in residential areas adjacent to these roadways.

Noise has become an important environmental consideration for highway planners and designers. The U.S. Department of Transportation and state transportation agencies are charged with the responsibility of optimizing compatibility of highway operations with

environmental concerns. Highway noise has been addressed by numerous investigations, including distinguishing among different sources of noise at receptor locations, studying noise perception by the human ear, and calculating highway noise reference energy mean emission levels. In addition, the effects of site geometry, meteorology, ground surface conditions and barriers on noise propagation are estimated and considered. While the study of noise and its perception has become more sophisticated, there is still a need for precise, uniform noise measurement procedures for assessing impacts of traffic noise in the vicinity of roadways, as well as a need for effective cost-efficient noise barriers.

When measurements indicate that noise abatement is required, the following procedures are options:

- The construction of barriers/walls or raised berms.
- The provision of landscaping/vegetation.
- The provision of acoustical design techniques.

In densely populated areas such as Fairfax County, noise barrier walls remain one of the most reasonable and feasible measures to abate traffic noise upon adjacent residential properties.

2. State Policy

Virginia adopted its original noise abatement policy in 1989. The policy established criteria for providing noise protection in conjunction with proposed highway projects in the state. Implementation of the policy has aided in the construction, or construction approval, of more than 100 federally-funded sound barriers. Experience with this policy created considerable feedback from residents and elected officials. As a result, the Commonwealth Transportation Board decided to evaluate the policy for possible changes. The major source of information used was a survey of 15 state departments of transportation in the eastern U.S. The culmination of this process was the adoption of changes to the state policy in November 1996, which became effective in January 1997. The three key changes to the policy were to raise the cost-effectiveness ceiling from $20,000 per protected receptor to $30,000 per protected residential property based on other state practices, to clarify that Virginia will not participate in any retrofit project along an existing highway when not in conjunction with an improvement for that highway, and to add the possibility for third party funding of the amount above Virginia Department of Transportation's $30,000 ceiling if the abatement measure otherwise satisfies the criteria. The State Noise Abatement Policy was revised again effective July 13, 2011 to comply with the Federal Highway Administration's noise abatement regulations. The policy now establishes a reasonableness criterion (cost effectiveness) for a sound barrier of 1,600 square feet per noise receptor (rather than a cost figure), a noise reduction design goal of at least seven decibels, consideration of balconies as an outdoor usage area and elimination of Third Party funding (except for aesthetics). The policy of not considering noise impacts beyond 500 feet from the roadway in determining the need for noise abatement will be continued. More information about

the new state noise abatement policy can be viewed at the Virginia Department of Transportation website: http://www.virginiadot.org/projects/pr-noise-walls-about.asp.

3. State Projects in Fairfax County

The potential noise impact of the I-495 High Occupancy Toll Lanes Project, which has added a total of four new lanes for a 14-mile stretch between the Springfield interchange and the American Legion Bridge, was assessed in accordance with Federal Highway Administration and VDOT guidelines. To determine the degree of impact of highway traffic noise, traffic noise levels during the loudest hour of the day were determined for the existing (1998) conditions and the design-year (2020) no-build and build conditions. Noise levels for the design-year no-build scenario are expected to increase on average by approximately 1 dB because of an increase in projected traffic volumes and the mix of heavy trucks during the loudest hour. In comparison, noise levels for the build scenario were estimated to increase an average of approximately 4 dB, with noise impacts in some areas increasing up to 19 dB and in others actually decreasing. The majority of impacted residences would be exposed to design-year traffic noise levels that approach or exceed an average of 67 dBA during the loudest hour of the day, a level that qualifies them for noise barriers if the following conditions for feasibility and reasonableness are also met:

- Noise barriers must be physically feasible and capable of providing at least five decibels of noise reduction, and for projects considered as of July 2011, at least seven.

- The noise barriers must meet VDOT's cost-effectiveness criterion of a maximum of $30,000 per protected or benefited dwelling unit, unless additional funding is provided by a third party. For projects being considered after July 2011, a barrier must meet a reasonableness criterion of 1,600 square feet per noise receptor (rather than a cost figure).

- Noise barriers under consideration after July 2011 may include balconies as an outdoor usage area, and Third Party funding may no longer be used, except for aesthetics

Recommendations from the study led to subsequent approval of nine new sound barrier systems, as well as the replacement/enhancement/extension of eight previously existing sound walls that needed to be removed in order to widen the highway. Sound walls, therefore, have been constructed to protect almost all residential areas on both sides of the highway adjacent to the 14-mile stretch of the project, with gaps where walls could not be built because of terrain or access issues, or, in a few cases, where a proposed barrier was not approved because it did not meet the criterion of either sound reduction or cost-effectiveness.

The study also estimated the impact of highway traffic noise on non-residential areas such as parks, schools, places of worship and recreation areas. Reasonableness for

these areas was determined during final design on a case-by-case basis with respect to the type and duration of activity, size of the affected area, severity of impact, total cost and the amount of noise reduction.

Barriers constructed by VDOT since the early 1990s in Fairfax County have consisted of a solid wall of absorptive concrete that breaks the line of sight between vehicles and homes. Although noise barriers typically have a maximum decibel reduction of 20 dBA, most only provide a reduction of 10-12 dBA. Walls for the I-495 Express Lanes Project look similar to those sound walls built in the past in Fairfax County. Noise barriers that have been built for this project range in height from about seven to 39 feet.

No noise barriers for highway construction projects in Fairfax County were completed during FY12-13.

Noise barriers have been approved for the following highway construction project in Fairfax County that began construction in late FY13:

- Two new noise barrier systems on I-495 at the Georgetown Pike (Route 193) interchange (VDOT Project # 0495-029-874,C501,P101/UPC (94944)).

Noise barriers have been approved for the following highway construction projects in Fairfax County that have been scheduled to begin construction in FY2013-14:

- Four new noise barrier systems on the Dulles Connector Road (VDOT Project #0267-029-919,C501/UPC 98232). The construction of these sound walls was legislated by Chapter 874, Virginia Acts of Assembly, 2010.

- Two replacement and three new noise barrier systems on the I-66 Spot Improvement #2 (VDOT Project No. 0066-96A-113,C501/UPC 78828).

- Four new noise barrier systems on the I-95 Express Lanes (VDOT Project No. 0095-969-074, C501 / UPC 103106).

Noise barriers are also under consideration for the Richmond Highway (U.S. Route 1) improvement project between Telegraph Road and Mount Vernon Memorial Highway (VDOT Project No. 0001-029-938, P101/UPC 99181).

D. METRO YARD NOISE

The Metro Service and Inspection Yard, located near the West Falls Church Metro station, services trains using a short-radius loop track. As the trains move along the track, “wheel squeal” is generated, which is extremely irritating to residents in nearby neighborhoods. An expansion of this yard has been proposed by the Washington Metropolitan Area Transit Authority in order to provide support for the coming Silver Line, and as part of the

expansion, the Federal Transit Authority is requiring a sound box to be built over the noisiest portion of the loop track.

The sound box must meet a development condition of DNL 55 dBA as well as requirements of the county's noise ordinance (Chapter 108.1 of the Fairfax County Code)--a requirement of a maximum noise level of 55 dBA and also maximum noise thresholds in specific frequency-based octave bands. The sound box is under construction and should be completed in February 2014. It will cover approximately 1,000 linear feet of track and is expected to meet all of the required conditions.

To protect residents from wheel squeal and other noises, stringent requirements have been built into the permit, SEA 85-D-033-02. A noise study must be performed to demonstrate compliance with the Noise Ordinance before the permit will be issued, and additional studies can be requested by the Zoning Administrator when warranted by resident complaints. If a noise study does not demonstrate compliance, additional noise attenuation and mitigation measures shall be implemented in order to achieve compliance. To ensure that there is a forum for ongoing discussion with the adjacent residential community, the applicant shall meet with a Communications Committee comprised of representatives of nearby homeowners when requested, but not more than twice a year. In addition, a dedicated telephone contact number for the West Falls Church rail yard will be provided to the Dranesville District Supervisor's office and to members of the Communications Committee to enable them to report concerns regarding the operation of the West Falls Church rail yard.

E. TYSONS NOISE STUDY

As reported in the 2012 *Annual Report on the Environment*, the Comprehensive Plan recommends that an area-wide study of noise levels along Tysons' major transportation corridors be undertaken. The Comprehensive Plan specifies that the noise study should define noise contours with current noise levels and future noise levels based on a minimum 20-year traffic volume projection for the roadway and other transportation noise sources.

A contract was awarded in June 2011 to Phoenix Noise and Vibration to complete a study of transportation generated noise for the Tysons Corner Urban Center. The Tysons Corner Areawide Urban Center Transportation Noise Study was completed by the consultant in December 2012. The study focused on all major roadways, within and bordering the urban center, with a posted speed limit of 35 mph or greater. The study provided noise contours for both ground level and vertical estimates of existing and projected transportation generated noise in this area. Staff continues to rely on the findings of this study as a resource for determining the need for more detailed, site-specific noise studies.

F. STEWARDSHIP

The Fairfax County Restoration Project, a public-private partnership, launched in spring 2010 with its initial focus on restoration of areas negatively impacted by the I-495 Express Lanes Project. It is working with VDOT to modify VDOT's landscaping plans to include restoration of cloverleaf areas and areas inside and outside the sound walls. Vegetation planted inside and outside the sound walls will provide many benefits, including reduction in storm water runoff, habitat for pollinators, birds and small mammals and visual relief for both motorists and residents.

In recognition of its many projects already underway in different parts of the county, the FCRP was awarded a 2011 Environmental Excellence Award (see Appendix C). Anyone interested in joining the efforts should contact the FCRP at info@fcrpp3.org .

G. COMMENTS AND ONGOING CONCERNS

1. Continue to support airport noise-compatible land use planning near airports in the county through the implementation of policies and regulations that reference the most current airport noise contour projections for the airports and that are at least as stringent as federal noise compatibility guidelines.

2. Staff should continue to review all airport and highway studies that require Environmental Assessments or Environmental Impact Statements under the National Environmental Policy Act for consistency with county policies addressing transportation-related noise and mitigation and report its findings to the board. In turn, the Board of Supervisors should, when appropriate, adopt resolutions with specific requests and/or recommendations and transmit these to the Metropolitan Washington Airports Authority, Federal Aviation Administration, Commonwealth Transportation Board, Virginia Department of Transportation and other state and federal agencies as applicable.

3. Encourage the retention and planting of noninvasive vegetation to provide visual shielding of residents from highways. Where possible, support the provision of vegetated areas adjacent to highways that are wide enough and dense enough to provide noise reduction benefits to residential areas near the highways. Where feasible and appropriate, pursue such approaches in lieu of noise walls.

4. EQAC is pleased that a series of Web pages addressing noise issues have been established on the county's website. The county should ensure that this page is kept current through regular updates.

5. EQAC is pleased that the Metropolitan Washington Airports Authority reports, on its website, results from the new noise monitoring system for Washington Dulles International and Ronald Reagan Washington National Airports, and that the noise reports for both airports are accessible from the MWAA homepage by searching "noise" from the box at the upper right.

6. Once one year of reliable community noise impact data from the new runway configuration at Dulles Airport, with all four runways fully operational, are available, the Metropolitan Washington Airports Authority should review and analyze the data to identify operations on the new runways as they relate to community noise impacts and whether or not such impacts would suggest the need for consideration of operational changes.

H. RECOMMENDATIONS

1. The noise monitor at Great Falls Elementary, which primarily served Reagan National Airport, has been decommissioned with no plans for a replacement as there are currently few complaints about noise at that site. EQAC recommends that MWAA's decision to decommission this monitoring station be referred to the county's Airports Advisory Committee for review and recommendation. EQAC further recommends that the Airports Advisory Committee be asked whether it may be appropriate to consider if this monitoring station should be relocated elsewhere in the county, recognizing MWAA staff's perspective as to why such an effort may not be appropriate.

2. EQAC supports efforts by the Metropolitan Washington Airports Authority to report, on its website, results from the new noise monitoring system for Washington Dulles International and Ronald Reagan Washington National Airports. EQAC recommends, however, that the Board of Supervisors request to MWAA that these results be reported on a quarterly basis and that the data be posted more promptly, ideally within three months.

REFERENCES

Fairfax County Virginia Noise website: http://www.fairfaxcounty.gov/dpz/environment/noise/

Federal Aviation Administration, 2007, Ronald Reagan Washington National Airport, Volume 1, FAR Part 150 Noise Exposure Maps and Noise Compatibility Program.

Federal Aviation Administration, June 15, 2012 and August 30, 2013 letters from Dr. Lourdes Q. Maurice to Noel Kaplan, Fairfax County Department of Planning and Zoning.

Metropolitan Washington Airports Authority website: www.mwaa.com

Metropolitan Washington Council of Governments website: www.mwcog.org

Tysons Corner Areawide Urban Center Transportation Noise Study of December, 2012 published by Phoenix Noise and Vibration for Fairfax County Department of Planning and Zoning

Virginia Department of Transportation, July 9, 2013 letter from William C. Cuttler to Fred Selden, Director, Fairfax County Department of Planning and Zoning.

IX-2. LIGHT POLLUTION

A. OVERVIEW

Light pollution is a general term used to describe light output, primarily from exterior (outdoor) sources, in commercial, residential and roadway settings that is excessive in amount and/or that causes harmful glare to be directed into the path of travel or into residential neighborhoods. Light pollution is thus both a safety issue and a quality of life issue. With the increasing urbanization of Fairfax County, exterior (outdoor) lighting and light pollution in its many forms have become pressing issues to our communities. In the past, Fairfax County had some regulations regarding exterior lighting, but they were minimal and out of date. A major effort was undertaken in 2002 to write a totally new and modern Outdoor Lighting Ordinance that took into account the numerous advances that have been made in lighting technology in recent years. This highly successful effort utilized several workshops, in which EQAC and a number of local experts participated, and came to fruition in the early summer of 2003 with the adoption of the new Outdoor Lighting Ordinance. It is regarded by experts in the outdoor lighting community as being one of the best such ordinances in the mid-Atlantic region and has been cited and largely copied by localities in Connecticut, Illinois and California. However, there are a few areas that could not be adequately addressed by the new ordinance, since suitable standards and convenient measurement technology were not available. This report will focus on these areas.

B. RESPONSE OF THE HUMAN EYE TO LIGHT

To put the following sections in proper context it is helpful to briefly review how the human eye perceives and reacts to light. The various cells of the retina of the eye contain what are called visual pigments. These pigments, in the fully dark-adapted condition, are complex proteins consisting of two linked components. The pigments respond to light by "bleaching" (actually the dissociation of the two protein moieties). The brighter the light, the greater is the bleaching and the longer the regeneration time. The greater the bleaching, the lower is the sensitivity of the retinal cell. The retina contains three types of sensory cells:

- The rods which are most numerous toward the periphery of the retina and contain the visual pigment rhodopsin. They are useful primarily in low light and provide monochromatic images.

- Three types of cones, mostly concentrated in the central portion of the retina, which provide color vision. They contain respectively photopsin I (erythrolabe), photopsin II (chlorolabe), and photopsin III (cyanolabe). Their peak sensitivities are in the red, green, and blue portions of the spectrum just like the sensor chip in a digital camera. (George Wald received the 1967 Nobel Prize in Medicine for his work on the three kinds of cone photopsins.)

- The spidery retinal ganglion cells, containing the visual pigment melanopsin. These cells perform two different functions: (1) control of the size of the pupil of the eye in response to light and (2) as the control that resets the body's day-night cycle clock. Prolonged exposure of melanopsin to bright lights during normally dark periods of the evening and night can result in significant disturbances of the sleep-wake cycle.

C. ISSUES AND PROBLEMS

The main issues and problems of exterior lighting and light pollution may be summarized as follows:

1. Glare

Glare, as defined by the Illuminating Engineering Society of North America, falls into three main categories:

- Disability glare – Disability glare (sometimes less accurately referred to as veiling luminance) is caused by overly bright light sources that shine directly into one's eyes and is dangerous because it is blinding (i.e., it totally overloads the eye's light sensor cells).

- Discomfort glare – Discomfort glare may not necessarily reduce the ability to see an object, but it produces a sensation of discomfort due to high contrast or non-uniform distribution of light in the field of view.

- Nuisance or annoyance glare – Nuisance glare is that which causes complaints such as, "The light is shining in my window."

Glare is a significant and pervasive problem that seriously impairs both safety and quality of life. Glare demands attention in that one's eyes are naturally attracted to bright light, and at night this destroys the eye's dark adaptation (the eye's sensitivity to lower light levels), which is a serious hazard for both drivers and pedestrians. Obtrusive lighting by commercial establishments to attract attention is a serious problem as is selection of inappropriate fixtures for exterior residential lighting. A major problem is the high intensity lighting of sports facilities, such as ball fields and tennis courts, adjacent to residential neighborhoods. Glare and excessive illumination (which are two separate problems) cast into surrounding residential neighborhoods not only detracts from the quality of life but can make it difficult for pedestrians and homeowners to see their surroundings.

2. Light Trespass

Light trespass is the poor control of outdoor lighting such that it crosses property lines and detracts from the property value and quality of life of those whose property is so invaded. It is particularly common when obtrusive commercial or recreational lighting is immediately adjacent to residential neighborhoods or when a homeowner uses inappropriate fixtures, light levels and lighting duration, often in the interest of "security." It is generally categorized in two forms:

- Adjacent property is illuminated by unwanted light.
- Excessive brightness (often called "glare") occurs in the normal field of view.

Both of these forms may be present in a given situation. Illumination, that is, the amount of light energy falling on a surface, is readily measured by simple hand held instruments and is expressed in foot candles. Light levels of 0.5 foot candles at the property line of the property producing the illumination are regarded as a reasonable limit in residential areas. Illumination levels above that are regarded as excessive light trespass onto adjacent properties.

Glare or excessive brightness is a more complex and difficult-to-measure phenomenon. It is experienced when the light producing source (the bulb) is directly visible, but also depends on the luminance of the source and on the contrast between that source and the surrounding background. For example, even a very bright light source viewed against a noonday sky doesn't seem particularly glaring or objectionable, but the same source viewed against a night sky is very objectionable and seems so bright as to be almost painful. One of the problems in addressing this kind of light trespass, or more properly glare trespass, is that there have not been good standards for acceptable limits, and instruments to measure this kind of glare are necessarily complex and difficult to operate.

3. Security

Much outdoor lighting is used in the interest of providing security. These safety concerns often result in bad lighting rather than real security. One reason often cited for today's bright lights is that high wattage is needed to deter crime. However, studies have shown that if light is overly bright with excessive glare it makes it easier for a person to hide in the deep shadows created by objects in the harsh glaring light. This might actually encourage crime rather than discourage it. The debate as to whether or not additional light provides more safety has been emotional rather than factual. The few rigorous studies that have been done reveal no connection between higher lighting levels and lower crime rates. This may be due to people with nefarious intent taking more risks in better lit areas. For example, the National Institute of Law Enforcement and Criminal Justice found no statistically significant evidence that lighting impacts the level of crime (Upgren, 1996). Thus, the supposed correlation between a high level of security lighting and reduced crime appears to be nothing more than a popular myth.

4. Urban Sky Glow

Urban sky glow is brightening of the night sky due to manmade lighting that passes upward with the light rays reflected off of submicroscopic dust and water particles in the atmosphere. Although urban sky glow was first noted as a problem by the astronomical community, it is by no means any longer solely an astronomical issue. With the increasing urbanization of many areas of the U.S., all residents in those areas are now being affected. In Fairfax County, which is now a mostly urban county, improper lighting has seriously degraded the darkness of our local night skies into a pallid luminescence that many of our residents find objectionable.

5. Energy Usage

Smart lighting techniques, which direct all of the light generated onto the target area, reduce energy consumption and hence the use of fossil fuels. Several engineering estimates suggest that at least 30 percent of outdoor lighting is being wasted through light energy spilling upward and outward rather than being directed downward onto the target area. Also, many installations are greatly over-illuminated as well as being lighted for unnecessary durations, further compounding the energy wastage. Inefficient lighting incurs both direct financial costs and hidden environmental costs. It has been estimated by national organizations studying light pollution that in excess of $8 billion of electricity is being wasted annually on obtrusive and inefficient outdoor lighting (see data from Virginia Outdoor Lighting Task Force and the International Dark-Sky Association). Since electricity generation in the eastern part of this country is mostly from fossil fuels, every unnecessary kilowatt of electrical energy generated also produces air pollution, unnecessary greenhouse gases and acid rain.

D. CURRENT COUNTY STANDARDS AND REGULATIONS

In EQAC's view, Fairfax County now has a generally excellent ordinance that prescribes limits for the maximum wattage of light sources and for the amount of illumination and glare in commercial and residential districts. However, existing installations that were noncompliant under the new ordinance are allowed under state law to continue until such time as the fixture requires replacement. Also, these standards do not cover roadways that are under the jurisdiction of the Virginia Department of Transportation, and a number of these roadway fixtures represent a continuing source of glare and light pollution.

Fairfax County's Policy Plan: The Countywide Policy Element of the Comprehensive Plan (2013 Edition) recognizes the nuisance of light emissions arising from increasing urbanization and recommends that efforts be made to avoid creating sources of glare that interfere with residents' and/or travelers' visual acuity. To put this into practice, the county's Zoning Ordinance contains standards for illumination limits**.** However, the issue of glare, as opposed to illumination level, has only recently been addressed adequately. EQAC has recently collaborated with the Park Authority in conducting a study of glare in

athletic field lighting and the scientific limitations on its control. That study provides a basis for addressing glare from all sources.

E. ADDRESSING THE PROBLEM

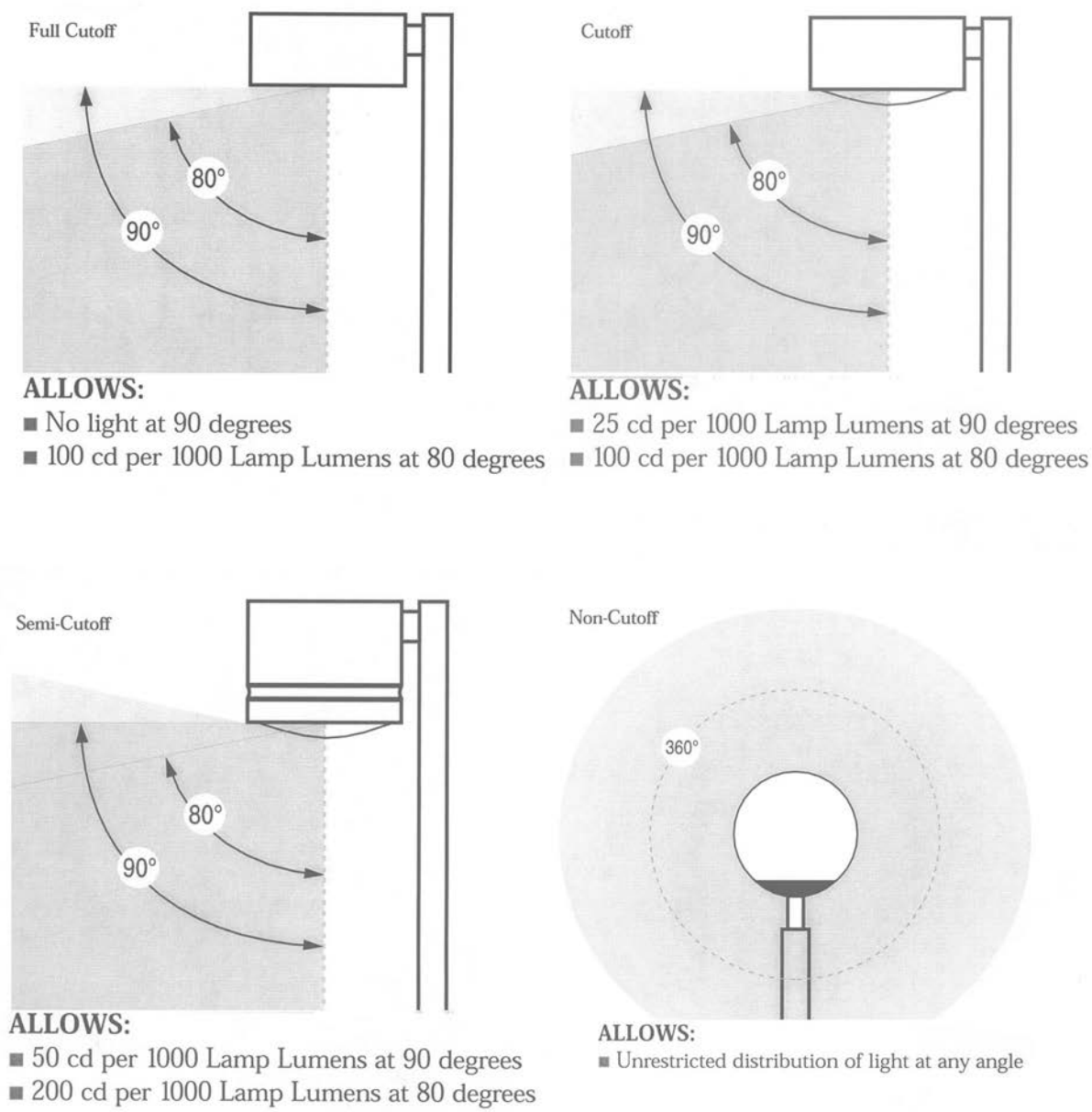
While the 2003 ordinance very adequately addresses new and replacement installations of outdoor lighting and fixtures in commercial and residential districts, much roadway lighting remains a problem because it is prescribed by VDOT, which is not subject to local control. A recently passed Virginia law and policy to use henceforth only fully shielded fixtures will eventually mitigate these problems as older fixtures are replaced. Ensuring that new residential installations meet code requirements represents a potentially significant compliance problem and will require that both review and inspection personnel be fully aware of the new code requirements and diligent in the application and enforcement of them. In addition, the 2003 ordinance is currently under review to include some modifications that will further reduce adverse effects of improper lighting. In 2010, staff coordinated with a work group consisting of representatives from the International Dark Skies Association, developers, the lighting industry, county residents and staff from the Fairfax County Park Authority and Fairfax County Public Schools to discuss potential revisions to the outdoor lighting provisions. In addition, staff has discussed the potential changes with the Northern Virginia Building Industry Association. This item is on the 2013 Zoning Ordinance Amendment Work Program and it is anticipated that this amendment will be scheduled for public hearings in early 2014.

One of the most common street lights in use, the drop-lens, cobra-head fixture, uses 150 watt bulbs. A fixture with reflective backing and shielding can direct all light below the horizontal plane with the same illumination of streets and homes and use only 100 watt bulbs. The same possibility exists with the popular 175 watt unshielded mercury vapor lamp. Both the 150-watt cobra-head fixture and the 175-watt mercury vapor lamp cast light laterally as well as down. As a result, substantial glare is often cast directly into the eyes of drivers. This glare destroys drivers' dark adaptation, creating potential safety hazards. In many cases the driver is not able to see the roadway as well as he or she would with lower-wattage properly shielded lights, and in many cases his/ her vision is made much worse. Because they cut down on glare, shielded fixtures not only are safer for drivers, but, according to experts (see references), actually make it easier for pedestrians and home owners to see their surroundings.

By redirecting this wasted energy, lower wattage lights provide the same amount of illumination in the areas where it is needed. These fixtures have reflective backing and full cut-off shielding to direct all light below the horizontal plane, with 90 percent of the light directed below an angle of 20 degrees from the horizontal. For example, a 50-watt metal halide lamp with a reflective shield will provide as much illumination below the horizontal plane as the 150-watt cobra-head fixture or the 175-watt unshielded mercury vapor lamp. These newer types of fixtures, which are recommended by the Illuminating Engineering Society of North America, are widely available and direct all light below the horizontal plane, thereby eliminating lateral glare (see Figure IX-2-1). It is estimated that it takes only

Figure IX-2-1

Effects of Cut-off and Non Cut-off Luminaires



(Sources: Paulin, Douglas, *Full Cutoff Lighting: The Benefits*, IESNA website, and Shaflik, Carl, *Environmental Effects of Roadway Lighting*, Information Sheet Number 125, International Dark-Sky Association, Tucson, Arizona, August 1997.)

three years of energy savings to recoup the initial investment in these fixtures. The lower wattage fixtures provide energy savings, improved driver safety, better visibility for pedestrians and an improved ambiance and security for neighborhoods. Several municipalities, such as Tucson, Arizona, San Diego, California and Sanibel Island, Florida, have adopted street lighting ordinances requiring these newer fixtures.

Most security lighting is overdone, with high wattage lights burning from dusk to dawn. As noted earlier, constant levels of illumination tend to be largely ignored because they are commonplace, and they waste a huge amount of energy. The large amount of glare produced by high intensity sources creates shadows that provide hiding places for intruders. Moreover, the constant glare and light trespass onto adjacent properties is a major source of annoyance to their occupants. On the other hand, lights that are activated by motion within a controlled area attract immediate attention and, at the same time, use very little energy and create intrusion on adjacent properties only when such attention is desired. For example, if one is using 300 watts of security lighting for an average of 10 hours each night and converts to an infrared motion sensor control that turns on the lights only when there is motion in the controlled area, energy cost is reduced to almost nil. In addition, the cost of the added sensor-control hardware can be recovered in as little as two to four months due to the energy saving. At the same time, security is increased rather than decreased and glare and light trespass onto adjacent properties is largely eliminated.

Glare is a significant and pervasive problem, but in some cases can be solved by installing "full cut-off" (i.e., light fixtures fully enclosed on their sides) or in some cases using supplementary shielding panels, to prevent light trespass onto adjacent residential properties. Where it is not possible to completely eliminate glare through the use of shielded fixtures, inexpensive motion detector controls can limit the harsh light to only a few minutes when it is really needed. However, glare like that experienced from high-intensity sources, like those used to light athletic fields, is a result of the background contrast ratio which is not subject to human control. A light seen against a very dark sky seems very intense and intrusive, but if seen against a day time sky seems hardly noticeable. One can readily prove this by viewing a full moon at, say, 2 or 3 o'clock in the morning when it appears as an intense disc so bright that it shows no features. However, the same moon viewed at, say, 9 or 10 o'clock the next morning is a very pale appearing disc with only slight contrast against the day light sky and shows an extensive array of features. This effect is due to the great difference in contrast with the background against which it is viewed. The mathematical difference between the source and the background is known as the source to background contrast ratio.

Light trespass is a term of relatively recent origin and denotes (1) glare that is generated by sources on one property that lie within the normal field of view of the occupants of another property and (2) light that spills over the boundaries of one property onto another, thereby producing unwanted illumination of it. Increasingly, such light intrusions are being regarded as trespass violations every bit as serious as physical trespass of a person onto the property of another. Such problems can now be readily avoided by the selection of proper fixtures, intensity levels and the use of timers and sensors/controllers.

Sky glow is also readily addressed by the selection of properly designed modern fixtures for new installations and phased retrofit of current inadequate installations. The cost of such retrofits is normally recoverable within a reasonable time period (usually estimated at about three years) through efficiently placing all of the light onto the desired area and the resulting lower energy usage.

Adherence to the following four principles will do much to mitigate or eliminate light pollution.

- Always illuminate with properly shielded fixtures that prevent the light source itself, and the resultant glare, from being directly visible. This is done by using cutoff fixtures or supplementary shielding that keeps all of the illumination below the horizontal plane and directed onto the target area.

- Do not over-illuminate. Never use more illumination than needed for the task at hand. Using a 400 watt floodlight to illuminate a small parking area or a flag at night is overkill and wastes a great deal of energy. A properly shielded and adjusted 250 watt luminaire (light source + fixture) can illuminate an area just as effectively as an older style 1,000 watt light source.

- Always aim lighting downward, keeping all of its distribution within the property lines and below the horizontal plane so that it is not a source of glare. Light trespass onto adjacent properties is unnecessary, inconsiderate and potentially illegal.

- Do not burn lighting all night long with the intention of improving security. Using infrared motion sensor-controlled lighting that comes on instantly when there is motion in the designated area is far more effective as a security measure. That rapid change from dark to light draws the immediate attention of everyone in the surrounding area, including security and law enforcement personnel on patrol, and may well be unsettling enough to cause illicit intruders to immediately flee. Lighting that stays on all night draws no special attention and is an enormous waste of energy.

F. PUBLIC AGENCY RESPONSIBILITIES

The responsibility for ensuring compliance with glare standards for residences and other private property lies primarily with the county's new Department of Code Compliance. Any enforcement activity dealing with light is complaint-driven. Typically, light-related complaints represent about 0.5 percent of total complaints. The county does not respond to anonymous complaints. Complaints are either filed directly with the Department of Code Compliance or are forwarded by the staff of a member of the Board of Supervisors. The causes of the complaints have usually been fast food establishments, security lighting for residences, athletic facilities (e.g., ball fields, driving ranges), or churches. The inspectors typically resolve violations with informal enforcement such as a verbal warning that there is a violation and how it may be remedied. A written notice of violation or civil action can be used if needed. Beyond the general glare standards, the county frequently is able to

impose additional "before-the-fact" restrictions through development conditions when rezoning, special permit and special exception processes come into play.

The Fairfax County Park Authority and the Fairfax County Public Schools are the two largest users of recreational and sports field lighting in the county. Parks and schools by their very nature are usually located in the midst of residential communities where their outdoor lighting, if inadequately designed, can seriously impact the surrounding residents. Schools, particularly high schools, often have sports practice sessions extending into the early evening hours and games that begin after the dinner hour and run into the later evening hours. In addition, schools of all categories often have "security" lights that burn from dusk to dawn, although they could perhaps be better served by motion-detector activated lights. Our park system, faced with increasing demand for team athletic facilities, will necessarily have to turn to synthetic turf and lighting during the evening to enable greater utilization of its existing fields. It is the responsibility of both organizations to utilize the best designs and equipment in addressing these needs in order to minimize adverse impacts on the surrounding neighborhoods and to ensure that lighting will not diminish either property values or quality of life. To this end, the Park Authority has recently published an extensive guidance handbook for athletic lighting design.

During the recent renovation of McLean Central Park all of the walkway and path lighting fixtures were changed to ones using LED (Light Emitting Diodes) light sources. This was done as a beta-test of this technology which should offer significant cost savings in both operation and maintenance. The test results have been so satisfactory that the Park Authority is planning to require the use of LED lighting for paths and walkways as a revised standard.

One of the most onerous sources of light pollution is the obtrusive lighting of commercial and industrial facilities, particularly commercial retail and service establishments. While their desire to attract attention to themselves is understandable, abusive excesses degrade the overall ambience of our commercial areas and materially degrade the quality of life in adjacent residential neighborhoods. This is of particular concern in the case of "by-right" development, where there are no public hearings (e.g., Planning Commission, Board of Zoning Appeals, Board of Supervisors) at which adjacent property owners and neighborhoods can register their concerns and see approval conditioned on appropriate restrictions. In such "by-right" cases, the initial responsibility would necessarily fall almost entirely upon the Land Development Services function of the Department of Public Works and Environmental Services, which reviews all proposed plans before a building permit is issued and subsequently conducts inspections to ensure that the work is in compliance with regulations. Evaluation of plans for compliance would add a small amount of effort to the review process but would add only a negligible amount to the inspection process.

At this time, the county has no formal policies regarding street lighting. Some neighborhoods within the county prefer to have local streets lighted, while others do not. Whether or not the county provides street lighting is often driven by budget priorities, and, unless there is a demonstrable public safety need, the priority for retrofitting an established

community is usually low. More often, street lighting is addressed in the overall planning of new subdivisions. In these cases, the Land Development Services function of DPWES would have responsibilities for both reviewing the plan and inspecting the implementation of it.

Responsibility for the lighting of main roadways is under the jurisdiction of the Virginia Department of Transportation. Historically, local communities and neighborhoods have had to deal directly with VDOT or through their local Supervisor's office over roadway lighting issues. It has proven very difficult to influence VDOT's choice of fixtures and technical standards, even when it can be demonstrated that their proposed implementation will result in unacceptable levels of glare and light trespass in adjacent residential neighborhoods. However, quite recently, encouraging headway has been made in getting VDOT to recognize the severity of the problem and to take some limited first steps to address it. As reported to EQAC by VDOT, all VDOT construction projects involving new lighting or replacement of existing highway lighting will eventually be upgraded to "night-friendly" cobra-style lighting. The same standard will apply to VDOT's commuter parking lot maintenance contracts. VDOT is also conducting a pilot program to install LED lighting along I-395 and I-495.

G. PUBLIC EDUCATION AND AWARENESS NEEDS

The general public needs awareness of the sources and problems of light pollution and of the methods by which these can be best addressed. The county staff has prepared an excellent and very informative 16 page booklet to explain the new Outdoor Lighting Ordinance (available at www.fairfaxcounty.gov/DPZ/Zoning/lightingbrochure.PDF). It can also be made available in printed version to individuals, homeowners groups and community associations directly through appropriate county offices and through the district offices of the members of the Board of Supervisors. The complete ordinance in convenient form is available on the Fairfax County website at www.fairfaxcounty.gov/DPZ/Zoningordinance/articles/Art14.PDF. In addition, the International Dark Sky Association and the Illuminating Engineering Society of North America maintain websites with a variety of technical information on lighting issues and technology.

Our county's 16 page booklet provides much of the information that architects, contractors and electricians need to familiarize themselves with our lighting codes and specifically what is not permitted (e.g., unshielded security lights, angle-directed post or building mounted fixtures, wall packs without shielding or baffling, excessive wattage or unshielded floodlights, light-trespass onto other properties, etc.) and what practices are recommended. Our county review and inspection personnel should make sure that members of the development, contractor and building management communities with whom they deal will be fully aware from the outset of the revised standards in the new ordinance and how best to address them.

There is an excellent website (www.qualityoutdoorlighting.com) that illustrates many examples of good, bad and ill-conceived lighting practices right here in our local area. It can play a central role in education of the public.

H. CONCLUSIONS

The principal means to prevent poor exterior lighting practices is a comprehensive code or ordinance, because this provides well thought out standards for, and enforceable legal restrictions on, specific lighting practices that affect the community and its quality of life. Numerous jurisdictions have adopted codes and ordinances that have proven very effective in reducing light pollution and preventing light trespass. A properly conceived and well written code permits all forms of necessary illumination at reasonable intensities, but requires shielding and other measures to prevent light pollution and light trespass. A good code applies to all forms of outdoor lighting, including streets, highways and exterior signs, as well as lighting on dwellings, parks, schools, commercial and industrial buildings, parking areas and construction sites. A good code also provides for reasonable exceptions for special uses within acceptable time periods and subject to effective standards. In EQAC's opinion, Fairfax County's recently adopted Outdoor Lighting Ordinance is an outstanding example of such a code. As the county has gained experience with application of the new ordinance, some areas have been identified where adjustments and fine-tuning are needed. A task force, under the leadership of the Department of Planning and Zoning, is currently developing specifications for the revisions needed.

The Fairfax County Park Authority has had an urgent need to increase the hours of utilization of its existing sports fields by installing lights to illuminate them. Aware of its special responsibility to ensure that such lighting systems minimize adverse impacts on adjacent residential properties, it has prepared extensive specifications for lighting of athletic fields designed to reduce spill light and glare to an absolute minimum. The results with a test rectangular field that was outfitted with lights and artificial turf have been very informative. While the illumination of the field surface is excellent and the illumination at the property line with respect to light spillover meets the Park Authority's stringent standards, the glare from the fully exposed, 1,500 watt lamps on 70 foot poles facing a residential neighborhood is intense (in the range of 12,000 lumens at 200 feet). A second field outfitted with an advanced model of fixtures of the same type shows no improvement in glare. The Park Authority has conducted a recent special study that reveals the glare problem is primarily governed by fundamental laws of nature over which man has no real control. However, the Park Authority's carefully worked out specifications minimize adverse impacts to the extent humanly possible. This same concern applies equally to the Fairfax County Public Schools, which also use lighted sports fields.

The county needs to work closely with VDOT to achieve better lighting practices on roadways within Fairfax County that are under VDOT jurisdiction. Current VDOT lighting and proposed new installations are regarded as being very intrusive by adjacent neighborhoods. However, it should be noted that a newly enacted law requiring the

commonwealth to acquire only shielded fixtures should materially improve VDOT practices in this regard on new installations and as old fixtures are replaced.

Much of the security lighting, both residential and commercial, in Fairfax County is poorly conceived, excessive in intensity and improperly directed and controlled. These deficiencies could be corrected at relatively low initial costs that would be rapidly recovered through the energy savings realized. This will require considerable public education to familiarize the using public with the issues and the available technology.

Much lighting in residential neighborhoods uses old style fixtures (or new but poorly designed ones) that cause excessive glare and light trespass onto adjacent properties. The new comprehensive ordinance and an intensive public awareness campaign should be used to address correction of these problems. Single family dwellings especially need to be brought into compliance with the spirit and provisions of the revised ordinance, for that is where the majority of us live and where our quality of life is most affected by intrusive lighting.

Poor lighting design, particularly in commercial areas, is contributing to excessive and highly objectionable sky glow. The new ordinance and retrofitting or adjustment of fixtures can eliminate the worst of this effect.

I. COMMENTS AND ONGOING CONCERNS

1. In response to a recommendation in earlier EQAC Annual Reports on the Environment, the Fairfax County Park Authority commissioned several studies of sports field lighting design and technology. The Park Authority issued a set of specifications, dated November 2006, for new athletic field lighting installations that addressed all of the issues adequately except for glare. The Park Authority then commissioned a special study of the glare problem. The Park Authority Director of Planning and Development requested EQAC to collaborate with his staff to develop this study. The final document, based on the underlying science, reveals that much of the glare problem is dependent on source-to-background contrast ratio, which is a fundamental law of nature and not under the control of man.

2. The earlier EQAC Annual Report recommendation that the Department of Planning and Zoning undertake some modest but needed revisions of the Outdoor Lighting Ordinance has come to fruition in the form of current meetings of a task force of stakeholders to develop specifications for such revisions. The originally scheduled revisions have been expanded to include consideration of light emitting diode lamps. The Park Authority has recently begun to use these for walkway lighting due to their much lower operating and maintenance costs. The revisions should be in final form before the end of the current year.

3. EQAC continues to support that the Board of Supervisors work with VDOT and Virginia elected officials to eliminate unnecessary roadway lighting and whenever possible to

accelerate replacement of existing poorly designed fixtures under the control of VDOT with full cut-off fixtures.

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International Dark-Sky Association website, www.darksky.org/.

National Electrical Manufacturers Association website, www.nema.org/
(Particularly see their White Paper on Outdoor Lighting Code Issues.)

Virginia Outdoor Lighting Taskforce website, www.volt.org/.

Quality Outdoor Lighting website, www.qualityoutdoorlighting.com/.

IX-3. VISUAL POLLUTION AND URBAN BLIGHT

A. OVERVIEW

Historically, the term “pollution” has referred primarily to the fouling of air, water and land by wastes or from the byproducts of human activities. In recent years it has come to signify a wider range of disruptions to environmental quality. Both noise pollution and light pollution issues have been addressed earlier in this chapter. This section focuses on visual blight/pollution issues, including such things as proliferation of signs, billboards, litter, dumps, junkyards and the like, which are important components of visual pollution.

Simply stated, “blight” is something that impairs or destroys appearance and results in a deteriorated condition. In recent times, urban blight has come to include a wide range of visual pollutants that degrade the ambience of our communities, including such things as trash and litter on roadsides, unkempt properties, above-ground power and communications transmission lines, communication towers, intrusive and objectionable advertising signage and other forms of visual impairments. Signage that is excessive in amount and inappropriate in placement is one of the most ubiquitous of these “pollutants,” and is the primary focus of this chapter.

B. SIGNS AND BILLBOARDS

Unnecessary signs and billboards, almost always placed as some kind of advertising, have been called "visual pollution," "sky trash," "litter on a stick" and "the junk mail of American roadways." Uncontrolled signs and billboards are examples of the types of visual pollution that can destroy the distinctive character of our communities and countryside.

Signs in the public rights-of-way have been around for as long as there have been public rights-of-way, but the numbers have spiraled out of control in recent years. Between fields of “popsicle-stick” signs for homebuilders and politicians and signs for weight loss, work-at-home businesses, painting, hauling and other signs plastered on every available traffic sign and utility pole, everyone in Fairfax County has something to hate about the proliferation of signs.

Communities can regain control of their visual environment, preserve their distinctive character and protect natural beauty and the environment by enacting and enforcing ordinances that control signage and billboards. Reducing sign and billboard blight helps communities reclaim local beauty and character. Excellent alternatives to large intrusive signs and billboards, such as wayfinding signs, logo signs and tourist-oriented directional signs, can help people locate local businesses and are minimal in their visual impact.

C. TELECOMMUNICATION TOWERS AND UTILITY TRANSMISSION LINES

In 1996, Congress passed the landmark Federal Telecommunications Act to encourage the rapid development and growth of new telecommunications technology such as wireless telephones and digital television. However, antenna towers, often of considerable height, have been built near people's homes, next to historic buildings, or in rural, scenic areas. Towering above trees and neighborhoods, and protruding into the skyline, such towers often have a very unappealing visual impact (see the website www.scenic.org for examples). Reconciling the requirements of communications engineering and community aesthetics is a difficult and growing problem but one that must be directly addressed if both needs are to be properly served.

The visual blight associated with above ground utility lines besets both our residential and commercial areas. These lines and poles are particularly objectionable in our local shopping areas where they obstruct the vision of drivers and greatly impair the visual attractiveness of the locale.

D. ADDRESSING THE PROBLEM

Creating sign regulations developed with community input encourages business owners to erect less intrusive signs that reflect an area's spirit, contributing to civic pride and helping to revitalize commercial districts. Regulations should encourage signs that quickly communicate their message, complement their surroundings and enhance the visual character of the community. Attractive on-premise signs can help encourage residents and business owners to work together to improve and revitalize local appearance.

For many years, EQAC has issued recommendations regarding illegal signs. Most recently, EQAC noted its support for a proposed agreement between Fairfax County and the Virginia Department of Transportation regarding removal of illegal signs from highway rights-of-way (memorandum dated February 13, 2013—see Appendix B of this report). EQAC supported the proposed legal agreement as it would have the effect of reducing the number of illegal signs that are found within the county.

Since that time, the Board of Supervisors, at its meeting on February 27, 2013, directed the county executive to enter into an agreement with the State of Virginia allowing for the removal of illegal signs in the public rights-of-way by the county. That agreement includes an initial phase and a second phase of an enforcement program. During the initial phase, county staff will educate the public and business groups about it after the sign removal agreement has been executed. On this effort, the Department of Code Compliance will work in coordination with the Sheriff's Office, Office of Public Affairs and VDOT's public affairs staff. These efforts may include outreach to homeowners and civic groups, outreach to business and trade organizations, public service announcements and outreach to the news media.

During the second phase, and upon selection of the roadway segments and public information effort by county staff, the actual implementation of the program will begin. The Office of the Sheriff will provide its Community Labor Force to remove signs in identified areas of the county. It is estimated that the cost of this program will be $150,000 on an annual basis. Community Labor Force crews will remove all signs located in the designated public rights-of-way between Tuesdays and Fridays. Special event signs are only permitted from Saturday through Monday. If they are present during the weekdays they will be subject to removal. These signs will then be stored at a county facility for five days, which will allow the owner of the sign to reclaim it as required by Va. Code Ann. §33.1-375.1(D). After this five day period, unclaimed signs would be destroyed.

Assuming that this program is maintained for a period of one year in the county, at the end of the one year period, it will be evaluated by staff and an analysis of its successes and/or failures will be forwarded to the Board of Supervisors. If it is determined by the Board of Supervisors that the program should be retained, any modifications suggested by the Board of Supervisors will be reviewed and a recommendation will be forwarded to the Board of Supervisors, with resource requirements, for its consideration.

E. RELATED INFORMATION

The Fairfax County Department of Code Compliance provided the following information for 2012:

- Total number of zoning complaints received in 2012: 3,581
- Number of sign-related zoning complaints received in 2012: 288
- Number of lighting-related zoning complaints received in 2012: 37

On July 1, 2013 the Community Labor Force of the Sheriff's Office began a countywide cleanup of illegally posted signs in the rights-of-way on the major roadways in the county. Details of this program are available at http://www.fairfaxcounty.gov/signs/signremovalprogram.htm.

The Alice Ferguson Foundation provided information about the 25th Annual Potomac River Watershed Cleanup in April 2013, as well as a regional litter prevention campaign. The Regional Litter Prevention Campaign works to change littering behaviors of residents in the Potomac Watershed with unified messaging that engages the public both from a jurisdictional and grass-roots level. Arlington and Fairfax Counties are both involved in the Regional Litter Prevention Campaign. Arlington County has been posting information about this effort it in its city buses and both counties helped spread the word about the Litter Prevention Video Contest. Woodbridge became the newest Trash Free Community with Woodbridge Potomac Communities Civic Association working in collaboration with Keep Prince William Beautiful to raise awareness through a grassroots effort that has included posters and a Spanish radio public service announcement. Both Spanish and English materials are being used. During Litter Enforcement Month, 15 agencies from 12 jurisdictions participated. From Northern Virginia, nine partners participated, including the Fairfax County Police and the Falls Church City Police. There were 822 officers trained

and 200 reminded of how to enforce litter, illegal dumping and related codes. Regarding citations and other reports for Virginia, there were 33 littering citations (18 civil, 15 criminal); 10 illegal dumping citations (6 civil, 4 criminal); and 59 Snipe Sign violations. A full report for Litter Enforcement Month can be found online at: http://fergusonfoundation.org/trash-free-potomac-watershed-initiative/litter-enforcement/litter-enforcement-month/.

F. COMMENT

1. EQAC applauds the county's efforts to enter into a legal agreement with the Virginia Department of Transportation that addresses removal of illegal signs from highway rights-of-way. Further, EQAC supports the plan noted by the county to evaluate the program following its first year of operation in the county. EQAC intends to follow the results from this program and to provide further input regarding both the county staff's analysis of its successes and/or failures and staff's recommendations about retention of and possible modifications to the program.

APPENDIX A
SUMMARY OF ENVIRONMENTAL BILLS OF INTEREST
2013 VIRGINIA GENERAL ASSEMBLY

Each year, the Virginia General Assembly considers scores of bills that could impact the environment and conservation efforts in the commonwealth. This appendix identifies and summarizes several such bills that were considered by the General Assembly in 2013. Note that the General Assembly sometimes incorporates provisions from several bills in one substitute bill. Thus a bill may have failed, but all or some of its provisions have been "incorporated" in another bill. The summary for the bill will so note when this occurs.

The major substantive provisions of each measure are listed as summaries prepared by Virginia legislative staff. The appropriate bill number and main patron are noted so that one can obtain further information, if needed. A researcher should refer to the enrolled bill, the appropriate chapter of the 2013 Acts of Assembly, or the Legislative Information System on the Internet (**http://lis.virginia.gov**) for detailed information on legislation.

These summaries reflect actions of the regular session of the 2013 General Assembly through adjournment sine die on February 23, 2013. Many of the measures were subject to gubernatorial review and veto. Therefore, some measures may have been amended and some may not have become law.

Agriculture, Horticulture and Food

HB 1695 Agricultural-customer generators, eligible; renewable energy incentives through net metering. Requires the State Corporation Commission to establish a net energy metering program for eligible agricultural customers. Agricultural net metering will allow a customer that operates a solar, wind, or aerobic or anaerobic digester gas facility of up to 500 kilowatts as part of an agricultural business to be served by multiple meters that are located at separate but contiguous sites, provided the generating facility is located on land owned or controlled by the agricultural business and is used to provide energy to metered accounts of the agricultural business. *Minchew*: **PASSED**

HB 1834 High Performance Building Act; use of certain forest products. Requires the Department of General Services to include in the high performance building certification program, certificate credits for forest products certified by the Forest Stewardship Council or certified under the Sustainable Forestry Initiative or the American Tree Farm System. *Poindexter:* **FAILED**

HB 2137 Local governments; environmental impact reports, prohibits purchase of certain deicing agents. Localities; environmental impact reports and the sale of certain deicing agents. Raises from $500,000 to $2 million the cost threshold at which a locality will be required to obtain an environmental impact report for a highway project. For certain projects costing more than $500,000 and less than $2 million, the locality is required to consult with the Department of Historic Resources to make efforts to minimize impacts to historic resources. The bill also

exempts the sale of deicing agents containing urea from the current prohibition on such sales where the deicing agent is to be used by a municipal corporation at an airport. *Byron:* **PASSED**

HJ 609 Biosolids; DEQ to study substances contained in certain wastewater treatment facilities. Directs the Department of Environmental Quality to study the substances contained in biosolids generated from wastewater treatment facilities that are applied to lands for agricultural purposes. *Gilbert:* **CARRIED OVER**

Waste Disposal

HB 1727 Water and waste authorities; rates and charges. Clarifies the ability of a water or waste authority to fix rates for services that are furnished by a refuse collection and disposal system. The bill expands the list of rate-setting powers that require a public hearing by adding the rate-setting power found in subdivision 10 of § 15.2-5114, a power that includes the establishment of incentives for green roofs. The bill combines the two parallel processes found in current law for the setting of rates for sewage disposal and refuse collection, and it reduces the period for publication of notice of a rate-setting hearing from 60 days to 14 days. Finally, the bill provides that no rate established before January 1, 2013, shall be invalidated because of a failure to provide the required public notice. The bill also makes technical changes. *Toscano:* **CARRIED OVER**

Motor Vehicles

HB 1944 Electric vehicles, converted; fees for inspection. Allows safety inspectors of converted electric vehicles to charge an additional fee of no more than $40 for such an inspection. *Lopez :* **PASSED**

SB 1102 Emissions inspection; minimum miles per gallon rating required to be exempt from testing. Decreases the minimum miles per gallon rating required to be exempt from emissions inspection testing from 50 to 48 miles per gallon for 2008 and 2009 hybrid vehicles. *Ebbin:* **PASSED**

General Assembly

HJ 669 Renewable energy; Commission on Electric Utility Regulation to study portfolio standard program. Study; mandatory renewable energy portfolio standard program; report. Directs the Commission on Electric Utility Regulation to study the establishment of a mandatory renewable energy portfolio standard program for the commonwealth. The study will (i) address issues associated with transitioning from the existing voluntary renewable energy portfolio standard program to a mandatory program, (ii) determine the costs and benefits that would be associated with requiring electric utilities to meet varying levels of renewable energy portfolio standard goals, (iii) recommend measures to address electric utilities that do not meet the program's goals and (iv) determine if it is feasible and advisable to require that all electric utilities in Virginia participate in a mandatory renewable energy portfolio standard program. *Herring:* **CARRIED OVER**

SJ 331 Renewable energy; establishment of mandatory portfolio standard program for State, report. Directs the Commission on Electric Utility Regulation to study the establishment of a mandatory renewable energy portfolio standard program for the commonwealth. The study will (i) address issues associated with transitioning from the existing voluntary renewable energy portfolio standard program to a mandatory program, (ii) determine the costs and benefits that would be associated with requiring electric utilities to meet varying levels of renewable energy portfolio standard goals, (iii) recommend measures to address electric utilities that do not meet the program's goals and (iv) determine if it is feasible and advisable to require that all electric utilities in Virginia participate in a mandatory renewable energy portfolio standard program. *Northam:* **CARRIED OVER**

SJ 338 Environmental regulation; need for reducing burden of EPA regulations. Recognizes the need for regulatory agencies to use administrative discretion to reduce the burden placed upon the coal and electricity-generation industries by the regulations recently adopted by the Environmental Protection Agency. *Martin:* **CARRIED OVER**

Energy Conservation and Resources

HB 1916 Income tax, state and corporate; tax credit for solar thermal systems. Establishes beginning in 2013 an individual and corporate income tax credit for solar energy space heating, water heating, space cooling, and industrial and commercial process heating systems placed in service. The credit would equal 35 percent of the installed cost of the system and only the ultimate consumer or user of the system would be allowed to claim the credit. The credit would not exceed (i) $500,000 for solar energy systems placed in service for any purpose other than use for a single-family dwelling or placed in service and having in excess of 120 square feet of collector area or (ii) $2,500 for every other solar energy system placed in service.
The credit would be required to be claimed in three equal annual installments for solar energy systems serving other than a single-family dwelling. The credit would expire and no further credit could be claimed if the solar energy system is disposed of, taken out of service or moved out of the commonwealth during any of the installment years. Any unused credit could be carried forward for three taxable years. The credit would sunset in 2018. *Surovell and Krupicka:* **CARRIED OVER**

HB 1917 Electric utilities; renewable thermal energy. Expands the definition of "renewable thermal energy" to include the energy output from certain solar energy systems located in the commonwealth that heat air or water for residential, commercial, institutional or industrial processes. Under current law, the term encompasses only the energy output from renewable-fueled combined heat and power facilities used in industrial processes. Renewable thermal energy is eligible to satisfy the goals of the renewable energy portfolio standard program. The measure also defines "solar energy system" as a system that produces heat or electricity, or both, from sunlight. *Surovell, Krupicka, Minchew and Ramadan:* **PASSED**

HB 1946 Renewable energy; amends existing portfolio standard program. Amends the existing renewable energy portfolio standard program to require that for calendar years 2016 through 2025 a utility shall apply (i) only renewable energy generated or purchased in Virginia, off its coast or represented by a renewable energy certificate from eligible sources in Virginia or

off its coast and (ii) renewable energy sales or renewable energy certificates from electric energy derived from any combination of sunlight, onshore wind, offshore wind, wave motion, tides or geothermal power to meet at least 40 percent of the sales requirement for the RPS Goal in that year. The measure also eliminates provisions that give double or triple credit toward meeting the RPS Goals for energy from specified sources of energy. *Lopez and Krupicka:* **CARRIED OVER**

HB 2180 Electric utilities; renewable energy portfolio standard program, eligible energy. Renewable energy portfolio standard program; eligible energy. Provides that renewable energy that is purchased by a participating utility under an agreement executed on or after July 1, 2013, will count toward meeting the RPS Goals of the renewable energy portfolio standard program only if the agreement expressly transfers ownership of renewable attributes, in addition to ownership of the energy, to the participating utility. The bill also provides that renewable energy generated by the utility will be counted toward meeting the RPS Goals if it is from a facility in which the public utility owns at least a 49 percent interest that is located in the commonwealth, in the interconnection region of the regional transmission entity of which the utility is a member, or in a control area adjacent to such interconnection region. Renewable energy represented by renewable energy certificates will continue to be eligible to be counted toward meeting the RPS Goals. This bill is identical to SB 1259. *Rust:* **PASSED**

HB 2305 Community associations; restrictions on solar panels. Clarifies that a community association may establish reasonable restrictions concerning the size, place and manner of placement of solar energy collection devices on property designated and intended for individual ownership and use. The bill also requires the resale certificate required under the Virginia Condominium Act and the disclosure packet under the Virginia Property Owners' Association Act to contain a statement setting forth any restriction, limitation or prohibition on the right of an owner to install or use solar energy collection devices on his property. In addition, the bill adds to the seller's representation to a prospective purchaser of residential property under the Virginia Residential Property Disclosure Act that the seller makes no representations with respect to right to install or use solar energy collection devices on the property. *Ramadan:* **PASSED**

HB 2334 Solar-powered or wind-powered electricity generation facility; SCC to conduct pilot program. Directs the State Corporation Commission to conduct a pilot program in a certain utility's service territory. Under the pilot program, a person that owns or operates a solar-powered or wind-powered electricity generation facility with a capacity between 50 kilowatts and one megawatt that is located on premises owned or leased by an eligible customer-generator will be allowed to sell the electricity generated from such facility exclusively to the eligible customer-generator under a power purchase agreement. The power purchase agreement will provide for third party financing of the costs of the renewable generation facility. The minimum size requirement does not apply to certain nonprofit entities. The SCC shall establish guidelines concerning aspects of the pilot program by December 1, 2013. This bill is identical to SB 1023. *Yancey, Hodges and Kilgore:* **PASSED**

HJ 666 State renewable energy utility; joint subcommittee to study feasibility of establishing. Establishes a joint subcommittee to study the feasibility of establishing a state renewable energy utility. The joint subcommittee is directed to examine the report of Delaware's

Sustainable Energy Task Force, examine the feasibility of authorizing a state renewable energy utility to issue tax-exempt bonds to fund renewable energy improvements at state buildings, and determine what lessons can be learned from Delaware's experience in establishing and operating its sustainable energy utility. *Surovell and Minchew:* **CARRIED OVER**

SB 1023 Solar-powered or wind-powered electricity generation facility; SCC to conduct pilot program. Directs the State Corporation Commission to conduct a pilot program in a certain utility's service territory. Under the pilot program, a person that owns or operates a solar-powered or wind-powered electricity generation facility with a capacity between 50 kilowatts and one megawatt that is located on premises owned or leased by an eligible customer-generator will be allowed to sell the electricity generated from such facility exclusively to the eligible customer-generator under a power purchase agreement. The power purchase agreement will provide for third party financing of the costs of the renewable generation facility. The minimum size requirement does not apply to certain nonprofit entities. The SCC shall establish guidelines concerning aspects of the pilot program by December 1, 2013. This bill is identical to HB 2334. *Edwards; Delegate: Torian:* **PASSED**

SB 1259 Electric utilities; renewable energy portfolio standard program, eligible energy. Provides that renewable energy that is purchased by a participating utility under an agreement executed on or after July 1, 2013, will count toward meeting the RPS Goals of the renewable energy portfolio standard program only if the agreement expressly transfers ownership of renewable attributes, in addition to ownership of the energy, to the participating utility. The bill also provides that renewable energy generated by the utility will be counted toward meeting the RPS Goals if it is from a facility in which the public utility owns at least a 49 percent interest that is located in the commonwealth, in the interconnection region of the regional transmission entity of which the utility is a member, or in a control area adjacent to such interconnection region. Renewable energy represented by renewable energy certificates will continue to be eligible to be counted toward meeting the RPS Goals. This bill is identical to HB 2180. *Edwards:* **PASSED**

SB 1269 Renewable energy portfolio standard program; sale of electricity from renewable sources. Renewable energy portfolio standard program. Amends the existing renewable energy portfolio standard program to require that for calendar years 2016 through 2025 a utility shall apply (i) only renewable energy generated or purchased in Virginia, off its coast or represented by a renewable energy certificate from eligible sources in Virginia or off its coast and (ii) renewable energy sales or renewable energy certificates from electric energy derived from any combination of sunlight, onshore wind, offshore wind, wave motion, tides or geothermal power to meet at least 40 percent of the sales requirement for the RPS Goal in that year. The measure also eliminates provisions that give double or triple credit toward meeting the RPS Goals for energy from specified sources of energy. *McEachin:* **CARRIED OVER**

SB 1286 Solar energy equipment facilities and devices; exempted from state and local taxation. A bill to amend and reenact § 58.1-3661 of the Code of Virginia, relating to taxation of solar energy equipment. *Deeds:* **FAILED**

SB 1341 Renewable energy facilities, certain; exemption from local zoning and land use regulations. Exempts certain electrical generation facilities powered by renewable sources of energy from local zoning and land use requirements. The exemption applies to a facility that is owned by an electric utility, has a capacity of at least four megawatts, is on a parcel of at least 25 acres and has received all required approvals and permits from the State Corporation Commission and environmental regulators. *Saslaw and Watkins:* **FAILED**

Counties, Cities and Towns

HB 1324 Efficiency Evaluation Fund; established, grants to localities. Efficiency Evaluation Fund; grants to localities. Creates the Efficiency Evaluation Fund to provide matching grants to localities to pay for evaluations by private consultants to determine ways in which localities may become more efficient. *Morris:* **CARRIED OVER**

HB 1448 Septic systems, failed; contracts with property owners to provide loans for repairs. Authorizes a locality, by ordinance, to create a loan program to enable the repair of property owners' failed septic systems. Any such ordinance is required to describe the arrangement of the loan program, including any partnership with a planning district commission, and is permitted to provide for the repayment of the loan through water or sewer billings, real property tax assessments or other billings. The bill authorizes other features of a loan program and permits a locality to set a minimum ownership interest or minimum level of proof of ownership of the property for situations in which it is extremely difficult or impossible to identify all of the people who have an ownership interest in the property. *Hodges:* **PASSED**

Emergency

HB 1488 Stormwater management program; delays date local governments will have to for administering. Local implementation of stormwater management program. Delays the date that local governments will have to assume responsibility for administering the stormwater management program from July 1, 2014, to July 1, 2015. *Rush:* **CARRIED OVER**

HB 1718 Transportation projects and planning; reimbursement of VDOT by localities. Requires a locality to repay the Department of Transportation when a locality requests termination of a project and the department does not agree to the termination or the locality or metropolitan planning organization doesn't advance the project. The bill also expands the step before a locality requests alterations to a project to include the design approval by the chief engineer. *Anderson:* **PASSED**

HB 1727 Water and waste authorities; rates and charges. Clarifies the ability of a water or waste authority to fix rates for services that are furnished by a refuse collection and disposal system. The bill expands the list of rate-setting powers that require a public hearing by adding the rate-setting power found in subdivision 10 of § 15.2-5114, a power that includes the establishment of incentives for green roofs. The bill combines the two parallel processes found in current law for the setting of rates for sewage disposal and refuse collection, and it reduces the period for publication of notice of a rate-setting hearing from 60 days to 14 days. Finally, the bill provides that no rate established before January 1, 2013, shall be invalidated because of a failure

to provide the required public notice. The bill also makes technical changes. *Toscano:* **CARRIED OVER**

HB 1762 Hunting; allowed on Sunday in certain counties. Allows any person to hunt or kill wild animals on Sunday, on private lands in the counties of Fairfax, Fauquier, Loudoun and Prince William. However, the hunting or killing of wild birds on Sunday in these localities would continue to be prohibited. *Ramadan and Webert*: **CARRIED OVER**

HB 1878 Sources of revenue; establishing and adjusting for appropriations of state and its localities. Establishing and adjusting sources of revenue for appropriations of the commonwealth and its localities. Makes several changes to sources of revenue of the commonwealth:

Establishes a five percent tax on motor fuels sales based on the statewide average wholesale price of a gallon of self-serve unleaded regular gasoline. The revenues would be distributed to the Highway Maintenance and Operating Fund, the Transportation Trust Fund, the Intercity Passenger Rail Operating and Capital Fund and the localities to be used for transportation purposes.

Increases the additional registration fee on electric vehicles from $50 to $102 and requires hybrid electric motor vehicles registered in the commonwealth to pay this fee. However, owners of hybrid electric motor vehicles registered in the commonwealth would be eligible for a refund of the new five percent tax on motor fuels sales.

Lowers individual income tax rates and changes the individual income tax structure, effective January 1, 2014. Income less than $5,000 would be taxed at a 0.75% rate, income over $5,000 and up to $17,000 would be taxed at a 4.5% rate, and income over $17,000 would continue to be taxed at a 5.75% rate.

Repeals income tax credits for vehicle emissions testing equipment, clean-fuel vehicles and biodiesel fuel producers effective for taxable years beginning on or after January 1, 2013. Eliminates the sales tax exemption currently extended to certain services, such as auto repairs, taxi and limousines, armored cars, travel and transportation. *Morrissey*: **CARRIED OVER**

HB 2048 Water quality; transfer of responsibility for administration of programs. Consolidation of water quality programs. Moves several water quality programs currently administered by the Department of Conservation and Recreation to the Department of Environmental Quality. The Department of Environmental Quality and the State Water Control Board will have oversight of water quality planning and laws dealing with stormwater management, erosion and sediment control and the Chesapeake Bay Preservation Areas. The Virginia Soil and Water Conservation Board will have continuing responsibility for oversight of the soil and water conservation districts and of resource management planning. The Virginia Soil and Water Conservation Board will continue to be responsible for administration of the flood prevention and dam safety laws. The board will continue to be staffed by the Department of Conservation and Recreation. This bill is identical to SB 1279. *Sherwood:* **PASSED**

HB 2063 Sources of revenue; establishing and adjusting for appropriations of state and its localities. Establishing and adjusting sources of revenues for appropriations of the commonwealth. Makes several changes to sources of revenue of the commonwealth as follows: Establishes a 5% tax on motor fuels sales based on the statewide average wholesale price of a gallon of self-serve unleaded regular gasoline. The revenues would be distributed to the Highway Maintenance and Operating Fund, the Transportation Trust Fund, the Intercity Passenger Rail Operating and Capital Fund and the localities to be used for transportation purposes. Increases the additional registration fee on electric vehicles from $50 to $102 and requires hybrid electric motor vehicles registered in the commonwealth to pay this fee. However, owners of hybrid electric motor vehicles registered in the commonwealth would be eligible for a refund of the new 5% tax on motor fuel sales.

Repeals income tax credits for vehicle emissions testing equipment effective for taxable years beginning on or after January 1, 2013.

Authorizes planning district commissions to be eligible to receive revenues to be used solely for transportation purposes within the planning district. The revenues would be generated by an additional 0.5% state sales and use tax and an additional state recordation tax of 15 cents per $100 in the localities located in the planning district commission. In order to be eligible, the planning district commission must determine, in order of priority, a list of 10 transportation projects that it would like to fund with the revenues. Additionally, the governing bodies of the localities representing at least a majority of the residents within the planning district commission must pass a resolution in support of the generation of such revenues. After these requirements have been met, the General Assembly must specifically authorize the imposition of such taxes in the localities in the planning district commission during the next session of the General Assembly. If the revenues are authorized, then, if applicable, a locality would no longer be authorized to impose a local income tax. *Rust and Minchew:* **CARRIED OVER**

HB 2137 Local governments; environmental impact reports, prohibits purchase of certain deicing agents. Localities; environmental impact reports and the sale of certain deicing agents. Raises from $500,000 to $2 million the cost threshold at which a locality will be required to obtain an environmental impact report for a highway project. For certain projects costing more than $500,000 and less than $2 million, the locality is required to consult with the Department of Historic Resources to make efforts to minimize impacts to historic resources. The bill also exempts the sale of deicing agents containing urea from the current prohibition on such sales where the deicing agent is to be used by a municipal corporation at an airport. *Byron*: **PASSED**

HB 2190 Stormwater management ordinances; requires localities to adopt more stringent requirements. Stringency of stormwater management ordinances. Establishes a procedure for state review of the stringency of local stormwater ordinances. The bill requires localities within 30 days of the adoption of a more stringent stormwater ordinance or requirement to submit a letter report to the Department of Conservation and Recreation. The letter report is to include an explanation as to why the more stringent ordinance or requirement is necessary. In addition, within 90 days of the ordinance's adoption, a landowner or his agent can request the Department of Conservation and Recreation to determine whether the ordinance or requirement meets the

standards of the state law. The department has 90 days to make such a determination. *Cosgrove:* **PASSED**

HB 2253 Transportation; makes several changes to state & local taxes & fees to acct. for & provide funding. The bill makes several changes to the individual and corporate income tax. The bill: (i) decreases all individual income tax rates by 0.2%; (ii) adopts market-based sourcing for corporate income tax for the sourcing of services, marketable securities and property; and (iii) repeals (a) the land preservation tax credit, (b) the long-term care insurance tax credit and (c) the coalfield employment enhancement tax credit, including the ability of electricity generators to allocate tax credits earned by such persons for purchasing coal to persons with an economic interest in coal.

The bill imposes a 5% state tax on motor fuels sales based on the statewide average wholesale price of a gallon of self-serve unleaded regular gasoline. The revenues would be distributed for maintenance of roads in the secondary state highway system and construction of new roads.

The bill also increases the additional state registration fee on electric vehicles from $50 to $102 and requires hybrid electric motor vehicles registered in the commonwealth to pay this fee. However, owners of hybrid electric motor vehicles registered in the commonwealth would be eligible for a refund of the new 5% tax on motor fuels sales.

The bill imposes a 2% state transient occupancy tax, an initial 1% state motor vehicle registration fee and a $0.20 per $100 recordation fee in any locality in Northern Virginia that is imposing either of the two local taxes set forth below.

The bill completely exempts food for human consumption from state and local sales taxes, repeals the sales and use tax exemption for nonprofit entities and increases the amount of state sales tax distributed to localities from 1% to 1.23%.

The bill authorizes Fairfax County, Loudoun County and Prince William County to impose a 4% food and beverage tax without a referendum, to be used for the construction of roads that reduce traffic congestion. The bill authorizes Arlington County and the cities in Northern Virginia to impose an additional 0.5% local sales and use tax to be used for the construction of roads that reduce traffic congestion.

The bill also authorizes localities in Hampton Roads to impose an additional 1% sales and use tax to be used for the construction of roads that reduce traffic congestion.
All provisions of the bill, except the adoption of market-based sourcing for corporate income tax, are effective January 1, 2016. The market-based sourcing for corporate income tax is effective January 1, 2014. *Albo:* **CARRIED OVER**

Conservation

HB 1367 Cigarettes; deemed litter for purposes of criminal punishment for improper disposal of trash. Littering; cigarettes, civil penalty. Includes cigarettes specifically in the category of things deemed litter for purposes of criminal punishment for improper disposal of

trash. The bill also provides that in lieu of the imposition of the Class 1 misdemeanor criminal penalty, the court may order the defendant to perform community service in litter abatement activities. If the offense involves a cigarette or cigarettes, the court shall order the payment of a $100 civil penalty payable to the Litter Control and Recycling Fund established in § 10.1-1422.01 in addition to the imposition of such community service. *Morrissey and Surovell*: **FAILED**

HB 1488 Stormwater management program; delays date local governments will have to for administering. Local implementation of stormwater management program. Delays the date that local governments will have to assume responsibility for administering the stormwater management program from July 1, 2014, to July 1, 2015. *Rush:* **CARRIED OVER**

HB 1531 Public beaches; sand dredging and beach replenishment. Sand replenishment for public beaches. Authorizes the Marine Resources Commission and the Department of Environmental Quality to establish an expedited application review process for dredging of sand and beach replenishment on the public beaches abutting the waters of the Chesapeake Bay. The bill requires the agencies to establish a working group, consisting of representative stakeholders, to assist in the development of the expedited review process. The working group is to consider a requirement that the application for the sand replenishment project permit include the submission of a dredging plan by the locality for areas within the Chesapeake Bay from which the dredged material will be taken and the location of the beach replenishment project. The bill provides several types of information that such a plan would include, such as the analysis of benthic, marine and fishery resources; impact on any historical artifacts; and impact on other uses of the state waters and bottomlands at the dredge site. This bill is identical to SB 946.*Stolle, Knight, Lewis, Spruill and Villanueva*: **PASSED**

HB 1548 Municipal separate storm sewer permittees; guidance documents. Requests the Department of Conservation and Recreation and the Department of Environmental Quality to jointly prepare guidance documents to assist MS4 permittees in developing and implementing their Chesapeake Bay Total Maximum Daily Load Action Plans. The guidance documents shall (i) identify methodologies to be used by MS4 permittees in calculating nutrient reductions and best management practices efficiencies as part of their Bay TMDL planning activities pursuant to MS4 permits and (ii) assist MS4 permittees in developing and implementing their action plans. *Knight*: **FAILED**

HB 1591 Plastic bags; use by retailers. Bans the use of plastic carryout bags by retailers at the point of sale unless such bags are (i) durable plastic bags with handles, (ii) at least 2.25 mils thick and (iii) specifically designed and manufactured for multiple reuse. *Ware, O.*: **CARRIED OVER**

HB 2040 Noise abatement practices and technologies; VDOT's evaluation extended for two additional years. Extends for two additional years (until June 30, 2015) VDOT's evaluation of noise abatement practices and technologies demonstration projects. *Comstock and Rust:* **PASSED**

HB 2048 Water quality; transfer of responsibility for administration of programs. Moves several water quality programs currently administered by the Department of Conservation and Recreation to the Department of Environmental Quality. The Department of Environmental Quality and the State Water Control Board will have oversight of water quality planning and laws dealing with stormwater management, erosion and sediment control and the Chesapeake Bay Preservation Areas. The Virginia Soil and Water Conservation Board will have continuing responsibility for oversight of the soil and water conservation districts and of resource management planning. The Virginia Soil and Water Conservation Board will continue to be responsible for administration of the flood prevention and dam safety laws. The board will continue to be staffed by the Department of Conservation and Recreation. This bill is identical to SB 1279. *Sherwood:* **PASSED**

HB 2069 Seedlings; State Forester to furnish those grown in nurseries to state without expense. Authorizes the state forester to (i) provide seedlings at no expense for use on state forests, public grounds and state parks and (ii) sell seedlings to private individuals. The terms and conditions of the sale and the price of the seedlings will be set by the state forester. *Knight, Fariss, Lewis, Scott, E.T. and Webert*: **PASSED**

HB 2089 Permits and other information; DEQ to transmit electronically air pollution control. Allows the Department of Environmental Quality to transmit electronically air pollution control, water quality and waste management permits or certificates, as well as other information such as plan approvals. *Wilt:* **PASSED**

HB 2111 Coal; repeals an obsolete chapter that regulates surface mining. Surface mining of coal. Repeals an obsolete chapter in Title 45.1 that regulates the surface mining of coal. The provisions of this chapter have been superseded by the Virginia Coal Surface Mining Control and Reclamation Act (§ 45.1-226 et seq.). This bill is identical to SB 1014. *Morefield:* **PASSED**

HB 2137 Local governments; environmental impact reports, prohibits purchase of certain deicing agents. Raises from $500,000 to $2 million the cost threshold at which a locality will be required to obtain an environmental impact report for a highway project. For certain projects costing more than $500,000 and less than $2 million, the locality is required to consult with the Department of Historic Resources to make efforts to minimize impacts to historic resources. The bill also exempts the sale of deicing agents containing urea from the current prohibition on such sales where the deicing agent is to be used by a municipal corporation at an airport. *Patron: Byron*: **PASSED**

HB 2190 Stormwater management ordinances; requires localities to adopt more stringent requirements. Establishes a procedure for state review of the stringency of local stormwater ordinances. The bill requires localities within 30 days of the adoption of a more stringent stormwater ordinance or requirement to submit a letter report to the Department of Conservation and Recreation. The letter report is to include an explanation as to why the more stringent ordinance or requirement is necessary. In addition, within 90 days of the ordinance's adoption, a landowner or his agent can request the Department of Conservation and Recreation to determine whether the ordinance or requirement meets the standards of the state law. The department has 90 days to make such a determination. *Cosgrove:* **PASSED**

HB 2209 Virginia Soil and Water Conservation Board; powers and duties. Transfers authority for administration of the nutrient management certification program and responsibility for adopting regulations on nitrogen application rates from the Department of Conservation and Recreation to the Virginia Soil and Water Conservation Board. The bill also empowers the board to oversee districts' programs and to allocate general fund moneys to soil and water conservation districts to support their operations. This bill is identical to SB 1309. *Knight, Sherwood, Ware, R.L. and Webert*: **PASSED**

HB 2283 Virginia Recreational Facilities Authority; designated as an agency in executive branch of state. Designates the Virginia Recreational Facilities Authority as an agency in the executive branch of state government that, as such, reports to the Secretary of Natural Resources. *Head*: **CARRIED OVER**

HB 2296 Virginia Urban Best Management Practices Cost-Share Program Fund; established. Requires the Department of Conservation and Recreation to administer an urban best management practices cost-share program. The program would provide matching funds of up to 50 percent to promote best management practices on private property. Eligible projects must be located in a locality subject to MS4 Phase I or Phase II stormwater permits. The bill also establishes the Virginia Urban Best Management Practices Cost-Share Fund as a subfund of the Virginia Water Quality Improvement Fund to provide the matching funds for the cost-share program. *Bulova:* **CARRIED OVER**

HB 2309 Virginia Indoor Clean Air Act; prohibits smoking in health care facilities. Prohibits smoking in health care facilities. *Howell, A.T.* : **CARRIED OVER**

HJ 609 Biosolids; DEQ to study substances contained in certain wastewater treatment facilities. Directs the Department of Environmental Quality to study the substances contained in biosolids generated from wastewater treatment facilities that are applied to lands for agricultural purposes. *Gilbert*: **CARRIED OVER**

HJ 615 Chesapeake Bay Preservation Act; DCR to study feasibility of applying provisions to watershed area. Requests the Department of Conservation and Recreation to study the feasibility of applying the provisions of the Chesapeake Bay Preservation Act to all localities within Virginia's Chesapeake Bay watershed. *Krupicka and Surovell*: **CARRIED OVER**

SB 909 State park master planning; Department of Conservation & Recreation shall solicit comments. Requires the Department of Conservation and Recreation, in considering public comments on stage one and stage two master plans, to make a reasonable effort to solicit comments and to provide timely notice of the comment period to trade associations and private businesses within a 10-mile radius of the park that offer similar services, including private campgrounds, marinas and recreational facilities. *Reeves; Delegate: Farrell*: **PASSED**

SB 946 Public beaches; sand dredging and beach replenishment. Authorizes the Marine Resources Commission and the Department of Environmental Quality to establish an expedited application review process for dredging of sand and beach replenishment on the public beaches abutting the waters of the Chesapeake Bay. The bill requires the agencies to establish a working

group, consisting of representative stakeholders, to assist in the development of the expedited review process. The working group is to consider a requirement that the application for the sand replenishment project permit include the submission of a dredging plan by the locality for areas within the Chesapeake Bay from which the dredged material will be taken and the location of the beach replenishment project. The bill provides several types of information that such a plan would include, such as the analysis of benthic, marine and fishery resources; impact on any historical artifacts; and impact on other uses of the state waters and bottomlands at the dredge site. This bill is identical to HB 1531. *Wagner and McWaters*: **PASSED**

SB 1014 Coal; repeals an obsolete chapter that regulates surface mining. Repeals an obsolete chapter in Title 45.1 that regulates the surface mining of coal. The provisions of this chapter have been superseded by the Virginia Coal Surface Mining Control and Reclamation Act (§ 45.1-226 et seq.). This bill is identical to HB 2111. *Puckett:* **PASSED**

SB 1055 Medical waste; repeals certain provisions regarding disposal of. Disposal of infectious waste. Repeals certain provisions regarding the permitting of infectious waste incinerators by the State Air Pollution Control Board and the Waste Management Board. The repeal of these sections will eliminate outdated regulations, which have been superseded by federal air emission requirements. The Virginia Waste Management Board's regulations related to medical waste incinerators would remain in place under the board's other existing authorities. *Black:* **PASSED**

SB 1166 Littering & illegal dumping; if convicted, ordered to perform minimum of 10 hours community service. Provides that when a person is convicted of illegally dumping or disposing of garbage or refuse on public property or on private property without the permission of the owner, the court may order a mandatory minimum of 10 hours of community service. *Smith:* **PASSED**

SB 1212 Environmental Quality, Department of; provision of information, protection of trade secrets. Provision of information to Department of Environmental Quality; protection of trade secrets. Requires that every person who the Department of Environmental Quality has reason to believe is generating or handling waste provide the department with information about the waste upon request. The bill exempts trade secrets contained in such information from disclosure by the department under certain conditions while still allowing the department to provide such information to the Environmental Protection Agency or as otherwise required by law. *Stuart:* **PASSED**

SB 1279 Water quality; transfer of responsibility for administration of programs. Moves several water quality programs currently administered by the Department of Conservation and Recreation to the Department of Environmental Quality. The Department of Environmental Quality and the State Water Control Board will have oversight of water quality planning and laws dealing with stormwater management, erosion and sediment control and the Chesapeake Bay Preservation Areas. The Virginia Soil and Water Conservation Board will have continuing responsibility for oversight of the soil and water conservation districts and of resource management planning. The Virginia Soil and Water Conservation Board will continue to be responsible for administration of the flood prevention and dam safety laws. The board will

continue to be staffed by the Department of Conservation and Recreation. This bill is identical to HB 2048. *Hanger*: **PASSED**

SB 1283 Virginia Recreational Facilities Authority Fund; established. Establishes the fund with the purpose of assisting in the financing of the authority's operations. *Newman:* **CARRIED OVER**

SB 1309 Virginia Soil and Water Conservation Board; powers and duties. Transfers authority for administration of the nutrient management certification program and responsibility for adopting regulations on nitrogen application rates from the Department of Conservation and Recreation to the Virginia Soil and Water Conservation Board. The bill also empowers the board to oversee districts' programs and to allocate general fund moneys to soil and water conservation districts to support their operations. This bill is identical to HB 2209. *Hanger:* **PASSED**

SJ 338 Environmental regulation; need for reducing burden of EPA regulations. Recognizes the need for regulatory agencies to use administrative discretion to reduce the burden placed upon the coal and electricity-generation industries by the regulations recently adopted by the Environmental Protection Agency. *Martin:* **FAILED**

Other

HB 1768 Environmental courts; district court or circuit court may establish, specialized court dockets. Provides that any district court or circuit court may establish an environmental court, a separate court docket within the existing calendar of a district or circuit court, that would have the authority to hear cases involving the protection, improvement and preservation of the public health and the environment. *O'Quinn:* **FAILED**

HB 1804 Uranium; establishes 3% state severance tax on receipts of any severed from earth in state. Establishes a three percent state severance tax on the gross receipts of any uranium severed from the earth in the commonwealth. One-half of the proceeds of the tax shall be deposited in the general fund of the commonwealth. The other half of the proceeds shall be distributed to the locality from which the uranium was severed. *Miller:* **CARRIED OVER**

HB 2330 Uranium; establishes process for DMME to issue permits for mining of uranium ore, report. Establishes a process for the Department of Mines, Minerals and Energy to issue permits for the mining of uranium ore. DMME, in consultation with the Department of Environmental Quality, Department of Health, State Corporation Commission, Department of Conservation and Recreation, Department of Game and Inland Fisheries, Department of Historic Resources and Department of Agriculture and Consumer Services, is required to adopt regulations governing uranium mining. DMME shall not accept an application for a uranium mining permit from an applicant unless the applicant had a valid permit for uranium exploration on July 1, 2013. DMME shall not accept an application for a permit to mine uranium at a location more than 10 miles from an area for which a uranium exploration permit was in effect on January 1, 2012. Permit holders are required to pay application fees and annual fees, which shall be sufficient to defray the costs of administering the uranium mining program. The measure establishes the Uranium Administrative Fund, Uranium Response Fund and Long-Term

Monitoring Fund, which will be funded by fees assessed on permittees. A permittee that violates a permit condition or provision of law or regulation may be subject to civil penalties. A person who conducts uranium mining without a permit, violates a condition of a permit, fails to comply with a regulation or order, makes certain false statements, violates recordkeeping requirements or impedes the DMME in its performance of duties is subject to criminal penalties. A uranium mining permit shall not be issued to an applicant unless the applicant is licensed by the State Corporation Commission as a uranium development corporation, the requirements for which are established by this measure. The commission is authorized to suspend a uranium development license if it finds that a licensee is not in compliance with financial responsibility requirements or if it receives notice of a determination by an agency that an operation is being conducted in violation of a permit or license. The commission may revoke a uranium development license if it finds by clear and convincing evidence that the license holder has failed to correct a condition for which its license was suspended or has committed other specified acts. *Jackson:* **CARRIED OVER**

SB 919 Uranium; 3% state severance tax on receipts of any severed from earth in state, proceeds. State severance tax; uranium. Establishes a three percent state severance tax on the gross receipts of any uranium severed from the earth in the commonwealth. One-half of the proceeds of the tax shall be deposited in the general fund of the commonwealth. The other half of the proceeds shall be deposited into an Economic Development and Environmental Trust Fund established for each locality from which uranium is mined. Each locality's fund would be administered by a board appointed by the governing body of the locality. *Watkins:* **FAILED**

SB 1353 Uranium; establishes process for DMME to issue permits for mining of uranium ore, report. Uranium mining; penalties. Establishes a process for the Department of Mines, Minerals and Energy to issue permits for the mining of uranium ore. DMME, in consultation with the Department of Environmental Quality, Department of Health, State Corporation Commission, Department of Conservation and Recreation, Department of Game and Inland Fisheries, Department of Historic Resources and Department of Agriculture and Consumer Services, is required to adopt regulations governing uranium mining. DMME shall not accept an application for a uranium mining permit from an applicant unless the applicant had a valid permit for uranium exploration on July 1, 2013. DMME shall not accept an application for a permit to mine uranium at a location more than 10 miles from an area for which a uranium exploration permit was in effect on January 1, 2012. Permit holders are required to pay application fees and annual fees, which shall be sufficient to defray the costs of administering the uranium mining program. The measure establishes the Uranium Administrative Fund, Uranium Response Fund and Long-Term Monitoring Fund, which will be funded by fees assessed on permittees. A permittee that violates a permit condition or provision of law or regulation may be subject to civil penalties. A person who conducts uranium mining without a permit, violates a condition of a permit, fails to comply with a regulation or order, makes certain false statements, violates recordkeeping requirements or impedes the DMME in its performance of duties is subject to criminal penalties. A uranium mining permit shall not be issued to an applicant unless the applicant is licensed by the State Corporation Commission as a uranium development corporation, the requirements for which are established by this measure. The commission is authorized to suspend a uranium development license if it finds that a licensee is not in compliance with financial responsibility requirements or if it receives notice of a determination

by an agency that an operation is being conducted in violation of a permit or license. The commission may revoke a uranium development license if it finds by clear and convincing evidence that the license holder has failed to correct a condition for which its license was suspended or has committed other specified acts. *Watkins:* **FAILED**

APPENDIX B
EQAC RESOLUTIONS AND POSITIONS NOVEMBER 2012 THROUGH OCTOBER 2013

Date Adopted	Resolution/Position	Page
January 7, 2013	Memorandum to the County Executive regarding the FY 2014 budget (memorandum dated January 9, 2013)	B-2
February 13, 2013	Memorandum to the Board of Supervisors regarding removal of illegal signs from highway rights-of-way	B-4
March 13, 2013	Testimony on the FY 2014 Fairfax County budget (testimony presented on April 11, 2013)	B-6
April 10, 2013	Memorandum to the Board of Supervisors regarding urban development standards (memorandum dated April 19, 2013) of illegal signs from highway rights-of-way	B-7
May 8, 2013	Memorandum to the Board of Supervisors regarding advertisement of the proposed stormwater management ordinance (memorandum dated June 10, 2013)	B-9
June 12, 2013	Memorandum to the Board of Supervisors supporting Fairfax Forward	B-10
August 14, 2013	Legislative Proposal: Legislative position regarding disposable bags	B-11
September 11, 2013	Legislative Proposal: Legislative position regarding community net metering	B-13
September 11, 2013	Legislative Proposal: Legislative position regarding the moratorium on uranium mining	B-15
September 11, 2013	Memorandum to the Board of Supervisors regarding the proposed stormwater management ordinance (memorandum dated September 20, 2013)	B-17
September 11, 2013	Memorandum to the Board of Supervisors regarding proposed improvements to the Braddock Road/Pleasant Valley Road intersection (memorandum dated September 23, 2013)	B-18

Due to formatting, the resolutions and positions may not appear precisely as they were originally transmitted.

County of Fairfax, Virginia

MEMORANDUM

DATE: January 9, 2013

TO: Edward L. Long, Jr.
County Executive

FROM: Stella Koch, Chairman
Environmental Quality Advisory Council

SUBJECT: EQAC input on the FY 2014 budget

This memorandum is in response to your December 4 request for input and guidance from members of boards, authorities and commissions regarding the FY 2014 budget. Specifically, you asked for guidance "on the types of investments we will need to make over the next two years to get us through this difficult time and to ensure the integrity of our infrastructure and core government services." EQAC appreciates the opportunity to provide input at this time as well as for your continued communications and coordination with EQAC.

As you are aware, we have provided a number of recommendations in our Annual Report on the Environment, and our priority recommendations have been highlighted in the Chairman's letter, which can be found toward the beginning of the report. In response to your request, we reiterate these priorities. We also note the following statement from the Board of Supervisors' Environmental Agenda and feel that, in order to prioritize decisions in these difficult budget times, the county should build on this statement in its budget decisions:

". . . everyone has a need and a right to breathe clean air, to drink clean water, and to live and work in clean surroundings. A healthy environment enhances our quality of life and preserves the vitality that makes Fairfax a special place to live and work."

We believe that these goals are not only important to county residents but are also critical for growth and redevelopment. We also note that, in pursuing efforts to achieve these goals, the county has opportunities to undertake work that maximizes environmental protection and minimizes cost through better integration of management practices. One example would be an increased focus on the many examples of the county's efforts to retrofit buildings with energy-saving technologies that have led to substantial cost savings in annual operating costs. Funding for such efforts should be provided through the environmental improvement program.

In recognition of the continuing budget challenges that the county is facing, we want to assure you that we will commit ourselves to the examination of the combination of environmental

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benefits and cost as we develop future recommendations relating to environmental policies, projects and initiatives.

We again appreciate and thank you for the opportunity to comment on this critical issue and look forward to supporting you on this and other issues.

SMK:LJZ:nhk

cc: Susan Datta, Chief Financial Officer and Director, Department of Management and Budget
David J. Molchany, Deputy County Executive

County of Fairfax, Virginia

MEMORANDUM

DATE: February 13, 2013

TO: Board of Supervisors

FROM: Stella Koch, Chairman Stella M. Koch
Environmental Quality Advisory Council

SUBJECT: EQAC support for a proposed agreement between Fairfax County and the Virginia Department of Transportation regarding removal of illegal signs from highway rights-of-way

For many years, EQAC has issued recommendations regarding illegal signs. We are writing in support of a proposal that we think will address a key portion of our most recent recommendation regarding sign enforcement.

The Board of Supervisors will hold a public hearing on Feb. 26, 2012, at 4 PM, on a proposed legal agreement between the Virginia Department of Transportation and the county to remove illegal signs from highway rights-of-way. A Newslink article about the proposal, with links providing details, is available at: http://www.fairfaxcounty.gov/news/2013/board-approves-public-hearing-sign-removal-program.htm.

In order to implement the program, Fairfax County must enter into a legal agreement with the Virginia Commissioner of Highways. This agreement would allow Fairfax County to act as the commissioner's agent, as allowed by the Code of Virginia Section 33.1-375.1. The proposed legal agreement and staff report are available at the link shown above.

As noted in EQAC's most recent (2012) Annual Report on the Environment (ARE), with further information shown at http://www.fairfaxcounty.gov/dpz/eqac/report2012/, Chapter 9: "Simply stated, "blight" is something that impairs or destroys appearance and results in a deteriorated condition. In recent times, urban blight has come to include a wide range of visual pollutants that degrade the ambience of our communities, including such things as trash and litter on roadsides, unkempt properties, above-ground power and communications transmission lines, communication towers, intrusive and objectionable advertising signage and other forms of visual impairments. Without doubt, signage that is excessive in amount and inappropriate in placement is the most ubiquitous of these 'pollutants.'"

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EQAC supports the proposed legal agreement as it will have the effect of reducing the number of illegal signs that are found within the county. We thank the Board for its attention to this issue.

SMK:RW:nhk

cc: Edward L. Long, Jr., County Executive
David J. Molchany, Deputy County Executive
Jeff Blackford, Director, Department of Code Compliance
EQAC file, February 2013

FY 2014 Fairfax County budget
Testimony from the Environmental Quality Advisory Council—Stella Koch, Chairman
April 11, 2013

My name is Stella Koch and I am speaking on behalf of the Environmental Quality Advisory Council. I am speaking in support of two specific budget areas: (1) funding for Environmental Improvement Program projects; and (2) a future increase in the Stormwater Service District rate.

The Environmental Improvement Program supports implementation of the Board's Environmental Agenda. This year's budget proposes $500,000 of funding for several environmental initiatives, including additional energy efficient lighting upgrades at Fairfax County Park Authority facilities; continuation of the Park Authority-managed Invasive Plant Removal Program; Energy Education and Outreach initiatives to county businesses and residents: a Green Purchasing Program and other strategic initiatives. EQAC supports the Board's continued commitment to its Environmental Agenda through the provision of funding for EIP projects and supports the proposed funding of these projects. It should be noted that many of these projects have the potential to cut future expenditures.

While we recognize that there will be no increase in the Stormwater Service District tax rate this year, EQAC continues to support in upcoming budgets an additional rate increase by a ½ penny per $100 assessed real estate value to 2.5 cents per $100.

In 1998, $500,000 was committed to fund the first county-wide stream assessment, with the results published in late 2000. This laid the groundwork for our understanding of Fairfax County's streams and the stewardship needed to protect and restore them.

Staff continues to monitor a portion of our streams each year, and by February 2011, watershed plans were completed for all 30 of the county's watersheds. These watershed plans need funding to be implemented.

The county owns and maintains 1,553 storm water management facilities and BMP's and is responsible for both inspection and maintenance of these facilities. The County maintains 1,500 miles of pipe and channels and also has 44,000 inlets and manholes. The estimated value of the storm sewers, storm structures, and channels is approximately $1.3 billion dollars. Each storm drainage component lasts approximately 75 years before it needs to be replaced; therefore, the County needs to reinvest approximately $17 million each year to replace the failed sewers and structures. Similarly, the storm water management facilities are valued at $525 million and these facilities last approximately 40-years; thus, the County will need to reinvest approximately $13.1 million each year to ensure the safety of the community and environment that is near these facilities. This funding will need to come from the Stormwater Service District.

Fairfax County is committed to creating and maintaining an excellent quality of life for its residents, and that includes the environment in which we live. EQAC would like to thank the Board of Supervisors for its continued support for environmental initiatives.

County of Fairfax, Virginia

MEMORANDUM

DATE: April 19, 2013

TO: Board of Supervisors

FROM: Stella Koch, Chairman
Environmental Quality Advisory Council

George Lamb, At-Large member
Environmental Quality Advisory Council

SUBJECT: EQAC concern about the need to apply urban development standards more broadly across Fairfax County

EQAC shares the concerns that were brought to Stella Koch's attention by Supervisor Hudgins regarding transit-oriented development design and pedestrian accessibility at and near the county's transit stations. In response to these concerns, at its March 13 meeting, EQAC engaged in a conversation with staff from the Departments of Transportation and Planning and Zoning as well as the county's broader Environmental Coordinating Committee. The discussion focused on the new Wiehle-Reston East station and surrounding development projects but was intended to be generally applicable to all transit station areas. The outcome of the March 13 discussion was awareness that the urban design guidelines that were carefully created for Tysons Corner, as the county's urban center, are not currently being applied in transit station and revitalization areas. While Tysons is indeed a special area, the transit areas in particular are mini urban districts with highly valuable public transit investments. In order to maximize the potential for these areas, they also need to be designed with an urban focus and the associated amenities necessary to create an exciting and vibrant community.

Our specific concerns about the current Wiehle Avenue development include the following:

- Parking requirements are still focused on minimum numbers of spaces. They do not reference the urban maximum space approach that could be effectively implemented around the transit stations. The parking maximum approach encourages multi-modal transportation versus single mode, high-density parking.
- The road network that is being provided in this area includes roads that will be higher in capacity than what EQAC feels would be appropriate for an urban road network. In particular, the grid streets inside the development are two lanes in each direction, with

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no street parking. In a May 2012 presentation from the Fairfax County Department of Transportation to the Board of Supervisors on proposed countywide urban transportation design standards, the design for an Urban Local Street called for one lane in each direction with on street parking.

In the same presentation, the justification for on-street parking per the proposed design standards stated: "On-street parking is required on most streets to create a more useable street frontage that serves street-level commercial retail, and to create side friction that reduces vehicles speeds, thereby maintaining a more pedestrian friendly street."

It is recognized that the Wiehle Avenue development is already under construction and that it is difficult to retroactively apply the Urban Transportation standards. EQAC feels, though, that there should be a consideration of whether there may be measures that could be taken at this point to fix any pedestrian safety/accessibility problems that may be associated with the design of this development.

We further stress our strong recommendation that the Board of Supervisors direct that there be a consideration of the application of urban parking and transportation standards to other urbanizing areas outside of Tysons Corner.

References:

1. Report To Board Of Supervisors on Tysons Corner, October 2012
2. Fairfax Forward Staff Report, March 19, 2013
3. County of Fairfax, Virginia, County-wide Urban Transportation Design Standards
   Board of Supervisors Transportation Committee May 8, 2012

SMK:GWL:nhk

cc: Edward L. Long, Jr., County Executive
David J. Molchany, Deputy County Executive
Fred R. Selden, Director, Department of Planning and Zoning
Thomas P. Biesiadny, Director, Department of Transportation
EQAC file, April 2013

County of Fairfax, Virginia

MEMORANDUM

DATE: June 10, 2013

TO: Board of Supervisors

FROM: Stella Koch, Chairman
Environmental Quality Advisory Council

SUBJECT: EQAC recommendation regarding advertisement of the proposed stormwater management ordinance

EQAC has been carefully following the evolution of the proposed stormwater management ordinance in Fairfax County. We recognize that much of the language being suggested already exists within other regulatory ordinances and has served the county well. We have concerns over what the Board of Supervisors may advertise in regard to the stormwater management ordinance exemption for construction on single family residential lots. Specifically, EQAC recommends that language be advertised that at least mirrors (i.e., doesn't weaken) the county's current approach regarding the threshold for exemption of construction on single residential lots (i.e., an 18% impervious cover threshold). There are enough instances of neighbors being flooded as more infill occurs to warrant not lessening this requirement.

Thank you for your consideration.

SMK:nhk

cc: Edward L. Long, Jr., County Executive
David J. Molchany, Deputy County Executive
James W. Patteson, Director, Department of Public Works and Environmental Services
EQAC file, May 2013

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County of Fairfax, Virginia

MEMORANDUM

DATE: June 28, 2013

TO: Board of Supervisors

FROM: Stella Koch, Chairman Stella M. Koch
Environmental Quality Advisory Council

SUBJECT: EQAC support for Fairfax Forward

Since 2004, EQAC has recommended that the county review our planning process in the context of the transformations that have steadily reshaped our county from the suburbs of 1975 into the vibrant and built-out community we live in today. We have participated in the Fairfax Forward process and want to reiterate our support for adopting Fairfax Forward as the new comprehensive planning review process for the county. This new process provides the county a more flexible, systematic, comprehensive and adaptable approach to planning our future, while expanding and encouraging public participation.

Thank you for your consideration.

SMK:GWL:nhk

cc: Edward L. Long, Jr., County Executive
David J. Molchany, Deputy County Executive
Robert A. Stalzer, Deputy County Executive
Fred R. Selden, Director, Department of Planning and Zoning
EQAC file, June 2013

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POSITION STATEMENT FORM

(Completed form to be provided to the Legislative Committee)

GENERAL SUBJECT AREA -- TITLE OF PROPOSAL:

REDUCING ENVIRONMENTAL CONTAMINATION FROM PLASTIC AND PAPER BAGS

PROPOSAL:

Support legislation to reduce the use of plastic disposable bags. If disposable bags are provided they should be paper with a high recycled content and with a nominal fee/deposit of a nominal amount, such as 5-10 cents. The use of reusable bags should be encouraged.

SOURCE:

Environmental Quality Advisory Council, August, 2013

BACKGROUND:

Plastic bags do not completely degrade in the environment. They present a real threat to wildlife and aquatic organisms. In the open ocean, plastic bags break up into small pieces that resemble food that fish ingest. While plastic bags may be recycled or disposed of so that they are not released to the environment, many plastic bags end up in fields, streams, lakes, rivers and the oceans. Paper bags are disposable and are expected to pose fewer environmental risks. Paper bags in Fairfax County can be recycled or disposed of as trash, where they would be incinerated. Incinerated bags will release some carbon dioxide. Discarding paper bags after one use is also resource intensive in terms of trees and all of the efforts to harvest trees and manufacture the paper.

The goal should be to encourage the use of reusable bags. In order to discourage the use of single use throw away bags, a nominal deposit/fee should be required for each bag. The proposal is broad so that there may be support for legislation for statewide actions, as well as legislation authorizing localities to take certain actions to meet this goal.

In past legislative sessions, legislation aimed at reducing the use of plastic and/or paper bags has been introduced; however, these bills have either been tabled or left in the committees to which they were referred.

The Fairfax County Board of Supervisors' 2013 Legislative Program included the following position statement, which updated and reaffirmed a previous position: "Support legislation or other efforts which would encourage the use of reusable shopping bags, consistent with the County's waste reduction goals and environmental stewardship efforts. As in previous sessions, it is anticipated that legislation to ban plastic bags or impose a fee for their use may be introduced again in 2014. Such legislation would need to be examined by the County for efficacy, cost, and ease of administration." EQAC supports retention of this position statement in the 2014 Legislative Program.

RECOMMENDATION:
(*Do not fill out-- This will be indicated by the Legislative Director and County Executive)*

POSSIBLE SUPPORT OR OPPOSITION BY ORGANIZATIONS:
(List any organizations or groups, if any, which might be in favor of or against the proposed position)

Support from environmental and civic organizations is expected for bills that encourage the reuse of bags, ban plastic bags or require deposits for disposable bags. Organizations such as The Alice Ferguson Foundation, Choose Clean Water Coalition, Clean Water Action, Institute for Local Self Reliance, Surfrider Foundation-DC Chapter and other cities and towns have also supported such legislation. We expect at least some retail establishments and consumer groups may oppose such legislation.

STAFF CONTACT PERSON(S):
(Provide name and phone number of County staff person(s) best able to provide any additional research or necessary information)

Noel Kaplan (EQAC staff liaison)
Environment and Development Review Branch
Fairfax County Department of Planning and Zoning
12055 Government Center Parkway, Suite 730
Fairfax, VA 22035

Phone: 703-324-1380
Fax: 703-324-3056
Email: Noel.Kaplan@fairfaxcounty.gov

POSITION STATEMENT FORM

(Completed form to be provided to the Legislative Committee)

GENERAL SUBJECT AREA -- TITLE OF PROPOSAL:

COMMUNITY NET METERING

PROPOSAL:

Support legislation creating a "community customer" net metering definition. A community customer would be a net metered generation facility sited on a single location with multiple owners, with all the owners receiving a share of the net metering credits. The legislation should demonstrate a positive cost benefit associated with residential net energy metering (NEM). The avoided costs associated with NEM should be sufficient to offset the utilities' lost revenues and incremental net energy metering program administration and customer costs.

SOURCE:

Environmental Quality Advisory Council, September, 2013

BACKGROUND:

Renewable energy offers great promise for job growth and economic opportunity in Fairfax County, and can help the county reach its Cool County goals. While the Board of Supervisors supported expansion of renewable energy in the last legislative session by endorsing the Power Purchase Agreement, legislation which incentivized renewable energy by reducing upfront costs, additional legislation is necessary to expand the availability of renewable energy by allowing more owners. Other benefits to expanding local generation include less transmission loss, less burden on the grid, provision of peak energy, and less need for new generation.

Additional background information:

Renewable energy is currently not available to many industrial, commercial or residential customers, including tenants of rental properties and those with properties that are shaded or otherwise not suitable for solar installations. In fact, the National Renewable Energy Laboratory estimates that three quarters of residential buildings in America do not have access to solar.

Community net metering was considered in the 2013 legislative session as part of HB1695, introduced by Delegate Randy Minchew (R-Leesburg). The bill as enacted did not include community net metering, but it did include aggregate net metering, which is similar in concept, albeit with restrictions. In aggregate net metering, energy from a single renewable energy installation can be attributed to more than one meter (e.g., solar panels on a barn can also serve a farmhouse on the same property);

however, the meters must serve the same customer and the properties involved must be contiguous.

Community net metering will allow a group of residential, commercial, industrial, and other customers to establish a “community customer" to act collectively to install a renewable energy facility sited on a single location with multiple owners. The multiple owners may develop a system that provides that all the generation will be credited to the owners to offset a portion of their electricity bills.

RECOMMENDATION:
(*Do not fill out-- This will be indicated by the Legislative Director and County Executive)*

POSSIBLE SUPPORT OR OPPOSITION BY ORGANIZATIONS:
(List any organizations or groups, if any, which might be in favor of or against the proposed position)

Delegate Minchew has reiterated his interest in passing a community net metering bill. Other local governments are interested in this legislation, as is the Metropolitan Washington Council of Governments. Although we are not aware of any formal positions of support from the Metropolitan Washington Council of Governments, in the Climate, Energy and Environment Policy Committee’s Proposed 2013-2016 Action Plan, jurisdictions are encouraged to “help support, where appropriate, state and federal legislation that reduces barriers to renewable energy. . .” This legislation is also a high priority for environmental groups including the Virginia Conservation Network (a coalition of 150 organizations), the Sierra Club, and the Piedmont Environmental Council.

This provision would help expand participation to achieve net metering’s potential, including reducing both peak demand and energy purchases from PJM.

STAFF CONTACT PERSON(S):
(Provide name and phone number of County staff person(s) best able to provide any additional research or necessary information)

Noel Kaplan (EQAC staff liaison)
Environment and Development Review Branch
Fairfax County Department of Planning and Zoning
12055 Government Center Parkway, Suite 730
Fairfax, VA 22035

Phone: 703-324-1380
Fax: 703-324-3056
Email: Noel.Kaplan@fairfaxcounty.gov

POSITION STATEMENT FORM

(Completed form to be provided to the Legislative Committee)

GENERAL SUBJECT AREA -- TITLE OF PROPOSAL:

RETAINING THE MORATORIUM ON URANIUM MINING

PROPOSAL:

Support retaining the moratorium on uranium mining.

SOURCE:

Environmental Quality Advisory Council

BACKGROUND:

In January 2012, EQAC adopted a resolution supporting the retention of Virginia's uranium mining moratorium, which was imposed statewide in 1982. EQAC's resolution is available for review at http://www.fairfaxcounty.gov/dpz/eqac/resolutions/2012_january--uranium_mining.pdf. EQAC recognized that the impetus behind efforts to lift the moratorium was a substantial uranium deposit in Pittsylvania County that may be economically viable for mining, and EQAC noted in its resolution that mining of this deposit would have no impact on Fairfax County. However, the resolution also noted the presence of uranium elsewhere in Virginia, including locations within the watershed of the Occoquan Reservoir; the lifting of the moratorium could conceivably result in mining of these deposits at some time in the future.

At the time of adoption of its resolution, EQAC was concerned that there may be efforts during the 2012 legislative session to lift the moratorium; such efforts were deferred to allow further consideration of the issue, but EQAC is concerned that related legislation may be introduced during the 2013 legislative session. EQAC feels that the reasons for retaining the moratorium that were outlined in EQAC's resolution remain valid and therefore recommends that a position be adopted in the Board of Supervisors' Legislative Program supporting retention of the moratorium.

In EQAC's view, independent reviews are compelling in their observations that there are significant gaps in legal and regulatory coverage for activities dealing with uranium mining in Virginia. EQAC continues to feel that it would be premature to draft regulations pertaining to uranium mining without first addressing concerns identified by the National Academy of Sciences in its report. Also, the National Academy of Sciences and other sources, such as the General Accountability Office, have raised concerns about the lack of adequate financial assurance to address environmental cleanups that have been needed elsewhere following uranium and other mining

activities. In the event that uranium mining caused an environmental problem, the cost could be passed on to the state of Virginia; taxpayers from across the state could be burdened with a very expensive cleanup.

The approval of uranium mining operations are complicated by a number of factors including the high cost of cleanup in the event of environmental releases of contamination and the operation of mining operations by companies that are owned by companies outside of the United States. In addition, the experience with uranium mining within the United States has largely been limited to western states with low rainfall.

Please note that EQAC has proposed two additional position statements this year, both of which EQAC considers to be of lesser priority to this proposed position statement. EQAC's second priority recommendation addresses third-party power purchase agreements for renewable energy while its third priority recommendation addresses reduction in the use of disposable bags. The latter is a recommendation to carry forward a previously-established Board position.

RECOMMENDATION:
(*Do not fill out-- This will be indicated by the Legislative Director and County Executive)*

POSSIBLE SUPPORT OR OPPOSITION BY ORGANIZATIONS:
(List any organizations or groups, if any, which might be in favor of or against the proposed position)

Support from environmental and civic organizations is expected for retaining the moratorium on uranium mining.

STAFF CONTACT PERSON(S):
(Provide name and phone number of County staff person(s) best able to provide any additional research or necessary information)

Noel Kaplan (EQAC staff liaison)
Environment and Development Review Branch
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County of Fairfax, Virginia

MEMORANDUM

DATE: September 20, 2013

TO: Board of Supervisors

FROM: Stella Koch, Chairman Stella M. Koch
Environmental Quality Advisory Council

SUBJECT: EQAC recommendation regarding the proposed stormwater management ordinance

EQAC has continued to follow the evolution of the proposed stormwater management ordinance in Fairfax County. As we noted in our earlier correspondence, we recognize that much of the language being suggested already exists within other regulatory ordinances and has served the county well. We thank the Board for advertising a draft ordinance that retains the opportunity to ensure that the county's current efforts will not be weakened. Where there is discretion for the county to choose among a range of options, we urge the Board to pursue options that will be equal to or greater than existing requirements as they address protection of the county's water resources.

Thank you for your consideration.

SMK:nhk

cc: Edward L. Long, Jr., County Executive
David J. Molchany, Deputy County Executive
James W. Patteson, Director, Department of Public Works and Environmental Services
EQAC file, September 2013

Environmental Quality Advisory Council (EQAC)
c/o Department of Planning and Zoning
Planning Division
12055 Government Center Parkway, Suite 730
Fairfax, Virginia 22035-5509
Phone 703-324-1380 TTY: 711
Fax 703-324-3056
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County of Fairfax, Virginia

MEMORANDUM

DATE: September 23, 2013

TO: Board of Supervisors

FROM: Stella Koch, Chairman Stella M. Koch
Environmental Quality Advisory Council

SUBJECT: EQAC concerns about proposed improvements to the Braddock Road/Pleasant Valley Road intersection

EQAC has long held concerns about the implications of transportation improvements to natural resources and county parks. We also have concerns about the compatibility of transportation projects with land use, and consequent environmental impacts. Because of this, we have been watching with interest the proposed improvement plan for the Braddock Road and Pleasant Valley Road intersection that would affect the following county parks: Rock Hill District Park; Mountain Road District Park; and Elklick Preserve. We have two concerns with this plan that illustrate our broader focus on transportation projects: the first is related to the unique ecological nature of the parks; and the second relates to the transition of a semi-rural road into a commuter road.

With respect to ecological resources on and near the project site, there are wetlands present in all three of the county parks. Rock Hill Park has a globally rare forested wetland community and two state rare plant species that have the potential to be impacted by the project. There is a receiving stream south of the proposed project that could be negatively impacted by increased flows and no studies have been done to date to consider those impacts.

Any VDOT proposal for this intersection must protect these state rare plants and the globally rare forested upland swamp community. The Virginia National Heritage Program and the Fairfax County Park Authority Natural Resources Management and Protection Branch must be involved in these efforts.

The Natural Resources Management and Protection Branch of the Fairfax County Park Authority has made the following requests; we support these requests and urge the Board of Supervisors to ask that these requests be honored before any decision is made on this proposed improvement, including any requests for a "temporary construction easement":

Environmental Quality Advisory Council (EQAC)
c/o Department of Planning and Zoning
Planning Division
12055 Government Center Parkway, Suite 730
Fairfax, Virginia 22035-5509
Phone 703-324-1380 TTY: 711
Fax 703-324-3056
www.fairfaxcounty.gov/eqac/

1) Completion of the hydrology and hydraulics analysis of the globally rare wetlands by VDOT.
2) Delineation of the wetlands in Rock Hill District Park and Mountain Road District Park to determine the extent of impacts, if any, of the proposed project.
3) Completion of field technical studies with the Virginia Natural Heritage Program staff for the extent of rare plant species and communities.

We request that, before any improvement plans move forward for any transportation project, plans be implemented, where applicable, to protect state rare plants, globally rare communities and other wetlands. In the example of the Braddock Road and Pleasant Valley Road intersection, we feel that such an effort is needed.

Our second concern, as noted earlier, is the compatibility of transportation projects with land use, with consequent environmental impacts. For example, the Braddock Road/Pleasant Valley Road intersection is the back door to the South Riding community in Loudoun County. Many of those residents use the intersection to get to jobs in the Route 28 corridor of Fairfax County. The preferred route from South Riding to Fairfax County is via Route 50, which is designed for commuter traffic. The proposed enhancement would open an alternative route that is not designed for continuously increasing levels of traffic. The traffic projections show demand increasing through 2020 and volume-to-capacity ratios approaching 0.88 with all proposed enhancements. However the supply of commuters from suburban communities will consume the new capacity.

EQAC is concerned with the long term effects of opening semi-rural roads to commuter demands and suggests that alternatives be explored that encourage utilization of high capacity roads as the first choice.

EQAC feels that, when issues of this significance arise on any transportation project, the Board of Supervisors should hold a public hearing on that improvement project. We feel that the proposed Braddock Road/Pleasant Valley Road intersection improvement rises to this level.

SMK:GWL:nhk

cc: Edward L. Long, Jr., County Executive
Robert A. Stalzer, Deputy County Executive
David J. Molchany, Deputy County Executive
Thomas P. Biesiadny, Director, Department of Transportation
Cindy Messinger, Acting Director, Fairfax County Park Authority
EQAC file, September 2013

APPENDIX C
FAIRFAX COUNTY
ENVIRONMENTAL EXCELLENCE AWARDS

The Fairfax County Environmental Excellence Awards have been established to recognize county residents, organizations, businesses and county employees who unselfishly dedicate time, energy and expertise for the betterment of the environment in support of countywide environmental goals and initiatives. Award recipients are selected by the Environmental Quality Advisory Council, and the awards are presented each fall during a meeting of the Fairfax County Board of Supervisors.

The recipients of the 2013 Environmental Excellence Awards were:

County Resident Award:	Alan Ford
Organization Award:	Herndon Environmental Network
Business Award:	Burgundy Farm Country Day School
Business Award:	Potomac Vegetable Farms
County Employee Award:	Sean Duffy
County Employee Award:	Randall G. Miller

The nomination for **Alan Ford** described him as "*a multi-faceted champion for Fairfax County's Environment"* and a *"hard working 'boots on the ground' volunteer rescuing and propagating native plants, managing non-native invasive plants, working to monitor and improve water quality, teaching the public about our environment, and leading groups including the Virginia Native Plant Society's Potowmack Chapter. His tremendous knowledge and passion for the environment, combined with his calm manner and great people skills, make him an outstanding ambassador for environmental resources and a model for others.*" The nomination lists over a dozen highlights of his volunteer efforts, including leadership roles with several organizations dedicated to the protection and enhancement of native habitats and service on a watershed advisory group for the preparation of a watershed management plan. This list exemplifies statements later in his nomination that "*the scope of his activities is breathtaking*" and that "*he is the epitome of environmental excellence.*"

The nonprofit **Herndon Environmental Network** has been recognized for a range of environmental initiatives, including the following activities that occurred during the period of eligibility for this year's award:

- Invasive plant removal along a stream in downtown Herndon.
- Provision of educational information at local festivals.
- A partnership with the Herndon Community Center to screen two environmentally-oriented films.

- Participation in a trail cleanup event.
- A tour of a recycling center.
- Distribution of environmental information at a farmers market.
- Organization of a month-long recycling competition between two Herndon neighborhoods, with related educational efforts.

Efforts getting under way include the establishment of a community garden in Herndon, the filming of environmental videos for airing on a local cable television system (and online) and a second community recycling competition.

HEN's nomination identified the organization's mission as follows: "*to establish a presence in the community and have an impact on vitally important issues affecting the world around us. We believe a cleaner, healthier Earth starts at home through local initiatives, education and advocacy.*" The organization was founded less than two years prior to its selection for this award, and the enthusiasm and dedication of what the nomination described as "*just ordinary people seeking to do our part to negate the harmful effects humans are having on the planet*" is clear.

The nomination for the **Burgundy Farm Country Day School** noted that the school has been committed to environmental sustainability since its founding in 1946. In 2009-2010, the school began work on a master plan for renewal of its 25-acre campus in the Alexandria area of Fairfax County. An ecological assessment that was prepared in advance of this effort recommended improved stormwater management, preservation and creation of wildlife habitat and development of a long-term plan for deer exclusion. Efforts pursued toward these ends over the past year included:

- Re-landscaping of a long, sloping hillside to create terraced rain gardens and outdoor play areas incorporating natural structures, thereby reducing erosion and improving the control of stormwater runoff; the play structures were carefully build into the topography (e.g. a 35-foot slide build into a hillside) rather than on top of it.
- Addition of a large cistern to reduce stormwater runoff.
- Expansion of native plantings around a pond on the site.

The environmentally-sensitive site improvements support both the school's curriculum and its ongoing sustainability efforts. The nomination noted the following:

- All classes participate in composting and recycling.
- All buildings have rain barrels.
- All classes have a plot in the school's community garden and take care of barnyard animals.
- All students are encouraged to bring waste-free lunches to school.
- Kindergarten classes maintain a butterfly and pollinator garden.

Potomac Vegetable Farms operates two farms, including one on Leesburg Pike in Fairfax County. The award nomination cited PVF's environmentally-sensitive farming approaches, including:

- The maintenance of soil rich in organic matter and beneficial microbes.
- Avoidance of use of commercial synthetic fertilizers or pesticides.
- Sustainable soil management and crop cultivation methods that PVF refers to as "Ecoganic."

The nomination also highlighted PVF's "Community Supported Agriculture" initiative to provide for community support for locally-grown food and the farmers who grow it.

The nomination stated: "*For 51 years the water falls softly on the fields of PVF. Even if it doesn't fall softly, the crops and trees filter and soak up the rains. The land could have been sold many times over as the location close to Tysons Corner is ideal for a large housing development. As a matter of fact, the PVF farm is the last farm standing, now surrounded by development.*"

In addition, the nomination highlighted PVF's outreach and education efforts, including the establishment of a three-week "introductory farm school" training session and the training of high school and college interns.

The award nomination cited PVF as representing "*urban agriculture in action*" and stated: "*The manner in which PVF operates their business, the number of Fairfax County resident's* [sic] *lives and health that benefit from their business, their educational outreach and the benefit that their open land brings to the County is unparalleled.*"

Sean Duffy is described in his nomination as "*the energy and creativity behind the Waples Mill Elementary School Science Program.*" In his 12 years as a science teacher at the school, he has transformed the school's campus into an environmental laboratory that provides students with a hands-on learning experience and that serves as a model that can be replicated elsewhere in the county. His nomination cites efforts including the following:

- The planting of milkweed on a hillside that he has converted from grass to native plants, with a goal of growing enough to supply other schools as well as the yards of his students.
- The planting, with grant funding from the Chesapeake Bay Foundation, of water-loving plants in an area conveying stormwater runoff, thereby providing water quality and wildlife habitat benefits.
- Establishment of a purple martin colony and creation of a bluebird trail on the school campus, along with engagement of bird experts to educate (and inspire) his students.

Mr. Duffy's nomination stressed his broader outlook and his care in establishing demonstration programs that can be replicated elsewhere. He has trained teachers from other schools, has

pursued environmental improvement efforts at other schools, has reached out to the local business community to support his program and has been active with the Living Classrooms Foundation, the Interstate Commission on the Potomac River Basin, the Virginia Department of Game and Inland Fisheries and the Chesapeake Bay Foundation. The conclusion of his nomination provides an apt summary: *"His enthusiasm for the environment, his creativity for teaching science, his commitment to doing real science that helps the community and his excellence in execution of his ideas make Sean Duffy, 5th grade teacher extraordinaire, an example of Environmental Excellence in Fairfax County . . ."*

Randall G. Miller has been teaching science at Glasgow Middle School since the 2009-2010 school year. He made a commitment upon his arrival at the school to the development of a school-wide environmental awareness program and has accomplished much toward this end. The nomination highlighted the following efforts:

- Establishment of partnerships with the local Lions Club and garden club on tree planting and vegetable and herb gardening on school grounds, and leadership in obtaining a grant for expansion of the gardens.
- Establishment of a Recycling Club at the school, with recycling bins in each classroom.
- Integration of these environmental initiatives into school curricula.

The nomination notes that the passion, energy and enthusiasm that Mr. Miller has brought to these efforts have spread both within and outside the school, with the local PTA having begun a composting project. The local garden club has expressed similar interest and is pursuing a number of other efforts, including collection of rain water for use in the gardens, and establishing plans for a butterfly garden. Posters about the environment are displayed in the halls of the school and announcements are made about activities supporting environmental awareness.

EQAC congratulates each of these award recipients and is honored to have participated in this effort to recognize their accomplishments.

In past years, Environmental Excellence Awards have been awarded to the following people and organizations:

2012

County Resident Award:	Elaine Tholen
County Resident Award:	Betsy Washington
Organization Award:	ServiceSource
Business Award:	Walker's Grille
County Employee Award:	Ron Tuttle

2011

Organization Award:	Fairfax County Restoration Project
Organization Award:	Fairfax County Dept. of Vehicle Services

2010

County Resident Award:	Maureen Goble
Business Award:	Project Performance Corporation
County Employee Award:	Meghan Fellows

2009

Organization Award:	Earth Sangha
Business Award:	Allen Wayne, Ltd.
County Employee Award:	Carl Sivertsen

2008

County Resident Award:	Chet McLaren
Organization Award:	Katherine K. Hanley Family Shelter Project Management Team
Business Award:	"Jack-the-Ripper" Certified Arborists, Inc.

2007

County Resident Award:	Scott Birdwell
County Resident Award:	Eleanor Quigley and Penelope Firth
Organization Award:	Great Falls Citizens Association
Organization Award:	Invasive Management Area Volunteers
County Employee Award:	Judy Fincham

2006

County Resident Award:	Ken Andrews
Organization Award:	Northern Virginia Soil and Water Conservation District
Business Award:	Wetland Studies and Solutions, Inc.

2005

County Employee Award:	Janet Rahman

2004

County Resident Award:	Ned Foster
Organization Award:	Reston Association

2003

County Resident Award:	Joseph Chudzik
Organization Award:	Students Against Global Abuse
County Employee Award:	Noel Kaplan

2002

County Resident Award:	Charlie Creighton
Organization Award:	Hickory Farms Community Association

2001

County Resident Award:	Chris Koerner
Organization Award:	Bailey's Beautification Alliance

2000

County Resident Award:	Norma Hoffman
Organization Award:	Friends of Sugarland Run
County Employee Award:	Gary Roisum

The nomination period for the Environmental Excellence Awards occurs during the spring of each year. EQAC encourages interested individuals, organizations, county employees and businesses to submit nominations.

APPENDIX D

ACRONYMS AND ABBREVIATIONS USED WITHIN THE 2013 ANNUAL REPORT

4YTP	**Four-Year Transportation Program**
AA/EA	**Alternatives Analysis/Environmental Assessment**
A&F	**Agricultural and Forestal**
ACM	**Assessment of Corrective Measures**
ACPAC	**Air Quality Public Advisory Committee (regional)**
AEDT	**Aviation Environmental Design Tool**
ALB	**Asian Longhorn Beetle**
AO	**Administrative Order**
APR	**Area Plans Review**
BEEAC	**Built Environment and Energy Advisory Committee (regional)**
BMP	**Best Management Practice**
BOS	**Board of Supervisors (county)**
BRAC	**Base Realignment and Closure (federal)**
BTU	**British Thermal Units**
BTW	**Bridging the Watershed**
C&I	**Commercial and Industrial**
CAA	**Clean Air Act (federal)**
CADD	**Computer-Aided Design and Drafting**
CAIR	**Clean Air Interstate Rule (federal)**
CBC	**Community business center**
$CBOD_5$	**Chemical and Biological Oxygen Demand (5-day test)**
CCTV	**Closed circuit television**
CDA	**Community development authority**
CDC	**Centers for Disease Control and Prevention (federal)**
CDD	**Construction demolition debris**
CEEPC	**Climate, Energy and Environment Policy Committee (regional)**
CESQG	**Conditionally Exempt Small Quantity Generator**
CFI	**Covanta Fairfax, Inc.**
CFL	**Compact fluorescent light**
CFR	**Code of Federal Regulations**
cfu	**Colony forming units**
CHPS	**Collaborative for High Performance Schools**
CLF	**Community Labor Force**

CO	**Carbon monoxide**
CO_2	**Carbon dioxide**
COG	**Metropolitan Washington Council of Governments (regional)**
CRA	**Commercial Revitalization Area (county)**
CRD	**Commercial Revitalization District (county)**
CRP	**Commercial Reinvestment Plan (county)**
CSAPR	**Cross State Air Pollution Rule (federal)**
CSO	**Combined sewer overflow**
CTB	**Commonwealth Transportation Board (state)**
CTP	**Comprehensive Transit Plan (county)**
CWI	**Central Wetland Inflow**
CWR	**Central Wetlnad Reservoir**
CY	**Calendar Year**
dB	**Decibel**
dBA	**Decibel (A-weighted level scale)**
DC	**District of Columbia**
DCMP	**Dulles Corridor Metrorail Project**
DCR	**Virginia Department of Conservation and Recreation (also VDCR)**
DEET	**N,N-diethyl-meta-toluamide**
DEIS	**Draft Environmental Impact Statement**
DEQ	**Department of Environmental Quality (state—also VDEQ)**
DNA	**Deoxyribonucleic Acid**
DNL	**Day-Night Average Sound Level**
DOT	**Fairfax County Department of Transportation (also FCDOT)**
DPWES	**Department of Public Works and Environmental Services (county)**
DPZ	**Fairfax County Department of Planning and Zoning**
DRPT	**Department of Rail and Public Transportation (state)**
dscm	**Dry standard cubic meter**
DSWPP	**Drinking Source Water Protection Partnership (regional)**
DTM	**Ditigal terrain model**
DU/AC	**Dwelling Units per Acre**
DVS	**Fairfax County Department of Vehicle Services**
E&S	**Erosion and sediment**
E/RRF	**Energy/Resource Recovery Facility**
EA	**Environmental Assessment**
EAB	**Emerald Ash Borer**
EAC	**Energy Advisory Committee (regional)**
EAF	**Energy Action Fairfax**

ECC	**Environmental Coordinating Committee (county)**
EECBG	**Energy Efficiency and Conservation Block Grant (federal)**
EHD	**Epizootic hemorrhagic disease**
EIP	**Environmental Improvement Program (county)**
EPA	**Environmental Protection Agency (federal)**
EQ	**Exceptional quality (biosolids)**
EQAC	**Environmental Quality Advisory Council (county)**
EQC	**Environmental Quality Corridor (county)**
ES	**Elementary School**
EV	**Electric vehicle**
EVSE	**Electric vehicle supply equipment**
FAA	**Federal Aviation Administration**
FAR	**Floor Area Ratio**
FCDOT	**Fairfax County Department of Transportation (also DOT)**
FCPA	**Fairfax County Park Authority**
FCPD	**Fairfax County Police Department**
FCPS	**Fairfax County Public Schools**
FCRP	**Fairfax County Restoration Project**
FEEE	**Fairfax County Employees for Environmental Excellence**
FHWA	**Federal Highway Administration**
FJLEPC	**Fairfax Joint Local Emergency Planning Committee (regional)**
FMD	**Fairfax County Facilities Management Department**
FMN	**Fairfax Master Naturalists**
FMR	**Four Mile Run**
FTA	**Federal Transit Administration**
FY	**Fiscal Year**
GET	**Green Energy Triangle**
GHG	**Greenhouse gas**
GIS	**Geographic Information System**
GMU	**George Mason University**
Hazmat/HazMat	**Hazardous Materials**
HB	**House Bill (state)**
HCl	**Hydrochloric acid**
Hg	**Mercury**
HHW	**Household Hazardous Waste**
HMIS	**Hazardous Materials and Investigative Services Section of the Fairfax County Fire and Rescue Department**
HJ	**House Joint Resolution (state)**
HOT	**High Occupancy Toll**

HOV	**High Occupancy Vehicle**
HRC	**Hydrogen Releasing Compound**
HVAC	**Heating, Ventilation and Air Conditioning**
HWA	**Hemlock Woody Adelgid**
IAQC	**Interstate Air Quality Council (regional)**
IBI	**Index of Biological Integrity**
ICI	**Industrial/Commercial/Institutional**
ICPRB	**Interstate Commission on the Potomac River Basin (regional)**
IESNA	**Illuminating Engineering Society of North America**
IHRR	**Industrial and High Risk Runoff**
IIHS	**Insurance Institute for Highway Safety**
IM	**Inspection and maintenance**
IMA	**Invasive Management Area**
IPC	**Invasive Plant Control, Inc.**
IPLS	**Integrated Parcel Lifecycle System**
IT	**Information Technology**
kBTU	**Thousands of British Thermal Units**
kWh	**Kilowatt hours**
LAVC	**Lake Anne Village Center**
LDI	**Land Development Information (county data warehouse)**
LDS	**Land Development Services, Fairfax County Department of Public Works and Environmental Services**
LDS	**Land Development System (county)**
LED	**Light-emitting diode**
LEED®	**Leadership in Energy and Environmental Design**
LEPC	**Local Emergency Planning Committee**
LFAA	**Low Flow Allocation Agreement (regional)**
LFG	**Landfill gas**
LHMS	**Langston Hughes Middle School**
LID	**Low Impact Development**
LT2ESWTR	**Long Term 2 Enhanced Surface Water Treatment Rule (federal)**
LWR	**Lower Wetland Reservoir**
MACT	**Maximum Achievable Control Technology**
MARAMA	**Mid-Atlantic Regional Air Management Association**
MCL	**Maximum Contaminant Level**
MD	**Maryland**
mg	**Milligram**
mgd	**Million gallons per day**
ml	**Milliliters**
mg/l	**Milligrams per liter**
MLC	**McLean Land Conservancy**
MMTCO$_2$e	**Million metric tons carbon dioxide equivalent**

MOA	**Memorandum of Agreement**
MOU	**Memorandum of Understanding**
MS4	**Municipal Separate Storm Sewer System**
MSMD	**Maintenance and Stormwater Management Division (county)**
MT	**Metric tons**
$MTCO_2e$	**Metric tons carbon dioxide equivalent**
MW	**Megawatts**
MWAA	**Metropolitan Washington Airports Authority (regional)**
MWAQC	**Metropolitan Washington Air Quality Committee (regional)**
NAAQS	**National Ambient Air Quality Standards**
NEPA	**National Environmental Policy Act**
NMCPCP	**Noman M. Cole, Jr. Pollution Control Plant (county)**
NNIAP	**Non-Native Invasive Plant Assessment and Prioritization**
NO_2	**Nitrogen Dioxide**
NOx	**Oxides of Nitrogen**
NPS	**National Park Service**
NRCS	**Natural Resources Conservation Service (federal)**
NRMP	**Natural Resource Management Plan**
NSR	**New Source Review (federal permitting process)**
NTU	**Nephelometric Turbidity Unit**
NVCT	**Northern Virginia Conservation Trust**
NVCWP	**Northern Virginia Clean Water Partners**
NVRC	**Northern Virginia Regional Commission**
NVRPA	**Northern Virginia Regional Park Authority**
NVSWCD	**Northern Virginia Soil and Water Conservation District**
NVTA	**Northern Virginia Transportation Authority**
NWR	**National Wildlife Refuge**
O&M	**Operation and maintenance**
OCR	**Fairfax County Office of Community Revitalization**
OWML	**Occoquan Watershed Monitoring Laboratory**
Pb	**Lead**
PCB	**Polychlorinated Biphenyl**
PDC	**Planning district commission**
PDRP	**Pre-Disaster Recovery Plan (county)**
PFM	**Public Facilities Manual (county)**
PM	**Particulate matter**
$PM_{2.5}$	**Particulate matter less than 2.5 microns in diameter**

PMT	**Project management team**
ppb	**Parts per billion**
ppm	**Parts per million**
PTA	**Parent-Teacher Association**
QA/QC	**Quality Assurance/Quality Control**
RA	**Reston Association**
RBRC	**Rechargeable Battery Recycling Corporation**
REE&O	**Residential Energy and Outreach (county)**
RFID	**Radio frequency identification**
RFP	**Request for Proposals**
RMS	**Records management system**
RPA	**Resource Protection Area**
RPN	**Responsible Purchasing Network (regional)**
RPS	**Renewable portfolio standard**
RSF	**Recovery Special Function (county)**
SAG	**Stakeholder advisory group**
SARA	**Superfund Amendments and Reauthorization Act of 1986 (federal)**
SAV	**Submerged aquatic vegetation**
SB	**Senate Bill (state)**
SCC	**State Corporation Commission (state)**
SDID	**Site Development and Inspection Division (county)**
SDWA	**Safe Drinking Water Act (federal)**
SFDC	**Southeast Fairfax Development Corporation**
SFHA	**Special Flood Hazard Area (federal)**
SI2K	**Site Inspection 2000**
SIP	**State Implementation Plan**
SJ	**Senate Joint Resolution (state)**
SO_2	**Sulfur Dioxide**
SOCs	**Synthetic Organic Compounds**
SOS	**Save Our Streams**
SQI	**Stream Quality Index**
SRTS	**Safe Routes to School (federal program)**
TAC	**Technical Advisory Committee**
TAFIE	**Trash Assessment for Improved Environments**
TCC	**Transportation Coordinating Council (regional)**
TDM	**Transportation Demand Management**
TDP	**Transit Development Plan (county)**
TMDL	**Total Daily Maximum Load**
TMSAMS	**Tysons Metrorail Station Access Management Study (county)**
TOD	**Transit Oriented Development**
TPB	**Transportation Planning Board (regional)**
Tpy	**Tons per year**
TSG	**Transportation Services Group (county)**

TSS	**Total suspended sediment**
UFMD	**Urban Forest Management Division (county)**
$\mu g/m^3$	**Micrograms per cubic meter**
UOSA	**Upper Occoquan Service Authority**
USACE	**United States Army Corps of Engineers**
USDA	**United States Department of Agriculture**
USGS	**United States Geological Survey**
VA	**Virginia**
VAC	**Virginia Administrative Code**
VDCR	**Virginia Department of Conservation and Recreation (also DCR)**
VDEQ	**Virginia Department of Environmental Quality (also DEQ)**
VDGIF	**Virginia Department of Game and Inland Fisheries**
VDH	**Virginia Department of Health**
VDOF	**Virginia Department of Forestry**
VDOT	**Virginia Department of Transportation**
VIMS	**Virginia Institute of Marine Science**
WID	**Watershed Improvement District**
WIP	**Watershed Implementation Plan**
VOF	**Virginia Outdoors Foundation**
VPDES	**Virginia Pollutant Discharge Elimination System**
VRE	**Virginia Railway Express**
VSMP	**Virginia Stormwater Management Program**
W&OD	**Washington & Old Dominion trail**
WCD	**Wastewater Collection Division (county)**
WID	**Watershed Improvement District**
WIP	**Watershed implementation plan**
WMATA	**Washington Metropolitan Area Transit Authority**
WP&AB	**Watershed Planning & Assessment Branch (county)**
ZOAWP	**Zoning Ordinance Amendment Work Program (county)**