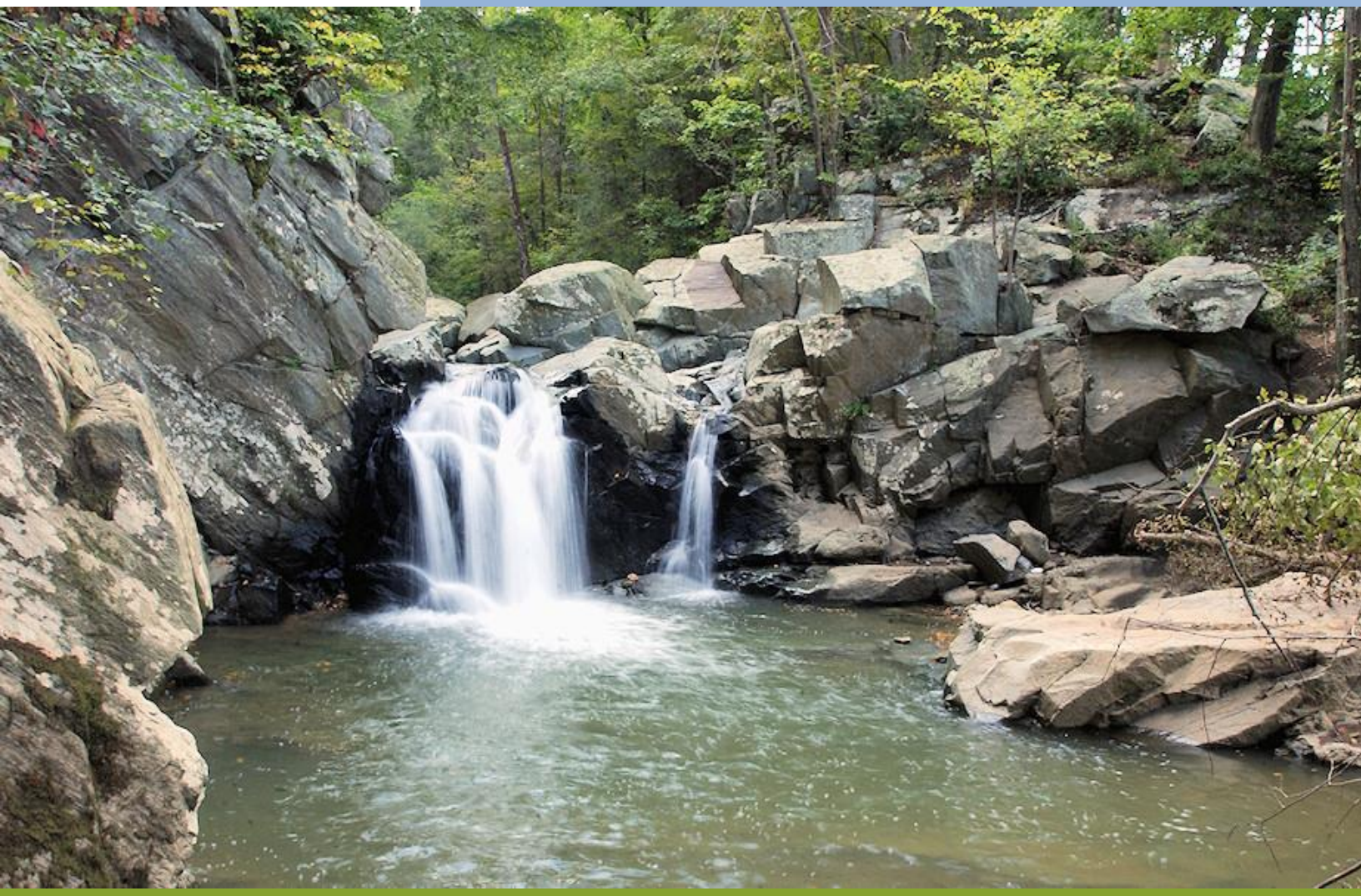
2015
Annual Report on the Environment



Environmental Quality Advisory Council
Detailed Report, November 2015
A Fairfax County, Virginia Publication

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The cover depicts Scotts Run at the Scotts Run Nature Preserve. Photo Courtesy of the Fairfax County Park Authority. Cover design by Katrina White, Student Member, Environmental Quality Advisory Council.

ANNUAL REPORT
on the
ENVIRONMENT

2015

DETAILED REPORT

Fairfax County, Virginia

Environmental Quality Advisory Council

November 2015

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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. First, it is intended to assist the Board of Supervisors in evaluating ongoing environmental programs and to provide the basis for proposing new programs. Second, the document aids public agencies in coordinating programs to jointly address environmental issues. Third, the report is intended to inform residents and others who are concerned with environmental issues.

This year's report in two formats: (1) a detailed report; 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.

The report includes 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. Also included are: EQAC's "Scorecard" of progress made on previous recommendations; a summary of EQAC activities since the last report was published; contacts for reporting potential environmental crimes/violations; an overview of stewardship/volunteer opportunities; and a "spotlight" on three environmental initiatives of Fairfax County Public Schools--High performance and sustainable schools; Get2Green Environmental Education and Action; and 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. In addition, the detailed report includes appendices addressing: state legislation relating to the environment; resolutions and positions taken by EQAC over the past year; the county's Environmental Excellence Awards; the county's Environmental Improvement Program (EIP) and EIP project selection process; and acronyms and abbreviations used in this report.

Within each chapter of the detailed report 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. Recommendations are again presented in two formats: items addressing ongoing considerations and continued support for existing programs are noted as "comments." Comments may also provide information to support items in the "recommendations" section. Items addressing new considerations, significant refinements of previous recommendations or issues that EQAC otherwise wishes to stress are presented as "recommendations." EQAC requests that county staff provide its perspectives on items presented as "recommendations."

This report covers activities affecting the environment in 2014; however, in some cases, key activities from 2015 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 Deer Management Committee
Fairfax County Department of Administration for Human Services
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 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 Management Specialist
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
National Park Service
Northern Virginia Conservation Trust
Northern Virginia Regional Commission
Northern Virginia Soil and Water Conservation District
NOVA Parks (Northern Virginia Regional Park Authority)
Occoquan Watershed Monitoring Laboratory
Potomac Conservancy
Reston Association
United States Fish and Wildlife Service
United States Geological Survey
United States National Museum of Natural History
Upper Occoquan Service Authority
Virginia Cooperative Extension, Fairfax County

Virginia Department of Environmental Quality
Virginia Department of Forestry
Virginia Department of Game and Inland Fisheries
Virginia Department of Transportation
Virginia Division of Legislative Services
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 2014 *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 17, 2015

The Environmental Quality Advisory Council (EQAC) is pleased to present the 2015 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 2014, but also includes significant actions from 2015 that could impact EQAC's comments and recommendations.

We realize that the report does not cover all ongoing actions; if we tried to accomplish this, the report would never be finished. 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:

- Created two versions of the report; one a printed summary version, and two, an electronic complete version with supporting information included, available both on-line and in the CD attached to this report.
- Highlighted environmental stewardship opportunities within the report chapters and have retained a summary of these opportunities.
- Included within the detailed report an appendix on the Environmental Improvement Program funding, explaining the program, what the funds are used for and what the selection process is for the funds.
- Included a section within both versions of the report summarizing EQAC's activities over the past year.

EQAC thanks the board for its continued strong support of environmental programs. We understand that budget constraints still continue to impact all programs within the county.

Environmental Quality Advisory Council
c/o Department of Planning and Zoning
12055 Government Center Parkway, Suite 730
Fairfax, Virginia 22035-5509
Phone 703 324-1380
FAX 703-653-9447
www.fairfaxcounty.gov/eqac

EQAC's priority recommendations this year focus on two areas:

The first is the need for continuing long-term financial support to sustain environmental programs that will only be effective and lasting if funded through multiple years. This includes:

- **Increase in the Stormwater Service District rate by one-quarter penny** that would again result in more funding for modest watershed improvement programs and a somewhat more realistic infrastructure replacement timeline.
- **Continued funding of Environmental Improvement Program projects**, most of which will be cost effective and result in significant cost reduction.
- **Funding for an approved Ecologist position in the Fairfax County Park Authority**.
- **Funding for the Assistant Wildlife Management Specialist position.**

The second recommendation asks that the county develop policies that address development and redevelopment within areas that are vulnerable to sea level rise.

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 (ECC), which is chaired by Deputy County Executive David Molchany, for its continued efforts at managing environmental action within the county. We appreciate 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.

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.

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

SUMMARY OF EQAC ACTIVITIES NOVEMBER 2014 THROUGH OCTOBER 2015

Between November 1, 2014 and October 31, 2015, EQAC held 12 meetings, including one public hearing and two joint meetings with the Fairfax County Environmental Coordinating Committee. During this period, EQAC issued five resolutions and positions, with one clarification (see Appendix B of the detailed version of this report). On November 18, 2014, EQAC presented its 2014 Annual Report on the Environment to the Board of Supervisors. On October 6, 2015, EQAC presented the 2015 Environmental Excellence Awards (see Appendix C of the detailed version of this report).

Key agenda items from EQAC's meetings were as follows:

November 12, 2014

- The FY 2016 Fairfax County budget process.
- Perspectives on PACE (Property Assessed Clean Energy).
- Grant funding through Virginia's Stormwater Local Assistance Fund (SLAF).
- Consideration of correspondence to the Board of Supervisors regarding transportation.
- 2014 Annual Report on the Environment.

December 10, 2014

- Discussion of spraying to control the fall cankerworm.
- Environmental Improvement Program project proposals.

January 21, 2015

- Election of officers for 2015.
- EQAC's annual public hearing.
- Consideration of correspondence to the Board of Supervisors regarding control of the fall cankerworm.
- The MITRE building energy technology report.

February 11, 2015

- County water quality monitoring programs.
- Stormwater education efforts in the public schools.
- Status of the county's MS4 permit.
- Review of issues identified at the January 21 public hearing.

March 11, 2015

- Joint meeting with Fairfax County's Environmental Coordinating Committee.
  - The FY 2016 Advertised Budget Plan.
  - The Deer Management Program audit.
  - County activities supporting pollinators.
  - Climate change/energy efforts in the community.
- Energy dashboards.
- Freshwater mussels and the Virginia Department of Environmental Quality's proposed ammonia criteria.
- Concerns identified in response to EQAC's January 22, 2015 memorandum to the Board of Supervisors regarding fall cankerworm control.
- Review of issues identified at the January 21 public hearing.
- The annual report preparation process.

April 8, 2015

- Climate change/energy efforts in the community: emissions reductions in the utility sector.
- Climate change/energy efforts in the community: regional efforts and county support.
- 2015 Annual Report on the Environment.
- 2015 Environmental Excellence Awards.

May 13, 2015

- Tour of the Noman M. Cole, Jr. Pollution Control Plant.
- The Gunston Cove Study.
- EQAC notifications of certain development proposals.
- 2015 Annual Report on the Environment.
- 2015 Environmental Excellence Awards.

June 10, 2015

- Joint meeting with Fairfax County's Environmental Coordinating Committee.
  - Fairfax Forward.
  - Proposed revision to the Noise Ordinance.
  - Overview of the county's Wastewater Management Program.
  - Update on development of a Web-based energy dashboard for county government facilities.
- Student member search.
- 2015 Annual Report on the Environment.
- 2015 Environmental Excellence Awards.

July 8, 2015

- Cleanup of dump sites.
- Preparation for September 2015 budget discussion.
- Staff response to the EQAC recommendation addressing impacts of climate change to Fairfax County.
- Legislative proposals for the 2016 General Assembly.
- 2015 Annual Report on the Environment.
- 2015 Environmental Excellence Awards.

August 12, 2015

- Legislative proposals for the 2016 General Assembly.
- 2015 Annual Report on the Environment.

September 9, 2015

- The FY 2017 Fairfax County budget process.
- Legislative proposals for the 2016 General Assembly.
- 2015 Annual Report on the Environment.

October 14, 2015

- 2015 Annual Report on the Environment.

Approved minutes of EQAC meetings are available from EQAC's website, at www.fairfaxcounty.gov/dpz/eqac/minutes.

EQAC resolutions and positions were as follows:

November 12, 2014:	Support for grant funding through the Stormwater Local Assistance Fund
January 21, 2015:	EQAC position on the county's fall cankerworm spray program.
February 11, 2015:	EQAC comments on the MITRE building energy technology report.
March 11, 2015:	Clarification on the January 21 position on the county's fall cankerworm spray program.
April 8, 2015:	Testimony in support of the proposed budget for the environment.
September 9, 2015:	EQAC support for the Board of Supervisors legislative position on reducing environmental contamination from plastic and paper bags.

Details are available in Appendix B of the detailed version of this report as well as EQAC's website, at www.fairfaxcounty.gov/dpz/eqac/resolutions/dpz_eqac_resolutions.htm.

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SCORECARD
Progress Report on 2014 Recommendations

I. 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 funding can be provided for a variety of environmental initiatives through the county's Environmental Improvement Program (EIP), including education programs (including social media) and other programs to promote energy efficiency. However, EQAC is concerned that the EIP activities were eliminated as part of budget negotiations for the FY 2015 budget. EQAC appreciates the Board of Supervisors' restoration of funding for EIP projects through the FY 2014 carryover process, but the FY 2015 budget decision suggests that future funding of EIP projects may be uncertain. EQAC recognizes that these programs hold promise for efficiencies that might not be identified by other means. It is EQAC's view that, if Fairfax County is going to continue to compete with neighboring jurisdictions for progressive companies to enhance our workforce, Fairfax County must be a leader in energy efficiency, outreach and education, and environmental stewardship in general. EQAC recommends that the County Executive and the Board of Supervisors support and fund those projects that are recommended by staff. Moreover, EQAC recommends that funding for the EIP be structured so that it is not as vulnerable to future actions like the one that would have eliminated it for FY 2015.	The County Executive recognizes the value of EIP project funding and will make every effort to include funding for this program in his Advertised budget annually. The new evaluation process for reviewing EIP projects has been extremely beneficial and enhanced the process for determining the level of project funding. All EIP projects are funded by the General Fund, and as with all other department and program funding, is subject the availability of General Fund revenue. Project funding will be evaluated each year based on the fiscal environment. It should be noted that the Board of Supervisors specifically requested that beginning in the FY 2016 budget, the funding that supports the Invasive Plant Management Program be included as a baseline funding adjustment outside the project selection process. All other EIP project will be evaluated using the new selection process annually.	EQAC is pleased to see that the County Executive and Board of Supervisors are supporting the EIP. We believe that the EIP should be used to support promising initiatives that will provide for energy efficiencies and other worthwhile environmental projects.	Yes.

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. Specific recommendations related to the support of recycling are included in the Solid Waste chapter.	This recommendation was presented in the EQAC report in 2012 and staff responded with information regarding the status of food waste composting in the northern Virginia region. As an update, Prince William County has recently announced an agreement to develop a composting facility on its Balls Ford Road property that will be capable of processing food waste, yard waste and wood waste. We hope to continue and expand our composting diversion rates with this program. EQAC's recommendation further requests that the county "provide for the recycling of all waste streams" and that this should be considered as the county develops its strategic plan for waste management. The county's Solid Waste Management Plan clearly identifies recycling as preferable over incineration and landfilling. Opportunities to enhance recycling are routinely explored.	The EQAC is pleased to see that progress has been made in this area, but further work is necessary to establish networks for the recycling of all waste streams.	No.

Climate Change & Energy Recommendation	Action taken by Agency or Department	EQAC Comments	Completed
3. The work of the Private Sector Energy Task Force was intended to help Fairfax County position itself as a leader in the area of energy efficiency, sustainability and “green” technology. The Private Sector Energy Task Force was a good beginning, but the work recommended by the task force is languishing and needs to be reinvigorated. As an example, EQAC recommends that Fairfax County place a priority on supporting education and recognition for companies that adopt energy efficient approaches as part of their business practices.	Yes and further work is underway. As described in the FY2015 Sustainability Initiatives report, http://www.fairfaxcounty.gov/living/environment/sustainability/, Fairfax County is a leader in the areas of energy efficiency, sustainability and "green" technology. The county recognizes the value in working more closely with the business community to achieve even greater gains in these areas. Work to address the recommendations of the Chairman's Private Sector Energy Task Force is ongoing. County staff has continued to develop policies like the Green Building Policy Comprehensive Plan Amendment and programs like the Energy Action Fairfax to position Fairfax County as a leader on energy efficiency and sustainability as recommended by the task force. Other recommendations rely on private investment and partnership with the private sector and efforts to identify partnership opportunities continue. As proposed in the response to EQAC's Climate Change and Energy Recommendation #3 in the 2013 Annual Report on the Environment, staff re-connected with the Chamber of Commerce and other key partners on forming an alliance or fostering a transformative project. Unfortunately, due to regional economic dynamics, these organizations are in no better position to lend resources to the creation of an alliance now than they were a year ago and there is no guarantee of when these circumstances will change.	While efforts continue to be made to address this recommendation, EQAC does not agree that this recommendation has been addressed. Funding of the Energy Action Plan and completion of the Sustainability Report are positive steps, but this work has not brought stakeholders together as envisioned by the Private Sector Energy Task Force.	No.

Climate Change & Energy Recommendation	Action taken by Agency or Department	EQAC Comments	Completed
4. Fairfax County should undertake an effort to identify all the impacts of climate change that might reasonably be expected to impact the county. This information will help to: 1) better plan for potential impacts; and 2) initiate mitigation or adaptation efforts where appropriate.	This recommendation has been addressed only to the extent that an unqualified list of impacts has been identified below; a more rigorous quantification of potential impacts has not been performed. Staff recognizes the value of identifying potential impacts of climate change that might reasonably be expected to impact the county. Staff also recognizes the need for the county to review and assess the impacts of climate change on the future of the county's operations and the need to monitor and evaluate impacts as they occur and develop recommendations.	Other jurisdictions have placed a focus on the identification of areas that might be flooded as a result of climate change and are adjusting planning and permitting (e.g., comprehensive plan, permitting) so that building will not continue in areas that may be flooded. Also, mitigation measures to address existing facilities should be undertaken (e.g., construction of levies) to the extent appropriate and feasible.	No.

Climate Change & Energy Recommendation	Action taken by Agency or Department	EQAC Comments	Completed
5. Fairfax County has made significant strides in monitoring energy use, identifying opportunities for reducing energy use, and reporting this information to the county government. Just as this information has been useful to the county, it would also be helpful for businesses and residents to see the benefits of monitoring energy use. EQAC recommends that monitoring information that shows the benefits of monitoring be made available to the public and private sectors.	The Facilities Management Department (FMD) maintains 205 Board of Supervisors owned sites with more than 8.5 million square feet of space. These sites include numerous types of buildings, including offices, libraries, police and fire stations, community centers and vehicle maintenance facilities. FMD uses EnergyCAP software and a comprehensive database of building utility information to track and analyze energy consumption in each of the 205 buildings in its inventory. EnergyCAP allows FMD to identify high energy use buildings, develop a building's energy baseline and track changes in its energy use from year to year, or forecast energy usage for each utility. In addition to its use of EnergyCAP, FMD has installed a real-time building energy management system, or BEMS, in 94 of the 205 sites in its inventory. With BEMS, FMD can monitor and remotely control lighting and/or heating, ventilating and air conditioning (HVAC) systems in buildings. The number of building energy management systems will increase over time because BEMS installation is specified for all new building construction projects and for all end-of- lifecycle HVAC replacements. Investing in BEMS has allowed the County to achieve significant reductions in energy use while accruing energy savings. Data regarding the energy consumption of county buildings is not currently displayed via an energy dashboard on the county's website. However, at the Board of Supervisors Environmental Committee meeting on Tuesday, February 3, 2015, county staff presented various energy dashboard scenarios for the committee's consideration. The committee asked that staff pursue the low-cost option and create an energy dashboard that can be shown on the county website.	EQAC commends county staff for the focus on an energy dashboard that can show results on a website for the public.	No.

II. LAND USE AND TRANSPORTATION

Land Use & Transportation Recommendations	Action taken by Agency or Department	EQAC Comments	Completed
1. Continue to Innovate with Social Media EQAC commends the county for embracing new technology and leveraging the Web to share and interact with the public. We recommend that the county continue 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.	Staff agrees that integrating social media into the planning process can be a powerful and effective tool to enhance public outreach capabilities and public participation opportunities. The Department of Planning and Zoning (DPZ) already has been using social media and continues to explore ways to expand its activities. Coordinating traditional outreach methods with social media can be an effective strategy to increase the number of community stakeholders who are reached. As the county explores new social platforms, DPZ will continue to look at using more social and public participation tools in concert with county policy to adopt the use of specific social media platforms on a countywide basis, not agency by agency.	EQAC agrees that the county is adopting social media for outreach. We continue to encourage new innovative approaches such as virtual town hall meetings and forums. This includes necessary policy expansion to accommodate new media approaches.	Ongoing.
2. Urban Design Standards Urban standards are designed to improve the environment, quality of life, balance and safety of a well-planned mixed-use place. These new 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. EQAC recommends that the county allow a wide range of urban design standards, including green spaces, to be adopted and applied to all mixed-use centers.	Fairfax County has adopted Urban Design Guidelines for many of its mixed-use activity centers, including Tysons, and is moving towards adoption of such standards for additional areas including Seven Corners. The adopted Comprehensive Plan guidance for the Reston Transit Station Areas includes a section on urban design and placemaking.	EQAC supports urban standards adopted for Tysons. We encourage applying them broadly to Suburban, CBC, and Transit areas. The Urban Standards should be the baseline with exceptions as necessary. This is preferable to developing many site specific urban standards.	Ongoing.

Land Use & Transportation Recommendations	Action taken by Agency or Department	EQAC Comments	Completed
3. Data and Modeling EQAC recommends that nonresidential development data be comprehensively integrated into the county's Integrated Parcel Lifecycle System and used for forecasting, as demonstrated by residential data that have been harnessed in IPLS for that purpose. Currently, nonresidential data on proposed development projects are captured in disparate systems for zoning and site plan applications, but have not been fully brought into IPLS, and, therefore, cannot be used for forecasting.	Building on the momentum gained in 2013, staff continues to focus on this recommendation, propose improvements, and see progress. In 2014, DPZ staff briefed and subsequently gained the support of DPWES and DIT staff regarding a change to the IT system that captures site plans data (PAWS). Staff still believes that the IT project funding for the replacement of the FIDO and LDS (ZAPS and PAWS) systems (Fund 10040) presents a good opportunity to capture and track a development project and its associated data as it is processed at different stages, beginning with a zoning case and through project completion at the building permit stage. Having a unified IT system that tracks this "evolution" of development cases would allow one to address the question: *What development is in the pipeline?* However, this Fund 10040 project has not yet been approved.	EQAC continues to support this project.	Ongoing.
4. Data and Modeling 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.	Land uses and densities are key pieces of information. That information is shown on the County's Comprehensive Plan Land Use Map available online at the County's map portal. The Comprehensive Plan also recommends land uses and densities that are different than the baseline for approximately 10% of the County. For these areas, DPZ created a Comprehensive Plan Potential database in 2006 to track the permutations of land use recommendations. While the database has been kept up-to-date as Plan Amendments have been approved, it has only been available to DPZ planners for land use modeling and forecasting work. The next step is to make this dataset publically-accessible.	EQAC continues to support this project.	Ongoing.

Land Use & Transportation Recommendations	Action taken by Agency or Department	EQAC Comments	Completed
5. Data and Modeling 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. Multi-spectral imagery has the potential to enhance our knowledge of the county by answering questions such as tree species identification and tree canopy density.	DPWES and DIT have partnered to obtain new satellite imagery in the summer of 2015 and to retain the services of a contractor to process the imagery and LIDAR to create land use and land cover data for the county. It will also identify changes from 2011 to 2015. DPWES were able to use those data to develop a GIS toolkit for facilitating and streamlining area delineation. These are essential analyses and with these tools Stormwater can do analyses in half the time. These recommendations have long-range fiscal impact. The four types of data must be refreshed on a cycle that provides sufficient value to the county to justify the investment. Ideally a predictable budgeting approach would assist in budgeting.	EQAC continues to support GIS and data acquisition projects.	Ongoing.

Land Use & Transportation Recommendations	Action taken by Agency or Department	EQAC Comments	Completed
6. Transportation 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.	The majority of the recommendations are being addressed. "Bike Fairfax" is still under consideration and funding opportunities for a "Bike Fairfax" program are currently being explored by DOTs Marketing Division.	EQAC fully supports these multi-modal programs and will continue to advocate for them.	Ongoing.

III. AIR QUALITY

There were no recommendations in the 2014 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 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 2016 by at least one-quarter penny, from a rate of 2.25 cents per $100 assessed real estate value to 2.50 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.	The Board of Supervisors addressed this recommendation by increasing the Stormwater Service District rate to 2.50 cents per $100 of assessed real estate value.	EQAC thanks the Board for increasing the funding for stormwater programs by the one-quarter penny.	Yes.

V. SOLID WASTE

Solid Waste Resources Recommendations	Action taken by Agency or Department	EQAC Comments	Completed
1. While the County's 48 percent recycling rate exceeds the minimum state requirement, it is considerably less than Montgomery County Maryland's rate of 58 percent. Additional means of increasing recycling should be investigated and implemented. In particular, recycling requirements for commercial properties should be enforced and additional requirements should be considered.	The county is investigating organics recycling with Prince William County. In addition, the county has expanded service for electronics and household hazardous waste disposal.	The County's 2015 recycling rate remains unchanged from 2014. In addition, it is a concern that glass contamination and market conditions have reduced the actual recycling rate substantially.	No.
2. EQAC recommends the continued investigation of alternative waste stream reduction including food waste composting. Regional cooperation should be considered.	A cooperative effort with Prince William County for food waste composting is planned to begin in July of 2017.	It will take continued action to bring this plan to fruition.	Ongoing.
3. EQAC recommends that opportunities to minimize redundant trash truck collection trips in the same neighborhoods be examined for implementation while not increasing cost.	County Staff has laid out the issues of implementing a franchise program.	It will take Board of Supervisors support for this recommendation to move forward.	No.
4. To increase the value and environmental benefit of recycled materials, the county should investigate ways to improve the quality of recyclables collected at residential and commercial properties. Removing glass from residential collection systems could significantly improve the quality of paper and plastic recycled. As such, alternative methods of glass recycling should be considered in addition to other ways to improve the quality of recyclables collected. One potential method to reduce the quantity of glass in the waste stream would be to establish a container redemption fee; such a fee would also reduce litter and increase the recovery of containers. EQAC therefore supports a statewide container redemption fee.	Staff has investigated several means of increasing the value of recyclables. In addition, the administrative steps and code changes needed have been identified.	Implementation will take Board of Supervisors support and changes to the county recycling code.	No.

Solid Waste Resources Recommendations	Action taken by Agency or Department	EQAC Comments	Completed
5. The county should investigate the potential for increased county participation in recycling of materials such as asphalt, glass and organic materials.	County staff described how materials under county control are used. They have examined additional options for adding to these programs.	This program should be considered for expansion.	Ongoing.

VI. HAZARDOUS MATERIALS

There were no recommendations in the 2014 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 fulfilled a long-standing EQAC recommendation to develop and implement a countywide Natural Resource Management Plan. In 2014, the Park Authority adopted a revised Natural Resource Management Plan that more closely focused on adaptive management of natural resources. However, full funding to implement the plan is not yet in the Park Authority budget. The Park Authority has managed to secure some funding from several sources but lacks most of the amount to implement fully the plan. 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. Implementation of the new plan will require similar funding and positions. EQAC strongly feels that the Natural Resource Management Plan needs to be fully 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 further recommends that, over time, the full plan be funded.	The Park Authority has not received recurring funding to fully implement Phase 1 of the Natural Resource Management Plan. It has, however, received dedicated recurring funding for one position, is making administrative changes in anticipation of additional funding such as reclassifying positions, and continues to pursue alternative funding strategies, which include further volunteer development, to implement the newly adopted plan. Fairfax County dedicated recurring funding for the Invasive Management Area (IMA) Volunteer Coordinator position beginning in FY14, which has ensured a consistent level of service provided by this program. In addition to the IMA Volunteer Coordinator merit position, the agency has identified a second merit position for plan implementation. The second position is vacant and will remain so until funding is available. Finally, all five merit positions in the branch were reclassified from the Naturalist to the Ecologist class in 2013. The newly adopted Natural Resource Management Plan will require approximately $8 million and dozens of staff position annually to fully implement. This includes approximately $3.5 million to focus on general natural resource management and $4.5 million for a non-native invasive plant control program. Five additional merit positions and $705,000 would be required to fund Phase 1 of the Natural Resource Management Plan.	EQAC commends the Park Authority for finding funding sources to fund a limited amount of activities called for in the Natural Resource Management Plan. EQAC continues its recommendation that Phase 1 be funded by the Board of Supervisors. Additionally, EQAC recommends that the unfunded merit position be funded by the Board of Supervisors.	No.

VIII. WILDLIFE MANAGEMENT

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 have become both cost-effective and efficient in reducing excesses in the deer herd.	This recommendation has already been addressed. In FY 2015, managed shotgun hunts were coordinated by the Fairfax County Wildlife Management Specialist, Animal Control (FCPD), and the Fairfax County Park Authority at the Sully Woodlands area. Additional public hunts were held by federal and state agencies at Mason Neck National Wildlife Refuge and Mason Neck State Park (this program has been in place since 1993). Managed hunts are safe and often highly efficient for deer population control at select sites. Over the past five years of the program, managed hunts have contributed to approximately 13 percent of the total deer harvest even though this method is only implemented on a small proportion of total hunt acreage included in the Deer Management Program. Public managed hunts will continue to be used at selected parks to implement sustainable hunting pressures.	The previously authorized position of Assistant Wildlife Management Specialist, which has been in abeyance due to county budget constraints, should be restored as soon as possible and the Wildlife Management Program should receive a specific allocation in the county budget.	Yes, within the limits of available staff resources.

Deer Management Recommendations	Action taken by Agency or Department	EQAC Comments	Completed
2. The sharpshooter events should be continued because they are both humane and cost-effective.	This recommendation has already been addressed. Sharpshooting is a safe and highly efficient method for deer population control at select sites. Over the past five years of the program, sharpshooting operations have contributed to approximately 21 percent of the total deer harvest even though this method is only implemented on a small proportion of total hunt acreage included in the Deer Management Program. Sharpshooting is especially important for deer population control on public lands where other methods, such as archery and managed shotgun hunting, are not determined to be appropriate due to park operations and/or environmental features that make implementation difficult (i.e., large open fields, recreational complexes, botanical gardens). Sharpshooting allows for a targeted harvesting effort when parks are closed to minimize disruption to park operations and use by park patrons. Although sharpshooting is efficient, it does contribute to higher operational costs than other control methods because additional personnel are needed on sharpshooting nights for park security, harvesting and processing of deer. Improvements were made for the sharpshooting tactical operations in FY 2015 to increase efficiency of harvest and minimize suffering of deer.	The previously authorized position of Assistant Wildlife Management Specialist, which has been in abeyance due to county budget constraints, should be restored as soon as possible and the Wildlife Management Program should receive a specific allocation in the county budget.	Yes, within the limits of available staff resources.

Deer Management Recommendations	Action taken by Agency or Department	EQAC Comments	Completed
3. The archery program should be continued as a means of controlling deer depredation of vegetation on residential properties where firearms cannot be used. Archery is also particularly cost-effective, relying on hundreds of qualified volunteers contributing thousands of hunt hours to the program at no cost.	This recommendation has already been addressed. Archery is a safe, cost-effective, and highly efficient method for deer population control at select sites. Since the archery program was initiated in FY 2010, it has contributed to approximately 66 percent of the total deer harvest. By FY 2015, the archery program has been expanded to include 24 qualified volunteer archer groups assigned to approximately 65 parks countywide. This includes over 10,000 acres of FCPA parkland and 3,300 acres of NVRPA parks. The archery program continues to increase the number of hunt sites available in the county through participation by ethical, qualified archers with superior skill. All parks where the archery program is implemented remain open to the public due to the continued excellent record ensuring public safety and participant safety. Currently, the Fairfax County Deer Management Program only implements archery as a management tool on public parklands, which represent less than 20 percent of total county acreage. The county program does not currently coordinate hunting on private property, which also provides refuge and food that sustain overabundant deer. However, private citizens do hunt in these areas. Reduction of deer densities to more sustainable, healthy levels is likely to require coordination of hunting on both public and private lands within Fairfax County.	The previously authorized position of Assistant Wildlife Management Specialist, which has been in abeyance due to county budget constraints, should be restored as soon as possible and the Wildlife Management Program should receive a specific allocation in the county budget.	Yes, within the limits of available staff resources.

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 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.	This recommendation has already been addressed. 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 goose population at selected sites. To date, 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 contained 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 good populations.	The previously authorized position of Assistant Wildlife Management Specialist, which has been in abeyance due to county budget constraints, should be restored as soon as possible and the Wildlife Management Program should receive a specific allocation in the county budget.	Yes, within the limits of available staff resources.

VIII-3. COYOTES IN FAIRFAX COUNTY

There were no recommendations in the 2014 Annual Report

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

There were no recommendations in the 2014 Annual Report

IX. NOISE, LIGHT POLLUTION AND VISUAL POLLUTION

There were no recommendations in the 2014 Annual Report

Spotlight on Fairfax County Public Schools

Fairfax County Public Schools (FCPS) is the largest school district in Virginia (the 10th largest in the U.S.) and has an enrollment of over 187,994 students for the 2014-2015 school year. Over 14 percent of Virginia's K-12 students are enrolled in FCPS.

In this Spotlight, EQAC wants to provide recognition and to highlight 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 (CHPS), (see http://www.chps.net/dev/Drupal/node), specifically the Virginia-CHPS Criteria, as its standard for sustainable design and benchmarking. CHPS offers resources for different phases and types of projects, including planning, designing, operating, 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 operations; assessment tools for new construction, major modernizations and relocatable classrooms; and recognition programs.

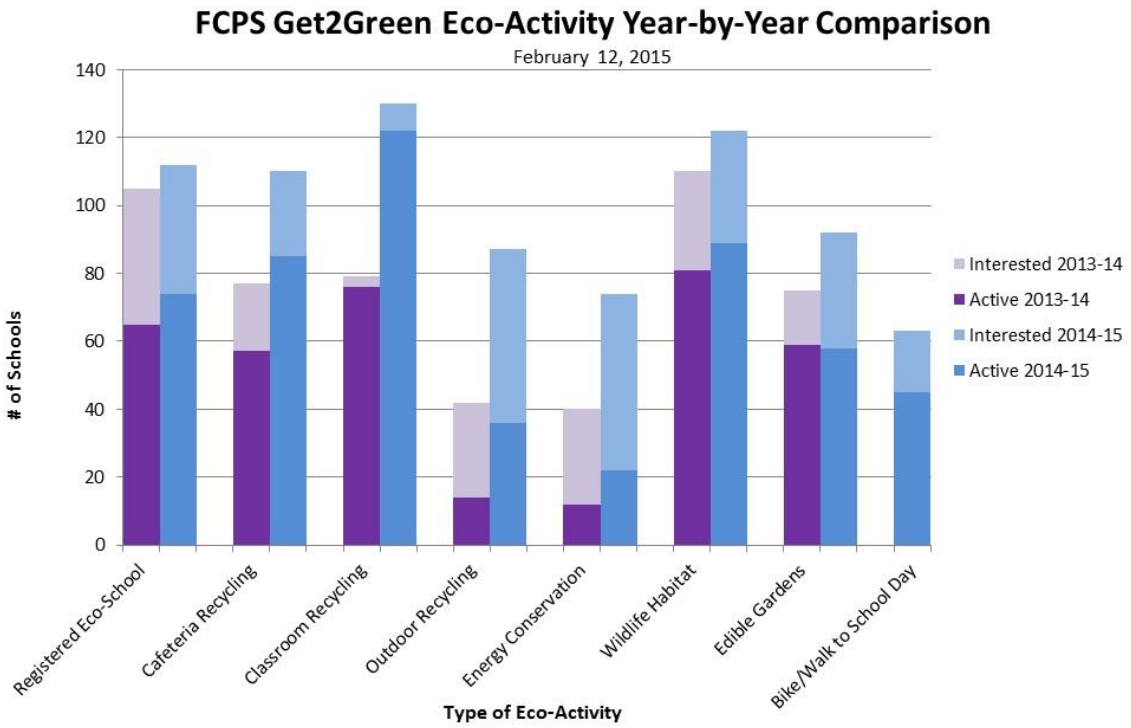
FCPS policy is for all 2013 bond (and beyond) projects to be CHPS-designed under the VA-CHPS Criteria.

The Office of Facility Management Energy Management Section prepares an annual greenhouse gas inventory for all of FCPS (annual reports from 2008 to 2013 are available at http://www.fcps.edu/fts/facmanagement/greenhousegas/index.shtml).

FCPS has contracted with Cenergistic, Inc., to implement an energy conservation program. Work started February 1, 2014, and Cenergistic engineers and experts are working throughout the school district to implement conservation procedures in all facilities. Ten energy specialists are conducting energy audits to ensure that students and teachers are comfortable during class time and scheduled activities and that energy is used only as necessary. Energy specialists are responsible for helping to motivate everyone in the school district to use energy wisely, keep

classrooms comfortable and practice smart energy strategies—ensuring that the energy management program is implemented district-wide.

Get2Green Environmental Education and Action – FCPS Get2Green (see http://www.fcps.edu/is/science/get2green/) is in its fifth year. It was started as a means to help attain the School Board goal to graduate environmental stewards. The school district defines stewardship as a combination of knowledge and action.



* The increase between years is partially attributable to improvements in data collection. The 2014-15 school year is also the first year data was collected on Bike/Walk to School Day.

To assist schools with a framework for student action, Get2Green partnered with the National Wildlife Federation Eco School USA program. Through this program, FCPS efforts focus on developing student driven action teams within Eco Schools across the county. These teams work on a variety of environmental topics (pathways) under the Eco School umbrella. In addition, FCPS focuses efforts on teacher professional development to assist teachers in running eco teams, working with students on Eco School USA activities, and in taking students outdoors for lessons.

Given the new focus of FCPS on the Portrait of a Graduate, a strategic focus to graduate global citizens, the environmental stewardship work that Get2Green fosters is integral in helping FCPS meet its goals. Through collaboration with initiatives such as Service Learning and Science, Technology, Engineering, Art and Math (STEAM) and the overall curriculum integration efforts of the Department of Instructional Services, Get2Green can help to offer teachers, staff and students opportunities to work on authentic problems with the environment as the integrating concept. This problem-based learning is shown to

enhance critical thinking and other 21st century skills.

FCPS has 75 registered Eco Schools and 7 of those have achieved Green Flag status, the highest honor in that program. They are Lanier Middle School, Churchill Road ES, Centreville ES, Lake Anne ES, Franklin Sherman ES, Longfellow Middle School and Flint Hill ES. In addition, FCPS records at least 75 more schools working on related projects. Most common areas of work include; energy conservation, reduction of waste, building wildlife habitat and studying biodiversity, sustainable food and edible gardens, water conservation, transportation improvements, and healthy living-exercise and nutrition. Additional metrics include: schoolyard habitats (90+ schools); edible gardens (60+ schools); and Blackboard Get2Green Community Members (600).

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. Get2Green is collaborating with Cenergistic in the district's efforts to conserve energy and will jointly plan a student energy conservation initiative in the 2015-2016 school year. The school district works with many external partners across the county and region to bring expertise and resources to the schools. Work is underway with the Fairfax County Park Authority to train teachers to use parks adjacent to the schools as additional outdoor classroom space. Students are engaged in service learning projects to improve the parks by removing invasive plants and litter. A grant from NOAA, where FCPS is partnered with both DPWES and FCPA and others, was received in 2015 to train middle school teachers to run stewardship projects with students over the next three years.

Recycling and Waste Reduction

In an effort to creatively increase the amount of recycling in schools, FCPS ran a business case competition with Ernst and Young for high school teams. The teams designed a marketing plan to increase recycling and waste reduction. As part of this effort, a set of signs designating what is recyclable and what is trash were developed and distributed to all schools. The high school students then created a contest for schools to build their mascots out of recyclable materials. The mascots were displayed and judged at the NoVA Outside/GMU School Environmental Action Showcase in April 2015.

Wildlife Habitat and Garden Implementation

Get2Green is assisting many schools to develop and expand their wildlife habitat. These habitats may take the form of meadows, enhanced woodland areas or butterfly and bird attracting gardens. Many of them are created to alleviate erosion issues and enhance storm water management on local campuses. Significant progress has been made to work with the Department of Public Works on increased stormwater education in the classroom and planning student wildlife habitat projects. FCPS is partnering with federal, state and local organizations to form an Urban Wildlife Habitat Program whose purpose is to educate students, faculty, staff and the general public about the importance of protecting and maintaining local wildlife habitats and gardens on campus. Although these habitats may be small, their collective impact can be felt district wide. To better understand this impact, Get2Green is piloting biodiversity studies to measure the positive effect these wildlife habitat constructions are having on the animal population within school grounds and the surrounding communities. The centerpiece of these

materials is the Fairfax County Field Guide that DPWES designed with FCPS. The US Fish and Wildlife Service provided an intern for the summer of 2015 to enhance and expand this program.

Get2Green is also partnered with the Fairfax County Health Department in a grant and other planning to develop edible gardens in locations in the county that have been designated as areas where fresh food and produce is not available.

Collaboration between Fairfax County Public Schools and the County's Stormwater Planning Division on Stormwater Management Plans

In November 2012, staff from FCPS and SWPD 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 include: evaluation of opportunities to provide additional stormwater management onsite during the design and construction of projects in the FCPS Capital Improvement Program (CIP); opportunities for SWPD to construct stormwater management facilities on school properties which are not part of the CIP; and education and outreach opportunities in the FCPS science curriculum.

FCPS and SWPD coordinate throughout the planning and design of FCPS CIP projects to identify opportunities to enhance the code required stormwater management provided by FCPS. For projects where additional stormwater management measures are found to be feasible, SWPD provides technical support and funding, through the Stormwater Service District revenue. The support is provided to FCPS for the design and construction of additional stormwater management measures to be permitted and built as part of the FCPS CIP. A list of FCPS CIP projects where SWPD and FCPS were able to provide additional stormwater management is included below. These additional stormwater management measures help us improve water quality in our streams and meet our Total Maximum Daily Loads (TMDL) requirements. It is anticipated that these efforts will continue with future FCPS CIP projects. A broader list that also identifies joint projects that are being planned is provided in the detailed Water Resources chapter of this report.

EQAC notes that it would be beneficial if the advanced stormwater management activities that are installed at FCPS facilities would include visible signage that describes the nature of the improvement. Such signage could help students and others at the schools to increase their appreciation of the efforts and be useful as an educational tool. SWPD will work with FCPS to identify opportunities to install signage on school stormwater management facilities.

FCPS and SWPD Stormwater Collaborations as of July 2015		
Location	**Plan Status**	**Facility Descriptions**
Langley High School	Under construction	Underground storage / filtration (Bay Filter)
Marshall High School	Construction substantially complete	Cistern - irrigation system
Mt Vernon High School	Construction complete	Added storage under turf field
Ravensworth Elementary School	Under construction	Bioretention, amended soils
Sunrise Valley Elementary School	Under construction	Permeable pavers, vegetative swale, underground detention / infiltration trench
Terraset Elementary School	Under construction	Pervious pavement, Filterras, permeable pavers, Underground Detention
Keene Mill Elementary School	Under construction	Vegetative swales, permeable pavers, amended soils, sheet flow
North Springfield Elementary School	Under construction	Bioretention, amended soils
Hayfield High School	Under construction	Additional storage under turf field

Environmental Stewardship/Volunteer Opportunities in Fairfax County

Environmental quality 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. 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. NOVA PARKS (NORTHERN VIRGINIA REGIONAL PARK AUTHORITY)

For the environmentally-conscious park enthusiast, we recommend contacting NOVA Parks (the Northern Virginia Regional Park Authority), www.NVRPA.org/. NOVA Parks 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.

The Northern Virginia Regional Park Foundation gives grants, through its Nature Nuts, to 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, and 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. Meadowlark Botanical Gardens 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 and conserving native plants and animals.

NOVA Parks partners with REI's adventure school, introducing people to the outdoors at Pohick Bay, Hemlock Overlook and Fountainhead Regional Parks. NOVA Parks' 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 has hosted booths at various county fairs to give environmental information to the public.

In 2015, Friends of the Occoquan hosted five cleanup events on the Occoquan River, at host sites Fountainhead and Occoquan Regional Parks, the town of Occoquan, Lake Ridge Marina and Bull Run Marina. Over 250 volunteers removed 154 bags of trash and 16 bags of recyclables. Many Girl and Boy Scout troops, as well as student organizations got involved.

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. NOVA Parks implemented a program that allows youths 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 www.nvrpa.org/park/main_site/content/volunteer.

2. FAIRFAX COUNTY PARK AUTHORITY

The Fairfax County Park Authority (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 www.fairfaxcounty.gov/parks/volunteer/.
More information about FCPA and its programs is available at 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.

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 cleanup events, although many individuals and friends groups participate in more regular cleanups 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 youths to get involved in their local parks - as permanent volunteers, as students for their community service hours and as 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.

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 nonprofit 501(c) (3) 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
www.fairfaxparkfoundation.org

3. NORTHERN VIRGINIA SOIL AND WATER CONSERVATION DISTRICT

The Northern Virginia Soil and Water Conservation District (NVSWCD) supports numerous opportunities throughout the year to participate in stream cleanups and restorations, storm drain labeling, rain barrel workshops, native seedling sales, 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.

NVSWCD runs Envirothon, an annual environmental science competition for high school students.

NVSWCD 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" and the "Water Quality Stewardship Guide" (www.fairfaxcounty.gov/nvswcd/youyourland/).

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 www.fairfaxcounty.gov/dpwes/stormwater/. For a list of common household hazardous materials and how to dispose of them, go to 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'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 (energyactionfairfax@fairfaxcounty.gov).

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

Northern Virginia Clean Water Partners is a group of 19 Northern Virginia local governments, school systems, independent water and sanitary sewer authorities, and local businesses that are concerned with local water quality. Examples of the activities of this group include its Dog Blog and Facebook pages for dog owners. Clean Water Partners also provides sustainable landscaping, home and vehicle tips.

Find out more about this organization at its website at 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 cleanups), classroom presentations and presentations to homeowner associations, church groups, small businesses and more.

For over 30 years, Clean Fairfax has been working to make Fairfax County clean, green and sustainable. In the last three years, community cleanups have yielded 975 cubic yards of trash. In addition, the organization has presented sustainability workshops to over 50 groups and has visited 39 schools. All of this was accomplished by the equivalent of 1.25 full-time employees and upwards of 7,000 volunteer hours.

Clean Fairfax serves on the county and statewide litter control and recycling committees. Clean Fairfax produces the county's official Earth Day and Arbor Day event, called SpringFest Fairfax, with the financial and personnel help of DPWES, and the Fairfax County Park Authority. Over 5,000 residents and children spend the day learning about the county agencies and nonprofits that work to keep their county clean and green.

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 (gloves, trash bags, recycling bags, vests and safety tips as well as assistance in large scale pickups by connecting residents with the county's trash pickup program) 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.

In 2014, community cleanup programming yielded 82 neighborhood cleanups, with 2,200 volunteers putting in approximately 2,343 volunteer hours (a value of over $263,000) and collecting over 355 cubic yards of trash. In addition, Clean Fairfax supports several individuals who provide daily or weekly cleanups in their community, adding an additional 600 volunteer hours, and over 10,000 illegally placed signs picked up.

Clean Fairfax also organizes periodic cleanup projects around the Fairfax County Government Center (with Fairfax County employees and area businesses) and supports the Virginia Department of Transportation with its Adopt-a-Highway program.

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 and Workhouse Arts. Now in its third year at the Workhouse, over 5,000 children and families attended this all-day, Virginia Green certified event which included environmental education and entertainment, local food vendors, urban forestry workshops and open studio artist exhibitions. County agencies such as the Health Department, DPWES and the Park Authority as well as many local and regional environmental nonprofits were key to the success of the event. However, funding continues to be a challenge to this very

popular event, as the bulk of the costs are borne by Clean Fairfax and the Park Authority.

This is also the third year of the Clean Fairfax Environmental Passport which is a SpringFest Fairfax booklet that encourages attendees to visit each table/tent or booth to learn what each organization supports and represents. For every visit, children earn a sticker or a stamp and can show their passports at Clean Fairfax to be presented with an Environmental Good Citizen award (a globe "medal" made of recycled paper and seeds that can be planted in a pot or the family's backyard). Clean Fairfax also encourages other festivals, events, fairs and carnivals.

Clean Fairfax also supports and promotes the Johnie Forte, Jr. Environmental Education Program, which awards small grants to applicants from the Fairfax County Public Schools to promote sustainable programming, increase recycling, school cafeteria composting and other environmental projects with students from elementary, middle and high schools. Clean Fairfax funded the following projects: a rain barrel creation project to water a school's community and pollinator gardens; establishing heavy duty recycling bins for outdoor playing fields as well as the same in school cafeterias; retrofitting drinking water fountains to fill reusable water bottles; and continuing to support cafeteria composting and saving of uneaten/unopened food which is then donated to a local food bank. In the past, the program was co-funded by Clean Fairfax and the Department of Public Works and Environmental Services, but this year DPWES was not able to fund the program and without additional resources it may be put on hold until more funds can be raised.

Clean Fairfax reports that the Report-a-Litterer program was dismantled due to Fairfax County Police Department budget limitations. The Clean Fairfax website asks that litter reports be sent to them and to the county Board of Supervisors' office of the person observing the litterer.

Clean Fairfax continues to look for new opportunities to assist the county in litter reduction and enforcement and will continue to advocate and encourage participation in the State Police's Cover Your Load campaign, which happens in the early spring.

Other major continuing projects include: outreach on reducing residents' reliance on plastic grocery bags; cigarette butt litter education; promotion of the use of rain barrels; advising and mentoring environmental clubs in the school system; creating opportunities for college students wishing to explore the fascinating and important world of environmental advocacy; encouragement of small scale, backyard composting, grass-cycling, rain and pollinator gardens and other sustainable practices; and encouragement of community gardens and micro farms at schools and churches. This year, Clean Fairfax finished an 18 month process of updating the digital educational materials with four new short videos on Recycling and Trash, Water Quality and Conservation, Alternative Energy and Clean Fairfax.

Clean Fairfax is provided office space by DPWES, and the executive director works directly with many county staff on litter control and recycling education issues. The executive director also serves on the cross-agency Litter Task Force and the MS4 (Municipal Separate Storm Sewer System) Tactical Team on Public Outreach. The Memorandum of Understanding between the county and Clean Fairfax allows the organization to be deployed to assist on important tasks such as information dissemination in stormwater management, recycling, urban forestry and other crucial county environmental endeavors.

Clean Fairfax reaches thousands of Fairfax County residents, employees and businesses through e-newsletters, Facebook and Twitter as well as an environmental blog at www.cleanfairfax.org. The organization also provides the Fairfax County Visitors Center with thousands of auto litter bags each year plus informational bookmarks and brochures and this year will provide two Fairfax County Farmers Markets (the Workhouse Farmers Market and Town of Herndon Farmers Market) with branded reusable grocery and produce bags as part of the #PlasticFreeProduce pilot program.

2015 marks 35 years that Clean Fairfax has been an active partner in Fairfax County's environmental mission. 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 connect people to the natural world, sustainable agricultural practices and cultural heritage in their local watershed through education, stewardship and advocacy."

In April 2015, the foundation held its 27th annual Potomac River Watershed Cleanup. Reports from 77 cleanups throughout Fairfax County involved 1,643 volunteers removing almost 75,000 pounds of trash from local watersheds. This included 176 tires, 34,700 beverage containers, 10,402 plastic bags and 3,742 cigarette butts. For full cleanup results and information on volunteer opportunities, visit the cleanup Web page at www.potomaccleanup.org.

Other programs implemented by the foundation include:

- Trash Free Potomac Watershed Initiative: Celebrating its tenth anniversary, this is a program to reduce trash, increase recycling and provide education regarding trash issues in the watershed. Multiple years of data are available for specific areas. There is a free toolkit available to help supporters change behavior

regarding littering and illegal dumping. See http://fergusonfoundation.org/trash-free-potomac-watershed-initiative/.

- 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: In February 2015, the foundation received unanimous support from the Police Chiefs of the Metropolitan Washington Council of Governments for its fifth Annual Litter Enforcement Month. This is a campaign to reduce littering and illegal dumping through enforcement of local laws. This effort 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 that can be found on the foundation's website at www.fergusonfoundation.org.

9. CLEAN AIR PARTNERS

Residents of Fairfax County have many opportunities to contribute to improvements in air quality. While some of the metropolitan Washington area's 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. 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 forAirAlerts, a free service that delivers air quality information straight to their inbox.

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.*

HOW TO REPORT ENVIRONMENTAL CRIMES OR CONCERNS IN FAIRFAX COUNTY	
TTY 711 for all phone numbers	
Type of Incident	**Phone Number**
RELEASE OF HAZARDOUS MATERIALS INTO THE ENVIRONMENT—ACTIVE RELEASE, DANGEROUS, OR UNKNOWN If the dumping of any substance into a stream, into a manhole, into a storm drain or onto the ground is witnessed, assumptions regarding the contents of the materials should not be made. 911 should be called immediately. When calling 911, be prepared to provide specific information regarding the location and nature of the incident. The local office of the U.S. Environmental Protection Agency (703-235-1113) can be called in addition to (but not instead of) 911.	**911**
RELEASE OF HAZARDOUS MATERIALS INTO THE ENVIRONMENT—NO IMMEDIATE DANGER If a known discharge of hazardous materials has occurred in the past and no lives or property are in immediate danger; this should be reported to the Fairfax County Fire and Rescue Department's Fire and Hazardous Materials and Investigative Services Section at this number (includes Towns of Clifton, Herndon and Vienna). If there is any question about whether a release may still be active or whether there may be any immediate danger, 911 should be called.	**703-246-4386 (working hours)** **703-691-2131 (after hours)**
RELEASE OF ANY MATERIAL INTO THE ENVIRONMENT Any release of materials into the environment, whether hazardous or not, should be reported to the Northern Regional Office of the Virginia Department of Environmental Quality at the above number. If the release is an active one, call 911.	**703-583-3800** **OR** **911**
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**
SOIL EROSION To report soil erosion from private properties or construction sites, contact the Site Development and Inspection Division of the Department of Public Works and Environmental Services	**703-324-1720**

Type of Incident	Phone Number
GENERATION OF DUST FROM CONSTRUCTION, GRADING OR LAND CLEARING Contact the Virginia Department of Environmental Quality, Northern Regional Office	**703-583-3800**
TRASH/DEBRIS ON CONSTRUCTION SITES Contact the Site Development and Inspection Division of the Department of Public Works and Environmental Services	**703-324-1720**
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**
NOISE IN A RESIDENTIAL AREA To make a complaint about nuisance noises (e.g. barking dogs or loud music) in residential areas only, call the Fairfax County Police non-emergency number.	**703-691-2131**
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**
OTHER SOLID WASTE COMPLAINTS ASSOCIATED WITH WASTE COLLECTORS/HAULERS Call the Department of Public Works and Environmental Services. .	**703-324-5230**
SOLID WASTE COMPLAINTS ASSOCIATED WITH WASTE HANDLING WITHIN BUILDINGS (E.G., TRASH CHUTES) Contact the Department of Code Compliance, or visit www.fairfaxcounty.gov/code.	**703-324-1300**
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. Fairfax County performs monthly collections of illegal roadway signs on certain designated roads. More information can be found at www.fairfaxcounty.gov/code/signs.	**1-800-367-7623**
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**

Type of Incident	Phone Number
POORLY MAINTAINED HOMES OR OTHER BLIGHTED PROPERTIES 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**
ABANDONED VEHICLES (FIVE OR FEWER) Contact the Fairfax County Police Department's Traffic Division Impound Section; e-mail: FCPDJunkVehicle@fairfaxcounty.gov.	**703-280-0716**
ABANDONED VEHICLES (SIX OR MORE) Contact the Department of Code Compliance, or visit www.fairfaxcounty.gov/code.	**703-324-1300**
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**
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**
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: www.fcps.edu/fts/facmanagement/recycle.shtml.	**703-764-2459**
BUSINESS OR RESIDENTIAL RECYCLING To report a suspected violation of recycling requirements (whether residential or business), contact the Department of Public Works and Environmental Services—Solid Waste at the phone number provided or through the Online Complaint/Comment Form at www.fairfaxcounty.gov/dpwes/trash/dispcompform.htm.	**703-324-5230**
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**

2015 ANNUAL REPORT ON THE ENVIRONMENT

CHAPTER I

CLIMATE CHANGE AND ENERGY

I. CLIMATE CHANGE AND ENERGY

A. BACKGROUND

Climate change/global warming is the result of world-wide emissions of greenhouse gases (GHGs), including carbon dioxide. Because the rise in GHG 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[1]. This chapter outlines work that is under way in Fairfax County to reduce GHG emissions and improve energy efficiency.

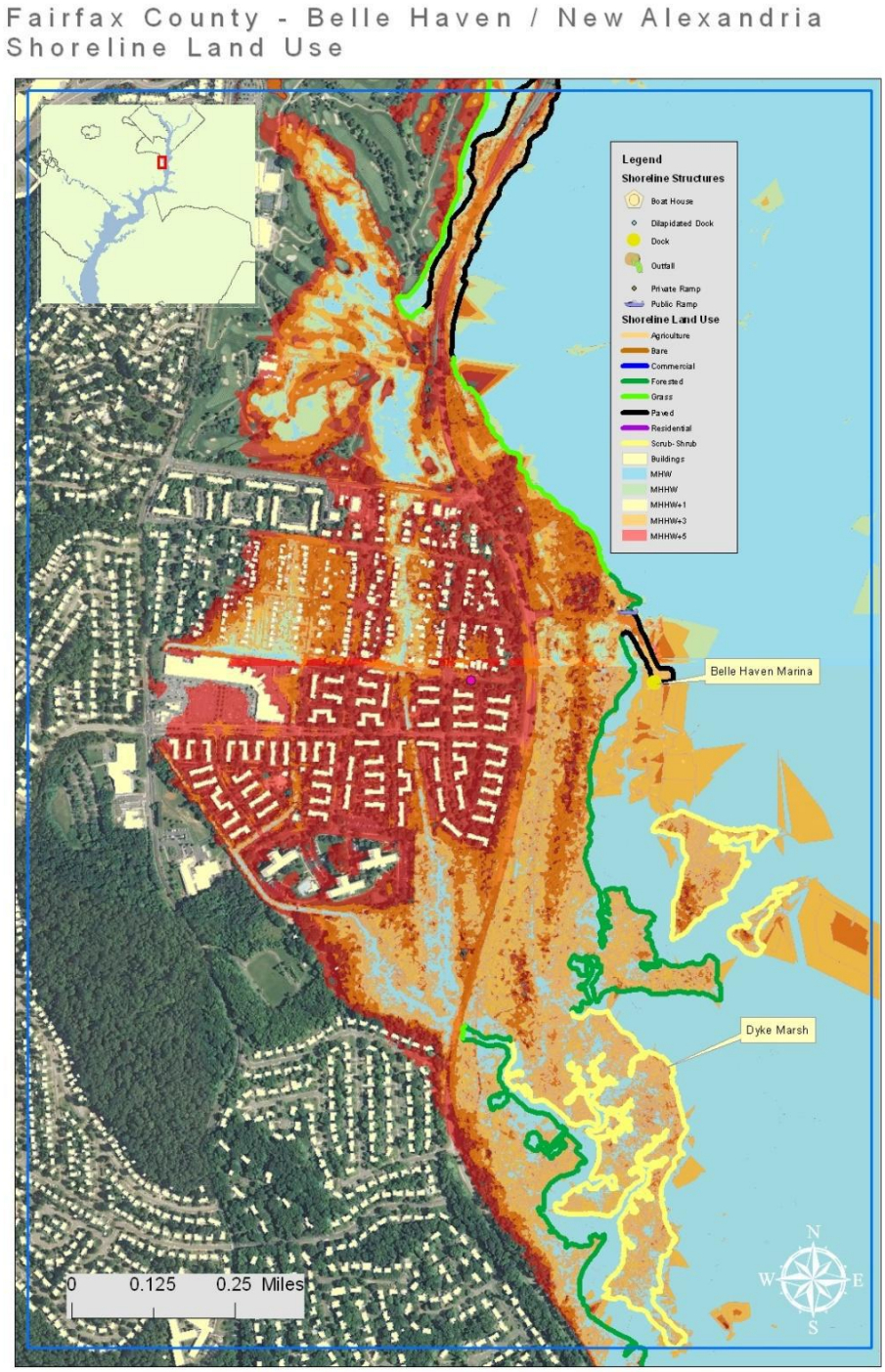
Climate change is already impacting the United States. Recent evidence shows that climate change is worsening the California drought because the higher temperatures are hastening evaporation in an area that is already stressed for water.[2] The governments of many countries and scientists worldwide acknowledge a real concern for the impacts of climate change.

Is climate change a threat to Fairfax County? In recent years, Fairfax County has seen warmer temperatures and more poison ivy, which has been attributed to slightly warmer temperatures. Floodplain boundaries in the county have been redrawn 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[3] estimated that there will be a sea level rise of between one and 1.6 feet by 2050 and between 2.3 and 5.2 feet by the year 2100. Similar impacts are being predicted elsewhere in the United States and around the world. The average carbon dioxide level, which results from the combustion of fossil fuels and contributes to global warming, has risen to over 400 parts per million (ppm).

Because climate change will have a range of impacts, including rising sea levels and changes in species that can inhabit an area, a number of counties and states have developed and are developing plans to mitigate the impact of climate change. These plans address a variety of issues from health impacts to minimizing property damage due to rising sea levels. While Fairfax County has taken steps to evaluate some impacts such as a rise in sea level, there has not been an effort to examine all impacts of climate change on Fairfax County and outline measures that can or should be taken to mitigate these impacts.

The Northern Virginia Regional Commission has prepared several reports to characterize the impact of climate change on sea level rise on Northern Virginia communities. Fairfax County would be impacted in a number of areas but especially in the Belle Haven/New Alexandria area as shown in Figure I-1.[4] However, other communities near coastal areas in Virginia and elsewhere face similar risks and many have programs designed to mitigate the impacts of rises in

Figure I-1: Belle Haven/New Alexandria Inundation Scenarios, Northern Virginia Regional Commission



Source: Northern Virginia Regional Commission, Sustainable Shorelines and Community Management in Northern Virginia, Phase III, September 30, 2013

sea level. Mitigation could involve levies, berms and changes in land use. The identification of vulnerable areas and proactive steps to mitigate impacts is important to reducing the risk of flooding as a result of sea level rise. Coastal states and communities in the United States are taking steps to plan and prepare for sea level rise to minimize impacts.

The 2008 National Capital Region Climate Change Report[1] provides some excellent background information on climate change in the metropolitan Washington, D.C. area. The report[1] 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 on Global Climate Change,[5] the United States has five percent of the world's population yet we contribute 17 percent of the world's GHG emissions. Moreover, U.S. emissions have accounted 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.[2]

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.[6]

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 and lead in the area of energy efficiency, sustainability and "green" technology. The task force brought together the private sector, utilities, schools, government officials, organizations including the Environmental Quality Advisory Council and county staff. At this point, it appears that the work of the Task Force has come to an end. The work of the Private Sector Energy Task Force was intended to help Fairfax County position itself as a leader in the area of energy efficiency, sustainability and "green" technology. The Private Sector Energy Task Force was a good beginning, but the development of an energy strategy remains important to Fairfax County. As an example, EQAC recommends that Fairfax County place a priority on supporting education and recognition for companies that adopt energy efficient approaches as part of their business practices. By achieving a reduction of energy use for Fairfax County businesses of all sizes, projects that improve energy efficiency and reduce the need for energy will give companies a clear return on their investments, not only through lowered costs but also through enhanced reliability and security and increased competitiveness in the region and in the country.

Fairfax County has undertaken new efforts to make sustainability a core element of county operations. Making decisions that will be sustainable for the county and provide for sound environmental practices is important to the future of Fairfax County. Much of the progress in this area is summarized on the county's webpage dedicated to the environment and sustainability.[7]

An 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 in the report of the Task Force.[8]

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.

While district energy has proven efficiency and is being used in a variety of areas, even around the Washington, D.C. metropolitan area, 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.

During 2015, Fairfax County published *Sustainability Initiatives: FY 2015*. The Sustainability Initiatives report outlines a vision for sustainability that reflects the consideration of climate change and energy consumption. It also highlights the process that the county undertakes to fund projects selected as part of the Environmental Improvement Program that have the potential to save money and provide for environmental improvements. While projects funded as initiatives have an up-front capital cost, they have often shown that they can pay for themselves over a few years through cost savings.

B. FAIRFAX COUNTY GHG EMISSIONS INVENTORY

In April 2013, the county completed its GHG emission inventory.[9] This was the first comprehensive attempt to evaluate the GHG emissions for Fairfax County. While this was the first comprehensive inventory of GHGs for the county, differences in methodologies by the various local governments made it difficult to either compare or combine the inventories from different governments in the Washington D.C. area. As a result, the Metropolitan Washington Council of Governments, with the support of the Northern Virginia Regional Commission, is undertaking an inventory all of GHG emissions in the region using a consistent methodology that is widely used nationwide. While aggregate results for the region have been prepared, Fairfax specific results are not yet available. When the results are available, this annual report on the environment will be updated.

The 2013 Fairfax County GHG emissions inventory 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.[8,9]

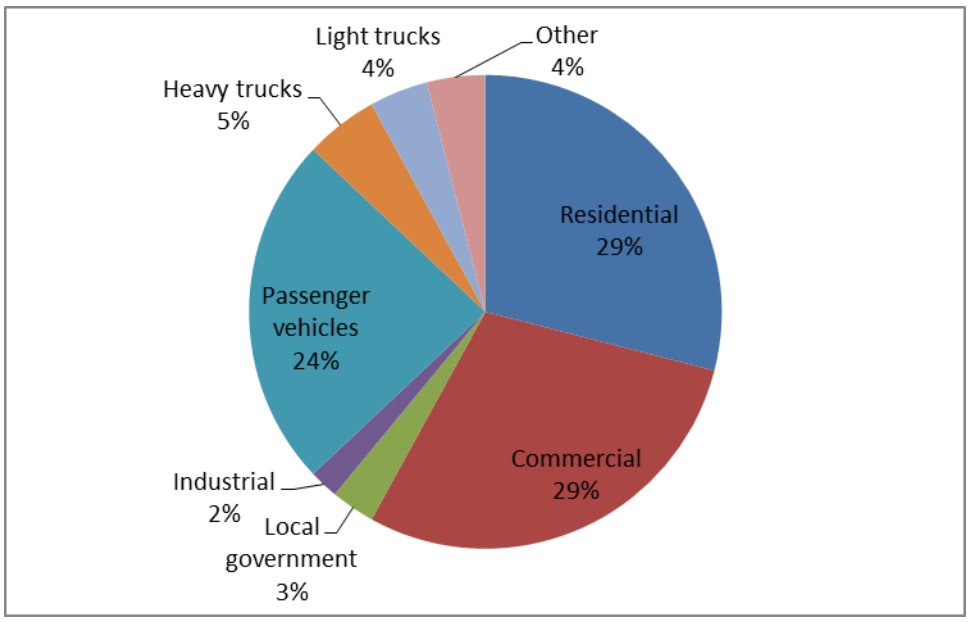
Both of the above assumptions, though reasonable, should be examined when comparing the Fairfax County emissions of 11.4 metric tons CO_2 equivalent ($MTCO_2e$) per capita across local jurisdictions because of the differences in methodologies for the GHG inventory. For example, Arlington County's estimate of over 13 metric tons per capita includes emissions from National Airport, although Arlington County exerts no control over the airport.

While Fairfax County has been working with the Metropolitan Washington Council of Governments to develop a comprehensive regional GHG inventory, the Fairfax County specific results are not yet available. Consequently, this section summarizes results from the 2006 countywide emissions inventory. When the Fairfax County results are available, they will be incorporated into this report.

Figure I-2 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 had 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 on Global Climate Change, the average U.S. citizen has an annual average GHG emission of over 20 $MTCO_2e$, over twice the world average.[5] However, the lower estimate of GHG emissions per person reported in this inventory has a much sounder basis than the 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.

Figure I-2. 2006 Countywide GHG Emissions (11.838 $MMTCO_2e$)



Source: *Community Greenhouse Gas Inventory for Fairfax County, Virginia, Report of Findings: 2006-2010*, Fairfax County, Virginia[9] (advance copy).

While Figure I-2 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 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.

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 while providing good exercise. Key opportunities for GHG emissions reductions include:

- Reduce home energy demands. Much of the electrical use shown in Figure I-2 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.

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

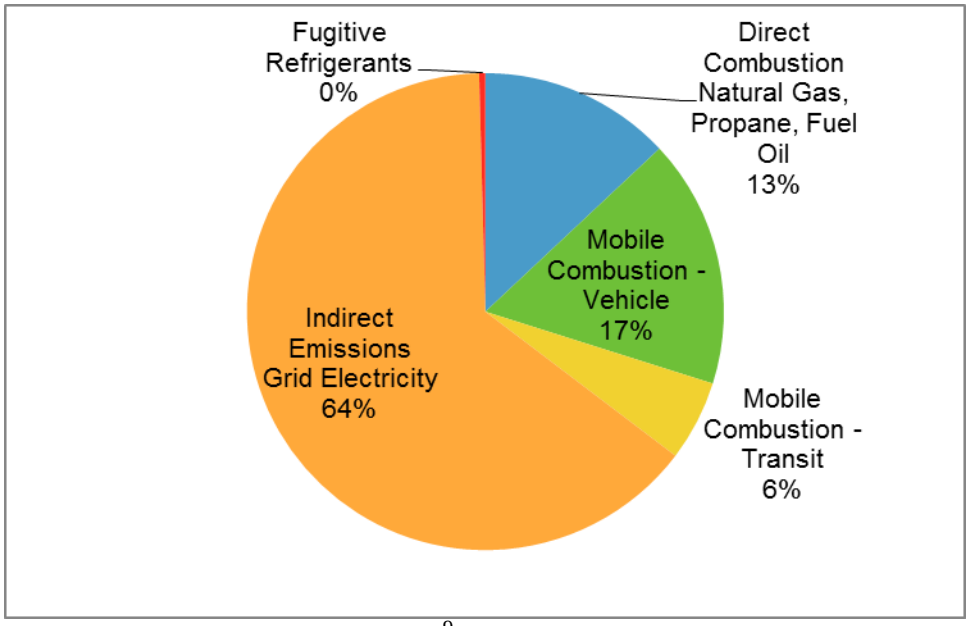
1. Overview

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 the 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). Subsequently, the county purchased five plug-in hybrid electric Chevrolet Volts.

Figure I-3. 2010 Fairfax County Government Emissions by Source Type (460,695 $MTCO_2e$)



Source: Fairfax County, Virginia.[9]

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.[10]

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.

2. Facilities Management

A decade ago, the county's Facilities Management Department (FMD) set an internal goal of a one percent annual reduction in energy use per square foot (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 FY 2001 – FY 2010, FMD's energy reduction efforts resulted in a cost avoidance of more than $7 million. The magnitude of the energy savings is illustrated by kilowatt hours avoided. In 2005, FMD's actions saved 4,232,639 kWh; an additional 2,398,036 kWh were saved 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 (DVS) 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. The county's fleet includes 117 hybrid-electric and plug-in hybrid-electric vehicles. The county saves over 16,000 gallons of gas each year from its use of hybrid vehicles.

The county operates other non-conventional vehicles, including a hybrid-electric school bus. 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.

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 the Fairfax County website on sustainability.[7]

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 the 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.[7] Smaller facilities are expected to achieve LEED certification. As of July 2015, the county had a total of 36 green building projects, 17 of which attained certification (15 under the LEED program and two under the Green Globes program). The other 19 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 county continues to investigate and implement sustainable practices in both new and renovation projects.[7] Green roofs were installed at both the Great Falls Volunteer Fire Station and the Dolley Madison Library. An extensive rainwater collection system and cistern storage was implemented at the Newington Department of Vehicle Services facility for use by the vehicle bus wash. Lighting controls systems and both interior and exterior LED lighting have been specified on a number of projects. The majority of the projects include construction waste management plans that are executed by the construction contractor. Capital Facilities has also partnered with the Department of Public Works and Environmental Services-Stormwater Planning to implement water quality enhancement measures (e.g., low impact development stormwater management practices) on projects to exceed the regulatory requirements. Practices include porous asphalt, pavers and concrete; bioretention/infiltration facilities; cisterns; gravel galleries; and compost soil amendments.

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 over 400 parks, nine recreation centers, seven golf courses and other facilities that 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.

Some of the upgrade/retrofit energy projects that were completed in 2014 are:

- Lee District spray park variable frequency drive (VFD) installation for the main pump.
- Oak Marr VFD installation for the main pool pump.
- Providence RECenter natatorium lighting upgrade.
- Nottoway tennis courts (1 and 2) lighting upgrade.

6. Waste Management

The Department of Public Works and Environmental Services (DPWES) 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 under way is a project to provide the Energy/Resource Recovery Facility (E/RRF) 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 www.fairfaxcounty.gov/dpwes/wastewater/noman_cole.htm and 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 (DOT) 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 www.fairfaxcounty.gov/fcdot/.

The county's Transportation Demand Management program is designed to reduce the number of cars on the road. The program includes a variety of common sense components including ridesharing, guaranteed ride home, transit incentives, non-single occupancy vehicle parking and other components (see: www.fairfaxcounty.gov/fcdot/tdm.htm). Progress in achieving the goals of this program should be tracked to see how effective they are in achieving the program goals.

8. Schools

Fairfax County Public Schools comprise a significant part of the county's facilities. School renovations have provided an excellent opportunity to improve the energy efficiency of school building operations. Teachers also promote energy efficiency, which not only improves energy use but also provides an important part of student education on reducing the emissions of greenhouse gases and energy efficiency. The Get to Green program, which is a national program promoted within Fairfax County, promotes environmental awareness for students and faculty alike.

9. Reporting of Greenhouse Gases

Fairfax County has made significant strides in collecting information on energy use at county facilities. This information has been used to help the county understand areas of high energy use and target opportunities for reducing energy use. One of the suggestions to help reduce energy use is to make energy use more visible through real time reporting or some summary of recent energy use. This information has been of interest to communities and has allowed counties and organizations to identify areas for potential energy savings and to demonstrate that energy savings can be realized. In response to public comment and EQAC interest, county staff has briefed the EQAC on progress that the county is making towards improved reporting, including development of an energy dashboard. The most recent update from county staff was in June.

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.

In late 2011, following an open bidding process, the county selected a vendor to assist in the development and branding of a federally-funded residential energy education and outreach program and to work closely with the county's project management team (PMT) 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[11] 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 energy-audit gatherings 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. [11]

In its 2012 and 2013 Annual Reports, 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 that both retains a residential component and also develops and implements a green business recognition program. The residential component includes a restructured and revised Web presence and continuing free presentations to homeowner associations and community groups. The green business recognition program will be a free program open to businesses of all types and sizes that are integrating sustainability principles like energy conservation, waste reduction and water conservation into their day-to-day operations. Participating businesses will be listed in a green business directory on a "green business" Web page on the county's website and will receive window decals or other means of advertising their designation as a Fairfax County green business designation. Both the residential and business efforts anticipate direct outreach, community events and continuing updates to their respective webpages.

F. REGIONAL COORDINATION

1. Climate, Energy and Environment Policy Committee

Fairfax 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). CEEPC was created in 2009 by the Metropolitan Washington Council of Governments' 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.[1]

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 May 2013, CEEPC adopted its 2013-2016 Climate and Energy Action Plan.[12] The new plan places a greater emphasis on energy efficiency and climate resiliency, and 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.

Figure I-4 summarizes recent local government efforts to address the local measures included as key priorities in the 2013-2016 Action Plan. This figure helps to illustrate the breadth of activities local jurisdictions in the Washington, D.C. area are undertaking to address climate change and the progress the region has already made. As one of the largest local governments, Fairfax County is not only active but plays a leadership role in many activities related to climate change.

To track the region's progress toward the CEEPC Action Plan goals, COG Department of Environmental Programs staff performs an annual Climate and Energy survey of local member governments and water utilities and evaluates the results in the annual Progress Report.[13]

In 2013, CEEPC, working with the members of the Air and Climate Public Advisory Committee, created a Climate and Energy Awards Program. The awards program will recognize projects, programs or policy initiatives that help achieve the regional goals identified in the Climate, Energy and Environment Policy Committee's 2013-2016 Climate and Energy Action Plan. In 2015, awards will be given in each of the following categories: small and medium communities (population under 100,000); large communities (population over 100K); nonprofit organizations; and private businesses. Awards will be given based on results achieved, creativity, stakeholder engagement and transferability to other jurisdictions. Recipients will be announced in fall 2015. Details are on the COG website.

b. ENERGY STAR® Portfolio Manager Regional Data Sharing

In May 2014, COG held an ENERGY STAR Portfolio Manager Regional Data Sharing Training for local governments and schools in the region that wish to connect and share their building data with COG and each other. Sharing this data will allow COG to better track regional Climate, Energy and Environment Policy Action Plan goals, such as energy and water use and GHG emission reductions. It will also allow local governments to compare their facilities' energy performance with similar property types on a region-wide basis.

c. Advocacy

In 2014, CEEPC advocated for a number of climate and energy issues in the Virginia General Assembly, including strengthening the state renewable energy portfolio standard, removing financial disincentives for solar energy and expanding low-cost financing for energy efficiency and renewable energy projects through Property Assessed Clean Energy (PACE) financing. CEEPC also made recommendations to the Department of Mines, Minerals and Energy on the 2014 Virginia Energy Plan.

Figure I-4. Select Local Measure Highlights (At least 50 percent of local governments are implementing or in progress on each measure listed in the following chart.)

Local Government	2010 Census Population[1]	Govt GHG Inventory	Community GHG Inventory	Govt GHG Reduction Plan	Comprehensive Energy Strategy	Green Building Policy	Efficient Street Light Program	Govt Energy Benchmark	Green Purchasing Policies	Green Fleet Policy	Commuter Options Program	Tree Canopy Plan
District of Columbia	601,723	■	■	□	□	■	□	■	□	□	■	□
Suburban Maryland												
Fredrick County	233,385	■	■	■	■	□			○	□	■	□
City of Frederick[2]	65,239	○	○	○	○	○	NR	NR	■	○	○	□
Montgomery County	971,777	■	■	■	□	■	□	■	■	N/A	■	N/A
City of Gaithersburg[2]	59,333	□	○	○	■	■	□	○	○	○	○	□
City of Rockville[2]	61,209	□	□	■		■	■	■	□	□	■	■
City of Takoma Park[2]	16,715	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Prince George's County	863,420	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
City of Bowie2	54,727	■	○	○	■	■	□	□	○	□	○	□
City of College Park[2]	30,413	■	□	○	○	N/A	■	○	□	N/A	■	□
City of Greenbelt[2]	23,068	□	□	□	□		N/A	□	○	■	○	□
Town of Bladensburg[2]	9,148	○	○	○	○	○	○	□	□	□	□	□

Local Government	2010 Census Population[1]	Govt GHG Inventory	Community GHG Inventory	Govt GHG Reduction Plan	Comprehensive Energy Strategy	Green Building Policy	Efficient Street Light Program	Govt Energy Benchmark	Green Purchasing Policies	Green Fleet Policy	Commuter Options Program	Tree Canopy Plan
Northern Virginia												
Arlington County	207,627	■	■	□	□	■	□	■	■	■	■	■
Fairfax County	1,081,726	■	□	■	□	■	□	□	■	■	■	■
Loudon County	312,311	■	■	■	■	■	○	■	■	■	■	□
Prince William County	402,002	□	○	□	□	□	○	■	□	□	■	□
City of Alexandria	139,966	■	■	■	■	■	□	□	□	□	■	■
City of Fairfax	22,565	○	○	□	□	■	□	□	○	□	○	□
City of Falls Church	12,332	■	■	□	□	○	□	□	■	■	□	□
City of Manassas	37,821	○	○	○	□	○	□	□	N/A	■	N/A	■
City of Manassas Park	14,273	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR

■-Implemented □-In progress ○-Not Started N/A-Not Applicable NR-No response

[1] Source: COG tabulation of Census 2010 PL 94-171 Redistricting Data

[2] Population in Maryland cities is included in appropriate county totals.

Source: Metropolitan Washington Council of Governments, 2011, *Climate, Energy and Environment Policy Committee Regional Climate and Energy Action Workplan 2010 Progress Report*, with an update from Amanda Campbell, June 27, 2014[14]

d. Energy and Greenhouse Gas Reporting

COG Climate and Energy staff collected and analyzed annual energy consumption data from regional utilities, which will be used to measure progress on reducing greenhouse gas emissions from the 2005 baseline. An initial analysis shows that the region has met its goal of reducing greenhouse gas emissions back to 2005 levels by 2012. The data are also used to inform COG's progress report on regional air, climate and energy initiatives, and to assist local governments in their own energy and climate programs and reporting, such as grant and award applications.

In 2014 staff collected electricity and natural gas data for the 2013 calendar year. Since 2005, the region's overall electricity consumption has grown 2.3 percent and natural gas consumption has fallen nine percent. Fairfax County's electricity consumption has grown eight percent and natural gas consumption has fallen 19 percent. The region's installed net-metered solar capacity more than doubled between 2012 and 2013, to 28 megawatts. Net metered solar capacity in Fairfax County increased 28 percent between 2012 and 2013 to 116 kW.

e. Built Environment and Energy Advisory Committee

The Built Environment and Energy Advisory Committee (BEEAC) serves as a technical advisory committee to the Climate, Energy and Environment Policy Committee. Membership includes local government energy managers and 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 Washington, D.C. metropolitan area. Environmental, energy and land use and planning staff from Fairfax County actively participate in BEEAC.

In 2014 and 2015 BEEAC primarily focused on three areas:

1. Development of BEEAC By-laws.
2. Regional Solar Permitting Guidelines.
3. Establishing the PACE Financing Work Group Subcommittee.

BEEAC updated its bylaws in 2015 to formally establish the committee's role as a technical advisory committee to the Climate, Energy and Environment Policy Committee. The updated bylaws also expanded the committee's purpose to cover issues related to green buildings, the built environment and renewable energy. Noel Kaplan, Senior Environmental Planner in the Fairfax County Department of Planning and Zoning, provided valuable feedback throughout the committee input process.

The new bylaws also outlined BEEAC's support of Emergency Support Function (ESF) 12 under the National Response Framework. The BEEAC

ESF-12 subcommittee is responsible for coordinating with state and local agencies and emergency response teams to maintain continuous and reliable energy supplies through preventive measures, restoration and recovery actions. The ESF-12 subcommittee sponsored a three-workshop series that has led to recommendations to improve the region's ability to respond to a long-term energy supply disruption. Garrick Augustus, Energy Coordinator for Fairfax County, actively participates in the BEEAC ESF-12 subcommittee.

f. Electric Vehicle Working Group

COG's electric vehicle (EV) initiatives began in early 2011, leading to the creation of a stakeholder-driven task force whose mission was to develop regional and local program and policy recommendations that would facilitate adoption of electric vehicles. Kambiz Agazi, Fairfax County Environmental Coordinator, served as task force co-chair. Subgroups addressed comprehensive planning, zoning, building codes and permitting/inspection, infrastructure siting, energy utility policy and outreach and education.

Task Force stakeholders 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 D.C.), the Greater Washington Regional Clean Cities Coalition and electric utility representatives from the region.

In 2012, the Task Force produced the report, "Electric Vehicles in Metropolitan Washington" (www.mwcog.org/store/item.asp?PUBLICATION_ID=449). [15] 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.

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

1. 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. Consider offering incentives such as preferred parking, high occupancy vehicle (HOV) occupancy exceptions and tax credits to promote EV adoption.

3. 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 comprehensive plans and zoning regulations should guide EV infrastructure development and ensure that the built environment can accommodate future EV charging station installations.

The 2014 and 2015 EV work program years focused on three key areas: supporting the eight state zero-emission vehicle (ZEV) program memorandum of understanding (MOU); developing and conducting the COG-vision fleet pilot assessment; and promoting work place charging.

The ZEV MOU is an agreement that was signed in October 2013 by the governors of eight states, including Maryland, to adopt or consider adopting regulations requiring increasing sales of zero-emission vehicles. To promote regional collaboration, COG partnered with the Maryland Electric Vehicle Infrastructure Council to conduct a Regional EV Readiness Workshop. The purpose of the workshop is to promote shared standards and region-wide EV infrastructure development. Noel Kaplan, Senior Environmental Planner with the Fairfax County Department of Planning and Zoning, highlighted the county Planning Commission's Environment Committee review process and electric vehicle charging infrastructure recommendations prepared by the MITRE Corporation.

g. Climate Adaptation

The Metropolitan Washington Council of Governments, working with the U.S. Environmental Protection Agency (EPA) and National Oceanographic and Atmospheric Administration (NOAA) through the Smart Growth Implementation Assistance Program, has developed a guidebook for adapting to risks from climate change in four sectors: land use; transportation; buildings; and water.[16]

During the process to develop the guidebook, stakeholders identified the need for more specific information about climate trends, anticipated impacts and planning implications in the Washington, D.C. metropolitan area. To address this need, COG developed its *Summary of Potential Climate Change Impacts, Vulnerabilities, and Adaptation Strategies in the Metropolitan Washington Region.*[17] This summary is a synopsis of lessons learned from MWCOG's climate adaptation planning initiatives from 2010-2012.

COG has led teams of local climate leaders attending several Institute for Sustainable Communities climate leadership academies. Kambiz Agazi, Fairfax County Environmental Coordinator, participated in the October

2014 Sustainable Communities Leadership Academy entitled "Think Resiliently; Act Regionally" held in Alexandria, Virginia (www.sustainablecommunitiesleadershipacademy.org/workshops/act-regionally).

COG continues to monitor and present the latest findings from sources such as the International Panel on Climate Change and the National Climate Assessment to aid decision makers. See COG's Climate Impacts and Adaptation website for additional resources and activities (www.mwcog.org/environment/climate/adaptation.asp), including a handout on climate projections for the region developed by the National Aeronautics and Space Administration (NASA).[18]

h. Sustainable Purchasing

On January 29, 2015, COG held a Green Purchasing Vendors' Fair. More than 120 representatives from local governments (including Fairfax County) school systems and utilities joined over 30 vendors representing a wide variety of environmentally friendly products and services. In addition to showcasing these green products and services, expert panels and speakers discussed "greening" the supply chain and contract language as well as creating healthy buildings through procurement choices.

The fair was a collaborative effort between COG and the Baltimore Metropolitan Council, (through the Mid-Atlantic Purchasing Team) and the Montgomery County Green Business Certification Program.[19]

i. Rooftop Solar Challenge

COG has been continuing its work under the U.S. Department of Energy (DOE) SunShot Initiative Rooftop Solar Challenge II to reduce the soft costs of solar photovoltaic (PV) deployment. Eleven COG members, including Fairfax County, are participating in the project, which focuses on streamlining the permitting and inspections process, removing zoning barriers and expanding access to solar PV through financing or bulk purchasing programs.

Through the Rooftop Solar Challenge II, Fairfax County has access to free technical assistance from two teams of consultants through DOE, and the resources developed by two national Rooftop Solar Challenge II teams of which COG is a member, to assist the county in meeting its solar market development goals. Fairfax County's progress can be tracked on the Solar Roadmap website (http://my.solarroadmap.com/ahj/fairfax-county-va/view). This project runs through April 2016.[20]

j. Regional Solar Permitting Recommendations

In 2014, COG worked with the Maryland/DC/and Virginia Solar Energy Industries Association and BEEAC members to develop the Regional Recommendations for Residential Solar PV Systems to support the consistent application of solar PV permitting and inspection best practices across the region. Adopting and implementing best practices for solar permitting and inspections will ensure that systems are installed and operated safely, reliably and efficiently, while reducing the paperwork burden for permitting and inspections staff. Regional consistency will further reduce the costs currently incurred by property owners and solar companies across the region.

This effort will also help municipalities and states meet their renewable energy and climate change goals. In addition, it will foster regional economic and job growth by helping local solar companies expand their businesses. The recommendations, including template permitting and inspections checklists and a model expedited permit process, are available on the COG website, at www.mwcog.org/uploads/committee-documents/YF1WV1dc20150603162429.pdf.

k. Solarize Initiative

Solar bulk purchasing initiatives (called solarize programs or solar-co-ops) help reduce customer acquisition costs for solar installations and reduce the cost of going solar for the community by leveraging bulk purchasing power. Under the Rooftop Solar Challenge II project, a team led by Community Power Network (CPN) is supporting local governments in education and outreach activities to accompany the launch of solarize programs or solar-co-ops in their communities.

Northern Virginia Regional Commission (NVRC) and Local Energy Alliance Program (LEAP), who are part of the CPN team, recently launched the second round of Solarize NoVA. This program is focusing on Herndon and Vienna in Fairfax County, the City of Falls Church and Loudoun County. CPN is also supporting residential solar co-ops in Bowie, Maryland, Rockville, Maryland and Arlington, Virginia.

l. PACE Financing Workgroup

In early 2015, CEEPC voted to establish a regional workgroup to provide guidance to COG members on developing Property Assessed Clean Energy financing programs and to encourage growth of the PACE market regionally. The PACE workgroup will also encourage consistency in PACE programs across the region to improve the growth and success of PACE

financing in all jurisdictions. As the technical advisory committee to CEEPC, BEEAC will advise the workgroup.

By leveraging public taxing authority to bring in private capital, PACE financing can reduce or eliminate up-front project costs, offer transferability upon sale and enable low monthly payments by providing financing terms up to 15-20 years. Because of these advantages, PACE financing can be an important tool for achieving significant greenhouse gas reductions though building energy efficiency and renewable energy improvements. Washington, D.C. has an operational PACE program for commercial buildings, and several jurisdictions in the region intend to soon implement programs.

Implementing PACE would require local governments to establish new processes to manage payments on PACE loans as part of property tax payments. Payments on PACE loans would have priority lien status similar to that of property tax payments. Implementation would require careful consideration by localities to ensure a PACE program could be successfully implemented within the locality's property tax system. This will be a key component of the regional PACE workgroup.

2. Northern Virginia Regional Commission

The nonprofit Local Energy Alliance Program, in partnership with the Northern Virginia Regional Commission, operates the Home Performance with ENERGY STAR (HPwES) program to help improve the energy efficiency of existing homes in northern and central Virginia. LEAP educates communities on energy efficiency and facilitates and tracks energy improvement work done by a network of vetted local contractors. Homeowners can have their homes certified HPwES if they make efficiency improvements measuring 20 percent or more. LEAP is headquartered in Charlottesville, Virginia and expanded to Northern Virginia in 2012.

In October 2013, LEAP introduced the Home Energy Check-Up as an entry service offering to the HPwES program; this has proven to be a very effective way to get the energy conversation started with homeowners and to get energy plans for their houses. The Home Energy Check-Up is a one hour visual inspection done by a LEAP professional building analyst who provides an evaluation of the homes' efficiency potential, advice on cost effective improvements and a few immediate installed saving measures based on the home's needs such as energy efficient light bulbs and smart power strips. The value of the check-up is estimated at over $250 in goods, savings and professional advice. LEAP is able to offer the low price of $45 to the homeowners as a participating contractor in the Dominion Virginia Power Home Energy Check-Up Program. For those homeowners interested in making improvements through the HPwES program after the check-up, LEAP is then

available to assist with technical advice throughout the improvement process, whether that is all at once or staged over time.

As of June 30, LEAP has performed 723 Home Energy Check-Ups in northern Virginia, of which 392 were in Fairfax County. 137 homes in Northern Virginia have been certified in the Home Performance with ENERGY STAR program to date, of which 20 were in Fairfax County.

Re-Energize Reston Community Challenge

LEAP engages local communities with outreach; this is done in partnership with local municipalities, civic associations, congregations and other community groups. Campaigns in Fairfax County have ranged from neighborhood efforts in Wilton Woods in Alexandria and Long Branch in Annandale to a broader community effort in Reston. In partnership with Reston Association and in celebration of Reston's 50th anniversary of its founding year (1964), LEAP launched the Re-Energize Reston Community Challenge with the goal of helping 1,964 homeowners get a Home Energy Check-Up. To engage the community, the effort is also serving as a fundraiser for Friends of Reston, which will earn $10 for each Home Energy Check-Up done in the challenge. Friends of Reston is a nonprofit organization that provides environmental education programs at its flagship Walker Nature Center in Reston.

3. NOVA Parks (Northern Virginia Regional Park Authority)

Three Northern Virginia counties (Fairfax, Loudoun and Arlington) and three cities (Alexandria, Fairfax and Falls Church) participate in NOVA Parks (the Northern Virginia Regional Park Authority). NOVA Parks was founded in 1959 and currently operates 31 regional parks on 12,031 acres of land that it owns and leases throughout the region. It also holds conservation easements on 115 parcels covering more than 655 acres.

Since 2005, NOVA Parks has adopted energy conservation plans for each park and has tracked its carbon footprint. Using the accounting system, instead of just recording utility costs, NOVA Parks also tracked units of consumption for all fuels. The NOVA Parks facility in Fairfax County with the most significant energy reduction in 2014 was Pohick Bay Regional Park, with consumption down 12.2 percent. This was achieved by implementing easily attainable items like 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, programmable thermostats and green building elements that improve efficiency; and having a policy that considers the life cycle costs of the energy-consuming systems.

In November and December 2014, Meadowlark Botanical Gardens hosted a walking holiday light show using all LED lights that use only a 10th of the

electricity normal incandescent bulbs use. NOVA Parks partnered with Dominion Virginia Power to educate the public about energy conservation for both all-LED holiday light shows at Bull Run Regional Park and Meadowlark Botanical Gardens.

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 (TOD) 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, Baileys Crossroads, Annandale, Seven Corners, Lake Anne Village Center, the Fairfax Center Area, areas near Fort Belvoir and areas near future rail stations in the Reston and Herndon areas; and the adoption of new zoning districts to facilitate the establishment of mixed use, transit-oriented development in growth centers.[21]

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,[22] 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 www.fairfaxcounty.gov/dpz/tysonscorner/.

3. 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 included broad support for green building practices and established 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 were 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 were 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 in the form of a second "strawman" draft. In July 2013, the board authorized, through the Fairfax Forward program, a Plan amendment consistent with this second strawman draft.

The Planning Commission held a public hearing on May 7, 2014 and recommended approval of a proposed Plan amendment on June 12, 2014. The Planning Commission recommended several changes to the policy, including:

- Clarifying that the emphasis of the policy has always been on individual buildings, not site/neighborhood design.
- Adding support for reuse of and for greening/retrofitting existing buildings.
- Adding language to encourage energy and water usage data collection and performance monitoring, as well as participation in regional and local evaluations of outcomes.
- Adding language to encourage the use of natural lighting.
- Adding support for solid waste and recycling management practices.
- Defining "equivalent" in reference to green building rating systems.
- Removing a limitation on a green building expectation for multifamily residential proposals relating to number of stories, as rating system eligibility requirements have changed.
- Adding support for higher levels of green building performance when proposed developments have relatively high levels of intensity or density (both residential and non-residential).
- Updating the range of residential green building rating systems available for use, recognizing the more comprehensive systems now available, and revising the related policy to focus more holistically on green building design and not just ENERGY STAR qualification.
- Adding Industrial Areas to the areas of the county with an expectation for a green building commitment.
- Clarifying expectations for public-private partnerships.
- Adding support for infrastructure for electric vehicle charging.

On July 1, 2014, the Board of Supervisors adopted the Plan amendment as recommended by the Planning Commission.

While a green building policy is expected to encourage more energy efficient practices, it is important to recognize that there are a number of companies that already seek to adopt energy efficient policies. For example, a Costco that was recently built is applying for LEED certification. This Costco, like others, incorporates many energy efficient features in it construction and operations. Other chains, like Whole Foods, are also sensitive to energy efficiency and recycling.

4. MITRE Studies

Electric Vehicle Charging Infrastructure

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 recently completed its review of the MITRE report and its recommendations. During the several meetings that the committee held on this issue, the committee 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. The committee developed a series of policy questions for consideration based on these discussions. The list of policy questions was circulated to stakeholders for comment, and the revised policy questions were then considered by the committee. A draft white paper was prepared that provided: an overview of the review process; background information regarding electric vehicle charging; comprehensive plan guidance as it relates to this issue; guidelines and requirements of other jurisdictions; and draft recommendations on each of the policy questions. The draft white paper was circulated to stakeholders in April 2014 and was discussed at a workshop in May 2014. The Environment Committee has completed its review and is forwarding its recommendations to the full Planning Commission for its consideration.

Building Energy Technology

Also per MITRE's proffer commitment, 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. The Planning Commission's Environment Committee began its review of this report in February 2014.

Presentations have been provided by: the MITRE Corporation; the Fairfax County Department of Cable and Consumer Services (regarding the district energy concept); the Fairfax County Department of Facilities Management (regarding the county's building energy monitoring efforts) and the U.S. Environmental Protection Agency (regarding EPA's Portfolio Manager tool). At the committee's request, staff prepared a document and provided a briefing on its perspectives on the recommendations provided by the MITRE Corporation. The MITRE report and staff perspectives document were posted to the committee's website and a notice was sent to stakeholders seeking comments on these documents. The committee has since been discussing the comments that were received as well as issues relating to building energy monitoring. The committee's review is continuing.

5. 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 efforts, and efforts to make more efficient use of existing energy sources and to create renewable energy within the county, are 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.[23]

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. A second system at the Bus Operations Garage has been installed and is now operational. 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 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.[7]

I. AWARDS AND RECOGNITION

Climate Action Champions

In December 2014, the U.S. Department of Energy selected the National Capital Region as one of 16 national "Climate Action Champions" under a program launched by the White House to recognize local and regional efforts to reduce greenhouse gas emissions and enhance climate resilience. Officials lauded COG and its member governments for the National Capital Region Climate Change Report, which they said demonstrates "a fully integrated approach to climate change mitigation." As Climate Action Champions, COG and its members, including Fairfax County, will be eligible for future targeted federal financial and technical assistance to help those communities further raise their ambitions.

J. COMMENTS

1. The Facilities Management Department cost avoidance from fiscal year 2001 to fiscal year 2010 is in excess of $7 million, or an average annual energy reduction of one percent. For example, one energy project performed by part-time efforts of one staff member resulted in a cost avoidance of approximately $83,000 annually at the Government Center complex (variable frequency drives, lighting retrofits and lighting software upgrades). More could be accomplished with dedicated staffing. EQAC commends the county for its past efforts and looks forward to working with the county in the future on its climate change program. Continued support for the funding of projects through the county's Environmental Improvement Program will be important to continue to support progress in identifying new efficiencies in energy use.

2. EQAC commends the county for assembling an inventory of greenhouse gas emissions for Fairfax County facilities and for designing a GHG reporting program

for the county that allows for GHG emissions to be 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. It is EQAC's view that this effort has been productive, and EQAC 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.

5. EQAC commends Fairfax County for the work that has taken place to support residential education and outreach. This is a good beginning but it will need continued support. The residential sector is a big part of Fairfax County and there are potential significant efficiencies to be realized by the county. This should continue to be an area of emphasis.

K. RECOMMENDATIONS

1. EQAC recommends that the county establish a program to evaluate and address the impacts of sea level rise. Last year, EQAC recommended that the county undertake an effort to identify all the impacts of climate change that might reasonably be expected to impact the county. County staff replied with a comprehensive list of such impacts, along with the climate drivers associated with each of the impacts (i.e., temperature changes, precipitation variability, severe storms and sea level rise). EQAC recommends that Fairfax County place sea level rise as a priority among the various impacts so that the impacts of sea level rise would be further evaluated and addressed through a program that would be dedicated to the reduction of impacts of sea level rise through proactive planning efforts, as other jurisdictions have done. An example of a possible outcome of this effort would be a consideration of land use policy changes that may be appropriate to address existing and potential future land uses within areas in Fairfax County that would be vulnerable to sea level rise.

2. While Fairfax County has made significant strides in monitoring energy use, identifying opportunities for reducing energy use and reporting this information to the county government, the county has not yet completed and published an online energy dashboard as discussed at a meeting of the Board of Supervisors' Environmental Committee earlier in 2015. Just as this information has been useful to the county, it would also be helpful for businesses and residents to see the benefits of monitoring energy use as well as the significant savings that the county has realized. EQAC understands that a website similar to websites in Arlington, Los Angeles and other cities is affordable and would likely more than pay for itself

as energy savings opportunities are identified and addressed. In June 2015, county staff provided EQAC with an update to its Environmental Committee presentation, and EQAC understands that a refined approach to the establishment of an online energy dashboard is getting under way. EQAC recommends that this effort be completed.

3. While EQAC appreciates the efforts of Fairfax County to reengage the private sector on energy efficiency, sustainability and ”green” technology, the work of the Private Sector Energy Task Force to help Fairfax County position itself as a leader in the area of energy efficiency, sustainability and “green” technology stopped years ago. The Private Sector Energy Task Force was a good beginning, but the work recommended by the task force is languishing and needs to be reinvigorated. More specifically, EQAC recommends that the county facilitate meetings of the private sector so that private sector entities can be acknowledged for their energy efficiency accomplishments in Fairfax County and so that steps can be taken to encourage and facilitate continued dialogue among private sector entities. We are hoping that Fairfax County will have private sector discussions on energy efficiency and acknowledge accomplishments like Arlington and other nearby jurisdictions have done.

4. While the county staff is pursuing opportunities with a composting facility in Prince William County and the county’s Solid Waste Management Plan clearly identifies recycling as preferable over incineration and landfilling, EQAC continues to recommend that the Board of Supervisors direct county staff to evaluate alternatives for the county to further reduce greenhouse gas emissions from the incineration of waste. It is unclear if facilities in nearby counties will accommodate additional waste streams from Fairfax County. 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. Specific recommendations related to the support of recycling are included in the Solid Waste chapter.

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CHAPTER II

LAND USE AND TRANSPORTATION

II. 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 "build-out," 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 report entitled State of the Plan—An Evaluation of Comprehensive Plan Activities Between 2000-2010[1]. It describes changes that have been happening in our approach to planning as the county transitions over time. Since 2012 additional changes have been made with Fairfax Forward becoming the primary planning process and the Zoning Ordinance Amendment Work Program making associated updates to the Zoning Ordinance. Fairfax Forward is a holistic approach that is appropriate for making the strategic decisions that guide and encourage future projects.

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 Washington area resident spent 16 hours in congestion; by 2011 the number increased to 67 hours, and by 2014, the Washington metropolitan area had the nation's worst congestion at 81 wasted hours per commuter annually.[3]

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[1] www.fairfaxcounty.gov/dpz/projects/state_of_the_plan.pdf
[2] "Where We are Growing", Southern Environmental Law Center, 2002
[3] Texas A&M Transportation Initiative, 2015 Urban Mobility Report http://mobility.tamu.edu/ums/report/

From 2012 to 2015 the county underwent several transportation mega-projects, including the Dulles Rail, I-495 Express Lanes and I-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 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 now has 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 and the 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 on 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 build-out of the county's land use 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 needed data to plan for the future and incorporate future population and trends. It indicates 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 the quality of life, health and natural experiences. The Comprehensive Plan specifically provides strategies and practices that can address land use and transportation together. The Office of Community Revitalization is applying these approaches to support mixed-use projects that 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

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

same 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 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.

In summary, 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 15 years, the county has made great strides in integrating land use and transportation planning and decision making. 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.

1. Trends and Concepts

The Fairfax County Comprehensive Plan and the county's Zoning Ordinance are the primary documents that guide decisions and specify legal requirements for developing projects in the county. The Comprehensive Plan is forward looking and shows how the county expects to grow and where new growth should occur. The Zoning Ordinance contains legal regulations for building in the county. This report has focused primarily on the Comprehensive Plan and the environmental impacts of future strategic plans. Since 2012 the county has changed the process for updating the Comprehensive Plan which has made the Zoning Ordinance more significant in the planning process.

Prior to 2012, the county would conduct an Area Plans Review (APR) process every five years or less to consider changes to the Plan. These changes were proposed primarily by private parties and not coordinated with other proposals or long-range infrastructure investments by the public. The APR process was augmented by special studies that were more holistic. As the combination of APR and special studies became unwieldy, the

county adopted Fairfax Forward, a new process with an ongoing work plan that was more responsive and holistic for strategic planning.

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 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. The Tysons plan went from a visionary document in 2010 to a full scale city rebuilding project; Tysons is indeed becoming the new downtown for Fairfax County. The transformation is unfolding everyday with new construction, businesses and residents that inhabit Tysons Corner. As the development continues, it is important that mechanisms be adopted to monitor the macro effects and provide mitigation options to make sure the reality aligns with the vision.

Fairfax Forward adopted the approach used in Tysons Corner with a holistic focus on key areas of the county that are undergoing change and revitalization. We are pleased to see that the Park Authority has collaborated in the Fairfax Forward process through the Great Parks, Great Communities Park Plan. Most recently, Great Parks, Great Communities policy guidance was incorporated into Fairfax Forward Plan amendments for Fairfax Corner and Lincolnia and special land use studies in Seven Corners and Reston. 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[6] defines sustainability as follows:

[6] www.epa.gov/sustainability/basicinfo.htm

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 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 www.sustainablecommunities.gov/mission/livability-principles.

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:

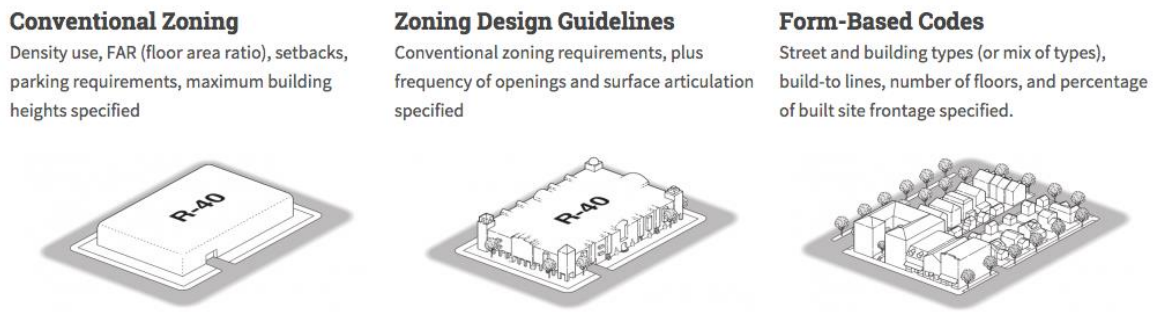
- Mix land uses.
- Take advantage of compact building design.
- Create housing opportunities and choices.
- Create walkable communities.
- Foster distinctive, attractive communities with a strong sense of place.
- Preserve open space, farmland, natural beauty and critical environmental areas.
- Strengthen 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 and Form-Based Codes

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.[7] A walkable community reduces the distance between where people are and where they want to go.

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. Form Based Codes provide clear direction on the adopted vision, with incentives such as expedited review and approval process for developers to adopt the form. The Form Based Codes Institute has a wealth of information, including the following graphic that compares traditional and form based codes guidance[8]:



[7] Charter of the New Urbanism at: www.cnu.org.
[8] http://formbasedcodes.org/definition

While not a code, the form based concept has been applied in Comprehensive Plan guidance for the Annandale Community Business Center.

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

Transit-Oriented Development or Design (TOD) 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 (TDM) 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 (LID) is an approach that reduces the impact of development on a site. The goal of LID is to better integrate the natural environment

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

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 and the county has established a green building policy.

High Occupancy Toll (HOT) 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.

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

[10] Low Impact Development Center at: 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

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 (GIS) 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.
- 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 using technology to better understand, explain and predict changes within our borders. The centerpiece of the technology is its Geographic Information System managed by Geographic Information Systems and 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 power 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**[12] 3-D application is an example of the power of digital technology to virtually fly through neighborhoods. Besides being entertaining it is very practical for boards and commissions to visualize proposed changes and make informed decisions.. Virtual Fairfax includes quick links to real estate assessment and land information for each parcel. One request would be to support Virtual Fairfax on computers other than Microsoft windows. Another example of internet mapping and information reporting applications is My Neighborhood (http://www.fairfaxcounty.gov/myneighborhood/). It lets 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.

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 (IPLS) 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:

1. Technology for GIS and IPLS—these are the technical systems that gather, move, manipulate and display information based on geographic location.

2. Data that are geographically located, also called spatial data—this is an expensive component that needs to be updated constantly 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.

3. Models and applications that can use the data to create 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.

[12] www.fairfaxcounty.gov/gis/virtualfairfax/

1. GIS and Integrated Parcel Lifecycle System

GIS technology has become an essential tool for county operations. What used to be simple maps has become a geospatial database that connects the history of all land parcels in the county. The Integrated Parcel Lifecycle System was an early program that refocused how information was rendered. Parcel data are accessible to all county staff via GIS and Oracle clients. The current parcel data include:

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

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. Some sample reports that can be created with GIS are population density, population forecasts, housing starts and completions, vacant land and underutilized land.

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 prior land use categories are no longer appropriate, especially as the county adopts more transit-oriented and mixed-use development. Parcels in a mixed-use development cross categories, and parcels with multiple stories of mixed-use further complicate simple analyses.
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 GIS analyses 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.

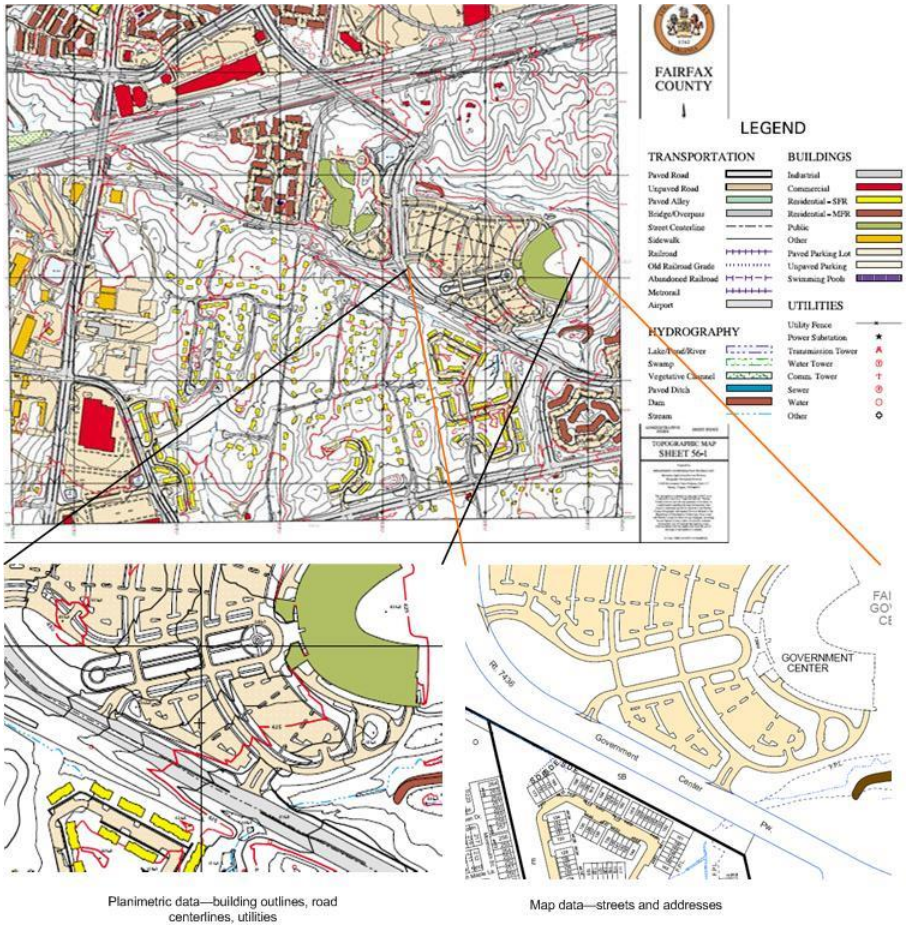
- Surface Data--data that provide elevations of the county's surface. It is essential data for stormwater analyses and dam inundation area determinations. Recently acquired LIDAR data also provide elevations of structures and tree canopy and is highly valuable in Urban Forestry canopy assessments.
- 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. Planimetric information for the Fairfax County Government Center area is shown in Figure II-1. 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, the following 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 (DTM).

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



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. For reference, the 1997 version contained 3,771,137 features – this is an improvement of over 400 percent more features.

A new round of planimetric updates is currently on hold and expected to resume in 2017 using updated imagery provided by the state.

The GIS office is making the majority of its vector data, comprising over 100 data sets, available to the public at no charge via open data on the Web: (http://data.fairfaxcountygis.opendata.arcgis.com/). Planimetric, centerline, historic sites, watersheds, Radon Potential Areas, Quarries, Marine Clay, Asbestos-containing Soils, Chesapeake Bay Preservation Areas and Tree Cover (1990-2002, 2011) are some of the layers available for viewing and downloading.

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 to 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, planning and emergency response. Figure II-2 is a sample oblique image of the Government Center. Figure III-3 shows the results of converting these images into 3-D models and viewing them in the Virtual Fairfax 3-D viewer.

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 (CADD) 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.

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

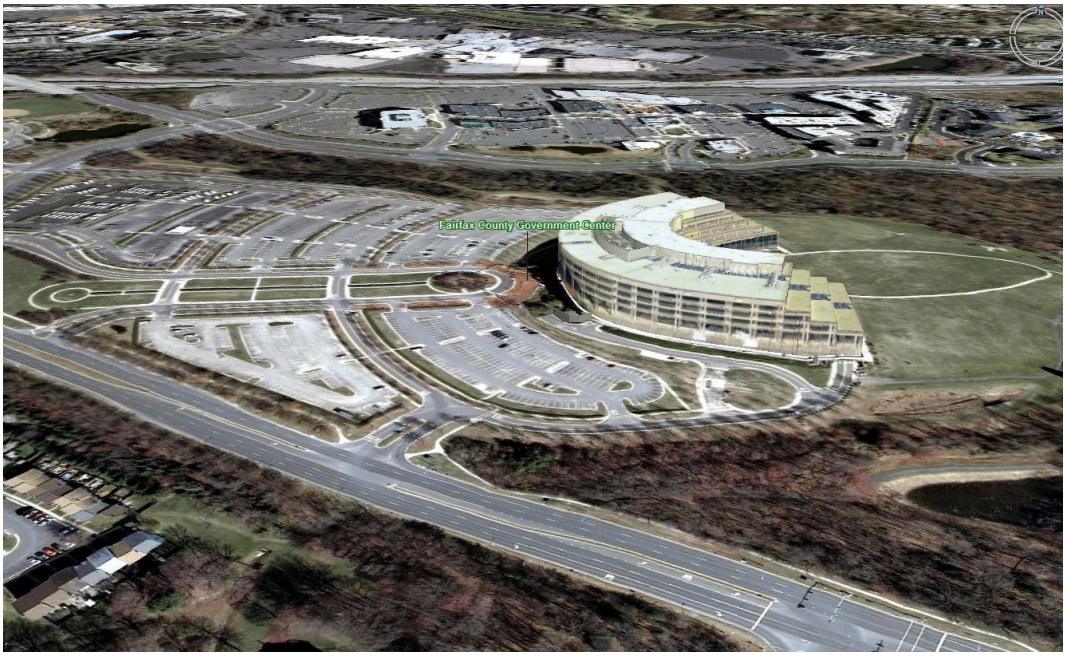
The Fairfax Park Authority and GIS office collaborated to create a natural resource geodatabase model. A field data collection technique was tested successfully and is

being expanded to all applicable field datasets. The new data collection technique uses tablet computers and mobile GIS combined with rapid assessment protocols to quickly and easily map natural resources data in the field and sync this data with a remote server. Applicable field datasets include Non-native Invasive Assessment Protocol (NNIAP) data, white-tailed deer browse impact (deer) data and community level vegetative classification (vegetative communities) data.

The Fairfax County Park Authority secured funding for inventories of NNIAP and deer data collection efforts. It has not secured funding for the vegetative communities inventory, which is estimated to cost $365,000. The Park Authority will submit requests to fund portions of the vegetative community inventory through the Environment Improvement Program (EIP) and the Park Authority's monopole funding sources.

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

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

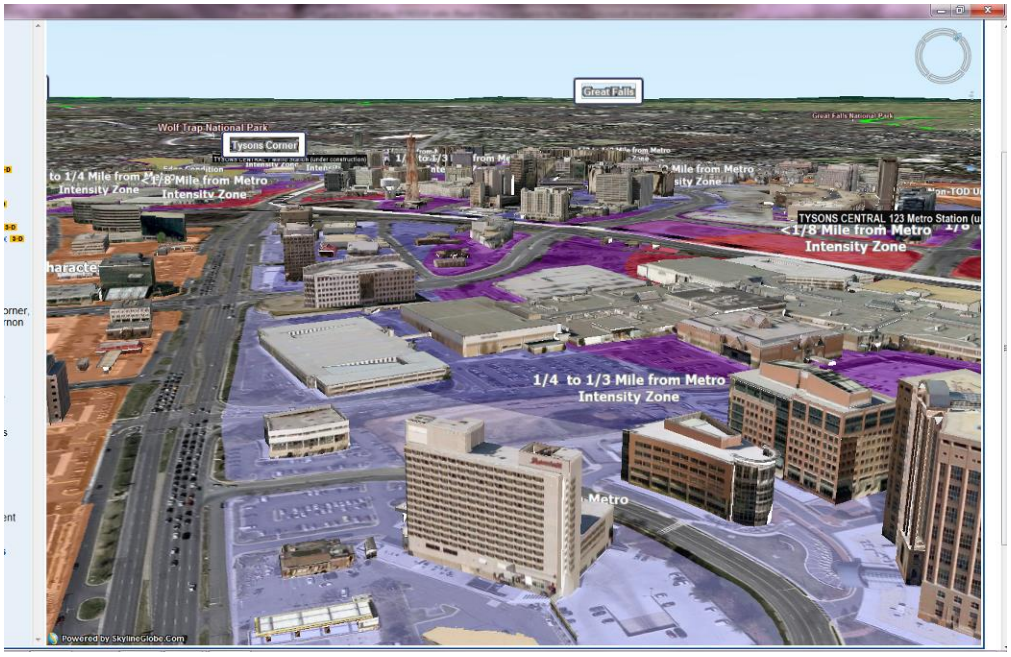


3. Models and Visualization

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. Some recent applications of computer models and visualization projects include:

- Transportation and traffic models to analyze congestion. The Tysons Land Use Task force relied on traffic projections for development scenarios.
- GIS used 2009 topographic data to create highly detailed elevation model of the county. With that, GIS was able to build a complex set of watershed delineation tools that significantly reduces DPWES Stormwater time and cost in carrying out its work.
- LIDAR data from the U.S. Geological Survey (expected to arrive in 2015) will assist DPWES Stormwater management in its analysis and forensics analysis of runoff problems.
- Virtual Fairfax to visualize new development proposals. 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.
- New tools on the geoportal: www.fairfaxcounty.gov/maps/geoportal.htm. The Historic Imagery viewer has seven years of imagery that can be overlaid with parcels and roads, and the Map Wizard enables users to create their own maps.

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



4. Mobile Applications

Several agencies are using mobile, Web-based GIS applications to increase data collection and documentation in the field. In particular, the Fairfax County Park Authority and Urban Forest Management Division have accomplished significant savings by using mobile data collection.

The GIS office has worked closely with DPWES, refuse collection teams to reduce the number of crews and trucks necessary to collect refuse and yard waste through the use of routing software. Initial efforts have enabled the reduction of two trucks on Mondays. There will be additional savings on other days of the week. GIS also developed a vacuum leaf collection app for DPWES to enable customers to view their collection dates and areas.

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.[13] The underlying data are primarily stored in the Integrated Parcel Lifecycle System.

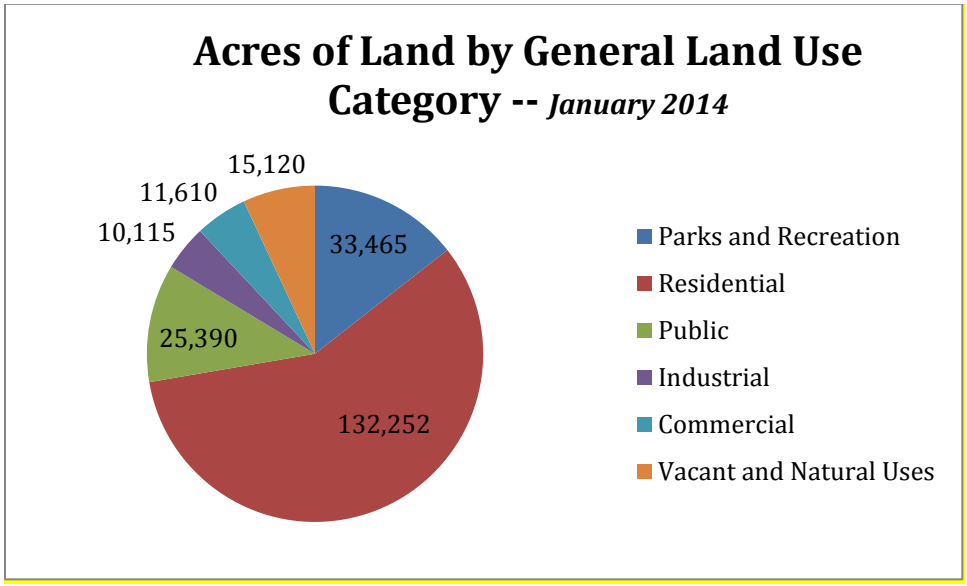
1. How Is Land Used In Fairfax County?

Fairfax County has 227,952 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.
- Commercial/Retail—acres developed for people to work or shop. Commercial space is measured by looking at the Floor Area Ratio (FAR), 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.

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

Figure II-5: Existing Land Uses in Fairfax County



Source: Fairfax County Department of Neighborhood and Community Services, 2014. www.fairfaxcounty.gov/demogrph/find_by_topic.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.

- 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. Major revisions took place in 1975 and 1991. The 1991 plan, which was the foundation for the 2013 edition, was developed around 18 Goals for Fairfax County (a 19th goal was added later). From 1991 through 2013, updates to the Plan were vetted through an Area Plans Review process with public participation in each district. By 2013, it was realized that the process was not sufficient for a growing county facing build-out and transitioning from development to redevelopment and revitalization. EQAC was one of the advocates for a more comprehensive and consistent process. Fairfax Forward is the new process that focuses and aligns resources on priority projects. This approach is working well and includes checkpoints to monitor and improve the process over time.

The Web edition of the Comprehensive Plan is available at www.fairfaxcounty.gov/dpz/comprehensiveplan/.

The current 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 and Recreation.
- Revitalization.
- Visual and Performing Arts.
- Chesapeake Bay Supplement.

In 1990, the county's Concept Map for Future Development was developed to guide more detailed planning efforts. 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).

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.

a. Fairfax Forward

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

i. 2015 Fairfax Forward Evaluation

An evaluation of the Fairfax Forward process began in July 2015. Staff continues to meet with the Planning Commission Policy and Procedures Committee to discuss observations, concerns, and opportunities to improve Fairfax Forward. Internal staff meetings have been held to share experiences with planning studies and generate ideas for sustaining Fairfax Forward over the long term. Planning

Division staff met with land use attorneys in summer 2015 to discuss their experiences with the Fairfax Forward process, particularly when working with staff to complete studies on the work program.

The feedback received from the Planning Commission, staff, land use attorneys, Board of Supervisors' staff and the community will be considered in the evaluation of the Fairfax Forward process and the work program. A preliminary report on the Fairfax Forward evaluation is anticipated at the end of 2015.

ii. Comprehensive Plan Amendment Work Program

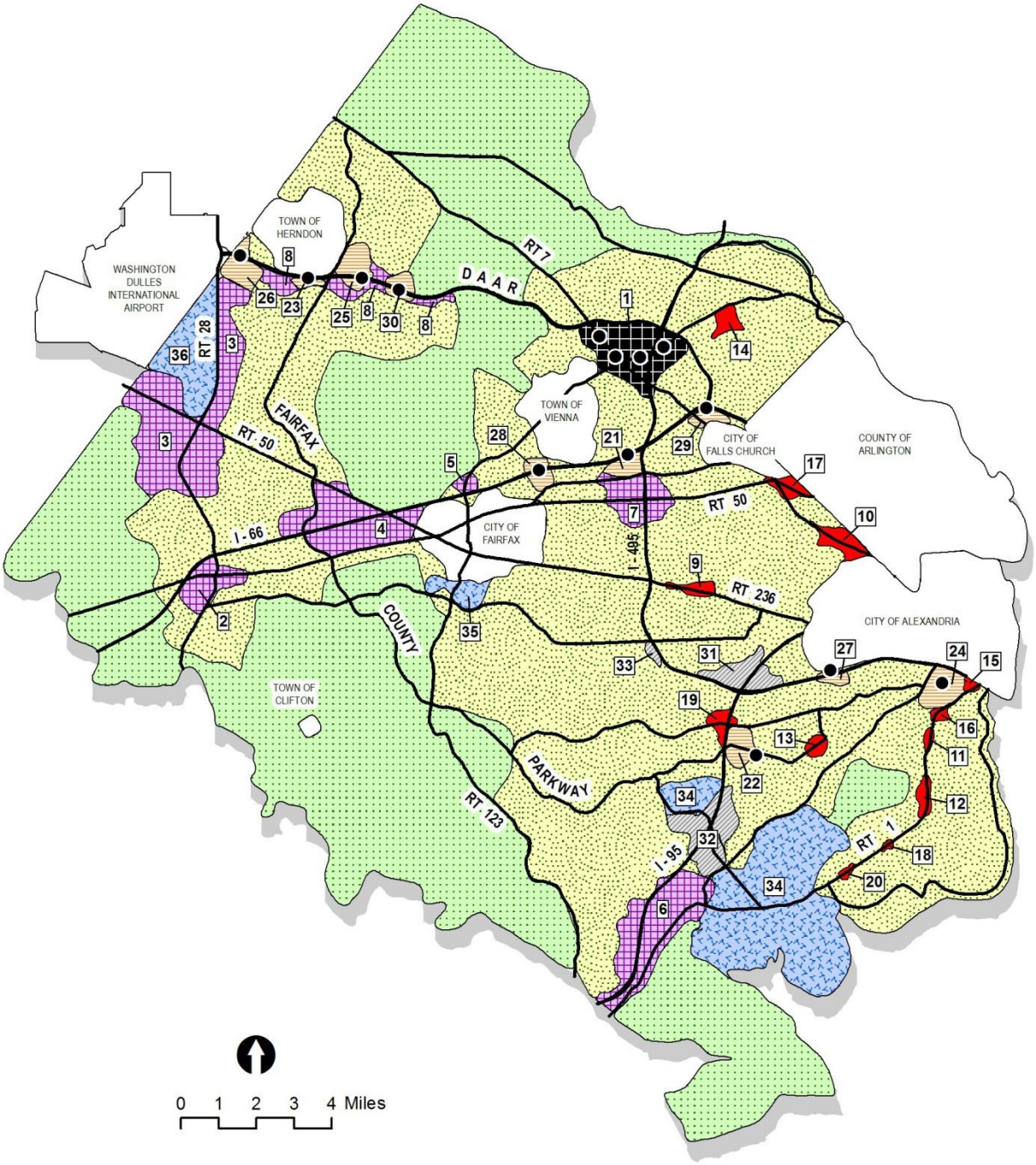
As of late October 2015, 31 planning studies were listed on the 2013 Pilot Comprehensive Plan Amendment Work Program, as amended through October 20, 2015. The Board of Supervisors has acted upon 36 studies since the work program was adopted in July 2013.

b. Overview of Plan Amendments Adopted through October 20, 2015

A total of 14 Plan amendments were adopted in 2013 through June 3, 2014. An additional 23 Plan amendments were adopted and two amendments were rescinded from July 1, 2014 through October 20, 2015. A general description of each adopted amendment and the adopted Comprehensive Plan guidance can be found at: www.fairfaxcounty.gov/dpz/comprehensiveplan/planadopted.htm.

- Green Building Policy: Revised the Green Building policy in the Environment section of the Policy Plan of the Comprehensive Plan.
- Charles Street: Modified the redevelopment option for Sub-Unit D2 in the Baileys Crossroads Community Business Center.
- Bicycle Master Plan: Recommended bicycle facilities and policies to guide the development of bicycle infrastructure throughout Fairfax County.
- 5285 Port Royal Road: Revised the Comprehensive Plan guidance by providing an option to convert an existing warehouse to a self-storage and truck rental facility.
- Fairfax Center Study, Phase I, Transition Areas and Land Units, including Fairfax Center Area Land Units T, U and V: Added options for residential and assisted living uses for parcels along Lee Highway and proposed editorial changes.
- Lake Anne Village Center/Reston Crescent: Modified recommendations regarding the building, heritage resources, the Consolidation Option and transportation.
- Baileys Crossroads Community Business Center (CBC), Southeast Quadrant: Provided a redevelopment option that includes residential uses and a public elementary school or other public use.

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

- 5600 Columbia Pike/Baileys Gateway: Added redevelopment option for multifamily residential use with an option for retail and services.
- Silas Burke Property: Added an option for residential use at 2-3 dwelling units per acre (du/ac) with the protection of heritage resources.
- West Falls Church Transit Station Area (TSA): Revised the Fairfax County boundary to reflect the 2014 boundary adjustment between Fairfax County and the City of Falls Church.
- Dulles Suburban Center, Marlo site: Removed the restriction limiting retail development to a furniture store and allows for additional retail opportunities.
- Dulles Suburban Center, Akridge site: Added recommendation for office, conference center/hotel, industrial/flex and industrial use, with an option for multifamily residential development with conditions.
- 4201 and 4203 Buckman Road: Added an option for residential at 8-12 du/ac.
- Reston Master Plan Special Study Phase II: Updated the Comprehensive Plan guidance for Reston and several small areas adjacent to Reston.
- Dulles Suburban Center, Timber Ridge: Added an option for residential use (up to 150 townhouses) on this site, with conditions.
- Forestville Elementary School: Added a recommendation for a limited sewer service area expansion to Forestville Elementary School.
- Seven Corner Community Business Center: Revised activity center guidance.
- Dulles Suburban Center, Wegmans site: Added an option for retail uses up to 0.20 FAR with conditions.
- Conservation Areas and Community Improvement Areas: Removed references from the Plan of to five expired Conservation Area Plans and all completed Community Improvement Area Plans.
- Lincolnia Planning District, Phase I: Revised Plan guidance to reflect existing conditions, recent planning efforts and editorial changes.
- Completed Transportation Facilities: Removed from the Plan completed transportation improvements; added to Plan maps county-owned commuter parking facilities and made editorial changes.
- Huntington Transit Station Area, Huntington Club Condominiums: Added phasing language to mixed-use transit-oriented redevelopment option.

c. Status of Special Planning Studies/Plan Amendments Under Way

The Fairfax Forward website provides the most current information regarding the status of projects: www.fairfaxcounty.gov/dpz/fairfaxforward/. Each planning study Web page includes information such as the study scope, anticipated timeline, meeting dates, presentations, reports and public outreach tools. The information is updated throughout the course of the study.

d. Area Plans Review

The Area Plans Review process has been supplanted by Fairfax Forward. It 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.

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.

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. Planning and Zoning

Planning and zoning are both necessary in the development process. The Comprehensive Plan is required by state law to be used as a guide in decision-making about the built and natural environment. Fairfax Forward is the process for reviewing and updating the Comprehensive Plan regularly and holistically.

The Zoning Ordinance is intended to implement the adopted Comprehensive Plan for the orderly and controlled development of the county. It is the official legal document describing how things may be built, and as such is a substantial document. It is regularly reviewed through the Zoning Ordinance Amendment Work Program (ZOAWP). There are several important changes being considered in the near term that affect the environment.

1. 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. Under consideration is whether open space credit should be given for an unenhanced dry pond, as these facilities are generally considered undesirable from a usable open space and visual perspective, and whether streetscape should be counted as open space, as such linear areas may not function as useable open space.

2. Planned Development Districts. Increase in FAR - PDC and PRM Districts. This amendment allows for the implementation of recent Comprehensive Plan

amendments that propose higher density, mixed-use areas in the county. The amendment proposes to increase the maximum FAR to 5.0 in commercial revitalization overlay districts and areas identified in the Comprehensive Plan as transit station areas, commercial revitalization areas and commercial business centers. Concentrating commercial and residential development in conjunction with the use of mass transit assists in achieving environmental goals by reducing air pollution caused by automobiles and traffic congestion, reducing energy consumption required to operate motorized vehicles and creating a framework that supports personal mobility.

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. As a Priority 2 item, this amendment will be maintained on a list for future prioritization.

3. 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 to consider a reduction of the minimum parking requirements due to Metrorail, bus route and other mass transit options such as streetcars. Reducing parking requirements through Zoning Ordinance amendments is an ongoing process. Parking rates were reduced with the adoption of parking maximums as part of the amendment that created the Planned Tysons Corner Urban District (PTC), the new zoning district for Tysons, on June 22, 2010.

   The Zoning Ordinance allows for parking reductions by up to 20 percent in Commercial Revitalization Districts, but for nonresidential uses only. With these areas being recommended for mixed-use developments under recently adopted Comprehensive Plan text, the Zoning Ordinance amendment proposes to expand the 20 percent reduction to residential uses as well, provided the reduction can be justified. Furthermore, the amendment will clarify that bus stops and bus routes can be used to request a parking reduction, if it is demonstrated that routes and stops are regularly scheduled and link to other transit opportunities.

4. Agricultural Districts/Uses. A review of the zoning districts that permit agriculture is needed in light of changes to the State Code that limit local regulation of agricultural activities, including farm wineries, farm breweries, farm distilleries and agri-tourism/recreational activities. Given that such uses can increase traffic, reduce water quality and cause noise pollution, it should be determined which zoning districts are appropriate for these agricultural activities and whether additional standards should be considered to address potential impacts to health, safety and welfare.

4. Land Use History and Build-Out 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 2014, with only approximately 6.0

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.

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
2014	13,528	227,057	6.0 percent

Planned land does not generally include public roads and water

Note: Some of the decrease in vacant land between 2000 and 2007/2010/2014 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.

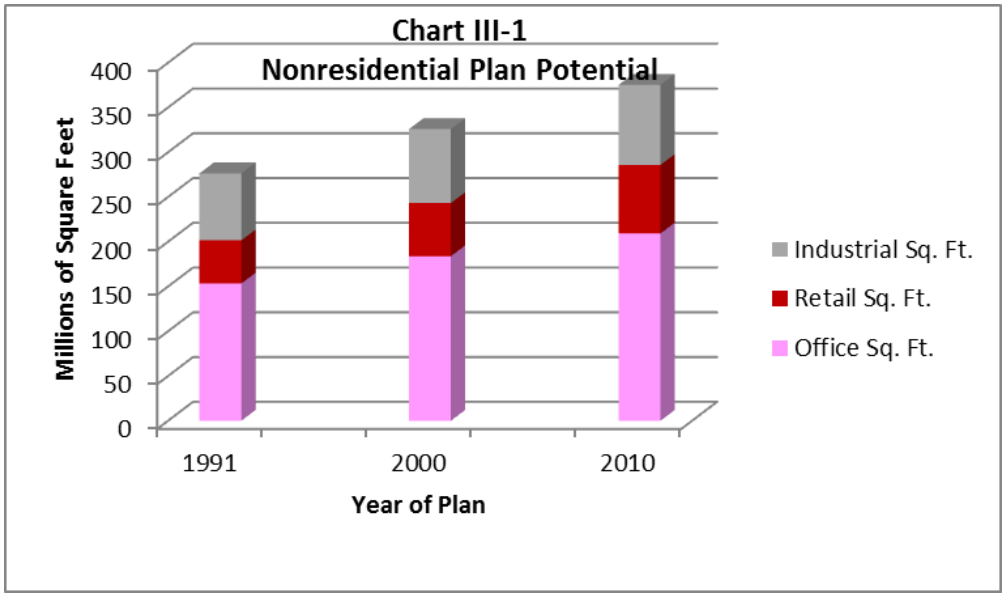
Source: Fairfax County Department of Systems Management for Human Services, 2007 and Fairfax County Department of Neighborhood and Community Services, 2010 and 2014

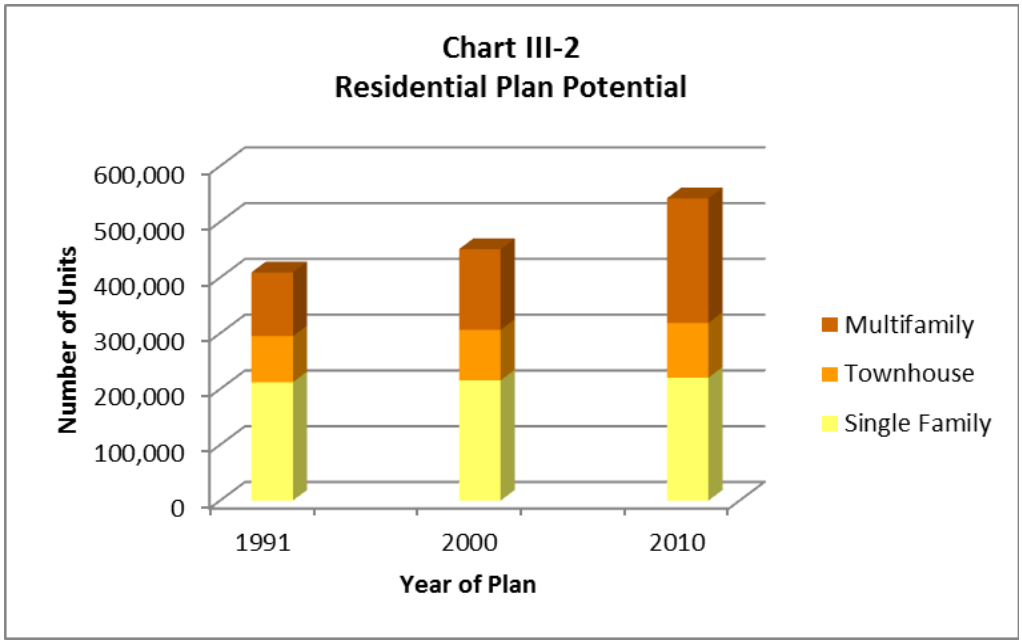
5. The State of the Plan, 2000-2010

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.

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 6.0 percent vacant space available, the Plan

Figure II-7: Nonresidential and Residential Plan Potential





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

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.*

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 County 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.

6. Green Building Policy[14]

In December 2007, the Board of Supervisors adopted an amendment to the Policy Plan that established a green building policy. The policy included broad support for green building practices and established linkages between the incorporation of green building/energy conservation practices and the attainment of planned uses and densities/intensities of development. In growth centers, commitments for green building practices sufficient to attain certification through the LEED® program or equivalent were recommended for certain nonresidential and multi-story multifamily residential proposals. ENERGY STAR® Qualified Homes designations were recommended for any other residential development proposed at the high end of the Plan density range.

On July 1, 2014, the Board of Supervisors adopted a Green Building Policy amendment to the Comprehensive Plan with several changes to the policy, including:

- Clarifying that the emphasis of the policy has always been on individual buildings, not site/neighborhood design.
- Adding support for reuse of and for greening/retrofitting existing buildings.
- Adding language to encourage energy and water usage collection and performance monitoring, and participation in regional and local evaluations of outcomes.
- Adding language to encourage the use of natural lighting.
- Adding support for solid waste and recycling management practices.
- Defining "equivalent" in reference to green building rating systems.
- Removing a limitation on green building expectation for multifamily residential proposals relating to number of stories, per rating system requirement changes.
- Adding support for higher levels of green building performance when developments have relatively high levels of intensity or density (residential and non-residential).
- Updating the range of residential green building rating systems available for use and revising the related policy to focus more holistically on green building design and not just ENERGY STAR Qualification.
- Adding Industrial Areas for a green building commitment.
- Clarifying expectations for public-private partnerships.
- Adding support for infrastructure for electric vehicle charging.

By establishing these amendments and incentives, green building has become an accepted practice across the county.

7. A Fairfax County Example: Merrifield Suburban Center

The Merrifield Suburban Center is a vibrant, exciting, transit-oriented neighborhood. 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.

[14] Provided to EQAC 2014 by Department of Planning and Zoning—Planning Division

The transition from a sleepy intersection to a transit-oriented center was 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 persevered. Merrifield, like all suburban areas, has unique challenges and, in this 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.
- Inclusion of a massive 500 cubic yard stormwater detention vault to address runoff from the town center.

These challenges and advantages have combined to create a transformed place. The success of Merrifield shows the potential of an integrated and strategic long term process. While not all redevelopments will be as spectacular, Merrifield proves that the county has the potential to grow and redevelop while improving the environment.

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. In Fairfax County, 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.[15] 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, I- 66 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 build-out. 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: www.fairfaxcounty.gov/fcdot/sam_study.htm .
- Tysons Station Access Management Study: www.fairfaxcounty.gov/fcdot/tmsams/
- Fairfax Connector ten year Transit Development Plan (the main guide for service expansion and changes in Fairfax County): www.fairfaxcounty.gov/fcdot/tdp.htm/.

[15] 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 www.fairfaxcounty.gov/fcdot/2050transitstudy/.
- A seven-minute video presentation has been prepared on sustainable transportation in Tysons. www.youtube.com/watch?v=4xAPeDF5veo&feature=youtu.be
- Fairfax Advocates for Better Bicycling is focusing on the need for 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. www.fabb-bikes.org.

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: https://www.itdp.org/tod-standard/.
- The National Complete Streets Coalition has provided a wealth of information regarding the complete streets concept. 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 the most significant mode of transportation, it directly effects the environment, and is closely related to land use and development. People have become dependent on automobiles for business, pleasure and various daily activities. The urban sprawl that has been experienced in Fairfax County and outer suburbs has caused major congestion on roadways, particularly during rush hour as many individuals are commuting long distances to and from their jobs.

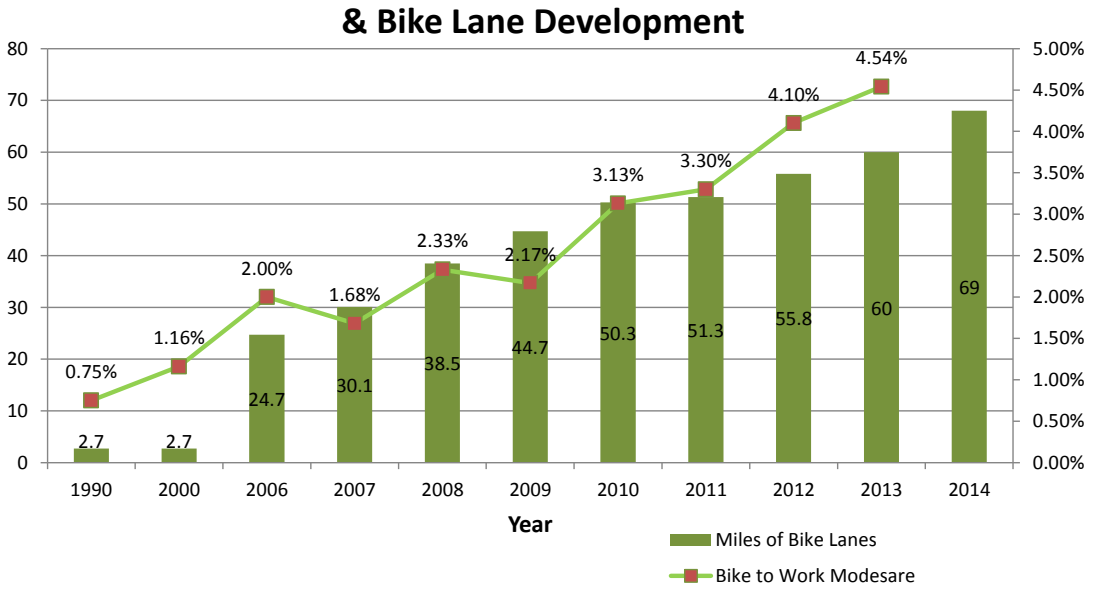
Rail and bus transit via Metro and connector services is looked upon as a means of reducing traffic congestion and thereby creating a positive impact on pollution and air quality. It also has a direct relationship to land use planning and development because rail transport centers are ideal locations 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 such as walking and biking, are gaining popularity in urban areas and being considered as viable alternatives to vehicles. Biking and walking reduce traffic congestion and improve air quality. Not having sufficient infrastructure for walking and biking is a major impediment to expanding non-motorized options. The

District of Columbia (D.C.) has been making investments since 2000 with over 69 miles of bike lanes in place and a steadily growing proportion of bicycle commuters [16].

Figure II-8



"Virtual transportation" is another viable alternative to motorized transportation. Modern technology has created opportunities for people to work from home, using computers for telecommuting and e-commerce to perform jobs. Fairfax County is a leader in this field with the Fairfax County Government Telework Program.

While there are many options, they are not utilized equally. The U.S. Census tracks the modes used by people to get to work each day. The 2013 data shows that of the 605,584 workers, 16 years and over, who live in Fairfax County:[17]

- 72.4 percent drove alone to work in a car, truck or van. (SOV)
- 8.5 percent of those workers commuted via carpool or vanpool. (HOV)
- 9.6 percent used public transportation (excluding taxicabs).
- 1.6 percent walked to work.
- 1.7 percent used other means (including biking).
- 6.1 percent worked at home. (This number may not fully represent the true number of teleworkers in Fairfax County.)

[16] http://ddot.dc.gov/publication/2014-bike-program-fact-sheet
[17] Source: U.S. Census Bureau 2013 American Community Survey 1-year estimate, Commuting Characteristics. Area: Fairfax County.

Across all modes, the mean travel time to work is 31.7 minutes. The Metropolitan Washington Council of Governments has noted: [18]

> *"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: 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

18 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*		

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. The **Fairfax County Department of Transportation** has the mission to represent local interests in transportation to plan, coordinate and implement a multi-modal transportation system for Fairfax County that moves peoples and goods, consistent with the values of the community. Coordination is essential because transportation programs are quite complicated, with different authorities participating together. For example, 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 plan 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, 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.

The Virginia **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 long term goals for multimodal transportation across the commonwealth are documented in VTrans2035. The next update to the comprehensive plan, VTrans2040, is currently under way, with visioning expected in 2015 and a final product in 2016.[19]

On April 6, 2014, Governor Terry McAuliffe signed *House Bill 2* (HB2). HB2 became effective as of July 1, 2014 and requires the Commonwealth Transportation Board (CTB) to develop and implement a quantifiable, transparent prioritization and funding process for all modes of transportation by July 2016. The prioritization process will evaluate projects for six evaluation measures, one of which is environmental quality to reduce pollutant emissions and energy consumption, and minimize the impact on natural and cultural resources.[20]

The **Northern Virginia Transportation Authority** (NVTA) 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[21] with the following goals:

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

The goals require balancing of various interests, but the priorities of multi-modal systems and respecting environmental factors highlight 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.[22]

[19] www.vtrans.org/plans.asp
[20] Provided 2015 by John Muse, VDOT District Environmental Manager
[21] www.thenovaauthority.org/planning-programming/transaction-2040/
[22] www.mwcog.org/store/item.asp?PUBLICATION_ID=82

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.

a. The County's Six-Year Plan for Transportation[23]

On January 28, 2014, the Board of Supervisors approved a county Six-Year Plan (CSYP) for transportation with a priority project list for funding for FY 2015 – FY 2020. This new plan includes nearly 200 new projects, totaling $1.4 billion in funding, and includes improvements to roadways, bicycle and pedestrian facilities and transit improvements. It is envisioned that the CSYP will be revised annually, resulting in a rolling funding plan for county transportation projects. It will also be updated to reflect actions of the Commonwealth Transportation Board, the Northern Virginia Transportation Authority and other funding agencies.

Since 2004, significant bond and Commercial and Industrial (C&I) funds have been utilized to supplement federal and state-managed projects in order to move them to construction. These include the Stringfellow Road widening, which was completed in June 2015, Fairfax County Parkway/Fair Lakes Parkway/Monument Drive interchange (completed in October 2013), the extension of Jeff Todd Way (formerly Mulligan Road) and Telegraph Road widening from Beulah to Leaf and widening of Telegraph Road from South Van Dorn Street to South Kings Highway. Lorton Road, one of the largest projects managed by Fairfax County, is currently under construction with scheduled completion in fall 2016.

b. Comprehensive Transit Plan (CTP)/Transit Development Plan[24]

The county is currently updating the Comprehensive Transit Development Plan which is the main guide for Fairfax Connector and Metrobus service expansion and changes in the county. Fairfax Connector plays a significant role in the overall transportation system. On an average weekday, the system carries over 40,000 passengers, with 270 buses, serving over 84 routes. This is approximately 55 percent of the county bus service, the remainder being provided by Metrobus.[25]

The phase 1 service recommendations for the CTP can be found online at: www.fairfaxcounty.gov/fcdot/connections2015/.

From the summary: *"Most of the recommendations are centered around improving an already robust bus network. This includes improvements to frequency and span of service, such as additional midday or weekend service. In addition, recommendations*

[23] Provided 2015 by Fairfax County Department of Transportation
[24] www.fairfaxcounty.gov/fcdot/connections2015/
[25] www.fairfaxcounty.gov/fcdot/pdf/ctp/ctp_tech_memo_1.pdf

to routing to streamline operations and provide quicker service, or alternatively recommendations for rerouting existing buses to serve new destinations, are also included. Finally, new routes have been recommended to connect locations that either do not have transit connections today or do not have a direct connection. In addition to these improvements, the recommendations outlined in this CTP include specific suggestions related to four key areas: Silver Line feeder service, inter-jurisdictional services, cross-county services, and alternatives to fixed-route bus service."

c. Tysons and Herndon Metrorail Station Access Management Studies

The Board has chartered two Metro station access management studies: the Tysons Station (TMSAMS) and the Herndon (HMSAMS). Tysons was approved in June 2009 and Herndon was approved in Fall 2013. The purpose of each was to engage the public to identify and prioritize necessary bicycle and pedestrian facility projects to improve access to the future Metrorail stations. The effort was led by the Fairfax County Department of Transportation (FCDOT), was guided by a diverse advisory group, was supported by a consultant team and included public outreach.

The HMSAMS Final Report was completed in September 2014 and presented to the Fairfax County Board of Supervisors Transportation Committee on January 20, 2015. The final report is on the Web at: www.fairfaxcounty.gov/fcdot/pdf/hmsams-report-final.pdf.

As noted in the final report: *"Providing opportunities to walk and bicycle to Metrorail will be critical to the success of the transportation network in the station areas overall and to building ridership for Metrorail. Driving is a dominant mode of travel in the study area today* [2014] *and will continue to be important in the future. Bicycling and walking need to become more prevalent to help fully realize the benefit of the county's Metrorail investment."*

d. Urban Street Standards[26]

An example of decision making can be seen in the designation of urban street standards and applying them in county urban centers. Urban standards 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. These features are safer for pedestrians and multi-modal users and appropriate for use wherever land-use density is significantly increasing.

The Virginia Department of Transportation (VDOT) is collaborating with Fairfax County on its efforts to develop multimodal system plans for the long term viability of older commercial areas, including the designated Commercial Revitalization Districts/Areas of Annandale, Springfield, Merrifield, Baileys Crossroads/Seven

[26] Provided 2014 by Kris Morley-Nikfar, Fairfax County Department of Transportation

Corners, McLean and the Richmond Highway Corridor as well as Reston and Tysons Corner.[27]

VDOT's *Transportation Efficient Land Use and Design Guide* offers information on principles and design best practices, the benefits of such design, planning for transportation efficient growth, methods for engaging the public in the planning process and implementation strategies. The Virginia Department of Rail and Public Transportation (DRPT) developed *Multimodal System Design Guidelines,* which provides a roadmap for the incorporation of these same concepts into activity center (higher density mixed-use development) design. VDOT has adopted the DRPT guidelines as alternate street design standards that may be used by localities for the construction of streets within activity centers. Supplemental information for the adoption of DRPT Guidelines as alternate standards by localities is found in Appendix B(2) of VDOT's *Road Design Manual*. These reference materials may be viewed on the following link:
www.vdot.virginia.gov/info/transportation_efficient_land_use_and_design_guide.asp

3. Electric Vehicles

Electric vehicles offer an environmentally friendly alternative to gasoline vehicles. Both the county and COG are working to provide facilities and options for charging electric cars.

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.

[27] Provided 2015 by John Muse, VDOT District Environmental Manager

The Planning Commission's Environment Committee has been reviewing the MITRE report and its recommendations. The committee received presentations from: MITRE Corporation; the Fairfax County Environmental Coordinator (regarding related efforts at the regional level); and three private sector providers of electric vehicle supply equipment. The committee developed a series of policy questions for consideration based on these discussions. A draft white paper was prepared that provided: an overview of the review process; background information regarding electric vehicle charging; Comprehensive Plan guidance as it relates to this issue; guidelines and requirements of other jurisdictions; and draft recommendations on each of the policy questions. The Environment Committee has completed its review and is forwarding its recommendations to the full Planning Commission for its consideration.

COG's electric vehicle initiatives began in early 2011, leading to the creation of a stakeholder-driven task force, whose mission was to develop regional and local program and policy recommendations that would facilitate adoption of electric vehicles. Kambiz Agazi, Fairfax County Environmental Coordinator, served as Task Force co-chair. Subgroups addressed 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 vehicles Original Equipment Manufacturers, electric vehicle supply equipment suppliers, non-profit organizations (e.g., Georgetown Climate Center, Electric Drive Transportation Association, Electric Vehicle Association of Greater Washington D.C.), the Greater Washington Regional Clean Cities Coalition and electric utility representatives from the region.

In 2012, COG published a report: "Electric Vehicles in Metropolitan Washington" (www.mwcog.org/store/item.asp?PUBLICATION_ID=449). The report provides a comprehensive look at regional EV readiness and offers recommendations to address barriers to EV use. The report stresses the benefits of EVs, including reducing greenhouse gases, improving air quality and dramatic fuel costs savings.

The top five recommendations from the report to encourage greater EV use in metropolitan Washington are:

1. 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. Consider offering incentives such as preferred parking, HOV occupancy exceptions and tax credits to promote EV adoption.
3. 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 comprehensive plans and zoning regulations should guide EV infrastructure development and ensure that the built environment can accommodate future EV charging station installations.

The 2014 and 2015 EV work program years focused on three key areas:

1. Supporting the eight state zero-emission vehicle (ZEV) Program MOU.
2. Developing and conducting the COG-vision fleet pilot assessment.
3. Promoting work place charging.

The ZEV MOU is an agreement that was signed in October 2013 by the governors of eight states, including Maryland, to adopt or consider adopting regulations requiring increasing sales of zero-emission vehicles. To promote regional collaboration, COG partnered with the Maryland Electric Vehicle Infrastructure Council to conduct a Regional EV Readiness Workshop. The purpose of the workshop was to promote shared standards and region-wide EV infrastructure development. Noel Kaplan, Senior Environmental Planner with the Fairfax County Department of Planning and Zoning, highlighted the county Planning Commission's Environment Committee review process and electric vehicle charging infrastructure recommendations prepared by the MITRE Corporation.

4. Non-motorized and Public Transportation

The Board of Supervisors 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 2020, the board has designated over $313 million in federal, state and county funding to construct high-priority bicycle and pedestrian improvement projects throughout the county. The following sections describe FCDOT programs related to multimodal and public transportation.

a. Walking – the Pedestrian Program

The pedestrian program includes projects on major roadways, in activity centers, providing access to Metro stations and completing neighborhood missing links. From FY 2008 through FY 2015, the county completed construction on 121 sites/segments; 16 are under construction and another 96 are under design. [28]

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

[28] Provided 2015 by Fairfax County Department of Transportation

Pedestrian Outreach Coordinator are all involved in community outreach. FCDOT coordinates with other facility resources and departments as appropriate.

The Fairfax County Police Department conducts pedestrian safety enforcement in high pedestrian crash areas countywide. Fairfax County is one of the few jurisdictions in Virginia permitted to install "Yield to Pedestrians in Crosswalk $100 - $500 Violation Fine" signs. The 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 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 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.[29]

b. Biking --The Fairfax County Comprehensive Bicycle Initiative[30]

Fairfax County's bicycle program was established by the Board of Supervisors in 2006 and the responsibilities for program implementation were assigned to the Department of Transportation. The program addresses both capital and non-capital bicycle projects. Some of the program's early accomplishments included the installation of bicycle racks on all Fairfax Connector buses and the production of the county's first bicycle route map, now in its third printing and also available on line and as a smartphone app.

The Bicycle Master Plan and the bicycle parking guidelines are both important. The Bicycle Master Plan (BMP) was adopted by the Board of Supervisors on October 28, 2014. The BMP sets bicycle policies, programs and facilities for the county.

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

[30] Provided 2015 by FCDOT and 2105 Fairfax County Transportation Status Report

The parking guidelines 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 with related 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, which was that year's "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 6,000 copies initially and another 41,000 as a result of demand for the maps. Electronic copies of the "Fairfax County Bicycle Route Map" are available at: www.fairfaxcounty.gov/fcdot/bike/bikemap/.

Current program highlights include:

- Secure Bicycle Parking Facilities: Staff is finalizing work on new "Bike and Ride" facilities at various locations countywide including: Phase II Silver Line stations, Stringfellow Road Park-and-Ride Lot and Springfield Community Business Center Commuter Parking Garage. This builds on the first "Bike & Ride" facility at Wiehle-Reston East Metrorail station. That facility provides enclosed, secure bicycle parking for over 200 bikes. There are over 255 paid members accessing the room.
- Improving connectivity/access for bicyclists by completing missing links, providing wayfinding signage and retrofitting roadways with on-road bike lanes:
    - Cinder Bed Road Bikeway: FCDOT has received $500,000 in grants to initiate environmental studies and preliminary engineering for the Cinder Bed Road Bikeway. This project will provide a new bicycle and pedestrian facility approximately three miles in length connecting the Franconia-Springfield Metrorail station and Springfield CBC to Fort Belvoir and activity centers to the south. The facility combines on-road bike lanes and shared use paths.
    - Vienna Metro-City of Fairfax-George Mason University (GMU) Connector: This is a cooperative project with the city, GMU and the Northern Virginia Regional Park Authority. A new trail connection from Towers Park to Vaden Drive will be an integral part of this route. This project has been funded and preliminary engineering has begun
- Bicycle Route Signage-Countywide: Staff has completed designs for the Reston area near the Metrorail station that would route bicyclists from and to the Metrorail. Staff continues to work on routing locations with the Silver Line stations.
- Western Fairfax Historic Cycle Tour: This pocket map has been completed. Staff is working with the Sully District to pick a sign design which will then be manufactured and placed along the route. Staff will also proceed with printing copies of the map book.

- Reston Capital Bikeshare Feasibility Study: The study was completed in July 2014. A second grant providing $400,000 for bikeshare infrastructure will be used to fund implementation of the program. Staff will be meeting with other county agencies and stakeholders to develop additional funding opportunities that will be needed to implement the project.
- 2015 Repaving Program: VDOT and FCDOT are working in close coordination to identify locations to improve multimodal safety and access by adding bicycle lanes during the annual summer repaving. Through a variety of methods, VDOT and FCDOT are able to add bicycle lanes to roads with extra width or capacity in their current configuration. The recently adopted bicycle master plan is helping to guide this process by matching roads listed on the repaving schedule to roads that have been identified for bicycle facilities. Successful projects that were completed in this manner include Lawyers Road, Soapstone Drive and Sherwood Hall Lane.

c. VDOT Pedestrian/Bicycling Facilities and Safety[31]

VDOT administers the Safe Routes to School program (SRTS), 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 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. The following projects were completed in 2015:

- U.S. Route 50 widening from Route 28 to Poland Rd (Loudoun County) includes a shared use path on both sides.
- The Stringfellow Road widening between Fair Lakes Blvd and U.S. Route 50 includes a sidewalk on one side, a shared use path on the other side and 14' wide curb lanes.
- The Telegraph Road improvements between South Van Dorn Street and South Kings Highway includes two striped, four-foot-wide on-road bike lanes, a five-foot-wide sidewalk on the east and 10-foot-wide shared-use path on the west.
- The newly constructed Jeff Todd Way between Telegraph Road and Richmond Highway includes five-foot-wide sidewalks and wide curb lanes to accommodate bicycles.

[31] Provided 2015 by John Muse, VDOT District Environmental Manager

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

d. Bus transit--Fairfax Connector and Metro Bus[32]

The county initiated the Fairfax Connector in September 1985 as a county-sponsored, cost-effective alternative to the bus service by the Washington Metropolitan Area Transit Authority (WMATA). The Fairfax Connector system now consists of 84 routes that provide over 650,000 revenue hours annually, representing 55 percent of the total bus service in the county. Fairfax Connector's available revenue vehicle fleet consists of 30-, 35- and 40-foot heavy-duty transit buses, all of which are owned by the county. The service, including the hiring and training of drivers and the maintenance of vehicles, is operated under contract with a private firm. Fairfax Connector buses operate within Fairfax County (including the Towns of Vienna and Herndon) and also provide commuter service to and from Arlington County (Crystal City and Pentagon).

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; and reducing the average age of the fleet to 2.8 years. FCDOT replaced 17 buses in FY 2015. All newer buses are equipped with Mini-Hybrid technology and meet strict EPA standards by using the newest emissions reduction technology. The maintenance and service buildings at West Ox Road have been converted to landfill gas for heat, which turns wasted energy into a useful product.

Connector is a compliment to Metro, and as Metro expands, Connector routes adapt to maximize the effectiveness of the new stations. With the Silver Line opening, coverage had to be modified to complement the faster Metro service in the northwest corner of the county. Two rounds of service changes have been implemented since the commencement of Silver Line service in July 2014. In total, approximately 40 percent of all Fairfax Connector bus service has changed to fit with the new Silver Line stations.

Highlights of the January 2015 service changes include:

- A new schedule to reduce passenger crowding and add extra time for buses to serve the Springfield Town Center and bus facility constructed at the Dunn Loring-Merrifield Metro station.
- A new schedule and added weekday trips between Fair Oaks and Reston.
- A change in the hours of operation of a portion of Route 335 to Fort Belvoir.
- Schedule adjustments to routes serving the Silver Line Metro stations to reflect current traffic conditions.

[32] Fairfax County DOT, Suggested Information for 2015 EQAC Annual Report

In May 2015, changes to 23 Fairfax Connector routes were implemented to improve on-time performance, enhance connectivity between routes and Metrorail and expand connections in the I-95 and I-395 corridors between Springfield, the Mark Center and Pentagon. Highlights of the May 2015 service changes include:

- New Reston internal schedules reflecting added trips and route changes.
- In Springfield, new service to the Mark Center and Pentagon.
- In Tysons, restructured service providing more direct, two-way service for passengers connecting with Silver Line on circulator routes.
- On the Tysons express lane service, schedule changes and consolidation. As a result, in June 2015, average daily ridership is approximately 150 passengers on Route 494 and approximately 64 passengers on Route 495. This is an increase over the FY 2014 average of 79 and 35 average daily riders on routes 494 and 495, respectively.
- In Lorton, the extension of Route 494 to the Lorton VRE station.

e. Bus Stop and Shelter Improvement Programs

In compliance with the agreement between the Department of Justice and Fairfax County, FCDOT has completed self-assessments of major park-and-ride facilities and bus stops improved by the county since 2007. FCDOT has submitted a remediation plan and anticipates completing remediation work over the next several years. Stop improvements are ongoing; they include improvements such as the construction of concrete or asphalt pads and accessible paths to and from bus stops. Progress in 2015 includes:

- 29 bus stop sites completed (457 sites have been completed to date).
- 26 bus stop sites authorized for or currently under construction.
- 55 bus stop sites in design or land acquisition phase.
- Eight bus stop sites in project initiation phase.

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. The current agreement permits several different advertising options and styles. The county's revenue share has been below initial estimates, but recent increases in advertising sales are anticipated to be sustained for the next two years.

5. Transportation Demand Management, Alternatives and Outreach

Transportation Demand Management is an important approach to maximize the effectiveness of the overall transportation network. The Mobility Lab[33] describes TDM as "*a program of information, encouragement and incentives provided by local or regional organizations to help people know about and use all their transportation options to optimize all modes in the system – and to counterbalance the incentives to drive that are so prevalent in subsidies of parking and roads.*" The Mobility Lab goes further to explain that *"TDM should guide everything we do in designing our transportation and physical infrastructure so that alternatives to driving are naturally encouraged and our systems are better balanced. TDM thus underlies most of the important new initiatives of today: transit-oriented development, complete streets, walkable activity centers, livability and sustainability initiatives, and integrated corridor management, to name a few examples."*

Fairfax County has been practicing TDM for many years, starting with early work encouraging telework and workforce flexibility, to new programs that tie TDM to development and county employees, residents and businesses to make better transportation choices.

a. TDM Tied to New Development in Fairfax County[34]

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 nonattainment 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 2012. In FY 2015, TDM proffers were committed for new developments in Reston, Fairfax, Tysons and Merrifield. Refinement to the reporting format was performed to streamline staff's ability to locate information quickly and also to remove redundancies, enabling quicker production times on the developer side. The implementation of TDM has been going smoothly, and proffer monitoring continues for properties throughout the county. Overall, the standardized TDM proffers are still seen as a benefit by all involved parties when compared to the previous method of securing TDM commitments.

33 http://mobilitylab.org/about-us/what-is-tdm/

34 Transportation Information for EQAC 2013, Kris Morley-Nikfar, FCDOT and Updated June 8, 2011, Dan Southworth, FCDOT

b. TDM for Employers—Results of the Transportation Services Group[35]

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 FY 2015 to continue to reach tens of thousands of people who live or work in Fairfax County with messages about environmentally friendly transportation options.

541 Fairfax County employers have implemented Transportation Demand Management programs. Of those programs, 263 are at level three or four, which means they have implemented benefits or programs that significantly help to reduce single-occupant vehicles. Outreach to businesses to encourage employee transportation benefits reached 670 new employers, impacting thousands of employees and commuters.

The RideSources program received 691 on-line applications from commuters looking for car or vanpool matches last year; over 255 participants were re-registered. RideSources staff assisted the regional Guaranteed Ride Home program by adding 168 commuters.

Information about transportation options such as the HOV and Express Toll lanes, RideSharing, Guaranteed Ride Home, SmartBenefits Plus50, car sharing, using bus and rail and teleworking is disseminated at outreach events throughout Fairfax County. In total, the Transportation Services Group (TSG) of the Fairfax County Department of Transportation participated in over 59 events within the community such as town fairs, employer fairs and public meetings.

The TSG, in partnership with the Center for Urban Transportation Research, has designated nine additional Fairfax County employers as “Best Workplaces for Commuters” in FY 2015. This raises the total number of recognized sites in Fairfax County to 47 since the program started in 2010. The employers were recognized by the Board of Supervisors in December 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 (NCTR) 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. Fairfax County staff also assisted NCTR in the conception and development of the national “BEST SITES” category, which recognizes developers, malls and office parks that have implemented planet-friendly trip reduction programs.

[35] Provided 2015 by Fairfax County Department of Transportation

The TSG continues outreach efforts including congestion mitigation and support for Base Realignment and Closure construction and relocation efforts. Fairfax County is working with VDOT and DRPT to provide transportation alternatives to employers impacted by I-66 and, I-95 Express Toll and Rail to Dulles construction. These ongoing activities have given the Employer Services program and RideSources team additional exposure to decision makers with many of the top corporations and organizations in Fairfax County.

c. TDM for Residents—Commuter Friendly Communities Program[36]

The FCDOT Commuter Friendly Communities program partnered with over 247 multi-family complexes, area developers and civic organizations to promote telecommuting, mass transit, carpools, vanpools, biking and walking instead of drive-alone commuting.

The Transportation Services Group also supports transportation management associations that assist commuters and the community. Some of these include the Dulles Area Transportation Association, LINK of Reston Town Center, TyTran in Tysons Corner and the Transportation Association of Greater Springfield.

d. Fairfax County Telework Initiative[37] and Options for County Employees

Fairfax County encourages employees to take public transportation to work through the Commuter Benefits Program. In 2014, there were 232 employees participating in the program. The county also provides reserved parking spaces for carpools and vanpools at some facilities.

The county has a long history with telework. Starting with 138 participants in 2001, the program increased 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). In 2015, there were 1,884 eligible county employees who teleworked at least one day a week.[38] The 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.

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.

[36] Provided 2014 by Kris Morley-Nikfar, Fairfax County Department of Transportation
37 Ibid + E-mail from Catherine Chianese, Assistant Fairfax County Executive, Sept 7, 2011
38 Provided July 2014 by Sharon Kay Hackett Organizational Development and Training Division

6. Highway Impact to Wetlands, Streams and Water Quality[39]

Due to the linear nature of highway construction projects, the presence of environmental resources varies from project to project. Environmental impacts must be minimized or mitigated during highway construction and water quality maintained after construction.

Impacts to stream and wetland resources from VDOT projects and activities are avoided and minimized to the extent feasible. Avoidance of such impacts involves a balance with avoiding and minimizing technical, logistical, socio-economic as well as other environmental resource factors to find the most practical and least environmentally-damaging solution. For unavoidable impacts to aquatic resources federal/state water quality laws and regulations may require compensatory mitigation in order to obtain water quality permit authorizations form the permit regulators.

Beginning in 2008, the Environmental Protection Agency, the U.S. Army Corps of Engineers and the Virginia Department of Environmental Quality jointly supported an order of preference for compensatory mitigation: first through purchase of stream and wetland credits from approved commercial mitigation banks; second by payment of in-lieu funds; and third by permittee responsible mitigation (i.e., preservation, enhancement, and creation) for compensation of unavoidable impacts to aquatic resources. As a result, VDOT now purchases wetland and stream credits from approved mitigation banks to fulfill compensatory requirements. While compensatory mitigation is ultimately subject to approval of the regulatory permitting agencies; VDOT is open suggestions for exploring mitigation opportunities within the Fairfax County geographical area.

Prior to the 2008 ruling, VDOT was required to design and construct on-site mitigation areas during project construction. Within Fairfax County, VDOT created several mitigation sites on state right-of-way totaling approximately eight acres of wetlands (seven acres non-tidal and one acre tidal) and approximately 2,635 linear feet of restored streams associated with unavoidable impacts from VDOT highway improvement projects (e.g., Fairfax County Parkway, Route 28 widening, Roberts Parkway bridge overpass, Springfield Interchange improvements, Route 29 bridge replacement over Big Rocky Run, Richmond Highway widening and Woodrow Wilson Bridge replacement).

These compensatory mitigation sites have satisfied the success establishment criteria set by the regulatory permitting agencies and now exist in perpetuity as protected conservation easements. One of that last remaining on-site mitigation sites under active post-construction permit monitoring is associated with the I-95/Telegraph Road interchange improvement project (opened to traffic last year). The compensatory mitigation requirements for the unavoidable impacts included wetland enhancement/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 plus 0.36 acre of stream restoration to relocated tributary to Cameron Run; these areas are in the third year of a five year monitoring period.

39 Provided 2015 by John Muse, VDOT District Environmental Manager

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. Under the new stormwater regulations effective last year, runoff from all existing and proposed impervious pavement on VDOT highway improvement projects will need to treated before it is discharged to adequate outfalls. These new requirements will increase the acreage of impervious road surface as well as expand the number of best management practice (BMP) measures for treatment of stormwater runoff from highways.

7. Highway Environmental Programs[40]

VDOT contributes information to EQAC for this report and several additional programs that are visible in Fairfax County should be highlighted. VDOT has indicated that it recognizes that solving transportation problems, no matter how simple or complex, also requires consideration of quality of life and the protection of the commonwealth's natural resources. EQAC appreciates and concurs with that new spirit.

a. Noise Barriers

Highway traffic noise is an important environmental issue and noise abatement measures help to improve quality of life for residents. Consistent with the Federal Highway Administration (FHA) regulation 23 CFR 772 and the State Noise Abatement Policy, construction of noise barrier systems have been completed on the following federal-aid projects in Fairfax County during FY 2014-15:

- Four new noise barrier systems on the Dulles Connector Road (VDOT Project # 0267-029-919,C501 / UPC 98232).
- Two replacement and three new noise barrier systems on the I-66 from Haycock Road to Lee Highway (VDOT Project No. 0066-96A-113, C501; UPC 78828).

Traffic noise studies are under way to assess impacts and determine whether noise barriers are warranted are presently under way for the following VDOT projects:

- Jones Branch Drive Connector over I-495 (administered by Fairfax County).
- Richmond Highway widening from Telegraph Road to Route 235.
- Route 7 bridge replacement and widening over the Dulles Airport Access and Toll Road.
- Route 7 corridor improvements from Reston Avenue to Jarrett Valley Drive.
- Route 28 corridor improvements from I-66 to Westfields Blvd.
- I-66 corridor improvements from I-495 to U.S. Route 15 in Prince William County.

[40] Provided 2015 by John Muse, VDOT District Environmental Manager

b. Environmental Commitment and Compliance Assistance Program

VDOT's *Environmental Commitments and Compliance* Assistance Program was developed pursuant to VDOT's *FY15 Business Plan*, which consists of eight Action Items/Goals. Action Item/Goal 4 is dedicated to Environmental Stewardship and requires VDOT "to protect the environment and improve the quality of life for Virginians" in its mission to build, operate and maintain highways. The primary objectives of this program are to establish a consistent process to communicate the environmental commitments (regulations, legislation and other legal requirements) at the beginning of project construction with active monitoring throughout the life of a project to ensure both compliance and proper implementation. The formal rollout of this program occurred on July 1, 2015.

c. Highway Lighting and Signals

VDOT Northern Region Operations (NRO) maintains and operates 224 dynamic message signs (DMS), most of which were installed in the early 1980s. Since 2010, NRO has been retrofitting DMS structures with light emitting diodes (LED). During the last fiscal year, 50 DMS signs utilizing the latest LED technology have been replaced throughout the interstate system in Northern Virginia.

The Northern Virginia District of VDOT maintains 1,382 traffic signals. Since the inception of a program to replace incandescent traffic signals with LEDs in 2002, more than 99 percent of all traffic signals in the district, including amber indicators and turn arrow signals, have been replaced with LEDs. The remaining non-LED traffic signals will be upgraded to LED by the end of the 2016 fiscal year with the funding available. VDOT no longer procures incandescent light bulbs for traffic signal use.

d. Landscaping and Aesthetics

VDOT has included landscaping on several road construction projects to enhance context-sensitive road design. Recent or current projects with landscaping include:

- Completion of the I-495 corridor-wide landscaping/reforestation project from Braddock Road to the Dulles Toll Road (14 miles along the inner and outer loops).
- Stringfellow Road widening between Fair Lakes Blvd. and U.S. Route 50.
- Jeff Todd Way between Telegraph Road and Richmond Highway.

Ongoing coordination continues among VDOT, the Fairfax County Restoration Project, Fairfax Re-Leaf and the Fairfax County Stormwater Planning Division on reforestation and stormwater management/water quality issues.

VDOT's *Wildflower Program* is funded through revenue fees paid of wildflower license plates at the Virginia Department of Motor Vehicles; approximately 3.5 acres

of right-of-way at four locations in Fairfax County are managed as wildflower meadows. Warm season, native grass species are seeded on construction projects where opportunity exists to take advantage of low maintenance requirements. Targeted control of invasive and nuisance vegetation is a large part of VDOT's *Roadside Vegetation Management Program* to promote the growth of more desirable species. Problematic roadside locations are prioritized for treatment and follow-up monitoring to reduce the population to a manageable level. For example, vegetation control work along segments of the pedestrian/ bicycle path along the Fairfax County/Franconia-Springfield Parkway was undertaken to remove and control encroaching brush as well as treat weeds growing in seams and cracks to provide a safer surface for path users.

e. Research

VDOT's research division, the Virginia Center for Transportation Innovation and Research (VCTIR), conducts research on current and future environmental topics related to maintenance, construction and operations of transportation systems. Current research projects include:

- ***Determining Animal Mortality Compost Maturity and Suitability for Road Project Applications for the Virginia Department of Transportation:*** The purpose of this study was to determine the time and treatment conditions necessary for compost vessels to generate mature compost and to evaluate the suitability of this compost for potential VDOT applications. The findings of this study were recommended for incorporation into a guidance document for VDOT animal mortality composting.
- ***Evaluation of a Buried Cable Roadside Animal Detection System:*** Animal-vehicle collisions (AVCs) are a concern resulting in hundreds of human fatalities and billions of dollars nationwide in property damage each year; VDOT currently spends over $4 million yearly to remove about 55,000 deer carcasses from its roadways. An innovative animal detection system, a buried dual-cable sensor system, was installed and tested under controlled conditions at a site on the Virginia Smart Road where large wild animals, including deer and bear, are often observed in a roadside environment. The evaluation concluded the system: can reliably detect large animals if properly installed; can differentiate among animals, humans and vehicle intruders; performs well under various traffic conditions; and is not affected by snowfall. A pilot study to perform a "real world" evaluation on a public road with a high rate of AVCs was recommended.

Prior studies that have environmental impacts include:

- ***Assessment of Low Impact Development Strategies for the Lorton Road Widening Project, Fairfax County, Virginia:*** The primary objectives of this study are to: (1) determine the effectiveness of multiple LID systems for mitigating potential adverse impacts of highway stormwater runoff; and (2) determine the maintenance requirements, procedures and costs associated with LIDs used in the highway setting.

- ***Permeable Pavement Pilot Using Porous Asphalt:*** This study addressed questions pertaining to installation costs, constructability, maintenance requirements and long-term hydraulic performance of permeable pavements. The pilot project is located at the I-66/Route 234 Bypass Park and Ride Facility in Prince William County.

Ongoing VCTIR research projects are at: http://vtrc.virginiadot.org/PUBS.aspx.

8. Major Transportation Projects[41]

The following section provides updates on the major transportation projects across the county in 2015.

a. Status of Dulles Rail Project

The Dulles Corridor Metrorail project (DCMP) has completed the extension between I-66 at the Dulles Connector Road and Wiehle Avenue in Reston. Substantial completion for the Silver Line, Phase 1 was declared in April 2014 and passenger service began in July 2014.

Fairfax County has completed construction on the below-grade 2,300 space commuter parking garage, 10 bus bays, 45 kiss-and-ride spaces and 150 secure bicycle spaces at the Wiehle-Reston East station. The commuter parking garage became operational in conjunction with the start of Silver Line passenger service in July 2014. The commuter parking garage is owned and maintained by Fairfax County. Comstock Partners continues construction of the mixed-use development that 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.

On February 23, 2010, the Board of Supervisors approved a Special Exception Amendment (SEA) for expansion of the West Falls Church Services and Inspection Yard to accommodate rail car storage and maintenance for Phase 1 of the DCMP extension to Wiehle Avenue. The SEA expanded the yard capacity by 42 rail cars and added more maintenance bays in a new annex building. As part of the approval, MWAA and 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 has been completed over the eastern most curved track in the yard to reduce “wheel squeal” that occurs as rail cars are moved within the yard. A Silver Line, Phase 1 bus service coordination plan was developed and coordinated by staff from the various service providers impacted by the DCMP: Fairfax Connector; Metrobus; Potomac and Rappahannock Transportation Commission; Loudoun County Transit; and MWAA – Washington Flyer. Staff has coordinated bus routes, bus bay assignments and other operational elements related to bus service to and from Phase 1 stations.

41 Provided 2014 by Kris Morley-Nikfar, Fairfax County Department of Transportation

After significant public outreach, FCDOT finalized the bus service plan to support the opening of Phase I of the Silver Line, which was approved by the board in June 2013. The service changes took place concurrently with the opening of the Silver Line on July 26, 2014. A substantial part of the plan was the implementation of a short-term circulator bus system within Tysons, called the Tysons Circulator (routes 422, 423 and 424), which provides a frequent bus connection from the new Silver Line stations in Tysons to the employment centers. These circulator routes 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 was 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 has changed in FY 2014.

b. Status of Dulles Rail Project Phase 2

The Metropolitan Washington Airports Authority is building the Dulles Corridor Metrorail Extension from 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 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 in July 2013. Design efforts are currently being completed for the three new stations in the county. Enabling construction work was initiated spring 2015 at Innovation Center station. Silver Line, Phase 2 substantial completion is expected in summer 2019 with passenger service to follow.

Design is also under way for the future park-and-ride garages at Innovation Center station and Herndon station that are to be constructed by the county. The park-and-ride garage at Innovation Center station is part of a joint development project and was approved in July 2014 as part of rezoning application. The Herndon station garage was the subject of a public facility review application (pursuant to Section 15.2-2232 of the Code of Virginia) that was approved in June 2014. FCDOT staff continues to coordinate with MWAA and other county agencies on the planning and construction of these garages. The garage completion is expected in spring 2019.

c. I-95 Express Lanes

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

This new project, which opened to the public in December of 2014, created approximately 29 miles of Express Lanes on I-95. This project added capacity to the existing HOV lanes from the Prince William Parkway to the vicinity of Edsall Road and improved 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 helps to alleviate the worst traffic bottleneck in the region.

As a separate project, plans are 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.

The Express Lanes project links the I-95 HOV lanes to new Express Lanes on the Capital Beltway, creating a 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 relieves one of the worst traffic bottlenecks in the region where the HOV lanes ended at Route 234 in Dumfries. Carpools with three or more people, vanpools and transit vehicles have free access to the Express Lanes network. The Express Lanes use dynamic tolling that adjusts 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 help maintain travel speeds, make travel times more predictable and reduce violators.

d. Columbia Pike Streetcar Project[42]

One of the biggest transportation disappointments in the county was a decision by Arlington County in November 2014 to cancel the Columbia Pike Streetcar Project. Fairfax and Arlington counties had been working on this project since 2012 to provide high quality transit options to this 7.4-mile corridor.

Fairfax County remains committed to providing high quality transit for the residents, workers and businesses in the Baileys Crossroads area. It is EQAC's view that this part of the county should have better transit options to align with the revitalization efforts in Seven Corners, Baileys Crossroads and Annandale.

The Coalition for Smarter Growth published an important collection of facts about the project:[43]

- With approximately 17,000 riders a day, right now, the Columbia Pike corridor is the busiest bus corridor in Virginia.
- The streetcar is projected to bring between $3.2 and $4.4 billion in real estate investment to the Columbia Pike corridor.
- Studies show that bus ridership in the Columbia Pike corridor is not growing. Ridership on the Metrobus and ART (Arlington Transit) routes that serve Columbia Pike climbed rapidly for five years after 2003, when Arlington

[42] Provided 2015 by Fairfax County Department of Transportation
[43] http://salsa3.salsalabs.com/o/2041/t/0/blastContent.jsp?email_blast_KEY=1295383

introduced a set of service enhancements, dubbed "PikeRide." However, since then ridership has stayed flat.

- Streetcars hold more people with fewer vehicles, which means moving more people through the corridor per hour. A standard Metrobus can carry 76 riders. An extra-long "articulated" Metrobus can carry 115 riders. A single streetcar can, however, carry 158 riders.
- On a per-mile or per-user basis, the streetcar costs less than other projects. The Beltway HOT lanes, for example, cost $1.4 billion for 14 miles and an estimated 66,000 users per day. Maryland's Intercounty Connector cost $2.6 billion for 18 miles and an estimated 30,000 users per day. The streetcar's upper estimated cost is $261 million -- for Arlington's five mile segment with an estimated 26,000 users per day.

e. Richmond Highway Widening Through Fort Belvoir

Richmond Highway through Fort Belvoir will be widened to six lanes from Telegraph Road to Mount Vernon Memorial Highway (approximately 3.4 miles). The project will include intersection improvements and provisions for bicycles, pedestrians and transit. It will also reserve right of way for future high-quality transit. The Federal Highway Administration completed an Environmental Assessment (EA) to comply with the National Environmental Policy Act. FCDOT prepared preliminary engineering documents in support of the EA. The project is administered by FHA in cooperation with the county, VDOT and U.S. Army Garrison Fort Belvoir. The design-build contract was awarded in April 2013. Target completion of the project is mid-2016.

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 environmental quality. But to do so requires sophisticated planning across 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 considers the laws governing development (i.e., the Zoning Ordinance). The ordinance needs to be updated continually 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. While the Plan describes what should be developed, the zoning codifies what legally can be built.

One item on the 2015 Priority 1 Zoning Ordinance Amendment Work Plan concerns parking reductions in transit-oriented areas. Parking maximums are a smart growth technique to give developers more flexibility when building space for automobiles. Rather than specifying hard minimums, they can use transportation demand management techniques to reduce the number required. This avoids excess parking and lets them build more valuable amenities that would have been devoted to automobiles. Some of the benefits include reduce energy consumption, improve air quality, reduce the amount of impervious surfaces and encourage the use of mass transit.

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 Planned Development Commercial (PDC) District and Planned Residential Mixed Use (PRM) District Amendment.

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 (OCR) facilitates strategic redevelopment and investment opportunities in older commercial activity centers in the county. In general, the county's revitalization plans support compact, pedestrian-oriented, mixed-use centers that reduce the need for automobiles and provide increased access to transit and other modes of transportation such as bicycling and walking. For more information, go to www.fcrevit.org. Much (but not all) of the discussion below regarding revitalization projects has been provided to EQAC directly from OCR.[44]

a. 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. While there are economic costs and benefits associated with the redevelopment of Tysons, there are also non-monetary benefits such as cleaner air, improved water quality, sustained economic vitality and improved quality of life. Achieving the vision for Tysons depends on implementing 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.

The vision for Tysons is based on the concept of transit-oriented development, which is a land use pattern that emphasizes compact, dense, walkable neighborhoods focused around transit stops. National studies have shown that TODs: provide

44 Provided to EQAC 2015 by Elizabeth Hagg, Deputy Director, OCR

increased transit ridership; significantly improve the efficiency and effectiveness of transit service investments; lower annual household rates of driving for those living, working and/or shopping within transit station areas; produce lower rates of air pollution and energy consumption by providing safe and easy pedestrian access to transit; and 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 through enhanced stormwater management, promotion of green buildings and provision of a green network of parks and open spaces, among other things.

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.

Since the adoption of the Plan in 2010, 22 rail-related zoning applications, containing a total of approximately 48.5 million square feet (SF), were approved. As of August 2015, almost four million square feet of development were under construction, about half of which are for residential uses and half for office, hotel and/or retail uses.

i. 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, developers, retail and residents; 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.

ii. Tysons Corner Urban Design Guidelines

In January 2012, the Board of Supervisors endorsed the Tysons Corner Urban Design Guidelines that provide recommendations to transition Tysons 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.

iii. Tysons Corner Park Plans

To be a great downtown, Tysons needs great parks. The Tysons Corner Comprehensive Plan amendment includes a conceptual park network and urban park service of 1.5 acres per 1,000 residents and one acre per 10,000 employees. The Plan also includes a typology of urban park types (pocket parks, civic plazas, common greens and recreation-focused parks), a recommendation for 20 new athletic fields to be built by 2050 and guidance on restoration and enhancement of existing stream valley parks in Tysons.

As Tysons undergoes transforms from a suburban commercial center to a major regional urban center, the urban park network will distinguish Tysons as a great urban place. To help ensure that happens, the Park Authority, in collaboration with the Department of Planning and Zoning and the Office of Community Revitalization, embarked upon an effort in 2012 to develop a comprehensive park system plan for Tysons. A Tysons Park System Concept Plan was developed with the involvement of an interagency team and advisory group consisting of citizens, design professionals, urban park planners and members of the Tysons Partnership. After an extensive public input process, the Plan was endorsed by the Park Authority Board in October 2014. www.fairfaxcounty.gov/parks/plandev/tysons-park-planning.htm

The Tysons Park System Concept Plan functions as a conceptual guide to bring about future park development by the public, private and nonprofit sectors to serve residents, employees and visitors. The Plan is organized to several key elements, including park placement and typology, connectivity, athletic fields and other recreational facilities, civic spaces and community building features and cultural and natural resource preservation and interpretation.

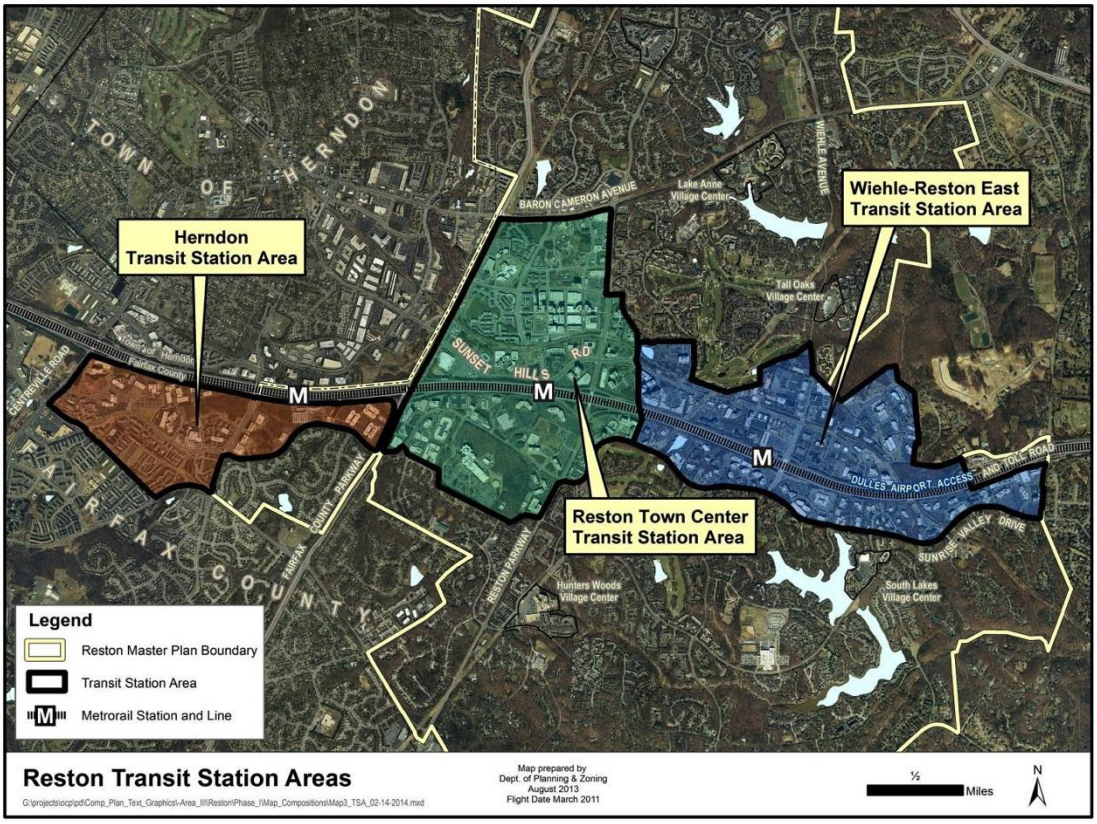
Combined, applications to rezone to the PTC district approved to date provide commitments to create a total of about 40 new acres of publicly-accessible urban park space. Most of the new parks will remain in private ownership and maintenance with public access easements. About 21 acres of new parkland in seven parcels will be dedicated to Fairfax County. With the approved applications, two full size and three smaller rectangular athletic fields (one of which is an interim use on a future school site) will be built and enough funding for two additional full size fields (land plus facilities) as redevelopment occurs. The first two new athletic fields were dedicated in May 2015. The Scotts Run Station South application made a commitment to improve the Scotts Run Stream Valley with trails, bridges, benches, interpretive signs, invasive species removal, stream bank restoration and stabilization and supplemental plantings. The Arbor Row application restored and dedicated a Scotts Run tributary, now known as Arbor Row Stream Valley, that runs between Jones Branch and Westpark Drives.

b. Reston Transit Station Areas

The Comprehensive Plan for the Reston's Transit Station Areas was amended in 2014, to encourage development related to Reston's new Metrorail Silver Line stations. The introduction of heavy rail to the Dulles corridor creates the opportunity for new TODs in each of the station areas. The planning objective for these TOD districts is to create transit-focused neighborhoods within one-half mile of the transit stations that will encourage pedestrian activity to enliven the area throughout the day and evening. The emphasis is on creating places and connections that are safe, comfortable and attractive for pedestrians and bicyclists. The Wiehle Reston East Metro station opened in July of 2014; the Reston Town Center, Herndon and Innovation Center stations are expected to be complete by 2020.

As with the TOD opportunities in Tysons, development opportunities around the Reston stations will increase the number of residential units, improve the walkability of the area and focus on infill development and an enhanced street network. The target development level is 28,000 new and existing residential units and approximately 30 million square feet of office uses (new and existing). The resulting development will further the principles that Reston was founded upon, allowing people to live, work, shop, worship and recreate in the same community. The land use pattern will have positive impacts on both individuals and the environment. The new mixed-use development planned in the TSAs will allow people to access many of their daily needs within walking or biking distance. New connections from the existing trail and bike networks in the established residential neighborhoods will be made, linking residents and employees to the Metro. The expected benefits for

personal health and quality of life include an overall reduction in health care costs and less time spent commuting. In addition, new development will provide more urban park space, improved green spaces and conservation of the existing natural environment through compact development and curbing sprawl.



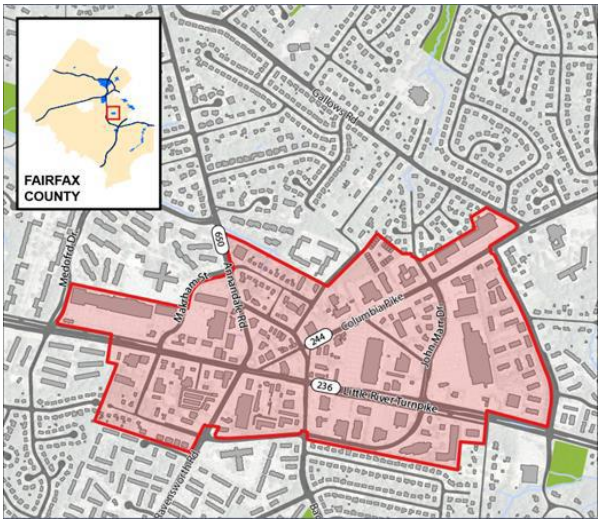
Expected environmental benefits include reduced air pollution as result of reduced vehicle miles traveled and less impervious surfaces resulting in a decrease in stormwater runoff. Green building techniques support a reduction in energy consumption; implementation of innovative energy generation and management techniques is also envisioned. Overall, new more compact development pattern will lessen the demand on the infrastructure through a more efficient use of resources.

i. Reston Area Urban Design Guidelines

OCR is developing Design Guidelines to support the approved Comprehensive Plan. The guidelines will build upon the plan recommendations and Fairfax County policies on Transit-Oriented Development and environmental sustainability. Once completed, the Urban Design Guidelines will be used to evaluate development applications and site plans to encourage walkable, mixed use development that implements sustainable design practices.

c. Annandale Commercial Revitalization District (CRD)

The 195 acre CRD is centered around the intersection of Columbia Pike and Route 236, and contains a wide variety of community serving office, retail and business uses bounded by stable residential neighborhoods.
In 2010, the board adopted an amendment to the Plan that incorporated a form-based planning approach to provide development flexibility by using building types, building heights and urban design guidance instead of Floor Area Ratio to guide and shape development.



In December 2014, the board approved the rezoning of a 3.5 acre site located near the intersection of Markham Street and Little River Turnpike. The Markham Place project is the first development approved under the new Plan and will consist of a 12-story, 310 unit residential building, 6,000 SF of nonresidential space, and 25 percent open space.

The Markham Place project will transform a single-use, surfaced parked 1960s era bowling alley into a vibrant, pedestrian-oriented mixed-use development.

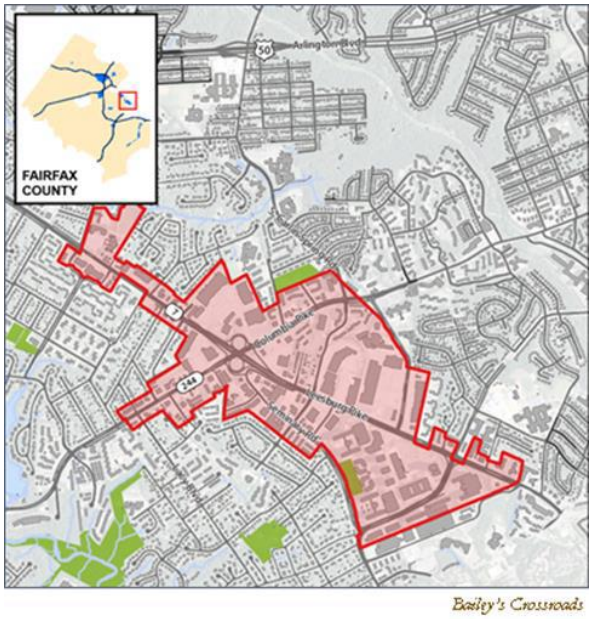
i. Columbia Pike Streetscape Project

A streetscape project comprised of 800 linear feet of brick paver sidewalk, street trees, curb and gutter, storm drainage items, benches, trash cans and acorn style streetlights was completed along the north side of Columbia Pike from Maple Place to Annandale Center Drive in summer 2014.

d. Baileys Crossroads/Seven Corners CRD

The Baileys Crossroads/Seven Corners CRD is on the eastern edge of Fairfax County adjacent to Arlington County; this Commercial Revitalization District includes two Community Business Centers – Baileys Crossroads and Seven Corners.

i. Baileys Crossroads



The Baileys Crossroads CBC encompasses approximately 530 acres of land surrounding the interchange of Leesburg Pike and Columbia Pike. In 2010, the Board of Supervisors approved the Baileys CBC Plan Amendment. This Plan Amendment encourages a transition from a predominately retail environment to one that balances retail, office, residential, civic uses and open space. It includes a "Town Center" and transportation improvements to balance land use with infrastructure and provide intermodal connectivity.

A key element of the original plan was the Columbia Pike streetcar project. That was unilaterally cancelled by Arlington County in 2014, leaving the Fairfax County community without direct linkage to the Pentagon and Metrorail. Other elements of the long term vision remain in place to position the area for redevelopment.
Proposals under review include redeveloping an underutilized industrial/outdated office site on Columbia Pike with mid-rise residential and public uses, and developing a vacant site on Leesburg Pike with a pharmacy/retail-strip center that places the parking to the rear and provides a public plaza and improved pedestrian connections.

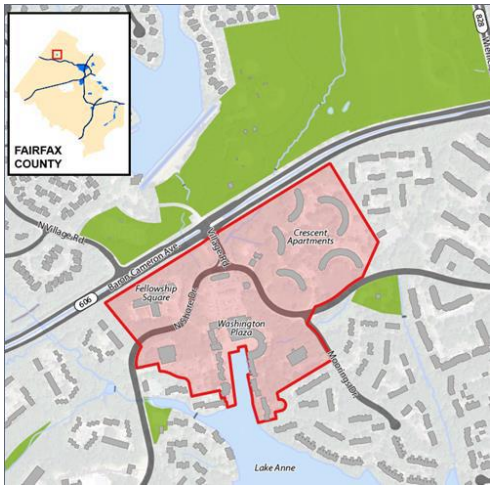
ii. Seven Corners

An extensive two-plus year planning process for the Seven Corners Community Business Center concluded with the board's adoption of the Plan amendment (2013-I-B2) on July 28, 2015. The planning process entailed two citizen committees – the Seven Corners Land Use and Transportation Task Force and the Opportunity Area C Special Working Group. The combined recommendations of these two groups were incorporated into a final draft Plan for the area.

The Plan is expected to bring about environmental benefits to the CBC. Currently, the area is completely built-out with extensive amounts of impervious surface. The CBC generally lacks modern stormwater management systems and buildings that meet green building standards. Through redevelopment in accordance with the Plan, there is an opportunity to achieve environmental goals in much of the CBC, such as reducing runoff that improves nearby water quality, reducing energy consumption due to a decreased reliance on automobiles and replacing older buildings with newer, more energy-efficient buildings.

e. Lake Anne Village Center Commercial Revitalization Area (CRA)

Built in 1965, the 45 acre Lake Anne Village Center (LAVC) was the first area to be developed in the planned community of Reston and in 2011 was designated as a Fairfax County Historic Overlay District. In 2006, the 16.5 acre Crescent Apartments property, located within the LAVC, was purchased by the Board of Supervisors to preserve affordable housing and encourage the revitalization of the aging LAVC.



In March 2009, the board adopted an amendment to the Plan to guide the revitalization of the LAVC. The Plan text includes urban design guidelines and guidance on the transportation network, provision of affordable housing, green buildings and infrastructure that is supportive of the unique character of the historically significant Washington Plaza.

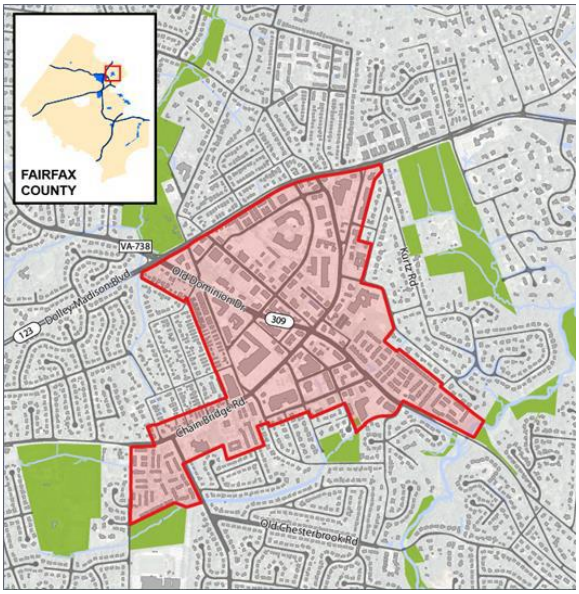
In February 2012, the county released a Request for Proposal for the redevelopment of the Crescent property, and encouraged respondents to consolidate and assemble additional properties within the LAVC as part of an innovative and imaginative mixed-use development. Following an extensive evaluation process, in 2013, the board entered into a public/private partnership with the Lake Anne Development Partners, LLC.

i. Lake Anne/Crescent Apartments Property Redevelopment

In 2015, the board approved a rezoning application to redevelop the 17 acre county owned Crescent Apartments property and additional properties within the LAVC as part of an integrated development plan. A comprehensive agreement addressing the financial and transactional aspects of the project was also approved.

The 24.3 acre development will realign Village Road to improve circulation and create a visual connection to Lake Anne and deliver 1.17 million SF in new housing, retail and office space, including up to 1,037 residential units and 136,173 SF of office and retail space in buildings that range in height from three to 18-stories. The development includes 185 affordable units to replace the existing 181 affordable Crescent Apartments. Additionally, 20 percent of all non-replacement units will be affordable. The development will provide public parks, plazas and pedestrian connections to link the development with the Washington Plaza and the existing Reston trail system; underground and garage parking; an amphitheater; bike share stations; and an improved main plaza for hosting a farmers market and other events. This redevelopment project is expected to interject needed vitality into the village center and enhance the LAVC as a place to live, work and play.

f. McLean CRD



The Plan for the 230 acre McLean CRD envisions the creation of community focal points that will provide a pedestrian-oriented Main Street in a South Village, and aesthetically integrated commercial uses in a North Village.

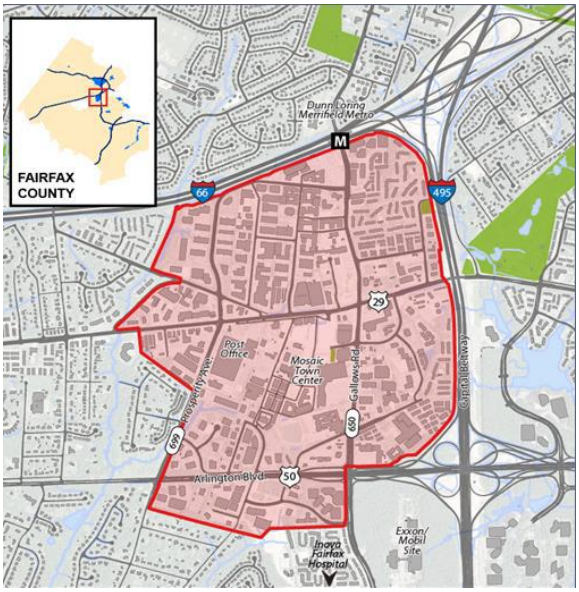
In 2013, the board adopted editorial edits to the Plan to clarify guidance for the McLean CBC. In 2014, the board approved an amendment to the Plan that re-designated the properties located northeast of Elm Street and southwest of Fleetwood Road from an Area of Minimum Change to a Redevelopment Area. The amended Plan provides for mixed-use development of up to 400,000 SF, with stipulations related to

consolidation, building and site design, circulation, parking and stormwater management. A rezoning application (the Elm Street Residences) was approved in July 2014 pursuant to that Plan guidance.

The Elm Street Residences project will transform a single-use, surface-parked office site into a pedestrian oriented, mixed-use development with neighborhood-serving retail uses, and open space. The development includes a seven-story, 263,806 SF multi-family residential building with street level retail and 7,010 SF of new ground-floor retail space in an existing eight-story office building.

Various infrastructure improvements are planned or under way in McLean, including utility underground, streetscape and pedestrian improvements, landscaping, gateway signage, signal and mast arm replacements and public art projects.

g. Merrifield CRA

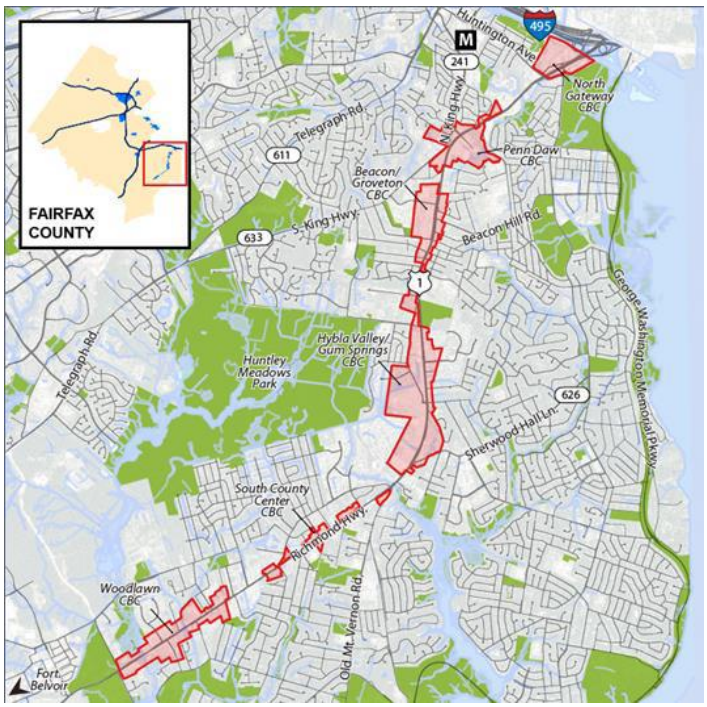


In 2001, the Board of Supervisors adopted an amendment to the Plan that created the Merrifield Suburban Center. The vision for the Merrifield Suburban Center includes two core areas: one focuses on development near the transit station and the second on a town center south of Route 29. A new "Main Street"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

Over the past decade Merrifield has been transforming into a thriving mixed-use area attracting new residents, while also supporting the surrounding existing neighborhoods. Recent mixed-use developments have brought additional residential, retail and office space and have included amenities such as improved pedestrian connections and open space. Projects in Merrifield include Halstead II, Avenir Place and Square 1400. Construction of the first phase of the Mosaic project, which is in the Town Center, was completed in fall 2013 with the opening of an urban-model Target, movie theatre, hotel, variety of retail, new park and townhomes. The remainder of the project is currently under construction and includes apartments, a new phase of townhomes and additional retail.

h. Richmond Highway Corridor CRD

The Richmond Highway corridor extends 7.5 miles from the Capital Beltway to Fort Belvoir. The CRD, which encompasses 700 acres, is not continuous, but rather consists of six distinct CBCs: North Gateway; Penn Daw; Beacon/Groveton; Hybla Valley/Gum Springs; South County Center; and Woodlawn. The CBCs are envisioned to serve as focal points or nodes for residential and mixed-use development.



Huntington Avenue from Telegraph Road to Richmond Highway and the Huntington Transit Station Area are also areas of interest to revitalization. The Huntington TSA is envisioned to include transit-focused housing and employment to take advantage of its location surrounding the Huntington Metro station.

Recent residential development activity, resulting from a strong multi-family residential market and proximity to the Huntington Metro station, has been concentrated in the northern end of the Richmond Highway corridor and the Huntington TSA. Projects include the completed Beacon at Groveton and the Shelby at Penn Daw, as well as the Parker at Huntington, which is under construction. Further south, the Accotink Village development will be providing a solar panel on the rooftop to promote sustainability. All of these projects are pedestrian-oriented, with improved streetscapes, pedestrian amenities and stormwater management; some took advantage of a parking reduction to promote the use of transit.

In May 2015, the Board of Supervisors endorsed the BRT (Bus Rapid Transit)/Metrorail Hybrid transit alternative for Richmond Highway (Route 1), authorized a Comprehensive Plan Amendment to consider the recommendations of the Route 1 Multimodal Alternative Analysis (includes roadway, transit and bicycle/pedestrian improvements) and directed staff to proceed with an Environmental Assessment for the project. This multi-phasic effort is anticipated to take approximately four years to complete.

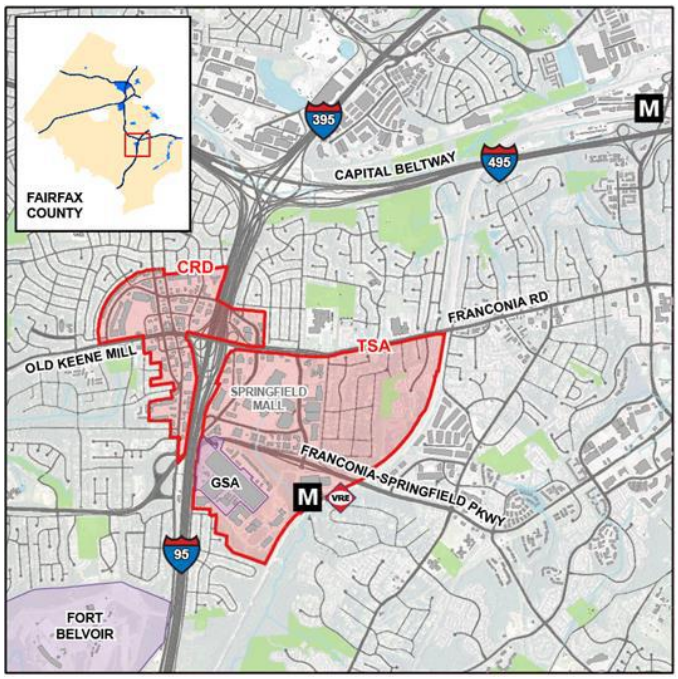
i. Transportation Projects

A number of significant transportation related activities are under way, including the following:

- *Richmond Highway Widening* – In 2011, the U.S. Department of Defense awarded $180 million to VDOT and Fairfax County for the design and construction of a project to widen the segment of Richmond Highway from Telegraph Road to Mount Vernon Highway from four to six lanes. The approximately 3.4-mile widening will include the provision of a shared-use trail along the northern edge and a pedestrian sidewalk along the southern edge, and will accommodate on-road bicycles. Construction of the project is projected to be completed by June 2016.
- Additionally, as part of its adopted six-year transportation plan, the Board of Supervisors approved $68 million for the widening of Richmond Highway from four to six lanes from Mount Vernon Memorial Highway to Napper Road. This project would include pedestrian and bicycle facilities and provisions for future transit.
- *Transit Center Study* – The Fairfax County Department of Transportation has identified possible sites on Richmond Highway for a transit center that would accommodate bus transfers in a convenient one-stop location.
- *Mulligan Road/Jeff Todd Way Project* – The project includes the construction of a new four-lane divided roadway from Telegraph Road to a realigned intersection with Mount Vernon Memorial Highway (Route 235) at Richmond Highway. This road provides a major east-west connection at the southern end of the Richmond Highway corridor for vehicles, pedestrians and bicyclists. Both sides of this road will have five-foot sidewalks. The road opened to traffic in August 2014.
- *VDRPT Multimodal Alternatives Transportation Analysis* - The Virginia Department of Rail and Public Transportation is conducting a multimodal study of Richmond Highway to identify the transit mode for the corridor while also addressing vehicular and pedestrian needs. Transit options being considered for further analysis are express bus, bus rapid transit, light rail (streetcar) and a combination of a Metro extension to Hybla Valley with BRT to the south. The study, which began in summer 2013, is being conducted with extensive community involvement.
- *Richmond Highway Public Transportation Initiative* - The Richmond Highway Public Transportation Initiative is a multi-year project that started in 2004 and is part of Fairfax County's Four-Year Transportation Plan. The goal is to upgrade transit and pedestrian facilities along Richmond Highway, and the initiative includes: improving bus service and pedestrian facilities; improving bus stop amenities and intersections to facilitate a safer and more inviting travel experience; developing or building bus transit centers; and using technology to make transit quicker and more utilized. Infrastructure improvements associated with the project include: pedestrian improvements at 29 intersections such as cross-walks, pedestrian signals and pedestrian

access improvements; completion of missing sections of sidewalks or trails at 24 locations; and various bus stop improvements.

i. Springfield CRD



A new vision for Springfield is contained in the Springfield Connectivity Plan, which was approved by the Board in 2010. The Plan includes land use intensities within the CRD designed to spur redevelopment, new transportation infrastructure improvements and detailed guidance with respect to urban design, streetscape and placemaking. The transformation of the central business area into a walkable village town center convenient to well-located and maintained neighborhoods is under way. A number of older and/or vacant retail structures have been redeveloped with new uses or updated structures, such as a Homewood Suites and a new commuter parking facility. A number of pedestrian improvements are being made to increase the safety and functionality of roadways in the CRD, including the removal and replacement of street trees, correcting safety concerns at two intersections, improving trail connections for bicyclists and replacing non-compliant bus shelters.

A complete street study is under way to further refine the street cross-sections contained in the Connectivity Study to take into account existing right-of-way while accommodating all appropriate modes of travel on Springfield's roadways.

i. <u>Springfield Town Center</u>

Redevelopment plans to transform the Springfield Mall into a mixed-use town center were approved by the board in 2009. The first phase of the new 2.1 million square foot Springfield Town Center opened in October 2014 and includes: renovation of the interior retail spaces; 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 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.

3. Metropolitan Washington Council of Governments

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.

The National Capital Region's Planning Directors and the COG Board of Directors worked to complete a regional initiative: "Place + Opportunity: Strategies for Creating Great Communities and a Stronger Region." The report presented a regional framework to understand common challenges and opportunities among Activity Centers in our region. Examining a cross section of the region's 141 Activity Centers (26 of which are located in Fairfax County), the Place + Opportunity Project Team conducted detailed analysis of each Center's market, urban form, and socioeconomic characteristics to identify six common Activity Center "place types" and four "opportunity types." For each place and opportunity type, the report provides a set of development goals, strategies and tools to support implementation of key priorities, complement local planning and development efforts and help communities meet their aspiration for their activity centers.

The Place + Opportunity: Strategies for Creating Great Communities and a Stronger Region report is available at www.regionforward.org/wp-content/uploads/Place-+-Opportunity-updated_2-14-14_web.pdf.

During fall 2014, the Planning Directors and COG's Cooperative Forecasting Subcommittee also completed the draft Round 8.4 Cooperative Forecasts of employment, population and household growth to 2040. The Round 8.4 Forecasts will be used by the National Capital Region Transportation Planning Board in the Air Quality Conformity Analysis of the 2015 Update to the Financially Constrained Long-Range Transportation Plan and FY 2015-2020 Transportation Improvement Program.[45]

[45] E-mail from Amanda Campbell, Metropolitan Washington Council of Governments, to Noel Kaplan, July 8, 2015.

4. Future Mega Projects

Over the past 10 years, the county has directed significant resources towards mega projects and revitalization. The rapid growth and investment in Tysons would not have been possible without the Metrorail expansion. Similarly, the successful Merrifield revitalization was anchored by the nearby Metrorail station. As the county looks forward for the next 25 years, the next mega projects that include expansion of Metro should be starting in earnest now.

One project already in place is the Route 7 Corridor Transit Study/Envision Route 7.[46] This is in-depth assessment of the travel needs in the corridor that includes the development of potential recommendations to improve mobility and accessibility to and within the Route 7 corridor between Tysons and the City of Alexandria. It is being conducted by the Northern Virginia Transportation Commission and is funded by the Northern Virginia Transportation Authority. The primary objective of this study will be to assess the project for viability and, if desired, prepare for entrance into the Federal Transit Administration's Project Development process. The public is welcome to participate through crowdsourcing on the study map at: www.envisionroute7.com/crowdsource/map. Many of the comments reflect both transportation and development concerns, how to live and work together in a busy corridor.

EQAC encourages the work on both Columbia Pike and Route 7. As the Metrorail expansion continues to Dulles, these projects can be anchors for the next round of transit expansion around the Beltway. The spoke from the Pentagon through Arlington to Baileys Crossroads then to Annandale was dealt a blow by Arlington County's decision to withdraw from the Columbia Pike streetcar project. Refocusing on the county needs to connect Tysons and Dulles to Springfield through Annandale would link the county together. Now is the time to prioritize these long-term projects.

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 Metropolitan Washington Council of Governments' Region Forward 2050 plan.

Fairfax County is expected to increase both population and jobs by more than 200,000 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

[46] www.envisionroute7.com/

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

While there is still much to be done, EQAC is pleased to recognize that several recommendations have been completed and significant long term projects are coming to fruition.

1. Silver Line Service to Dulles

Last year saw the Silver Line begin service to Reston. This year, work continues on extending the line to Dulles Airport. This is one of the last mega-projects to revamp our aging infrastructure and extend core services.

2. 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 in 2012. 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: 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: www.fairfaxcounty.gov/chairman/evolution-of-transportation.htm

3. Update to the Comprehensive Plan Map

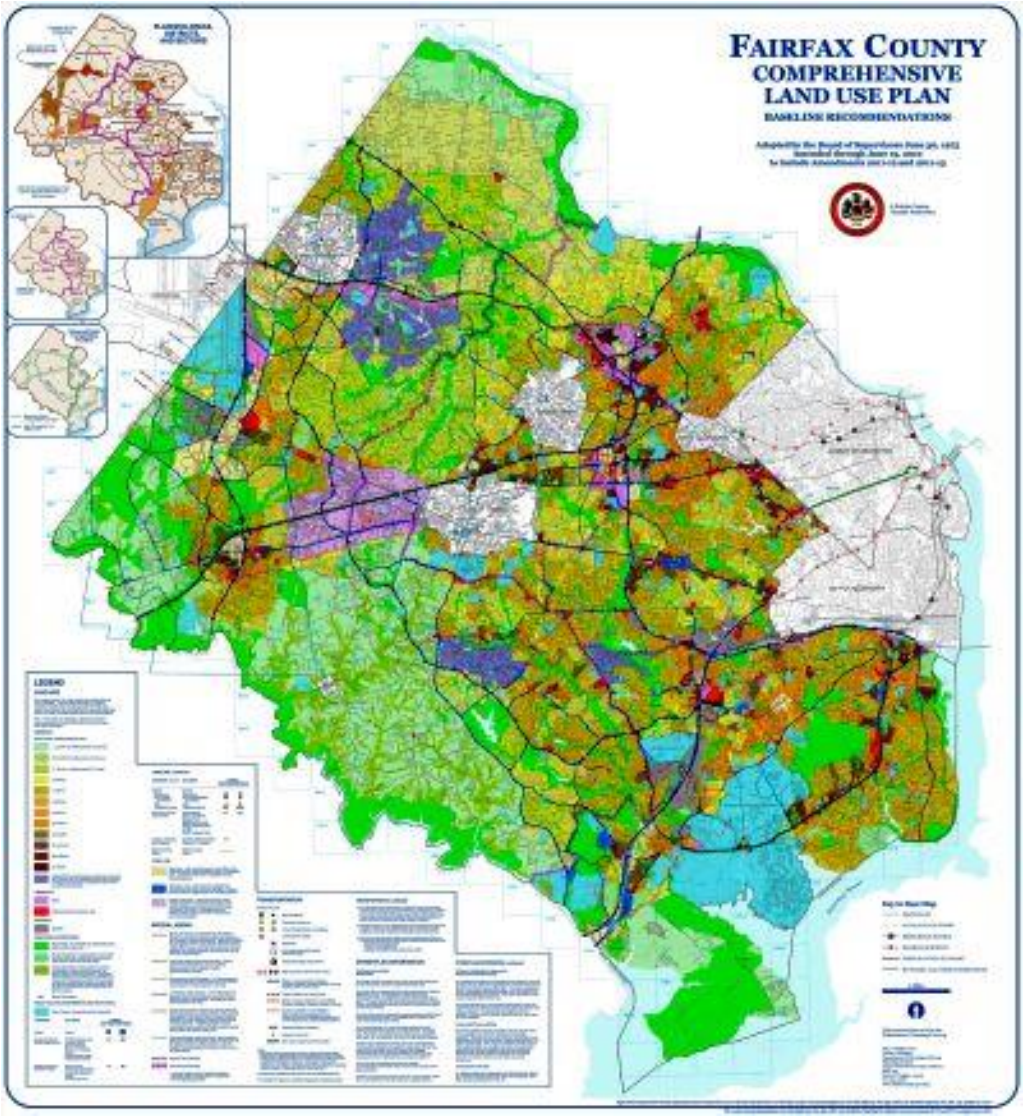
The Comprehensive Plan map was updated by the Board of Supervisors on June 19, 2012 and is available on the Internet at: www.fairfaxcounty.gov/dpz/comprehensiveplan/compplanmap.htm.

A copy of this map is shown as Figure II-9.

Previously, 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.

Figure II-9. Comprehensive Plan Map



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 July 2015, the county had a total of 36 green building projects, 17 of which attained certification (15 under the LEED program and two under the Green Globes program). The other 19 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 eight 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 Mega Projects

The county has seen the successful completion of several mega projects such as the I-495 Express Lanes and Beltway widening and the Dulles Corridor Rail Project. These projects fundamentally changed and improved the transportation flow in the region. 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 delivered the promised service improvements. 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.

We also advocate that a dialogue begin on the next mega projects which should include:

1. Continued expansion of Metro in the county through additional stops and expanding capacity on the existing lines. With the cancellation of the Columbia Pike Streetcar, that corridor needs renewed focus to build the backbone for the next 20 years.

2. Focus on improving multi-modal options within and between urban centers, especially along the Richmond Highway corridor.

3. Continue working to improve transit utilization through a systematic plan that includes multiple options within a community. This can be combined with pedestrian improvements, more connector bus options and biking trails that together provide a diverse transportation plan.

2. 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:

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

2. 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.

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

3. Comprehensive Planning

EQAC fully supports changes that have been made to the Comprehensive Plan update process and the retrospective analysis of changes that have been realized by the Plan over the past 37 years. The 2012 review of the Plan "*State of the Plan, An Evaluation of Comprehensive Plan Activities between 2000-2010*" (published in 2012) should continue to be updated every 10 years.

EQAC also endorses efforts to focus on revitalization through the Office of Community Revitalization (established in 2007) and the Fairfax Forward process that succeeds the Area Plans Review (APR) process 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.

We are encouraged to see Fairfax Forward as the long term process to update the Comprehensive Plan and completely replace the APR process. We also commend the Fairfax Forward team for providing a wealth of information to the public on the county Web page.

H. RECOMMENDATIONS

1. Continue to Innovate with Social Media

EQAC commends the county for embracing new technology and leveraging the Web to share and interact with public. We recommend that the county continue 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. Social media is very powerful for encouraging and educating people about alternative transportation options. The Envision 7 crowd sourcing map is one innovative example that can be replicated: www.envisionroute7.com/crowdsource/map.

2. Urban Design Guidelines

Urban guidelines are designed to improve the environment, quality of life, balance and safety of a well-planned mixed-use place. These new guidelines 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. EQAC recommends that the county develop one countywide set of urban design guidelines that would have sufficient breadth to address variations in circumstances among mixed-use centers within the county, as opposed to the development of multiple area-specific urban design guidelines. These urban design guidelines should be the baseline expectation for development in mixed-use centers, with exceptions as necessary to accommodate site-specific considerations.

3. 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 development data be comprehensively integrated into the county's Integrated Parcel Lifecycle System and used for forecasting, as demonstrated by residential data that have been harnessed in IPLS for that purpose. Currently, nonresidential data on proposed development projects are captured in disparate systems for zoning and site plan applications, but have not been fully brought into IPLS, and, therefore, cannot be used for forecasting.

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. Multi-spectral imagery has the potential to enhance our knowledge of the county by answering questions such as tree species identification and tree canopy density.

4. Transportation

EQAC recommends that the county provide priority for non-motorized/multi-modal transportation options. EQAC supports the goals of Fairfax Advocates for Better Bicycling which include:

- Implementation of the bicycle master plan, which is now complete and ready for implementation.

- Growing the bike share community in Fairfax County.
- Encouraging the Safe Routes to School project with Fairfax County Public Schools.
- Implementation of an outreach and education program for encouraging/promoting bicycling as a transportation mode. This could be called "Bike Fairfax!"

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OTHERS

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2015 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, a robust air monitoring network collects samples of our air for specific pollutants to determine air quality. Actions are taken against those who cause concentrations to exceed federal standards and against entities that fail to meet other regulatory requirements. Fairfax County's major responsibility involves participation and coordination with regional organizations on plans intended to reduce air pollution and improve air quality. The county has also taken a leadership role beyond the limits of its traditional air quality partnership; it helped formulate and subsequently adopted a program to reduce gases that may be the cause of global climate change (see chapter on Climate Change and Energy). With regard to criteria pollutant air quality matters, Fairfax County has demonstrated a continuing commitment to being an active partner in improving the region's air quality.

In support of the regional goal of improving air quality and attaining the federal ambient air quality standards, Fairfax County has, for many years, implemented air quality improvement strategies that include:

- Reducing county vehicle emissions through the purchase of hybrid vehicles, diesel retrofits and the use of ultra-low sulfur fuel.
- Not allowing refueling of county vehicles except emergency vehicles on Code Red Days.
- Encouraging county residents to use the Fairfax Connector bus rides on Code Red Days (free rides are provided on the Connector Bus on Code Red Days; this is a regional policy that all local governments have adopted to incentivize the use of public transportation on those days).
- Teleworking.
- Not allowing mowing of grass at county properties on Code Red Days.
- Use of low volatile organic compound paints.
- Promoting county building energy efficiency programs.
- Tree canopy and planting activities.
- Green building actions.
- Support for non-motorized transportation such as bicycling and pedestrian programs.
- Participation in community outreach.
- Maintaining standards and procedures that promote healthy air.

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, and, at this time the Health Department does not have an air quality program. The county contributes to the Metropolitan Washington Council of Governments (COG) and uses the outreach materials that are developed for the region. The budget reductions also ended the county's Air Quality Monitoring Program. The Health Department stopped conducting air quality monitoring activities in June 2010. At that time, the Virginia Department of Environmental Quality (DEQ) assumed responsibility for air quality monitoring in Fairfax County. The county continues to participate in regional air quality planning activities, with a staff person serving on the Metropolitan Washington Air Quality Committee (MWAQC) and the Technical Advisory Committee (TAC) to MWAQC. The Health Department's function is to provide health information as needed.

b. Update on Air Quality Regulatory Changes

i. Cross State Air Pollution Rule

On July 6, 2011, the U.S. Environmental Protection Agency (EPA) finalized the Cross State Air Pollution Rule (CSAPR), which required reductions in emissions of oxides of nitrogen and sulfur dioxide from large fossil fuel-fired electrical generating units. This rule requires 27 states in the eastern half of the United States to reduce power plant emissions. EPA estimates that CSAPR will 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 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, and on April 29, 2014, the court reversed the D.C. Circuit opinion vacating CSAPR. CSAPR took effect in Virginia on January 1, 2015.

ii. Mercury and Air Toxics Rule

On December 16, 2011, EPA finalized national Clean Air Act (CAA) 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 in Virginia. 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.

Dominion Virginia Power has requested and received an extension for Units 1 and 2 at the Yorktown Power Station. The request notes that these coal-fired units will be retired by April 16, 2016. Additionally, Dominion Virginia Power retired four coal-fired units located at the Chesapeake Power Station in December 2014. These changes should improve air quality in all downwind areas.

iii. Stage II Gasoline Vapor Recovery Systems

On May 16, 2012, EPA published a notice that states could remove Stage II gasoline dispensing controls in areas where newer vehicle control technology superseded the need for Stage II controls. Virginia had previously adopted Stage II requirements in the Northern Virginia area, including Fairfax County, due to Clean Air Act mandates. DEQ submitted a request on March 18, 2014, to remove the Stage II program for the Northern Virginia area. Calculations in this request show that emissions actually increase from these systems in the Northern Virginia area due to incompatibilities between the Stage II equipment and onboard vehicle control equipment installed on newer vehicles. DEQ is working to remove these requirements from the Virginia regulations and is waiting for EPA's final approval of the request, expected in 2015.

iv. Greenhouse Gas Permitting

On January 2, 2011, greenhouse gases became pollutants regulated by the major source air permitting process pursuant to federal requirements. On May 13, 2011, EPA approved Virginia's program for GHGs. As a result of this approval, DEQ, not EPA, became the official permitting authority for major sources emitting GHGs. A facility must address its GHG emissions only if it emits more than 100,000 tons per year of carbon dioxide equivalent pollution or if it modifies its operations such that there is at least a 75,000 tons per year increase in CO_2e. These regulations exclude minor sources of air pollution from the GHG requirements.

v. Greenhouse Gas Guidelines for Existing Electric Generating Units

On June 18, 2014, EPA proposed the Clean Power Plan in the *Federal Register* (79 FR 34830). This proposal would cut CO_2 emissions from coal-fired and oil-fired electrical generating units in 2030 by 30 percent from 2005 levels, which is equivalent to about 730 million metric tons of carbon pollution (none of the units are located in Fairfax County). Reductions would begin in 2020. The proposal suggests setting interim and final goals for every state, and these goals would include energy efficiency and renewable energy building blocks. The comment period for this proposal closed on December 1, 2014. EPA has received over 4,000,000 public comments on this proposal.

vi. Reasonably Available Control Technology

The Clean Air Act requires that all major stationary sources of VOC located in the Ozone Transport Region, which includes Fairfax County, must install Reasonably Available Control Technology (RACT) to support each promulgated ozone standard. EPA published final rules supporting this requirement for the 2008 ozone standard on March 6, 2015 (80 FR 12264). Virginia DEQ is in the process of identifying subject facilities and updating state regulations to require the submittal of RACT analyses. Emission reductions deemed RACT compliant must be implemented no later than January 1, 2017, according to federal requirements

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

i. Atmospheric (Ground-Level) Ozone

On April 28, 2008, EPA announced that the Washington metropolitan 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 (due to “anti-backsliding” provisions).

On May 21, 2012, EPA published final designations for areas under the 2008 Ozone NAAQS. The Washington metropolitan area was designated as being in nonattainment of this standard, with a classification of marginal. The area’s compliance date for the 2008 ozone NAAQS was July 20, 2015. Since three full seasons of monitoring data are required for a compliance determination, the data collected in the summer of 2014 are being evaluated by EPA for compliance with this standard. The design value for the Washington metropolitan area was 76 ppb for 2012 through 2014. However, in

areas with no monitored exceedances during the most recent summer, the Clean Air Act allows states to request an extension of the compliance date, rather than having the area's classification "bumped up" to moderate. EPA defines a monitored exceedance as data from any monitoring site where the fourth highest eight-hour average ozone concentration exceeds 75 ppb. The Washington metropolitan area did not have an exceedance of the 75 ppb standard in 2014, and Virginia is requesting that EPA extend the area's 2008 ozone NAAQS compliance date.

Preliminary 2015 ozone data shows that the area also did not have an exceedance of the 75 ppb standard during the most recent summer. The preliminary design value for the area, using 2013 through 2015 data, is now 70 ppb, which is less than the 2008 ozone NAAQS. On December 17, 2014, EPA proposed to revise the ozone standard and requested comment on a range of 65 to 70 ppb (79 FR 75234). The proposal also noted that EPA would accept comments on standards as low as 60 ppb. The comment period for this proposal closed on March 17, 2015, and EPA adopted a new standard of 70 ppb shortly before this report went to print—EQAC will provide more information about the updated standard and its implications in its next Annual Report on the Environment.

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

Effective December 14, 2009, EPA announced that the Washington metropolitan area 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. EPA published approval of the redesignation request and maintenance plan on November 5, 2014 in the *Federal Register* (79 FR 60081). Within Virginia's regulations, the Northern Virginia area was redesignated to attainment/maintenance for this standard on March 11, 2015. This redesignation highlights the improvements seen in $PM_{2.5}$ air quality within the Washington metropolitan area.

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 15.0 $\mu g/m^3$. On October 8, 2009, EPA designated all of Virginia, including Northern Virginia, as being in attainment of this standard.

On December 14, 2012, EPA finalized an update to the $PM_{2.5}$ NAAQS, setting the annual health standard at 12.0 μg/m^3. On January 15, 2015, EPA designated the Washington metropolitan area, including Northern Virginia, as being in attainment of this standard (80 FR 2206).

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. This standard will protect people against adverse health effects associated with short-term exposure to NO_2, including respiratory effects. The standard also requires monitoring to occur near roads, in areas with high community-wide NO_2 concentrations, and in low income or minority at-risk communities. 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 Virginia show compliant measurements. EPA did not revise the existing secondary SO_2 NAAQS of 0.50 ppm over a three-hour average (set to protect public welfare, including effects on soil, water, visibility, wildlife, crops, vegetation, national monuments and buildings).

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 μg/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. No areas in Virginia were designated as nonattainment for the 2008 Lead NAAQS.

2. Air Quality Status in Northern Virginia

a. Introduction

Air pollutants are emitted by four types of sources: stationary (i.e. power plants and industrial); area (i.e. gasoline service stations and dry cleaners); nonroad (i.e. airplanes, tractors, boats); and mobile (i.e. automobiles and trucks).

EPA tracks the emission of air pollutants from stationary sources, including sources in Fairfax County. They are regulated under the Clean Air Act and the National Ambient Air Quality Standards. Virginia DEQ's air compliance program conducts inspections of facilities within Fairfax County and records information on violations in the state's database, the Comprehensive Environmental Data System.

Emissions from all sources are modeled by a number of modeling centers, including the University of Maryland/Maryland Department of the Environment, DEQ, and the Ozone Transport Commission, to determine if the National Capital Region complies with Clean Air Act requirements. The region and the Commonwealth of Virginia have had to develop air quality plans to improve air quality when the region is not in compliance.

b. Status of State Air Quality Plans

i. Ground-Level Ozone

In April 2004, EPA designated the Washington metropolitan region as a moderate nonattainment area for the eight-hour ozone standard of 0.08 ppm (80 ppb). This required the region's states to develop and implement ozone reduction strategies in the form of a State Implementation Plan (SIP). The SIP is the state's "master plan" for attaining and maintaining the NAAQS. Virginia, Maryland and the District of Columbia submitted the Washington region's attainment plan for the 1997 ozone NAAQS to EPA in May 2007. EPA published final approval of this plan on April 10, 2015 (80 FR 19206).

The region had a deadline of June 15, 2010 to meet the 0.08 ppm 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.

EPA published a revised eight-hour ozone standard of 0.075 ppm in March 2008 and, in July 2012, designated the Washington metropolitan region as a marginal nonattainment area for this standard. The region had

a July 20, 2014 deadline to meet the 0.075 ppm ozone standard. In 2014, the area's design value was 76 ppb (0.076 ppm); however, the area is requesting an extension of the deadline under the CAA due to the area's 2014 ozone data showing no exceedances of the standard.

Figures III-1 through III-3 and Table III-1 present regional air quality trends as they relate to the 2008 eight-hour ozone standard.

In 2014, monitors recorded data on four days during the ozone season when ozone values were above the 0.075 ppm standard. The 2014 summertime ozone data resulted in a three year design value for 2012 through 2014 of 0.076 ppm. Since the region's design value was above the 2008 ozone standard, there was a possibility that the region would not meet the 2008 standard, which would result in the area being reclassified (bumped-up) to the moderate nonattainment level. To prepare for this possibility, the Metropolitan Washington Air Quality Committee Technical Advisory Committee is developing a Reasonable Further Progress plan and laying the groundwork for an attainment plan, if needed. Additionally, DEQ has sent a request to EPA to extend the attainment date by one year to July 20, 2016. The Clean Air Act allows states to request this one year extensions to the attainment date as long as it meets the criteria for such extensions.

Preliminary data show that monitors in the metropolitan region recorded data on five days during the 2015 ozone season when ozone values were above the 0.075 ppm standard. This resulted in a preliminary design value for 2013 through 2015 of 0.070 ppm (70 ppb), which is less than the 2008 ozone standard.

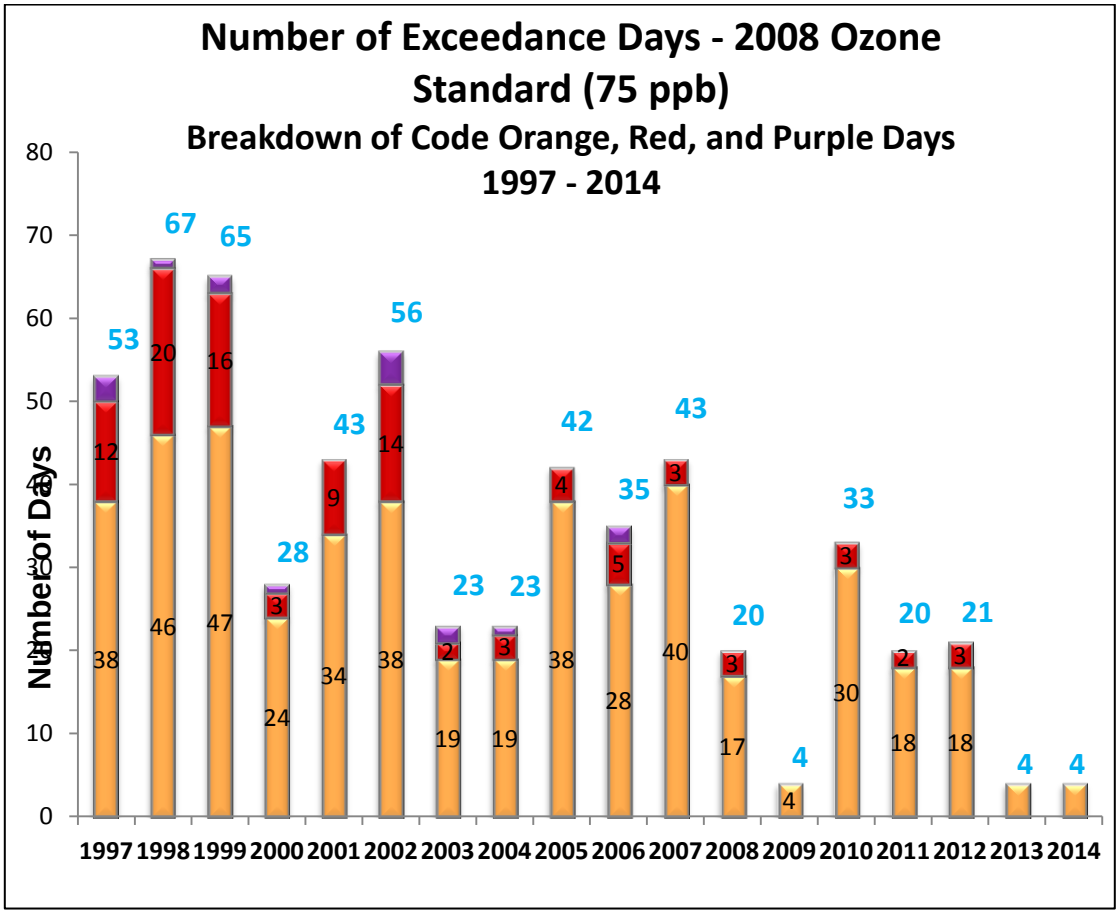
EPA adopted a new standard of 70 ppb shortly before this report went to print—EQAC will provide more information about the updated standard and its implications in its next Annual Report on the Environment.

ii. Fine Particulate Matter

The current federal NAAQS for fine particulate ($PM_{2.5}$) set limitations of 12.0 $\mu g/m^3$ on an annual average, as required by the 2012 $PM_{2.5}$ NAAQS, and 35 $\mu g/m^3$, as required by the 2006 $PM_{2.5}$ NAAQS. The Washington metropolitan area has met these standards for several years.

Fine particulate concentrations have continued to improve over the past several years. Additional improvements are expected due to the installation of upwind control devices and retirements of coal fired combustion units. Figures III-4 and III-5 present regional $PM_{2.5}$ trends (annual and 24-hour, respectively) as they relate to the standard.

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



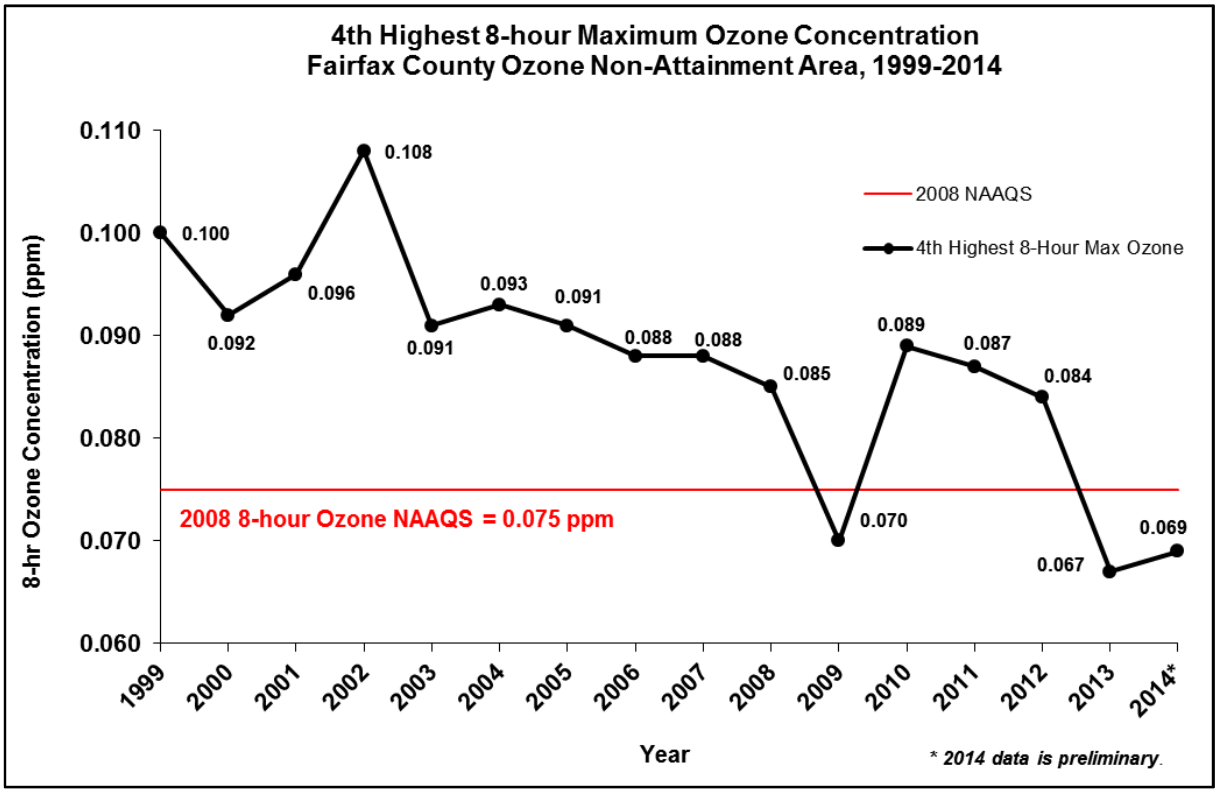
Source: Metropolitan Washington Council of Governments. 2014 data are preliminary and are subject to change.

Table III-1. Regional Eight Hour Ozone Exceedances – 2014 (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
6/16/2014	0.087	2
7/11/2014	0.076	1
8/6/2014	0.077	1
8/27/2014	0.076	1

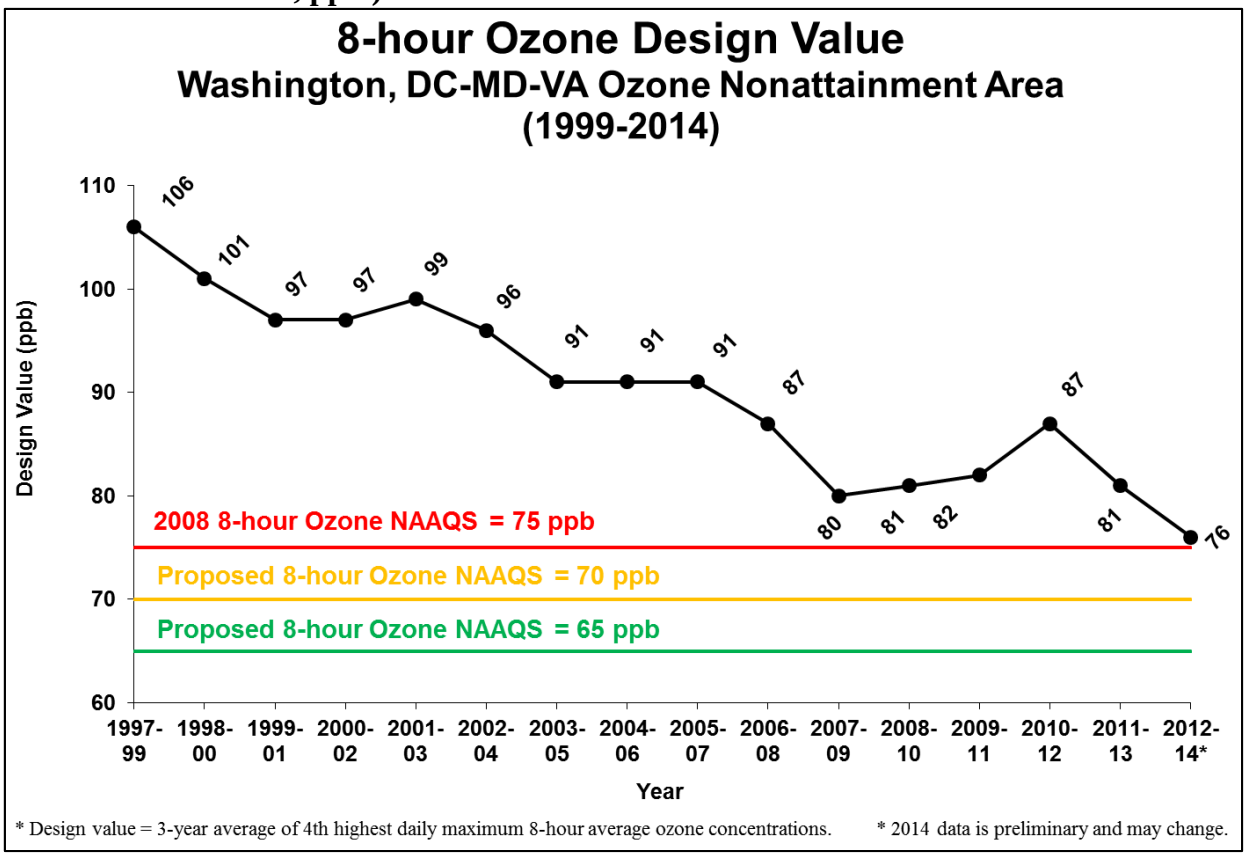
Source: Metropolitan Washington Council of Governments. 2014 data are preliminary and are subject to change.

Figure III-2. Air Quality Trends in Relation to the Eight-Hour Ozone Standard, Fairfax County (Fourth Highest Daily Maximum Eight-Hour Ozone Concentration, ppm)



Source: Metropolitan Washington Council of Governments. 2014 data are preliminary and are subject to change.

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



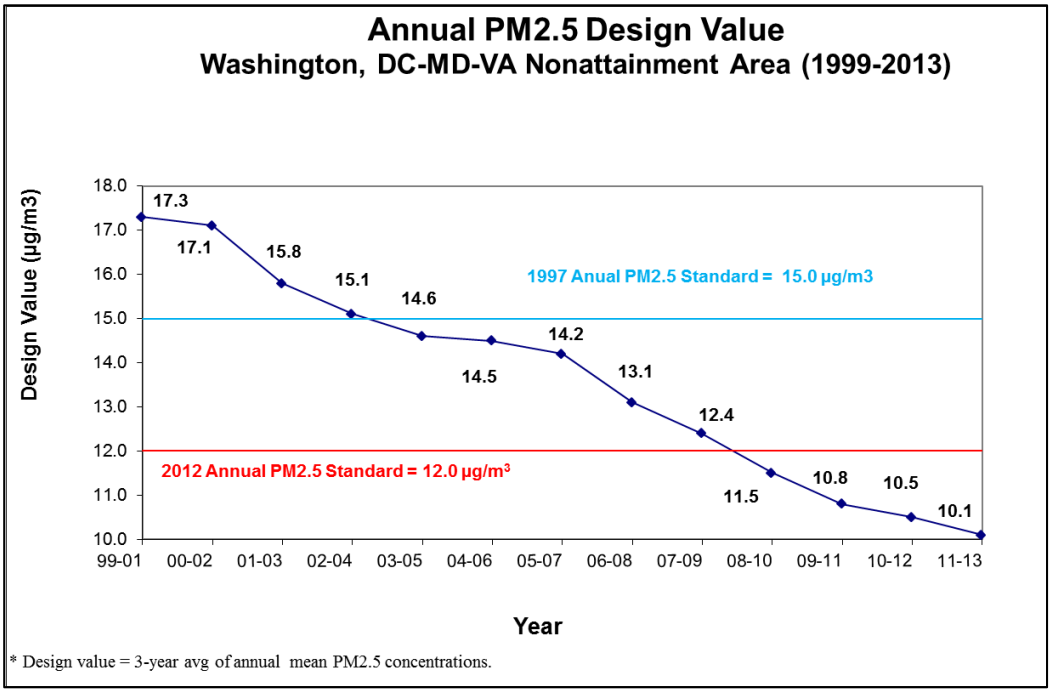
Source: Metropolitan Washington Council of Governments. 2014 data are preliminary and are subject to change.

In May 2013 the Metropolitan Washington Air Quality Committee endorsed a redesignation request and maintenance plan for $PM_{2.5}$. DEQ submitted these documents to EPA on June 3, 2013. EPA published approval of the redesignation request and maintenance plan on November 5, 2014 in the *Federal Register* (79 FR 60081). Within Virginia's regulations, the Northern Virginia area was redesignated to attainment/maintenance for this standard on March 11, 2015. This redesignation highlights the improvements seen in $PM_{2.5}$ air quality within the Washington metropolitan area.

iii. Nitrogen Dioxide--NO_2

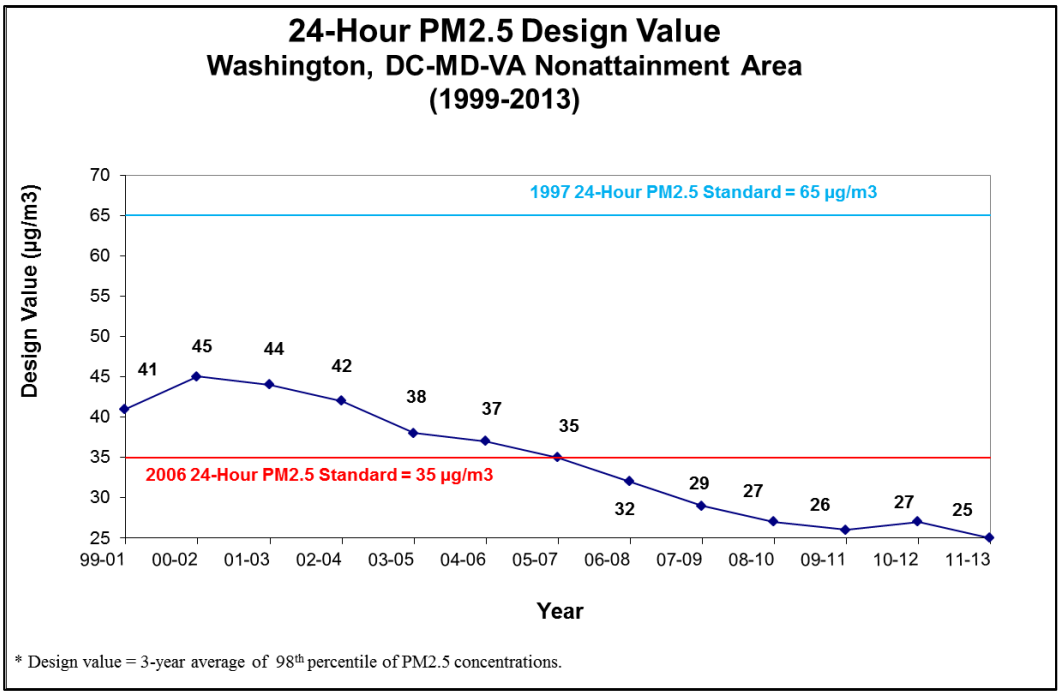
DEQ is in the process of installing a near-road monitoring site at the Backlick Road park and ride lot, and this site will include an NO_2 monitor.

Figure III-4. Air Quality Trends in Relation to the Annual Fine Particle ($PM_{2.5}$) Standard (3-Year Average of Annual Mean $PM_{2.5}$ Concentrations, ug/m3)



Source: Metropolitan Washington Council of Governments

Figure III-5. Air Quality Trends in Relation to the Daily Fine Particle ($PM_{2.5}$) Standard (3-Year Average of 98th Percentile of $PM_{2.5}$ Concentrations, ug/m3)

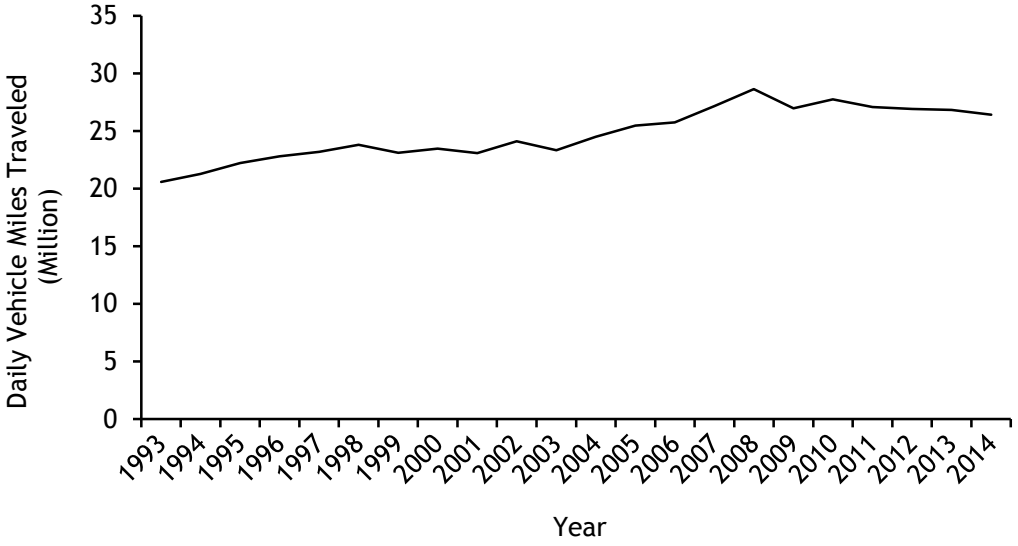


Source: Metropolitan Washington Council of Governments.

c. 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 approximately 26.4 million vehicle miles were traveled daily in 2014, a slight decrease from the number for 2013.

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



Source: Virginia Department of Transportation

The Fairfax County Department of Transportation (FCDOT) provided the following information (based on the 2011 American Community Survey 1-year estimate, area: Fairfax County, with revised estimates for Fairfax County for 2012 as provided on the survey's website and as refined for this report by FCDOT) for the 606,954 workers, 16 years of age and over, who live in Fairfax County:

- 71.6 percent drove alone to work in a car, truck, or van.
- 10.2 percent of those workers commuted via carpool or vanpool.
- 9.1 percent used public transportation (excluding taxicabs).
- 1.8 percent walked to work.

- 1.6 percent used other means.
- 5.8 percent worked at home (this number may not fully represent the true number of teleworkers in Fairfax County).

DEQ operates a motor vehicle inspection and maintenance (IM) program in Northern Virginia, which requires that vehicles pass an emissions test every two years in order to register or reregister with the Virginia Department of Motor Vehicles. In 2013, over 868,000 vehicles were tested in the Northern Virginia area (data are not yet available for 2014). Fairfax County vehicles represent 47.2 percent of the IM fleet in the area. The overall fail rate was 4.0 percent, and the fail rate increases as vehicles age. Several changes to the program occurred during 2014 or are about to be implemented. One major change, which relates to the fail rate, will be an increase in the new vehicle exemption period from two years to four years. Based on historical data, these newer vehicles have a very low fail rate so the overall program effectiveness should not be affected. Another significant change will be the expansion of the "Clean Screen" program, in which 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. DEQ anticipates no negative impact on the overall effectiveness of the emissions inspection program as a result of this change. Moreover, this program improvement will increase the number of very high emitters identified that must retest and get repairs. DEQ expects that the expanded clean screen program will be implemented in 2015. A final change, which was fully implemented in 2014, was new emissions testing equipment and a faster internet-based communication system, which has improved customer convenience.

The following information was provided by the Fairfax County Department of Vehicle Services (DVS):

i. Update on purchase of alternate fuel vehicles

The Fairfax County Department of Vehicle Services' responsibilities include management of the county's Vehicle Replacement Fund. In response to the county's desire for cleaner and more energy efficient vehicles, DVS has included 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 acceptable to the using agency and conditions warrant. The county's fleet includes 117 hybrid electric and plug-in hybrid-electric vehicles. The county saves over 16,000 gallons of gas on average each year from its use of hybrid vehicles.

Using federal stimulus funding, in the 2011-2012 period DVS added 16 Ford Fusion Hybrids, five Chevrolet Volts and one plug-in hybrid electric school bus to the county fleet. In December 2014, DVS purchased an all-electric Nissan LEAF. In FY 2016, DVS plans to

purchase an additional all-electric vehicle and increase the fleet of hybrid-electric to 135. DVS anticipates installing charging stations necessary to support the electric vehicles.

ii. Other DVS initiatives

- In FY 2015, DVS purchased 132 school buses that use Selective Catalytic Reduction (SCR) technology. SCR meets the EPA 2010 requirement of providing engine emissions to near zero (a NOx level of 0.2 g/bhp-hr).

- DVS has implemented an automotive parts core reuse program.

- DVS is transitioning school buses that are model year 2009 and newer to 5W-40 synthetic motor oil, which reduces harmful engine deposits.

- DVS upgraded the Alban fuel site by installing new double walled tanks, lines and fuel dispensers.

- DVS upgraded fuel sites at Fair Oaks Police Station, McLean Police Station and Government Center, Newington DVS Maintenance Facility and Newington Connector Bus in conjunction with major facility construction.

- The Newington Maintenance Facility was constructed in June 2013. The modern LEED certified facility was built using materials with recycled content purchased regionally within a 500-mile radius of the project. Also, the building was designed to ensure no increase in runoff. Rain from the roof is captured for vehicle washing.

- DVS continues to recycle waste antifreeze, scrap metal and retread tires.

- DVS sells leftover waste oil (that is not burned in its waste oil furnaces).

d. 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 2020, the board has designated over $313 million in federal, state and county funding to construct 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 2015, the county has completed construction on 121 sites/segments; 16 are under construction and another 96 are under design.

i. Bicycle Program

Fairfax County's bicycle program was established by the Board of Supervisors in late 2006 and the responsibilities for program implementation were assigned to the Fairfax County Department of Transportation. The Virginia Department of Transportation (VDOT) administers the Safe Routes to School Program and continues to ensure that biking remains an integral component of Virginia's multimodal transportation system. Please see the Land Use and Transportation chapter of this report for information about these efforts as well as FY 2015 funding allocations to Fairfax County through VDOT's Transportation Alternatives Program.

e. Additional Air Quality Information from Fairfax County

i. Radon

Fairfax County has natural mineral deposits that release radon gas. The health risk from radon can be reduced significantly when known in advance. The Fairfax County Health Department has developed specific resources necessary to let residents know in advance the potential risks associated with a property. Extensive information is available online and residents who contact the department are provided information based on their specific circumstances.

The Surgeon General has identified radon as a leading cause of lung cancer. The U.S. Environmental Protection Agency broadly considers all of Fairfax County as a high risk for the accumulation of radon gas inside homes. However, studies conducted by the Fairfax County Health Department resulted in a more detailed map identifying radon risk rankings from low to high in geographic regions of the county. This map, along with information to include radon mitigation techniques, can be found on the Health Department's Radon Information Web page at www.fairfaxcounty.gov/hd/air/radon.htm.

ii. Asbestos

Asbestos, a known human carcinogen when inhaled, is a mineral found within certain geologic formations in Fairfax County. Fairfax County has approximately 11 square miles of land with the potential for these mineral deposits. The Fairfax County Health Department has maps showing these areas in the county, along with additional information

sources, on the Health Department's Naturally Occurring Asbestos Web page at www.fairfaxcounty.gov/hd/chs/natural-asb.htm

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 Washington metropolitan 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 approve regulations, 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

The Metropolitan Washington Council of Governments is the regional planning group that works toward solutions to regional problems related to air and water quality, energy, climate change, transportation and housing. COG also manages other programs such as those responsible for forecasting demographic changes.

The Metropolitan Washington Air Quality committee, which is a part of COG, partners with the state air agencies to assist in the development of air quality plans as required under Section 174 of the Clean Air Act. MWAQC's authority 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 local planning organizations, 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 Washington metropolitan region. Three members of the Fairfax County Board of Supervisors currently serve on the committee. The Transportation Planning Board (TPB), which also is part of COG, serves as the designated Metropolitan Planning Organization for the Washington region and is responsible for regional transportation planning and conformity. 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 daily basis. Staff from the Fairfax Health Department attends MWAQC meetings to support the Fairfax County members.

MWAQC operates through a subcommittee system. Subcommittees include:

a. MWAQC Technical Advisory Committee (TAC)

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 (IAQC)

The Interstate Air Quality Council consists of six members: the secretaries of the environment and transportation from Virginia, Maryland and the District of Columbia 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 information on the 2008 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 and Climate Public Advisory Committee (ACPAC)

The Air and Climate Public Advisory Committee advises COG's Metropolitan Washington Air Quality Committee and Climate, Energy and Environment Policy Committee on air quality, climate, and energy issues and initiatives. ACPAC provides a forum for members to provide input to local elected officials and staff on environmental policy issues and stay informed of local and regional progress. Six members represent Northern Virginia.

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. Summary of Regional Air Quality Planning Efforts in 2014

a. $PM_{2.5}$ Redesignation Request & Maintenance Plan

MWAQC developed a redesignation request and maintenance plan for the 1997 $PM_{2.5}$ NAAQS and DEQ submitted these final documents to EPA on June 3, 2013. These documents included mobile vehicle emissions budgets for $PM_{2.5}$ and NOx for 2007, 2017, and 2025. EPA approved the above plan along with mobile budgets in it and reclassified the Washington region as a maintenance area for the 1997 $PM_{2.5}$ NAAQS.

b. Attainment Modeling

MWAQC staff participated in the Mid-Atlantic Regional Air Management Association (MARAMA) to follow their development of emissions inventories. MARAMA also evaluated various ozone NAAQS attainment scenarios using a regional photochemical model for the current and expected future ozone NAAQS. 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.

c. Transportation Conformity/Mobile Emissions Analysis

MWAQC commented on the transportation conformity analysis (2014 Constrained Long-Range Transportation Plan and 2015-2020 Transportation Improvement Program).

Conformity was tested against the attainment and contingency mobile budgets in the region's eight-hour ozone SIP for:

a) The 1997 ozone standard.
b) Winter carbon monoxide (CO) mobile budgets in the CO maintenance plan.
c) $PM_{2.5}$ and NOx mobile budgets in the region's $PM_{2.5}$ maintenance plan for the attainment year 2007 emissions, interim year 2017, and the future year 2025.

The conformity analysis showed current and future mobile emissions lower than the ozone, $PM_{2.5}$, and CO mobile budgets. MWAQC noted 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.

d. Air and Climate Public Advisory Committee

Key topics ACPAC took on in 2014 include the Gold Book (compilation of local air quality initiatives), EPA Clean Power Plan, Metro's Sustainability Agenda, transportation planning and air quality conformity, air quality

impacts on environmental health and environmental justice. ACPAC served as the judging panel for the Climate and Energy Leadership Awards at its July meeting. At the December meeting, ACPAC received a Climate Communications Training session from the Frameworks Institute.

e. Climate Change and Air Quality Technical Support

MWAQC staff, with collaboration from COG climate, energy and transportation staff, reviewed and revised the Gold Book (https://www.mwcog.org/uploads/committee-documents/Zl1YV1xb20141001155247.pdf), the region's compendium of voluntary local measures to clean the air. The Gold Book presents a summary of measures currently in place, those that could be expanded for further air quality improvements, and new initiatives for local government consideration.

5. MWAQC FY 2016 Work Program

MWAQC and the states will work towards maintaining compliance with the 2008 ozone NAAQS and meeting the recently-adopted lower ozone NAAQS. A number of potential control measures to address the ozone NAAQS will be evaluated based on their ability to cost-effectively reduce ozone precursors NOx and VOCs (volatile organic compounds). The region may also quantify control measures' co-benefits in reducing SO_2 or $PM_{2.5}$ emissions. The work program will also provide technical support for local government air quality initiatives. Coordinating air quality planning with state and local clean energy programs will continue to be a focus.

In FY2016, MWAQC Core Program tasks include:

- Prepare ground work to develop a State Implementation Plan for the 2008 Ozone NAAQS. This is needed in the event the Washington metropolitan region is reclassified to a Moderate Nonattainment Area. Identify cost-effective control measures to meet the requirements of attaining future standards. Finalize the Reasonable Further Progress (RFP) plan as required by the 1997 $PM_{2.5}$ NAAQS redesignation request and maintenance plan.

- Develop RFP and attainment year inventories for ozone.

- Develop updated 2017 and 2025 mobile vehicle emissions budgets for NOx and $PM_{2.5}$ for the 1997 $PM_{2.5}$ Maintenance Plan.

- Conduct revisions for MOVES2014 model implementation.

- Review and comment on transportation conformity assessments for ozone, $PM_{2.5}$, and CO.

- Work with the Region Forward Coalition, TPB, COG's Climate, Energy and Environment Policy Committee (CEEPC) and others at COG to identify and coordinate opportunities to advance strategies identified in the Regional Transportation Priorities Plan.

- Work with the Multi-Sector Greenhouse Gas Workgroup to develop actions that provide co-benefits for reducing emission of ozone precursors.

- Coordinate air quality planning with state and local Clean Energy Programs.

C. STEWARDSHIP OPPORTUNITIES

Residents of Fairfax County have many opportunities to contribute to improvements in air quality. While some of the Washington metropolitan 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 STARTM 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.

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 has previously commented about Fairfax County's plans to cease the operation of the four ozone air quality monitors and expressed concerns about the elimination of those ozone monitors, in particular the one in Mount Vernon. DEQ notes that the annual network monitoring plan is available yearly to the public for review and comment. It is usually made available in May of the year, with the final due to EPA in July. In addition, information was provided by DEQ about the results from statistical analyses relating to monitors that they maintain in Northern Virginia (see, e.g., letter from DEQ to ACPAC). Further, DEQ notes that additional data are not available to perform a more up-to-date analysis than the one noted in 2010. Unless additional information is made available relevant to this concern, EQAC will no longer identify this issue in its Annual Report on the Environment.

2. Although Health Department staff no longer participates in air quality monitoring or planning activities, EQAC appreciates that the county continues to support participation in and attendance at Metropolitan Washington Council of Governments' Air Quality Committee meetings and meetings of MWAQC's Technical Advisory Committee and subcommittees. In addition, county 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; provide for interagency coordination as needed on efforts to reduce air pollution;

perform legislative reviews; 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 2020, the board has designated over $313 million in federal, state and county funding to construct 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.

E. RECOMMENDATIONS

None.

F. REFERENCES

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2015 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 impacted significantly by human activities such as 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.

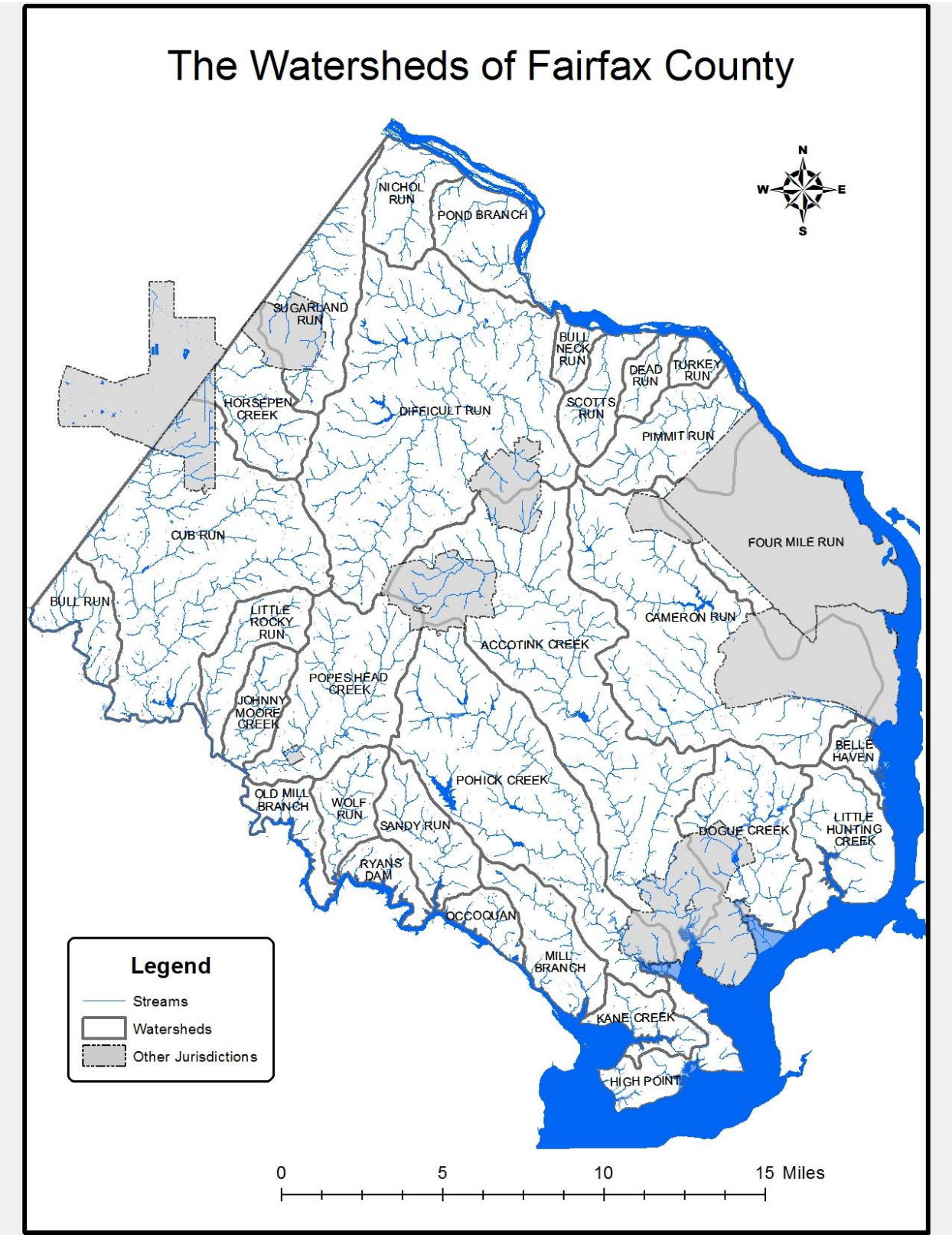
1. Watersheds

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. Watersheds nest within one another, with large watersheds typically having 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 drained 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 typically 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.

Figure IV-2: A Healthy Stream

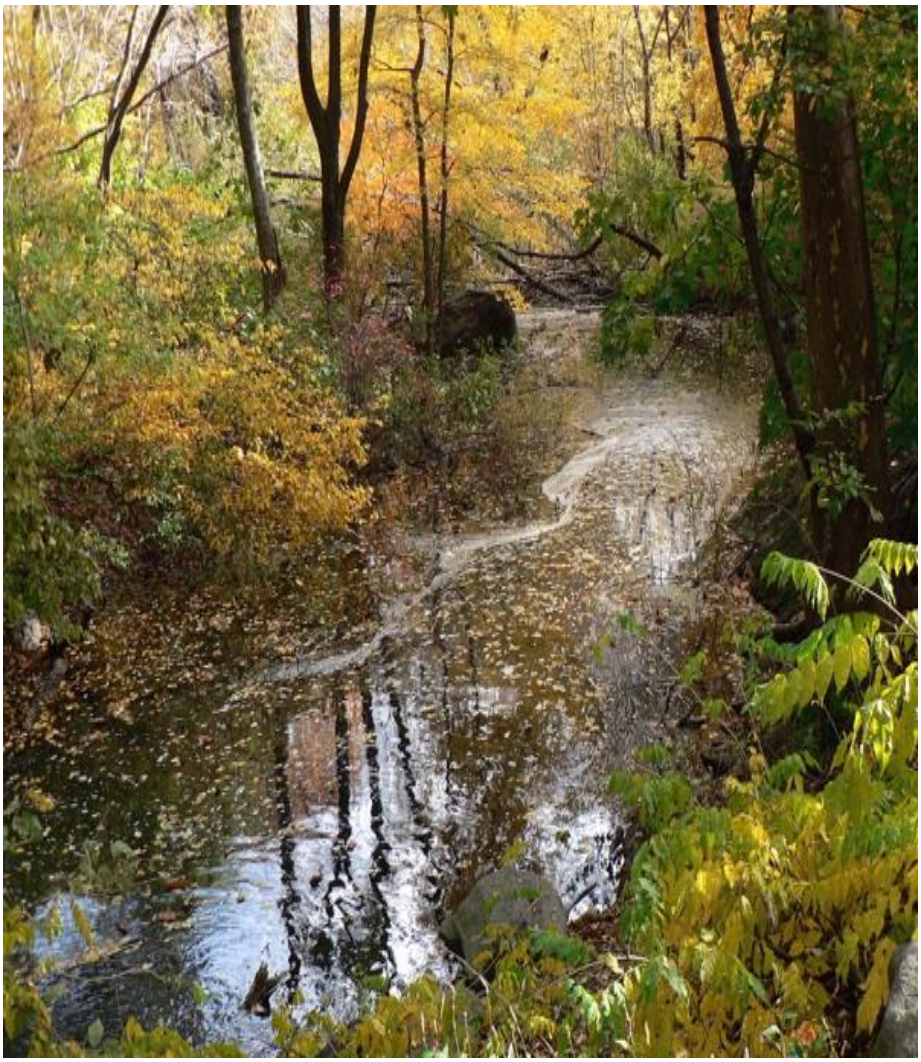


Figure IV-3: Components of a healthy stream

Lakesuperiorstreams. 2009. LakeSuperiorStreams: Community Partnerships For Understanding Water Quality and Stormwater Impacts at the Head of the Great Lakes (http://lakesuperiorstreams.org). University of Minnesota-Duluth, Duluth, MN 55812.

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 zone. 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.

Figure IV-4: An Unhealthy Stream

Photo provided by the Fairfax County Department of Public Works and Environmental Services.

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. 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, the amount of stormwater runoff increases and it flows into streams more quickly. Increased uncontrolled runoff causes stream erosion, resulting in scouring, down cutting and over-widening of stream channels and loss of streamside vegetation. 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. 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.

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 lead to habitat loss, water quality problems and damage to utilities and infrastructure.

2. Point and Nonpoint Source Pollution Treatment and Management

Water pollution originates from either nonpoint or point sources.

Point sources are specific locations, such as discharge pipes, where pollutants can enter a waterway. In the Potomac River watershed, most point sources are wastewater treatment plants or industrial discharges. Wastewater treatment facilities have significant infrastructure in pipes and pumping stations that must be maintained rigorously to ensure that no wastewater effluent leaks into the soil or surface waters. Because they are gravity fed, pipes carrying raw sewage to treatment facilities often are found near or below streams. Because of effective wastewater treatment, point sources are not, however, the largest source of water pollution in Fairfax County.

Nonpoint sources include surface runoff, atmospheric deposition and groundwater flow. Because of its 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 stimulate algal growth. Other nonpoint source pollutants are sediment (from erosion, construction sites, eroded stream banks and road sand), toxics (oil, paint, pesticides, chemicals and metals), pathogens and bacteria (animal waste, failing septic systems and leaking sewer systems) and trash. In areas with buildings, roads and parking lots, the water flows over these surfaces into storm drains. Storm drains lead to streams, not to a wastewater treatment facility. Anything that goes down a storm drain goes directly to the nearest stream. Stormwater is also treated by either constructing facilities that capture the rainfall on site and infiltrate it into the ground or by conveyances and facilities that carry the water off site to facilities that treat and release the water into streams or lakes. The purpose of stormwater management is to manage both the quality and quantity of water coming off sites with increased impervious surfaces. Management removes pollutants and controls volume to reduce flooding and the erosive quality of increased water flow on streambanks and bottoms.

C. SURFACE WATER MONITORING AND ANALYSES

The Fairfax County Department of Public Works and Environmental Services (DPWES), Fairfax County Park Authority, Virginia Department of Environmental Quality (VDEQ), U.S. Geological Survey (USGS) and local water treatment plants and other organizations regularly conduct water quality monitoring and testing. The Northern Virginia Soil and Water Conservation District (NVSWCD) 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. The county collects data that is system wide, specific watershed-wide and has had some that focuses on some specific stormwater treatment methods to monitor their effectiveness.

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 baseline 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.

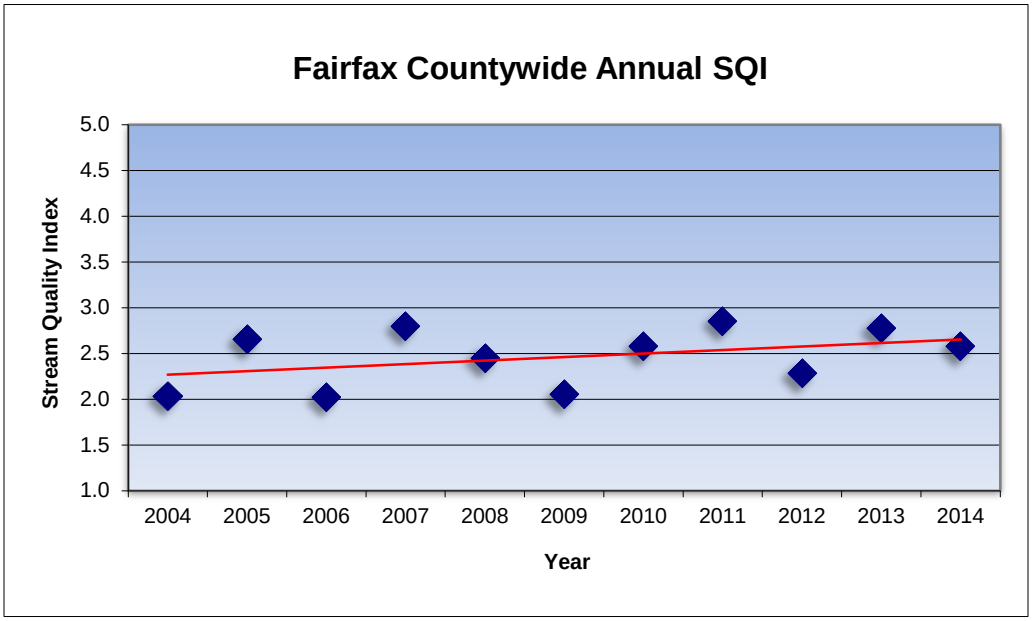
b. 2014 Annual Report on Fairfax County's Streams (now the Stormwater Status Report)

i. Overview of Biological Monitoring

This report provides data from sampling efforts conducted in 2014 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 and for *E. coli* bacteria. Water quality and stream habitat characteristics are also evaluated. The previous year's annual stream reports are available online at www.fairfaxcounty.gov/dpwes/stormwater/stormwater_status.htm and www.fairfaxcounty.gov/dpwes/stormwater/streams/streamreports.htm. Figure IV-5 presents a summary of trends in a countywide Stream Quality Index.

Figure IV-5: Trends in the Countywide Stream Quality Index



Source: 2014 Fairfax County Stormwater Status Report, August 2015

A total of 53 sites were sampled in 2014: the 40 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 40 sites selected, all were sampled for macroinvertebrates and 17 were sampled for fish. Additionally, fish were sampled at six Piedmont reference sites. (Only those sites with a drainage area greater than 300 acres are sampled for fish; headwater streams have few fish.) Results from the 40 randomly selected sites suggest that approximately 52.5 percent of the county's waterways are in "Poor" to "Very Poor" condition based on a macroinvertebrate sampling and 58 percent are in "Poor " to "Very Poor" based on fish sampling. This is an increase 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 10 years, a small increase in the benthic Index of Biological Integrity scores is suggested. As future sampling results are added, this small trending may emerge more clearly.** The index is 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 2014 Stormwater Status Report states the following:

The monitoring program is part of the framework to establish a baseline to evaluate future changes in watershed conditions. Monitoring results from 2008 through 2014 were reported in Fairfax County Stormwater Status Reports, which may be viewed at 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 www.fairfaxcounty.gov/dpwes/stormwater/streams/streamreports.htm.

ii. Bacterial Monitoring

In 2014, the Stormwater Planning Division completed its eleventh year collecting data for the bacteria monitoring program since acquiring the program from the Fairfax County Health Department.

To determine levels of *E. coli* in county streams, grab samples of stream water were taken at 40 sites in 20 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.*

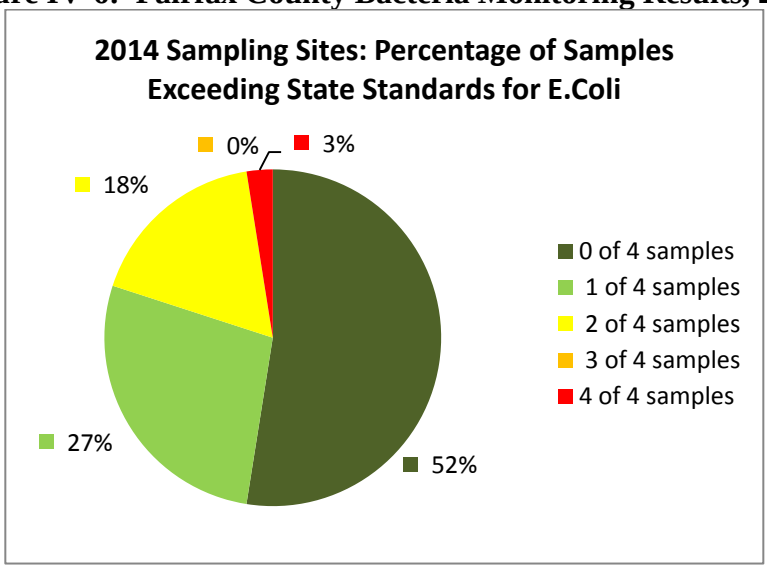
In 2014, 52 percent of Fairfax County's bacteria monitoring locations were consistently below VDEQ's standard of 235 units per 100 ml of water (Figure IV-6). Fairfax County staff concurs with officials from VDEQ and the Virginia Department of Health, who caution that it is impossible to guarantee that any natural body of water is free of risk from disease-causing organisms or injury.

Based on historical and ongoing bacteria monitoring data, the Fairfax County Health Department issues the following statement related to the use of streams for contact recreation:

> *[A]ny open, unprotected body of water is subject to pollution from indiscriminate dumping of litter and waste products, sewer line breaks and contamination from runoff of pesticides, herbicides and waste from domestic and wildlife animals. Therefore, the use of streams for contact recreational purposes such as swimming, wading, etc., - which could cause ingestion of stream water or possible contamination of an open wound by stream water, should be avoided."*

Past annual reports on Fairfax County streams and monitoring methods are available on the Stream Quality Assessment Program page at www.fairfaxcounty.gov/dpwes/stormwater/streams/assessment.htm.

Figure IV-6: Fairfax County Bacteria Monitoring Results, 2014



Source: 2014 Fairfax County Stormwater Status Report, August 2015

iii. Dry and Wet Weather Screening

In 2014, the county selected 102 outfalls in its Municipal Separate Storm Sewer System (MS4) for dry weather screening and recorded physical parameters at each outfall. Water was found to be flowing at 47 of the outfalls and was tested for a range of pollutants (ammonia, conductivity, surfactants, fluoride, pH, phenol, copper and temperature) using field test kits. Of the outfalls tested, three required follow-up investigations because they exceeded the allowable limit for at least one pollutant. Upon retesting these sites, none of the sites continued to exceed the screening criteria and further testing was not necessary.

In 2014, the county solicited a proposal to review and update its Wet Weather Screening program. The previously developed "Wet Weather Site Selection and Screening Plan" (2006) was replaced and Wet Weather Screening was conducted during 2014 using this new protocol, "Fairfax County Wet Weather Screening Program Plan" (2014). This updated plan will monitor a suite of 12 targeted sites during 40 storm events between 2014 and 2018. Every year two sites will be monitored quarterly for the analytes listed in the Wet Weather Screening Program Plan and for metals. The preliminary water quality analysis indicates that the runoff from the two sites sampled in 2014 is not a significant source of pollutants to the MS4. These sites were identified in industrial and commercial areas and ranked according to the county land use code, potential to contribute pollutants to the MS4 and information gathered from field reconnaissance.

c. Stream Physical Assessment

Completed in 2004, the Stream Physical Assessment study provides baseline 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. This countywide stream assessment can be obtained by going to www.fairfaxcounty.gov/dpwes/stormwater/psa-update.htm or by contacting the Fairfax County Stormwater Planning Division at 703-324-5500, TTY 711.

d. Long Term Monitoring Stations

Two long-term monitoring stations were established in 2005; Station VNA is in a medium to high density residential area in the Accotink Creek watershed and Station OQN is in a low density residential area in the Sandy Run watershed. Station VNA drains 152 acres, and the drainage area has an estimated imperviousness of 25 percent. Station OQN drains 415 acres, and the drainage area has an estimated imperviousness of 10 percent. Automated sampling equipment is used to collect stormwater for water quality analysis. Sampling devices record rainfall amount, flow levels, pH and temperature at timed intervals.

In 2014, storm event sampling continued at the two monitoring sites, Henderson Road in the Occoquan watershed and Kingsley Avenue in Vienna, in accordance with Fairfax County's Watershed Water Quality Monitoring Program (2003). Samples were tested for concentrations of nine constituents, including measurements of total suspended solids, total dissolved solids, ammonia and nitrogen, phosphorus and two bacteria, E. coli and Fecal streptococcus.

These data will be incorporated with other data to give a more complete picture of stream conditions.

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 to 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 and stormwater management program and to characterize urban and suburban streams.

This base network now is comprised of five automated stations and 15 less-intensely monitored sites. 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 hourly to a USGS Web page. 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 2014 ran from October 1, 2013 through September 30, 2014.

As reported in the 2014 Stormwater Status Report:

Continuous Data Collection

- *Continuous water quality and stream flow data were collected at the five intensive monitoring stations throughout the water year with no significant interruptions in data collection.*
- *Stream flow 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, pH, 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/fairfax.*

Discrete Data Collection

- *Grab samples were collected monthly at all 20 monitoring stations, resulting in 264 samples collected and analyzed (including QA [quality assurance] samples). Water level and water quality parameters were measured at the time of sampling. Samples were further analyzed for nutrients and suspended sediment concentration.*
- *Storm event samples were collected using automated samplers at the five intensive monitoring stations. These samples were collected in response to elevated turbidity and stream flow conditions during storms, resulting in the collection of 212 samples that were analyzed for the same suite of nutrients and suspended sediment concentration as the monthly grab samples.*
- *Sixty-eight manual stream flow measurements were made across the 20 sites to support the maintenance of the stream flow rating curve for each site.*

A report summarizing the data collected at the original 14 station network through the first five years of the study (2007-2012) has been published by the USGS (Streamflow, Water Quality, and Aquatic Macroinvertebrates of Selected Streams in Fairfax County, Virginia, 2007–12 By John D. Jastram). This can be found at: http://pubs.usgs.gov/sir/2014/5073/.

2. Virginia Department of Environmental Quality

In 2014, VDEQ conducted water quality monitoring at total of 16 stations, on 14 different waterbodies, in or on the border of Fairfax County:

- 13 stations were long term, trend monitoring stations.
- Biological monitoring data were collected at no stations.
- No stations were sampled to collect data to assist for the development of Total Maximum Daily Loads (TMDLs).

The list of monitoring stations sampled in Fairfax County in 2014, including location information, is presented in Table IV-1.

3. Volunteer Water Quality Monitoring Programs

In 2014, the Northern Virginia Soil and Water Conservation District (NVSWCD) continued its successful volunteer stream monitoring program. 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 (SOS) protocol (www.vasos.org/). Monitoring includes biological and chemical aspects and a physical habitat assessment. NVSWCD provides training, equipment, support, data processing and quality control.

Table IV-1
Water Quality Monitoring Stations, Virginia Department of Environmental Quality

Monitoring Station	Stream Name	Latitude	Longitude	Location
1AACO014.57	Accotink Creek	38.811111	-77.230556	Rt. 620 (Braddock Rd)
1ABUL016.31	Bull Run	38.823889	-77.504444	Rt. 29/211 (Lee Hwy)
1ACAM002.92	Cameron Run	38.804472	-77.106361	Eisenhower Avenue
1ACUB002.61	Cub Run	38.821133	-77.465931	Rt. 658 (Compton Rd)
1ADIF000.86	Difficult Run	38.975833	-77.246111	Rt. 193 (Georgetown Pike)
1ADOU000.60	Dogue Creek	38.697778	-77.121111	Across from the Mt. Vernon Yacht Club
1AHUT000.01	Hunting Creek	38.789722	-77.051667	G.W. Parkway
1ALIF000.19	Little Hunting Creek	38.712778	-77.074722	G.W. Parkway
1AMAE000.21	Massey Creek	38.661361	-77.224056	Near Mouth of Creek
1AOCC002.47	Occoquan River (Belmont Bay)	38.640389	-77.219417	Daymarker #6 (Red), off Sandy Point
1APOE002.00	Popes Head Creek	38.781667	-77.388333	Rt. 645 (Clifton Rd.)
1APOH000.93	Pohick Creek	38.671250	-77.148139	Off Gunston Hall
1APOH002.32	Pohick Creek	38.680278	-77.169167	Across from red brick house (Pohick Bay)
1APOH005.36	Pohick Creek	38.701111	-77.210000	Rt. 1 (Jefferson Davis Hwy)
1ASUG004.42	Sugarland Run	39.013181	-77.368467	Rt. 7 (Leesburg Pike)
1AWOT002.36	Wolftrap Creek	38.940861	-77.266917	Rt. 676 (Trap Rd)

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. Throughout FY 2015, 17 sites continued to be monitored by 21 active certified volunteers. In order to attract new recruits, NVSWCD held nine training sessions for 142 potential new volunteers. In addition, six special monitoring field trips were provided to 93 students with the Northern Virginia Community College.

Reston Association (RA) is among the organizations that participate in the monitoring program using the SOS protocol, and it submits data on Reston streams to NVSWCD. Volunteers and RA staff monitor Reston's streams four times a year. They have 15 volunteers collecting data at eleven monitoring sites in Reston.

A monthly *Watershed Calendar*, listing training and other events of interest, is e-mailed to over 1,000 recipients. More information about these events and about the NVSWCD volunteer monitoring program can be found at www.fairfaxcounty.gov/nvswcd/monitoring.htm.

4. Fairfax County Park Authority Stream Monitoring

a. Stream Monitoring in Parks

The Park Authority continues to support volunteer stream monitoring programs through its partnership with the Northern Virginia Soil and Water Conservation District.

During 2014-2015, NVSWCD supported ongoing stream monitoring programs at the following streams, with some sites located on parkland, with sampling conducted primarily by volunteers using the SOS protocol.

- Accotink Creek at Eakin Park.
- Accotink Creek at Lake Accotink.
- Accotink Creek at Wakefield Park.
- Big Rocky Run at E. C. Lawrence Park.
- Big Rocky Run at Greenbriar Park.
- Colvin Run in Lake Fairfax Park.
- Cub Run in Cub Run Stream Valley Park.
- Cub Run at Cub Run Rec Center.
- Difficult Run near Great Falls.
- Difficult Run in Oakton.
- Holmes Run Stream Valley Park below Lake Barcroft.
  Holmes Run Stream Valley Park near Roundtree Park.
- Old Courthouse Spring Branch in Old Courthouse Stream Valley Park, Tysons.
- Little Difficult Run in Fred Crabtree Park.
- Little Pimmit Run in Little Pimmit Run Stream Valley Park.
- Long Branch at Rutherford Park.
- Paul Springs Branch.
- Pike Branch at Jefferson Manor Park.
- Pohick Creek, near the southern end of the Cross County Trail.
- Pohick Creek – Sideburn Branch Tributary at Woodglen Lake Park.
- Popes Head Creek.
- South Run.
- Sugarland Run.
- Wolftrap Creek at Foxstone Park, Vienna.

5. Potomac River Monitoring

a. Overview

The Metropolitan Washington Council of Governments (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 River 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. According to a 2014 COG report, water quality data gathered in the Potomac River estuary over the past 10-15 years paints a picture that defies a simple explanation. There are places in the river where current water quality conditions meet the habitat requirements for living resources, but the trends in these same conditions are worsening. There are other places where water quality conditions do not meet the habitat requirements, but the trends are improving.

COG continues to focus on regional water quality issues, particularly in the upper estuary of the Potomac River. A Potomac River Water Quality fact sheet (www.mwcog.org/environment/water/downloads/Potomac%20WQ%20factsheet_January%202014.pdf) and a summary (www.mwcog.org/uploads/committee-documents/bF1YX1lc20140515151124.pdf) were developed to provide a snapshot of current conditions and an assessment of water quality in the Potomac River. Success stories were highlighted, like the huge investments in improving wastewater treatment over the past thirty years, increased submerged aquatic vegetation and fish populations and decreased occurrences of algal blooms. Yet, COG has emphasized that there is much more to be done to improve the quality of the water in the Potomac River.

COG also continues to enhance its website to provide a user-friendly location for accessing regional data and contact information and to promote the exchange of monitoring data, watershed programs, wastewater and stormwater implementation programs and related activities. A preliminary on-line interactive map has been generated for members' use at www.mwcog.org/environment/water/potomacmap.asp.

b. 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 (OWML) 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 OWML data set, which provides the most comprehensive accounting of pollutant loads at this fall line station, is being used to check the accuracy of the new U. S. Geological Survey method for generating flow-adjusted trends in load and to provide a fuller picture of load trends from the watershed upstream of Chain Bridge.

6. Potomac Estuary 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 Washington, D.C. metropolitan area 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 an 18-year study of submerged aquatic vegetation in the tidal Potomac River (http://water.usgs.gov/nrp/highlights/potomac_update.html) 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 abundances 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 (USACE), Baltimore; the Metropolitan Washington Council of Governments' 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 approximately 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 (SOCs) have been monitored quarterly in the Occoquan watershed since 1982. The program is funded by the Fairfax County Health Department and was established under a recommendation by EQAC. Water samples at stream and reservoir stations and sediment samples at reservoir stations are monitored quarterly. Fish samples are taken at three reservoir stations semi-annually. The Lake Manassas program, likewise, funds the monitoring of SOCs in the Lake Manassas watershed, but there are no fish samples taken for the Manassas program.

Calendar year 2014 was a reasonably good year for the SOC monitoring program. Few ‘detects’ were found for any compound of concern, and most of those were well below limits of concern. Besides the ubiquitous phthalates, typically found in concentrations much lower than those that might be a cause for concern, atrazine, Dual (metolachlor) and lindane were the compounds detected most often.

Atrazine was detected in Occoquan stream and reservoir samples taken on June 23, 2014. All values were below 1.5 µg/L, which is half of the Maximum Contaminant level (MCL) value. The pattern of detection appears to indicate that the atrazine

originated in the Occoquan creek arm (Cedar Run and Broad Run) of the watershed, which is the more rural area. This makes sense as atrazine is often used to kill cover crops. It was found at stations ST10 (Occoquan Creek below Lake Jackson dam), ST25 (Cedar Run), ST30 (Broad Run below Lake Manassas) and at RE15 (Occoquan Reservoir near Ryan's Dam). At RE30 (Bull Run arm of the Occoquan Reservoir), a low concentration of 0.44 µg/L was detected. Values less than 1 µg/L were detected in the Lake Manassas watershed, as well as in the lake itself, during the sampling run on July 14, 2014.

Dual (metolachlor) was detected at levels of 0.60 µg/L or below at several stations in the June and July sampling runs. There is no MCL for Dual, but there is a lifetime health advisory limit of 100 µg/L, which is more than two orders of magnitude above the values detected, thereby indicating that the concentrations of Dual detected have basically no health significance.

Lindane was also detected at some stream and Occoquan Reservoir stations at concentrations between 1.30-1.50 µg/L in the March 10-11 sampling trip. These concentrations are above the MCL of 0.2 µg/L. Because lindane was not detected at other times of the year, there is little reason for concern, as MCLs are typically set for lifetime exposures.

Finally, there were some detects of petroleum hydrocarbon-related compounds during the March 10-11 sampling run. These compounds were typically detected at concentrations below 1 µg/L. There are no MCLs associated with these compounds, and at the low concentrations found there do not generate concern.

Neither the sediment nor the fish samples showed any particular compound to be above detection limits, and most fell into the category of "not found" (which means that they were not detected at all). Some phthalates were found at low concentrations. This, certainly, continues to be good news, as fish are known concentrators of organic chemicals, and SOCs often accumulate in sediments.

Overall, the results of the SOC monitoring in 2014 show that the watershed conditions with regard to SOCs continues to be good.

General water quality in the Occoquan Reservoir has also remained stable over the years. While the reservoir continues to be enriched with nutrients (eutrophic), 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.

The SOC program is fairly modest, with four samplings per year (one for each season) and fish sampling twice a year. This is more or less the minimum necessary to track conditions in the watershed. The program has been flat funded for many years now, while costs have continued to go up. In program year 2015-16, the approach being taken is to continue the monitoring and stop it when the money is

exhausted. It is time, perhaps, to look at the budget for the program and determine if there are means to get the budget back to where it needs to be.

Updates continue to be made to the OWML website (www.owml.vt.edu), and stakeholders can continue to access near-real-time field data at various stream sites.

8. Gunston Cove Aquatic Monitoring Program

Gunston Cove is an embayment of the tidal freshwater Potomac River located in Fairfax County about 12 miles (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 (NMCPCP) 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 2014 report (December 2014) 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.

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 at the Noman M. Cole, Jr. Pollution Control Plant, which were initiated in the late 1970s. A 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.

Another trend of significance to managers is changes in the relative abundance of fish species. While it is still the dominant species in trawls, white perch has gradually been

displaced in seines by banded killifish. Blue catfish have entered the area recently, and brown bullhead has decreased greatly in the cove. To determine some of the most significant changes in the fish community through time, the report authors performed a community analysis using the seine collections. The most dominant species of the fish collected was white perch (59.9 percent, numerically). Other abundant species (annual total greater than one percent) included: spottail shiner (19 percent), Alosa sp. (8.25 percent), bluegill (2.61 percent), blue catfish (2.27 percent), redear sunfish (1.55 percent), Bay anchovy (1.48 percent) and pumpkinseed (1.06 percent). Overall, the fish assemblage in Gunston Cove is dynamic and supports a diversity of commercial and recreational fishing activities.

The DPWES Wastewater Management program continued its funding of and collaboration with the George Mason University Department of Environmental Science and Policy to monitor the water quality of Gunston Cove, which receives the NMCPCP discharge. Sampling and analysis results are shared with GMU researchers, who gather and evaluate data on the cove biota. Together, Wastewater Management program and GMU collect hundreds of field measurements and samples yearly. These data form the basis of the ecological assessment of Gunston Cove."

In short, due to these 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 and detailed read of the "Ecological Study of the Gunston Cove 2013" Final Report, see www.academia.edu/12414213/The_Ongoing_Aquatic_Monitoring_Program_for_the_Gunston Cove Area of the Tidal Freshwater Potomac River 2013 Final Report or contact R. Christian Jones, Professor and Project Director at George Mason University.

9. Fairfax County Park Authority Huntley Meadows Monitoring Water Quality Monitoring Project in Huntley Meadows Park

Huntley Meadows Park staff conducted water quality monitoring at four sample sites in 2014. During years prior to 2011 seven sites were sampled, three on Dogue creek and four on Barnyard Run. However, in 2011 the Watershed Planning and Assessment Branch (WP&AB) of the Department of Public Works and Environmental Services took over the analysis of Dogue Creek. The analysis conducted by the WP&AB of DPWES is a much more detailed assessment than done by site staff at Huntley Meadows Park. The Dogue Creek data are included in the DPWES stream monitoring annual report. Huntley Meadows Park staff continues to sample four sites along East Barnyard Run, including the central wetland, although the locations have changed slightly due to the Wetland Restoration Project completed in 2014. The Rapid Bio-assessment II monitoring protocol was used at all four sites sampled by Huntley Meadows Park staff.

Results

Water Quality scores are based on the numbers and tolerance levels of the macroinvertebrate families collected during sampling; zero to eight are unacceptable; nine to 13 are partially acceptable; and 14 to 24 are acceptable. Barnyard Run watershed includes the Central Wetland, and samples were collected at four different locations: the Central Wetland Inflow (CWI), the Central Wetland Reservoir (CWR), the Lower Wetland Reservoir (LWR) and the berm (Berm). All four sites were sampled in the spring and three were sampled in summer 2014; one was dry and a sample was not possible. Scores for all sites in spring and summer are in the following tables. All sites sampled in the spring had a partially acceptable score; the summer sampled varied with two "partially acceptable" scores for the central wetland (CW) and the berm (Berm) and one "unacceptable" score for the wetland inflow site (CWI). The wetland outflow (CWO) site was dry and therefore no sample was collected.

Tables IV-2 and IV-3 below, showing water quality scores for each of the four locations sampled in the spring and summer of 2014.

Table IV-2.
Water Quality Scores, Huntley Meadows Park, Spring 2014

	CW	CWI	CWO	Berm
%EPT[1]	3	0	0	3
Gomphidae	0	0	0	0
Non-Insects	0	6	3	3
Tolerance	6	6	6	6
Total	9	12	9	12

Table IV-3.
Water Quality Scores, Huntley Meadows Park, Summer 2014

	CW	CWI	CWO	Berm
%EPT	3	0	N/A	0
Gomphidae	0	0	N/A	0
Non-Insects	3	0	N/A	3
Tolerance	6	6	N/A	6
Total	12	6	N/A	9

[1] *Ephemoptera* (mayflies), *Plectoptera* (stoneflies) and *Trichoptera* (caddisflies)

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 TMDL is a watershed-specific plan for bringing an impaired water body into compliance with water quality goals. Since fulfilling the requirements of a consent decree, Virginia has developed a pacing guideline of approximately 150 TMDLs per biennium, which is expected to allow for TMDL development for currently listed waters by 2022.

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 Run, Johnny Moore Creek and Little Rocky Run).
- Popes Head Creek.
- Difficult Run.
- Hunting Creek (includes Cameron Run and Holmes Run).
- Sugarland Run.
- Mine Run.
- Pimmit Run.

Sediment (Benthic Impairment):

- Bull Run (includes Cub, Johnny Moore and Little Rocky Runs).
- Popes 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:

www.deq.virginia.gov/Programs/Water/WaterQualityInformationTMDLs/WaterQualityAssessments.aspx.

i. Accotink Creek TMDL

Accotink Creek was first listed as impaired on the 1998 303(d) List of Impaired Waters for not meeting the recreational use due to exceedances of the bacteria water quality standard. This impaired segment of Accotink Creek begins at the confluence with Crook Branch, upstream from Route 846 (Woodburn Road), downstream to the start of Lake Accotink (4.77 miles). Additional segments of Accotink Creek were listed as impaired for bacteria in 2002 (1.20 miles from the confluence with Daniels Run, in the City of Fairfax downstream to the confluence with Bear Branch) and 2004 (7.34 miles from the confluence with Calamo Branch downstream to the tidal waters of Accotink Bay), and a segment of Long Branch was listed in 2008 (4.76 miles from the headwaters of Long Branch downstream to the confluence with Accotink Creek, at rivermile 4.41.) TMDLs were developed for the upper Accotink Creek watershed in 2002 and for the lower watershed in 2008.

Fairfax County partnered with the United States Geological Survey following development of the upper Accotink Creek bacteria TMDL to identify the distribution and specific sources of the human wastewater signal within the Accotink Creek watershed. Samples were collected during low flow periods and the results indicated that many sources are transitory, making them extremely challenging to detect, locate and eliminate.

The U.S. Environmental Protection Agency (EPA) established a TMDL to address the benthic impairments in Accotink Creek in April 2011. 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. A schedule for development of the TMDL has been set for estimated completion in 2016.

County staff was invited by VDEQ to serve on the technical advisory committee (TAC) that will assist in the development of this TMDL, and the first TAC meeting was held on August 26, 2014. VDEQ presented the project plan for development of the TMDL which included a summary of the engagement and outreach process, and a project timeline. The first public meeting on the development of a replacement TMDL was held on September 10, 2014 and also covered the outreach process and project timeline.

ii. Potomac River--Tidal Potomac River- Polychlorinated Biphenyls

A PCB TMDL was established for the Tidal Potomac River in 2007 and includes Accotink Creek, Belmont Bay, Dogue Creek, Four Mile Run, Gunston Cove, Hunting Creek, Little Hunting Creek, Occoquan River and Pohick Creek. Loads of PCBs to the Potomac River estuary system were grouped into seven categories: the non-tidal Potomac River at Chain Bridge; lower basin tributaries; direct drainage; wastewater treatment plants; combined sewer overflows; atmospheric deposition to the water surface; and contaminated sites. An average reduction of 96 percent is required.

iii. Potomac River – *Escherichia coli* TMDL

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 5.72 miles from the confluence with Folly Lick Branch downstream to the confluence with the Potomac River. The impaired reach of Mine Run extends 0.93 miles from the confluence with an unnamed tributary to the confluence with the Potomac River. The impaired portion of Pimmit Run extends 7.37 miles from the headwaters of Pimmit Run downstream to the confluence with the Potomac River.

In order to meet the *E. coli* geometric mean water quality criterion of 126 cfu/100 ml, reductions are required from point source dischargers, pet waste, residential waste and wildlife sources. This TMDL was approved by EPA on September 26, 2013.

Information on TMDL development in Virginia is available on VDEQ's website:
www.deq.virginia.gov/Programs/Water/WaterQualityInformationTMDLs/TMDL/TMDLDevelopment.aspx

The TMDL project was completed and approved by EPA on September 26, 2013 and is available on the VDEQ website (www.deq.state.va.us/Programs/Water/WaterQualityInformationTMDLs/TMDL/TMDLDevelopment/ApprovedTMDLReports.aspx).

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 (WIPs) 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.

Information on the Chesapeake Bay TMDL is available on EPA's website at: www.epa.gov/reg3wapd/tmdl/ChesapeakeBay/index.html.

Information on Virginia's WIP process is available on VDEQ's website at: www.deq.virginia.gov/Programs/Water/ChesapeakeBay/ChesapeakeBayTMDL/ChesapeakeBayWatershedImplementationPlans.aspx

i. Northern Virginia Regional Commission (NVRC) Chesapeake Bay TMDL Coordination

At the request of local governments and the Virginia Department of Conservation and Recreation, NVRC hosted meetings between the department and local governments to discuss the Phase II Watershed Implementation Plan, the Virginia Assessment and Scenario Tool (which allows users to develop scenarios rapidly with varying best management practices) and the integration of the new stormwater management regulations and the MS4 permit regulations. An NVRC staff member continues to serve as the Chairman of the Urban Stormwater Work Group (USWG) for the EPA Chesapeake Bay Program.

The USWG has been charged with developing a set of recommendations for the Chesapeake Bay Program's Water Quality Goal Implementation Team regarding issues dealing with urban stormwater and the impact to the health of the Chesapeake Bay. The process of making these recommendations is to create panels populated with experts in the field from all different disciplines and

geographic locations within the Bay watershed. The panel members then review the current literature about their subject areas, discuss the issues, consider any implications of the recommendations to localities, and eventually come up with a set of recommendations.

In 2014, a number of 'expert panels' were convened to define and develop nutrient and sediment load reductions for localities:

- Recommendations of the Expert Panel to Define Removal Rates for the Elimination of Discovered Nutrient Discharges from Grey Infrastructure www.chesapeakebay.net/publications/title/elimination_of_discovered_nutrient_discharges_from_grey_infrastructure.

- Recommendations of the Expert Panel to Define Removal Rates for Urban Filter Strips and Stream Buffer Upgrade Practices www.chesapeakebay.net/publications/title/recommendations_of_the_expert_panel_on_urban_filter_strips_and_stream_buffe.

- Recommendations of the Expert Panel to Define Removal Rates for Urban Stormwater Retrofit Projects (short version) with updated adjustor curves January 2015 www.chesapeakebay.net/publications/title/stormwater_retrofits_expert_panel_report_without_appendices.

- Recommendations of the Expert Panel to Define Removal Rates for New State Stormwater Performance Standards (short version) with updated adjustor curves January 2015 www.chesapeakebay.net/publications/title/stormwater_performance_standards_bmp_panel_report_without_appendices.

- Recommendations of the Expert Panel to Define Removal Rates for Urban Nutrient Management (short version) www.chesapeakebay.net/publications/title/recommendations_of_the_expert_panel_to_define_removal_rates_for_urban_nutri.

- Recommendations of the Expert Panel to Define Removal Rates for Individual Stream Restoration Projects (short version) http://www.chesapeakebay.net/publications/title/recommendations_of_the_expert_panel_to_define_removal_rates_for_indivi.

- Recommendations of the Expert Panel to Define Removal Rates for Erosion and Sediment Control Practices www.chesapeakebay.net/publications/title/recommendations_of_the_esc_expert_panel.

A complete review of all the past and current USWG BMP Expert Panels can be found under the publication tab at: www.chesapeakebay.net/groups/group/urban_stormwater_workgroup.

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 a published notice 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 or to specific TMDL projects should be directed to the TMDL Coordinator at the Northern Regional Office of VDEQ: http://deq.state.va.us/Programs/Water/WaterQualityInformationTMDLs/TMDL/Contacts.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 2014 Reston Lakes

Annual Monitoring Report. This report and other information about Reston's lakes can be obtained by contacting RA's watershed manager at 703-435-6560 or visiting the website: www.bit.ly/LakeReport

In 2014, RA staff continued the massive removal of purple loosestrife from the shoreline at all four lakes. RA's management strategy included contracting with a licensed aquatic herbicide company, Aquatic Environmental Consultants, Inc., to do treatments at Lake Newport to control white water lilies, Lake Thoreau to control for Fireflag and Lake Anne to control algae when needed.

In 2014, Bright Pond and Butler Pond were hydraulically dredged. In 2015, Lake Anne canal was dredged.

In 2014 RA helped install two shoreline stabilization projects by placing biologs at Lake Anne and Lake Audubon.

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 Huntsman Lake was characterized to evaluate potential management activities that could be employed in addition to the dredging planned in summer 2014. In 2012, in-lake water quality monitoring continued at Huntsman Lake 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, hindering water quality and limiting sunlight penetration depths.

In spring 2014, Huntsman Lake was drained to allow for necessary dam upgrades and to dredge up to 34,500 cubic yards of accumulated sediments in the lake bottom. A lake restoration plan will be implemented as part of this work. Post construction monitoring will commence on Huntsman Lake in 2015. In 2012, monitoring of recently-dredged Lake Barton commenced. In late 2013, the solar powered water circulator was moved from Huntsman Lake to Lake Barton (in anticipation of dredging activities). The water quality data collected at Lake Barton will be evaluated in concert with the data from nearby Huntsman Lake.

In 2014, a more comprehensive lake monitoring scheme was developed on the Pohick lakes and two more lakes were added to the monitoring: Lake Royal and Woodglen Lake. These two lakes are the next two scheduled for improvements and dredging. Analysis of these data will focus on the benefits of selected management/restoration 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 (WID) 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 impacted significantly by accelerated sedimentation, which had 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 oversaw 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 included 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 could 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 had 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 were removed by the time of project completion in September 2008.

12. Groundwater Monitoring

The United States Geological Survey maintains a series of wells throughout the nation to monitor groundwater levels and drought. Several wells (Site Number: 385311077215001 - 52V 25, Site Number: 385305077162101 - 52V 24, Site Number: 384956077250301 - 51U 144, Site Number: 384854077251801 - 51U 145, Site Number: 384354077135801 - 53T 59, Site Number: 385930077215901 - 52V 23 and Site Number: 385638077220101 - 52V 2D) are depicted on the Fairfax County, Virginia location map, which is provided at the following link: http://groundwaterwatch.usgs.gov/countymap.asp?sa=VA&cc=059. By clicking on the icon associated with the well, you can get information on how long the well has been functioning and what data are being collected.

a. Expansion of the Eastern Virginia Groundwater Management Area

On June 17, 2013, the State Water Control Board adopted final regulations developed by the Department of Environmental Quality adding portions of Fairfax County east of Interstate 95 to the Eastern Virginia Groundwater Management Area. On January 1, 2014, the Eastern Virginia GWMA was expanded (9VAC25-600-10 et seq.) and the Groundwater Withdrawal Regulations (9VAC25-610-10 et seq.) became effective in the expanded area.

As a result, all persons in the expanded area withdrawing or having withdrawn groundwater on or before January 1, 2014 in excess of 300,000 gallons per month (from well, well system or a pond recharged by groundwater with mechanical assistance) must apply for an Existing Users Groundwater Withdrawal Permit to continue their withdrawals. Persons wanting to establish a new withdrawal or expand an existing withdrawal must apply for that new/expanded use in accordance with 9VAC25-610-92 of the regulations.

b. Virginia Department of Environmental Quality Leaking Underground Storage Tank Information

With respect to leaking underground storage tanks for regulated tanks (i.e., gas stations), in 2014, there were 16 open cases and 1,108 closed cases, with seven new cases opened and 14 cases closed. In terms of unregulated tanks (i.e. residential

heating oil), there were 46 open cases and 2,036 closed cases, with 82 new cases opened and 75 cases closed.

D. WATERSHED MANAGEMENT

Watershed management is the process of implementing plans, programs and projects to protect and/or restore watershed functions. Streams form at the low points of watersheds. Plans usually take into account both ground and surface water flow, recognizing and planning for the interaction of water, plants, animals and human land use found within the physical boundaries of a watershed.

1. Watershed Management Plans

In 2003, 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 between 2003 and 2011 with the assistance of the community through a public involvement process that included community interest meetings and stakeholder groups. A total of 13 plans, which cover all 30 county watersheds (www.fairfaxcounty.gov/dpwes/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.

Many non-structural projects and policy recommendations from the watershed plans have been implemented while implementation of others is ongoing. The number of projects selected each year for implementation will be determined as part of the annual budget process. Projects under design and construction can be found on the Stormwater Improvement Projects Web page at:
www.fairfaxcounty.gov/dpwes/stormwater/projects/project_list.htm

Fairfax County's Department of Information Technology (DIT) used 2009 topographic data to create the most highly detailed elevation model of the county. With that Geographic Information System (GIS) modeling, DIT was able to build a complex set of watershed delineation tools that significantly reduces DPWES Stormwater's time and cost in carrying out its work.

DIT was expecting, in fall 2015, delivery of LIDAR imagery from USGS to provide countywide coverage. Having such coverage will enable more detailed modeling of

the surface, which will assist DPWES Stormwater in its analysis and forensics analysis of runoff problems.

2. 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. Maps may be viewed at www.fairfaxcounty.gov/dpwes/watersheds/perennial.htm.
Fairfax County's Chesapeake Bay Preservation Ordinance is available on-line at: 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.

3. Restoration Efforts

a. Department of Public Works and Environmental Services Stream Restoration and Stabilization Projects—Stormwater Capital Projects

In 2014, the county and its partners continued to implement stormwater management-related capital projects. Projects completed in 2014 included six stormwater management facility retrofits, seven low impact development projects and nine stream restoration projects. Examples are identified below.

i. Stream Restorations

In 2014, the county completed nine stream restoration or stabilization projects:

- Banks Property Stream Restoration.
- Big Rocky Run Phase II Stream Restoration.
- Great Passage Channel Stabilization.
- Hickory Hill Outfall Stabilization.
- Indian Run Stream Restoration.
- Pohick Creek Stream Restoration.
- Scotts Run at Arbor Row.
- South Lakes Stream Restoration.
- Wakefield Run Stream Restoration.

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 2014, six 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.

iii. Low Impact Development Projects

Seven locations were retrofitted in calendar year 2014 through partnership projects with the Department of Public Works and Environmental Services, Fairfax County Public Schools, Fairfax County Park Authority and the Fairfax Fire and Rescue Department. Various techniques for water quality were employed, including the installation of rain gardens, pervious pavement, underground storage, rainwater harvesting, soil amendment, native vegetation and water quality swales.

iv. Education and Outreach

Tours of stormwater retrofits were conducted in 2014 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 Big Rocky Run, Pohick Creek and Government Center projects:

- Environmental Quality Advisory Council.
- Fairfax County Board of Supervisors.
- Fairfax County DPWES Directors Office.

- 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 Engineers in Training Program.

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. Numerous agencies and organizations provide support for riparian buffer restoration efforts, and these efforts are detailed, within the broader context of ecological restoration efforts, within the Ecological Resources chapter of this report.

c. NVSWCD Stream Restoration

Virginia's Phase II Watershed Implementation Plan recognizes a need for urban/residential BMPs in its "Local Implementation Strategies for Urban/Suburban Source Sector," including a cost share program strategy. Funded through the Environmental Improvement Program and working with representatives from Fairfax County DPWES' Stormwater Planning Division and Maintenance and Stormwater Management Division (MSMD) and the Fairfax County Park Authority, NVSWCD implemented, through its Conservation Assistance Program (CAP), the first four urban cost-share projects in Fairfax County in spring 2015 (Table IV-4). These projects were implemented by homeowners associations.

Table IV-4.
NVSWCD Urban Cost-Share Projects in Fairfax County, Spring 2015

Community	Supervisor District	Watershed	Practice	Acreage Treated	CAP Program Cost	Community Cost (anticipated)
Loftridge HOA	Lee	Cameron Run	- Bioretention (Rain Garden)	9,700 ft^2	$2,500.00	$2,500.00
Chesterfield Mews CA	Providence	Accotink Creek	- BayScaping - Dry Well/Infiltration Trench	20,327 ft^2	$4,000.00	$4120.00
Lake Braddock CA	Braddock	Pohick Creek	- Bioretention (Rain Garden) - BayScaping	19,100 ft^2	$2,000.00	$2,000.00
Winding Ridge HOA	Sully	Cub Run	- BayScaping	20,880 ft^2	$1,500.00	$3,000.00
Total				70,007 ft^2	$10,000.00	$11,620.00

d. 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, oversees the progress of the bank.

The groundbreaking for Phase I, which covers 14 miles of stream, occurred on February 12, 2008. 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. For more information on the stream restoration project in Reston visit: http://reston.wetlandstudies.com or www.reston.org.

e. Collaboration between Fairfax County Public Schools and the County's Stormwater Planning Division on Stormwater Management Projects

In November 2012, staff from FCPS and SWPD 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 include: evaluation of opportunities to provide additional stormwater management onsite during the design and construction of projects in the FCPS Capital Improvement Program (CIP); opportunities for SWPD to construct stormwater management facilities on school properties which are not part of the CIP; and education and outreach opportunities in the FCPS science curriculum.

FCPS and SWPD coordinate throughout the planning and design of FCPS CIP projects to identify opportunities to enhance the code required stormwater management provided by FCPS. For those projects for which additional stormwater management measures are found to be feasible, SWPD provides technical support and funding, through the Stormwater Service District revenue, to FCPS for the design and construction of this additional stormwater management measures to be permitted and built as part of the FCPS CIP. A list of FCPS CIP projects for which SWPD and FCPS were able to provide additional stormwater management is included below. These additional stormwater management measures help us improve water quality in our streams and meet our Total Maximum Daily Load requirements. It is anticipated that these efforts will continue with future FCPS CIP projects.

Table IV-5 shows the schools and the status of facilities being implemented.

Table IV-5. FCPS and SWPD Stormwater Collaborations as of July 2015		
Location	**Plan Status**	**Facility Descriptions**
Langley High School	Under construction	Underground storage / filtration (Bay Filter)
Marshall High School	Construction substantially complete	Cistern - irrigation system
Mt Vernon High School	Construction complete	Added storage under turf field
Ravensworth Elementary School	Under construction	Bioretention, amended soils
Sunrise Valley Elementary School	Under construction	Permeable pavers, vegetative swale, underground detention / infiltration trench
Terraset Elementary School	Under construction	Pervious pavement, Filterras, permeable pavers, Underground Detention
Keene Mill Elementary School	Under construction	Vegetative swales, permeable pavers, amended soils, sheet flow
North Springfield Elementary School	Under construction	Bioretention, amended soils
Hayfield High School	Under construction	Additional storage under turf field

Source: Department of Public Works and Environmental Services

4. Low Impact Development (LID) 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 2014, the Department of Public Works and Environmental Services, the Fairfax County Park Authority, Fairfax County Public Schools, 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 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, have been integrated into the local code and PFM requirements. The revisions have incorporated VDEQ's requirements from the Best Management Practices Clearinghouse and include 17 different practices:

- Simple rooftop disconnection.
- Rooftop disconnection to alternative practice.
- Sheet flow to vegetated filter or conserved open space.
- Soil compost amendment.
- Reforestation.
- Vegetated roof.
- Rainwater harvesting.
- Permeable pavement.
- Infiltration practices.
- Bioretention.
- Vegetated swale.
- Wet swale.
- Filtering practice.
- Constructed wetland.
- Wet pond.
- Extended detention.
- Manufactured (proprietary) BMP.

The amended Public Facilities Manual became effect July 1, 2014.

b. DPWES LID Monitoring Efforts

DPWES staff has conducted monitoring and evaluation of the quantity and quality of runoff from selected innovative stormwater management systems installed at Fairfax County-operated stormwater management facilities. The stormwater systems that were 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 attempt to replicate the natural processes that occur when stormwater is retained by forests, meadows and wetlands.

Between 2007 and 2012, monitoring occurred at four innovative stormwater facilities implemented by DPWES: the Providence District Supervisor's Office/Fire Station 30 in Merrifield, Cub Run RECenter, the Herrity Building in the Government Center complex and the 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. Lastly, wetland cells and benches, a sand seepage storm outfall and organic soil amendment with native landscaping were installed at the Cinnamon Oaks pond.

The Virginia Tech Occoquan Watershed Monitoring Laboratory was contracted to conduct full analysis of the monitoring record for these four facilities. The data are being evaluated to determine performance and make design-related recommendations.

c. Virginia Department of Transportation LID Monitoring

VDOT's research division, the Virginia Center for Transportation Innovation and Research, conducts research on current and future environmental topics related to maintenance, construction and operations of transportation systems. Current research projects include:

- ***Assessment of the low impact development strategies for the Lorton Road widening project, Fairfax County, Virginia:*** The primary objectives of this study are to: (1) determine the effectiveness of multiple LID systems for mitigating potential adverse impacts of highway stormwater runoff; and (2) determine the maintenance requirements, procedures and costs associated with LIDs used in the highway setting. Phase I of the project is under way and involves the characterization (both quantity and quality) of runoff coming from Lorton Road prior to LID construction. This will serve as a baseline to determine the pollutant removal efficiency of LID technologies once they are installed and monitored. This information will also help determine the performance of vegetated roadsides and the effects on performance of various vegetation management and maintenance routines. Currently, efforts are concentrated on three automatic samplers and flow monitors located at a single location to aid in this characterization. This pre-construction monitoring will continue until the initiation of construction in the area and is expected to be completed in fall 2015. Subsequent sampling will take place at new sites as construction progress allows.

- ***Permeable pavement pilot project using porous asphalt:*** The purpose of the study is to address the remaining VDOT-specific questions pertaining to installation costs, constructability, maintenance requirements and long-term hydraulic performance of permeable pavements. The scope of the study will be limited to the installation, monitoring and evaluation of a single type of permeable pavement – porous asphalt – by way of a pilot project at the newly constructed I-66/Route 234 Bypass Park and Ride Facility in Prince William County. The study began with the installation of the permeable pavement in March 2013. Following the completion of construction, initial permeability readings were taken at the six primary sampling locations and the 18 auxiliary points. In addition to the initial sampling, follow-up sampling was done in July

2013. In November 2013, permeability was measured again and then two of the four sections of the pavement were maintained using two different vacuum systems: a standard vacuum truck and a regenerative air vacuum system. Five days after the maintenance, permeability readings were taken again. Readings were taken again in May 2014, and selected sections will be cleaned, immediately followed by additional permeability tests. The project is scheduled to be complete in fall 2016.

d. 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 and booklets.
- Slideshare (online PowerPoint presentations).
- Flickr (photo stream).
- Web pages.
- Events (SpringFest, Celebrate Fairfax, Fall for Fairfax homeowner association and project meetings).
- Reports (Stormwater Status Report).
- Personal contact by telephone, email, letter and visit.
- Volunteer opportunities (stream and litter cleanups).
- School programs (Sewer Science, Water Quality Day).
- Stormy the Raindrop (activity books, puppet shows at events).
- Tours of completed projects (e.g., Government Center stream restoration, Big Rocky Run Phase II stream restoration, Pohick Creek stream restoration).

Popular public education topics have included: The stormwater ordinance; stream restorations; litter in the environment; proper disposal of pet waste; motor oil and other household hazardous waste; natural gardening techniques; completed projects; detention basins and micropools; native plants; permeable pavers; rain barrels and rain gardens; how to properly discharge swimming pool water; summer and winter tree care tips; and the Huntington levee, among other topics.

Fairfax County addresses nonpoint 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 commenced in 2012. By pooling outreach funds with other jurisdictions to reach a wider audience, the campaign used radio and television

advertising in an effort to reduce pollution-causing behaviors among Northern Virginia residents.

The 2014 campaign ran four commercials featuring messages on the importance of picking up pet waste, used motor oil, over fertilization of lawns and general household stormwater pollution reduction measures. The ads aired on twelve cable TV channels, including three Spanish-speaking channels, a total of 3,502 times. These TV ads reached three million Northern Virginia residents and resulted in more than 400 visits to the www.onlyrain.org website.

The Clean Water Partners conducted a mini campaign featuring banner ads on the Comcast website that promote alternatives to chemical fertilizer use, how to dispose used motor oil correctly and the importance of picking up pet waste.

The Northern Virginia Clean Water Partners website may be seen here: www.onlyrain.org/.

e. Green Golf Course at Pohick Bay

The Pohick Bay Regional Park Authority 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. Pohick Bay Regional Golf Course follows a Nutrient Management Plan approved by the Virginia Department of Conservation & Recreation to ensure sustainability for the wetlands, the Potomac River and the Chesapeake Bay. The course completed a new pump station in 2014 that will reduce groundwater withdrawals for irrigation.

In 2014, 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. During an Earth Day cleanup, volunteers at Upton Hill Regional Park mulched the park's natural surface trails to prevent erosion.

5. 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 the City of 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; more than 200 structures were damaged. Both neighborhoods are located in the Special Flood Hazard Area (SFHA) 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 flood wall/levee combination, with a pumping station for interior drainage, may be feasible. The USACE study evaluated structural options (levees and flood walls) and flood proofing alternatives (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 flood wall/levee alignments in April 2014, with the most expensive alternative being approximately $34 million.

b. Huntington Flood Remediation Project

In June 2006, the Huntington community experienced flooding from Cameron Run--more than 160 homes were affected. The flood waters exceeded the Federal Emergency Management Agency 100-year floodplain elevation by approximately three feet. The community also experienced 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, 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.

6. 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 continues to provide environmental and stewardship offerings for adults and families as well as youth. Throughout FY 2015, NVSWCD staff presented or participated in roughly 100 events, reaching out to approximately 5,000 individuals on watershed, soil, stormwater and conservation-related topics. In addition, NVSWCD staff coordinated the following efforts:

i. Storm Drain Marking

Volunteers educate their communities about nonpoint source pollution prevention and glue pre-printed labels on the concrete covers of storm drains. The labels identify the stream or Potomac River watershed in addition to providing a "No Dumping" message. Many residents in Fairfax County are unaware that storm drains lead to local streams and the storm drain education and marking program is key to getting that message out to the public. In FY 2015, 484 volunteers logged 2,883 hours over 33 projects to label 2,303 storm drains and educate 12,249 households. Since the start of this program, one-quarter of the more than 80,000 storm drains in the county have labels.

ii. Watershed Calendar

Every month, NVSWCD distributes a calendar of engagement opportunities across Fairfax County to over 1,300 recipients. Events are sponsored by NVSWCD and other partnering agencies and include stream monitoring activities, green breakfast announcements, seminars, watershed cleanups, film festivals, invasive management and others.

iii. Conservation Currents

NVSWCD's quarterly newsletter, Conservation Currents, is distributed to 2,500 individuals and organizations. Topics covered during FY 2015 included:

- Jean Packard's Legacy.
- Clover in Your Pasture?
- Wakefield Run Stream Restoration Project.
- Rain Barrel Art.
- 2014 Land Conservation Awards.
- Stewardship is a Focus for New NVSWCD Director – Jerry Peters.
- Trash Cleanups.

b. Virginia Department of Forestry

In 2014, the Virginia Department of Forestry partnered with volunteers from organizations such as Fairfax ReLeaf, Eagle Scouts, homeowner associations and school groups and completed 23 community tree plantings in the county. Volunteers donated 615.25 hours and planted 1,417 trees in these events. Two of the tree plantings were along streams and added 863 feet of riparian buffer.

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 fourth class of Tree Stewards was trained in 2014. Thirty Tree Stewards reported 715.5 hours of volunteer service, including invasive plant removal, tree planting and education and outreach activities.

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. DPWES Urban Forest Management Division--Tree Canopy

i. Urban Tree Canopy Analysis

The 2012 Urban Tree Canopy (UTC) Analysis conducted by the University of Vermont Spatial Analysis Laboratory indicated that 53 percent of the county's land mass is covered by tree canopy. In addition to canopy coverage, the analysis delineated the percent coverage for impervious surfaces, water, grass/shrub, bare soil, roads and buildings. The analysis was used to develop canopy coverage for all 30 major watersheds found within Fairfax County. The high resolution satellite imagery and UTC analysis for the county is being updated in 2016.

This information on existing tree canopy in the county is being used to also calculate the environmental benefits, such as carbon sequestration, stormwater management, air and water quality benefits and energy conservation, of the urban forest based on science and Web-based tools (*i-Tree*) developed by the U.S. Department of Agriculture (USDA) Forest Service. These efforts are in support of Tree Action Plan Core Recommendations #5, to Improve Water Quality and Stormwater Management through Tree Conservation and #6, to Use Ecosystem Management to Improve and Sustain the Health and Diversity of the Urban Forest.

ii. Tree Canopy and Watersheds

In 2013 and 2014, the Urban Forest Management Division, in cooperation with the county GIS office, continued modeling on county watersheds to simulate the effects of changes in tree and impervious cover on stream flow and water quality. The selected modeling software is i-Tree Hydro, a part of the i-Tree suite of tools developed by the USDA Forest Service which analyzes urban and community forest benefits. The tree canopy analysis, along with field-collected inventory data, hourly stream flow and weather data, is used to quantify the value of trees on the watershed level. Theoretical gains or losses in tree canopy and/or impervious surfaces can be modeled to demonstrate the effects on water quality and stream flow.

The Urban Tree Canopy Analysis and i-Tree Hydro will provide useful input toward achieving many goals set forth by the Tree Action Plan. The benefits of these analyses include:

- Developing benchmark tree canopy levels for the major watersheds in Fairfax County from Urban Tree Canopy Analysis data.
- Using i-Tree Hydro software to model effects of gains and/or losses of tree canopy and impervious surface on water quality and stormwater flow.
- Cooperating with Stormwater Planning to incorporate tree canopy analysis with MS4 Permit and Chesapeake Bay TMDL regulatory requirements.
- Adjusting watershed canopy goals to reflect available planting space, demographics, comprehensive plan potential for land use change, etc. if needed.
- Embedding reforestation and related best management practices in MS4 Permit and Watershed Improvement Plans as credited measures.

The Urban Forest Management Division provides consultations to various county agencies. Representing only two percent of requests of the total requests for help, there were 20 stormwater-related requests coming primarily from the Stormwater Planning Division, the Utilities Design and Construction Division, contractors and stakeholders as part of planning and implementation teams. Contributions included project scoping, plan review, pre-construction meetings and consultation during construction of various projects, including stream restoration, stream stabilization and stormwater management facilities. In addition, UFMD staff participated in

outreach efforts to property owners impacted by proposed stormwater projects to help explain the scope of work and anticipated impacts to trees, as well as proposed planting.

d. Reston Association

The Reston Association, the homeowners association for the large, planned community of Reston (population of greater than 60,000), has an active watershed and lakes management program.

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.

i. Programs for All Ages:

- On March 21, 2015, RA hosted the fifth annual **Reston Kid's Trout Fishing Day**, during which 322 kids ages 2-12 enjoyed catching rainbow trout from the restored Snakeden Branch stream between Soapstone Drive and Lake Audubon.
- At RA's **Spring Festival** on May 2, 2015, residents rented boats at Lake Audubon, learned about stream monitoring and tried their hands at fishing at the lake.
- RA hosted a **Stream Monitoring Workshop** on March 4, 2015 with four people getting certified as stream monitors in addition to two other field days with 14 volunteers gaining experience.
- RA, working with volunteers and an Eagle Scout, marked over 200 storm drains in 2015.

ii. Community Low Impact Development:

Reston Association provides watershed education opportunities for the public at its Walker Nature Center. The nature center conducts programs for all ages that promote watershed appreciation and conservation, including stream and lake explorations, rain barrel workshops and fishing programs. A summary of RA's activities in 2014 follows:

- Distributed printed watershed education materials at the center and at community events, including "Helping Our Watersheds: Living in the Potomac and Chesapeake Bay Watershed," "Understanding, Preserving and Enjoying Reston's Lakes and Streams" and "Rain Barrels."
- Assessed the Snakeden Branch stream restoration with the South Lakes High School IB students.
- Included watershed education, stream and lake exploration and fishing and boating activities at eight of its summer camp programs for children ages

three to 16. These programs served over 1,200 campers between June 30 and August 29.

Every Reston lake has a permanent wayside exhibit with information about the lake's watershed and the flora and fauna that are supported by the lake. There is also a permanent wayside exhibit at the nature center at Snakeden Branch that includes watershed and stream restoration information. There is a Stormwater Trail at Brown's Chapel with educational signs explaining rain gardens, native plant gardens, rain barrels and permeable pavement sidewalks as part of the demonstration project. These interpretive signs are for all ages.

iii. Reston Stormwater 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 stormwater trail in Reston that serves as a guide to help community associations, residents and youths 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 stormwater trail is complete and established.

The stormwater 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 stormwater 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.

e. DPWES Wastewater Management Public Education and Outreach Efforts

These efforts include:

- School programs; Sewer Science in Fairfax County high schools.
- Water quality field day for students.
- Wastewater treatment plant pours.
- Raising awareness at county events (Fall for Fairfax, town halls, Earth Day, Touch a Truck, Take Back Medication Day).
- Television public service announcements.
- Water quality education videos.
- Participation in Fairfax County Channel 16 programs/broadcasts.
- Distribution of informational fact sheets, tri-folds and brochure.
- Web pages.
- Social media (Facebook and YouTube) communiques.
- News releases.
- Flickr.

Fairfax County's Wastewater Management program also addresses point source pollution also in partnerships with surrounding jurisdictions. As a member of the Council of Area Governments, COG Water Team jurisdictions (including Fairfax County) pool together funds to support regional efforts such as Take Back Medication Day or Fats, Oil and Grease (FOG) campaigns.

7. Organized Watershed 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.

a. Clean Fairfax

Clean Fairfax reports that, last year, the organization worked with over 2,200 volunteers at 82 assisted cleanups, picking up over 320 cubic yards of trash, on and around Fairfax County's roads, parks and side streets. Additional activities of Clean Fairfax are highlighted in the Solid Waste chapter of this report.

b. Reston Association

Reston Association reports the following cleanups:

- The **2015 Potomac River Watershed Cleanup** was a success, with 80 volunteers getting out into Reston's natural areas and streams to collect a total

of 112 bags of trash. They were able to recycle 42 of those bags and remove three tires, over 550 plastic bags and 1,350 cigarette butts.

- On June 6, 2015, 34 volunteers collected 300 pounds of trash from Lakes Anne, Audubon and Thoreau. Reston's **Lake Cleanup** was held in conjunction with the Chesapeake Bay Foundation's Clean the Bay Day.

- At Reston Association's **Fall Stream Watershed Cleanup** on October 18, 2014, 58 volunteers cleaned approximately two miles of stream and collected 55 bags of trash, 23 of which were able to be recycled. The cleanup effort at the four sites (Hunters Woods, Cedar Ridge, Great Owl Circle and Nature House) removed about 700 pounds of trash. Volunteers collected over 900 beverage bottles and cans, making them the most common items collected.

c. Alice Ferguson Foundation Potomac Watershed Cleanup

The 27th Annual Potomac River Watershed Cleanup was successful again with 16,521 volunteers removing 285 tons of trash from 411 sites throughout the watershed. In Fairfax County, 1,643 volunteers removed 37.5 tons of trash from 77 sites. Additional activities of the Alice Ferguson Foundation are highlighted in the Solid Waste chapter of this report.

d. Clean Virginia Waterways

According to Clean Virginia Waterways, a total of 778 volunteers participated in the International Coastal Cleanup in Fairfax County during September and October 2014. 10,055 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.

e. Fairfax County Park Authority

Fairfax County Park Authority organized and/or assisted with a number of stream cleanups in 2014.

f. NOVA Parks (Northern Virginia Regional Park Authority)

Occoquan, Fountainhead and Bull Run Marina Regional Parks hosted cleanup events on the Occoquan River with Friends of the Occoquan (FOTO), removing dozens of bags of trash from the reservoir. Pohick Bay Regional Park hosted the Alice Ferguson Foundation Rivershore Cleanup. At Sandy Run Regional Park, rowing crew teams took part in water cleanup days, removing trash from the Occoquan Reservoir in the vicinity of the park.

g. Department of Public Works and Environmental Services

In 2014, the Stormwater Planning Division continued to develop a logical model to organize and analyze data collected using the Trash Assessment for Improved Environments (TAFIE) stream condition assessment protocols and data forms developed in 2012. When completed, this will enable TAFIE data collected by the county as well as by volunteer groups to be integrated and compared with stream cleanup data collected using similar methodologies (particularly the Alice Ferguson Foundation's Visible Trash Survey and the International Coastal Cleanup), as well as allow cleanup data to be merged with other permit-related information (for example, stream cleanup results and stream biomonitoring data).

TAFIE forms and guidance were provided to elementary schools 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. Virginia Pollutant Discharge Elimination System (VPDES) Municipal Separate Storm Sewer System (MS4) Permit

Fairfax County's VPDES 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.

VDEQ administers these programs through the Virginia Stormwater Management Program Regulations, which are authorized by the Virginia Stormwater Management Act.

The county's MS4 permit was renewed on April 1, 2015. Fairfax County's MS4 permit and MS4 annual reports can be viewed on-line at: www.fairfaxcounty.gov/dpwes/stormwater/ms4permit.htm.

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 (IHRR) 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 (AO) 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 county has taken the following steps related to the Industrial and High Risk Runoff inspection program:

- Drafting 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 have the potential to discharge to the MS4; this database is being used to identify facilities that will be used to prioritize inspections associated with the IHRR program.

- Updating of its list of facilities holding Virginia Pollutant Discharge Elimination System permits.

- Development of new educational materials to assist other county agencies with recognizing and reporting IHRR during their inspections.

- Hiring of two Code Specialists for the purpose of conducting IHRR inspections.

The following steps related to the Construction Site Runoff inspection programs will 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.

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, 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 2014, Fairfax County inspected 475 of the 1,749 county-owned stormwater management facilities and 749 of the 3,825 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 2014, MSMD continued its maintenance program for county stormwater management facilities. Maintenance can include repairs to stormwater management facility structures and removal of sediment. During 2014, the county cleaned and/or mowed 1,355 dam embankments, including 56 regional ponds that 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 3,432 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; graffiti 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 stormwater management 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 168 facilities, including: bioretention gardens; green roofs; permeable pavers; vegetated swales; tree box filters; and infiltration trenches.

In 2014, MSMD continued a partnership with the Fairfax County Sheriff's department using the Community Labor Force (CLF) crews to help maintain Fairfax County's public LID facilities and remove trash in all the publicly maintained stormwater ponds. In 2014, the CLF work crews were tasked with maintaining roughly 36 publically-maintained LID facilities and removed trash in over 1,300 ponds.

In 2014, MSMD continued implementation of its infrastructure inspection and rehabilitation program. Staff inspected over 11,000 pipe segments and over 10,000 storm structures with video and photo documentation. Under the rehabilitation program, more than 834,200 linear feet (158 miles) of pipe were videoed, documenting the existing structural and service conditions of the interior of the storm system. These efforts represent 389 miles, or one-third of the storm drainage network, being screened through walking and/or video documentation for obvious deficiencies. In addition, more than 3.1 miles 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 stormwater management 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 (E&S) Control

DPWES continues to make improvements to the county's erosion and sediment control program, resulting in a greater emphasis on, 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.

In 2014, a total of 594 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 Environmental Quality.

In 2014, 25,844 E&S inspections were performed through the county's Alternative Inspection Program on all sites under construction. Those E&S inspections represented 57.2 percent of the 45,167 total site inspections that were performed by Site Development and Inspection Division (SDID) personnel. The site inspections total also included 19,323 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 2014, SDID wrote 741 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 99 violations in 2014 and 90 of those were later cleared. The remaining nine violations are extended until the required corrections are made or court action is initiated. SDID held 21 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 2014, the branch received 245 total complaints. In most instances there was either no violation or there was timely compliance if a violation was cited. The branch issued 19 Resource Protection Area violation notices and 38 land disturbance violation notices. The branch undertook one criminal proceeding to ensure compliance.

5. Illicit Discharges

a. Fire and Rescue Department

The Fire and Rescue Department's Fire and Hazardous Materials Investigative Services (FHMIS) 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 2014, the section received 581 complaints involving hazardous materials. The actual spill, leak or release of hazardous materials into the environment occurred in

289 of these cases. Of these 289 releases, 125 involved petroleum based products. There were 22 hydraulic oil spills/releases (mostly from trash trucks), 22 gasoline releases, 10 fuel oil or home heating oil releases and 40 diesel fuel releases. The remainder consisted of a variety of materials including, paint, antifreeze, cleaners, various gases, various chemicals and mercury. There were 22 incidents where the release of hazardous materials impacted storm drains or surface waters. The section tracked eight sites for both short and long term remediation activities.

b. Virginia Department of Environmental Quality

The Northern Regional Office of the Virginia Department of Environmental Quality reported that, in 2014, there were 158 stream pollution incidents in Fairfax County. These include petroleum surface spills, discharges from point sources (discrete conveyances/pipes) and sewage discharges. Water bodies were involved in 72 of the incidents.

6. Virginia Department of Transportation Wetlands, Streams and Water Quality Mitigation Actions and Policies

a. Virginia House Bill 2

On April 6, 2014, Governor Terry McAuliffe signed *House Bill 2* (HB2). HB2 became effective as of July 1, 2014 and requires the Commonwealth Transportation Board to develop and implement a quantifiable, transparent prioritization and funding process for all modes of transportation by July 2016. The prioritization process will evaluate projects for six evaluation measures, one of which is environmental quality to reduce pollutant emissions and energy consumption, and minimize the impact on natural and cultural resources.

b. Wetlands and Streams

Potential impacts to stream and wetland resources from VDOT projects and activities are avoided and minimized to the greatest extent feasible. Avoidance of such impacts involves a balance with avoiding and minimizing technical, logistical, socio-economic as well as other environmental resource factors to find the most practical and least environmentally-damaging solution.

For unavoidable impacts to aquatic resources federal/state water quality laws and regulations may require compensatory mitigation in order to obtain water quality permit authorizations form the permit regulators. To comply compensatory mitigation requirements, VDOT designed and constructed several on-/off-site mitigation areas as a part of a highway construction project. Within Fairfax County, several mitigation sites were created on state right-of-way totaling approximately eight acres of wetlands (seven acres non-tidal and one acre tidal) and approximately 2,635 linear feet of restored streams associated with unavoidable impacts from VDOT highway improvement projects. These compensatory mitigation sites have

satisfied the success establishment criteria set by the regulatory permitting agencies and now exist in perpetuity as protected conservation easements. One of that last remaining on-site mitigation sites under active post-construction permit monitoring is associated I-95/Telegraph Road interchange improvement project (opened to traffic lasts year). The compensatory mitigation requirements for the unavoidable impacts included wetland enhancement/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 plus 0.36 acre of stream restoration to relocated tributary to Cameron Run; these areas are in the third year of a five year monitoring period.

Beginning in 2008, EPA, USACE and VDEQ jointly supported an order of preference for compensatory mitigation: first through purchase of stream and wetland credits from approved commercial mitigation banks; second by payment of in-lieu funds; and third by permittee responsible mitigation (i.e., preservation, enhancement and creation) for compensation of unavoidable impacts to aquatic resources. As a result, VDOT now purchases wetland and stream credits from approved mitigation banks to fulfill compensatory requirements. While compensatory mitigation is ultimately subject to approval of the regulatory permitting agencies, VDOT is open suggestions from EQAC for exploring mitigation opportunities within the Fairfax County geographical area.

VDOT has been treating nearly 900 acres of impervious road surface area through a system of 190 stormwater basins throughout the county under the requirements of the 1990 stormwater regulatory requirements. Under the new stormwater regulations effective last year, runoff from all existing and proposed impervious pavement on VDOT highway improvement projects will need to treated before it is discharged into adequate outfalls. These new requirements will increase the acreage of impervious road surface as well as expand the number of best management practice (BMP) measures for treatment of stormwater runoff from highways.

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 (maintained by Fairfax County) 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 through which the water infiltrates into ground and ultimately reaches groundwater. The only small treatment plant remaining in the county serves the Harborview subdivision of Mason Neck.

Fairfax County generates about 100 million gallons a day in wastewater. Approximately 40 percent of this is delivered to the Noman M. Cole, Jr. Pollution Control Plant (owned and operated by Fairfax County) for treatment. The treatment facility operated by the Upper Occoquan Service Authority (UOSA, an independent regional authority) treats 13 percent of the county's wastewater. The Blue Plains facility (the largest tertiary sewage

treatment facility in the world, it is owned and operated by the District of Columbia) treats 30 percent, 15 percent is delivered to AlexRenew (Alexandria) and the remaining small percentages go to facilities in Arlington County and Prince William County.

The improved water quality of Gunston Cove (Noman M. Cole Pollution Control Plant), the Occoquan Reservoir (the UOSA Plant) and the Potomac River (Blue Plains) are testament to the high standards of treatment in the last decades.

1. Treatment Facilities

a. Upper Occoquan Service Authority

The following information has been provided by UOSA:

UOSA is an independent authority that 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 water 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 2015 plant performance are listed in Table IV-6.

Table IV-6.
UOSA Permit Requirements and 2014 Performance

Parameter	Limit	Performance
Flow	54 mgd	34.1 mgd
Fecal Coliform	<2/100 mg/l	<1./100 mg/l
Chemical oxygen demand	10.0 mg/l	0.54mg/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	0.03 mg/l
Total Kjeldahl Nitrogen	1.0 mg/l	0.34 mg/l
Dissolved Oxygen	>5.0 mg/l	>7.0 mg/l
Dechlorination Chlorine Residual (mg/l)	Non detect	Non detect

Source: Upper Occoquan Service Authority

In 2014, the influent highest rolling 30-day flow was observed during the 30-day rolling period ending on May 14, 2014 at 40.53 mgd. The UOSA Plant continues to produce high quality reclaimed water that is used to replenish the Occoquan Reservoir.

UOSA produces and treats two types of residuals: biosolids from conventional treatment and lime solids from chemical treatment.

In 2014, the UOSA Water Reclamation Plant prepared a total of 4,632 dry weight metric tons of biosolids by two different processes. One of the processes yielded Class B biosolids and the other produced Class A pellets.

Of the total biosolids produced in 2014, a rotary dryer system (RDS) produced 3,647 dry metric tons of Class A Exceptional Quality pellets. The RDS heats centrifuge cake to a temperature in excess of 93 degrees Celsius and produces pellets that are approximately one to three millimeter in size.

For the Class A pellets, the level of pathogen requirements were achieved as stated in paragraph 9 VAC 25-31-710.A.7 – Alternative 5 (Process to Further Reduce Pathogens Option 2 – Heat Drying). The process produced pellets with a fecal coliform density that were <0.19 MPN (Most Probable Number) per dry gram of biosolids, meeting the requirements of 9 VAC 25-31-710.A.7.a.

The UOSA Class A pellets samples total solids content ranged from 92.9 to 95.8 percent, therefore, the Vector Reduction Attraction requirements of paragraph 9 VAC 25-31-720.B.8 were met.

Of the total biosolids produced in 2014, 791 dry metric tons were produced by centrifugation followed by lime stabilization. Anaerobic digested and thickened waste activated sludge were blended together, conditioned with polymer and processed through centrifuges. The centrifuged sludge was transported to a screw mixer where granular lime was added, resulting in biosolids with percent total solids ranging between 25.7 to 30.9 percent.

For the lime stabilized biosolids, the level of pathogen requirements were achieved as stated in paragraph 503.32(b)(3) Class B – Alternative 2 *(Appendix B.A - Process to Significantly Reduce Pathogens Option 5-lime stabilization)* by achieving a pH of 12 units after two hours of contact.

The UOSA lime stabilized biosolids had a pH of 12 after two hours of contact and 11.5 or higher for an additional 22 hours. Therefore, the Vector Reduction Attraction requirements of paragraph 503.33(b)(6) were met.

Thickened lime residuals are gravity thickened and dewatered on 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 plant is owned and operated by the Fairfax County DPWES Wastewater Division 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-7 presents the facility's performance and current effluent monthly limitations.

Table IV-7.
NMCPCP Permit Requirements and 2014 Performance Averages

Parameter	Limit	Performance
Flow	67 mgd	39.23 mgd
$CBOD_5$	5 mg/l	< 2 mg/l
Suspended Solids	6 mg/l	0.6 mg/l
Total Phosphorus	0.18 mg/l	0.06 mg/l
Chlorine Residual	0.008 mg/l	< 0.008 mg/l
Dissolved Oxygen	6.0 mg/l (minimum)	8.6 mg/l
pH	6.0-9.0 (range)	6.9
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	2.25 mg/L

*Geometric mean
Source: Fairfax County Department of Public Works and Environmental Services

In 2014, 56,927 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.

Water Reuse Project

The purpose of the project, which was completed in 2013, is to provide treated effluent, as allowed by state regulations, that can be used by various users in lieu of potable water. 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 (E/RRF), 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.

2. Sanitary Sewer Maintenance, Repairs and Rehabilitation

The Wastewater Collection Division (WCD) 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.

WCD takes a proactive approach toward maintenance of the county's wastewater collection and conveyance system to assure that facilities remain at a high service level:

- Sewer Rehabilitation - Utilization of trenchless technologies for sewer rehabilitation is a major initiative for both gravity and pressure lines. In 2014, 99,774 linear feet of gravity sewers and 2,237 linear feet of 20-inch force mains were rehabilitated using cured-in-place pipe repair. Over the past 10 years, 206.2 miles of sewer lines have been rehabilitated. From 1974 to present, 492.34 miles of sewer lines have been rehabilitated.

- Inflow/Infiltration (I & I) and Flow Monitoring Program -The WCD in-house I & I and flow monitoring programs enable the Wastewater Management program to be proactive in diagnosing wet weather induced problem areas. The I & I program targets the system's older sewer service areas, which are then addressed by the comprehensive sewer capital project and rehabilitation program. The flow monitoring program provides valuable data to determine problem areas and for billing of inter-jurisdictional flows.

- Sewer Maintenance-The Sewer Maintenance group integrates and optimizes the sewer maintenance activities of WCD. Staff reviews and evaluates procedures, programs, work completed to date and equipment needs. They also plan 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

2014, 384.2 miles of sewer were cleaned and 104.0 miles were visually inspected. The work orders are planned and managed using a Web-based asset management

- The Television Inspection Group continues its documentation process for new construction as well as existing sanitary lines. Closed circuit television (CCTV) inspection is used to inspect sanitary sewer lines to identify defective lines in need of repair, rehabilitation and/or regular maintenance. In 2014, 163.5 miles of old sewer lines and 7.5 miles of new sewer lines were inspected using CCTV. All inspections are recorded in the Enterprise Asset Management system and are used in work order planning and management. There is a new WCD initiative, to replace current process of manual visual inspection of the gravity sewer system with scanning technology (in combination with a digital camera pole) to create robust, efficient, reliable and searchable video inspections. This initiative will enhance the reliability of the inspection program.

- Sanitary Sewer Extension and Improvement Program – This program addresses pollution abatement and public health considerations by providing sanitary sewer service to areas identified by the Department of Health as having non-repairable, malfunctioning septic systems. There was no activity in this program in 2014

- Pumping Stations - The Pumping Stations Branch is responsible for operation and maintenance of the county's sewage pump stations, low pressure systems and flow meters. The preventive and corrective maintenance performed by the branch is critical for reliable operation within the pumping station system. The Pumping Station Branch is also responsible for the rehabilitation of the county's pump stations, meter stations and force mains. The branch works to monitor, repair and identify future projects associated with keeping these facilities in good working order.

  The pump station Supervisory Control and Data Acquisition system provides remote monitoring, alarm management and limited control capabilities for the pump stations on a local area network.

- Lifecycle Asset Management Initiative - In 2009, WCD began participating in Fairfax County's new program-wide strategic lifecycle asset management initiative for wastewater assets including: planning; funding; operation; management; inspection; maintenance; rehabilitation; renewal; disposal; and performance measurement. WCD Projects and Assets Branch is responsible for: monitoring and recommending adjustments to the WCD's asset management strategies and objectives; minimizing wastewater collection and conveyance asset whole life cost; and maintaining acceptable level of service and managing risk associated with asset failure.

- The county has been listed as an example case study by EPA for its capacity, management, operation and maintenance program to abate sewer overflows and extend the life of the sewer systems. Since its inception in 1995, it has reduced

sewer overflows by 66 percent.
www.epa.gov/npdes/pubs/sso_casestudy_fairfax.pdf

3. Septic System Permitting and Repairs

a. Overview

An estimated 21,534 homes and business are served by onsite sewage disposal systems in Fairfax County. Over 700 of these systems are alternative sewage disposal systems, which require more extensive maintenance than conventional systems. The operation and maintenance of all onsite sewage disposal facilities is regulated by the county's Health Department, which reported that, in 2014, 143 New Sewage Disposal Permits were issued for single family residences. There were 115 new sewage disposal systems installed: 62 (54 percent) were alternative type systems and 53 (46 percent) were conventional systems. There were 737 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 3,275 septic tank pumps outs.

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 28 properties permitted for pump and haul as a result of failing onsite sewage disposal systems with no areas 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 onsite 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 may not be aware of their responsibilities for maintaining these systems. Education from the private sector and government sector is essential.

ii. Summary/Status of present amendments to Chapter 68.1 of the Fairfax County Code

No changes have been made to the Fairfax County Individual Sewage Disposal Facilities Code (Chapter 68.1). Chapter 68.1 will continue to be reviewed for future amendments to address changes that may be necessary to comply with statutory codes related to alternative onsite sewage systems.

The Virginia Regulations for Alternative Onsite Sewage Systems (AOSS) supersede requirements of Chapter 68.1. This regulation establishes permanent design, operation and monitoring requirements for AOSS. The Chesapeake Bay watershed nitrogen limitations, set in the AOSS regulations, went into effect December 7, 2013.

The Virginia Department of Health contracted the University of Virginia Institute for Environmental Negotiation to undertake a stakeholder process to examine privatization of the onsite sewage disposal system and offer consensus-based recommendations on how the agency should proceed. The stakeholder group, Safety and Health in Facilitating a Transition (SHIFT), included both VDH and private sector onsite sewage practitioners, local government representatives, homeowners and other interested parties who can provide different perspectives. SHIFT was charged to produce a report of recommendations to advise VDH on how to maximize private sector participation in the onsite sewage program while providing adequate oversight to protect public health and the environment. The Division of Environmental Health is monitoring this process to determine the potential impacts to the Onsite Sewage and 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 homeowners 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.

G. DRINKING WATER

The county's water supply comes from the Potomac River, the Occoquan Reservoir, 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, Town of Vienna, Fort Belvoir and Dulles Airport. As of 2014, both the City of Fairfax and Falls Church systems were incorporated into Fairfax Water's system.

Fairfax Water provided 59,585 million gallons of drinking water in 2014 (see Table IV-8).

With the exception of water from some wells, water must be treated prior to use.

Table IV-8
Fairfax Water -- Water Supply Sources, 2014

Sources	Gallons (in billions)
Occoquan Reservoir (Griffith)	21.638
Potomac (Corbalis)	32.753
Wells	0.000
Purchased	5.114
Untreated	.08
TOTAL	59.585

Source: Fairfax Water

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/water/water.htm.

1. Source Water Assessments

The 1996 amendments to the Safe Drinking Water Act (SDWA) 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. In 2002, Fairfax Water 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/water/swap.htm

Fairfax Water is currently participating in a Water Research Foundation study to develop an information system that catalogs storage facilities, pipelines, roads, rail crossings and other potential sources of contaminants sources in the watershed upstream of drinking water utility intakes in the Potomac and Occoquan watersheds. Concurrently, Fairfax Water is also participating in a project through the Metropolitan Washington Council of Governments to assess vulnerabilities and to rank contaminant

sources based on risk for drinking water treatment facilities. The goal of both projects is to ultimately update the 2002 Source Water Assessments.

2. Treatment Facilities

a. Fairfax Water Occoquan Reservoir Facilities

The Frederick P. Griffith, Jr., Water Treatment Plant, sourced by the Occoquan Reservoir, came on line in 2006. It is currently operating at an average of 59 mgd 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.

On June 3, 2014, the Board of Supervisors adopted an amendment to Fairfax County's Comprehensive Plan to facilitate the reconfiguration and conversion in phases of the quarry located adjacent to the Griffith facility to a future water supply storage facility. In 2015, Fairfax Water and the quarry operator received zoning approvals for this action.

b. Fairfax Water Potomac River Facilities

The James J. Corbalis, Jr., Water Treatment Plant, sourced by the Potomac River, is currently operating at 90 mgd and 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.

e. Washington Aqueduct Facilities

Fairfax Water purchases treated water from the U.S. Army Corps of Engineers, Washington Aqueduct Division, treated at the Dalecarlia and McMillan water treatment plants in Washington, D.C. The original Dalecarlia plant was completed in 1928. The plant capacity was increased in the 1950s by the addition of two additional sedimentation basins, a 30 million gallon clearwell, a 577 million gallon per day finished water pumping station and additional filters. A new chemical building and an additional filter building were completed in 1964. The plant has a capacity of 164 mgd based on filtration rates of two gallons per minute per square foot, and a maximum capacity of 264 mgd. Its treatment scheme consists of screening, chemical additions for flocculation and sedimentation, rapid sand filtration and chemical additions for chlorination, fluoridation and pH control.

The original McMillan plant was constructed in 1905 as a slow sand filter plant. It was replaced in 1985 with a new rapid sand filtration plant at the same site with an average design capacity of 120 mgd based on a filter design rate of 4 gpm/sf, and a maximum capacity of 180 mgd.

3. Wells

Fairfax Water no longer operates public wells.

There are approximately 14,285 single family residences and businesses that are served by individual well water supplies in Fairfax County.

The Fairfax County Health Department has developed and maintains an extensive database and GIS data 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 2014, there were 153 new well permits for single family residences, 30 well repairs permits and 167 Water Well Abandonments issued. There were 40 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.

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. Fairfax Water's current Water Quality Report is available for review on its website at www.fairfaxwater.org/water/water.htm. It includes much of the following information in more detail.

a. Disinfection By-Products

Trihalomethanes are by-products of chlorination water treatment and are suspected carcinogens at elevated levels. The 2014 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 and unregulated elements: aluminum; antimony; arsenic; barium; beryllium; cadmium; calcium; total chromium; copper; iron; lead; manganese; magnesium; mercury; nickel; potassium;

selenium; silicon, silver; sodium; thallium; and zinc. The levels of these metals in 2014 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: www.fairfaxwater.org/water/imar.htm

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.

In 2006, EPA created the Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR) to provide for increased protection against microbial pathogens, such as *Cryptosporidium,* in public water systems that use surface water sources. Fairfax Water completed monitoring for Round 1 of the LT2ESWTR in 2006 and recently began monitoring for Round 2. Both monitoring programs involve the collection of two samples from water treatment plant sources each month for a period of two years.

Under the LT2ESWTR, the average *Cryptosporidium* concentration determines whether additional treatment measures were needed. A *Cryptosporidium* concentration of 0.075 oocysts/liter would have triggered the need for additional water treatment measures. Fairfax Water's raw water *Cryptosporidium* concentrations continue to remain well below this LT2ESWTR 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. While it would be impossible to test for all of them, Fairfax Water considered the feasibility of monitoring and implemented a targeted program focused on constituents most likely to be relevant. First, a suitable list of compounds was carefully researched. Influences in the Potomac and Occoquan River watersheds (industrial, agricultural uses, etc.) to determine which compounds are most likely to be present were also considered. Fairfax Water then evaluated its 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, Fairfax Water began testing an updated list of 25 compounds on a routine basis.

As part of the special monitoring, Fairfax Water tested its source waters, the Potomac River and the Occoquan Reservoir, and its treated water. Samples were sent to an independent laboratory specializing in this type of analysis. As expected, trace amounts of a very few compounds were found in the Potomac River and Occoquan Reservoir sources. Trace amounts of a very few 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, and Fairfax Water concluded its special monitoring in 2014. To view the results from Fairfax Water's monitoring of these compounds and learn more about emerging water quality issues, visit the Fairfax Water Web site at 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 EPA at http://water.epa.gov/drink/contaminants/unregulated/perchlorate.cfm 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 its 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 2014, Fairfax Water monitored more than 3,600 taps for coliform bacteria. The monthly monitoring results were within the 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 caffeine were detected in the source water, and none of the compounds were detected in finished waters during regulatory testing. 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.

Since 1992, Fairfax Water has been testing for lead and copper in customer tap samples in accordance with EPA's lead and copper rule and has consistently tested below the action level established in the rule. In 2014, the 90th percentile value for lead was 0.78 parts per billion (ppb), compared to the EPA action level of 15.00 ppb. For copper, the 90th percentile value in 2014 was 0.17 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 2017. Additional information on these programs and more can be found at: www.fairfaxwater.org.

h. New Regulatory Monitoring - EPA Unregulated Contaminant Monitoring Rule 3

The 1996 SDWA amendments require the EPA once every five years to issue a new Unregulated Contaminant Monitoring Rule (UCMR) list of no more than 30 unregulated contaminants to be monitored by public water systems. This is the first step in the EPA's process to determine what new contaminants may need to be regulated.

Through the UCMR, public water systems provide the EPA with scientifically valid data about the presence of these contaminants in drinking water. These data allow the EPA to determine if the population is being exposed, quantify the level of exposure and assess the impact of these unregulated contaminants on the environment and public health. These data provide one of several primary sources of occurrence and exposure information used by EPA to develop regulatory

decisions for emerging contaminants. The first UCMR was published on Sept. 17, 1999, the second on Jan. 4, 2007 and the third on May 2, 2012. Each UCMR provides a basis for future regulatory actions to protect public health.

The UCMR3 requires public water systems like Fairfax Water to monitor for 28 chemical contaminants for at least a 12-month period between January 2013 and December 2015. Two types of monitoring are being conducted:

- Assessment Monitoring uses common analytical method technologies used by drinking water laboratories. For UCMR3, Fairfax Water is monitoring for 21 contaminants using this method.

- Screening Survey Monitoring uses specialized analytical method technologies not as commonly used by drinking water laboratories. Fairfax Water is required to monitor for seven contaminants using this method.

The UCMR program was developed in coordination with the Contaminant Candidate List (CCL). The CCL is a list of contaminants that are not regulated by the National Primary Drinking Water Regulations, are known or anticipated to occur at public water systems and may warrant regulation under the SDWA. Data collected through the UCMR are stored in the National Contaminant Occurrence Database to support analysis and review of contaminant occurrence, to guide the CCL selection process and to help determine whether to regulate a contaminant in the interest of protecting public health.

EPA reviewed contaminants that had been targeted through existing prioritization processes, including previous UCMR contaminants and the CCL. Additional contaminants were identified based on current research on occurrence and health-effect risk factors. Pesticides that were not registered for use in the United States, contaminants that did not have an analytical reference standard and contaminants for which analytical methods were not ready for use were removed from the list. EPA further prioritized the remaining contaminants based on more extensive health-effects evaluations by the Office of Science and Technology in EPA's Office of Water. These procedures for evaluating health effects support the ranking of contaminants for future CCLs.

The UCMR benefits the environment and public health by providing the EPA and other interested parties with scientifically valid data about the presence of these contaminants in drinking water. This allows the EPA and public water systems to assess whether the population is being exposed and to quantify the level of exposure. This information is one of several primary sources of occurrence and exposure information used by the EPA to develop regulatory decisions for emerging contaminants.

Fairfax Water conducted UCMR3 collection during the EPA-required monitoring period of the third quarter of 2013 through the second quarter of 2014. Very few of

the 28 tested contaminants were detected in Fairfax Water samples, and those that were detected were detected at low levels. For a complete list of the UCMR3 contaminants and those that were detected, please visit www.fairfaxwater.org/current/ucmr3.htm

For more information, visit the EPA website at http://water.epa.gov/lawsregs/rulesregs/sdwa/ucmr/ucmr3/index.cfm or call 202-564-3750, TTY 711.

5. Regional Cooperative Water Supply Agreements

In order to provide adequate supplies of drinking water and 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 allocation of water during low flows. Upstream dams, the Jennings-Randolph Dam 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.

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). The average water withdrawals from the Potomac River as of 2014 are over 400 mgd.

In 1978, the three major metropolitan water utilities (including Fairfax Water), along with the Federal Government, signed the Low Flow Allocation Agreement (LFAA), which created a protocol for allocation of water from the Potomac during periods of low flow.

In 1982, the Metropolitan Washington Area (MWA) water suppliers and the Interstate Commission on the Potomac River Basin (ICPRB) signed the Water Supply Coordination Agreement (WSCA). The purpose 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 interests to continue work on the low-flow issue. The final large river flow needs report is now available at: www.potomacriver.org/wp-content/uploads/2015/02/ICPRB10-3.pdf

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 ICPRB's section for Cooperative Water Supply (CO-OP) Operations 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.

Since the creation of the region's cooperative water supply system in 1982, low flow conditions necessitating the release of water from upstream reservoirs to augment Potomac River flow have occurred in only three years: 1999; 2002; and 2010. Since 2010, flow in the Potomac River has been more than adequate to meet drinking water withdrawal needs by the region's major utilities and no additional releases from upstream reservoirs to augment water supplies have been needed. Given the rainfall this year throughout the Potomac watershed, it is unlikely that releases will be needed for the remainder of 2015.

Information on water supply status, recent Potomac River flow, reservoir storage, water supply outlooks and precipitation maps can be found in the "Drinking Water and Resources" section of the ICPRB website under "Cooperative Water Supply Operations on the Potomac," www.potomacriver.org/focus-areas/water-resources-and-drinking-water/cooperative-water-supply-operations-on-the-potomac/.

ICPRB annually coordinates a weeklong drought management exercise that simulates water management operations and decision making under drought conditions for the Metropolitan Washington Area (MWA) water utilities. 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 stream flow, reservoir storage, water supply outlooks and precipitation maps can be found at: www.potomacriver.org/focus-areas/water-resources-and-drinking-water/cooperative-water-supply-operations-on-the-potomac/drought-monitoring-and-operations/water-supply-outlook-status/.

Every five years since 1990, the CO-OP section of ICPRB has conducted a 20 year forecast study of demand and resource availability on behalf of the three major MWA water utilities (including Fairfax Water). The most recent study (2015) is in

progress and will provide forecasts of water demand and availability through the year 2040 by analyzing demands trends, population growth and available water resources. It will also provide recommendations for future planning when finalized. This study will be published at: www.potomacriver.org/publications/

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.

The 2010 demand study consisted of two parts. The first part evaluated demand forecast, analysis of current resources and evaluation of alternative resources. The second part factored in the effects and impacts of climate change to this equation. The first part of the 2010 study is available at: www.potomacriver.org/wp-content/uploads/2015/02/ICPRB10-01.pdf
The second part of the 2010 study pertaining to climate change is available at: www.potomacriver.org/wp-content/uploads/2014/12/ICPRB13-071.pdf

b. Potomac River Drinking Source Water Protection Partnership (DSWPP)

The Potomac River DSWPP (Partnership) 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. Emerging Contaminants, Early Warning/Emergency Response, Urban Issues, Agricultural Issues and Water Quality data are some of the existing workgroups in the partnership. The Partnership was also recognized in the National Water Program by the Environment Protection Agency (EPA) in 2008 as a best practice. More information on the Partnership can be found at www.potomacdwspp.org

c. Metropolitan Washington Council of Governments Drought Response

In response to the droughts of 1998 and 1999, COG 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 ICPRB handles the administration of the coordinated drought response for water withdrawals from the

Potomac River and during low flows. Additionally, the CO-OP Section also works with COG and the Drought Coordination Committee to assist in providing accurate and timely information to residents during low-flow conditions. COG also provides information on current water supply and drought conditions at: www.mwcog.org/environment/water/watersupply.asp

In coordination with the water utilities in the Washington area, including Fairfax Water, a Water Emergency Response Plan (Plan) was developed through the Metropolitan Washington Council of Governments. The Plan, which was completed in 2005 and updated in 2009, 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, when 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: www.mwcog.org/environment/water/water_workshops.asp

A revised regional Drought Coordination and Response Plan and also a revised Water Supply Emergency Plan are in process.

COG 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.

In 2009, the Climate, Energy and Environment Committee (CEEPC) 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. It is also responsible for developing a regional climate change strategy to meet the regional greenhouse gas reduction goals. In May 2013, CEEPC adopted the second edition of the regional strategy. The regional strategy is available at:
www.mwcog.org/uploads/committee-documents/lV1aXl5e20130717132447.pdf

CEEPC has also developed a resource guide to help the local jurisdictions with the plan implementation. The resource guide is available at:
www.mwcog.org/uploads/committee-documents/lF1aXl5d20130717132518.pdf

COG issues monthly reports during the drought monitoring season (typically from May to October) unless conditions deteriorate and additional reporting is needed. The report is a snapshot of current water supply and drought monitoring conditions in the Potomac River Basin along with an outlook for the next several months, including: (1) The current U.S. Drought Monitor issued by NOAA; (2) Precipitation data for the Potomac River Basin; (3) Groundwater Levels; (4) Seasonal Drought Outlooks—prediction tools issued by NOAA; and (5) Streamflow data for Little Falls and Point of Rocks. The latest copy and other drought response information can be found on COG's water supply website www.mwcog.org/environment/water/watersupply.asp.

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 (Plan), a regional plan as allowed under the Regulation, has 22 local jurisdictions as participants, including Fairfax County. Preparation of the Plan was administered by the Northern Virginia Regional Commission (NVRC).The Plan includes information on water sources, water use, water resource conditions, projected water demand, water management actions and an analysis of alternatives, drought and contingency plans in the event of water deficits. The plan also includes water supply projections for the next 30 years. The final draft of the Water Supply plan was submitted to the Virginia Department of Environmental Quality in November 2011. After a public meeting, the Fairfax County Board of Supervisors adopted the plan in February 2012. VDEQ has issued a final determination of compliance for the regional water supply plan.
The Northern Virginia Regional Water Supply Plan is available at:
www.novaregion.org/index.aspx?NID=1214

6. Occoquan Watershed Initiatives

a. The Occoquan Policy

The Occoquan Reservoir is one of the two sources of drinking water for Fairfax Water. Fairfax Water relies on the reservoir to provide about 40 percent of its water

supply. Therefore, maintaining the water quality in the reservoir is of utmost importance. Several initiatives are in place to protect the water quality in the reservoir.

During the latter part of the 1960s, the Occoquan Reservoir exhibited signs of advanced eutrophication, such as frequent and intense algal blooms (including cyanobacteria), periodic fish kills and taste and odor problems. All these issues threatened the health of the reservoir as a water supply source. In an attempt to find a solution to these problems and to ensure long term health and usability of the reservoir, the Virginia State Water Control Board (SWCB) commissioned the firm Metcalf & Eddy to study the reservoir water quality issues and to suggest a plan of action. Based on the report, in an effort to improve the water quality in the reservoir, the SWCB adopted the Occoquan Policy in 1971. The main goal of the program was to regulate point source pollution in the reservoir by regulating jurisdictional domestic sewage and by setting forth requirements for high performance regional treatment plants. Realizing that the establishment of advanced waste water treatment plants in a rapidly urbanizing watershed might not be sufficient to fully protect the reservoir, the Occoquan Watershed Monitoring Program was established in 1972. It serves as an independent program for monitoring the water quality in the reservoir. The program is overseen by the Occoquan Watershed Monitoring Subcommittee and the monitoring and evaluations are done by the Occoquan Watershed Monitoring Lab. As outlined in the policy, an advanced waste water treatment facility operated by the Upper Occoquan Service Authority came into operation in 1978. It replaced 11 major point sources of pollution in the watershed. This system was also one of the early pioneers of indirect potable reuse.

b. Occoquan Basin Nonpoint Source Pollution Management Program

The point source pollution in the Occoquan watershed was addressed by the Occoquan Policy. Planning studies conducted by NVRC between 1976 and 1978 indicated that nonpoint source pollution loadings from the watershed were a significant contributor to the water quality problems observed in the reservoir. In an attempt to combat the sources of nonpoint source pollution in the basin, the Occoquan Basin Nonpoint Source Pollution Management Program was established in accordance with Section 208 of the Metropolitan Washington Region's Area Wide Water Quality Management Plan, which was developed pursuant to the 1972 Federal Water Pollution Control Act Amendments. NVRC coordinated this multijurisdictional effort to supplement the water quality benefits of the advanced wastewater treatment plant in the basin.

c. Fairfax County New Millennium Occoquan Watershed Task Force Report

To further combat the effects of nonpoint source pollution in the watershed, in 1980 the Fairfax County Board of Supervisors authorized the Occoquan Basin Study and appointed the Citizens Task Force on the Occoquan Basin to carry out the study.

The report from the study was published in 1982. It recommended downzoning the land use in about two-thirds of the Fairfax County portion of the Occoquan Watershed to allow no more than one residence per five acres of land and to implement stringent stormwater management best management practices (BMPs) in the remaining urbanized areas to protect the Occoquan Reservoir from the impacts of stormwater runoff. As recommended by the report, in the same year, Fairfax County downzoned about 41,000 acres of the Occoquan watershed. Concurrent with the 1982 rezoning, the county established the Water Supply Protection Overlay District in its zoning ordinance, consisting entirely of its portion of the Occoquan watershed. Stormwater BMPs are required for all new developments exceeding a density of one dwelling per five acres; a 50 percent phosphorus reduction requirement was established.

On the twentieth anniversary of the downzoning, the Fairfax County Board of Supervisors established a New Millennium Occoquan Watershed Task Force to provide an assessment of issues facing the Fairfax County portion of the Occoquan Watershed. The report was published in 2003 and put forward management options for consideration both at the county and regional levels to further protect the Occoquan Reservoir. The Fairfax County New Millennium Occoquan Watershed Task Force report is available at:
www.fairfaxcounty.gov/dpwes/watersheds/part_1_otf.pdf

7. Lifting the Moratorium on Uranium Mining

Since 1982, there has been in place in Virginia a statewide ban on uranium mining. However there have been recent legislative and/or gubernatorial efforts under way 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 then-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. See EQAC's resolution on retaining the ban at www.fairfaxcounty.gov/dpz/eqac/resolutions/2012_january--uranium_mining.pdf.

8. Water Supply 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: 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 shoreline stabilization projects. The project must address issues within areas served by Fairfax Water or its watershed lying in Fairfax, Loudoun, Prince William, or Fauquier Counties or the Cities of Fairfax, Falls Church Manassas and Manassas Park. 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 91 water supply stakeholder outreach grants totaling $428,696.00. More information about the grant program is available at: www.fairfaxwater.org/outreach/grants.htm.

H. REGULATIONS, LAWS AND POLICIES

1. 2015 Virginia General Assembly Legislation

Legislation enacted, or approved by the Governor, in the Commonwealth of Virginia during 2015 is available at the following link:
http://lis.virginia.gov/cgi-bin/legp604.exe?151+lst+APP.
There was no legislation enacted or approved in 2015 specifically addressing water resources issues.

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. In 2014, the Exception Review Committee was not presented any exception requests.
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 (9VAC25-870-880)

As required by of the Code of Virginia, beginning July 1, 2014, local governments became the Virginia Stormwater Management Program (VSMP) authorities. Prior to this date, this responsibility belonged to the Virginia Department of Environmental Quality. The commonwealth will maintain oversight of local programs to ensure that all applicable state regulations are applied and enforced.

The Stormwater Management Ordinance of Fairfax County applies to all unincorporated areas of the county and the town of Clifton. Any cities or towns that have their own MS4 permit will also have their own ordinance and stormwater management program. The VPDES (formerly known as 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. As of July 1, 2014, the county administers the state permit program on behalf of the Department of Environmental Quality. Also, the Virginia Soil and Water Conservation Board approved new stormwater management regulations. Compliance with these new rules is required by the 2014 VPDES permit and the localities' stormwater management ordinances as of on July 1, 2014. The Board of Supervisors approved a new Chapter 124, Stormwater Management Ordinance, as well as related County Code and Public Facilities Amendments on January 28, 2014. The main regulatory changes are summarized in Table IV-9.

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 a jurisdiction was primarily at the discretion of the locality. Under the new regulations, the BMP must be listed on the clearinghouse. In 2014, manufactured treatment devices were first approved for statewide use and included in the clearinghouse. Also, the VPDES permit requires 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.

Table IV-9
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 Criteria with land disturbance of less than one acre	10 percent reduction in Total Phosphorus	Land disturbance of less than one acre: 10 percent reduction in Total Phosphorus or up to 0.41 pounds per acre per year
Redevelopment Criteria with land disturbance of one acre or more		Land disturbance of one acre or more: 20 percent reduction in Total Phosphorus or up to 0.41 pounds per acre per year
Compliance	Occoquan Method	Runoff Reduction Method
Water Quantity	Criteria for natural and man-made conveyance systems	Criteria for natural, man-made and restored conveyance systems

The stormwater management regulations contain the following noteworthy provisions regarding both grandfathering and time limits. 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 state 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.
    - Portions of a project not under construction June 30, 2019, must comply with any new criteria adopted by the state.
- Projects with government bonds or public debt financing before July 1, 2012.

- Projects that obtained 2009 state permit coverage before July 1, 2014 have two five-year permit cycles (until June 30, 2024) to commence construction.

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. This amendment 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.

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: www.dcr.virginia.gov/dam_safety_and_floodplains/index.shtml

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

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. Medicine may be mixed with coffee grounds or kitty litter to be made unusable and then disposed of in regular trash.

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, through which 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 day.

For a list of common household hazardous materials and how to dispose of them, go to www.fairfaxcounty.gov/dpwes/trash/disphhw.htm.

2. Septic System Pump Outs

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" (www.fairfaxcounty.gov/nvswcd/youyourland/) and the "Water Quality Stewardship Guide" (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 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. For further information, visit the foundation's website at www.Fergusonfoundation.org.

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 regional parks on occasion. NOVA Parks implemented a program that allows youths 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 www.nvrpa.org/park/main_site/content/volunteer. For current information about NOVA Parks, visit its website, www.NVRPA.org/.

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 the Site Development and Inspection Division of DPWES at 703-324-1720, 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 following the Scorecard section of this report.

6. Pet Wastes

Northern Virginia Clean Water Partners continued its support efforts tailored to stormwater specific messages in 2013. Clean Water Partners used television, print, internet advertising and the Only Rain Down the Storm Drain website (www.onlyrain.org) to distribute messages linked to specific stormwater problems, such as proper pet waste disposal, over-fertilization of lawns and gardens and proper disposal of motor oil.

From April 2013 through August 2013, four commercials featuring messages on the importance of picking up pet waste and general household stormwater pollution reduction measures aired on twelve cable TV channels, including three Spanish-speaking channels, 1,530 times. These TV ads reached four million Northern Virginia residents and resulted in more than 400 visits to the www.onlyrain.org website.

J. NOTABLE AND ONGOING ISSUES

1. EQAC continues to support the full funding and implementation of the comprehensive countywide watershed management program. EQAC strongly endorses 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.

2. 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.

3 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 could be cost-prohibitive.

4. 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.

5. There has been in place in Virginia a ban on uranium mining statewide since 1982. However, in recent years, there have been legislative or/and gubernatorial efforts 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 the moratorium on uranium mining in Virginia should remain and no effort should be made to draft regulations pertaining to uranium mining without first addressing concerns identified by the National Academy of Sciences in its report.

K. COMMENTS

1. Wastewater Treatment

EQAC commends the Board of Supervisors and the county for both its own facilities and the other facilities that are contracted with to treat wastewater to high standards. The present levels of funding from fees for service as collected allow the county to adequately maintain and replace the significant amount of infrastructure managed by the Waste Collection Division and the Noman M. Cole, Jr. Pollution Control Plant.

2. Stormwater Management

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 and one half 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 2016 Stormwater Service District tax rate of 2.50 cents (and adoption of the five-year plan with a quarter cent increase each year to ramp up to meet the Chesapeake Bay TMDL mandates) has allowed the county's stormwater program 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 the stormwater program 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 less than 200 years. With the implementation of the next five-year funding plan, this should reduce this reinvestment cycle eventually to a 100 year plan.

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 and 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. 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 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. Fairfax County's new MS4 permit was issued on April 15, 2015.

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 (as demonstrated in the five-year adopted plan) 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. RECOMMENDATION

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 2017 by at least one-quarter penny, from a rate of 2.50 cents per $100 assessed real estate value to 2.75 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.

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CHAPTER V

SOLID WASTE

V. SOLID WASTE

A. OVERVIEW

The Fairfax County Solid Waste Management Program (SWMP) manages solid waste recycling, collection, transfer and disposal within the county. 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 48 percent last year. It should be noted that the recycling rate of 48 percent is based on materials sent to recycling centers. An unknown quantity of this material is rejected from recycling due to contamination and other factors.

The county met the 930,750 tons annual waste delivery obligation to the Energy/Resource Recovery Facility (E/RRF), which is located at the county's I-95 Landfill Complex and owned and operated by Covanta Fairfax, Inc.

The program provides waste collection and recycling services to over 44,000 homes in designated county sanitary districts. Until 1994, the county collected waste from Fairfax County Public Schools; they are now collected by private contractor.

The program also moves a daily average of approximately 100 tractor-trailer loads of municipal solid waste (MSW) from the I-66 Transfer Station to the Energy/Resource Recovery Facility, Lorton Debris Landfill, Davis Industries, Loudoun Composting, Broad Run Recycling and other appropriate disposal and recycling locations. This material comes from the county collection and from private haulers.

This Chapter has been substantially reorganized from previous reports, focusing now on the following specific topics of interest, which are covered in separate sections below:

B. Recent Modifications to the county's contract with Covanta Energy.
C. Enhanced Metals Recovery at the E/RRF.
D. Education/Outreach Activities.
E. I-95 Landfill Groundwater Programs.
F. I-95 Landfill Methane Capture and Control Programs.
G. Recycling Markets and System Performance.
H. Enforcement Overview and Priorities.
I. Supporting Programs and Institutions of Note.
J. Future Concepts and Challenges.

B. RECENT MODIFICATIONS TO COVANTA CONTRACT

The Energy/Resource Recovery Facility continues to serve as the primary disposal location for the county's municipal solid waste, processing approximately 1,000,000 tons of MSW per year. Approximately 25 percent of the waste processed at the facility is from neighboring jurisdictions, including Prince William and Loudoun counties and the District of Columbia, with minor amounts also being brought to the plant under merchant arrangements that are managed by Covanta. A new waste disposal agreement was negotiated with Covanta Fairfax, Inc. for the continued processing of county waste when the original service agreement expires in February 2016. This new five-year contract brought with it the following changes:

1. Below-market disposal pricing, with greater flexibility to adapt to opportunities for increased recycling and changing waste composition.

2. Simplified administration of the partnership, with a "fixed price" flat-rate disposal contract replacing the complex, higher-risk approach of the expiring service agreement.

3. Reduced annual tonnage delivery guarantees, with a new contract minimum low enough to be covered solely by the projected tonnage of waste that will be generated within the county (at the time of this writing, the guarantee falls from 950,750 to 650,000 tons).

4. Performance standards that promote faster and higher levels of customer service for waiting collection vehicles, translating to shorter idle times and the various economic and environmental benefits that will yield.

Covanta is free to market the remaining disposal capacity at the plant (nominally thought to be approximately 600,000 tons per year). However, the county retains the right of first refusal for this remaining capacity, provided an agreeable price can be negotiated (i.e., the existing rates do not apply).

The new contract covers a five-year term (2016-2021), and includes two potential five-year renewals, if contract terms continue to be mutually agreeable. The intent to renew by either party requires two years' advance notice, and the key terms such as price, tonnage or capacity guarantee and revenue-terms are entirely negotiable. As a practical matter, then, the county has no guarantees or commitments after 2021. It is germane to note that Covanta has a lease on the property where the plant stands and the right to operate there until 2031.

C. ENHANCED METALS RECOVERY AT THE E/RRF

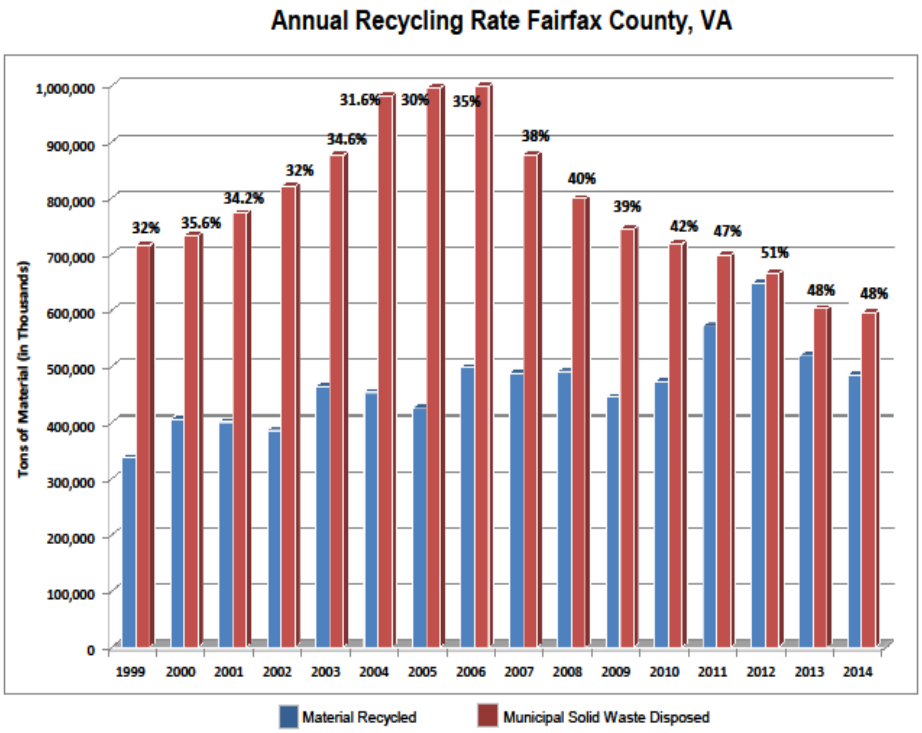
In addition to recovering energy from municipal solid waste, metals are recovered from the ash residue and recycled. In FY 2015, approximately 24, 000 tons of ferrous metal and 2,500 tons of non-ferrous metal were recycled from the ash.

Over the past two years, the performance of the non-ferrous materials recovery system has improved significantly, largely due to the addition of a duplicate line of mechanical and magnetic processing equipment that targets small-size non-ferrous items (less than ¼-inch diameter), and the optimizing of ash conditions and handling processes. As a result, the overall recovery rate for non-ferrous metals has approximately doubled since FY 2012.

D. EDUCATION/OUTREACH ACTIVITIES

Virginia Department of Environmental Quality regulations require municipalities in the commonwealth to recycle a certain minimum percentage of the MSW generated within the jurisdiction (codified at 9 VAC 20-130-10). For Fairfax County, that minimum requirement is 25 percent (by weight). Although approximately 90 percent of the waste and recyclables generated in the county are collected and/or managed by the private sector, it is the SWMP that is held responsible for meeting this 25 percent recycling requirement. Each year, the SWMP must collect and compile recycling data to support the required annual report that is sent to DEQ in Richmond. Fairfax County's recycling rate for 2014 was 48 percent, unchanged from the previous year. Figure V-1 depicts the historical quantities of recyclables collected in the county since 2000.

Figure V-1 - Historical Quantities of Materials Recycled in Fairfax County



The annual recycling rate is calculated by comparing the material recycled to the municipal solid waste generated. The technique for calculating the annual recycling rate is defined in Virginia's administrative code, 9VAC20-130-125B. Fairfax County includes a 2% credit for having a source reduction program, as allowed by 9VAC20-130-125C(4).

It is important to note that the reported "recycling rate" is not a simple, calculated fraction (e.g., weight of recyclables as a percentage of the total weight of waste generated). Instead, the rate is a value calculated from a statutory formula that includes "credits" for various beneficial solid waste management practices, applied to the percentage of waste *collected* as a recyclable. The majority of recyclables collected in Fairfax County are delivered to third-party material processors that sort, purify, and package target recyclables for resale. As a result, some collected recyclables do not ultimately go to market, due to contamination or the absence of a willing buyer. For example, such is currently the case for glass, for which none of the processors used by county collectors are actually recycling this material; it is currently considered a discard at area recycling plants and is shipped elsewhere for disposal. There is no reporting requirement or statutory mechanism available at this time to determine how much of the reported "48 percent" was actually recycled into another useful material.

Public education and outreach are key components of any successful municipal recycling program. To that end, the SWMP has focused on developing outreach and education programs that take advantage of its partnerships with county agencies, Fairfax County Public Schools, community organizations, commercial businesses and privately-owned collection companies. In general, outreach programs consist of activities and displays at county festivals, support and publicity for several events specifically dedicated to recycling, public speaking at community and industry events, and providing technical support and research to decision makers on emerging recycling technologies and issues. Examples of ongoing efforts in this area include:

"Know Toxics" - The SWMP works closely with the Northern Virginia Regional Commission on this regional public information program. The purpose of this program is to educate business owners about their regulatory responsibilities for 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 through which businesses can learn how to legally and appropriately manage these materials.

County "Fairs" - The SWMP continues to sponsor "Fall for Fairfax" and participate in "Celebrate Fairfax". These events provide great opportunities 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 SpringFest Fairfax (Earth Day/Arbor Day) festival produced by Clean Fairfax. SpringFest Fairfax boasts an attendance of over 5,000, and the Department of Public Works and Environmental Services (DPWES) and other county agencies are well-represented and spend the day teaching residents ands and

children about the important role DPWES plays in keeping the county clean and healthy.

E. I-95 LANDFILL GROUNDWATER PROGRAMS

Opened by the District of Columbia in 1972, the county assumed operational responsibility for the facility in 1982. The facility accepted MSW for landfill disposal through 1995. Since that time, only incinerator ash has been disposed in the landfill.

In response to the presence of regulated constituents found in groundwater leaving the site, the SWMP established a Corrective Action Plan (CAP) which was implemented in 2011. The CAP, reviewed and approved by the DEQ, specified a battery of remediation and additional monitoring activities (covered in detail in previous years of this report). The CAP activity was required to show a reasonable reduction in the concentration of targeted groundwater constituents after one year. Sufficient progress has been shown to warrant continuing the prescribed active remedy, which is an enhanced form of natural bioremediation.[1] Once every three years, a Corrective Action System Evaluation report must be submitted to DEQ, to summarize remedial activity and progress toward attainment of the groundwater quality standards established for the site. The first CASE Report was submitted to DEQ in April, 2014, and demonstrated that the selected remedies have been effective.

At the time of this writing, additional groundwater impacts of a similar nature to those being already addressed have been observed at other groundwater locations beneath the site. For each new impact observed, a Nature and Extent Study is being completed and submitted to DEQ. Following the review of this document by DEQ, the county will submit an Assessment of Corrective Measures. On an interim basis, the county has initiated enhanced bioremediation at the affected areas, to address these groundwater impacts immediately and in advance of formal DEQ approval. To date, the interim measures have been effective at reducing the constituents of concern associated with the new plumes.

It should be noted that while groundwater contamination is a concern wherever it occurs, the typical greatest concern is contamination of drinking water wells. There are no known drinking water wells threatened by groundwater leaving the I-95 landfill site.

F. I-95 LANDFILL METHANE CAPTURE AND CONTROL PROGRAMS

Typical of municipal landfills, the I-95 landfill materials decompose over time and produce off-gases comprised mainly of methane and carbon dioxide. Trace amounts of potentially toxic gases are also produced. Some toxic gases may be produced from the decomposition of personal care products. Landfill gas (LFG), if not collected has a significant greenhouse

[1] DEQ's June 11, 2015 approval of the county's "2014 Annual Report, Assessment and Corrective Action Monitoring Program", dated February 2015.

gas impact from methane and the potential to impact the surrounding community with other off-gasses.

The I-95 Landfill operates a large LFG collection system, with over 350 installed wells extracting LFG 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 Landfill Energy Systems 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. SWMP staff also converted space heating at the landfill maintenance shop to use LFG as the fuel source (the original heating system used bottled propane gas). This conversion has historically saved approximately $5,000 per year in heating costs, although depressed natural gas prices over the past two years has eroded this estimated value. Economics aside, the project received a national award from the U.S. Environmental Protection Agency for its positive impacts on greenhouse gas (GHG) emissions and climate change.

To minimize GHG and other impacts, it is important for the LFG collection system to minimize leaks and capture as much gas as possible.

During this reporting period, the SWMP continued to face challenges with the aging landfill infrastructure systems that need to be upgraded. The SWMP addressed issues of compliance with Virginia's air pollution, landfill gas control, solid waste management and stormwater management regulations, as well as the Environmental Protection Agency's Greenhouse Gas Reporting Rule. The SWMP annually submits reports to DEQ and/or the EPA, covering LFG control system monitoring and operational data and greenhouse gas monitoring data (LFG contains several potent greenhouse gases), and LFG surface emissions and facility perimeter monitoring data. Approximately 85 percent of the landfill gas produced in the landfill is captured. DEQ and EPA have found this capture rate and all submittals to be acceptable.

G. RECYCLING MARKETS AND SYSTEM PERFORMANCE

1. Glass

As noted earlier in this report, there is currently no regional market for post-consumer glass (the glass recovered by municipal recycling programs), causing glass collected in the county to ultimately be disposed as a processing residue by the region's recyclables processors (i.e., it is not currently being recycled).

Glass constitutes an estimated 20 percent by weight of the recyclables collected by the county's residential programs. While the statutory means of calculating recycle rates allows the inclusion of this non-recycled glass, it is important to understand the impact of the lack of a glass recycling. The county's actual recycle rate is reduced by about 10 percent overall (to 38 percent from 48 percent) due to the lack of glass recycling alone.

The loss of a sustainable local glass market is particularly frustrating as glass is one of a small number of recyclables that retains all of its natural qualities, no matter how many times it is recycled and re-processed. This means that glass recycling offers particularly high savings in terms of natural resource use, as well as savings in energy and emissions.

There are a number of options for addressing glass recycling including:

- Bottle bills.
- Market stimulation.
- County-initiated glass recycling.
- County recycle glass.
- Education.

Bottle bills are in place in California, Connecticut, Hawaii, Iowa, Maine, Massachusetts, Michigan, New York, Oregon and Vermont. These states typically require a deposit on a range of beverage containers that may include glass, aluminum, plastic and bi-metals. Recycling is handled by recycling centers that may include stores.

For reasons that chiefly relate to the limited ability of a single municipality to influence a commodity market, institutional resistance by industry to bottle bills, and the challenge of overcoming technical limitations related to the closest available users, it seems unlikely that the county can directly influence or stimulate the most beneficial end use, which is sale as feedstock to glass manufacturers.

However, a number of other, largely sustainable and highly-feasible alternate reuses for post-consumer glass should be evaluated by the county.

For example, post-consumer glass can be used as a feedstock to make mulch and road salt. Using simple and relatively low-cost equipment, glass can be transformed into sand-like dust, gravel, chips, or mulch-like stone. The finished products are not jagged and will not cut. They can be used in many applications including playgrounds, landscaping, soil stabilization and traction control on roadways. Sandy material can be mixed with road salt to treat icy roads, which in turn would allow the county to purchase less salt and cover more roads.

Credit: Andela Products Co. – glass crushing equipment

A larger 3/8-inch glass product could be used as landscaping material and also has uses in fish tanks and aquariums. Glass mulch lasts longer and, unlike regular mulch, will not fade, break down or become termite-infested. Additionally, the county could explore the use of glass as a substitute for aggregate in a variety of civil engineering applications, including drainage layers in county construction, and as "glassphalt" in road construction.

The county moved to single stream recycling in 2009. This approach resulted in higher recycle rates, principally due to the simplicity provided to the homeowner. However, it also has resulted in an increase of materials that are not recycled (such as glass) and other materials that contaminate the potentially recyclable material. With single-stream collection where glass is collected, the glass results in non-productive contamination of other recyclable products, reducing the overall true recycle rate. This contamination increases the reject material. It may be preferable to discourage single-stream glass collection in addition to providing an education program to help reduce the placing of inappropriate materials in the single stream recycle bin.

2. Food Waste Composting

The Prince William Board of County Supervisors authorized an agreement with Freestate Farms LLC, a local agricultural services and production company, to construct and operate a new facility to process yard waste, food scraps and wood waste at the county's Balls Ford Road composting facility. When fully developed, the Freestate facility will recycle over 80,000 tons per year of organic waste into compost, soil products and non-synthetic fertilizers. Fairfax County already has an agreement with Prince William County through which leaves and grass collected in the county are sent to its existing composting facility for yard waste. With the addition of food waste composting services, it is anticipated that larger generators of food waste in the county (institutional kitchens, large restaurants and grocery stores) will direct food waste to this facility when it comes online (planned for July 2017). As such, a regional facility will be developed by a neighboring community that the county has the opportunity to use. It is the view of SWMP staff that large-scale generators of food waste will be the first to direct some of their waste to this facility. As such, natural market forces will evolve into a situation where food waste from the county will be composted.

3. Business Recycling

Chapter 109.1 of the Fairfax County Code (the county's solid waste management ordinance) requires businesses, schools and institutions to provide for recycling. For cardboard and mixed paper, however, there are no requirements to meet a recycling percentage goal. An outreach plan is being implemented to encourage expansion of recycling requirements beyond those currently mandated. This plan includes:

1. Developing new outreach materials to be distributed to county businesses. These materials are likely to be designed to target specific business types, such as office buildings or eating and drinking establishments.

2. Conduct on-site visits to target businesses to determine current level of participation and provide compliance assistance.

3. Take advantage of opportunities in social media, radio, and television advertisements as outlets for recycling education and outreach.

4. Be an active presence at business association meetings, to reinforce recycling requirements.

5. Continue the already-planned outreach for the county's institutional customers (e.g., libraries, recreation centers, parks).

4. Electronics and Hazardous Waste Recycling

Electronics and household hazardous wastes can be dropped off daily at the Household Hazardous Waste areas at both the I-66 Transfer Station and the I-95 Landfill. Electronics are processed under a contract with Service Source, a sheltered workshop, and the components recycled, sold or the residue disposed of. HHW is consolidated for shipment to various interim processors for recycling or disposal, as appropriate. Further data on these activities can be found in Chapter VI of this report (Hazardous Materials).

5. Recycling Revenue

In the past the county's recycling contractors have been a revenue source to the county. For the last two years, this has no longer been the case, with county paying for recycling instead of receiving revenue.

Revenue has been falling due to a lack of market for glass and paper. In addition, the use of single bin recycling has deteriorated the quality of the recycled material. This has been happening to recycling programs all across the county.

H. ENFORCEMENT OVERVIEW AND PRIORITIES

The county's solid waste management ordinance, Chapter 109.1, is enforced by the SWMP. The enforcement unit doing this work consists of four inspectors, including the unit supervisor. The unit's primary functions are as follows, presented in general order of priority:

- Responding to and investigating resident and business complaints (over 500 cases).

- Conducting random compliance inspections of target waste collectors (approx. 300 inspections).

- Prosecuting enforcement actions generated as a result of the previous two items (approx. 50 actions).

- Providing compliance assistance to members of the regulated community, on demand and also as part of a planned program of education and outreach (approx. 100 site visits and training events).

The values shown in parentheses are the estimated level of activity during FY 2014, which was relatively low due to staff turnover and a broad emphasis on recycling outreach.

As part of a broad program of changes intended to promote greater operational efficiency, and to align enforcement priorities with direction from the Board of Supervisors, the priorities and focus for the SWMP enforcement program going forward can be summarized as follows:

- Maintaining detailed, available statistics on compliance and enforcement activities. Until recently, current county enforcement processes did not capture machine-readable data on complaints, compliance investigations or complaint outcomes.

- Expanding the regulated community to include homeowners associations (HOAs) and similar community associations, property management companies that manage waste at apartment complexes and solid waste brokers (a recent phenomenon, where typically out-of-state companies provide a for-fee waste management service on behalf of large commercial properties such as malls, office buildings and large residential apartment complexes).

- Establishing specific capacity and level-of-service requirements for recycling systems at multi-family and non-residential properties, so that adequate service can be provided to residents, employers and other system users.

- With few exceptions, establishing a clear prohibition on collecting refuse and recyclables in the same container, collecting less frequently than weekly, and collecting putrescible materials in an open-top container.

- While education and outreach to all sectors will likely occur, the focus for this activity over the next year will target apartment complexes, construction and demolition debris contractors, office buildings and eating and drinking establishments.

In 2015, EQAC received requests to address an illegal dump in the southern part of the county. EQAC does not involve itself in individual matters of this type. However, due to the public interest, at EQAC's July 2015 meeting, EQAC focused on how the various county agencies coordinate and respond to solid waste enforcement issues. A wide range of public agencies addressed the issue at the meeting, including:

- The County Executive's Office.
- The County Attorney's Office.
- The Department of Code Compliance.
- The Department of Public Works and Environmental Services-Solid Waste.
- The Department of Public Works and Environmental Services—Stormwater.

- The Fire and Rescue Department.
- The Health Department.
- The Sheriff's Office.

At the July meeting, the county staff explained how complaints are handled and enforcement is addressed. Each department explained its role. Typically, one department of the county will take the lead and coordinate with other departments. Where needed, the lead county department will coordinate with out-of-county agencies such as the Virginia Department of Environmental Quality. It was apparent to EQAC from this discussion that enforcement is being addressed but that communication protocols are informal. This can lead to delays in addressing issues that cross over departments. The county has initiated evaluation of coordination procedures to improve the process.

I. SUPPORTING PROGRAMS AND INSTITUTIONS OF NOTE

1. 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 connect people to the natural world, sustainable agricultural practices and cultural heritage in their local watershed through education, stewardship and advocacy."

In April 2015, the foundation held its 27th Annual Potomac River Watershed Cleanup. Reports from 77 cleanups throughout Fairfax County indicate that the cleanups involved 1,643 volunteers removing almost 75,000 pounds of trash from local watersheds. This included 176 tires, 34,700 beverage containers, 10,402 plastic bags and 3,742 cigarette butts. For full cleanup results and information on volunteer opportunities, visit the cleanup Web page at www.potomaccleanup.org.

Other programs implemented by the foundation include the following:

- Trash Free Potomac Watershed Initiative –Celebrating its tenth anniversary, this is a program to reduce trash, increase recycling and provide education regarding trash issues in the watershed. Multiple years of data are available for specific areas. There is a free toolkit available to help supporters change behavior regarding littering and illegal dumping (www.fergusonfoundation.org/trash-free-potomac-watershed-initiative/).

- 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. Included in

the meeting are discussions on regional public policy, model best management practices, business actions and public education.

- Enforcement—In February 2015, the foundation received unanimous support from the Police Chiefs of the Metropolitan Washington Council of Governments for its fifth Annual Litter Enforcement Month. This is a campaign to reduce littering and illegal dumping through enforcement of local laws. This effort 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 that can be found on the foundation's website at www.fergusonfoundation.org.

2. 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 cleanups), classroom presentations and presentations to homeowner associations, church groups, small businesses and more.

For over 30 years, the Clean Fairfax has been working to make Fairfax County, Virginia clean, green and sustainable. In the last three years, community cleanups have yielded 975 cubic yards of trash. In addition, the organization has presented sustainability workshops to over 50 groups and has visited 39 schools. All of this was accomplished by the equivalent of 1.25 fulltime employees and upwards of 7,000 volunteer hours.

Clean Fairfax serves on the county and statewide litter control and recycling committees. Clean Fairfax produces the county's official Earth Day and Arbor Day event, called SpringFest Fairfax, with the financial and personnel help of DPWES and the Fairfax County Park Authority. Over 5,000 residents and children spend the day learning about the county agencies and nonprofits that work to keep their county clean and green.

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 (gloves, trash bags, recycling bags, vests and safety tips as well as assistance in large scale pickups by connecting residents with the county's trash pickup program) for a successful

cleanup. A follow-up form is available on the Clean Fairfax website to track progress, tally volunteer hours and tally trash pickup tonnage.

In 2014, community cleanup programing yielded 82 neighborhood cleanups, with 2,200 volunteers putting in approximately 2,343 volunteer hours (a value of over $263,000) and collecting over 355 cubic yards of trash. In addition, Clean Fairfax supports several individuals who provide daily or weekly clean ups in their community, adding an additional 600 volunteer hours and over 10,000 illegally placed signs picked up.

Clean Fairfax also organizes periodic cleanup projects around the Fairfax County Government Center (with Fairfax County employees and area businesses) and supports the Virginia Department of Transportation with its Adopt-a-Highway program.

Clean Fairfax continues to organize and lead the county's official Earth Day/Arbor Day event, now called SpringFest Fairfax, in partnership with the Fairfax County Park Authority and Workhouse Arts. Now in its third year at the Workhouse, over 5,000 children and families attended this all day, Virginia Green certified event which included environmental education and entertainment, local food vendors, urban forestry workshops and open studio artist exhibitions. County agencies such as the Health Department, DPWES and the Park Authority as well as many local and regional environmental nonprofit organizations were key to the success of the event. However, funding continues to be a challenge to this very popular event, as the bulk of the costs are borne by Clean Fairfax and the Park Authority.

This is also the third year of the Clean Fairfax Environmental Passport, which is a SpringFest Fairfax booklet that encourages attendees to visit each table/tent or booth to learn what each organization supports and represents. For every visit, children earn a sticker or a stamp and can show their passports at Clean Fairfax to be presented with an Environmental Good Citizen award (a globe "medal" made of recycled paper and seeds that can be planted in a pot or the family's backyard.) Clean Fairfax also encourages other festivals, events, fairs and carnivals to institute a similar program to better track what is being offered by way of environmental education to Fairfax County's residents.

Clean Fairfax also supports and promotes the Johnie Forte, Jr. Environmental Education Program, which awards small grants to applicants from the Fairfax County Public Schools to promote sustainable programing, increase recycling, school cafeteria composting and other environmental projects with students from elementary, middle and high schools. Clean Fairfax funded the following projects: a rain barrel creation project to water a school's community and pollinator gardens; establishing heavy duty recycling bins for outdoor playing fields as well as the same in school cafeterias; retrofitting drinking water fountains to fill reusable water bottles; and continuing to support cafeteria composting and saving of uneaten/unopened food, which is then donated to a local food bank. In the past, the program was co-funded by Clean Fairfax and the Department of Public Works and Environmental Services, but this year DPWES was not able to fund the program and without additional resources it may be a program that is put on hold until more funds can be raised.

At the direction of the Fairfax County Police Department, the Report-a-Litterer program has been discontinued. While its reach was not wide, and it is unclear whether the program had any impact on auto-centric litter, it did serve as an outlet for residents who were interested in keeping their neighborhoods and county roads clean, green and healthy.

Clean Fairfax continues to look for new opportunities to assist the county in litter reduction and enforcement and will continue to advocate and encourage participation in the State Police's Cover Your Load campaign, which happens in the early spring.

Other major continuing projects include: outreach on reducing residents' reliance on plastic grocery bags; cigarette butt litter education; promotion of the use of rain barrels; advising and mentoring environmental clubs in the school system; creating opportunities for college students wishing to explore the fascinating and important world of environmental advocacy; encouragement of small scale, backyard composting, grass-cycling, rain and pollinator gardens and other sustainable practices; and encouragement of community gardens and micro farms at schools and churches. This year, Clean Fairfax finished an 18 month process of updating the digital educational materials with four new short videos on Recycling and Trash, Water Quality and Conservation, Alternative Energy and Clean Fairfax.

Clean Fairfax is provided office space by in DPWES, and the executive director works directly with many county staff on litter control and recycling education issues. The executive director also serves on the cross-agency Litter Task Force and the MS4 (Municipal Separate Storm Sewer System) Tactical Team on Public Outreach. The Memorandum of Understanding between the county and Clean Fairfax allows the organization to be deployed to assist on important tasks such as information dissemination in stormwater management, recycling, urban forestry and other crucial county environmental endeavors.

Clean Fairfax reaches thousands of Fairfax County residents, employees and businesses through e-newsletters, Facebook and Twitter as well as an environmental blog at www.cleanfairfax.org. The organization also provides the Fairfax County Visitors Center with thousands of auto litter bags each year plus informational bookmarks and brochures, and this year will provide two Fairfax County Farmers Markets (the Workhouse Farmers Market and the Town of Herndon Farmers Market) with branded reusable grocery and produce bags as part of the #PlasticFreeProduce pilot program.

2015 marks 35 years that Clean Fairfax has been an active partner in Fairfax County's environmental mission. For more information, please visit the website at www.cleanfairfax.org or the SpringFest Fairfax website at www.springfestfairfax.org.

J. OTHER FUTURE CONCEPTS AND CHALLENGES

As Fairfax County's population grows and the community becomes generally more urban, the potential to minimize commercial truck traffic within residential communities has become increasingly desirable. Specific to refuse and recyclables collection, it is noted that approximately 30 waste collection companies openly compete to provide service to individual homeowners, community groups such as homeowners associations, apartment buildings and office and business parks. As a practical matter, this means that many companies each send their collection vehicles down the same streets, exacerbating traffic, associated pollution and public safety concerns.

A proven method for easing these congestion issues would be the use of franchise collection, through which the county would establish defined collection districts and the various licensed collectors would compete to serve each district. Only one or two companies would be allowed to service each collection district, dramatically reducing the number of trucks on the road in each neighborhood. Franchising has worked well in many communities, with proven benefits including consistency in cost to customers (everyone pays the same amount for the same level of service), fewer trucks on the road, improved ability to monitor and enforce compliance and associated environmental benefits.

It should be acknowledged that collection franchising has been considered by Fairfax County in the past. Concerns were raised that collection franchising limits competition and favors larger collection companies. However, these concerns can be addressed through careful establishment of franchise zones, and intelligent procurement processes that encourage diversity and provide set-aside opportunities for small and minority-owned businesses. Also, the establishment of franchise collection can allow the integration of additional progressive practices, such as a Pay-As-You-Throw program that would enable customers to pay less if they recycle more.

Previous Recommendation by EQAC

In 2014, EQAC recommended that opportunities to minimize redundant trash truck collection trips in the same neighborhoods be examined for implementation while not increasing cost. In response, county staff noted that a very similar recommendation had been considered by the county during the development of its 20-Year Solid Waste Management Plan in 2004. The concept of franchising raised significant community and industry objections, causing the Board of Supervisors to direct staff away from the concept. Consequently, no further action was recommended due to the negative reactions of residents and businesses, combined with the challenge of implementing certain requirements of Virginia Code as discussed below.

Legal Considerations

Section 15.2 - 930 of the Code of Virginia regulates the process that must be used by a jurisdiction to take control of waste collection activities conducted by the private sector. Key provisions of the process include:

- At least one public hearing must be held, with advance notice to private companies which collect waste in the county.

- Five years' notice must be provided to any companies that will be displaced by a franchising arrangement, or the governing body can accelerate the process by paying affected collectors an amount equal to their preceding twelve months' gross receipts for services in the franchise territory.

K. COMMENTS

1. The new Covanta contract price is only good for five years. For this reason, it is important that the county continue to increase its recycling programs and continue to pursue other options such as food waste recycling and alternative glass recycling.

2. Improved metals recovery from Covanta ash is beneficial by increasing recycling and lowering the ash that consumes landfill space.

3. The county's education programs help support environmental stewardship

4. Portions of the I-95 landfill predate modern landfill environmental protection requirements. As a result the potential for groundwater contamination requires careful attention and remediation actions. The county has been exemplary in doing what is needed. This program should continue to be a priority for environmental protection.

5. The landfill gas recovery program assists in reducing methane release, an important action to ameliorate greenhouse gas emissions. However, the county faces challenges as the recovery infrastructure ages.

6. The county's solid waste recycling program is operating at a loss. This is a concern. Historically, recycling has returned revenue to the county. With recycling becoming a revenue burden, funds will have to be justified in the county budget process. Support for recycling is likely to be enhanced if the program can be returned to a source of revenue.

L. RECOMMENDATIONS

1. **Increase Recycling** - Additional means of increasing recycling should be investigated and implemented. In particular:

    a. Recycling requirements for commercial properties should be enforced and additional specific numeric recycling goals requirements should be considered.
    b. Move forward with a food waste recycling program.

2. **Minimize Redundant Trash Truck Traffic** – In 2004, the Board of Supervisors rejected the franchising approach to reducing trash truck traffic. However, it remains a safety and environmental issue that needs to be addressed. EQAC recommends that opportunities to minimize redundant trash truck collection trips in the same neighborhoods be examined for implementation while not increasing cost.

3. **Make Recycling More Cost Effective -** The county has moved to single stream recycling through which all recyclable material is collected in a single bin. This has reduced the quality and value of collected recyclable materials. Changes to the recycling market have also reduced revenue and actual materials recycled. These are long term problems that will get worse if not addressed. It will take careful study, time and potentially changes in regulation and law to resolve. EQAC recommends the initial step of collecting data on the cost of recycling specific materials. With these data in hand, evaluate if changes should be made to what is recycled. Finally, consider alternatives to single-stream recycling. To implement these steps, consider also the following:

    a. Develop estimates of the actual quantity, quality and cost of recycling specific materials. Estimate the true recycling rate and determine what materials should be recycled due to either being cost-effective, or because recycling of that material provides an important environmental benefit for a reasonable cost.

    b. Revise the list of materials that are recycled from homes to remove glass and other materials that degrade the cost effectiveness of recycling. Conduct a public information campaign to inform residents on how best to recycle.

    c. Support a statewide container redemption fee to reduce litter and increase the recovery of containers in a form that can be recycled.

    d. Investigate the potential for increased county participation in recycling of materials. In particular, programs for glass recycling should be initiated.

    e. Consider alternatives to single-stream recycling that preserve the quality of recycled materials and increase the true quantity of recycling.

4. **Solid Waste Enforcement Coordination for Illegal Dump Sites** – The county has initiated evaluation of coordination procedures to improve the process. EQAC supports this effort and recommends that written inter-departmental coordination enforcement procedures be developed.

ACKNOWLEDGEMENT

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 has provided.

2015 ANNUAL REPORT ON THE ENVIRONMENT

CHAPTER VI

HAZARDOUS MATERIALS

VI. HAZARDOUS MATERIALS

A. OVERVIEW, INCIDENTS AND REPORTING

1. Overview

As this report is being prepared, Fairfax County is working on its MS4 (Municipal Separate Storm Sewer System) Program Plan. While the primary focus is storm water management, discharge protection is included to locate and eliminate illicit discharges and improper disposal.[10] Fairfax County already has many programs addressing illicit discharges and improper disposal. Many of these are included in this chapter about hazardous materials.

Almost daily the news includes an incident somewhere involving a hazardous material. It may be a vehicle accident with spilled fuel, a tanker or train leaking a chemical, a fire in a plant containing hazardous chemicals or a broken mercury thermometer or light bulb. Very little is covered about individuals handling and disposing of hazardous materials that are located in most homes. A hazardous material is any item or agent (biological, chemical, radiological and/or physical) which may cause harm to humans, animals or the environment, either by itself or through interaction with other factors (fire, moisture, other chemicals). Fairfax County is relatively "clean" in that we don't have manufacturing or storage of fertilizers or chemicals. 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.

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 fluorescent light (CFL) 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 phase-out of incandescent light bulbs well underway, the proper disposal of CFL bulbs is becoming more important and the county has expanded its capability to support this requirement.

The Fire and Rescue Department is using Tier II Manager Software for emergency and hazardous chemical reporting. 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. Currently, over 500 total facilities are in the system. Tier II reviews were conducted for county facilities between January and March 2014.[13]

The Fire and Hazardous Materials Investigative Services Section initiated a records management system in 2012 called Fire Files. This new record management system combines previously collected data from the section's Hazardous Materials Complaint Database and its Fire Investigations Case Files into one single records management system.

2. Hazardous Materials Incidents

a. Overview of 2014 Hazardous Materials Incidents

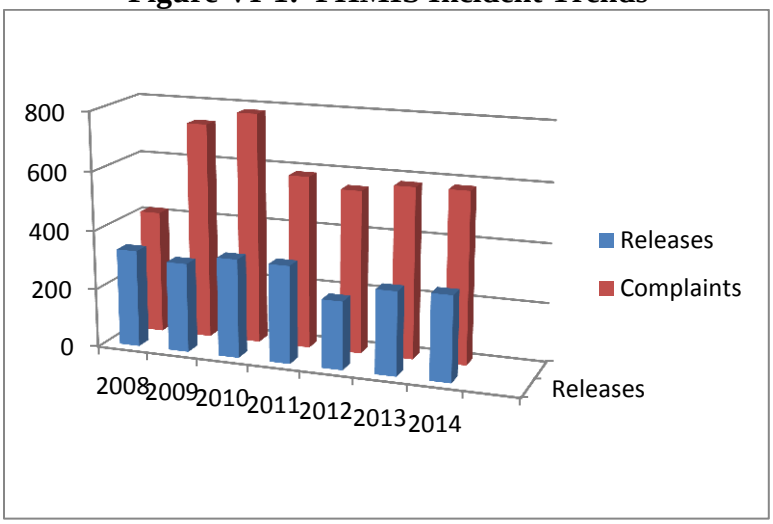
The Fire and Rescue Department's Fire and Hazardous Materials Investigative Services (FHMIS) section responds to all reported incidents of hazardous materials releases, spills and discharges in Fairfax County and the towns of Herndon, Vienna and Clifton as requested or directed by the Fire and Rescue Department's Operation Division's first responders, the Department of Public Safety Communications, other county agencies, the Commonwealth of Virginia and/or complaints from residents. The mission of the section is to prevent the inception or recurrence of fire and hazardous conditions through the enforcement of applicable codes and laws. The section issues notices of violation and summons where appropriate and ensures the proper cleanup of the releases. The section received 581 case entries into its Fire Files record management system in 2014. The actual spill, leak, or release of hazardous materials into the environment occurred in 289 of these cases. Of these 289 releases, 125 involved petroleum based products. There were 22 hydraulic oil spills/releases (mostly from trash trucks), 22 gasoline releases, 10 fuel oil or home heating oil releases and 40 diesel fuel releases. The remainder consisted of a variety of materials including, paint, antifreeze, cleaners, various gases, various chemicals and mercury. There were 22 incidents where the release of hazardous materials did impact storm drains or surface waters. The section tracked eight sites for both short and long term remediation activities. The vast majority of these releases were small in scale. The section also staffs the Hazardous Materials and Fire Investigations Mobile Lab. The Mobile Lab was requested to respond to no hazmat incidents and eight fire events in 2014. The trend in the number of case entries and actual spills over recent years is presented in Table VI-1 and Figure VI-1.

Section personnel maintain relationships with the major hazardous materials 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. FHMIS staff is also

working in partnership with multiple other county agencies on the county's new MS4 permit project.[1]

Table VI-1 Fire and Rescue Department's Fire and Hazardous Materials Investigative Services Incident Trends		
Fiscal Year	**Complaints/Case Entries**	**Spills, Leaks, or Releases of Hazardous Materials**
FY 2014	581	289
FY 2013	579	283
FY 2012	552	231
FY 2011	585	331
FY 2010	782	335
FY 2009	735	303
FY 2008	418	330

Figure VI-1: FHMIS Incident Trends



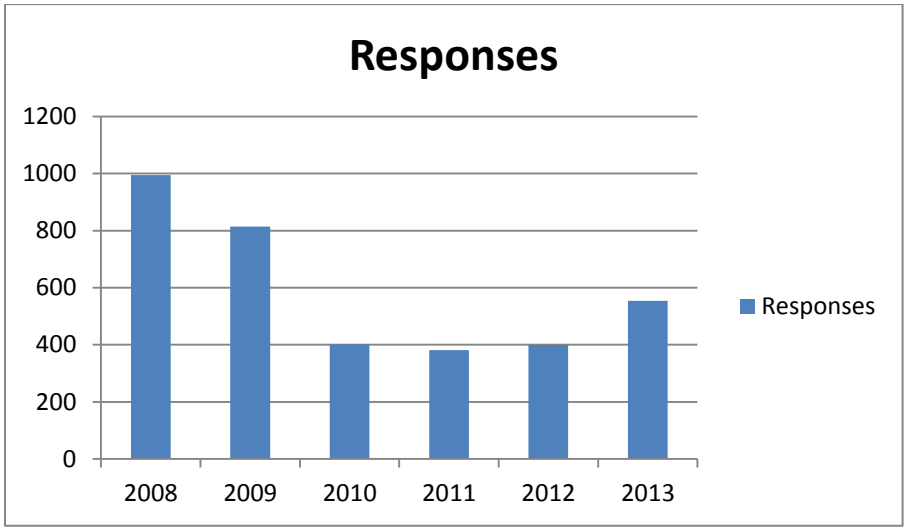
b. Hazmat Response Team Information

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 adverse environmental impact and damage. All units are staffed 24 hours per day, seven days per week.[1]

In 2013, the Hazardous Materials Response Team (HMRT) responded to 554 calls. 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] The trend in the HMRT responses is captured in Figure VI-2.

Figure VI-2: Hazmat Response Team Responses



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 material 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 our 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. Current Tier 2 data indicates, based on 2013 reporting data, that there are 449 active facilities with hazardous materials in the county. Of these, 133 store extremely hazardous substances above the threshold planning quantity. Of the 449 facilities, eight store bulk petroleum.[1]

The Virginia Department of Environmental Quality (DEQ) report for 2014 Leaking Storage Tanks in Fairfax County included regulated (i.e. gas station) and unregulated (i.e. residential heating oil).[15]

Table VI-2
DEQ Storage Tank Leaks

	Regulated	**Unregulated**
Total cases closed	1108	2036
Total cases open	16	46
Cases opened in 2014	7	82
Cases closed in 2014	14	75

3. 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."

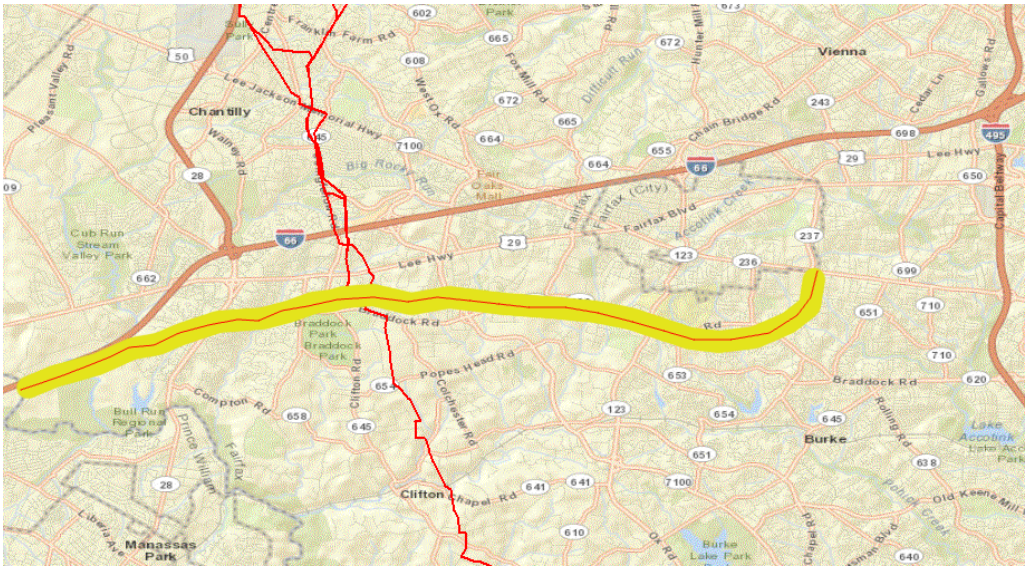
B. ISSUES

1. Pipelines

Pipelines traverse Fairfax County carrying refined petroleum products (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]

Pipelines are cost-effective for shipping large quantities of refined petroleum products to a few destinations, but not to end customers such as gas stations. Except for airports that receive jet fuel directly, most gasoline and distillates, such as heating oil, finish their journey in a truck. In contrast, most natural gas

is delivered via pipeline all the way to the customer's home or business. There are some exceptions – Liquefied petroleum gas can be shipped in railroad tanker cars and trucks, and compressed propane gas is transported via truck to refill tanks at the homes/businesses that are not connected directly to pipelines. In addition, customers with backyard grills handle the last leg of some propane transport, by exchanging propane tanks at businesses to get refills.[17]



A 22-inch wide pipeline (red line with yellow border) transports petroleum products from the main Colonial Pipeline to the tank farm on Pickett Road, near the intersection with Route 236.
Source: US Department of Transportation, National Pipeline Mapping System (17)

Starting in the 1990s, the development of the hydraulic fracturing ("fracking") process for "tight gas" formations on the western edge of the Appalachians led to a dramatic increase in the supply of natural gas from domestic resources. The market for that gas includes urban areas in the eastern U.S. Building pipelines to deliver that new supply of gas to customers on the east side of the Appalachians is not a risk-free business and not every project announced is completed. Pipeline companies have announced several competing plans to bring Appalachian Basin shale gas to markets in Virginia and North Carolina, including the Atlantic Coast Pipeline, Mountain Valley Pipeline and Appalachian Connector. The latter two are planned to connect with the existing Transco pipeline at the same location, the compressor station in Pittsylvania County known as Station 165. Within Virginia, Virginia Nation Gas owns the largest intrastate gas pipeline, carrying gas from the Transco system in Northern Virginia to Richmond and Hampton Roads. In Northern Virginia, Transco is located in Manassas. If oil and gas is discovered in commercial quantities under the Outer Continental Shelf of Virginia, pipelines will be constructed to move the hydrocarbons from wells to tank farms offshore.[17]

Pipeline accidents can affect both human safety and the environment. Northern Virginia and Fairfax County, specifically, have had pipeline spills and leaks in the past. In 1993, a break in the Colonial Pipeline released 400,000 gallons of

diesel oil into Sugarland Run. Fairfax County had to close its drinking water intake on the Potomac River for 11 days, while the oil was skimmed off. Tank farms at the end of pipelines can also be the site of oil spills. The Motiva tank farm on Pickett Road in the City of Fairfax handles 40% of gasoline in the Northern Virginia area. In 1980, 300,000 gallons of gasoline spilled on the surface there, when a pipeline shipment was directed to a small rather than a large tank. The spill forced evacuation of the Comstock subdivision south of the tank farm. In 1990, rainstorms brought to the surface some petroleum that had accumulated underground from leaking pipes and small overfills of trucks at the tank farm since it was built in 1965. The contaminated groundwater, fumes and oil sheens at the surface caused property values in the nearby Mantua subdivision to nosedive. Since then, there have been periodic lesser leaks and spills that have been addressed immediately. Colonial Pipeline had a discharge of 200,000 gallons of aviation-grade kerosene near Manassas which flowed from Route 234/Sudley Road to Bull Run and ultimately into the Occoquan Reservoir – a major water supply for Fairfax County and Prince William County.[17]

Pipes transporting other chemicals onsite can also cause hazardous materials or environmental incidents when they leak or burst. In 2011, the Pepco power plant in Alexandria had, as reported by Alexandria fire officials, 21,000 gallons of mineral oil leak after a pipe burst. The pipe, connected to a transformer, carried mineral oil to cool the transformer. Some of the spill entered the Potomac River. Once the spill entered the river, it exited Alexandria's jurisdiction.[20]

To continue the relative human and environmental safety of the past couple decades, attention should be given to any future increase of production and transport by pipeline of hazardous materials to or through Fairfax County.

2. 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. Concerns introduced as a result of the September 11, 2001 terrorist attack and more recent terrorist attacks, new ethanol transfer stations, new methods to retrieve oil and gases, as well as shipments of radioactive nuclear waste throughout the country require vigilance for safe transportation.

a. Incidents of Note

In a 2013 train accident in Quebec, tanker cars carrying crude oil from North Dakota exploded and over 40 people died. Afterwards, CSX reassured residents in Washington, D.C. that, in 2013, only three tank cars loaded with crude oil were transported by the 7,000 trains that traveled on

the CSX rail line going through the city (and across the Potomac River, through Alexandria). That claim may have been accurate for crude oil shipments, but news stories at the time discussing risks of hazardous materials transport failed to address the number of rail cars loaded with ethanol or refined petroleum products traveling through Alexandria, Fredericksburg, Richmond, etc.[17] Rail cars traveling through Alexandria will either travel through Fairfax County or be unloaded at the Van Dorn rail yard adjacent to Fairfax County.

An April 2014 train accident in Lynchburg resulted in dramatic pictures of tanker cars burning along the city's downtown waterfront along the James River. The crude oil in those cars had come from the Bakken formation in North Dakota. That oil production region has surged due to the success of hydraulic fracturing. The supply exceeded available pipeline capacity, so Bakken crude oil was shipped by rail to refineries in the Northeastern United States.[17]

A February 2015 train accident in West Virginia blocked transport of the oil trains running on the normal CSX route along the James River. Until the tracks were repaired at the accident site, CSX arranged with Norfolk Southern to transport Bakken crude oil on tracks that parallel the New River, and then go through Roanoke and Petersburg to reconnect with the CSX line.[17] With the increase in number of rail cars moving Bakken crude oil, there have been additional train accidents and derailments that result in the rail cars being rerouted onto other rail lines through other communities.

An incident not to be forgotten was the July 18, 2001 CSX train fire in a Baltimore, Maryland tunnel involving a train car with hazardous materials; the incident had wide-range, long-term consequences. Major sections of the downtown were closed, businesses were impacted, Baltimore Orioles' games had to be rescheduled and portions of a major street were closed for five weeks.[3]

b. Ethanol

Most ethanol is distilled from corn and produced in the middle of the United States, but primary markets are urban areas with Clean Air Act compliance challenges. At rail yards, like the Van Dorn rail yard in Alexandria, tanker cars unload ethanol into trucks, which carry it to tank farms with blending terminals. There, ethanol is added to create E-10, E-15 and E-85 mixes, while other additives are blended in to create the specific gasoline formulas sold by brand name retailers such as Exxon, Shell, etc. "Finished" gasoline with specific brand names is then carried by tanker trucks to local gas stations, completing the supply chain.[17]

Why isn't ethanol transported by truck from the Midwest ethanol refineries to Virginia? Transport by rail in 30,000-gallon tank cars costs far less than shipping via 9,000-gallon trucks, each which requires its own driver – compared to two railroad workers driving a train that can haul 100 tanker cars.[17]

As noted by the U.S. Energy Information Administration:

> *Because of the chemical characteristics of ethanol, finished gasoline (which contains ethanol) cannot be shipped via pipeline. Thus, ethanol generally is shipped by rail from the Midwest to blending terminals on the East Coast.*[17]

The Norfolk Southern railroad imports biofuels by train to Thoroughbred Bulk Transfer terminals in Alexandria, Petersburg and Roanoke. CSX has ethanol terminals in Norfolk, Portsmouth, Chesapeake, Richmond and Fredericksburg. CSX may also transport ethanol to the storage and distribution hub at the former oil refinery in Yorktown. CSX announced plans in 2012 to extend its line of ethanol terminals further north to Prince William County. As described by CSX:

> *With access to multiple rail providers and interstates, Prince William County is an ideal location from which to serve Mid-Atlantic markets.*[17]

Norfolk Southern operates an ethanol transloading terminal in the Van Dorn rail yard in Alexandria, from which trucks carry ethanol to gasoline tank farms in Springfield and in Fairfax City. Though Alexandria developed as a transportation hub in the 1800s, today its economy is based on professionals who work in offices, high-end retail and tourism. The former Potomac Yard, where rail cars were classified and lined up into trains headed to various destinations for almost a century, has transformed into a mixed-use community with residential developments.[17]

Industrial operations transferring a flammable, hazardous material from rail to truck are considered by the City of Alexandria to be an inappropriate use near communities such as Cameron Station. Tanker trucks carrying ethanol through city streets are considered safety risks and traffic impediments. As noted in Alexandria's lawsuit attempting to regulate activities at the Van Dorn ethanol transfer facility:

Transferring ethanol from rail car to tank truck, for transport to a tank farm where ethanol will be blended with gasoline for final shipment by truck to gas stations
Map Source: City of Alexandria, Ethanol Transloading (presented to City Council, May 27, 2008)

> *An accident on City streets involving a truck transporting ethanol would pose a serious risk of injury to persons and property, depending on the circumstances of the accident. An elementary school, playing fields, the Van Dorn Street Metro Station, and several businesses are all located within 1,000 feet of the Facility. There is also a high-density residential neighborhood within 1,000 feet of the facility and another within one-half mile of the facility.*[17]

The Federal Surface Transportation Board and a federal judge ruled in 2009 that local land use controls and truck-hauling permits are trumped by federal laws for interstate rail operations, so Alexandria could not require Norfolk Southern to obtain permits for operating the ethanol transfer facility at the Van Dorn rail yard. However, state air quality permits would be required for the railroad to increase transfer capacity from 14 to 30 tanker cars, as Norfolk Southern proposed in May 2013.[17]

Biodiesel and ethanol for blending can also be shipped via barge/truck to customers, bypassing the constraints of transporting biofuels in pipelines. There are no ethanol pipelines in Virginia. Ethanol is transported in bulk by rail and truck rather than by pipeline, because the alcohol-based ethanol absorbs water that can rust pipeline equipment. For the same reason, pipelines do not ship finished gasoline, because it contains ethanol.[17]

Trains hauling crude oil from the Bakken region have been involved in multiple derailments in recent years, some causing fires. U.S. transportation

officials recently extended an order for railroads to notify states about hazardous crude oil shipments.[18]

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 freight 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.

3. Hazardous Materials in the Waste Stream

Household hazardous wastes (HHW) are products used in and around the home that are considered to be hazardous because they are ignitable, corrosive, reactive and/or toxic. Depending upon their constituents, these materials may cause a safety problem if they become mixed with the regular trash during collection or disposal. Of particular significance for this report, if HHW is improperly disposed (e.g., illegal dumping), there is the potential for significant stream and groundwater pollution, and also possibly soil contamination. By disposing of HHW separately in an appropriate manner, these materials can be properly packaged for shipment to a final recycling or disposal point which minimizes the likelihood that they will spoil the environment.

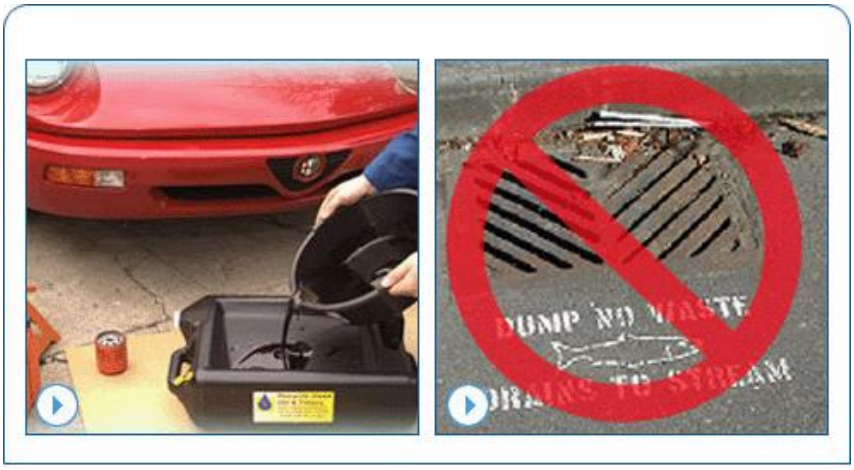
While HHW is largely exempt from regulation, similar types of hazardous waste that are generated in commercial business, institutions and other non-residential settings are heavily-regulated by the commonwealth and also at the federal level.

a. Used Automotive Oil and Fluids

Millions of household “do-it-yourselfers” change their own oil. While some of the used oil is disposed of properly at a used-oil recycling center, a significant volume is disposed of in garbage cans, sewers, storm drains and backyards; these are 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]

In FY 2015, Fairfax County residents recycled 12,355 gallons of oil through the county’s HHW program. Residents also recycled 1,730 gallons of antifreeze.[14]

This recycled motor oil is used for many purposes. The primary use is to refine it back into a base stock for lubrication oil; a secondary use is to burn it for energy. When used as fuel, two gallons of used oil 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. (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 new Spanish-language campaign. Despite the fact that about half of all automotive mechanics in the United States speak Spanish as their first language, little if any Spanish-language materials exists 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]

b. Spills

Spills of liquid and solid chemicals must also be a focus of proper handling to avoid being introduced into the environment. Washing down with water or sweeping up to dispose of in the regular trash may not be appropriate handling.

Commercial sites are more likely to handle spills appropriately. Education should be directed to individual homeowners, do-it-yourselfers and small independent businesses.

c. Pesticides, Herbicides, Fertilizers and other HHW

Residents and sometimes small businesses will dispose of unwanted or expired chemicals used around the home or business. Conscious or intentional "out-of-site, out-of-mind" choices are made to easily and quickly dispose of the HHW and other chemicals in the regular trash, emptying down the drain, or dumping outside or down a storm drain.
A trend that bears watching is the larger automotive stores that sell products that are immediately used in the parking lot by the consumer, sometimes with the assistance of the store employees who may or may not be trained in spill cleanup. These activities include adding or changing automotive fluids and changing batteries.

C. PROGRAMS, PROJECTS AND ANALYSES

1. Household Hazardous Waste Program

The HHW program is one of the county's premier pollution prevention programs. The Fairfax County HHW program accepts hazardous materials free of charge from residents and disposes or recycles these materials according to local, state and federal regulations. The safest way for Fairfax County residents to dispose of HHW is to carefully pack and bring them to one of the county's two permanent HHW collection sites, located at the I-66 Transfer Station and the I-95 Landfill as shown in Table VI-2.

Household hazardous waste refers to used or leftover contents of consumer products that contain materials with one of the four characteristics of a hazardous waste: toxic; ignitable; corrosive; or reactive. (See the Virginia DEQ Household Hazardous Waste Fact Sheet for more information.) Household hazardous waste should not be disposed of in the regular trash.

In FY 2015, 39,557 households participated in the HHW program, disposing of 636,422 pounds of HHW. Compared to FY 2014, this represents a 25 percent increase in the number of users and 15.6 percent increase in the weight of HHW disposed. The cost per household again reduced from the previous year. Program details are provided in Table VI-3.[14]

The Solid Waste Management Program (SWMP) expanded operating hours at the HHW Collection Sites (see Table VI-4) to match the regular operating hours of the recycling and disposal centers where residents bring their recyclables and ordinary household refuse. The expanded hours began on July 1, 2014.

Table VI-3 Fairfax County Household Hazardous Waste Program: Record of Fiscal Year Disposal			
Fiscal Year	**Participation (# of users)**	**HHW (pounds)**	**Cost per household**
FY 2015	39,557 households	636,422	$21.22
FY 2014	31,726 households	550,463	$23.13
FY 2013	28,723 households	470,775	$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

Source: Fairfax County Department of Public Works and Environmental Services, Solid Waste Management Program.

EQAC has long advocated for expanded collection capability at permanent sites for the growing amounts of household hazardous waste and e-waste.

HHW program services are provided free to residents. The program receives its funding through the SWMP tip fees for regular refuse. In FY 2015, materials deposited by residents for recycling or disposal primarily consisted of antifreeze, motor oil, lead-acid batteries, various acids, pesticides and oil-based paint. It is germane to note that none of these materials is regulated as hazardous waste, but the county collects them separately to minimize the potential environmental hazard that could be caused by improper disposal. A summary of participation information for the program is shown in Table VI-3.[14]

a. E-waste

E-waste contains constituents of concern that could cause long-term harm, if released into the environment. By removing e-waste from the solid waste stream, the county is effectively removing these potential contaminants from the fuel source that is used at the waste-to-energy facility. Currently, disposal of e-waste is free to county residents.

Daily collection of e-waste at the resident drop-off centers has successfully replaced other costly collection programs, resulting in a 16 percent increase in the amount of waste removed from the waste stream (almost 1.6M pounds in FY 2015). Further, the expanded access has reduced the unit cost for the program by 50 percent (from over $.19 per pound to $.095 per pound).[14]

Table VI-4: Household Hazardous Waste Collection Sites	
I-66 Transfer Station (Fairfax)	**I-95 Landfill (Lorton)**
4618 West Ox Road, Fairfax, VA 22030 **703-631-1179, TTY 711**	9850 Furnace Road, Lorton, VA 22079 **703-690-1703, TTY 711**
Trash and Recycling: Monday - Friday: 6 a.m. - 6 p.m. Saturday: 6 a.m. - 6 p.m. Sunday: 9 a.m. - 6 p.m.	**Trash and Recycling:** Monday - Friday: 7 a.m. - 6 p.m. Saturday: 7 a.m. - 4 p.m. Sunday: 7 a.m. - 4 p.m.
Household Hazardous Waste Monday – Saturday: 8 a.m. - 4 p.m. Sunday: 9 a.m. – 4 p.m.	**Household Hazardous Waste** Sunday - Saturday: 8 a.m. - 4 p.m.
E-waste Recycling Monday – Saturday: 8 a.m. - 4 p.m. Sunday: 9 a.m. – 4 p.m.	**E-waste Recycling** Sunday - Saturday: 7 a.m. - 4 p.m.
Both Facilities **Holiday Schedule**: 07/04/15: Independence Day - Closed 11/26/15: Thanksgiving Day - Closed 12/24/15: Christmas Eve Day - Closing at 1 p.m. 12/25/15: Christmas Day - Closed 12/31/15: New Year's Eve Day - Closing at 2 p.m. 01/01/16: New Year's Day - Closed **All Other Holidays - Open Regular Hours** Household Hazardous Waste Program Infoline: 703-324-5068, TTY 711	

With access to HHW and e-waste services during operating hours every day, it is anticipated that other, ad-hoc (and more expensive) collection programs can be phased out.[14]

b. Rechargeable Battery Recycling

The SWMP's battery program collects rechargeable batteries at its HHW facilities. Non-rechargeable household batteries are not accepted by the program and can be safely thrown away as refuse, due to federal regulations which required the reformulation of batteries approximately 20 years ago.[14]

A few years ago, the SWMP also placed 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: www.fairfaxcounty.gov/dpwes/recycling/mat-bat.htm.[14]

Additionally, any person, business or other entity can use the services of Call2Recycle.org. This is an industry-funded product stewardship initiative through which 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 online, and they will receive a cardboard box with a prepaid shipping label. The user fills the box with rechargeable batteries after the batteries are placed into individual plastic bags (to prevent arcing and potential fires in shipping). The user calls for pickup by UPS, which sends the container to a permitted hazardous waste disposal facility at no charge to the user. The SWMP strongly encourages users of rechargeable batteries to participate in this free program.[14]

c. Fluorescent Lights

Compact fluorescent light bulbs have become popular for residential use due to their energy savings potential. Incandescent light bulbs are being phased out and are no longer being sold. However, CFLs contain minute quantities of mercury, which causes them to be classified as HHW for disposal purposes. CFLs are therefore accepted from residents for disposal at the county's HHW facilities.[14]

Small businesses that generate less than the regulated quantity of fluorescent lights may bring them to collection events described in the "Commercial Hazardous Waste" section of this chapter. Other larger businesses that generate regulated quantities of these materials must comply with federal and state regulations regarding the proper disposal or recycling of the lights (40 CFR Part 273).[14]

A brochure about the value of using fluorescent lights and how to recycle them is available on Fairfax County's website. The website also refers the consumer to an EPA website (at www2.epa.gov/cfl) for instructions on procedures for disposing of fluorescent light bulbs that have been broken. In addition to county facilities, Home Depot and other large hardware stores will accept CFLs from consumers and dispose of them safely and responsibly.[14]

d. Mercury Thermostat Recycling

In FY 2014-15, Fairfax County government partnered with the Thermostat Recycling Corporation (TRC) in an effort to further mitigate the amount of

mercury polluting our environment. TRC is a non-profit organization that facilitates and manages the collection and proper disposal of mercury-containing thermostats. TRC has an ongoing commitment to raising awareness of the universal need to properly dispose of mercury-containing thermostats, and actively solicits program participation across the country. Through national and regional advertising, industry events, workshops and other outreach activities, TRC creates a dialog with industry stakeholders and consumers and actively promotes the need for safe and proper disposal of mercury-containing thermostats.[14]

Thermostat Recycling CORPORATION

an industry-funded non-profit

Participation as a collection site is simple: TRC provides storage and shipping containers and promotional materials to encourage participation. TRC charges a modest $25 one-time fee (per container) to participate. Fairfax County government has extended this free service to its businesses and residents.[14]

e. Cooking Oil Recycling

GreenLight

As an ongoing waste minimization initiative, and to prevent cooking oil from being disposed in storm water drains, Fairfax County government partnered with Greenlight Biofuels, in a pilot program that began in January 2014, to recycle waste vegetable and cooking oil. The pilot was so successful that a new contract was awarded in February 2015. Approximately 3,720 gallons of oil were collected and recycled in FY 2015.[14]

COOKING OIL RECYCLING PROGRAM

The recycled waste vegetable oil is converted into biodiesel, a clean-burning fuel that results in a significant net emissions decrease with lower SO_2 (sulfur dioxide) and NO_X (nitrogen oxides) emissions than heavy oils. Biofuels generally burn cleaner than No. 2 residual fuel oil, with little or no sulfur emissions.[14]

f. Habitat for Humanity Latex Paint Recycling Stewardship Pilot Program

Through the SWMP's HHW, the county has formed a partnership with Habitat for Humanity to reduce and reuse the amount of waste latex paint being generated by homeowners.[14]

Through partnerships with various Habitat for Humanity ReStores throughout Virginia, the program redistributes usable latex paint delivered by residents to the HHW program, rather than sending it for disposal. Reusable paint will be donated to various participating Habitat for Humanity ReStores, allowing them to resell or reuse it.[14]

It is important to note that, while latex paint has historically been managed through the HHW program, it is not a hazardous waste. When residents deliver latex paint to the county for disposal, they create additional unnecessary expenditures for the county. The donation of usable paint to Habitat for Humanity will provide the following benefits:

- Reduce the volume of paint disposed by 20-30 percent annually.
- Reduce potential environmental impacts from paint disposal.
- Establish a sustainable waste management practice.

The primary mission of the Virginia-based Habitat for Humanity ReStores is to generate revenue for the homebuilding efforts of the Habitat for Humanity affiliates in local communities throughout Virginia. The Habitat ReStores aim to offer quality household goods and building materials to the public at reasonable prices and to divert unnecessary waste from disposal.[14]

2. 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 has supported the remote HHW program since 2012 with four events per year scheduled and paid for by the Solid Waste Management Program. Remote collection events for 2015 were held from 9 a.m. - 2 p.m. on the following dates:

- Saturday, March 28 - South County Government Center, 8350 Richmond Highway, Alexandria.
- Saturday, April 25 - Reston South Park & Ride Lot located at the intersection of Lawyers Road and Fox Mill Road in Reston.

- Saturday, May 16 - Mason Governmental Center, 6507 Columbia Pike, Annandale.
- Saturday, September 12 - McLean Community Center, 1234 Ingleside Ave, McLean.[11]

3. Commercial Hazardous Waste

The management of hazardous waste is regulated under 40 CFR Part 261. In essence, any significant quantity of these wastes (defined by the regulation) generated under circumstances other than household use is subject to tracking, documentation of use and proper recycling or disposal. Businesses that fall below defined thresholds for how much waste they generate and store are exempt from some of the substantive documentation and disposal tracking requirements (although they must dispose of this waste in a proper, responsible manner).[14]

In Fairfax County, these Conditionally Exempt Small Quantity Generators (CESQGs) typically consist of small Fairfax County-based businesses, government agencies, non-profits, schools, universities and places of worship.[14]

In order to promote safe, cost-effective and responsible disposal of hazardous waste, the SWMP sponsors three events annually, using the services of a permitted hazardous waste management contractor. CESQGs are invited to bring their accumulated hazardous waste to these events, where they pay a fee for disposal. The economies-of-scale realized by these countywide events translate into a disposal fee that is generally lower than the cost to have a permitted hazardous waste contractor collect and appropriately manage the waste for an individual small business.[14]

In FY 2014, 101 companies participated in the three CESQG events, and in FY 2015, a total of 91 companies took part. Details on 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. [14]

4. Fairfax Joint Local Emergency Planning Committee

The establishment of Local Emergency Planning Committees is 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 Fairfax Joint Local Emergency Planning Committee (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 Hazardous Materials Emergency Response Plan 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. Member organizations have been focused on many plan exercises, ranging from community response to incidents at the Upper Occoquan Service 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. 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.

5. Storm Drain Education Programs

Many residents in Fairfax County are unaware that storm drains lead to the local streams that eventually join with other bodies of water (see the Water Resources chapter of this report). A system of publicly and privately maintained pipes, structures, channels and underground pipes carry stormwater (rain water) from streets and parking lots to ponds, lakes, streams and rivers. This water is not treated to remove chemicals and litter. Some chemicals are accidentally introduced to the storm drain, like a vehicle fluid leak or overuse of lawn fertilizer. Other chemicals are intentionally introduced by disposing or dumping into the storm drain as "out-of-sight, out-of-mind."

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 has been a leading cause of the water quality deterioration in the Chesapeake Bay. This includes what is put on yards and

driveways as well as litter on streets that will wash off with the rain water into these drains. A big, if not a bigger, problem is the intentional disposal of items into the drains such as used motor oil, fertilizer, antifreeze, pesticides, herbicides and other hazardous materials as well as pet waste, grass and leaves.

There are many organizations helping to educate about the importance of hazardous materials entering our natural waters through storm water runoff systems. Here are a few working for Fairfax County.

a. The Northern Virginia Soil and Water Conservation District (NVSWCD)

NVSWCD provides high quality environmental and stewardship offerings to individuals and communities. One of the very successful programs is the Storm Drain Education Program. Storm Drain labeling is an effective, low-cost method of educating residents about water quality problems in streams, lakes, rivers and the Chesapeake Bay. The labels identify the stream or Potomac River watershed in addition to providing a "No Dumping message.

This program is key to getting that message out to the public and provides an ongoing reminder to not dump anything in storm drains. In addition to marking the drains in a community, the volunteers provide an educational flier to residents about how everyone can help make sure nothing goes down storm drains except rain.

During FY 2015, 484 volunteers worked in their communities, logging over 2,883 hours, to carry out 33 projects to label 2,303 storm drains and educate 12,249 households. Since the start of this program, one-quarter of the county's over 80,000 storm drains have been labeled.[6]

NVSWCD also publishes a quarterly newsletter, Conservation Currents, for Fairfax County residents. Articles are available on hazardous waste

reduction, including an article entitled "Healthy Homes, Healthy Communities: Household Hazardous Waste Reduction in Fairfax County."

More information about NVSWCD's Storm Drain Education Program and newsletter articles are available at:
www.fairfaxcounty.gov/nvswcd/stormdrained.htm [6]

Pictures of storm drain marking by local volunteers (provided by NVSWCD)

b. Northern Virginia Clean Water Partners

A group representing 19 Northern Virginia local governments, school systems, independent water and sanitary sewer authorities and local businesses that care about the quality of our waterways and the region's quality of life makes up the Northern Virginia Clean Water Partners. Their goal is to work together to keep local residents healthy and safe by reducing the amount of pollution, including hazardous pollutants, that reaches streams and rivers.[2]

The logo, and theme, for the Northern Virginia Clean Water Partners

Print, video and Web-based products have been developed to aid in raising awareness about behaviors leading to nonpoint source pollution and the actions residents can take to protect local and regional water quality. The most recent TV ad, the Rubber Ducks: "Cleaner Streets mean Cleaner Water," is available in English and Spanish. All TV and radio ads are available to watch and listen to on the organization's website: www.onlyrain.org.[2]

c. Virginia Cooperative Extension

Virginia Cooperative Extension is a joint program of Virginia Tech, Virginia State University, the U.S. Department of Agriculture and state and local governments. Fairfax County has a local office with personnel who participate in many programs helping the people of Fairfax County improve their lives.

One program offered is a hazmat collection of pesticides, herbicides, fertilizers and any yard chemicals that residents may have that are no longer needed or past their expiration dates. The goal is to keep these chemicals from being incorrectly disposed of, including being put down storm drains.

This program is held every five years. The last collection was in 2010 with 15,341 pounds of chemicals turned in. The next collection was to have been held during September 2015.[16]

6. Railroad Transportation Plan

The U.S. Department of Transportation has predicted that U.S. freight railroad demand will rise 88 percent by 2035. Railroads will take on an increasing responsibility for movement of the nation's goods, including hazardous materials. Transporting hazardous materials is crucial to the nation's viability. Twenty percent of the nation's chemical are moved by rail, including an even higher percentage of those chemicals essential to the public health and standard of living for the United States. Railroads move 22 percent, or 35,000 carloads annually, of chlorine, which is an essential element used to purify more than half the nation's water supplies and contained in 85 percent of all pharmaceuticals. Other hazardous materials moved by rail include fuels, fertilizers, disinfectants and cleaners, along with the chemicals used in foods, glass, medicines, weapons and munitions. The Hazardous Materials Transportation Uniform Safety Act of 1990 emphasized the need to assess the risks and benefits associated with the transportation of hazardous materials by truck and rail. Given the dimension of terrorism, transportation of hazardous materials has become an even greater problem and major concern.[19]

Fairfax County has one freight rail, CSX, which traverses the eastern part of the county, with no rail or transfer yards located in the county. 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]

CSX provides emergency planning assistance and training to local fire, police and emergency response personnel in communities they serve. This free online training program educates emergency personnel on how to safely respond to incidents on and around railroad property and equipment. A written copy of the "Community Awareness Emergency Planning Guide," dated October 2008, is on file with the Fairfax County Fire and Rescue Hazmat Station 40.[12]

7. Pre-Disaster Recovery Plan (PDRP)

Much of the following discussion has been taken from a county website addressing the development of a Fairfax County Pre-Disaster Recovery Plan (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 www.fairfaxcounty.gov/oem/pdrp/ffx-pdrp-ttx-feb10-2012.pdf.

D. LEGISLATIVE UPDATE

None.

E. STEWARDSHIP

What is considered to be hazardous materials has changed in recent decades. Formerly, hazardous materials were primarily associated with industrial releases or the transportation of chemicals. Hazardous material then came to include 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 compact fluorescent light bulbs. Proper management of discarded electronics has become an area of increasing concern. Fairfax County has implemented its e-cycling program, which has diverted significant quantities of electronics from disposal to recycling. Stewardship for the storage, use 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 volumes will continue to increase.

F. COMMENTS

1. To continue the relative human and environmental safety of the past couple decades, attention should be on any future increase in the production and transport of hazardous materials to or through Fairfax County.

2. A trend that bears watching is the larger automotive stores that sell products that are immediately used in the parking lot by the consumer, sometimes with the assistance of the store employees who may or may not be trained in spill

cleanup. These activities include adding or changing automotive fluids and changing batteries.

G. RECOMMENDATION

None.

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4. American Petroleum Institute, *Used Motor Oil Collecting and Recycling*, www.recycleoil.org , viewed August, 2008 and July 2015.

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6. Northern Virginia Soil & Water Conservation District: July 2015 email and website www.fairfaxcounty.gov/nvswcd/stormdrained.htm

7. Fairfax Joint Local Emergency Planning Committee, www.lepcfairfax.org.

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 www.fairfaxcounty.gov/cable/channel16/vod.htm under the heading "Emergency Information."

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2015 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 227,952 acres (excluding roads and water). Of this total, 33,465 acres (14.7 percent) are in parks and recreation as of January 2014. Another 15,120 acres (6.6 percent) are 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 6.0 percent as of January 2014.

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.

In 2004, two significant efforts 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's Natural Resource Management Plan in fall 2012. The Park Authority staff held a public review in fall 2013 and adopted the revised Natural Resource Management Plan in January 2014. If this plan is implemented, improved preservation and protection of environmentally sensitive land should be the result. However, without additional funding, the Park Authority is not able to implement significant portions of the plan.

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 (DPWES) 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 board 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 board 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 volume of the Comprehensive Plan. However, there never had been an overarching vision dealing with the environment. This has now changed. As reported in the 2004 Annual Report on the Environment, the board 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:
www.fairfaxcounty.gov/living/environment/eip/bos_environmental_agenda.pdf

This document is very significant in its potential for the 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 the 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 (FCPA) 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 www.fairfaxcounty.gov/parks/.

a. Acquisition of Park Land by FCPA

Between July 2014 and June 2015, the Park Authority added 33.6 acres to its parkland inventory. This brings the parkland inventory to a total of 24,809 acres as of June 2015.

FCPA purchased the following properties:

- On December 4, 2014, the Park Authority acquired the 9.978 acre Roat property within the Mason District. The property is located on Edsall Road just west of its intersection with Shawnee Road in Alexandria. The property will eventually be known as Monch Farm Park.

FCPA acquired the following property through donations:

- On November 18, 2014, Van Metre Investments donated 1.7 acres of fully wooded property it owned within Long Branch Stream Valley Park in the Braddock District.

- On December 19, 2014, Edith Rameika donated 0.22 acre of fully wooded property she owned on the Northern Border of Accotink Stream Valley Park in the Springfield District.

FCPA acquired the following property through dedications:

- On September 17, 2014, McLearen Road Property Owner, LLC dedicated 4.5 acres to the Park Authority in the Hunter Mill District. This dedication was a result of a 1982 rezoning proffer.

FCPA acquired the following property through land transfers:

- On September 4, 2014, the Fairfax County Board of Supervisors transferred 11.72 acres to the Park Authority. The property is known as Dulles Rock Hill Park in the Dranesville District.

- On September 10, 2014, Henry A. Long, Trustee transferred 5.49 acres to the Park Authority. The property was added to Cub Run Stream Valley Park in the Sully District.

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 (NRMP) for Park Authority property. The NRMP contained seven elements:

- Natural Resource Management Planning.
- Vegetation.
- Wildlife.
- Water Resources.
- Air Quality.
- Human Impact of Parklands.
- Education.

In 2013, Park Authority staff worked with a wide range of stakeholders to revise the agency Natural Resource Management Plan. The new plan is more closely focused on adaptive management of natural capital for biodiversity. Natural capital is generally synonymous with natural resources and includes: the living organisms; non-living components, such as air, water and soil; the ecosystems they form; and the services they provide. The revised Natural Resource Management Plan was adopted on January 22, 2014. Implementation of the Park Authority Natural Resource Management Plan has begun. Project-level implementation funding continues to be sought from available sources, and the Park Authority continues to seek funding to fill a vacant senior ecologist position. A long-term implementation strategy is planned for completion by end of FY 2016

The Natural Resources Management Plan can be viewed at www.fairfaxcounty.gov/parks/resource-management/nrmp.htm.

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. However, the Park Authority

lacks sufficient funding to fully implement the plan. Some funding has been secured through the Environmental Improvement Program plus a combination of proffers, bonds, telecommunications fees and others. Much more needs to be added to the budget to fully fund the plan. FCPA staff estimates that full implementation would require approximately $8 million per year and dozens of staff positions. This includes 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 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 $705,000 and five positions. The Fairfax County Park Authority staff lacks a number of functions and capabilities in regard to the NRMP, including: natural land managers; ecologists; restoration specialists; water resource specialists; wildlife specialists; planners; and project managers. 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. EQAC supports increased funding for this purpose. Resources devoted to the protection of the environment need to be increased.

c. Status of Natural Resource Mapping Efforts

The creation of a natural resource protection zone and geodatabase model is complete. A more robust field data collection technique was successfully tested and is being expanded to all applicable field datasets. The new data collection technique uses tablet computers and mobile GIS (geographic information system) combined with rapid assessment protocols to quickly and easily map natural resources data in the field and sync these data with a remote server. Applicable field datasets include Non-native Invasive Assessment Protocol (NNIAP) data, white-tailed deer browse impact (deer) data and community level vegetative classification (vegetative communities) data.

The Park Authority secured funding for inventories of NNIAP and deer data collection efforts. It has not secured funding for the vegetative communities inventory, which is estimated to cost $365,000. The Park Authority will submit requests to fund portions of the vegetative community inventory through the Environment Improvement Program (EIP) and its monopole funding sources.

d. Invasive Plant Control Efforts

Invasive plant control projects have occurred at over 70 parks throughout the county and have focused on monitoring, management and outreach.

Monitoring has consisted of surveying park lands using two types of protocols: early detection monitoring, and assessment and prioritization monitoring. Volunteers with the Early Detection Rapid Response (EDRR) program donated 250 hours and located two new invasive species on park land. Monitoring to assess and

prioritize management actions using the NNIAP protocol have been completed on approximately 15,000 acres, or 65 percent, of park land.

The Invasive Management Area (IMA) program continues its operations at 41 sites with 45 active volunteer leaders. In 2014, nearly 2,000 volunteers spent a total of 5,707 hours restoring habitat through the removal of invasive plants and the planting of native species. The IMA program began its ninth year by celebrating Take Back the Forest in April and May 2015. During those two months, over 850 volunteers logged 3,053 hours. Take Back the Forest was funded for a fourth year with a $10,000 grant from REI.

Contractors continue to be used to support IMA efforts and manage high priority sites. Approximately 900 acres of park land was treated using contractors who carefully conduct both chemical and mechanical treatments.

The partnership with Earth Sangha, a local non-profit organization, to control invasive plants at both the Marie Butler Leven Preserve and Wilburdale Park continues, and the partnership provides local native plants for restorations. Other partnerships that continue to benefit invasive plant control include 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 from parkland.

e. Huntley Meadows Wetland Restoration Project

After 22 years of planning, input from three environmental engineering firms, numerous design drafts, more than 60 public meetings and months of construction, Huntley Meadows Park has a renewed and refreshed wetland – construction is complete, monitoring and management have begun.

In the 1970s and 1980s, Huntley's central wetland was known for its regional significance as one of the most productive and diverse non-tidal wetlands in the mid-Atlantic area. It was a hemi-marsh, a shallow wetland less than three feet deep of approximately 50 percent open water and 50 percent vegetated water. Beavers built dams in a low floodplain area that had been a forested wetland and river oxbow to create a wetland that attracted many locally and regionally rare wildlife species, including American Bittern, Least Bittern, Yellow-crowned Night Heron, King Rail, Pied-billed Grebe, Common Moorhen and a long list of reptiles and amphibians.

Since the late 1980s, silt from surrounding neighborhoods, stormwater runoff and poorly regulated construction sites flowed into the wetlands. That silt combined with the colonization and spread of aggressive plant species and with the changing activity of nomadic beavers to slowly reduce the wetlands' habitat and wildlife

diversity. Cattails and rice-cut grass grew on the deposited silt and took over areas that used to be open water while beavers abandoned key dams. The wetland lost about one-third of its water depth.

In order to ensure that Huntley Meadows Park continued to have a functioning, healthy, diverse wetland that supported locally rare plants and animals on a consistent and long-term basis, management became necessary. This concept was first explored by the Fairfax County Park Authority in 1992. Extensive research was performed by three separate environmental engineering firms as well as extensive monitoring by park staff and volunteers. Twenty public meetings were held, and the input from them was integral and central to the planning process. Approximately 50 other public programs were held to discuss the project with park visitors. Those meetings determined that biodiversity, resource protection and environmental education were priorities for the Huntley community, and the wetland restoration realized and supported those priorities.

To restore the wetland to its 1980s condition and provide long-term wildlife habitat, the Fairfax County Park Authority and the Huntley Meadows Park community engaged in wetland restoration. There were five primary aspects of the project:

- An earthen berm to hold back water.
- A water control structure to manage water levels.
- Expansion of the wetland into the surrounding forest.
- Five deep pools to provide year-round wildlife habitat.
- Brush shelters and logs to provide additional wildlife habitat.

Construction started in April 2013 and was completed in March 2014. The $3 million cost of design, permitting and construction was funded by park bonds and grants and managed by Park Authority staff. Park staff and volunteers monitor, manage and maintain the restored wetland.

Various monitoring and management projects are now under way, and will continue in some form in perpetuity, A partial list of survey and monitoring projects includes: water quality; water depth, flow and temperature; groundwater; weather stations; plant communities; bird, crayfish and amphibian populations; aquatic macro-invertebrates; and periodic aerial photography.

The wetland and its flora/fauna have reacted how we expected they might in the first few years of managed water levels. We saw an increase in dabbling ducks (both in numbers and diversity) in the first winter, and marsh birds (bitterns, rails, grebes, coots) have stayed longer in the spring, often several weeks past migration. Our hope is that they will eventually stay and raise their young once the water levels and plant communities are fully restored. The management plan for the wetland (based on decades of research by FCPA staff, and similar managed wetland plans used around the country) is to have approximately three stasis years of water levels, punctuated by one year of flood or drought water levels, depending on

monitoring results. Even the stasis years will have seasonally fluctuating water levels and some mudflats in the summer – essential for maintaining the area as a wetland rather than a pond. This method has been used successfully in national wildlife refuges around the county for decades, and fits the goals of sustainable biodiversity set for this project. In short, it maintains the wetland in a state of hemi-marsh, or emergent marsh, rather than letting it transition into either meadow, pond or forest.

To learn more about the project, the awards it's already received or to contact park staff with more questions, please visit the project website, www.fairfaxcounty.gov/parks/huntley-meadows-park/restorationproject.htm.

Periodic public programs are also offered throughout the year to give visitors updates and tours of the wetland.

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 www.fairfaxcounty.gov/parks/volunteer/.
More information about FCPA and its programs is available at: 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.

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 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 streams 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 youths to get involved in their local parks. These include: permanent volunteer opportunities; community service hours for students; and Eagle and Gold Award projects for scouts. 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
parkfoundation@fairfaxcounty.gov
www.fairfaxparkfoundation.org/

4. NOVA Parks (Northern Virginia Regional Park Authority)

Three Northern Virginia counties (Fairfax, Loudoun and Arlington) and three cities (Alexandria, Fairfax and Falls Church) participate in NOVA Parks. NOVA Parks was founded in 1959 and currently operates 31 regional parks on 12,031 acres of land that it owns or leases throughout the region. It also holds conservation easements on 115 parcels covering more than 655 acres. Samples of environmental initiatives in NOVA Parks in Fairfax County in 2013 include the following activities:

a. Acquisition

NOVA Parks acquired the half acre Tinner Hill site straddling the boundary of Fairfax County and Falls Church, adding needed open space in a developed part of the county. That location, coupled with the site's national and regional historic significance, made it a perfect candidate to be managed by NOVA Parks. The historic park was developed and opened to the public in January 2015.

b. Planning & Development

NOVA Parks has reached many of the objectives set forth in its Five Year Strategic Plan for 2012-2017, helping to fulfill the agency's conservation and environmental priorities for the next five years.

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 NOVA Parks 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

Recently, NOVA Parks developed a sustainability report outlining all of its efforts in the last few years to become a model for sustainable practices in numerous areas, including:

- Controlling its carbon footprint.
- Reducing the use of chemicals through our progressive fertilizer & pesticide use policy.
- Habitat restoration.
- System-wide recycling efforts.

Pohick Bay Regional Golf Course follows a Nutrient Management Plan approved by the Virginia Department of Conservation & Recreation to ensure sustainability for the wetlands, the Potomac River and the Chesapeake Bay. The course is also certified with Audubon International and with Groundwater Guardian Greensite. The course completed a new pump station in 2014 that will reduce groundwater withdrawals for irrigation.

In 2014, 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. During an Earth Day cleanup, volunteers at Upton Hill Regional Park mulched the park's natural surface trails to prevent erosion.

d. Vegetation Management

The W&OD Trail regularly offers invasive plant removal as a scout project option, and 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 native species to have less competition.

Invasive plant control efforts also continued at Occoquan Regional Park, Bull Run Regional Park and Bull Run Shooting Center, and at Meadowlark Botanical Gardens. Bull Run Shooting Center works on invasive vine removal through hand-cutting, pulling and clipping. At Hemlock Overlook Regional Park, NOVA Parks' site administrator, Adventure Links, controls invasive autumn olive by cutting. At Upton Hill Regional Park, volunteers work regularly on invasive plant removal. At Pohick Bay Regional Park, large patches of bamboo were removed from the golf course and water chestnuts were removed from the shoreline.

NOVA Parks roving park naturalist completed almost 50 programs that interpreted the impact of invasive species on the environment.

Riparian buffer tree plantings were completed at Bull Run Regional Park along Cub Run. As part of SpringFest Fairfax, 14 new trees were planted at Occoquan Regional Park.

e. Wildlife

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. The Virginia Bluebird Society has been working at the Pohick Bay Golf Course for many years and typically has one of the most productive sites in the state. Bull Run Regional Park continues to expand its inventory of bluebird boxes. A Boy Scout program was completed at Bull Run that involved the placement of bat boxes throughout the park

f. Environmental Education and Outreach

NOVA Parks continues to have a roving park naturalist regularly visit the high-attendance parks like pools, campgrounds and golf courses, bringing live wildlife and other exhibits and providing programming about nature and the environment. This has been especially enjoyed by summer campers who are visiting the pools at Upton Hill Regional Park on the Fairfax County/Arlington County line and at Bull Run Regional Park. The naturalist also attends events and functions such as the Walter Mess 5K race and the Friends of the W&OD 10K race.

In 2015, the NOVA Parks Foundation awarded grants through its Nature Nuts program, to seventeen Fairfax County public schools for children to attend an environmental education field trip at Hemlock Overlook Regional Park. Adventure Links at Hemlock Overlook Regional Park in Clifton offers a variety of outdoor and environmental education, and 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.

Eight Fairfax County schools attended nature visit programs at Potomac Overlook Regional Park.

NOVA Parks 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 inform the public about the environment

Occoquan Regional Park hosted the Occoquan River Festival, bringing together 18 environmental, conservation and recreation groups to educate the public about the Occoquan River and surrounding watershed. The festival included Citizen Science demonstrations on stream quality by the George Mason University (GMU) Biology department

In addition, the park continued its partnership with the Occoquan Watertrail League and a graduate student at GMU on a citizen science study of exotic snails in the Occoquan River. Earth Day events were held at Upton Hill and Hemlock Overlook. NOVA Parks and Friends of the W&OD held environmental outreach sessions at a 10K race event in Vienna, with about 400 participants and visitation at education booths. Pohick Bay Regional Park participates in the Mason Neck Eagle Festival and partners with Mason Neck State Park Interpretive Rangers to provide nature talks to campers at Pohick Bay campground.

g. Stewardship

Occoquan, Fountainhead and Bull Run Marina Regional Parks hosted cleanup events on the Occoquan River with Friends of the Occoquan, removing dozens of bags of trash from the reservoir. Pohick Bay Regional Park hosted the Alice Ferguson Foundation Rivershore Cleanup. At Sandy Run Regional Park, rowing crew teams took part in water cleanup days, removing trash from the Occoquan Reservoir in the vicinity of the park.

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. NOVA Parks implemented a program that allows youths 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 www.nvrpa.org/park/main_site/content/volunteer. For current

information about the Northern Virginia Regional Park Authority, visit its website, www.NOVAParks.com.

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 5,077 trees and shrubs in calendar year 2014. More than 1,000 volunteers spent a total of over 2,500 hours planting tree seedlings, removing invasive species and maintaining planting sites. Highlights of the 2014 plantings were:

- The planting of 746 trees and shrubs in riparian areas.
- The planting of 1,691 trees on homeowner association and private property.
- The planting of 772 trees and shrubs in parks, including private, county and national parks.
- The removal of invasive vines strangling mature trees within a Resource Protection Area.

In 2014, Fairfax ReLeaf provided many opportunities for community groups to serve Fairfax County. These included five school group plantings, two Lions Club plantings, two Boy Scout and an Eagle Scout project. ReLeaf led two corporate workdays, during which employees from Winchester Homes and GAP Solutions gave their time to improve Fairfax County. Fairfax ReLeaf also conducted a workshop to prepare individuals to lead plantings.

In 2015, Fairfax ReLeaf planned to continue its park and homeowners association plantings while increasing partnerships with agencies such as the Northern Virginia Soil and Water Conservation District and the Fairfax County Stormwater Planning Division.

Fairfax ReLeaf offers a number of opportunities for stewardship. For further information on Fairfax ReLeaf, visit its website at 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 noted 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 (NVCT), such a public-private partnership now exists. The partnership is now in its 13th 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 partnerships 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 has several ongoing projects in Fairfax County and is currently pursuing over a dozen prospects for protecting land in partnership with interested landowners. These lands encompass diverse landscapes, from stream valleys and wetlands to historic properties and forested tracts in residential areas. NVCT added one new easement to its portfolio in 2014, a 5.5-acre wooded property along Indian Run that was zoned for industrial use. In total, the trust has now preserved over 700 acres through conservation easements, fee ownership and partnerships throughout Fairfax County. NVCT now holds 35 conservation easements and owns four parcels in Fairfax County. All of these properties are monitored at least annually to assure compliance with the terms and conditions of the easements and to preserve the conservation values.

NVCT has enforcement responsibility for a conservation easement held by the Fairfax County Park Authority on the 41 acre historic Salona property in McLean. The easement was executed in 2006. A task force to make recommendations on the future of the property was appointed by Dranesville Supervisor John Foust in 2011. NVCT was represented on the task force and was active in considering all use options and their potential impacts on the conservation and historic values of the property. In early 2014, the task force recommended to the Fairfax County Board of Supervisors the creation of Salona Park as a History and Environmental Learning Center that includes a visitors' center, a protected meadow complex and an agricultural portion of the property with teaching and community-supported farming.

Tables VII-1 and Table VII-2 provide details on NVCT properties. Figure VII-1 presents a map of these properties.

NVCT continues to engage in outreach initiatives in Fairfax County to emphasize the importance of land conservation and the benefits of natural green space. As part of the Fairfax County community, NVCT participated in several local festival events throughout the county in 2015 including SpringFest Fairfax, Occoquan RiverFest and Clifton Day. Through a partnership with the Herndon Environmental Network, NVCT showed the environmental documentary *Green Fire* during the annual Herndon Environmental Network Film Series. NVCT has also continued to host volunteer restoration activities, focused on removal of non-native invasive plants, at NVCT and partner properties throughout the county. These events take place throughout the year and include celebration of the Martin Luther King Jr. Day of Service, Potomac Watershed Cleanup Day and National Public Lands Day.

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, www.nvct.org.

Table VII-1. NVCT Fee-Owned Properties in Fairfax County

Property/District	Location	Acreage	Recordation
Davenport/Pimmit Run/ Dranesville	McLean	1.0	Gift 8/11/2000
Little Hunting Creek/ Mt. Vernon	Alexandria	2.07	Gift 5/20/2002
Clifton Property/ Springfield	Clifton	8.66	Gift 6/26/2003
Mason	Alexandria	0.001	Gift 5/30/2005
	Total	**11.731**	

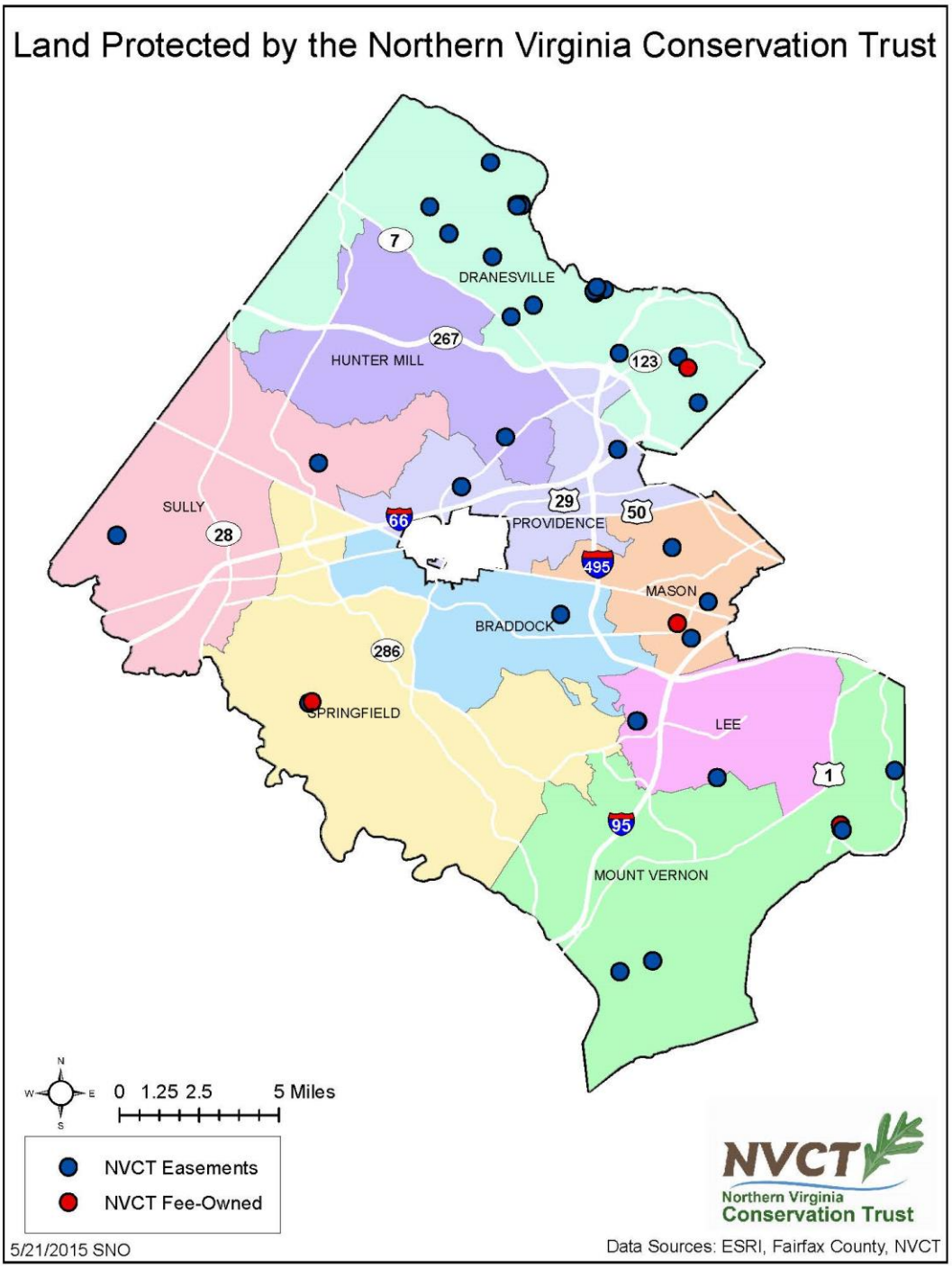
NVCT Submission for EQAC Annual Report 2015, Attachment to email, from Shannon O'Neil, Land Stewardship Specialist, Northern Virginia Conservation Trust, Fairfax County, Virginia, to Noel Kaplan, Department of Planning and Zoning, Fairfax County, Virginia, June 12, 2015.

Table VII-2. Easements Obtained by the Northern Virginia Conservation Trust

District	Location	Acreage	Recordation
Braddock	Annandale	2.61	6/1/2004
Dranesville	Great Falls	4.2	12/22/1999
Dranesville	Great Falls	5.6	12/29/2000
Dranesville	Great Falls	5.0	12/29/2000
Dranesville	Great Falls	5.0	8/14/2001
Dranesville	Great Falls	5.1	8/15/2001
Dranesville	McLean	6.0	8/2/2002
Dranesville	Great Falls	14.33	7/3/2003
Dranesville	McLean	1.9	12/14/2005
Dranesville	Great Falls	5.0	12/22/2005
Dranesville	McLean	41.0	12/28/2005
Dranesville	McLean	62.78	11/20/2006
Dranesville	McLean	7.77	11/20/2006
Dranesville	McLean	5.03	12/21/2006
Dranesville	Great Falls	23.81	12/28/2010
Dranesville	McLean	5.08	3/8/2011
Dranesville	McLean	15.34	12/19/2013
Hunter Mill	Vienna	0.39	3/28/2003
Lee	Springfield	0.87	10/30/2002
Lee	Springfield	0.78	11/26/2002
Mason	Alexandria	1.59	12/27/2002
Mason	Falls Church	0.69	4/14/2004
Mason	Alexandria	5.54	7/17/2014
Mt. Vernon	Lorton	33.73	5/18/2002
Mt. Vernon	Alexandria	0.92	6/20/2003
Mt. Vernon	Lorton	8.94	12/19/2003
Mt. Vernon	Alexandria	0.34	6/6/2005
Mt. Vernon	Alexandria	3.98	1/8/2008
Mt. Vernon	Alexandria	0.83	11/19/2008
Providence	Falls Church	7.24	5/11/2000
Providence	Oakton	0.87	7/14/2011
Springfield	Clifton	5.3	5/27/2003
Sully	Fairfax	1.52	4/17/2003
Sully	Centreville	226.36	12/19/2003
	Total	**520.44**	

NVCT Submission for EQAC Annual Report 2015, Attachment to email, from Shannon O'Neil, Land Stewardship Specialist, Northern Virginia Conservation Trust, Fairfax County, Virginia, to Noel Kaplan, Department of Planning and Zoning, Fairfax County, Virginia, June 12, 2015.

Figure VII-1. NVCT Properties in Fairfax County as of FY 2011



NVCT Fairfax County Properties by District, Attachment to email, from Shannon O'Neil, Land Stewardship Specialist, Northern Virginia Conservation Trust, Fairfax County, Virginia, to Noel Kaplan, Department of Planning and Zoning, Fairfax County, Virginia, June 12, 2015.

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 ecologically 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 www.nature.org.

8. The Potomac Conservancy

Other organizations also hold easements in Fairfax County. One of these is 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 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.

a. Easements held by the Potomac Conservancy

The Potomac Conservancy currently holds easements on four properties in Fairfax County. These properties total 13.46 acres with 0.14 of that being river frontage. Three of these properties are described below.

(FOSTER 09) McLean, VA 2.57 acres 12/2000
This property contains significant woodland and vegetation, steep slopes and floodplain leading down to the west bank of the Potomac River. The mature woodland consists of mixed hardwoods, including red oak, black oak, white oak, chestnut oak, tulip poplar, American beech, black locust and hickory. The understory consists of smaller trees and native shrubs, such as spicebush, mountain laurel, leaf viburnum and arrowwood. The riverbank is undeveloped and contains some low growing vegetation and several larger trees that extend out from the bank across the water. Public visual access is from several significant and widely traveled locations, including the Potomac River, Chesapeake and Ohio Canal t National Historical Park and towpath, George Washington Memorial Parkway and the Potomac Heritage National Scenic Trail. Turkey Run Park is adjacent to the northwest boundary. This property is strikingly natural in character, considering its proximity to highly urbanized Washington, D.C. and Northern Virginia. The existing residential dwelling and associated structures are not imposing or inconsistent with the natural beauty of the Potomac River Gorge.

(HOROWITZ 14) McLean, VA 1.02 acres 12/2001
The property contains one acre of mostly mature woodlands that consists of mixed hardwood trees, including red, black, white and chestnut oak, tulip poplar, American beech, black locust and hickory. Many trees are 30 to 45 inches in diameter. The forest understory consists of smaller trees including paw paw, American holly, witchhazel and others. Wildlife such as woodpeckers, warblers, wood ducks, great blue herons, migratory birds and deer use the forest. The property also contains steep slopes and ravines that are a part of a contiguous block of forest along the Potomac Gorge. It is adjacent to National Park Service land and is located within close proximity to other parcels that are protected by conservation easements held by the Potomac Conservancy and the National Park Service. The property is visible from the George Washington Memorial Parkway, Crest Lane and the Potomac National Heritage Scenic Trail.

(MARDIROSIAN 10) McLean, VA 2.1 acres 12/2000
This property contains two acres of mostly mature mixed hardwood forest, steep slopes and ravines. It is a part of a contiguous block of forest that connects to National Park Service land on the southwest boundary and forest protected by conservation easements held by the Potomac Conservancy on the southeast and northeast boundaries. The woodland contains red, black, white and chestnut oaks, tulip poplar, American Beech, black locust and hickory. Many trees are 30-45 inches in diameter. The forest understory consist of smaller trees including paw paw, witchhazel, red maple, chestnut and redbud, along with native shrubs such as arrowwood and spicebush. The forest is relatively undisturbed and the riverbank is undeveloped. There is low growing vegetation, including ferns and other native cover species, along the forest floor. Various animal species utilize the mixed hardwood forest for shelter and food.

b. Seed Collections Program

The reproductive cycle of trees varies from one year to the next. It was noted in 2012 that trees across the region produced a bumper crop of seeds. This was not true in 2013, when it was noted that trees were not dropping as many seeds. There is no official scientific explanation for this fluctuation in seed production.

A lack of funding for Growing Native in 2013 and 2014 prompted the Conservancy to scale back the program by limiting the number of collection sites, while focusing on those which had provided best results in years past.

In 2014, thirty-three volunteers, spending 100 hours, collected 132 pounds of seeds. These included: Black Walnut, Shagbark Hickory, Chestnut Oak and Black Oak.

c. Stewardship Opportunities

The Potomac Conservancy stewardship department creates and maintains positive, working relationships with landowners who have voluntarily protected their land

from development with a conservation easement. When a landowner grants an easement to the Potomac Conservancy, he/she perpetually preserves environmentally sensitive lands, such as wetlands and forests, various wildlife species and important agricultural soils. Qualifying conservation easements may result in financial benefits, such as being considered a federal tax-deductible charitable donation, being able to use a portion of the gift's value as a Virginia state income tax credit and/or reducing real estate taxes if the easement lowers the property's market value. After the easement is finalized, the Potomac Conservancy is responsible for stewardship of the property by performing annual monitoring visits. These visits safeguard a property's conservation values by ensuring terms of the conservation easement are upheld. They also provide landowners with the opportunity to seek assistance with easement and land management related issues. For more information about land conservation and stewardship with the Potomac Conservancy, please visit www.potomac.org.

Potomac Conservancy no longer pursues conservation easements in Fairfax County, Virginia. However, whenever the Conservancy receives an easement inquiry, it provides information about private land protection and forwards the information to the best organization to help with the needs of the person or group.

9. 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. No additional easements were acquired in 2014.

10. The Virginia Outdoors Foundation

The Virginia Outdoors Foundation (VOF) 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 27, 2014, VOF holds easements on nearly 730,000 acres in 106 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-3.

Table VII-3. 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	26.67	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	7.86	12/23/1998
Total Acreage under Easement	**127.73**	

Source: *Virginia Outdoors Foundation*, Attachment to e-mail, 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, as confirmed in an attachment to an e-mail from Jason McGarvey on April, 23, 2015.
***** 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.

Additional information about VOF can be seen at its website: www.vofonline.org/.

11. Northern Virginia Soil and Water Conservation District (NVSWCD)

NVSWCD continues to focus its programs in ways to support Fairfax County efforts in meeting stormwater and Chesapeake Bay Total Maximum Daily Load (TMDL) requirements through homeowner outreach, education and engagement. In addition, NVSWCD works to promote beneficial management practices and good stewardship of our land and water resources.

With DPWES – Land Development Services, NVSWCD co-hosted the 2014 Land Conservation Awards (LCAs) in January 2015. Proclaimed as the Oscar Awards for the development community, the LCAs are given to projects that exemplify the use and management of erosion and sediment controls during the site development process. Sites are nominated by site inspectors with DPWES – Site Development and Inspection Division and are judged by a panel of representatives from NVSWCD and the Virginia Department of Environmental Quality. During two onsite visits in May and October 2014, a total of eight nominated sites were evaluated for their excellence in implementing erosion and sediment control measures. The 2014 categories and award winners include:

- Large Commercial — Cinder Bed Road Bus Division.
- Large Single Family Residential — Gambrill Pointe.
- Small Single Family Residential — 7309 Hayfield Road, Alexandria.
- Infill Lots — 9022 Falls Run Road, McLean.
- Outstanding Engineering Firm — Wendel Companies (Cinder Bed Road Bus Division).

• Outstanding Superintendent	Clarke Newbill and Billy Huff (Gambrill Pointe).
• Outstanding Contractor	Strittmatter (Cinder Bed Road Bus Division).
• Outstanding Developer/Owner	Washington Metropolitan Area Transit Authority (Cinder Bed Road Bus Division).
• Best Protected Environmentally Sensitive Sites:	Washington Metropolitan Area Transit Authority (Cinder Bed Road Bus Division)

In addition, Jackson Ayers, a member of Boy Scouts of America, Troop 1539 received a *Certificate of Voluntary Merit* for his efforts in managing a drainage and erosion problem at the Unitarian-Universalist Congregation of Fairfax.

NVSWCD performs site investigations and conservation planning for land owners interested in creating and renewing Agricultural and Forestal Districts and administers the Virginia Agricultural Best Management Practices Cost-Share and Tax Credit program in Fairfax County. To support these efforts, NVSWCD provides soil and water quality conservation planning to suburban horse farms, small farmettes, plant nurseries and golf courses. In 2014, NVSWCD prepared plans covering 31 parcels, totaling 491 acres and providing recommendations for the protection of approximately 33,556 linear feet of Resource Protection Areas.

NVSWCD's annual seedling program emphasizes the role of vegetation in preventing erosion, conserving energy, and decreasing and filtering stormwater runoff. Those 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. The 2015 "Naturally Beautiful – Plant NoVA Natives" themed seedling sale highlighted the regional partnership between the Northern Virginia Regional Commission, Virginia Native Plant Society, Northern Virginia Soil and Water Conservation District and others to increase awareness of native varieties and improve the presence of native choices in the market. This year's plants included River Birch, Willow Oak, Shortleaf Pine, Winterberry, Silky Dogwood, Eastern Redbud, American Witchhazel and Arrowwood Viburnum. The theme was well-received and resulted in over 380 customers purchasing a total of 6,080 seedlings, which were planted across Fairfax County and surrounding areas. In addition to the benefits of the trees and shrubs in enhancing the region's native habitat, the plants are selected for their adaptability across the Piedmont and Coastal Plain provinces, and for many different growing conditions.

Six teams participated in this year's Envirothon Competition: Langley 1, Langley 2, Thomas Jefferson, James Madison and Fairfax High Schools and Hidden Pond Nature Center. The local competition was held at Hidden Oaks Nature Center. Hidden Pond came in first place and Thomas Jefferson placed second. Both teams advanced to the

Area II Competition in Fauquier County. There, Hidden Pond placed first and Thomas Jefferson placed third. Hidden Pond advanced to the State Competition at Longwood University on May 17-18. There, they placed first and represented Virginia at the North American Competition at Missouri State University in Springfield, MO from July 27– August 2.

Each year, NVSWCD has the opportunity to send high school students to Youth Conservation Camp, a week of natural resources career exploration held at Virginia Tech. Seven students from Fairfax County attended the program in July 2014.

District directors, staff and friends judge conservation-related projects at the Fairfax County Regional Science and Engineering Fair held annually at Robinson High School. In 2014, NVSWCD awarded first, second, third and honorable mention prizes to natural resource projects.

Annually, NVSWCD nominates a Fairfax County senior or first year undergraduate for a college scholarship offered by the Education Foundation of the Virginia Association of Soil and Water Conservation Districts. In 2014, Owen Mulvey-McFerron, a rising sophomore double majoring in Marine Biology and Environmental Studies at Richard Stockton College of New Jersey, was awarded one of four $1,000 scholarships.

NVSWCD continues to administer the Northern Virginia Rain Barrel Partnership in collaboration with Arlington County and the cities of Alexandria and Falls Church. Throughout the last year, over 258 participants built or purchased 348 55-gallon rain barrels at 12 workshops and distribution events. Since the program began in 2008, the partners have educated over 3,000 individuals, who built or purchased over 3,800 rain barrels, which have the opportunity to retain at least 200,000 gallons of water annually.

Additionally, NVSWCD hosted two Build-Your-Own Composter events, both of which sold out. The events resulted in the creation of 30 55-gallon composters that will reduce organic waste from reaching landfills and re-purpose organic matter to improve the soil health of gardens.

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. Conservation Currents included the following topics throughout FY 2014:

- Jean Packard's Legacy.
- Clover in Your Pasture?

- Wakefield Run Stream Restoration Project.
- Rain Barrel Art.
- 2014 Land Conservation Awards.
- Stewardship is a Focus for New NVSWCD Director – Jerry Peters.
- Trash Clean Ups.

12. 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's 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 (VIMS) has developed the Comprehensive Coastal Resource Management Portal. The portal is designed to provide guidance and resources to the public, especially shoreline property owners in Virginia, and to local governments. The website provides information on the current condition of the shoreline and information to help determine if shoreline stabilization is justified. VIMS also recommends the type of stabilization which would be most appropriate based on the shoreline conditions. The Comprehensive Coastal Resource Management Portal is available at
http://ccrm.vims.edu/ccrmp/fairfax/index.html.
The Wetlands Board welcomes VIMS guidance and has adopted a living shorelines policy, available at
www.fairfaxcounty.gov/dpz/environment/finallivingshoreline.pdf.

The Wetlands Board has also adopted a mitigation policy which can be found at www.fairfaxcounty.gov/dpz/environment/wetlands/mitigation_compensation_policy_adopted.pdf.

The Wetlands Board reviewed one permit application during the first half of 2015. The board approved the permit.

During 2015, the Virginia Marine Resources Commission staff, with guidance from a citizen advisory group, drafted the state's first general permit for living shorelines, to implement a 2011 state law (Senate Bill 964, now section 28.2-104.1). The general permit was approved by the Virginia Marine Resources Commission on July 28, 2015 following a public hearing; it became effective on September 1, 2015. The permit includes all criteria and procedures for proposing and evaluating living shoreline projects in tidal waterways and describes the purpose of the law as follows:.

> "The purpose of this general permit is to provide a streamlined permitting process as an incentive to encourage property owners to utilize a living shoreline approach as appropriate, to manage shoreline erosion and promote the planting and growth of tidal wetland vegetation to restore or enhance ecosystem services. The techniques and conditions contained in this general permit are designed to limit the applicability of the permit to situations where the projects are most likely to be successful, and so as to limit the potential for adverse impacts on the environment and adjoining or nearby properties."

The guidance describes three essential elements that the application must include to be approved under the general permit process:

- The application is sufficiently complete to allow evaluation.
- The project satisfactorily meets the general permit criteria, including the following:
  - Maximum fetch never exceeds ½ mile at any shoreline angle.
  - Appropriate wetland plants, as currently identified in the tidal wetlands ordinance, are proposed within the intertidal area.
  - Use of fiber logs and other biodegradable material, as appropriate and as long as the final elevation does not exceed mean high water and as long as no existing wetland vegetation is covered with the use of such materials.
- The general permit process should be used.

Carl Hershner, Jr., the Director of the Center for Coastal Resources Management and Associate Professor of Marine Science at the Virginia Institute of Marine Science, has noted the following to the Chairman of Fairfax County's Wetlands Board:

> "Fairfax County was one of the first localities to formally adopt a wetlands mitigation policy and the first locality in Virginia to establish a living shorelines policy. The mitigation policy requires that first and foremost all reasonable measures to avoid wetlands impacts be taken before consideration of creating new wetlands. Fairfax County's groundbreaking Living Shoreline Policy was included in the Virginia Institute of Marine Science Shoreline Management and Wetland

Sustainability Study submitted to the General Assembly, leading to the passage of Virginia's Living Shorelines legislation in 2011."

"The Fairfax County Wetlands Board has been in the forefront of natural resource conservation by incorporating the latest scientific information in both their living shoreline and mitigation policies. We routinely point to their practices as a model for other wetlands boards in Virginia."

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
www.co.fairfax.va.us/dpz/environment/wetlands.htm

13. Virginia Department of Forestry

The Virginia Department of Forestry (VDOF) has provided forestry-related services in Fairfax County for over 60 years. VDOF is also participating in several efforts aimed at improving riparian areas. 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 2014, the Virginia Department of Forestry provided project leadership and technical support to tree planting efforts in partnership with elementary school children, private landowners and Fairfax ReLeaf.

Each year, the Virginia Department of Forestry participates in the Fairfax County Arbor Day on the last Saturday in April. The county earned again, for the 32nd year, the Tree City USA award. This award is given for having a planting plan, management plan, a Tree Board/Commission and sponsoring an Arbor Day celebration. The award is

applied for by the Fairfax County Urban Forest Management Division and given through the Virginia Department of Forestry. Tree seedlings are distributed by VDOF to people attending the Arbor Day celebration. In 2014, 400 donated hardwood and shrub 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 2014, approximately 1,200 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 (A&F) District applications. A&F District forest management plans are prepared by VDOF; these efforts support the management of forested land for conservation purposes. Six A&F plans covering 236.2 acres were reviewed and updated. VDOF also wrote a Neighborhood Forest Management Plan for a homeowner association of some 250 homes and a fire management plan for another homeowner association. In addition, VDOF provided less formal advice to a number of home owners associations, civic groups and residents. 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 45 applications and plans in 2014. 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 2014, VDOF conducted 62 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 fourth class of Tree Stewards was trained in 2014. Thirty Tree Stewards reported 715.5 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 one burn in the county in 2014 with the Fairfax County Park Authority.

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.

14. Virginia Department of Transportation

Potential impacts to stream and wetland resources from the Virginia Department of Transportation (VDOT) projects and activities are avoided and minimized to the greatest extent feasible. Avoidance of such impacts involves a balance with avoiding and minimizing technical, logistical, socio-economic as well as other environmental resource factors to find the most practical and least environmentally-damaging solution.

For unavoidable impacts to aquatic resources, federal and state water quality laws and regulations may require compensatory mitigation in order to obtain water quality permit authorizations from the permit regulators. To comply with compensatory mitigation requirements, VDOT designed and constructed several on/off-site mitigation areas as a part of a highway construction project. Within Fairfax County, several mitigation sites were created on state right-of-way totaling approximately eight acres of wetlands (seven acres non-tidal and one acre tidal) and approximately 2,635 linear feet of restored streams associated with unavoidable impacts from VDOT highway improvement projects. These compensatory mitigation sites have satisfied the success establishment criteria set by the regulatory permitting agencies and now exist in perpetuity as protected conservation easements. The last remaining on-site mitigation sites under active post-construction permit monitoring are associated with the I-95/Telegraph Road interchange improvement project (opened to traffic last year). The compensatory mitigation requirements for the unavoidable impacts included wetland enhancement or 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, plus 0.36 acre of stream restoration to a relocated tributary to Cameron Run. These areas are in the third year of a five year monitoring period.

Beginning in 2008, the Environmental Protection Agency (EPA), the U.S. Army Corps of Engineers (USACE) and the Virginia Department of Environmental Quality (DEQ) jointly supported an order of preference for compensatory mitigation: first through purchase of stream and wetland credits from approved commercial mitigation banks; second by payment of in-lieu funds; and third by permittee responsible mitigation (i.e., preservation, enhancement and creation) for compensation of unavoidable impacts to aquatic resources. As a result, VDOT now purchases wetland and stream credits from approved mitigation banks to fulfill compensatory requirements. While compensatory mitigation is ultimately subject to approval of the regulatory permitting agencies, VDOT is open to suggestions for exploring mitigation opportunities within the Fairfax County geographical area.

VDOT developed the Environmental Commitments and Compliance Assistance Program pursuant to VDOT's FY 15 Business Plan, which consists of eight Action Items/Goals. Action Item/Goal 4 of the Business Plan is dedicated to environmental stewardship, which requires VDOT "to protect the environment and improve the quality of life for Virginians" in its mission to build, operate and maintains highways. The primary objectives of this program are to establish a consistent process to communicate the environmental commitments (regulations, legislation and other legal requirements) at the beginning of a project's construction, followed by active monitoring throughout the life of a project to ensure not only compliance but proper implementation. The formal rollout of this program occurred on July 1, 2015.

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.

VDOT has included landscaping on several road construction projects to enhance context sensitive road design. Recent or current projects with landscaping include:

- Completion of the I-495 corridor-wide landscaping/reforestation project from Braddock Road to the Dulles Toll Road (14 miles along the inner and outer loops).
- Stringfellow Road widening between Fair Lakes Blvd. and U.S. Route 50.
- Jeff Todd Way between Telegraph Rd. and Richmond Highway.

Ongoing coordination continues among VDOT, the Fairfax County Restoration Project, Fairfax Re-Leaf and DPWES Stormwater Planning on reforestation and stormwater management/water quality issues.

VDOT has multiple waste load allocation limitations derived from Total Maximum Daily Loads in multiple streams across the county. It is expected that these requirements will be met through best management practices required in the next DEQ Stormwater Discharge Permit issued to VDOT. Coordination with Fairfax County will be needed.

VDOT's Wildflower Program is funded through revenue fees paid for wildflower license plates at the Virginia Department of Motor Vehicles; approximately 3.5 acres of right-of-way at four locations in Fairfax County are managed as wildflower meadows. Warm season, native grass species are seeded on construction projects for which opportunities exist to take advantage of low maintenance requirements. Targeted control of invasive and nuisance vegetation is a large part of VDOT's Roadside Vegetation Management Program to promote the growth of more desirable species. Problematic roadside locations are prioritized for treatment and follow-up monitoring to reduce the population to a manageable level.

15. Virginia Department of Environmental Quality

In 2014 the Northern Regional Office of the Virginia Department of Environmental Quality received 19 applications to impact surface waters in Fairfax County. A total of 15 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.

16. Urban Forestry

Fairfax County's urban forest is critical to enhancing the livability and sustainability of our community. Management of the trees within our urban forests to maximize the multitude of benefits they provide to residents is an essential step in successfully reaching the commitments and goals of the Board of Supervisor's Environmental Agenda, the Tree Action Plan, the Cool Counties Climate Stabilization Initiative and other county public health, livability and sustainability initiatives and programs.

In 2014, the Urban Forest Management Division (UFMD) continued to coordinate and implement the county's efforts to manage our urban forest resources including advancing the board's Environmental Agenda to:

- Increase tree conservation in land development.
- Improve air quality through tree conservation policies and practices.
- Improve water quality and stormwater management through tree conservation.
- Foster an appreciation for our urban forest and inspire county residents to protect, plant and manage trees and forest stands on public and private lands.

In 2014, a new Urban Forester III position was created and filled in UFMD to move the Tree Action Plan forward and work with the Tree Commission to review the plan for possible updating. This urban forester is also working to establish and cultivate inter- and intra-agency and public-private partnerships to advance the Tree Action Plan and urban forest management in the county.

Current data on the structure, function and value of the social, economic and environmental benefits of the county's trees and forests are being used to influence urban forest management decisions to reach these goals. The benefits of the urban forest are also being used to incorporate urban forest management into regulatory requirements and processes such as Total Maximum Daily Load water quality planning and the Municipal Separate Storm Sewer System (MS4) permit process.

The Director of UFMD has been appointed to the Environmental Protection Agency Chesapeake Bay Program Urban Tree Canopy Expert Panel that will be making recommendations for the development of Best Management Practices and models for calculating urban tree pollutant load reduction credits for the Chesapeake Bay Watershed Model. The panel is expected to have a final approved report with its recommendations in December 2015.

Below is a summary of UFMD efforts in 2014 and into 2015, and how these efforts address the county's overall Tree Action Plan.

a. Tree Canopy

The 2012 Urban Tree Canopy Analysis (UTC) conducted by the University of Vermont Spatial Analysis Laboratory indicated that 53 percent of the county's land mass was covered by tree canopy in fall 2011. This figure is higher than those produced by previous imagery. (However, EQAC notes that the new data are at a higher resolution than the old. At this time, we cannot say what the actual difference, if any, there is in the tree canopy since the two datasets cannot be compared directly.) In addition to canopy coverage, the study delineated the percent coverage for impervious surfaces, water, grass/shrub, bare soil, roads and buildings. The analysis was used to develop canopy coverage for all 30 major watersheds found within Fairfax County. The high resolution satellite imagery and UTC analysis for the county is being updated in 2015.

This information on existing tree canopy in the county is being used to also calculate the environmental benefits, such as carbon sequestration, stormwater management, air and water quality benefits and energy conservation, of the urban forest based on science and Web-based tools (*i-Tree*) developed by the USDA Forest Service. These efforts are in support of Tree Action Plan Core Recommendations #5, to Improve Water Quality and Stormwater Management through Tree Conservation, and #6, to Use Ecosystem Management to Improve and Sustain the Health and Diversity of the Urban Forest.

i. Tree Canopy and Watersheds

In 2013 and 2014, the Urban Forest Management Division, in cooperation with the county GIS office, continued modeling on county watersheds to simulate the effects of changes in tree and impervious cover on stream flow and water quality. The selected modeling software is i-Tree Hydro, a part of the i-Tree suite of tools developed by the USDA Forest Service which analyzes urban and community forest benefits. The tree canopy analysis, along with field-collected inventory data, hourly stream flow and weather data, is used to quantify the value of trees on the watershed level. Theoretical gains or losses in tree canopy and/or impervious surfaces can be modeled to demonstrate the effects on water quality and stream flow.

The Urban Tree Canopy Analysis and i-Tree Hydro will provide useful input toward achieving many goals set forth by the Tree Action Plan. The benefits of these analyses include:

- Developing benchmark tree canopy levels for the major watersheds in Fairfax County from Urban Tree Canopy Analysis data.

- Using i-Tree Hydro software to model effects of gains and/or losses of tree canopy and impervious surface on water quality and stormwater flow.
- Cooperating with Stormwater Planning to incorporate tree canopy analysis with MS4 Permit and Chesapeake Bay TMDL regulatory requirements.
- Adjusting watershed canopy goals to reflect available planting space, demographics, comprehensive plan potential for land use change, etc. if needed.
- Embedding reforestation and related best management practices in MS4 Permit and Watershed Improvement Plans as credited measures.

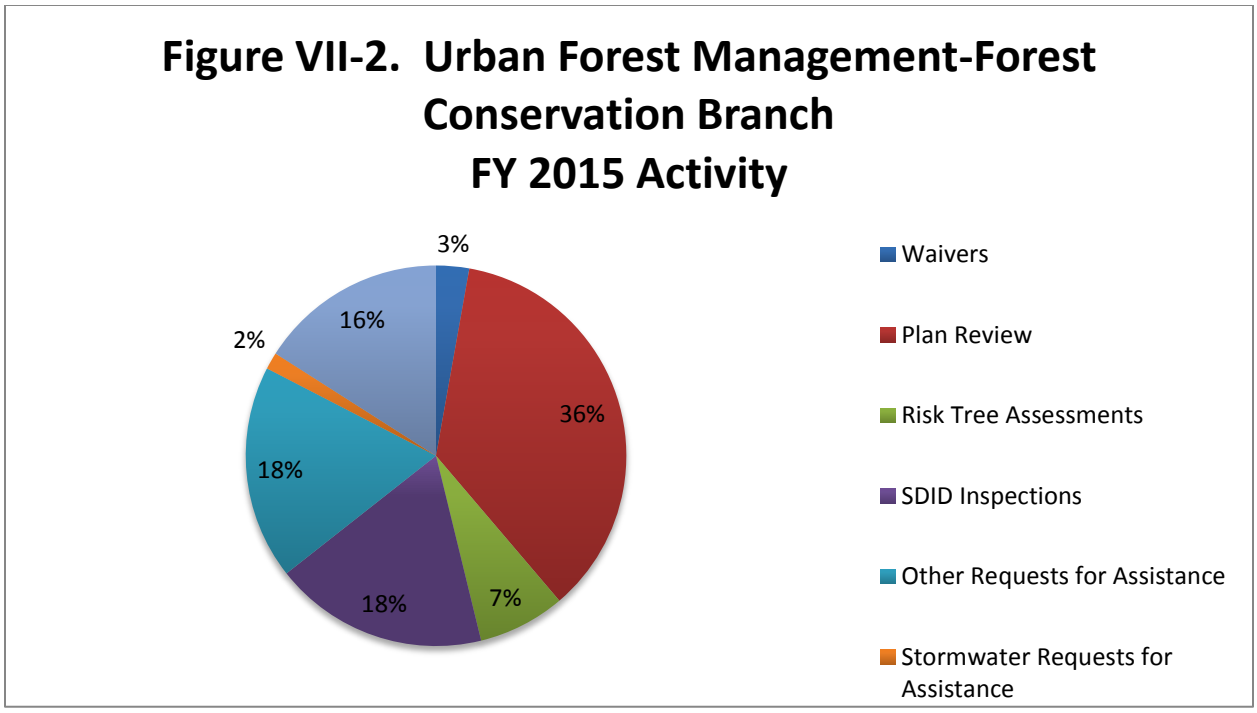
ii. Implications of Tree Canopy Analysis

The 53 percent tree canopy level analyzed in 2012 exceeded the 45 percent goal adopted by the Board of Supervisors in 2007. This figure is higher than those produced by previous imagery. (However, EQAC notes that the new data are at a higher resolution than the old. At this time, we cannot say what the actual difference, if any, there is in the tree canopy since the two datasets cannot be compared directly.) UFMD presented this information to the board's Environmental Committee in October 2013. In light of the 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 solely quantitative canopy goals and more toward development and implementation of qualitative forest management goals and metrics, including watershed management goals and green infrastructure planning. These efforts will be critical to ensuring the long-term health and sustainability of our urban forest.

b. Forest Conservation Branch Activities

The Forest Conservation Branch staff currently consists of seven full-time and two part-time urban foresters who work with a wide range of partners on a variety of urban forest management issues. One of the core responsibilities of the Forest Conservation Branch is to promote the Tree Action Plan's Core Recommendation #10, to Optimize Tree Conservation in Land Development. UFMD is unique in its "cradle to grave" participation and responsibilities in the land development process in the county. Urban Foresters provide expertise and comments on Comprehensive Plan Amendments, rezoning case reviews, special permit applications, special exceptions, site plan and other development plan reviews, site inspections and final bond release of development projects. In addition, the Urban Forest Management Division provides consultations to various county agencies.

Figure VII-2 illustrates the types of requests for assistance handled and percentage of time spent by the Forest Conservation Branch in Fiscal Year 2015. Below is a brief explanation of each of the categories of assistance tracked in the charts. This includes the type of customers and partners assisted within the process. A total of



Source: *EQAC 2015 UF Chapter Draft*, attachment to email from Keith Cline, Director Urban Forest Management Division, Department of Public Works and Environmental Services, Fairfax County, Virginia to Noel Kaplan, Department of Planning and Zoning, Fairfax County, Virginia, July 1, 2015.

1,228 requests for assistance by customers and partners were fulfilled by the Forest Conservation Branch in FY 2015.

i. Waivers (39)

Waivers include several types of modification requests, including Transitional Screening and Barrier waiver/modifications, 10-year Tree Canopy modifications and Interior Parking Lot Landscaping waiver/modifications.

ii. Plan Reviews (500)

The vast majority of plan review requests are in direct response to the Land Development Services, Site Development and Inspections Division's (SDID) workload during its reviews. The plan review process include; Site Plans, Minor Site Plans, Rough Grading Plans, Public Improvement Plans, Preliminary Plans, Subdivision Plans, Infill Lot Grading Plans, Demolition Plans, Plan Revisions and Water Quality Impact Assessments.

This year the Urban Forest Management Division, in consultation with leadership teams from SDID and the Engineers and Surveyors Institute (ESI), are now considered an "Outside Review Agency" to better accommodate the

Second Submission Designated Plans Examiner (DPE), expedited plan review process. Thus far, UFMD has processed 53 Second Submission DPE plans.

iii. Tree Risk Assessments (103)

A primary focus of tree risk assessments is the evaluation of risks that any tree may pose to the public, including a determination of a public safety hazard as defined in Chapter 46 of the Code of Fairfax County. Trees on public or private property that may affect the safety of the public are evaluated and follow-up mitigation is prescribed. Tree risk assessments are provided on a complaint basis by stakeholders and as requested by homeowners associations and county and outside agencies, such as the Facilities Management Department, Maintenance and Stormwater Management Division and VDOT.

iv. Stormwater Requests (20)

Stormwater requests come primarily from the Stormwater Planning Division, Utilities Design and Construction Division, contractors and stakeholders as part of planning and implementation teams. UFMD contributions to the process include project scoping, plan review, pre-construction meetings and consultation during construction of stream restoration, stream stabilization and stormwater facilities projects.

v. Zoning Cases (222)

Zoning cases consist of a variety of requests from the Department of Planning and Zoning. These requests include Conceptual and Final Development Plans, Planned Residential Community Plans, Special Permits, Special Exceptions, Variances and Rezoning cases.

vi. Site Inspections (253)

Site Inspections require a physical inspection of a site for compliance with approved plans, including landscaping inspections, bond release inspections, pre-construction meetings and site inspections for tree conservation compliance.

vii. Other Requests for Assistance (91)

The remainder of activities comprise a collection of both internal and external customer requests from the following agencies, organizations and the public:

- Facilities Maintenance Division.
- Capital Facilities.
- Park Authority.
- Public Schools.
- Wastewater.

- Stormwater.
- Code Compliance.
- Board of Supervisors.
- Homeowner Associations.
- Virginia Department of Transportation.
- Fairfax County Department of Transportation.

c. Forest Pests

In the early 1980s, the Board of Supervisors directed urban forest management staff to address the emerging issue of the gypsy moth caterpillar. In response, the Gypsy Moth Program was formed in the Department of Extension and Continuing Education (DECE). The mission of this program was to reduce gypsy moth populations to below defoliating levels and to minimize the environmental and economic impacts of the pest by limiting the amount of tree mortality and use of pesticides in the environment. Other forest insects and diseases have emerged and have been added the program's mission since its inception. The name was changed to the Forest Pest Program to reflect this diversification of management. In the mid-1990s, the program was moved from the DECE to DPWES.

Currently there are five full-time and three part-time urban foresters working in the Forest Pest Management Branch. The core work of the branch addresses Tree Action Plan Recommendation #6, to Use Ecosystem Management to Improve and Sustain the Health and Diversity of our Urban Forest. The staff works not only on forest pest management projects but provides support for the wide range of UFMD projects and partnerships, notably outreach and education (Core Recommendation #1).

i. Gypsy Moth Caterpillar

In the Fiscal Year 2015, gypsy moth (*Lymantria dispar*) caterpillar populations remained very low. There was no measurable defoliation reported in Fairfax County or elsewhere in the Commonwealth of Virginia. Successful management programs in conjunction with the naturally occurring fungal pathogen *Entomophaga maimaiga* may explain the extremely low gypsy moth populations in Fairfax County and other areas. Forest Pest Management staff continues to monitor the gypsy moth, but no control treatments were applied in 2014 or 2015. However, gypsy moth populations are cyclical and it is not uncommon for outbreaks to occur following dormant phases like what is most likely occurring in Fairfax County.

ii. Fall Cankerworm

The fall cankerworm (*Alsophila pometaria*) is an insect native to the eastern United States that feeds on a broader variety of hardwood trees than the gypsy moth. Periodic outbreaks of this pest are common, especially in older declining

forest stands. The Mount Vernon, Mason and Lee magisterial districts have, in recent years, experienced the most severe infestations and associated defoliation. Forest Pest Management staff observed population outbreak levels in the winters of 2012 and 2013 and declining populations in 2014. As a result of monitoring efforts in winter 2014, staff treated 66 acres by ground application of the biological control pesticide *Bacillus thuriengiensis* (Bt) in spring 2015.

In 2014, staff received input from civic groups in regard to the strategies that are used to implement this control program. Staff has worked diligently to explore ways to refine and improve this program so that these concerns can be addressed.

- Larval Study – The purpose of this study was to corroborate the results of fall cankerworm sticky band surveys in the fall and bolster overall monitoring efforts. Forest Pest Management staff used a technique developed by researchers at the University of North Carolina which related larval density to predict defoliation. This method involved using trays of soapy water to monitor for fall cankerworm larvae. In spring 2015, greenhouse flat trays filled with soapy water were placed under cankerworm host trees. The soapy tray traps were used to count the number of caterpillars ballooning during peak emergence and/or before pupation. These data will be used to predict defoliation in the following year. The initial survey point was randomly generated using ArcGIS to focus within parks which corresponded to areas of either high fall cankerworm banding counts (>70) or low fall cankerworm banding counts (<30). The overall results of the high (top) and low (bottom) banding count areas are presented in Table VII-4. The scope of the project was small and its goal was to determine if this would be a feasible monitoring effort for the future. Future efforts will continue with guidance from university researchers to further develop the technique.

- Parasite Study – Fall cankerworms have natural predators that can be influential in their population levels. One explanation for outbreak populations in these areas is a lack of predator controls like *Telenomus alsophilae*, an egg parasitoid. The purpose of this survey was to determine the population level of *T. alsophilae* in Fairfax County.

  Collection sites were located in cankerworm banding sites that amounted to 100 or more female moths over the course of the monitoring season. Staff collected eggs from survey bands that had eggs on them as well as from small branches of trees located near the bands. Cankerworm eggs were reared indoors and the number of viable eggs was counted to determine the level of parasitism.

Table VII-4. Fall Cankerworm Larval Study

Plot Number	Total Observed FCW	Average Observed FCW	Park
High Banding Sites			
1	2	0.4	Mason District
3	1	0.2	Joseph F. Barnes Battery
5	12	2.4	Lower Potomac
8	10	2	Pohick Estates
Low Banding Sites			
4	0	0	Lee District Park
6	1	0.2	Mason Neck State Park
7	0	0	Pohick Bay Regional Park
(Site 2 was not monitored)			

Source: *EQAC 2015 UF Chapter Draft*, attachment to email from Keith Cline, Director Urban Forest Management Division, Department of Public Works and Environmental Services, Fairfax County, Virginia to Noel Kaplan, Department of Planning and Zoning, Fairfax County, Virginia, July 1, 2015.

The data acquired from this survey should prove useful in obtaining a better understanding of overall cankerworm population dynamics in Fairfax County as well as locating areas of concern to be targeted in the ensuing year's fall cankerworm banding survey. At the time that this report was drafted, there were no results to publish.

- Resident Feedback Survey – At the conclusion of the 2015 treatment, staff conducted a survey to gauge how the public felt about the limited fall cankerworm ground suppression program. All residents in the treatment areas (130) were mailed a questionnaire. Thirty-one residents responded. The majority of those that replied (30) were very satisfied or satisfied. The lone "very dissatisfied" response was the result of foot traffic which disturbed a flower bed

- Fall Cankerworm Community Banding Campaign – The Fairfax County Urban Forest Management Division implemented a fall cankerworm community banding program in early December 2014. The goal for the pilot program was to mobilize and engage residents who were most affected by fall cankerworm, focusing on the Mount Vernon District. Efforts by volunteers would then be used to assist in Forest Pest Management's annual monitoring. Homeowner associations that fell within the historical areas for high cankerworm populations were targeted for participation. For any HOA that requested to participate, "kits "were provided based on the size of the organization

Each kit included a roll of tar paper banding material (approximately 15 feet in length), two cans of aerosol Tanglefoot® glue, gloves, instructions and a postcard to send back to UFMD with the data recorded from their sticky bands. Each kit was estimated to monitor 4-6 trees in the ideal diameter of 6-8 inches.

Out of over 100 total kits that were disseminated, a total of nine postcards were received by UFMD following the pilot program. The greatest return rate successes were for groups that attended UFMD's live demonstration and those which were spearheaded by Master Gardeners. In future years, a more robust outreach program should accompany the kits, including active involvement of Master Gardeners and Tree Stewards. Many residents assumed that the kits would provide good preventative control for fall cankerworm defoliation. As a result, most residents did not make the connection to record and reply with the number of females observed on the bands.

- Defoliation Survey – This year, the Fairfax County Forest Pest Management Program conducted an extensive defoliation survey to measure the damage caused by fall cankerworm. The purpose of this survey is to determine those areas of Fairfax County where fall cankerworm larvae have impacted the county's urban forest resources through foliar feeding and to quantify this feeding damage as a percentage of canopy defoliated. The data acquired from this survey should prove useful in gauging a better understanding of overall cankerworm population dynamics in Fairfax County as well as locating areas of concern to be targeted in the ensuing year's fall cankerworm banding survey.

  The defoliation survey for fall cankerworm consisted of two phases. The first phase of the survey consisted of a gridded ground. A 1,500 foot grid was established in the known area of fall cankerworm activity in the southeastern portion of the county. Defoliation was quantified at each grid point. Nearly 1,000 ground based surveys were conducted. The second phase of the defoliation survey was an aerial survey. The aerial survey was conducted to identify large areas of defoliation, as well as target large wooded tracts, such as those found on Mason Neck and in Huntley Meadows where a ground survey is impractical. The results of this survey indicated that there was no heavy defoliation from fall cankerworm in 2015; moderate feeding was, however, apparent.

- Fall Cankerworm Taskforce – Due to the growing concern over fall cankerworm and the lack of science regarding cankerworm population dynamics and population monitoring, a multi-state cankerworm task force was established in spring 2015. Fairfax County Urban Forest Management was instrumental in creating this task force. The group, consisting of local and state agencies as well us representation from universities, hopes to

establish standardized monitoring and treatment strategies for the future control and management of fall cankerworm.

On January 21, 2015 (as clarified on March 11, 2015), EQAC passed a resolution to the Board of Supervisors expressing agreement with the county's program for controlling the fall cankerworm. See Appendix B for the correspondence to the Board of Supervisors.

iii. Emerald Ash Borer

The emerald ash borer (EAB), *Agrilus planipennis*, is an exotic beetle introduced from Asia and was first discovered in the state of Michigan in the early 2000s. This beetle only attacks ash trees and can cause mortality in native ash species in as little as two years. In 2014, researchers in Ohio also observed EAB attacking white fringetree (*Chionanthus virginicus*), a close relative of ash. In July 2008, two infestations of emerald ash borer (EAB) were discovered in Fairfax County in the town of Herndon and the Newington area. The U.S. Department of Agriculture's Science Advisory Council recommended that no eradication was advised in Fairfax County. The recommendation was based on the consistent lack of success of eradication programs in other eastern states. On July 11, 2008, the county was put under federal quarantine for emerald ash borer. This meant that all interstate movement of ash wood and ash wood products from Fairfax County was regulated, including all ash firewood, nursery stock, green lumber, waste, compost and chips. During summer 2012, the Virginia Department of Agriculture and Consumer Services (VDACS) found EAB in many other areas of the state. All of Virginia is now subject to state and federal quarantines. Movement of ash wood and products is now permitted only within the contiguous multi-state, federal quarantine area.

Control options are being considered for publicly owned trees of high value that are susceptible to EAB. Prior to conducting treatment, approval will be sought from the Board of Supervisors.
Trapping efforts since 2008 revealed that beetle populations extend to all areas of Fairfax County. Staff is responsible for educating the public on how to manage the impending mortality and replacement of many thousands of ash trees. Education efforts emphasize hiring a private contractor to remove dead and dying trees and options for effective pesticides that may conserve ash trees in the landscape.

In March 2015, the Board of Supervisors authorized staff to begin a control program for EAB on trees on publicly owned land, including fire stations, parks, schools and libraries. Forest Pest Management staff conducted a survey to locate trees on county property for possible candidates for treatment. The results of this survey found 80 trees that qualify as candidates for control. Emerald ash borer control was accomplished using tree injection techniques which delivered the insecticide directly to the tree's vascular system. Once

injected, the insecticide was transported throughout the tree and has the potential to provide control for up to three years. The insecticide which was used contains the active ingredient of emamectin benzoate and is sold under the trade name TreeÄge®, which is highly recommended by industry and academic professionals.

iv. Hemlock Woolly Adelgid

Hemlock woolly adelgid (HWA) (*Adelges tsugae*) is a sap-feeding insect that infests and eventually kills hemlock trees. Forest Pest Management staff employs various control options for this pest including injected pesticide treatments and releasing predatory insects that feed on HWA. In 2014, staff recommended that the Board Of Supervisors approve a limited pilot treatment program for HWA. Plans to conduct small scale treatment efforts on naturally occurring hemlock stands found on public property are under way.

Native eastern hemlock is relatively rare in Fairfax County. The rarity of this species and the natural beauty that it imparts make it worthy of protection. Staff will continue to inventory the county in order to identify the natural stands of eastern hemlock. For this year's program, staff identified two native stands, in Dranesville and Springfield districts, for control.

Trunk injection of the insect growth regulating pesticide, azadirachtin or TreeAzin® is an effective method providing control to the target trees. Once injected, the insecticide is transported throughout the tree and provides control for up to two years.

v. Thousand Cankers Disease

In August 2010, a new disease was detected in black walnut trees (*Juglans nigra*) in Tennessee. During spring 2011, the same disease was observed near Richmond, Virginia. The disease complex called thousand cankers disease (TCD) is the result of an association of a fungus (*Geosmithia morbida*) and the walnut twig beetle (*Pityophthorus juglandis*), native to the southwestern United States. This disease complex causes only minor damage to western walnut species. Eastern walnut trees, however, are very susceptible and infested trees usually die within a few years. Urban foresters established monitoring sites for the walnut twig beetle during summer 2012. Walnut twig beetle and disease symptoms were found in the county and VDACS was petitioned to include TCD to the list of organisms that can be controlled by service districts in Virginia. Following disease discovery, VDACS listed Fairfax County under quarantine that prohibited the transportation of walnut wood and its products. Forest Pest Management staff will continue to monitor walnut tree health and educate homeowners on this condition.

vi. Other Pests

The Forest Pest Management Branch, in cooperation with VDACS, is monitoring for pests that are not yet known to exist in Virginia but would be problematic should they become established. Current trapping efforts include Asian longhorned beetle (*Anoplophora glabripennis*), oak ambrosia beetle (*Platypus quercivorus*) and sudden oak death disease (*Phytophthora ramorum*). Ongoing monitoring is conducted by strategically placing traps throughout the county that contain lures that are unique to each pest.

d. Outreach and Education

UFMD conducted and participated in multiple outreach and education efforts in support of Core Recommendation #1 of the Tree Action Plan, to Engage and Educate. UFMD staff fostered appreciation for trees and the urban forest, inspired citizens, county agencies and the development industry to protect, plant and manage greenscapes. Targeted audiences for education and training included Fairfax County Public Schools (FCPS), DPWES staff, the Engineers and Surveyors Institute, and volunteer groups through Fairfax ReLeaf, Fairfax SpringFest and Fall for Fairfax. Outreach efforts also included awards and recognition programs, specifically Tree City USA, Friends of Trees Awards and Tree Conservation Awards (also see Tree Commission Activities below).

i. Fairfax County Public Schools

School Programs: Urban Forest Management Division staff reached out to students in the county through various school programs that promote tree stewardship as well as the benefits that trees provide to our environment. Students are also encouraged to advocate for protection and support of the county's urban forest. In School Year 2013-2014, 2,777 students participated in the program. In 2014-2015, this number was 2,175.

UFMD education participation programs for students include:

- **Alien Invaders**- Staff introduces and defines native and invasive species. Students learn what qualities make invasive species destructive and how to reduce their impacts on the landscape.

- **Career Day**- Staff explains to students what an urban forester is and the importance of protecting the county's urban forest.

- **Forestry Badge**- UFMD staff teaches Boy Scouts about what urban foresters do, along with the importance of protecting the county's urban forest.

- **Meaningful Watershed Experience**- Staff explains the importance of an urban forest and how it impacts stormwater runoff at Hidden Oaks Nature Center.

- **Science Fair**- Urban foresters judge high school science fairs and discuss the students' projects with them and/or make presentations about the contributions of science to urban forest management and the quality of the forest resource.

- **Tree Planting**- Students learn about the values of trees and how to properly plant them.

- **Trees Please**- UFMD staff explains the value of trees in our community and simple measures students can take to protect trees.

- **Tree-ting Your Water: How Trees Act as Nature's Water Filtration and Storage System**- UFMD staff developed an interactive activity to engage fifth grade students on how water is filtered through various substrates: sand; gravel; clayey topsoil; turf; and a simulated forest. Students were asked to make predictions (hypotheses) and tested them by pouring water through prepared trays for each material. The goal of the activity was to foster appreciation for trees as natural flood and erosion mitigation.

ii. Public Meetings and Community Events

The Urban Forest Management Division makes a great effort to reach the residents of the county using a variety of public venues. Examples of those venues include:

- Providing educational programs to homeowners associations, scouting groups and Fairfax County Tree Stewards.
- Mount Vernon District Town Hall Meeting.
- Fall Cankerworm public notification meetings.
- Lake Barcroft Earth Day.
- SpringFest Fairfax.
- Celebrate Fairfax.
- Fairfax County 4H Fair.
- Fall for Fairfax.
- Emerald Ash Borer Educational Seminars.
- District Tree Forums.

At these public events, UFMD staff educates the public about the county's urban forest resources and programs. Urban foresters also develop and maintain hands-on activities and displays that help convey the importance of the stewardship of our natural resources.

iii. Tree Plantings at Festivals

A second tree planting project was orchestrated for SpringFest Fairfax (Earth Day/Arbor Day), April 25 and 26, 2015 at Occoquan Regional Park. UFMD collaborated with park staff to select a planting site and suitable tree species based on local environmental conditions and how the trees would function to provide needed services for the planting area. Seven UFMD staff members participated in the planting and enlisted the help of local service fraternity volunteers from Alpha Phi Omega to plant 15 trees (1.5-in. caliper dogwood and black gum; 6-ft tall Eastern red cedar and Norway spruce). Volunteers received instruction on proper tree planting, mulching and how the project was designed to provide both shade for the area and screening between the maintenance building and park athletic and open space uses. UFMD provided irrigation bags to facilitate tree establishment and success through regular watering

iv. Training

Engineers and Surveyors Institute (ESI): In December 2014, in coordination with ESI, UFMD staff provided training to a group of 25 civil engineers representing various engineering firms and government agencies. Topics discussed included the different components of the required Tree Conservation Ordinance and the ordinance as it relates to conservation plans submitted to the county for review. Similar training on the components of the Tree Conservation Ordinance was provided to site review engineers and site inspectors with the county's Site Development and Inspections Division.

Project Learning Tree: Project Learning Tree (PLT) is an environmental education curriculum designed for all educators. PLT is designed to help educators weave the environment into their lesson plans. This is especially relevant to county teachers, since all activities in the curriculum are correlated to the Virginia Standards of Learning. In August 2014, UFMD staff trained educators at Belvedere Elementary to use PLT curriculum.

Northern Virginia Urban Forestry Roundtable: UFMD regularly participates in the planning of the quarterly Northern Virginia Urban Forestry Roundtable meetings to present and discuss urban forest management issues of concern to all jurisdictions in northern Virginia and throughout the Washington metropolitan area. Two staff members from UFMD gave presentations at the quarterly roundtable meetings in 2014-2015. Hugh Whitehead joined a panel discussion of local experts to provide "Local Perspective on Landscape Diversity" in the context of climate change in November 2014. In May 2015, Jay Banks presented on the quality of landscape material titled: "Examining Trees for Your Project: What to Look for Above and Below to Ensure Quality."

v. Tree City USA

At the close of 2014, Fairfax County was recognized, for the 32nd consecutive year, for its excellence in urban forest management by the Arbor Day Foundation's Tree City USA Program. This milestone was followed in April 2015, when the county was again recognized for its efforts and awarded, for the sixth time, the Tree City USA Growth Award for the 6th time.

To be eligible for the Tree City USA designation, a community must meet four standards: to have 1) a tree board or department; 2) a tree care ordinance; 3) a community forestry program with an annual budget of at least $2.00 per capita; and 4) an Arbor Day observance and proclamation. The Growth Award recognizes work that goes above and beyond the four standards of the Tree City USA Program. Eligibility for the Growth Award included demonstrating increases in community forestry program expenditures and completion of activities such as tree plantings, revising ordinances, creating new educational materials and providing training for staff and members of the community.

Fairfax County not only met each standard, but it did so in impressive fashion. Most notably the Arbor Day observance and proclamation was, for the third year in a row, incorporated into a daylong event, SpringFest Fairfax. As part of the celebration, county staff, along with volunteers planted 15 trees at Occoquan Regional Park.

vi. Outreach Media

UFMD uses a variety of media to ensure that multiple audiences and demographics of the county are reached. Staff continues to improve messaging and communication with county residents by using various types of media including:

- Fact Sheets/Brochures.
- Television and YouTube Interviews.
- Podcasts.
- Videos.
- Facebook postings.
- Slideshare presentations.
- Updating UFMD web content.
- Newspaper articles and radio interviews.

Urban Forest Management created and distributed a number of fact sheets to the public. Topics included: summer watering tips for new trees; safe sidewalks and salty trees; hazardous trees; emerald ash borer; and beech bark disease.

In December 2014, UFMD staff participated in a County Conversation podcast in cooperation with Channel 16 to discuss and advertise the Fall Cankerworm

Community Sticky Banding Campaign. As part of the promotion of Fairfax County as a Tree City USA and the Tree Commission, UFMD staff also participated in two television interviews for *16 Around Fairfax*, the *Fairfax Magazine* and an associated YouTube video.

In March 2015, urban foresters participated in the first Fairfax Live Chat for the department, answering user-submitted questions online about the fall cankerworm. This information was archived and linked on the Forest Pest Web page.

In 2014-2015, UFMD applied several updates to the Forest Pest Web page in cooperation with Fairfax County Department of Information Technology. Following the initiation of the Fall Cankerworm Community Sticky Banding Campaign, a website was created to give information and instructions exclusively to residents participating in the pilot program through the following link:
www.fairfaxcounty.gov/dpwes/environmental/fallcankerworm/mount-vernon-cankerworm.htm.

This website was used as the basis for a much-needed update to the fall cankerworm main page, which included historic sticky banding information, frequently asked questions about the cankerworm and the suppression program and links on how to install a sticky band.

The gypsy moth webpage was also updated following the inception of a volunteer gypsy moth egg mass reporting pilot program in summer 2015. The website now includes a link to a volunteer reporting form and a SlideShare with information about the gypsy moth These updates will be put toward a greater outreach effort to coordinate volunteers to monitor for gypsy moth eggs to include a press release, information and fact sheets supplied to county libraries and distribution centers and dissemination through various social media outlets (Facebook, Flickr).

e. Strengthening Partnerships

In 2014, the Urban Forest Management Division formalized, maintained and strengthened partnerships with various county, state, federal and non-governmental agencies, as well as industry, professional and public-based organizations, in accordance with the Build Strong Partnerships and Alliances Core Recommendation #2 of the Tree Action Plan. Specifically, Fairfax County urban foresters sought to establish a framework for collaboration on tree preservation and planting efforts. Some partnership efforts include:

i. Stormwater Planning Division

UFMD staff continued to work with staff members from both the Stormwater Planning Division and Utilities Design and Construction Division, contractors and other stakeholders as part of the planning and implementation teams for stormwater projects. Contributions included project scoping, plan review, pre-construction meetings and consultation during construction of various projects, including stream restoration, stream stabilization and stormwater facilities. In addition, UFMD staff participated in outreach efforts to property owners impacted by proposed stormwater projects to help explain the scope of work and anticipated impacts to trees, as well as proposed planting. Throughout the year, urban foresters provided valuable input on the health and condition of existing trees, preservation potential of trees based on anticipated impacts, mitigating construction impacts to trees designated for preservation and proposed landscape planting. UFMD staff also had an integral role in pre-construction meetings and assessed impacts prior to full completion of projects by walk-throughs of sites to identify potential problems to be addressed.

ii. Northern VA Regional Park Authority (NVRPA)

UFMD staff continued to foster a strong partnership with NVRPA through tree planting efforts at Occoquan Regional Park during SpringFest 2015. Urban foresters worked along with volunteers from George Mason University to plant 15 additional trees and to help maintain trees planted during previous SpringFest events in 2013 and 2014.

iii. Nonprofit Organizations

A UFMD urban forester holds a position on the board of Fairfax ReLeaf, Inc. In 2014, the major projects of this community nonprofit organization involved coordinating tree planting on Fairfax County Public School property. Urban foresters assisted in identifying planting sites and gaining approval for planting. UFMD also provided Geographic Information System analysis of homeowner association-managed open space and its potential for Fairfax ReLeaf planting activities. UFMD staff reached out to Fairfax County Tree Stewards to provide volunteer opportunities as project managers and follow-up maintenance for Fairfax ReLeaf planting projects.

A UFMD urban forester serves as President of Trees Virginia, a nonprofit organization that strives to expand public awareness of the role trees and forests play in the urban environment. UFMD staff members present and participate in quarterly Northern Virginia Urban Forestry Roundtables, sponsored by Trees Virginia in partnership with the Virginia Department of Forestry, that include presentations and panel discussions on various topics regarding the management of trees and urban forests throughout Virginia and Washington Metropolitan Area.

iv. Professional Organizations

UFMD Urban Foresters continued to provide leadership and strengthen partnerships with professionals and professional organizations working in the urban forestry community. A staff member served on the board of the Mid-Atlantic Chapter of the International Society of Arboriculture (MAC-ISA) as Director of Professional Development, and a staff member also supported the chapter and regional tree care industry as a judge at the MAC-ISA Tree Climbing Championship. UFMD staff also serves on the Steering Committee of the Virginia Association of Forest Health Professionals, helping plan the annual conference that provides updates on pests and diseases that threaten trees and the urban forest in the region. The conference also provides information on techniques for management and efforts to control these threats, as well as continuing education opportunities for forestry practitioners in the Mid-Atlantic region.

In September 2014, the UFMD Director presented the Keynote Address, "Our Trees, Our Future: Growing Leaders, Growing Our Profession," at the 35th Annual Training Conference of the Pacific Northwest Chapter of the International Society of Arboriculture in Vancouver Washington. The director also participated on the teaching cadre for the Municipal Forestry Institute in Silverton, Oregon in February 2015. This week-long leadership training is sponsored by the Society of Municipal Arborists and trains municipal, nonprofit, utility and other community leaders involved in managing the urban forest.

f. Tree Commission Activities

The Fairfax County Tree Commission had a very productive 2014 through the beginning of 2015. Its major accomplishments include a complete update of its website, an improvement in the process for selecting annual Tree Preservation and Planting award winners and the creation of an on-line database of Virginia State Big Tree Champions located in Fairfax County. The commission again participated in the annual SpringFest Fairfax celebration by hosting an exhibit at the Lorton Workhouse in both April 2014 and 2015. Selected winners of the 2014 Friends of Trees awards were also presented at SpringFest Fairfax in 2015.

The Tree Commission began the year by saying goodbye to incumbent Urban Forest Management Division (UFMD) Director, Michael Knapp, and welcoming new Director, Keith Cline, to its monthly meeting. Several new Tree Commission representatives, including commissioners for the Providence and Hunter Mill Districts and for the Virginia Cooperative Extension Service (Extension), were also welcomed in 2014. In early 2015, a new representative for the Environmental Quality Advisory Commission (EQAC) was also appointed to the Tree Commission.

In 2014, the Tree Commission reviewed and commented upon several issues pertaining to urban forest conservation. These issues included the impact of the new Stormwater Management Ordinance on tree preservation during individual lot development, deer overbrowse and its effects on the future forest canopy and environmental impacts of the county's fall cankerworm suppression program.

As a result of concerns raised by various environmental groups, at the end of 2014, the commission spent a considerable amount of time and effort examining the impact of the county's annual fall cankerworm suppression program. Specific questions were raised on the effects of the suppression program on the environment, particularly other insect and bird populations. As a result, the Tree Commission sent a resolution to the Board of Supervisors on January 23, 2015 supporting the continuation of the use of Btk (*Bacillus thuringiensis* var. *kurstaki*) on a limited basis and only when warranted to prevent a severe defoliation and potential tree loss. Tree Commissioners also recommended expanded studies of fall cankerworm biology and defoliation effects in areas that were treated in comparison to untreated areas.

In 2014, the Tree Commission began working closely with Extension to organize a series of community meetings to discuss tree preservation issues throughout the county ("Tree Forums"). The first Tree Forum, titled "Protecting Neighborhood Tree Cover," was held on March 24, 2015 at the McLean Community Center (Dranesville District). Approximately 80 people attended the forum and it was very well received. The second forum, "How to Protect Trees in Our Yards and Neighborhoods," was held on April 22, 2015 at Braddock Hall in the Braddock District. Approximately 50 people attended the forum. In addition to the Tree Commission and Extension, the UFMD, Board of Supervisors' District Offices, Virginia Department of Forestry and citizen and civic associations all participated as sponsors and participants in the forums.

The Tree Commission continued to update and improve its website, which now contains a link to nearly 20 State Champion Trees located in Fairfax County. Although there are currently no National Champion trees in Fairfax County, the Commission presented cross sections of the former National Champion Virginia pine (*Pinus virginiana*) (blown down in a storm) to the Board of Supervisors, the Park Authority, the Hunter Mill District Supervisor, the Reston Association and UFMD. A cross section, or "tree cookie," is now on display in the main lobby of the Herrity building of the Fairfax County Government Center complex.

i. Tree Conservation Awards

The Tree Commission worked closely with UFMD to improve the annual Tree Preservation and Tree Planting Awards nomination process. The commission now provides a greater marketing incentive to developers by allowing nominations earlier in the site development phase, thus encouraging more participation in the awards process. Tree Commissioners selected the 2014

award winners for developers, designers and contractors of the following land development projects:

- Tree Planting category
  - Capital One, Providence District.
  - East Market at Fair Lakes, Phase III, Springfield District.
  - Jennings Toyota, Lee District.
  - Newington Department of Vehicle Services Maintenance Facility, Mount Vernon District.

- Tree Preservation category
  - National Library for the Study of George Washington, Mount Vernon District.
  - The Preserve at Scotts Run, Dranesville District.
  - Unitarian Universalist Congregation of Fairfax, Providence District.

ii. Friends of Trees Awards

In addition, the commission selected the following individuals and organizations for annual Friends of Trees Awards for 2014. These awards were presented before the Board of Supervisors on June 2 during the 2015 Celebrate Fairfax Week:

- Merrily Pierce of McLean for outstanding efforts on behalf of tree preservation on infill lots in established residential neighborhoods.
- The Master Gardeners of Fairfax County, Fairfax and Green Spring programs, for extensive community outreach on behalf of trees.
- The Fairfax County Tree Stewards, for continued efforts on behalf of tree care and planting.
- The Alpha Delta Delta Chapter of Alpha Phi Omega Fraternity at George Mason University for volunteer tree planting at Occoquan Park during the 2014 SpringFest Fairfax event.

In the coming year, the Tree Commission will be looking closely at the involvement of UFMD in the site development review process. Commissioners are particularly interested in what further steps might be taken to minimize tree loss during infill developments in established residential neighborhoods. Community outreach efforts will continue through participation in SpringFest and co-sponsorship of additional tree forums. Finally, the commission will review the Tree Action Plan's purpose and process in order to develop a more focused plan and implementation strategy during the coming year.

17. 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.

During 2014, there has been one change to the A&F Program as shown in Table VII-5.

Table VII-5: Change in Local and Statewide A&F Districts from January 1, 2014 to December 31, 2014

Magisterial District	No. of Local Districts		No. of Statewide Districts	
	2013	2014	2013	2014
Dranesville	12	12	1	1
Hunter Mill	1	1	0	0
Mt. Vernon	3	3	1	1
Springfield	18	18	2	2
Sully	6	5	0	0
Total	40	39	2	4

Source: *Fairfax County 2014 Agricultural & Forestal District Annual Statistical Report, June 1, 2015*, Attachment to email, from Michael Lynskey, Zoning Evaluation Division, Department of Planning and Zoning, Fairfax County, Virginia, to Noel Kaplan, Department of Planning and Zoning, Fairfax County, Virginia, June 2015

As can be seen in the above figure, there was one change in the Sully District--the withdrawal of the Fink-Butler Local District. This reduced the acreage in local districts from 1,695.01 to 1,666.35 – a loss of 28.66 acres. Statewide districts remained constant at 1,337.06 acres.

18. 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 2014, the Fairfax Master Naturalist Program provided a total of: 1,575 hours of education/outreach; 1,988 hours of stewardship; 2,669 hours of citizen science; and 1,634 hours of administrative hours. The Fairfax Master Naturalist chapter worked with a variety of sponsoring agencies, including the Virginia Department of Forestry, Virginia State Parks and the Virginia Department of Game and Inland Fisheries. These efforts included seed and acorn collection, invasive plant management and deer management.

In addition to projects conducted in partnership with sponsoring agencies, the Fairfax Master Naturalist chapter provided substantial volunteer hours in partnership with a variety of Fairfax County Park Authority locations. One example is the *Meaningful Watershed Educational Experience* held at the Hidden Oaks Nature Center/Hidden Pond Nature Center, where volunteers gave 150 hours to over 1,150 students. For more information see the program's website at http://vmnfairfax.org/SitePages/Home.aspx.

19. Fairfax County Restoration Project

With the help and guidance of the Fairfax County Office of Public/Private Partnerships, The Fairfax County Restoration Project (FCRP) 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.

Reforest Fairfax was launched on October 13, 2011. 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.

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 that, once the trees are planted, the locations 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 www.fcrpp3.org/reforestfairfax/. In 2014, the total reached 95 gifts purchased and 475 trees planted. Native tree fact sheets can be found on the FCRP website at www.fcrpp3.org.

For Earth Week, 2014, FCRP developed an environmental film festival entitled The Green Inspirations Environmental Film Festival. The event was held at the Cinema Arts theatre on Main Street in the City of Fairfax.

In 2012 the 495 HOT Lanes project, the original impetus for FCRP, was renamed 495 Express Lanes. Spring 2015 represents the end of the planting along the corridor. The unfortunate occurrence of unauthorized mowing destroyed much of the growth that had taken place between Braddock Road and Gallows Road. However, VDOT responded rapidly and confirmed that the trees destroyed will be paid for by the errant contractor and those voluntary natives will be replaced if they fail to regenerate as they are expected to do. Nothing can be done about the eight years of growth that has been lost, but the area should ultimately recover. According to FCRP, VDOT has taken additional steps to prevent a recurrence of the mowing.

FCRP partners Asad Rouhi and Dan Schwartz of the Northern Virginia Soil and Water Conservation District, Ron Tuttle (while with DPWES) and Jim McGlone with the Virginia Department of Forestry have worked extensively with members of the Unitarian Universalist Congregation of Fairfax in Oakton to plan and design a retrofit of the parking lot on church property that would eliminate most, if not all, of the runoff from the average one year storm. This is accomplished by terracing the lot and incorporating Fairfax County standard stormwater management best management

practice facilities, including a bio-swale and infiltration trench. The existing parking lot is over an acre in size, with compacted impervious gravel; it is also steeply sloping. Work on the parking lot was to have been completed by Labor Day 2014.

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 www.fairfaxcounty.gov/parks/volunteer/. More information about FCPA and its programs is available at 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 nonprofit 501 (c) (3) 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
www.fairfaxparkfoundation.org

NOVA Parks (the Northern Virginia Regional Park Authority) also has opportunities for volunteers. These 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. More information can be found at 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 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 stewardship opportunities for Fairfax County residents. Additional information on NVCT can be found on its website, 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 NCVT, they will not only protect sensitive land, but can realize some financial benefits. A perpetual easement donation that provides a 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.

For stewardship information on the Potomac Conservancy, see www.potomac.org.

D. COMMENTS

1. The Fairfax County Board of Supervisors has endorsed the goals and actions within the Tree Action Plan 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 imagery. (However, EQAC notes that the new data are at a higher resolution than the old. At this time, we cannot say what the actual difference, if any, there is in the tree canopy since the two datasets cannot be compared directly.)

   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 second, complete a countywide Baseline Natural Resource Inventory.

EQAC notes that progress is being made in this area by the Fairfax County Park Authority staff in its efforts to establish a natural resources baseline inventory. 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, FCPA must supplement these efforts with an inventory of the county that accounts for flora and fauna. The creation of a natural resource protection zone and geodatabase model is complete. A more robust field data collection technique was successfully tested and is being expanded to all applicable field datasets. The new data collection technique uses tablet computers and mobile GIS combined with rapid assessment protocols to quickly and easily map natural resources data in the field and sync this data with a remote server. Applicable field datasets include Non-native Invasive Assessment Protocol (NNIAP) data, white-tailed deer browse impact (deer) data, and community level vegetative classification (vegetative communities) data. In the future, the datasets should be expanded to include all flora and fauna.

EQAC also notes the accomplishment of the Park Authority in preparing and publishing a revised Natural Resources Plan (in January 2014) 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 implementing 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; however, one position is not yet funded. The Park Authority continues to be successful in obtaining project specific funding for some resource management. Some funding has been secured through the Environmental Improvement Program plus a combination of proffers, bonds, telecommunications fees and other sources. Much more needs to be added to the budget to fully fund the plan.

5. On January 21, 2015 (as clarified on March 11, 2015), EQAC passed a resolution to the Board of Supervisors expressing agreement with the county's program for controlling the fall cankerworm. See Appendix B for the correspondence to the Board of Supervisors.

E. RECOMMENDATIONS

1. The Fairfax County Park Authority has an approved merit Ecologist position. However, this position is vacant and will remain vacant until funding is provided. EQAC recommends that the Board of Supervisors provide sufficient funding so that this position can be filled.

2. 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. In 2014, the Park Authority adopted a revised Natural Resource Management Plan that more closely focused on adaptive management of natural resources. However, full funding to implement the plan is not yet in the Park Authority budget. The Park Authority has managed to secure some funding from several sources but lacks most of the amount to implement fully the plan. FCPA staff estimates that full implementation would require approximately $8 million per year and dozens of staff positions. This includes 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 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 $705,000 and five positions. EQAC strongly feels that the Natural Resource Management Plan needs to be fully 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 further recommends that, over time, the full plan be funded.

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Fairfax County 2014 Agricultural & Forestal District Annual Statistical Report, June 1, 2015, Attachment to email, from Michael Lynskey, Zoning Evaluation Division, Department of

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Master Naturalists – EQAC 2014, Attachment to email, from James McGlone, Urban Forest Conservationist, Virginia Department of Forestry, to Noel Kaplan, Department of Planning and Zoning, Fairfax County, Virginia, June 15, 2015.

FCRP 2014 Final Annual Report, Attachment to email from Amy Gould, Fairfax County Restoration Project, to Noel Kaplan, Department of Planning and Zoning, Fairfax County, Virginia, July 19, 2015.

2015 ANNUAL REPORT ON THE ENVIRONMENT

CHAPTER VIII

WILDLIFE AND THE ENVIRONMENT IN FAIRFAX COUNTY

VIII-1. IMPACTS OF DEER IN FAIRFAX COUNTY

A. OVERVIEW

The deer population in Fairfax County has reached critical proportions. This fact has been conclusively documented by the Virginia Department of Game and Inland Fisheries (DGIF). As a consequence DGIF has relaxed the rules for and considerably extended the hunting season for Fairfax County only. The season extension has been even greater for archery, which is of special benefit for areas where firearms are prohibited.

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. However, most residents recognize the need to take action due to the numerous and severe impacts of overabundant deer.

The Fairfax County Board of Supervisors is ultimately responsible for determining the county's policy on deer management, and should work with staff and citizens to create and implement a safe, effective and humane deer management program.

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 continue to 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.

3. 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.

4. 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.

5. 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 animal species that has become over-dominant in the food chain and by encroachment of non-native invasive plant species.

   Vegetation surveys were conducted by the Fairfax County Park Authority (FCPA) across eleven parks in 2013. Of 140 data points measured, 48 showed severe browse with no native vegetation between six inches and six feet above the ground; 56 showed heavy browse with limited plant growth and severe hedging. This equates to 74% of plots demonstrating heavy or severe impacts from white-tailed deer. (Source Kristen Sinclair, FCPA)

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 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 summer 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. Fairfax County's Deer Management Plan has served the county well since 1998, but it is in need of an update in order to address new methods for population reduction, as well as more comprehensive strategies for working across jurisdictions and on private land. In January 2015, the Fairfax County Board of Supervisors directed the county's Wildlife Management Specialist to provide an update of the Deer Management Plan.

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 (which began in 1998) showed deer densities from 90-419 deer/square 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.)

The Fairfax County Park Authority recently estimated deer populations at parks countywide through the use of aerial infrared surveys via fixed-wing aircraft (FLIR surveys - Table VIII-1-2). These surveys count, at a specific point in time, the number of deer inside the park and within a small distance in the surrounding neighborhood. These counts are divided by the number of square miles surveyed to come up with estimated population densities. Of the 65 parks included in the 2015 Deer Management Program, 35 percent of the parks (23 parks) have received deer density surveys since 2002. The majority of parks were surveyed in winter 2013-2014 using FLIR technology.

There was an overall average density of 47 deer per square mile. Deer management methods at the surveyed parks have included archery, sharpshooting and managed hunting, occasionally in combination. The recent counts and browse surveys combined indicate that deer populations may have been reduced somewhat since the deer management program has been implemented, though populations have not been held low enough for long enough to observe widespread vegetative recovery in the parks. Based on the FLIR surveys, current management methods, including archery, managed shotgun hunts and sharpshooting, appear to be successfully maintaining deer populations at 40 deer per square mile in many FCPA parks.

While much of the data is limited, taken collectively, the observations of professional park staff, as well as the 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 ecological carrying capacities. Unfortunately, there is little 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.

Table VIII-1-2
Aerial Infrared Surveys of Deer Density, 2013-2014

Park Name	Est. deer per square mile	Survey date	First year of deer management
Riverbend	32	12/27/13	1999
Scotts Run Nature Preserve	40	12/27/13	2012
Lake Fairfax	43	12/27/13	2007
Fred Crabtree	92	12/27/13	2013
Old Colchester	13		2013
Laurel Hill	107	2/6/14	2010
Burke Lake	66	2/6/14	2002
Lake Accotink and Accotink Stream Valley	46	2/6/14	2012
Wakefield	60	2/6/14	2012
Frying Pan Farm	18	2/6/14	N/A
Ellanor C. Lawrence	15	2/6/14	2001
Sully Woodlands (includes Cub Run Stream Valley, Hickory Forest, Rock Hill, Richard Jones, Mountain Road, Elklick Preserve and Poplar Ford)	35	2/6/14	2006

(Source: Kristen Sinclair, Senior Natural Resource Specialist, FCPA)

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. In 2014,

1.12 million people resided 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 restricted or 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 have 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-1-3 and Figure VIII-1-1), 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.

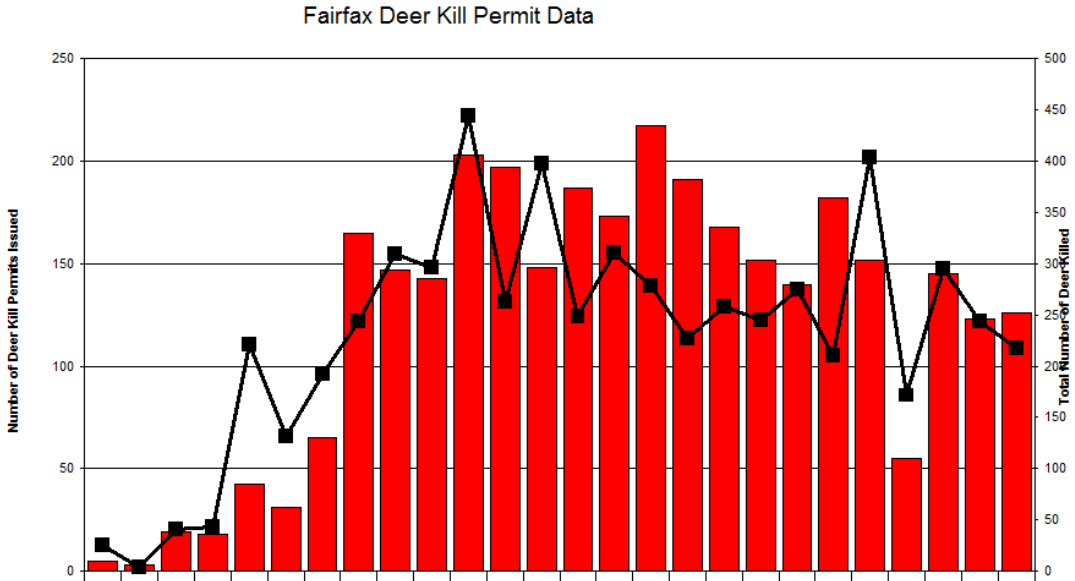
It should be noted that, while the number of out-of-season permits was markedly fewer in 2001, the number of deer taken increased dramatically. A similar pattern occurred in 2003, 2006 and 2010. This is quite consistent with intensification of problems in a smaller number of areas as land clearing for development alters the structure of habitat by increasing the amount of edge habitat and fragmenting forests and woodlands into smaller, more isolated patches.

Table VIII-1-3
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	55	171
2012	145	295
2013	123	244
2014	126	218

(Source: Susan Alger, Matt Knox, Mark Pritt, Jerry Sims, John Rohm, and Kevin Rose, Virginia Department of Game and Inland Fisheries.)

Figure VIII-1-1



	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
No Permits	5	3	19	18	42	31	65	165	147	143	203	197	148	187	173	217	191	168	152	140	182	152	55	145	123	126
Deer Killed	25	4	41	43	222	131	193	244	310	297	444	263	398	249	311	279	227	258	245	275	211	403	171	295	244	218

(Source: Susan Alger, Matt Knox, Mark Pritt, Jerry Sims, John Rohm, and Kevin Rose, Virginia Department of Game and Inland Fisheries.)

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 vegetation develops a "line" at the top of its 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 371) is exceeded. However, the apparent poor health of the county's deer indicates a level of deer density that reportedly approaches 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.

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-1-4) 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.

Table VIII-1-4
Deer-Vehicle Collisions in Fairfax County Reported to the Police

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	99	25	0	124
2010	102	18	0	120
2011	103	20	0	123
2012	80	14	0	94
2013	103	18	0	121
2014	48	17	0	65

* 41 and 43 percent of these crashes occurred in October and November.
(Source: 1993-2001: Michael Uram, FCPD; 2002-2004, 2006: Earl Hodnett, former county Wildlife Biologist; 2005: Emily Yance-Houser, FCPD; 2008, 2010: Brandi Horita, FCPD; 2009, 2011-2013; Kevin Rose DGIF.)

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-1-3), 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.

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. 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. Epizootic hemorrhagic disease (EHD), a viral disease fatal to deer but posing no threat to humans, may be a factor in natural reduction of the deer population. 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. 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.

5. Chronic Wasting Disease (CWD) has been identified by DGIF in Shenandoah County and a containment area has been established. Whether CWD is a potential future hazard for Fairfax County depends on its virulence and the ability to keep it confined to the current containment area. CWD is usually ultimately fatal to deer. It would be bad news, indeed, if it became epidemic in Fairfax County.

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 the highest density possible and is part of the framework to understand population dynamics. Populations are not generally managed for biological carrying capacity because populations at this level are necessarily unhealthy due to a lack of resources. The 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 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 the management and methods used 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, there is a need to adequately educate the public about the issues in order 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 to support well-informed judgments.

A survey was conducted in 2010 by the Fairfax County Wildlife Biologist to determine the level of support for the Deer Management Program in the county and to identify preferences related to management options. Over 6,000 residents responded with 67 percent indicating a preference for a reduced number of deer in the county. The majority of respondents supported various management methods for deer population control, while only 12 percent favored no control. Of the methods of deer management included in the survey, archery received the highest level (68 percent) of support.

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 nears 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. Also removal of predators has altered the natural biology of deer. Public concerns about the current and expected future impacts on the community, such as increased environmental damage and deer-vehicle collisions, 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. 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. Managed shotgun hunts yielded seven percent (82 deer) of 2015 harvests for the Fairfax County Deer Management Program.

ii. Archery Hunting

Archery hunting has proven an effective and acceptable means of deer control in residential areas where the use of firearms is deemed too hazardous or is restricted by law and ordinance. Archery is a quiet and short-range method, with most deer being taken within less than 100 feet. The Virginia Department of Game and Inland Fisheries has identified Fairfax County as an area for deer population reduction based on the abundant status of deer herds within the county. Thus, DGIF has set liberal regulations to assist population control efforts, including no daily or season bag limits and an extended eight month deer season. DGIF has authorized an early archery season on private lands within Fairfax County through which qualified bow hunters may hunt from the first Saturday in September through the last Saturday in April.

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. Archery hunting has become the most effective method for use in suburban parks that remain open to the public. It is also a cost-effective method, relying on numerous volunteer archers who have demonstrated skill through qualifications. During the 2014-2015 hunt season, archery is planned to occur at over 65 parks countywide, including parks managed by the Fairfax County Park Authority and NOVA Parks (Northern Virginia Regional Park Authority). During the prior hunt season (2013-2014), 1,005 deer were harvested via archery on FCPA and NOVA Parks property. (Source, Fairfax County Police Department, DGIF). Archery continues to be the most cost-efficient and successful method of

herd control in Fairfax County. In 2015, over 80 percent (916 deer) in the Deer Management Program were harvested by archery.

Volunteer archers contributed 31,328 hours to the Deer Management Program for an average of 55 hours per volunteer. The county's FY 2016 archery program will include 81 parks managed by FCPA and NOVA Parks. There are many archery groups and clubs outside of the county's Deer Management Program. Property owners may seek assistance from qualified bow hunters to hunt deer where the use of firearms is prohibited.

iii. Traditional Public Hunting

Under current restrictions outlined by DGIF, 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

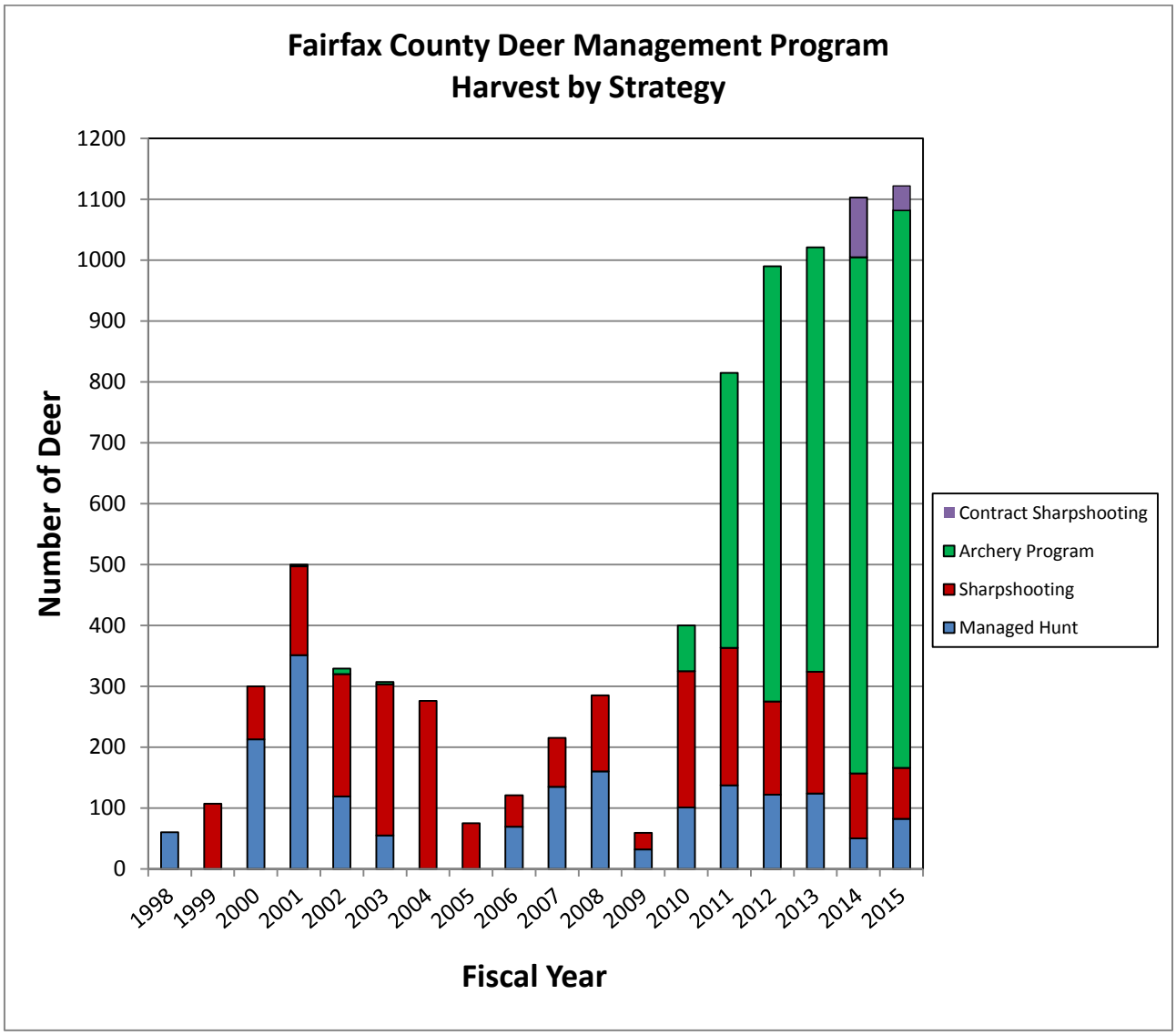
The use of professional animal control personnel, police experts or qualified and experienced volunteers has proven to be a safe, cost-effective and successful means of management if lethal methods are employed. Sharpshooting is sufficient to greatly reduce the population within a park. Earlier experience with this method in Fairfax County has led to significant refinements and greatly improved cost-effectiveness. Earlier data indicated a cost per deer taken ranging from $4.15 to $22.97. More 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. Sharpshooting operations in 2015 yielded 11 percent (124 deer) of the harvest of the Deer Management Program. The deer were donated, as usual, to Hunters for the Hungry for the benefit of local food banks. 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. Improvements to the sharpshooting protocol were made in 2015 to increase efficiency of culling efforts

and humane treatment of deer harvested. Recent management efforts by the Fairfax County Park Authority using a private sharpshooting vendor have demonstrated the ability to reduce deer populations to less than 15 deer per square mile at Ellanor C. Lawrence Park in one season (2013-2014). (Source: Kristen Sinclair, FCPA)

vi. Reintroduce Predators

The reintroduction of the usual wildlife species of deer predators into an urbanized setting such as Fairfax County is biologically unworkable and publicly unacceptable.

Figure VIII-1-2.



c. Nonlethal Methods

A report issued in August 2014 by the Virginia Department of Game and Inland Fisheries stated: "In many instances, non-lethal alternatives to hunting or sharpshooting have been proposed as a means to control deer populations. Research has shown that non-lethal methods are limited in applicability, prohibitively expensive, logistically impractical, and technically infeasible."

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; it is also prohibited under state game regulations.

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. These methods have had some success with captive deer, such as populations on islands or in fenced enclosures, where the deer are approachable and unable to disperse naturally, but present complications with free-ranging deer. Immunocontraceptives, like porcine zona pellucida (PZP) have not been approved for general use in Virginia. The Humane Society of the United States (HSUS) 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. HSUS has conducted several research studies of PZP on closed or semi-closed populations of white-tailed deer. In 2014, HSUS began a research study in New York of the effects of PZP on fawn production and population growth in an open suburban population of white-tailed deer. The costs for this method are reported to be approximately $500 per deer. Results are expected in 2019. 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 and for use in areas where lethal methods cannot be implemented.

iii. Sterilization

The City of Fairfax has undertaken an experimental research effort to sterilize deer within the city limits, beginning in 2014. This research study will last five years and should provide guidance to DGIF and regional land managers as to the effectiveness and cost of deer sterilization. The expected cost of sterilizing one doe is $1,000, but there is currently an additional cost of $436 in police overtime.

The 2014 DGIF report further states: "For example, fertility control in deer remains largely experimental and appears to be useful only in closed populations, such as islands or fenced areas where deer are approachable and unable to disperse naturally." The report adds: "Surgical sterilization can be effective in small, closed deer populations, but deer capture and surgery makes this option cost-prohibitive for general use."

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 can be effective if implemented correctly. Fences must be eight feet tall and can be costly to erect depending on the material used. Deer exclosures have demonstrated that fencing can be effective to protect small areas of garden and forest. However, the Fairfax County Code restricts the heights of fencing in most residential areas to four feet or less in front yards and seven feet or less in side and rear yards.

c. Repellants

In the past, repellants have had limited success. In addition, they 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

There are a few underpasses occurring beneath railroads, roadways and bridges. However, 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 (native plants are particularly recommended). 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. IMPORTANT SCIENTIFIC DATA NEEDS

Field studies have been conducted by FCPA to estimate the density of white-tailed deer and assess the impact of deer on native plant communities on FCPA properties. These data are used by biologists to better define harvest and recovery goals for future deer management activities.

Game camera surveys and aerial infrared (FLIR) surveys with fixed-wing aircraft have been conducted at select FCPA parks to obtain accurate estimates of the deer herd on Fairfax County parkland. Of the 65 parks included in the FY 2015 Deer Management Program, 35 percent of the parks (23 parks) have received a deer density survey since 2002. The majority of parks were surveyed in winter 2013-2014 using FLIR technology.

Deer browse surveys have been conducted by FCPA to assess the impact of white-tailed deer on native vegetation on county parkland. Forested areas in many FCPA parks are experiencing a significant loss of biodiversity resulting from the shrub and ground layer being almost entirely consumed by deer. In many areas there is little to no tree regeneration, minimal groundcover or significant encroachment of non-native invasive species that are not consumed by deer. Ecologists expect vegetation to be the slowest component of the system to recover, due to the immense pressures of deer and the confounding impact from non-native invasive species. Approximately 29 percent of the parks (19 parks) included in the FY 2015 Deer Management Program have received a browse survey from 2010-2014. Results of these browse impact surveys indicate that park vegetation has not yet recovered enough to consider scaling back deer management. If deer management is scaled back, ecologists expect herd levels to climb back above 100 deer/square mile as measured in early program years.

Monitoring data are imperative to guide deer management decisions and inform whether current management efforts have sufficiently reduced the deer population to a more sustainable level where reduced safety hazards and ecosystem recovery goals can be realized. Countywide population estimates and browse surveys are not attempted because of the extreme cost in creating an estimate with a high confidence value. However, surveys of smaller areas such as the individual parks included in the Deer Management Program should be possible over time. The Fairfax County Police Department and FCPA are planning to expand survey efforts to collect data on parks undergoing deer management on a five-year rotational schedule, dependent on staffing and available resources. These surveys are necessary to allow comparison of data over years and establish trends to determine when impacts have been sufficiently mitigated and management efforts for white-tailed deer can be scaled back in Fairfax County.

F. 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/wildlife/deer-management/

- 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-4 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. Fairfax County does not yet have this available, but there is the Virginia Wildlife Conflict Helpline hosted by DGIF and USDA-APHIS Wildlife Services that can be used as a resource for general questions about wildlife conflicts and interactions. This is staffed by biologists Monday through Friday, 8 am to 4:30 pm, toll-free at (855) 571-9003.

G. 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 Management Specialist 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 Management Specialist and the Animal Services Division advise private businesses 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) is the responsibility of the respective federal agencies and is subject to the applicable federal policies and regulations.

H. PRIVATE AND OTHER PUBLIC LANDOWNERS ROLES

To date, the Fairfax County Deer Management Program has organized and supervised deer harvests primarily on Fairfax County Park Authority and NOVA Parks properties, yet deer populations remain overabundant across Fairfax County. Forests, fields, gardens, landscaping and lawns on federal, state, other county agencies', Fairfax City, common (e.g., homeowner associations), residential and other private properties provide refuge and food that sustain overabundant deer. To lessen the safety, health and environmental impacts associated with white-tailed deer, deer populations need to be reduced to a healthier, more-sustainable level on all types of property in Fairfax County; not only within the public parks. Doing so efficiently, effectively and responsibly will require more hunting, adequate monitoring of deer populations and damages, greater understanding of the problem and solutions by county citizens and a robust information management system. These measures require resources. While some resources should be provided by landowners and volunteers, the county Board of Supervisors should encourage and support population control of deer on other public lands and on private properties across the county.

The greatest potential for reducing deer populations across Fairfax County is the expanded use of archery. Archery is legal throughout the county wherever arrows or bolts will land only on property for which a landowner has granted permission. The archery program has demonstrated that deer harvests by skilled, respectful and ethical archers can be both safe and effective. The safety of archery is further demonstrated by the fact that no bystander anywhere in the state has been struck by an archer hunting deer since records have been kept by the Virginia Department of Game and Inland Fisheries starting in 1959.

Many private property owners already grant access to archers to hunt. Indeed, during the 2012 – 2013 hunt season, twice as many deer were harvested by archers on private properties (1,540) as were harvested by archers in the county Deer Management Program (697). Yet there are thousands of properties and many square miles not being hunted.

Landowners have several ways they can help cull deer and thereby reduce the damages that deer cause:

- At a minimum, landowners (includes title holders and renters) can grant advance permission for archers to track and retrieve deer that are struck on neighboring properties but flee to theirs. It does not happen often, but deer do run onto neighboring properties and are not retrieved each year because archers cannot track or retrieve them without landowners' permission. If archers cannot fulfill their responsibility to track and retrieve, then deer will be wasted, a result that no one should want.

- Landowners can grant qualified archers or archer organizations access to hunt. Archers will want some evidence that deer frequent a property during hunt hours from the half hour before sunrise to the half hour after sunset. If a landowner has not personally seen deer on his or her property but discovers damages to plants or other sign of deer, he or

she might place trail cameras to learn what deer are doing (browsing, resting and/or traveling through) and when. Evidence landowners provide from their own observations or from trail cameras will help archers plan where to put up tree stands and when to hunt from them. Archers also need locations where they can safely target deer – usually aiming toward the ground from an elevated vantage point. A tree stand normally serves this purpose, but elevated decks or porches can also work. Elevated positions take advantage of deer's natural instinct to scan for predators only at ground level. Hunt locations need to be within 20 yards of where deer are likely to pass. In addition, archers will want to shoot from locations that are surrounded within 100 yards (more or less depending on site conditions) by property for which hunt or track/retrieve permission has been arranged.

- Landowners can hunt deer themselves. Virginia law allows landowners and their families to hunt deer on their properties without a license, although all other state game laws and local weapon laws still need to be complied with. It is strongly recommended that all hunters pass the Basic Hunter Education Course managed by the Virginia Department of Game and Inland Fisheries regardless of license requirements and that archers attend the Virginia Bowhunter Education course (see www.dgif.virginia.gov). It would be wise for new hunters to utilize an experienced archer as a mentor. Only physically and socially mature adults who have respect for the deer, the law, their neighbors, and safety should pursue this option.

I. PROGRAM IMPLEMENTATION ACTIVITIES

An Integrated Deer Management Plan was developed by county staff subsequent to the Consultant Report received in December 1997. In November 1998, the Board of Supervisors 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 Fairfax County 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 www.fairfaxcounty.gov/living/wildlife/deer-management.

The Fairfax County Park Authority Board also receives an annual implementation plan for deer management on parkland, as prepared by FCPA staff and the Police Department. This includes data on the prior year's activities and plans for the upcoming hunt season. 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 the 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 Fairfax County 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 Authority 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. FCPA reported in June 2003 significant regeneration of the vegetative understory in two of the 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 DGIF 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.

J. 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 the 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. 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 ecological carrying capacity. The archery program should be of significant help but must be evaluated for effectiveness over the first two to three 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 (see recommendation #3 below), 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.

K. 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 was filled by a highly qualified individual who conducted a thorough assessment of the wildlife management programs and introduced some additional activities. The position again became vacant in 2014. During the interim, the program was overseen by Animal Control Services Division, Fairfax County Police Department. A new Wildlife Management Specialist was brought on board in summer 2014. This position now reports to the Director of Fairfax County's Animal Shelter.

- However, despite these difficulties, the deer management program was able to conduct some managed hunts and sharpshooter events.

- The Wildlife Management Specialist 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, each year we will lose ground and the damage to key vegetation will increase; and the diet of the excessively large deer herd will become less adequate and the health of the individual members of the herd will suffer.

L. COMMENTS

The comments and recommendations provided below address only the first section of this chapter (deer management issues). Comments and recommendations addressing geese issues and comments addressing coyotes and wildlife borne disease issues are found beginning on pages 401, 404 and 413, respectively.

1. The Virginia Department of Game and Inland Fisheries has identified Fairfax County as an area for deer population reduction based on the abundant status of deer herds within the county. Thus, DGIF has set liberal regulations to assist population control efforts, including no daily or season bag limits and an extended eight month deer season. DGIF has authorized an early archery season on private lands within Fairfax County through which qualified bow hunters may hunt from the first Saturday in September through the last Saturday in April.

2 While limited program activities were conducted during the vacancy in the position of the county's Wildlife Biologist, it is apparent that there was considerable additional damage to the vegetation of the vital understory throughout the county.

3. Due to the recessionary environment in which the county has been operating, it was necessary to cancel the Assistant Wildlife Management Specialist position that had been authorized but not yet filled. In an attempt to meet the most urgent needs of the Wildlife Program, a limited-term part-time assistant specialist has been made available through the end of 2015. If the Wildlife Program is not to be seriously impaired, the previously authorized Assistant Wildlife Management Specialist position should be filled as soon as possible.

4 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 at www.fairfaxcounty.gov/living/wildlife/deer-management/fy-2011-deer-management-survey-results.pdf.

5. From 1998-2015, 8,085 deer have been harvested through the Fairfax County Deer Management Program. Harvests have been increasing annually and can be attributed to expansion of the program onto additional county lands and implementation of the archery program in 2010. Since archery was approved as a management tool, 69 percent of deer harvests have been through this method. Since 2010, managed hunts and sharpshooting operations have yielded 11 percent and 20 percent respectively. In 2015, 65 parks have been included in the program and a total of 1,122 deer have been harvested, with 66 percent being does.

M. RECOMMENDATIONS

There are four 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 archery program should be continued and significantly enhanced as a means of controlling deer depredation of vegetation on residential properties where firearms cannot be used. Archery is particularly cost-effective, relying on hundreds of qualified volunteers contributing thousands of hunt hours to the program at no cost.

4. The previously authorized Assistant Wildlife Management Specialist position should be filled as soon as possible.

ACKNOWLEDGMENTS

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Susan Alger, Virginia Department of Game and Inland Fisheries.

Matt Knox, Deer Biologist, Virginia Department of Game and Inland Fisheries.

Nelson Lafon, 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.

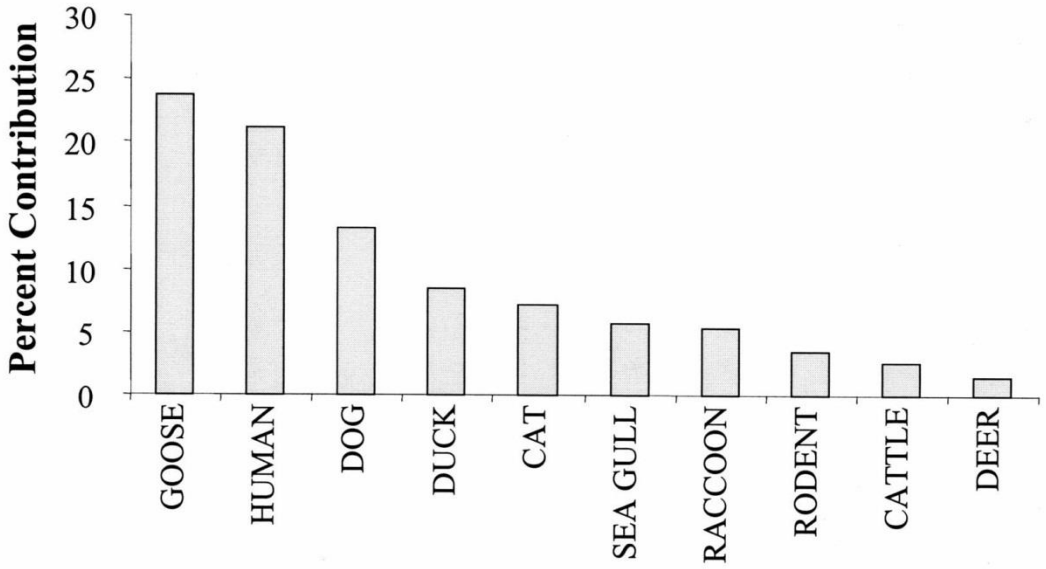
Another major impact of resident geese is significant alteration of the ecology of our marshlands. While migratory geese visited marshes on their twice-yearly trips through our region, the stopovers were brief and were timed so that plants had either not yet sprouted or had matured sufficiently that 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.

3. Hunting Creek Total Maximum Daily Load—Geese Control Required

A Total Maximum Daily Load is a regulatory document called for in the U.S. Clean Water Act for waters that are determined to be impaired. A TMDL determines the maximum amount (load) of a pollutant that a body of water can receive while still meeting water quality standards.

Figure VIII-2-1

Sources of Fecal Coliform Pollution in Accotink Creek



Fairfax County's Cameron Run was listed as impaired for bacteria in Virginia's 2008 305(b)/303(d) Water Quality Assessment Integrated Report (DEQ, 2008) due to exceedances of criteria for E. coli bacteria. As a result, the Virginia Department of Environmental Quality (DEQ) issued a TMDL[1] for bacteria that includes a requirement to control the many sources of bacteria entering the stream. One of the controls was for geese. The TMDL states the following:

> *"Given the effort of the local jurisdictions to reduce their resident geese population, the 85% reduction in population was applied uniformly across the Cameron Run watershed."*

It is expected that at some point in the future, DEQ will develop an implementation plan for the TMDL which will include an 85% reduction in geese bacteria entering Cameron Run.

1 Bacteria TMDLs for the Hunting Creek, Cameron Run, and Holmes Run Watersheds, Virginia Department of Environmental Quality, November 2, 2010

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 U.S. Department of Agriculture -Wildlife Services can send staff to round up and relocate them. However, the U.S. 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 Fairfax County 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. However, while one locale may be benefited, adjacent locales may be afflicted through transference of the problem. 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 they can return to their nest.

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. Immunocontraception

Immunocontraception 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 more intensive educational outreach by county staff. Additional efforts could include informative bulletins to local homeowners associations.

F. PUBLIC AGENCY RESPONSIBILITY

The office of the county Wildlife Management Specialist 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

Geese 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, 13 years.
   b. Pinecrest Community - population stabilization and nuisance abatement, 12 years.
   c. Pinecrest Golf Course - population stabilization and nuisance abatement, 12 years.

2. Centreville
   a. Franklin Farms - population stabilization, 13 years.
   b. Westfields - population stabilization, 12 years.

3. Fairfax County
   a. Lake Barcroft - population stabilization and nuisance abatement, 14 years.
   b. Fairfax County Parks - population stabilization, 14 years.
   c. Copeland Pond - population stabilization and nuisance abatement, 14 years.

d. Brook Hills - population stabilization and nuisance abatement, 14 years.
e. Waters Edge - population stabilization and nuisance abatement, 12 years.

4. Oakton
   a. Fox Lake - population stabilization, 12 years.

5. Reston
   a. Reston Community - population stabilization, 13 years.

6. Vienna
   a. Trinity School - population stabilization, 13 years.
   b. Champion Lake - population stabilization, 12 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.

Results from egg oiling efforts pursued through the county's permit and a Fairfax County Park Authority permit are presented in Table VIII-2-1.

Table VIII-2-1
Goose Egg-Oiling Activity

Year	County Permit		FCPA Permit	
	Eggs	Nests	Eggs	Nests
2002	275	NA	952	NA
2003	255	61	819	139
2004	10	2	674	123
2005	0	0	1403	243
2006	299	NA	1184	235
2007	0	0	509	109
2008	246	49	451	115
2009	282	56	522	123
2010	246	43	439	137
2011	*	*	545	89
2012	*	*	388	91
2013	*	*	596	123
2014	*	*	516	114

*No staff available

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 Management Specialist 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. COMMENTS

The comments and recommendations 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 388, 404 and 413, respectively.

1. The Fairfax County 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. The shot size was carefully selected and the powder load in the shells was reduced in the interest of safety. The hunt location was designed to comply with the requirements of Appendix J of the Fairfax County Code. This approach was deemed quite successful and has considerable promise for efficiently meeting FCPA control needs and should be expanded and fully supported.

2. It is noteworthy that some migratory geese elect to remain resident, thereby increasing the number requiring control.

J. RECOMMENDATIONS

1. EQAC strongly recommends that the Geese 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.

2. The shotgun for geese hunt pilot test conducted by the Fairfax County Park Authority should be expanded into an established program for those parks that can comply with Appendix J of the Fairfax County Code, and consideration should be given to limited amendment of Appendix J so additional parks could be included.

3. Due to the current scarcity of staff resources, the Geese Management Program is below an acceptable level of activity. Staff allocation to the program should be increased.

4. The previously authorized Assistant Wildlife Management Specialist position should be filled as soon as possible, in order to alleviate the current staffing inadequacy in the Geese Management Program.

ACKNOWLEDGMENTS

EQAC gratefully acknowledges the following individuals that have provided data and information included in this report:

Charles Smith, former Manager, Resource Management Branch, Fairfax County Park Authority.

Earl Hodnett, former Wildlife Biologist, Animal Services Division, Fairfax County Police Department.

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 plusses as well as minuses to having them around.

B. BACKGROUND

Biologically, the coyote, *Canis latrans*, is another member of the dog and wolf family (Canidae). 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 20 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. This larger build has the potential to make them more effective predators of Canada Geese and young deer fawns.

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 food dishes around human habitations.

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 very 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 Management Specialist 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 Management Specialist.

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 388, 401 and 413, 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 Management Specialist 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 (CDC) 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 DEET (N,N-diethyl-meta-toluamide). 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.

Historically, DEET has been used, in sprays or lotions, to repel mosquito-borne infections, such as West Nile Virus and tick-borne Lyme disease. However, there is at least one alternative to DEET (picaridin) that is less toxic to humans and that exhibits similar effectiveness when compared to DEET (http://www.outdoors.org/publications/outdoors/2012/equipped/picaridin-vs-deet-insect-repellent.cfm). Unfortunately, there are relatively few studies that compare the effectiveness of different insect repellants, so it is difficult to conclude that any one product is best.

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. 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.

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	146	Not available
2012	149	Not Available
2013	260	Not available
2014	284	Not available

**** The reporting period and methodology changed during this time.
(Source: Fairfax County Department of Health)

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 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. See also the above discussion of picaridin as an alternative to DEET.

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. In 2013, 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 coming in 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 - fewer doses are required and there are 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 394). 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 at www.fairfaxcounty.gov/hd/eh/.

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 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 388, 401 and 404, 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 was 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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John Ruthinoski, Fairfax County Health Department.

Jorge Arias, PhD., Fairfax County Health Department (retired).

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.

Fairfax County Department of Health. West Nile Virus Control and Mosquito Management Program. Disease Carrying Insects Program.

WILDLIFE AND THE ENVIRONMENT IN FAIRFAX COUNTY: SUMMARY OF RECOMMENDATIONS

Impacts of Deer in Fairfax County

There are four 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 archery program should be continued and significantly enhanced as a means of controlling deer depredation of vegetation on residential properties where firearms cannot be used. Archery is particularly cost-effective, relying on hundreds of qualified volunteers contributing thousands of hunt hours to the program at no cost.

4. The previously authorized Assistant Wildlife Management Specialist position should be filled as soon as possible.

Impacts of Geese in Fairfax County

1. EQAC strongly recommends that the Geese 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..

2. The shotgun hunt for geese pilot test conducted by the Fairfax County Park Authority should be expanded into an established program for those parks that can comply with Appendix J of the Fairfax County Code, and consideration should be given to limited amendment of Appendix J so additional parks could be included.

3. Due to the current scarcity of staff resources, the Geese Management Program is below an acceptable level of activity. Staff allocation to the program should be increased.

4. The previously authorized Assistant Wildlife Management Specialist position should be filled as soon as possible, in order to alleviate the current staffing inadequacy in the Geese Management Program.

Coyotes in Fairfax County

There are no recommendations at this time except that the county Wildlife Management Specialist 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 urging active support of a number of ongoing programs and the monitoring of these programs and their 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 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 Washington National) and Washington Dulles International Airport (Dulles). Reagan Washington National and Dulles are vital to the region's overall economy, connecting the Washington area with 140 domestic and international destinations. At Reagan Washington 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. Approximately 2,000 of these flights operate to/from Reagan Washington National and Dulles airports. The remaining flights use Baltimore Washington International or Andrews Air Force Base, or are transitioning the area at higher altitudes.

According to the Metropolitan Washington Airport Authority's website, in 2014, total operations at Dulles decreased from their 2013 level by six percent, dropping from 307,816 to 289,382. During the same year, operations at Reagan Washington National remained relatively steady, dropping less than one percent from 292,656 to 283,180.

Flight operations on a typical day at Dulles Airport have been decreasing from a range of 1,000 to 1,200 to a range of 800 to 1,000 since 2010, 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 6 A.M.

Reagan Washington National has historically had fewer flight operations than Dulles, but the difference in flight operations has been narrowing since 2010 as Reagan Washington National has steadily gained and Dulles has lost flights. Reagan Washington National now has almost 800 flights on a typical day, approaching the low end of the Dulles level. 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 Washington 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. Capitol, the National Mall, the White House

and the Vice President's house at the Naval Observatory. Under the Federal Aviation Administration's (FAA'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 Washington 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. See Section 4 below for an explanation of the Nighttime Noise Rule. There are typically five to 10 noise violations each year; in 2014 there were five, down from 11 in 2013.

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 Reagan Washington 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 2016, will prohibit the operation of small jet aircraft not complying with stage 3 noise levels.

At the meeting of the International Civil Aviation Organization in 2013, stricter noise standards for new aircraft were established, which will further reduce noise from aircraft using Dulles or Reagan Washington National Airports. The new standard will apply to new large aircraft types certified after 2017 and to smaller aircraft after 2020.

In addition, the FAA launched the Aviation Sustainability Center, which is a team of universities that will conduct research and development on NextGen environmental goals, including noise. One of the research projects is a multi-year effort to update the scientific evidence on the relationship between aircraft noise exposure and its effects on communities around airports by conducting a national survey on aircraft noise perceptions in 20 such communities across the nation. Survey data will be used to create a dose-response curve for day-night average sound level and annoyance. The agency will then analyze the results to determine whether to update its methods for determining exposure to noise.

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 Washington 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 (MWAA), which operates both Reagan Washington National and Dulles Airports, has historically monitored aircraft and community noise around the clock at 32 locations in the Washington 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 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 and frequently updated.

The latest version, introduced in fall 2014 and called IAD WebTrak and DCA WebTrak, for Dulles Airport and Reagan Washington National, respectively, is described under Paragraph ii below (Noise Measurement Reporting). MWAA monitors aircraft movements and noise levels in communities; it also works with the community and representatives from the airport and airlines, elected officials and the Federal Aviation Administration to address noise concerns. It does not, however, have the authority to change flight plans. FAA is solely responsible for aircraft flight patterns at the two airports.

When a fourth runway was constructed at Dulles Airport in 2008, EQAC was concerned that the new runway configuration would change noise impacts to the community. EQAC recommended that MWAA staff review and analyze noise patterns to see whether operational changes would need to be considered. In order to accurately assess noise impacts, MWAA staff felt it was necessary to wait until two years of reliable data was available, with all four runways fully operational. In 2014, MWAA had the requisite data, made the analysis and found no significant change in aircraft noise recorded by any of the monitors serving Dulles. Therefore, MWAA saw no need for an evaluation to consider operational changes.

i. Monitoring Station Locations

The new monitoring system, which included 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 Washington National and 20 for Dulles, including 15 locations in Fairfax County. Seven of the original 40 monitors are not currently in use, including three in Fairfax County. One that had been sited at Great Falls Elementary School to monitor Reagan Washington National Airport noise was decommissioned in 2011, and two that had been sited at Floris Elementary and London Towne Elementary to monitor Dulles Airport noise were decommissioned in 2014. These monitors were no longer operational because they had been subjected to repeated vandalism, and funds were not available to

replace them. 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 Washington 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.
- 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 had recommended that the monitor be placed in a different location in the county that experienced more noise and complaints. However, MWAA reported that the monitor had been destroyed, and MWAA has no funds for a replacement. In 2015, MWAA also reports that there are no funds to replace damaged monitors at Floris or at London Towne Elementary Schools.

ii. Reporting Noise Measurements

The most recent upgrade to the Noise Monitoring System was introduced in fall 2014. Called IAD WebTrak (serving Dulles) and DCA WebTrak (serving Reagan Washington National), and using the former noise monitors, it measures sound at each of the monitors. The measurements are displayed on public portals on an interactive map on which all of the monitors and aircraft are displayed as icons, with a one-hour delay. As each airplane icon approaches each noise monitor icon, a number flashes, representing the aggregate sound measurement at that monitor. WebTrak can be accessed from the home page of the MWAA website, www.MWAA.com, by searching either IAD or DCA "WebTrak" from the box at the top right of the page, then clicking on the "WebTrak" link at the bottom of the WebTrak page.

These aggregate measurements are updated every second and are shown as an A-weighted decibel level.[1] The dBA levels emulate the changes in sound pressure as perceived by the human ear, and indicate all aircraft and community noise contributions including vehicle traffic, lawnmowers, etc. While this number accurately measures total perceived sound at that second, it must be recalculated to be displayed as DNL, the day-night annual average sound level, in "A" weighted decibels to reflect the effect on the community. 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 aggregate number, representing total perceived sound, must further be separated into those events likely to have been caused by an aircraft from the remaining events, which are attributed to the community.

This kind of detailed noise reporting was presented by MWAA from 2010 through 2014 in its Annual Aircraft Noise Report, which provided three DNL values for each noise monitor for each month: total DNL, aircraft DNL and community DNL. Annual Aircraft Noise Reports from 2010-2014 can be accessed from the home page of the MWAA website, www.MWAA.com, by searching "Noise Report" from the box at the top right of the page.

Data from the reports enable comparisons of DNL noise among communities. For example, a review of the 2014 Annual Aircraft Noise Report shows that, of the 12 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 averaging DNL 58 dBA over 12 months. The consistently high level of community noise at that site raised the total noise level to a range from DNL 61 to 64 dBA.

Regarding the reporting format to be used by WebTrak, MWAA is reviewing options and has not yet decided on a format or frequency of reporting. EQAC recommends that MWAA continue its format of reporting quarterly summaries of the three DNL levels, aircraft, community and total. This recommendation will be discussed further in the "Comments and Ongoing Concerns" section below.

d. Noise Complaints

To register complaints by phone, call the Noise Complaint Telephone Center at Dulles, 703-572-8215, or Reagan Washington National, 703-417-1204.

[1] For information about A-weighted noise and the DNL noise metric, see the county's "Noise Basics" website at www.fairfaxcounty.gov/dpz/environment/noise/noisebasics.htm.

Complaints about aircraft noise from Reagan Washington National in 2014 totaled 1,286, a huge increase from the 299 received in 2013 and a significant increase from the 892 received in 2012. Much of the increase in complaints during 2014 was associated with aircraft noise during the late night or early morning hours, between 10:00 PM and 7:00 AM. Complaints for Dulles in 2014 totaled 435, a drop from 630 in 2013 but an increase from the 274 received in 2012. 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 one person filed 139 of the 435 complaints for Dulles, his neighbors may not have filed any complaints.

Resources: Metropolitan Washington Airports Authority website, www.mwaa.com; Federal Aviation Administration Noise Ombudsman, available at 202-267-3521 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 included 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.

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 Washington National. This study, conducted in accordance with the provisions of FAA's "Part 150" process, was designed to forecast future noise contours at Reagan Washington 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 included, 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 dB" 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 had 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 Washington 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 Washington 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. In the past, deviations to noise abatement procedures north of the airport were 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. Reagan Washington National Airport Nighttime Noise Rule Information

Reagan Washington National Airport has a long history of nighttime noise restrictions between 10 p.m. and 7 a.m. The restrictions are not a curfew on flights, but rather a prohibition for certain types of aircraft for which their designs and weights would make them more prone to higher noise levels on takeoff or landing.

The Nighttime Noise Rule was implemented in 1981, when aircraft were generally much louder than today's jets and when Reagan Washington National was operated by the Federal Aviation Administration. The rule was one of the first of its kind in the nation, and it helped usher in federal requirements for quieter aircraft. While these laws require airlines to fly quieter planes, they also prohibit individual airports from

creating noise rules. But because the rule at Reagan Washington National already existed, it has been allowed to remain in effect.

MWAA enforces the Nighttime Noise Rule based on noise-related data provided by FAA's standard certification processes for aircraft operating with all available engines. This method allows airlines and pilots to determine, in advance of a flight, whether the particular aircraft – based on design, weight and engine type – will comply with the rule.

5. 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 was returned to the COG board. The Honorable Mary Hynes, then Vice Chair of the Arlington County Board, served as Aviation Policy Liaison from January 2011 to January 2014, when the position was discontinued.

Concerns regarding airport noise issues for commercial flights should be directed to MWAA. MWAA maintains an on-line tracking and reporting system, as well as a telephone number, for airport noise complaints for Reagan Washington National and Dulles Airports.

6. Helicopter Noise

Recognizing both the vital need for helicopters in the Washington metropolitan area and community concerns with the associated noise, COG held a Helicopter Noise Forum in September 2010. The forum included presentations from officials from FAA and the Military District of Washington and participation from local elected officials and stakeholders, 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, community members and officials from 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 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 Washington metropolitan area. While defending the value of every helicopter flight, 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 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, COG is continuing to look for funding opportunities.

In the couple of years following the second forum, 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 states' 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 state's noise abatement policy can be viewed at the Virginia Department of Transportation website: 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. Noise barriers were recommended for construction consistent with the state's feasibility and reasonableness criteria:

- 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 can 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 are now complete with the erection of walls at the intersection of I-495 and Georgetown Pike in December 2013. Barriers look similar to those sound walls built in the past in Fairfax County, with heights ranging from about seven to 39 feet.

Noise barrier systems have been completed on the following federal-aid projects in Fairfax County during FY2014-15:

- Four new noise barrier systems on the Dulles Connector Road from Chain Bridge Rd. to I-66 (VDOT Project # 0267-029-919, C501; UPC 98232).

- Two replacement and three new noise barrier systems on the I-66 from Haycock Rd. to Lee Highway (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) were completed.

- Traffic noise studies to assess impacts and determine whether noise barriers are warranted are presently under way for the following VDOT projects:

  - Jones Branch Drive Connector over I-495 (administered by Fairfax County).
  - Route 7 bridge replacement and widening over the Dulles Airport Access and Toll Road
  - Route 7 corridor improvements from Reston Avenue to Jarrett Valley Drive.
  - Route 28 corridor improvements from I-66 to Westfields Blvd.
  - I-66 corridor improvements from I-495 to U.S. Route 15 in Prince William County.

Noise barriers are also under consideration for the Richmond Highway improvement project between Telegraph Road and Mount Vernon Memorial Highway (VDOT Project No. 0001 029 938, P101/UPC 99181). A final noise analysis is currently pending to determine if they will be warranted.

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; this noise impact is extremely irritating to residents in nearby neighborhoods. An expansion of this yard had been proposed by the Washington Metropolitan Area Transit Authority in order to provide support for operations on the newly-opened Silver Line, and as part of the expansion, the Federal Transit Authority required a sound box to be built over the noisiest portion of the loop track.

The sound box was completed in summer 2014 and met its 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.

A forum for ongoing discussion with the adjacent residential community was established, requiring WMATA to meet when requested (but not more than twice a year) with a Communications Committee comprised of representatives of nearby homeowners. In addition, a dedicated telephone contact number for the West Falls Church rail yard has been 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. Residents have complained about loudspeaker noise and wheel squeal from another loop, and the Department of Planning and Zoning has been working with WMATA to resolve these outstanding issues. An opportunity to address the noise will come when WMATA is actively working on that loop.

E. TYSONS NOISE STUDY

The following summary has been provided by the Department of Planning and Zoning:

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. Several such studies have been performed in conjunction with individual zoning applications in Tysons, leading to proffered commitments to appropriate levels of noise mitigation.

F. FAIRFAX COUNTY NOISE ORDINANCE REVISIONS

Much of the following summary has been provided by the Department of Planning and Zoning:

The Board of Supervisors requested staff to review and revise the Noise Ordinance to better address the methodology used in noise measurements; to consider the appropriateness of establishing daytime and nighttime noise levels to protect the community; and to add other objective criteria to regulate noise within the county. On December 3, 2013, the board adopted a new Excessive Sound Generation in Residential Areas and Dwelling Ordinance (Article 6 of Chapter 5 of the County Code), which gave the police the ability to address certain sound that is generated in a residential dwelling or residential area that is plainly audible and discernible inside another person's dwelling with doors and windows closed. The recent amendment to Article 6 was intended to be an interim step until more comprehensive amendments would be adopted. On February 14, 2014, staff presented a proposed new draft Noise Ordinance to the board's Development Process Committee.

The overall goal of the proposed Noise Ordinance is to minimize nighttime noise and guarantee residents a certain level of quietness within their homes. The proposed new Noise Ordinance would replace both the existing Noise Ordinance and the existing Excessive Sound Generation in Residential Areas and Dwelling Ordinance. Among other things, the new Noise Ordinance would prohibit certain noises and would exempt certain other noise.

In order to obtain feedback on the proposed new Noise Ordinance, three public meetings were held, stakeholder meetings were held, interested organizations were notified and public comments were received on-line. The number and variety of public comments received was expansive, with two of the more controversial issues being noise from dog parks and athletic activities on Fairfax County Public Schools grounds, and there was not a clear consensus on the issues. On June 10, 2014, staff presented a summary of all comments received to the board's Development Process Committee. Staff was directed to prepare a range of options on how the proposed amendment could be advertised to give the board maximum flexibility given the diversity of the public comments. Staff presented options to the board at the September 30, 2014 Development Process Committee meeting. A second public hearing was held on May 12, 2015, and in June staff proposed text that would potentially address some of the issues raised by the speakers. Additional information about dog parks and efforts to reduce noise from athletic events on school property was also provided by staff. It was the consensus of the Development Process Committee that additional time was needed to address the issues, and a workshop to discuss the proposed Ordinance was held September 11, 2015. With this additional information, the board was scheduled to make its decision on the proposed Noise Ordinance at its November 17, 2015 meeting. EQAC will report further on the revision of the county's Noise Ordinance in its next Annual Report.

G. 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 has worked 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 under way 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 through its website at www.fcrpp3.org.

H. 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.

I. RECOMMENDATION

1. EQAC recommends that the Board of Supervisors request to MWAA that quarterly summaries from MWAA's WebTrak system be displayed in three formats (Total DNL, Aircraft DNL and Community DNL), together with the interactive data, on the MWAA website. The quarterly summaries should be provided as promptly as possible, ideally within a month of the quarter's end (e.g., by the end of April, July, October and January).

REFERENCES

Fairfax County Virginia Noise website: 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 29, 2015 letter from Rebecca Cointin to Noel Kaplan, Fairfax County Department of Planning and Zoning.

Metropolitan Washington Airports Authority, July 13, 2015 letter from Mike Jeck 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, September 4, 2015 letter from John C. Muse 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 cells. 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 light 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 the 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.

EQAC also has concerns about the following issues:

- While individual light fixtures may be compliant with the ordinance, their number, spacing and arrangement may create illumination that exceeds reasonable county standards and regulations.

- When the lighting ordinance was created, an attempt was made to allay concerns of builders who use work lights on the open floors of buildings under construction. The ordinance specified that the light bulbs used around the perimeters of open floors must have frosted, rather than clear glass. However, a dozen years of experience has shown conclusively that this method does not eliminate the excessive brightness that is so distressing to nearby neighbors and that creates a definite safety hazard to nearby motorists. It is EQAC's view that ordinance amendments are urgently needed to correct this problem.

The first two recommendations provided by EQAC at the end of this section of the report address these issues.

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 has been 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 2015 Zoning Ordinance Amendment Work Program and it is anticipated that this amendment will be scheduled for public hearings in early 2016.

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.

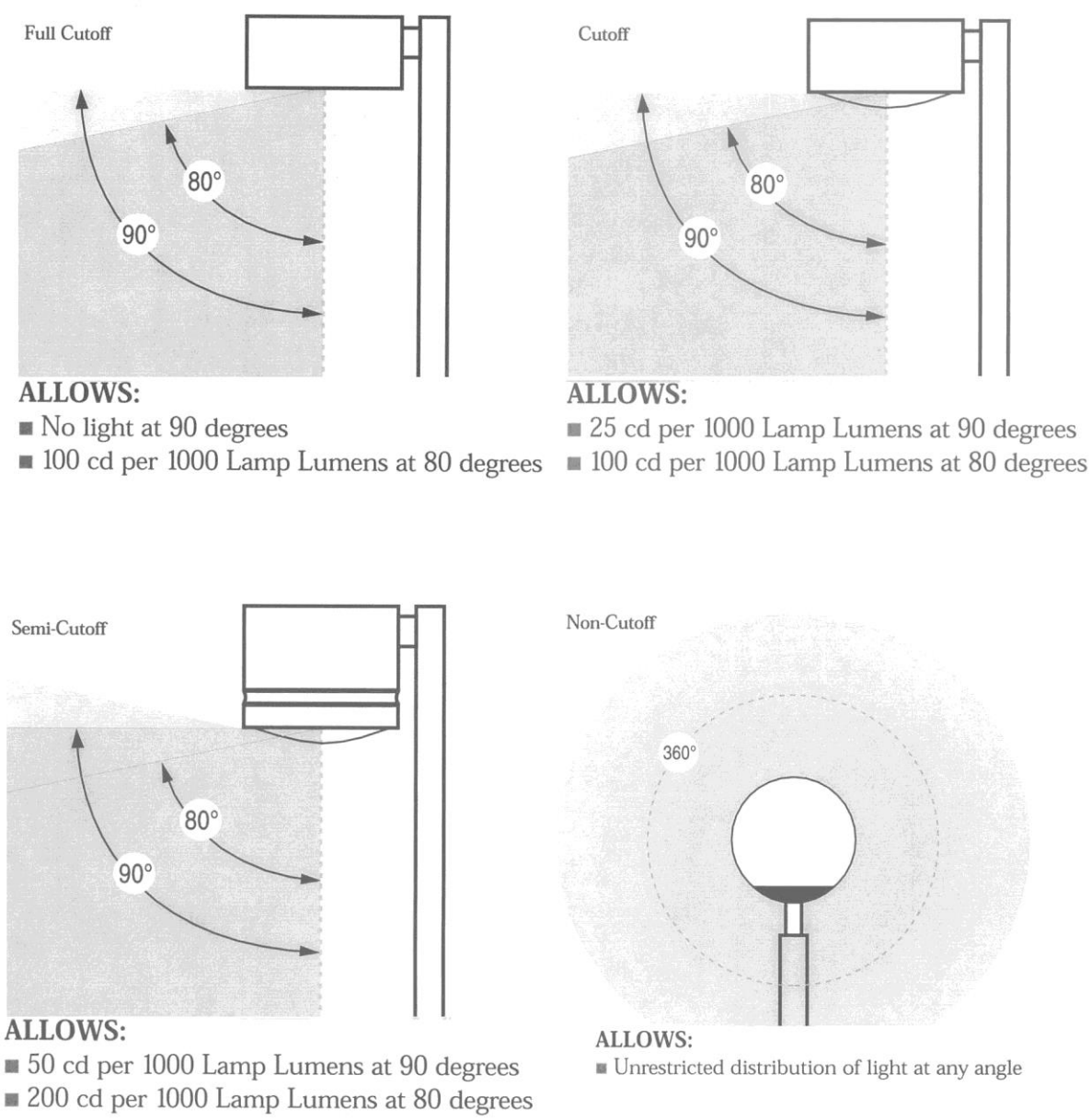
By redirecting this wasted energy, lower wattage lights provide the same amount of illumination in the areas where it is needed. These fixtures have reflective backing and full cut-off shielding to direct all light below the horizontal plane, with 90 percent of the light directed below an angle of 20 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 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 it 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

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.)

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. 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 and illumination standards for residences and other private property lies primarily with the county's Department of Code Compliance. Enforcement activity dealing with light is complaint-driven and amounts to about 0.5 percent of total complaints. The county does not respond to anonymous complaints. Complaints are either filed by individuals 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 or other commercial 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 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 use of its existing fields. It is the responsibility of both organizations to use 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 (with collaboration from EQAC) for athletic field 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 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.

The 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. 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.

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 the 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, has been developing specifications for the revisions needed. As noted earlier

in this chapter, EQAC sees a need for improvement to address multiple lighting fixture arrangements and work lights on the open floors of buildings under construction.

The Fairfax County Park Authority has had a continuing need to increase the hours of use 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 achievable 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 humans have 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 Fairfax County Public Schools, which also uses both lighted sports fields (mainly in high schools) and "security" lighting.

The county (the Board of Supervisors and all relevant county staff groups) 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 recommendations 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 most 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 humans.

2. The earlier EQAC Annual Report recommendations that the Department of Planning and Zoning undertake some needed revisions of the Outdoor Lighting Ordinance has come to fruition in the form of several meetings of a task force of stakeholders to develop specifications for such revisions.

3. The 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. Some of these revisions are soon to be in final form.

4. 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.

5. Adherence to four principles will do much to mitigate or eliminate lighting problems:

   - Always illuminate with properly shielded fixtures that prevent the light source, and the resultant glare, from being directly visible.

   - Never use more illumination than needed for the task at hand.

   - Always aim lighting downward, keeping its distribution within property lines and below the horizontal plane so it is not a source of glare.

   - Do not burn lighting all night long to provide security; instead use motion detector lighting, which burns only for motion in the designated area.

6. Ongoing evaluation of the Fairfax County Outdoor Lighting Ordinance, supported by extensive field observations, has identified four areas where the ordinance is in need of additions or amendments. These items are summarized in the recommendations below and drafting of the necessary revisions should be included in the Zoning Ordinance Amendment Work Program.

7. It should be noted that residential communities desire that schools and parks be located convenient distances from residences in order for children to have convenient pedestrian access to such facilities. Thus, it will never be possible to completely avoid some lighting problems.

J. RECOMMENDATIONS

1. The number and spacing of lighting fixtures, either as long lines or grids, may create unacceptable illumination. The county's lighting ordinance should therefore be amended where such unacceptable levels of illumination would constitute violations under the ordinance. Examples would be a string of lights along a driveway or walkway, an array of drop lens lights, or excessive lights in a parking lot.

2. The commonly used work lights placed in buildings under construction, especially before exterior walls are in place, are a serious annoyance to nearby local residents and a definite safety hazard to motorists on nearby roadways. It is EQAC's view that ordinance amendments are urgently needed to correct this problem.

3. Security lighting utilizing motion detectors needs to be provided with an automatic cutoff following a brief period after motion has ceased. An amendment to the county's lighting ordinance should be pursued to address this problem.

4. Security lighting at schools needs to be carefully re-evaluated since it is often excessive, is usually operating from dusk to dawn and constitutes a serious impairment for the quality of life for the adjacent neighborhood. EQAC recommends that the Board of Supervisors request that the School Board address this concern.

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Fairfax County, Virginia, Policy Plan: The Countywide Policy Element of the Comprehensive Plan, 2007 Edition.

Fairfax County, Virginia, Zoning Ordinance (Chapter 112 of the Fairfax County Code).

Illuminating Engineering Society of North America website, www.ies.org (There are numerous subsidiary and related websites).

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/.

VIII-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 pollution and urban blight issues, with an emphasis on roadside signs (i.e., signage that is excessive in amount and inappropriate in placement). Additional aspects of visual pollution include such things as proliferation of billboards, litter, dumps, junkyards and the like.

B. ROADSIDE SIGNS

Unnecessary roadside signs, 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 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 dislike 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. Reducing sign blight helps communities reclaim local beauty and character. Excellent alternatives to large intrusive signs, such as wayfinding signs, logo signs and tourist-oriented directional signs, can help people locate local businesses and are minimal in their visual impact.

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 had issued recommendations regarding illegal signs, including support for an agreement between Fairfax County and the Virginia Department of Transportation (VDOT) regarding removal of illegal signs from highway rights-of-way.

In February 2013, the Board of Supervisors (BOS) directed the county executive to enter into an agreement with the Commonwealth of Virginia allowing for the removal of illegal signs in the public rights-of-way by the county. That agreement included an initial phase and a second phase of an enforcement program. During the initial phase, county staff was to educate the public and business groups about the sign removal agreement. This effort had the Department of Code Compliance working in coordination with the Sheriff's Office, Office of Public Affairs and VDOT's public affairs staff.

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.
It was 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 each 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.

Feedback from the BOS to staff at its Development Process Committee meetings in both September 2014 and June 2015, after both the first and second full year of operations, continued to be positive. At those meetings, staff's evaluations of the program indicated that collection operations were at capacity for the one Community Labor Force crew being utilized. Based on a request by the BOS to evaluate of the feasibility of expanding the current program, in June 2015 staff advised the board that current resources were available to create a second collections crew. The BOS approved that expansion option and requested that staff: review current collection and complaint trends; develop a strategy for both increasing major road segments for collection and increasing collection frequency on problematic roads; and further advise the BOS as the second crew operation is implemented. The BOS also endorsed a pilot "robo-call" program to advise violators by phone, but asked staff for further details prior to implementation.

At the June 2015 Development Process Committee Meeting, county staff noted that the community labor force removed 14,000 signs in the first year of operations and is on pace to remove over 22,000 signs within the second year. With the committee's concurrence, staff will prepare a portfolio response to be sent to the committee to further address these matters.

C. RELATED INFORMATION

The Fairfax County Department of Code Compliance provided the following information for 2014:

- Total number of zoning complaints received in 2014: 3,393 (2013 data: 3,607)
- Number of sign-related zoning complaints received in 2014: 234 (2013 data: 343)
- Number of lighting-related zoning complaints received in 2014: 27 (2013 data: 27)

The Fairfax County Police Department provided information about littering and related complaints that were handled by the department during 2014 (data for 2013 provided for comparison):

Table IX-3-1: Littering and Related Complaints
Fairfax County Police Department, 2013 and 2014 data

Citations	Number in 2013	Number in 2014
Dumping: Dump trash/etc. on hwy./private property	1	1
Traffic: Leaking contents; uncovered loads	37	36
Z-dump trash on hwy./right of way	1	1
Arrests		
Dumping trash, comp. animal, etc. on hwy./property	15	40
Dumping: Dump trash/etc. on hwy./private property	141	109

The Alice Ferguson Foundation provided information about the 27th Annual Potomac River Watershed Cleanup with 16,521 volunteers removing 285 tons of trash from 411 sites throughout the watershed. In Fairfax County, 1,643 volunteers removed 37.5 tons of trash from 77 sites. Additional activities of the Alice Ferguson Foundation are highlighted in the Solid Waste chapter of this report.

For over 30 years, Clean Fairfax Council has been working to make Fairfax County clean, green and sustainable. In the last three years, its community cleanups have yielded 975 cubic yards of trash. It has presented sustainability workshops to over 50 groups, and visited 39 schools. All of this was accomplished by the equivalent of 1.25 full time employees and upwards of 7,000 volunteer hours.

D. COMMENT

1. EQAC applauds the county's efforts to enter into, and begin to implement, 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 increase the number of crews performing collections. 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.

REFERENCES

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E-mail from Tim Murphy, Alice Ferguson Foundation, to Noel Kaplan, EQAC. Environmental Quality Advisory Council's Annual Report on the Environment: Information Requests for the 2015 Report. June 22, 2015.

E-mail from Jennifer Cole, Clean Fairfax, to Noel Kaplan, EQAC. Environmental Quality Advisory Council's Annual Report on the Environment: Information Requests for the 2015 Report. June 20, 2015.

Memorandum to Board of Supervisors. Summary Notes from the June 9, 2015 Development Process Committee Meeting. July 23, 2015.

APPENDIX A

SUMMARY OF ENVIRONMENTAL BILLS OF INTEREST

2015 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 2015. 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 2015 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 2015 General Assembly through adjournment sine die on February 27, 2015. 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, Animal Care and Food

Bills Passed

HB 1488: Conservation easements; tax benefits; disputes over terms

Allows a landowner or other party to a conservation easement to request that the Virginia Land Conservation Foundation use the Administrative Dispute Resolution Act to resolve a dispute relating to the interpretation of the easement.

Patron - Pogge

HB 1507: Scenic river.

Designates a 38.6-mile segment of the Dan River as part of the Virginia Scenic Rivers System.

Patron - Edmunds

HB 1542: State Trails Advisory Committee established.

Establishes an advisory committee of the Department of Conservation and Recreation to assist in developing and implementing a statewide system of attractive, sustainable, connected, and enduring trails for the perpetual use and enjoyment of citizens. The bill has a sunset date of January 1, 2021.

Patron - Lingamfelter

HB 1817/SB 1079: Flood protection plan.

Directs the Department of Conservation and Recreation to regularly update the flood protection plan for the Commonwealth and to make the plan accessible online. This is a recommendation of the Joint Subcommittee to Formulate Recommendations to Address Recurrent Flooding.

Patron - Stolle

HB 1859/SB 858: Conservation officers; Breaks Interstate Park.

Establishes qualifications and procedures for the com- missioning as conservation officers of employees of Breaks Interstate Park, a park located in both Kentucky and Virginia and administered by the Breaks Interstate Park Commission. The bill gives all conservation officers jurisdiction over Virginia portions of the park, with the agreement of the Commission, and obligates conservation officers to uphold the rules and regulations of the Commission.

Patron - Pillion

HB 2193: Use of grant funds for battlefield preservation.

Expands the types of battlefields eligible to receive grants from the Virginia Battlefield Preservation Fund (the Fund), previously known as the Civil War Site Preservation Fund. Currently, moneys in the Fund can only be used for making grants to private nonprofit organizations for the fee simple purchase of, or purchase of protective interests in, Civil War historic sites. The bill allows the awarding of grants to protect Revolutionary War and War of 1812 historic battlefields.

Patron - Edmunds

HB 2226/SB 1376: State park master plans; update schedule.

Changes the requirement that the Department and Board of Conservation and Recreation review and update the master plan for each state park from once every five years to once every 10 years.

Patron - Edmunds

HB 2246: Regulation of wood heaters.

Prohibits the Air Pollution Control Board from adopting regulations that limit emissions from certain smaller wood heaters. The bill also prohibits the Board from enforcing any federal regulation limiting emissions from wood heaters that was adopted after May 1, 2014.

Patron - Poindexter

HB 2247: Conveyance of easement.

Authorizes the Department of Conservation and Recreation to convey a 15- foot-wide, permanent, nonexclusive right-of-way easement across its property in the Horsepasture District of Henry County. The bill contains an emergency clause.

Patron - Poindexter

SB 869: Carbon monoxide emissions; diesel-powered incinerator; exemption.

Exempts carbon monoxide emissions of certain diesel-powered incinerators from certain permitting regulations of the State Air Pollution Control Board. An incinerator whose emissions are exempted must be installed prior to July 1, 2015, owned by a locality, and used exclusively for the incineration of animal carcasses collected from public rights-of-way. The provisions of the bill expire on July 1, 2019.

Patron - Cosgrove

SB 1030: Marine Resources Commission; conveyance of easement and rights-of-way; Rappahannock River.

Authorizes the Virginia Marine Resources Commission to convey to Virginia Electric and Power Company (Dominion Virginia Power) an easement and rights-of-way needed for constructing and maintaining an overhead electric transmission line across the Rappahannock River in Middlesex and Lancaster Counties. The bill provides that none of the right-of-way property that lies within the Baylor Survey shall be considered part of the natural oyster beds, rocks, and shoals of the Commonwealth. The bill contains an emergency clause.

Patron - McDougle

SB 1126: Resource management plans; consideration of certain records in closed meetings.

Creates an open meeting exemption for those meetings or portions of meetings of a Resource Management Plan Technical Review Committee, a Soil and Water Conservation District Board, a review committee of the Department of Conservation and Recreation, or the Virginia Soil and Water Conservation Board when such body discusses or considers records currently excluded from FOIA. The bill provides that this exemption shall not apply, however, to the discussion or consideration of records that contain information that has been certified for release by the person who is the subject of the information or transformed into a statistical or aggregate form that does not allow identification of the person who supplied, or is the subject of, the information.

Patron - Hanger

SB 1306: Battlefield property; authority to acquire.

Authorizes the Director of the Department of Historic Resources and the Board of Historic Resources to acquire and administer Virginia battlefield properties, including properties listed in certain official reports on the battlefields of the Revolutionary War, the War of 1812, and the Civil War. Under current law, the Director and the Board are authorized to acquire only designated historic landmarks.

Patron - Watkins

Bills Failed

HB 1572: Acquisition of open-space land.

Provides that a locality shall not acquire an interest in property for the purpose of preservation or provision of open-space land that exceeds five years' duration. Any extension shall only be approved in conjunction with a comprehensive plan review. Patron - Pogge HB1697 Synthetic plastic microbeads; prohibition against manufacture or sale of certain products; penalty. Defines the term "synthetic plastic microbead" and prohibits the manufacture of certain personal care products containing microbeads beginning in 2018. The bill also bars the sale of such products, and the manufacture of over-the-counter drugs containing microbeads, beginning in 2019, and it prohibits the sale of such drugs beginning in 2020. Violators are subject to a civil penalty of between $250 and $10,000 per day, the proceeds of which are to be deposited into the Virginia Environ- mental Emergency Response Fund. Naturally occurring biopolymers or other compounds that biodegrade in marine and freshwater environments are excluded from the definition of "synthetic plastic microbead."

Patron - Bulova

HB 1846: Monitoring and testing of coal combustion residuals.

Requires owners or operators of electric generating facilities and landfills that manage coal combustion residuals (CCRs) to test private wells and springs located within a radius specified by the Department of Environmental Quality (DEQ) to determine the levels of heavy metals. If the facility or landfill has a liner, leachate controls, and groundwater monitoring, it is exempt from the testing requirement. The tests are to occur in the fourth quarter of each year, unless the owner of the well or spring waives the testing or DEQ determines no further testing is necessary. If the test indicates the presence of heavy metal at a level that exceeds drinking water or water quality standards, the owner or operator of an electric generating facility or landfill is required to report the exceedance within 24 hours of receiving the test results to (i) DEQ; (ii) the Virginia Department of Health (VDH); and (iii) the chief administrative officer of every locality, every private well and spring owner, and every water well systems provider, as well as local media, within the affected area. The owners or operators are also required to develop a response plan to remediate the exceedance and protect human health and the environment, and the plan is to be submitted to DEQ and VDH. With respect to the reporting of the release of CCRs, the owners or operators are required to report the release to DEQ, VDH, and the local coordinators of emergency services within one hour of learning of the release. Within four hours of the release, the owner or operator also is required to contact the local media in the affected area. Within five days of the release, the owner or operator is required to submit (a) a report describing details of the release and (b) a plan for remediation of the release. The State Water Control Board may require that certain strategies be included in the remediation plan.

Patron - Marshall, D.W.

HB 1866: Dam Safety, Flood Prevention, and Protection Assistance Fund.

Allows the Director of the Department of Conservation and Recreation to make loans from the Dam Safety, Flood Prevention, and Protection Assistance Fund of up to $300,000 to be used to elevate or flood-proof primary and secondary single-family homes, owner-occupied rental housing of not more than four units, and businesses. To be eligible, homeowners' and business owners' structures must be subject to coastal flooding and located in either Zone VE or Coastal Zone AE, as defined by the Federal Emergency Management Agency and the National Flood Insurance Program.

Patron - Stolle

HB 1903: State Air Pollution Control Board; membership.

Exempts the receipt of income from a state-supported institution of higher education that is subject to permits or enforcement orders of the State Air Pollution Control Board (the Board) from the reasons to disqualify a person from appointment to the Board. Under current law, the only income a member may receive from an entity subject to permits or enforcement orders of the Board is income from a vested retirement benefit.

Patron - Lopez

HB 2028: Scenic river designation.

Clarifies that the role of the Scenic River Advisory Committees is to make observations to the Director of the Department of Conservation and Recreation and the local governing bodies affected by the designation. The bill prohibits the Department, the Director, and the advisory committees from taking any action that prohibits, impedes, or restricts a project that may potentially alter the scenic river assets. In making their observations and recommendations to the local governing bodies, the Director and advisory committees are to consider the inherent rights of property owners.

Patron - Wilt

HB 2205: Regional Greenhouse Gas Initiative; Commonwealth Resilience Fund established.

Requires the Governor to join the Regional Greenhouse Gas Initiative that established a regional CO2 electric power sector cap and trade program and establishes the Commonwealth Resilience Fund, a revolving fund to serve as a consistent revenue stream to assist counties, cities, and towns in the Hampton Roads region with the implementation of adaptation efforts to combat sea level rise and recurrent flooding. The bill also provides economic development assistance for families, businesses, and localities in Southwest Virginia to offset negative economic impacts associated with reduced fossil fuel production.

Patron - Villanueva

HB 2291: Clean Power Plan; state implementation plan; General Assembly approval.

Requires the Department of Environmental Quality to receive approval from the General Assembly for a state implementation plan to regulate carbon dioxide emissions from existing power plants prior to submitting the plan to the U.S. Environmental Protection Agency for approval. The bill contains an emergency clause.

Patron - O'Quinn

SB 740: Regulation of carbon dioxide emissions from existing stationary sources; General Assembly approval of state plan.

Requires the Department of Environmental Quality to receive approval from the General Assembly for Virginia's state plan to regulate carbon dioxide emissions for existing stationary sources prior to submitting the plan to the U.S. Environmental Protection Agency for approval.

Patron - Carrico

SB 771: Department of Environmental Quality; toxic waste site inventory.

Directs the Department of Environmental Quality to inventory by July 1, 2016, nonfederally managed toxic waste sites in Virginia and publish the inventory at that time and annually thereafter. The bill also makes technical amendments. The bill does not become effective unless an appropriation effectuating the purposes of the bill is included in a general appropriation act passed in 2015 by the General Assembly that becomes law.

Patron - McEachin

SB 1071: Department of Environmental Quality; penalties.

Raises the civil penalty that may be included with a special order from $10,000 to $25,000. The bill also makes technical amendments.

Patron - McEachin

SB 1107: Release of balloons.

Prohibits any person, with certain exceptions, from intentionally releasing or causing to be released any balloon into the atmosphere that (i) is inflated with a substance lighter than air and (ii) requires more than five minutes' contact with air or water to degrade. Currently, a person is prohibited from releasing 50 or more nonbiodegradable or nonphotodegradable balloons within a one-hour period. The bill retains the current civil penalty of $5 per prohibited balloon released; however, the proceeds generated from the civil penalty are set to be deposited into the Litter Control and Recycling Fund administered by the Department of Environmental Quality; currently, the proceeds are deposited into the Lifetime Hunting and Fishing Endowment Fund.

Patron - McWaters

SB 1146: Virginia Vegetation Program.

Directs the Department of Environmental Quality (the Department) to establish the Virginia Vegetation Program, organizing volunteer labor to plant native vegetation on unimproved lands that is managed by the Department of Transportation or in stormwater management basins that are located on public lands. The bill requires the Department to establish planting criteria, develop an information packet, arrange planting in coordination with volunteers and local officials, and create a list of appropriate planting sites. The bill also addresses potential liability for any injury or damages caused or sustained by program volunteers.

Patron - Stuart

SB 1202: Clean Power Plan; preparation of state implementation plan.

Prohibits any state agency or employee from preparing or submitting to the Environmental Protection Agency (EPA) a state implementation plan, or other document with respect to the EPA's Clean Power Plan, unless and until the State Corporation Commission finds that the final version of the Clean Power Plan incorporates amendments or revisions that address 18 criticisms of the proposed version to an extent that makes it unlikely that compliance with the final version will increase electricity rates or reduce the reliability of electric service.

Patron - Wagner

SB 1266: Conservation easements; private bottomland conveyed by special grant.

Clarifies that riverbed property that a court has conclusively determined to be in private ownership may be the subject of a conservation easement. The bill defines "private bottomland," establishes the necessary provisions of a conservation easement in private bottomland, and provides that the owner of the bottomland may receive tax benefits for donating an easement for 10 years or more, rather than in perpetuity as current law requires.

Patron - Deeds

SB 1442: Implementation of Clean Power Plan rule.

Prohibits the Department of Environmental Quality (DEQ) from expending funds to develop or implement a Clean Power State Implementation Plan (Plan) required under Clean Air Act § 111(d) for existing power plants until federal judicial review as to the legality of a final U.S. Environmental Protection Agency rule has been fully resolved. The DEQ is also prohibited from expending funds to implement a Plan until that Plan is approved by the Air Pollution Control Board (Board). The Board is prohibited from expending funds to develop or approve a Plan until federal judicial review as to the legality of a final EPA rule has been fully resolved. The Board is also prohibited from regulating or

spending funds to implement a Plan until (i) both Senate and House of Delegates committees with jurisdiction over the federal Clean Air Act have, or an advisory committee appointed by these committees has, affirmatively approved the Plan and approved a report submitted by the State Corporation Commission (SCC) on the impact of the affordability and reliability of the Plan on commercial and residential consumers, and (ii) the SCC finds that the Plan will guarantee full compliance with Federal Energy Regulatory Commission (FERC) reliability standards. The SCC is required to cap non-fuel rate increases associated with greenhouse gas regulations at 1.5 percent. The SCC is directed not to allow electric generating units to be retired prior to the end of their engineering lifetime, as proposed in order to comply with a Plan, unless the owners have fully recouped the cost of construction and financing, the replacement generation results in lower costs to consumers, and there is sufficient replacement capacity to meet dispatchable capacity of the unit to be retired. Further, the SCC is directed not to allow an electric generating unit to be retired prior to the end of its engineering lifetime if the unit is necessary to maintain the grid reliability specified by the FERC in its reliability standards. Finally, the SCC is directed to require that existing electric generating units be operated in accordance with their design parameters and in such a manner as to ensure operation consonant with the design life of the unit.

Patron – Wagner

Counties, Cities and Towns

Bills Passed

HB 1424/SB 969: Water or sewer systems; delinquent payment of rates and charges.

Repeals a provision of the Virginia Water and Waste Authorities Act that limits a landlord's liability for a tenant's separately metered sewer or water charges to three delinquent billing periods of no more than 90 days in total. The provision being repealed also prohibits a water or sewer authority from refusing service to the affected premises, or other premises of the landlord, on account of the delinquency as long as the landlord has paid the charges for which he is liable.

Patron - Marshall, D.W.

HB 1446: Financing of clean energy programs; development of underwriting guidelines.

Expands the requirements of a local ordinance authorizing contracts to provide loans for clean energy improvements. The bill adds water efficiency improvements to the list of improvements for which loans may be offered; allows a locality to contract with a third party to administer the loan program; and requires a locality to identify any administrative fee it intends to impose on participants and sets parameters for the imposition of that fee. The bill also details the priority, enforceability, and other characteristics of the lien, now called a voluntary special assessment lien, that a locality is permitted to place against the property where the clean energy systems are installed. Finally, the bill directs the Department of Mines, Minerals and Energy (DMME) to develop underwriting guidelines for local loans made to finance clean energy improvements. The bill requires DMME to finalize the guidelines by

December 1, 2015, incorporating input from certain groups representing real estate, energy efficiency, banking, and other interests or industries and evaluating certain specific criteria. This bill is a recommendation of the Virginia Housing Commission.

Patron - Marshall, D.W

SB 1047: Stormwater utility fee; waiver.

Provides that where two adjoining localities each hold a permit to discharge stormwater from a municipal separate storm sewer system (MS4), a waiver of charges to a public entity for property that is covered by an MS4 permit shall also apply to covered property of a school board of one locality that is located in the other locality.

Patron – Hanger

SB 1443: Comprehensive plan; sea-level rise.

Provides that any locality included in the Hampton Roads Planning District Commission shall incorporate into the next scheduled and all subsequent reviews of its comprehensive plan strategies to combat projected relative sea-level rise and recurrent flooding. The bill requires such review to be coordinated with the other localities in the Hampton Roads Planning District Commission. The bill requires the Department of Conservation and Recreation, the Department of Emergency Management, the Marine Resources Commission, Old Dominion University, and the Virginia Institute of Marine Science to provide technical assistance to any such locality upon request.

Patron – Miller

Bills Failed

HB 1293: Stormwater fees; exemptions for religious groups.

Requires the State Water Control Board, in establishing a statewide fee schedule for stormwater management programs, to waive permit fees for land-disturbing activities undertaken on property owned by certain churches, religious associations, or denominations. The bill also requires localities to waive stormwater management program service charges for properties owned by such organizations.

Patron – Morris

HB 1665: Financing of clean energy programs; development of optional underwriting guidelines.

Expands the requirements of a local ordinance authorizing contracts to provide loans for clean energy improvements. The bill adds water efficiency improvements to the list of improvements for which loans may be offered; allows a locality to contract with a third party to administer the loan program; and requires a locality to identify any administrative fee it intends to impose on participants and sets parameters for the imposition of that fee. The bill also details the priority, enforceability, and other characteristics of the lien, now called a voluntary special assessment lien, that a locality is permitted to place against the property where the clean energy systems are installed. Finally, the bill directs the Department of Mines, Minerals and Energy (DMME) to develop optional underwriting guidelines for local loans made to finance clean energy improvements. The bill requires DMME to finalize the guidelines by December 1, 2015, incorporating input from certain groups representing real estate; banking, including community banking; energy efficiency; and other interests or industries and evaluating certain specific criteria.

Patron – Minchew

SB 1103: Distribution of disposable plastic shopping bags prohibited; local option.

Allows any locality by ordinance to prohibit the distribution, sale, or offer of disposable plastic shopping bags to consumers. The bill exempts from any such prohibition reusable bags of a certain thickness; bags that are used to carry certain products, such as ice cream or newspapers; and garbage bags that are sold in multiples.

Patron – McWaters

SB 1200: Noxious weeds.

Designates golden bamboo as a noxious weed. The bill authorizes a locality to adopt an ordinance to prevent, control, and abate the growth, importation, or spread of golden bamboo.

Patron – Wagner

Fisheries and Habitats of the Tidal Waters

Bills Passed

HB 1811: Harvesting clams.

Authorizes the Marine Resources Commission to issue permits for the use of a handheld hydraulically operated device for harvesting cultured clams from leased grounds.

Patron - Bloxom

HB 2195: Revocation of fishing privileges.

Authorizes the Marine Resources Commission to revoke the privilege to fish in tidal waters of any person who has been convicted of unlawfully taking oysters or other shellfish from oyster grounds. Currently, such a conviction only results in the revocation of a person's tidal fishing license. The bill also increases from two years to five years the maximum duration of the revocation of a fishing license or the privilege to fish in tidal waters. The bill also authorizes the Commission to assess a civil penalty not to exceed $10,000 against a person if it finds the person has engaged in fishing other than for recreational purposes during the revocation period. The bill requires the Commission to consider the person's history of violating the conservation, health, and safety laws or regulations in setting the amount of the civil penalty.

Patron - Lingamfelter

SB 1464: Management of the menhaden fishery.

Authorizes the Governor to implement by proclamation a revised quota for menhaden landings if the Atlantic States Marine Fisheries Commission acts to increase the total allowable landings during a specific time period and removes a general set of proclamation requirements. The bill also removes the July 1, 2016, sunset date for management of the menhaden fishery and includes an emergency clause.

Patron - Lewis

Bills Failed

HB 2032: Notice to localities and property owners of application for use of bottomland.

Requires the Marine Resources Commission to provide written notification of the receipt of an application for an oyster lease or a permit for the placement of temporary enclosure to adjacent property owners and localities where the lease or temporary enclosure is to be located. The applicant is responsible for paying the costs of notifying the property owners and localities.

Patron - Helsel

HB 2386: Nonresident commercial harvester's license.

Increases the fee range for the nonresident commercial harvester's license from the current range of not less than $350 or more than $1,150 to not less than $600 or more than $1,400. The Marine Resources Commission establishes the fee from this range.

Patron - Bloxom

HB 2392: Special nonresident harvester's license.

Prohibits the sale of special nonresident harvester's licenses for any species subject to a Virginia fishing management plan or a plan imposed on Virginia by a state or federal compact.

Patron - Ransone

SB 1006: Marine Resources Commission; sub- merged lands; permit fees.

Clarifies the requirement of a permit application to the Marine Resources Commission for the placement of certain piers and provides that certain applications for permits to use state-owned submerged lands shall be accompanied by a nonrefundable processing fee of $100. The bill raises the existing fees for the issuance of such a permit from $25 to $100 for small projects and from $100 to $300 for projects costing more than $10,000. The bill establishes a permit fee of $600 for projects costing $500,000 or more. The bill also increases the range of royalties for removal of each cubic yard of bottom material from $0.20-$0.60 to $0.40-$0.80.

Patron - Watkins

SB 1101: Marking oyster planting grounds.

Prohibits the use of stakes or buoys made of metal or polyvinyl chloride (PVC) to mark oyster planting grounds.

Patron – McWaters

Game, Inland Fisheries and Boating

Bills Passed

HB 1516: Visiting wildlife traps.

Requires the Board of Game and Inland Fisheries to adopt regulations allowing trappers to use remote trap-checking technology to check traps under specified conditions. Current law requires trappers to visit their traps either daily or, in the case of body-gripping traps that are completely submerged, once every 72 hours and remove all animals that have been caught in the traps.

Patron - Bulova

HB 1686: Stocking and sale of fish; permit.

Directs the Board of Game and Inland Fisheries to add largemouth bass and other members of the sunfish family to the types of fish that may be raised and sold from privately owned facilities. No license is required if the owner of the facility has paid the permit fee.

Patron - Fariss

HB 1961: Reciprocal law-enforcement agreements.

Authorizes the Director of the Department of Game and Inland Fisheries to enter into agreements with other states to enforce hunting, fishing, and trapping laws across state boundaries.

Patron - Lingamfelter

HB 2111: Hunting, trapping, or fishing licenses; electronic copies.

Allows a person who is required to carry certain hunting, trapping, or fishing licenses or a hunter education certificate to meet the requirement by carrying an electronic copy of the relevant license or certificate. The bill requires a license for bear, deer, or turkey to be carried in hard copy.

Patron - Futrell

HB 2240: Introduction, stocking, and release of blue catfish; penalty.

Makes it unlawful for any person to introduce into, stock in, or release into waters of the Commonwealth the blue catfish; however, a blue catfish may be released into the same water body in which it was caught. A violation of the provisions of the bill is a Class 2 misdemeanor.

Patron - Ransone

HB 2331: Definition of fur-bearing animal.

Defines the fisher as a fur-bearing animal in hunting and trapping pro- visions of the Code of Virginia. The fisher (Martes pennanti) is a small carnivorous mammal native to North America. It is a member of the weasel family.

Patron – Webert

SB 1461: Renewal of waterfowl blind licenses.

Exempts persons holding a waterfowl blind license for a blind located in Virginia Beach from the requirement to remove his blind when his license expires, if he notifies the Department of Game and Inland Fisheries that he intends to renew the license. Licenses for blinds in Virginia Beach that have expired in 2014 and thereafter may be renewed by the license holder up to one year after such license expired. The bill requires that the licensee pay a late fee of $75 for each license renewed.

Patron – Wagner

Bills Failed

HB 2242: Hunting requirement for person under age 12.

Conforms the definition of "accompanied and directly supervised" as it applies to the hunting requirements for persons under the age of 12 to that of the same term as it currently applies to the hunting requirements for apprentice hunters; "accompanied and directly supervised" means that a person over 18 maintains close visual and verbal contact with, provides direction to, and can immediately assume control of the firearm, bow, or crossbow from the person who is under the age of 12.

Patron - Edmunds

HB 2343: Feeding of game, game animals, and furbearing animals.

Directs the Board of Game and Inland Fisheries to allow the feeding of certain wildlife on privately owned land regardless of whether it is an open or closed season for hunting or trapping of wildlife.

Patron – Ramadan

SB 1315: Nonhuman primates; penalties.

Prohibits the acquisition of nonhuman primates and controls the ownership of such primates already in the Commonwealth. The bill prohibits the possession, sale, transfer, or breeding of a primate, defined as any species of the taxonomic order Primates except humans. The bill excepts from the prohibition certain institutions, such as zoos, qualified transporters passing through the Commonwealth, those in possession of a state or federal exhibitor's license, and those in lawful possession of a primate prior to July 1, 2015, as long as they meet certain conditions. The bill authorizes the Board of Game and Inland Fisheries to adopt regulations to carry out the law. Finally, the bill provides a procedure for the seizure of a primate in certain circumstances; the bill provides that a violation of any of its pro- visions is a Class 1 misdemeanor.

Patron – Lewis

Highways and Other Surface Transportation Systems

Bills Failed

HB 2101: VDOT tree replacement policy.

Requires VDOT, in highway construction projects, to adhere to any tree replacement policy adopted by the locality in which the construction project is located. The bill also provides that no VDOT review of tree replacement policy is required for locally administered projects.

Patron – Keam

SB 1367: Allocation of federal funds for establishment and maintenance of trails.

Allows the Commonwealth Transportation Board to allocate eligible federal funds for use in the establishment and maintenance of trails by the Department of Conservation and Recreation.

Patron – Chafin

Mines and Mining

Bills Passed

HB 2058: Coalbed methane gas; release of funds held in escrow or suspense.

Requires an operator of a previously pooled coalbed methane gas well to request, by the beginning of 2016, the release of any funds held in escrow or suspense to the person who possesses a claim through a gas title. A coal claimant may halt such a release of funds by pro- viding evidence that the coal and gas claimants have reached an agreement or that a proceeding against the gas claimant is pending. For a well that is pooled after July 1, 2015, the bill requires the operator to pay royalties directly to the gas claimant unless the coal claimant provides evidence of an agreement or a proceeding within a certain time. The Virginia Oil and Gas Board, under certain conditions, is authorized to extend the time for the payment of funds held in escrow and is not required to order payment if the gas claimant fails to provide information needed by the Board in order to distribute the funds. The bill also provides that it shall not create a fiduciary duty or extinguish any cause of action, including an action for an accounting.

Patron - Kilgore

HB 2257/SB 1366: Coal mine safety.

Eliminates the requirement that every miner receive copies of the mine rules and the Coal Mine Safety Act and requires that the surface mine fore man ensure that miners are aware of hazardous conditions and that the health and safety requirements of the Act are followed. The bill also requires that mine-wide tracking systems, electric equipment, and fire sensor systems be maintained.

Patron - Pillion

Bills Failed

HB 1650: Renewable energy property grants.

Establishes, beginning with fiscal year 2016, grants for placing into service renewable energy property. The grant would equal 35 percent of the costs paid or incurred to place the renewable energy property into service, not to exceed $2.5 million for any individual piece of renewable energy property. The bill provides that grants in excess of 2.5 percent of the total program appropriation for the relevant fiscal year would be paid in three equal calendar year installments. No grant would be awarded for renewable energy property that generated electricity within the 12 months preceding the date of the grant application or renewable energy property paid for by utility ratepayer funds. The bill defines renewable energy as energy derived from sunlight, wind, falling water, biomass, waste, landfill gas, municipal solid waste, wave motion, tides, or geothermal power, but not including energy derived from coal, oil, natural gas, or nuclear power. The Department of Mines, Minerals and Energy would administer the grant program. The Department would be authorized, subject to appropriation, to award up to $10 million in renewable energy property grants each fiscal year.

Patron – Villanueva

Motor Vehicles

Bills Passed

HB 1341/SB 1218: Motor vehicle emissions inspection program; autocycles.

Exempts autocycles that have not been emissions certified with an on-board diagnostic system by the U.S. Environmental Protection Agency from the motor vehicle emissions inspection program.

Patron – Scott

HB 2072/SB 989: Overweight permits; forest products. Establishes an overweight permit for hauling forest products and provides for the weight limits and the fee of $130 for the permit.

Patron – Knight

Public Service Companies

Bills Passed

HB 1475/SB 1163: Natural gas utilities; recovery of system expansion infrastructure costs.

Establishes a procedure under which a natural gas utility may seek State Corporation Com- mission (SCC) approval of a system expansion plan that includes, among other things, a schedule for recovery of eligible system expansion infrastructure costs through a system expansion rider and a methodology for deferral of unrecovered eligible system expansion costs. A system expansion plan and system expansion rider shall allocate and charge costs in accordance with cost causation principles in order to avoid any undue cross-subsidization between rate classes. The SCC is barred from examining other revenue requirement or ratemaking issues in its consideration of the natural gas utility's application. Costs recovered under this measure shall be in addition to all other costs that the natural gas utility is permitted to recover, shall not be considered an offset to other approved costs of service or revenue requirements, and shall not be included in any computation relative to a performance-based regulation plan revenue-sharing mechanism. The measure does not apply to interstate pipeline companies regulated by the Federal Energy Regulatory Commission. Construction projects undertaken pursuant to this measure are required to be completed in accordance with standards filed with the Department of Environmental Quality

Patron - Ware

HB 1950/SB 1395: Electric utilities; net energy metering.

Increases, from 500 kilowatts to one megawatt, the maximum generating capacity of an electrical generating facility owned or operated by an electric utility's nonresidential customer that may be eligible for participation in the utility's net energy metering program. In addition, the capacity of any generating facility installed under this section after July 1, 2015, shall not exceed the expected annual energy consumption based on the previous 12 months of billing history or an annualized calculation of billing history if 12 months of billing history is not available. The measure also (i) requires any eligible customer generator seeking to participate in net energy metering to notify its supplier and receive approval to interconnect prior to installation of an electrical generating facility and (ii) clarifies requirements regarding the customer-generator's obligation to bear the costs of equipment required for the interconnection to the supplier's electric distribution system. The change to the definition of an eligible customer-generator affects the definition of a qualified energy project as used in the Virginia Small Business Financing Act.

Patron - McClellan

HB 2237: Electric utilities; costs of solar energy facilities.

Authorizes an investor-owned electric utility that purchases a generation facility consisting of at least one mega- watt of generating capacity using energy derived from sunlight and located in the Commonwealth and that utilizes goods or services sourced, in whole or in part, from one or more Virginia businesses, to recover the costs of acquiring the facility, with an enhanced rate of return on equity, through a rate

adjustment clause. A utility filing a petition for approval of such a project may propose a rate adjustment clause based on a market index in lieu of a cost of service model for such facility. The measure also states that (i) the construction or purchase by a utility of one or more generation facilities with at least one megawatt of generating capacity, and with an aggregate rated capacity that does not exceed 500 megawatts, that use energy derived from sunlight and are located in the Commonwealth, regardless of whether any of such facilities are located within or without the utility's service territory, and (ii) planning and development activities for a new utility-owned and utility operated generating facility or facilities utilizing energy derived from sunlight with an aggregate capacity of 500 megawatts, are in the public interest.

Patron – Yancey

SB 1331: Natural Gas Conservation and Ratemaking Efficiency Act; cost-effective programs.

Requires the State Corporation Commission, when determining whether a natural gas conservation or energy efficiency program is cost effective, to assign administrative costs associated with the conservation and ratemaking efficiency plan to the portfolio as a whole. The measure requires the assignment of education and outreach costs associated with each program in a portfolio of programs to such program, and not to individual measures within a program, when such administrative, education, or out- reach costs are not otherwise directly assignable. The measure also provides that a cost-effective conservation and energy efficiency program shall not include a program designed to convert propane customers to natural gas.

Patron - Petersen

SB 1334: Electric utilities; cost recovery.

Permits investor-owned electric utilities to recover from certain customers, through a rate adjustment clause, the projected and actual costs of designing, implementing, and operating State Corporation Commission-approved programs that accelerate the vegetation management of distribution rights-of-way. The measure provides that these costs shall not be allocated to or recovered from certain classes of large customers.

Patron - Chafin

SB 1349: Electric utility regulation; suspension of reviews of earnings.

Bars the State Corporation Commission (SCC) from conducting a biennial review of the rates, terms, and conditions for any service of (i) Dominion Virginia Power for the five test periods beginning January 1, 2015, and ending December 31, 2019, and (ii) Appalachian Power for the four test periods beginning January 1, 2014, and ending December 31, 2017 (the Transitional Rate Period). An investor-owned incumbent electric utility's existing tariff rates shall not be adjusted between the beginning of the

Transitional Rate Period and the conclusion of the first biennial review after the conclusion of the Transitional Rate Period, except as permitted for fuel factor and purchased power cost adjustments, rate adjustment clauses, and emergency temporary rate increases. During the Transitional Rate Period, the SCC shall have the right to inspect the books, papers, and documents of any such utility and to require it to provide special reports and statements concerning its business. The SCC is directed to conduct two biennial proceedings for each such utility during the Transitional Rate Period to determine what constitutes the utility's fair rate of return on common equity for use in connection with rate adjustment clauses. Dominion Virginia Power is prohibited from recovering from customers 50 percent of certain deferred fuel expenses, and the SCC is required to reduce the utility's fuel factor rate. Except for early retirement plans identified in an integrated resource plan filed by September 1, 2014, an electric utility shall not permanently retire an electric power generation facility from service during the Transitional Rate Period without first obtaining the SCC's approval, which may be granted if the SCC determines that the retirement is reasonable and prudent. During the Transitional Rate Period, an electric utility shall recover the costs associated with asset impairments related to early retirement determinations for utility generation facilities resulting from the implementation of carbon emission guidelines for existing electric power generation facilities issued pursuant to § 111(d) of the Clean Air Act, costs associated with severe weather events, and costs associated with natural disasters, only through its existing tariff rates for generation or distribution services. During the Transitional Rate Period, the SCC and Department of Environmental Quality shall provide reports that address issues related to the implementation of such carbon emission guidelines issued pursuant to the federal Clean Air Act. The measure also (i) authorizes a utility to recover, through a rate adjustment clause, the costs of constructing or purchasing solar energy facilities and (ii) requires Dominion Virginia Power and Appalachian Power to conduct and fund pilot programs for energy assistance and weatherization for low income, elderly, and disabled individuals in their respective service territories in the Commonwealth. The measure also requires each electric utility to file updated integrated resource plans by July 1, 2015, and thereafter each May 1; currently, such updates are required to be filed biennially. Such plans are required to consider options for maintaining and enhancing rate stability, energy independence, economic development including retention and expansion of energy-intensive industries, and service reliability. In preparing a plan, a utility is required to evaluate the effect of current and pending environmental regulations upon the continued operation of existing electric generation facilities or options for construction of new electric generation facilities and the most cost effective means of complying with current and pending environmental regulations.

Patron – Wagner

Bills Failed

HB 1622: Electric utilities; net energy metering.

Increases the maximum generating capacity of an electrical generating facility owned or operated by an electric utility's residential customer that may be eligible for participation in the utility's net energy metering program from 20 kilowatts to 40 kilowatts. The measure also increases the maximum generating capacity of such a facility owned or operated by a nonresidential customer that may be eligible for participation in such a program from 500 kilowatts to one megawatt. This change to the definition of an "eligible customer-generator" also affects the definition of a "qualified energy project" as used in the Virginia Small Business Financing Act.

Patron - Sullivan

HB 1636: Electric utilities; net energy metering; community subscriber organizations.

Directs the State Corporation Commission to establish by regulation a program that affords community subscribers and community subscriber organizations the opportunity to participate in net energy metering. A community subscriber is a retail customer of an electric utility who owns a subscription in a community generation facility and receives on-bill credits for each kilowatt hour of energy produced by their portion of the community generation facility. The subscriber's premises is required to be located in the service territory of the utility in which the community generation facility is located and in the county in which the community generation facility is located or a neighboring county. A community generation facility is an electrical generating facility that uses as its total source of fuel renewable energy and has a capacity of not more than two megawatts. The measure also increases the maximum generating capacity of an electrical generating facility owned or operated by an electric utility's nonresidential customer, or a customer that operates a generation facility as part of an agricultural operation, that may be eligible for participation in the utility's net energy metering program from 500 kilowatts to two megawatts.

Patron – Minchew

HB 1729: Distributed electric generation; community solar gardens.

Authorizes the establishment of community solar gardens, which are required to be owned by a subscriber organization that has at least 10 subscribers. Subscribers will receive credits on their utility bills from energy generated at the solar facility in proportion to the size of their subscription. The output and renewable energy credits from a solar garden shall be purchased by the utility in the form of net metering credits allocated to the subscribers. To the extent that a subscriber's net metering credit exceeds the subscriber's electric bill in any billing period, the credit will be applied against future bills. If the electricity output of the community solar garden is not fully subscribed, the utility is required to purchase the unsubscribed renewable energy at a rate equal to the utility's average hourly incremental cost of electricity supply over the immediately preceding calendar year.

Patron - Sullivan

HB 1730: Electric and natural gas utilities; energy efficiency goals.

Requires investor-owned electric utilities, cooperative electric utilities, and investor-owned natural gas distribution utilities to meet incremental annual energy efficiency goals. Electric utilities are required to implement cost effective energy efficiency measures to achieve the goal of two percent savings by 2030, with interim goals that start at 0.5 percent for 2016 and increase incrementally to 2030. Gas utilities are required to achieve the goal of one percent savings by 2030, with interim goals that start at 0.25 percent for 2016 and increase incrementally to 2030. The utilities are required to submit energy efficiency plans with the State Corporation Commission. The Commission shall (i) require utilities to report annually on their efforts and progress in meeting the incremental annual energy efficiency goals; (ii) establish requirements for programs implemented by utilities to comply with the incremental annual energy efficiency goals; and (iii) design performance incentives that shall reward utilities for meeting or exceeding efficiency goals. The Commission may consider a penalty for failing to meet efficiency goals.

Patron - Sullivan

HB 1911: Electric utilities; net energy metering; standby charges.

Requires the State Corporation Commission, before approving a supplier's proposed standby charge methodology, to find that a value of solar analysis demonstrates that the standby charges reflect the supplier's net costs or benefits properly associated with serving the customers that have installed a net metered generation facility. The bill specifies that a value of solar analysis determines such net costs or benefits by subtracting the value of all benefits provided to the supplier or the electric grid as a result of the installation and operation of the solar generation facility from the portion of the supplier's infrastructure costs that are properly associated with serving such customers.

Patron - Lopez

HB 1912: Electric utilities; net energy metering.

Increases, from 500 kilowatts to two megawatts, the maximum generating capacity of an electrical generating facility owned or operated by an electric utility's nonresidential customer that may be eligible for participation in the utility's net energy metering program. This change to the definition of an "eligible customer-generator" also affects the definition of a "qualified energy project" as used in the Virginia Small Business Financing Act.

Patron - Lopez

HB 1913: Electric utilities; renewable energy resources and energy efficiency goals.

Revises the existing voluntary renewable energy portfolio standard program to require participating utilities to make investments in solar energy generation, onshore wind generation, offshore wind generation, and cumulative energy efficiency savings by calendar year 2030, but does not provide sanctions on a utility that fails to meet this goal. The measure (i) deletes provisions of the existing renewable energy portfolio standard program that provide credits for qualified investments by a participating utility in research and development programs and activities; (ii) deletes the double and triple credits for certain types of renewable energy generation while retaining the double credit for energy from on-shore wind obtained under power purchase agreements entered into prior to January 1, 2013; and (iii) requires participating utilities, through the implementation of energy efficiency and demand-side management programs, by calendar year 2022 to reduce the consumption of electric energy by retail customers by an amount equal to 10 percent of the amount of electric energy consumed by retail customers in 2006. The measure also provides that for compliance with any RPS Goal for calendar years 2015 through 2025, a utility may only apply renewable energy generated from renewable energy generation facilities owned by the utility, renewable energy purchased or acquired by the utility from a non-utility generator, renewable energy certificates purchased or acquired by the utility from customer-generators participating in net energy metering, or renewable energy certificates purchased or acquired by the utility from generators in the interconnection region of the regional transmission entity, except that a utility may not apply such renewable energy certificates to meet more than 20 percent of the sales requirement for the RPS Goal in any year.

Patron - Lopez

HB 1925/SB 1160: Renewable energy; third party power purchase agreements.

Replaces the pilot program enacted in 2013 that authorized certain third party power purchase agreements providing financing of certain renewable generation facilities. The measure requires the State Corporation Commission to establish third party power purchase agreement programs for eligible customer-generators in the service territories of Dominion Virginia Power and AEP. This measure differs from the existing pilot program in that (i) the existing pilot program applies only to Dominion Virginia Power and (ii) the maximum size of a renewable generation facility is increased from one megawatt to two megawatts.

Patron - Lopez

HB 2073: Electric utilities; net energy metering; energy balancing devices.

Directs the State Corporation Commission to establish a program for eligible energy balancing customers, which are customers that own an energy balancing device that provides value to the electric utility or regional transmission entity in the form of spinning reserve, frequency regulation, distribution system support, reactive power, demand response, or other electric grid services. An energy balancing device means either a grid-integrated electric vehicle or an electric battery that absorbs and returns energy to the electric grid on either a second-to-second response basis that provides frequency regulation or on a longer-term daily response basis that returns that energy to the electric grid during peak periods of demand. An energy balancing device does not add net electricity to the grid over a net metering period. An eligible energy balancing customer will be credited for the electricity it adds to the grid at the rate charged for the customer's usage of electricity.

Patron - Toscano

HB 2075: Renewable energy portfolio standard program; solar renewable energy certificate registration system.

Requires the State Corporation Commission to establish and maintain a registry for solar renewable energy certificates (SRECs). The SREC registry shall include pertinent information regarding all available SRECs and SREC transactions among electric suppliers in the Commonwealth, including (i) the creation and application of SRECs, (ii) the number of SRECs sold or transferred, and (iii) the price paid for the sale or transfer of SRECs.

Patron - Toscano

HB 2155: Energy diversification requirement.

Establishes a schedule by which Virginia's two largest investor-owned electric utilities are required to achieve certain percentages of quantified energy diversification (QED). QED consists of energy generated

at new zero-emitting energy facilities and energy savings achieved through demand-side efficiency. The required amounts of QED start at 0.25 percent of a utility's retail sales in calendar year 2016 and ramp up in ensuing years to 35 percent of its retail sales in 2030 and thereafter. The measure requires that not less than 40 percent of the required amount of QED that a utility is required to achieve be from demand-side efficiency, which consists of distributed generation, demand response, and energy efficiency programs. If a utility fails to meet the required percentage of sales in a calendar year from these sources, it is required to make a noncompliance payment of $200 per megawatt hour short of the requirement. The measure provides for the issuance of certain credits by the Department of Mines, Minerals and Energy or its appointee. A utility establishes that it has met a requirement by submitting credits that evidence compliance. Noncompliance payments will be deposited in the Deployment Investment Fund created by the bill. A utility is entitled to recover its costs of compliance with the requirements, including noncompliance payments if they are less than the cost of available credits, through a rate adjustment clause.

Patron - Sickles

HB 2219: Utility-scale solar energy facilities.

Declares that the construction by Appalachian Power or Dominion Virginia Power of utility-scale solar energy facilities with an aggregate rated capacity that does not exceed 500 megawatts is in the public interest. The bill authorizes these utilities to petition the State Corporation Commission for a certificate of public convenience and necessity to construct such a facility that has a rated capacity of not less than 20 megawatts, regardless of whether the facility will be located in the utility's service territory. The costs of the facility are recoverable through a rate adjustment clause, provided that the total rated capacity added by these facilities does not exceed 500 megawatts. The measure sunsets on January 1, 2019.

Patron - Yost

HB 2244: Electric utilities; integrated resource plans.

Requires electric utilities serving two million or more customers in the Commonwealth to file an integrated resources plan (IRP) by September 1 of each year. Currently, they are required to file an IRP at least every two years. The measure requires copies of the IRP to be provided to the Chairmen of the House and Senate Committees on Commerce and Labor and to the chairman of the Commission on Electric Utility Regulation. The measure also requires that IRPs evaluate compliance options to minimize effects on customer rates of pending federal environmental rules.

Patron - James

HB 2274: Electric utilities; cost recovery.

Permits investor-owned electric utilities to recover from certain customers, through a rate adjustment clause, the projected and actual costs of designing, implementing, and operating State Corporation Commission-approved programs that accelerate the vegetation management of distribution rights-of-way. The measure provides that these costs shall not be allocated to or recovered from certain classes of large customers.

Patron – Kilgore

SB 764/SB 833: Electric utilities; net energy metering.

Increases, from 500 kilowatts to two megawatts, the maximum generating capacity of an electrical generating facility owned or operated by an electric utility's nonresidential customer that may be eligible for participation in the utility's net energy metering program. This change to the definition of an "eligible customer-generator" also affects the definition of a "qualified energy project" as used in the Virginia Small Business Financing Act.

Patron - Edwards

SB 1365: Clean Power Plan; state implementation plan; General Assembly approval.

Requires the Department of Environmental Quality (the Department) to consider certain factors, seek input from the State Corporation Commission, and meet with interested members of the General Assembly as the Department develops a state implementation plan to regulate carbon dioxide emissions from existing power plants prior to submitting the plan to the U.S. Environmental Protection Agency for approval. The bill also requires the Department to report to the Governor and the General Assembly on the status of the plan by December 1, 2015, and each year thereafter until December 1, 2019.

Patron – Watkins

Taxation

Bills Passed

HB 1554/SB 1205: Recyclable materials tax credit.

Changes the recyclable materials tax credit by (i) extending the expiration date of the credit by five years to January 1, 2020; (ii) increasing the credit allowed from 10 to 20 percent of the purchase price of qualifying machinery and equipment; (iii) prohibiting denial of the credit based solely on another person's use of tangible personal property produced by the credit applicant from recyclable materials; (iv) clarifying that no credit will be allowed for machinery and equipment that does not manufacture, process, compound, or produce items of tangible personal property from recyclable materials; and (v) establishing

an annual cap of $2 million in recyclable materials tax credits that may be issued by the Department of Taxation. The provisions of the bill are effective for taxable years beginning on or after January 1, 2015.

Patron - Marshall, D.W

HB 1705/SB 1308: Gas severance tax.

Extends the sunset date from December 31, 2015, to January 1, 2018, for the local gas severance tax that is dedicated to (i) the local Coal and Gas Road Improvement Fund, (ii) the Virginia Coalfield Economic Development Fund, and (iii) water, sewer, and natural gas systems and lines. This bill incorporates HB 2282.

Patron – Morefield

HB 1724: Forest products tax.

Makes several changes to the forest products tax, including (i) revising the definition of a taxable "forest product" as wood derived from trees severed for commercial purposes; (ii) revising the definition of "manufacturer" liable for the tax as any person that uses, consumes, processes, or stores forest products for commercial purposes at a fixed place of business; (iii) providing that the first manufacturer using, consuming, processing, or storing the forest product is liable for the tax and that severers of wood are liable for the tax on sales to unregistered manufacturers; (iv) changing the forest products tax on wood chips, currently assessed per 100 pounds of roundwood, and mulch to $0.20 per ton for pine, $0.04 per ton for other species, and $0.10 per ton for loads consisting of both pine and other species; (v) changing the alternative forest products tax on wood chips, currently assessed per 100 pounds of roundwood, and mulch to $0.026 per ton for pine, $0.04 per ton for other species, and $0.03 per ton for loads consisting of both pine and other species; and (vi) requiring severers of wood to file tax returns and retain records relating to the tax.

Patron – Fariss

HB 1828/SB 1019: Land preservation tax credit. Makes several changes to the land preservation tax credit by (i) reducing the maximum amount of tax credits that may be issued in each calendar year from $100 million to $75 million beginning in 2015; (ii) with the exception of credits issued for fee simple interest donations, reducing the maximum amount of the land preservation tax credit that may be claimed in any year from $100,000 in taxable year 2014 to $20,000 in taxable years 2015 and 2016 and $50,000 for each taxable year thereafter; (iii) requiring that a complete application for the tax credit with regard to a conveyance be filed with the Department of Taxation by December 31 of the year following the calendar year of the conveyance; and (iv) prohibiting the Department of Taxation from issuing any tax credit for a donation from any allocation or pool of tax credits attributable to a calendar year prior to the year in which the complete tax credit application for the donation was filed.

Patron - Ware

HB 1843/SB 1037: Green job creation tax credit; sunset.

Extends the green job creation tax credit for three years, through taxable year 2017.

Patron – James

HB 1879/SB 1161: Coal tax credits.

Limits the aggregate amount of credits that may be allocated or claimed for the coal employment and production incentive tax credit to $7.5 million. An electricity generator must file an application with the Department of Taxation each year to determine the amount of credits that it may claim or allocate, including credits earned in prior taxable years. If the total amount of credits earned in a taxable year exceeds $7.5 million, the Department of Taxation shall apportion the credits on a pro rata basis. The bill also extends the sunset date of the coalfield employment enhancement tax credit through taxable year 2019.

Patron – Kilgore

Bills Failed

HB 1410: Motor fuels tax rate.

Reduces the motor fuels tax on gasoline and gasohol from 5.1% to 3.5% of the statewide average wholesale price of a gallon of unleaded regular gasoline. The rate increased from 3.5% to 5.1% on January 1, 2015, as required by Chapter 766 of the Acts of Assembly of 2013, because Congress did not pass a law permitting the Commonwealth to require out-of-state sellers to collect and remit sales and use tax.

Patron - Marshall, R.G.

HB 1651: Tax credit for public access to natural gas fueling stations.

Provides for a tax credit for owners of new natural gas fueling stations that are open to the public on or after January 1, 2016, but before January 1, 2021. The amount of the credit is equal to 50 percent of the fuels tax on gallons purchased for resale.

Patron – Taylor

HB 1728: Renewable energy property tax credit.

Establishes beginning in 2015 a tax credit for renewable energy property placed in service. The bill defines renewable energy property as certain biomass equipment that uses renewable biomass resources, combined heat and power systems using waste heat to produce electricity or thermal or mechanical energy, certain geothermal equipment, hydroelectric generators located at existing dams or in free-flowing waterways, solar energy equipment, and wind equipment that is required to capture and convert wind energy into electricity or mechanical power. The credit would equal 35 percent of the installed cost of the renewable energy property. However, the aggregate amount of credit allowed to each person for placing into service renew- able energy property during the taxable year would not exceed the lesser of (i) 50 percent of the amount of the state corporate income tax, license tax on certain public utility companies, or license tax on insurance companies imposed upon the person for the year or (ii) $15,000. Only the ultimate consumer or user of the renewable energy property would be allowed to claim the credit. The credit would be required to be claimed in five equal annual installments beginning with the taxable year in which the property was placed in service. The credit would expire and no further credit could be claimed if the renewable energy property was disposed of, taken out of service, or moved out of the Commonwealth during any of the installment years. The Department of Taxation would issue the tax credits. The Department would be authorized to issue $5 million in tax credits each fiscal year. Any unused credit could be carried forward for five taxable years. The credit would sunset in 2020.

Patron – Sullivan

HB 1777: Recyclable Materials Processing Equipment Tax Credit; sunset.

Extends the Recyclable Materials Processing Equipment Tax Credit for five years, through taxable year 2019.

Patron - Kory

HB 1778: Clean-Fuel Vehicle and Advanced Cellulosic Biofuels Job Creation Tax Credit; sunset.

Extends the Clean-Fuel Vehicle and Advanced Cellulosic Biofuels Job Creation Tax Credit for five years, through taxable year 2019.

Patron – Kory

HB 1877: Expiration of certain coal tax credits; dedication of additional revenues.

Sunsets the Virginia coal employment and production incentive tax credits and the coalfield employment enhancement tax credit on January 1, 2016. An amount equal to the additional annual revenue anticipated to be received in the state treasury from the expiration of the tax credits would be deposited into the Additional Guaranteed Assistance Fund (the Fund), a special fund created under the bill for providing

grants to eligible students enrolled in or accepted for enrollment in a public institution of higher education in Virginia. The Tax Commissioner would determine the amount to be deposited into the Fund, which would be the same amount in each fiscal year. The amount to be deposited would equal the average annual amount claimed or redeemed by all persons under the expiring tax credits for the three most recent taxable years for which the Department of Taxation has data. Deposits would be made into the Fund by July 31 of each year, beginning in 2016. One-half of the moneys deposited into the Fund each year by the Comptroller would be reserved and awarded to eligible students who have as a domicile the County of Lee, County of Wise, County of Scott, County of Buchanan, County of Russell, County of Tazewell, County of Dickenson, or the City of Norton. These counties and city comprise the Virginia Coalfield Economic Development Authority.

Patron – Krupicka

HB 2181: Coal tax credits.

Updates the Virginia coal employment and production incentive tax credit.

Patron – Toscano

SB 886: Plastic bag tax in the Chesapeake Bay Watershed.

Imposes a five-cent bag tax on plastic bags pro- vided to customers by certain retailers in localities located wholly within the Chesapeake Bay Watershed and directs revenues to be used to support the Chesapeake Bay Watershed Implementation Plan. The bill also allows every retailer that collects the tax to retain one cent of the five-cent tax.

Patron – Petersen

SB 949: Tax credit for hybrid vehicle registration.

Creates a $64 tax credit for the 2015 tax year for hybrid vehicle owners who paid the $64 annual license tax between July 1, 2013, and July 1, 2014. The bill has a July 1, 2018, expiration date.

Patron – Stuart

Virginia Energy Plan

Bills Passed

HB 2267/SB 1099: Virginia Solar Energy Development Authority.

Creates the Virginia Solar Energy Development Authority to facilitate, coordinate, and support the development of the solar energy industry and solar-powered electric energy facilities in the Commonwealth. The Authority is directed to do so by developing programs to increase the avail- ability of financing for solar energy projects, facilitate the increase of solar energy generation systems on public and private sector facilities in the Commonwealth, promote the growth of the Virginia solar industry, and provide a hub for collaboration between entities to partner on solar energy projects. The Authority will be composed of 11 members, of whom six will be appointed by the Governor, three will be appointed by the Speaker of the House, and two will be appointed by the Senate Committee on Rules. Members may be representatives of solar businesses, solar customers, renewable energy financiers, state and local government solar customers, and solar research academics. The Authority is charged with, among other tasks, (i) identifying existing state and regulatory or administrative barriers to the development of the solar energy industry, (ii) collaborating with entities such as higher education institutions to increase the training and development of the workforce needed by the solar industry in Virginia, including industry-recognized credentials and certifications, (iii) applying to the U.S. Department of Energy for loan guarantees for such projects, and (iv) performing any other activities as may seem appropriate to increase solar energy generation in Virginia and the associated jobs and economic development and competitiveness benefits, including assisting investor-owned utilities in the planned deployment of at least 400 megawatts of solar energy projects in the Commonwealth by 2020 through entering into agreements in its discretion in any manner pro- vided by law for the purpose of planning and providing for the financing or assisting in the financing of the construction or purchase of solar energy projects that are authorized pursuant to a provision of Chapter 23 of Title 56. The Director of the Department of Mines, Minerals and Energy may utilize nonstate-funded support to carry out any duties assigned to the Director. Funding may be provided by any source, public or private, for the purposes for which the Authority is created. The bill has a sunset date of July 1, 2025.

Patron - Hugo

Bills Failed

HB 1709: Allocation of offshore natural gas and oil royalties.

Changes the manner in which the revenues and royalties from offshore natural gas and oil drilling and exploration that exceed $50 million are distributed. Currently, an amount up to $50 million is deposited into the Virginia Offshore Energy Emergency Response Fund, and any funds in excess of this amount are deposited into the general fund. The bill allocates 50 percent of the amount of the excess to the general fund, 25 percent to K-12 capital projects, and 25 percent to operational support for K-12.

Patron - Davis

HB 1725: Virginia Solar Energy Development Authority.

Creates the Virginia Solar Energy Development Authority to facilitate, coordinate, and support the development of the solar energy industry and solar-powered electric energy facilities in the Commonwealth. The Authority is directed to do so by developing programs to increase the availability of financing for solar energy projects, facilitate the increase of solar energy generation systems on public and private sector facilities in the Commonwealth, promote the growth of the Virginia solar industry, and provide a hub for collaboration between entities to partner on solar energy projects. The Authority will be composed of 11 members appointed by the Governor. Members may be representatives of solar businesses, solar customers, renewable energy financiers, state and local government solar customers, and solar research academics. The Authority is charged with, among other tasks, (i) identifying existing state and regulatory or administrative barriers to the development of the solar energy industry, (ii) collaborating with entities such as higher education institutions to increase the training and development of the workforce needed by the solar industry in Virginia, including industry-recognized credentials and certifications, (iii) applying to the U.S. Department of Energy for loan guarantees for such projects, and (iv) performing any other activities as may seem appropriate to increase solar energy generation in Virginia and the associated jobs and economic development and competitiveness benefits. At the recommendation of the Authority, the Director of the Department of Mines, Minerals and Energy may utilize non- state-funded support to carry out any duties assigned to the Director. Funding for nonstate support may be provided by any source, public or private, for the purposes for which the Authority is created.

Patron - Bulova

SB 1462: Virginia Offshore Energy Development Authority.

Converts the Virginia Offshore Wind Development Authority to the Virginia Offshore Energy Development Authority and broadens its focus to include facilitating, coordinating, and supporting the development of the offshore oil and gas industry and offshore oil and gas projects.

Patron – Wagner

Waters of the State, Ports and Harbors

Bills Passed

HB 1364/SB 1413: Fees for testing and monitoring of land application of industrial wastes.

Allows localities to adopt ordinances that provide for the testing and monitoring of the land application of solid or semisolid industrial wastes. The bill requires the State Water Control Board (the Board) to adopt regulations no later than January 1, 2016, requiring persons that land-apply industrial wastes to collect a fee from the generator of the industrial wastes and remit the fee to the Department of Environmental Quality (DEQ). The bill sets the fee at $5 per ton until altered by the Board. The bill requires the Board's

regulations to include procedures for (i) collection of the fees by DEQ, (ii) deposit of the collected fees into the Sludge Management Fund (the Fund), and (iii) disbursements from the Fund to localities for the testing and monitoring of the industrial wastes. The Department of Environmental Quality is required to establish and implement a program to train the employees of the localities who will be responsible for testing and monitoring the land application of industrial wastes. The bill specifies the minimum instructional elements of the training program.

Patron - Peace

HB 1535: Secretary of Natural Resources; annual report on tributary plans.

Repeals the requirement that the Secretary of Natural Resources report annually to certain standing committees and the Virginia delegation to the Chesapeake Bay Commission on Chesapeake Bay tributary plans. The tributary plans have been replaced by the Watershed Implementation Plans.

Patron - Bulova

HB 1536: References to obsolete tributary strategy plans.

Removes out-of-date references to the tributary strategy plans that appear in the Virginia Water Quality Improvement Act of 1997. The tributary strategy plans have been replaced by the Chesapeake Bay TMDL Watershed Implementation Plan as the approach for cleaning up the Chesapeake Bay.

Patron - Bulova

HB 1734: Loans for creation of living shorelines.

Authorizes the State Water Control Board to provide loans from the Virginia Water Facilities Revolving Fund to (i) a local government for the purpose of establishing living shorelines that protect or improve water quality and prevent water pollution or (ii) a local government that has developed a funding program to provide low-interest loans or other incentives to individuals to assist in establishing living shorelines.

Patron - Hodges

HB 1812: Secretary of Natural Resources; Chesapeake Bay Watershed Agreement; annual report.

Updates the requirements for the annual report concerning the Chesapeake Bay prepared by the Secretary of Natural Resources by substituting the recently agreed-to 2014 Chesapeake Bay Watershed Agreement for the Chesapeake Bay 2000 Agreement, which is now obsolete. The recipients of the report are also updated.

Patron - Bloxom

HB 1827: Exemption for routine highway maintenance projects.

Exempts routine highway maintenance projects of the Virginia Department of Transportation from the requirements of the Erosion and Sediment Control Act, including the reduction of flow runoff rates. This exemption is consistent with the exemption for similar routine highway maintenance projects under the Stormwater Management Program.

Patron - Scott

HB 1829: Toxic substances report.

Changes from annually to every odd-numbered year the interval at which the Department of Environmental Quality is required to submit to the committees of oversight a report on the reduction of toxic substances in state waters.

Patron - Plum

HB 1871: Registration of wells.

Requires certified water well systems providers to register wells being constructed in ground water management areas with the State Water Control Board (SWCB) within 30 days of the completion of the well's construction. The bill requires the Department of Health (VDH) to provide the SWCB annually with a list of the wells that were permitted during the previous year and the SWCB to provide VDH annually with a list of the wells that were registered during the previous year.

Patron - Bulova

HB 1924/SB 1341: Eastern Virginia Groundwater Management Advisory Committee established.

Establishes the Eastern Virginia Groundwater Management Advisory Committee (the Committee) to assist the Department of Environmental Quality (DEQ) in developing, revising, and implementing a management strategy for ground water in the Eastern Virginia Groundwater Management Area. The bill prohibits the State Water Control Board and the DEQ from issuing draft permits that would require reductions in the volume of permitted ground water withdrawals before December 31, 2015. The bill has a sunset date of January 1, 2018.

Patron – Hodges

HB 2067: Daylighted streams.

Provides that the State Water Control Board (SWCB), when developing the criteria for a Resource Protection Area (RPA) under the Chesapeake Bay Preservation Act, shall not require that a daylighted stream become an RPA. The bill requires any locality that does not designate an RPA adjacent to a daylighted stream to use a water quality impact assessment to ensure that development adjacent to the stream does not result in the degradation of the stream. The locality's assessment must (i) be consistent with the SWCB's criteria for water quality impact assessments in RPAs, (ii) identify the impacts of proposed development on water quality, and (iii) determine measures to mitigate adverse impacts. The bill defines a daylighted stream as a stream that has been previously diverted into a culvert, pipe, or other underground drainage system and is redirected into an aboveground channel using natural channel design concepts. The bill does not limit a locality's authority to include such a stream within an RPA.

Patron – Watts

SB 811: Evaluate the safe storage of chemicals.

Directs the Director of the Department of Environmental Quality, the State Health Commissioner, and the State Coordinator of Emergency Management to evaluate various existing laws and regulations to ensure that chemical storage is conducted in a manner that protects human health and the environment. The bill provides guidance regarding the areas that are to be evaluated by the three agency heads. The bill has an expiration date of January 1, 2017.

Patron – Watkins

SB 1201: Stormwater; municipal separate storm sewer system permittees; dredging.

Directs the State Water Control Board (the Board) to establish a procedure for the approval of dredging operations in the Chesapeake Bay watershed as a method by which to meet pollutant reduction and loading requirements. The bill provides that before the Board is required to establish the procedure, the Chesapeake Bay Program shall first approve the procedure as a creditable practice for pollutant removal. The bill requires that any dredging comply with all applicable laws. The bill also provides that any locality imposing certain stormwater fees may make funds available for stormwater maintenance dredging, including at the point of discharge, where stormwater has contributed to the deposition of sediment in state waters, and that such use of the fee is required for any locality in the Lynnhaven River water- shed.

Patron - Wagner

SB 1203: Chesapeake Bay Watershed Implementation Plan.

Directs state agencies to remove the Little Creek watershed from inclusion in the James River Basin for purposes of the Chesapeake Bay Watershed Implementation Plan.

Patron - Wagner

SB 1284: Replacement of tributary strategies.

Replaces the tributary strategies for cleaning up the Chesapeake Bay and its tributaries, which were last prepared in 2003-2004, with the Watershed Implementation Plans (WIPs) developed pursuant to the Chesapeake Bay total maximum daily load (TMDL). The bill authorizes the Secretary of Natural Resources to oversee the development and implementation of the WIPs.

Patron – Hanger

Bills Failed

HB 1363: Land application of industrial wastes.

Makes it unlawful to apply industrial wastes to land located in the County of Hanover, King William, or New Kent. The bill contains an emergency clause.

Patron - Peace

HB 1381: Fees for testing and monitoring of land application of industrial wastes.

Allows localities to adopt ordinances that provide for the testing and monitoring of the land application of industrial wastes. The bill requires the State Water Control Board (the Board) to adopt emergency regulations, requiring persons that land apply industrial wastes to collect a fee from the generator of the industrial wastes and remit the fee to the Department of Environmental Quality (DEQ). The fee cannot exceed the direct costs to localities of testing and monitoring the land application of industrial wastes. The bill requires the Board's regulations to include procedures for (i) collection of the fees by DEQ, (ii) deposit of the collected fees into the Sludge Management Fund (the Fund), and (iii) disbursements from the Fund to localities for the testing and monitoring of the industrial wastes.

Patron - Fowler

HB 1511: Disclosure of industrial waste and sewage sludge on land.

Requires the owner of land upon which industrial waste or sewage sludge has been stored or to which industrial waste or sewage sludge has been applied pursuant to a permit issued by the Department of Environmental Quality (DEQ) to disclose such storage or application to a prospective purchaser or lessee of the land. If the owner of the subject land fails to make the disclosure in writing, on a form developed by the Real Estate Board in consultation with DEQ, prior to acceptance of a contract for the sale or lease of the subject land, the prospective purchaser or lessee may institute an action to recover actual damages. The disclosure and remedy provisions of the bill are similar to those in the Virginia Residential Property Disclosure Act.

Patron – Ware

HB 1870: Ground water withdrawal permits; sub- divisions.

Requires the developer of any subdivision in a ground water management area to obtain a withdrawal permit if the total volume projected to be withdrawn by all of the individual wells in the subdivision equals or exceeds 300,000 gallons per month. The bill requires a withdrawal permit for any subdivision that receives plat approval on or after January 1, 2016, and requires that the permit be amended for the construction of any additional well. The bill also specifies the procedure by which a developer may transfer the subdivision's withdrawal permit.

Patron - Bulova

HB 2227: Stormwater management; small agricultural structures; impervious cover.

Expands the stormwater management exemptions available to single-family detached residential structures to also include agriculture structures occupying a footprint of less than 2,500 square feet. The bill also directs the State Water Control Board to adopt a regulatory definition of "impervious cover" that excludes unpaved farm roads that are closed to public travel.

Patron – Webert

Study Resolutions

Bills Passed

HJ 587: Study; DEQ; impact of stormwater regulations on high water table area; report.

Requests the Department of Environmental Quality to conduct a two-year study of the application of the post-development stormwater management technical criteria, as established in the Virginia Stormwater Management Regulations, in areas with a seasonal high groundwater table.

Patron – DeSteph

SJ 273: Study; Department of Environmental Quality; "double-counting" of benefits of EPA Clean Power Plan; report.

Directs the Department of Environmental Quality to study whether the projected health benefits of the pro- posed federal Clean Power Plan, cited by the Environmental Protection Agency (EPA) as a benefit of the Plan, are already expected to result from the ongoing enforcement and revision of existing air quality regulations. The provisions of the resolution are contingent on funding in a 2015 general appropriation act.

Patron – Wagner

Bills Failed

HJ 506: Study; short- and long-term impact of biosolids and industrial waste; report.

Requests the Virginia Institute of Marine Science and the Department of Mines, Minerals, and Energy's Division of Geology and Mineral Resources' Virginia geological survey, in consultation with the United States Geological Survey's Toxic Hydrology Regional Contamination Investigation Program, to study the short- and long-term effects of the storage and land application of industrial wastes and sewage sludge on public health, residential wells, and surface and ground water.

Patron – Ware

HJ 516: Study; DEQ; long-term impact of biosolids and industrial waste; report.

Directs the Department of Environmental Quality to study the long-term effects of the storage and land application of industrial wastes and sewage sludge on public health, residential wells, and surface and ground water.

Patron – Fowler

HJ 619: Study; Department of Rail and Public Transportation to study Metrorail extension; report.

Requests the Department of Rail and Public Transportation to study the efficacy and desirability of extending the Metrorail in Virginia and to report on its findings no later than the first day of the 2016 Regular Session of the General Assembly.

Patron – Lingamfelter

HJ 642: Study; VDOT; recurrent flooding from outfall ditches; report.

Requests VDOT to conduct a one-year study of recurrent flooding from outfall ditches.

Patron – Hodges

SB 1323: Study; Regional Greenhouse Gas Initiative; report.

Requests the Department of Environmental Quality to study the potential for the establishment of a funding source to localities in coastal Virginia for flood resilience that could result by including the Commonwealth as a full participant in the Regional Greenhouse Gas Initiative.

Patron – Lewis

SJ 271: Study; long-term impact of biosolids and industrial waste; report.

Requests the Secretary of Natural Resources, the Secretary of Health and Human Resources, and the Secretary of Agriculture and Forestry to convene a joint task force to review and evaluate existing scientific literature on the impact of biosolids and industrial residuals on human health and the environment.

Patron – Norment

APPENDIX B
EQAC RESOLUTIONS AND POSITIONS NOVEMBER 2014 THROUGH OCTOBER 2015

Date Adopted	Resolution/Position	Page
November 12, 2014	Support for grant funding through the Stormwater Local Assistance Fund (memorandum dated November 13, 2014)	B-2
January 21, 2015	EQAC position on the county's fall cankerworm spray program (memorandum dated January 22, 2015)	B-3
February 11, 2015	EQAC comments on the MITRE building energy technology report (memorandum dated February 16, 2015)	B-5
March 11, 2015	Clarification on the January 21 position on the county's fall cankerworm spray program (memorandum dated March 18, 2015)	B-6
April 8, 2015	Testimony in support of the proposed budget for the environment (memorandum dated April 9, 2015)	B-8
September 9, 2015	EQAC support for the Board of Supervisors legislative position on reducing environmental contamination from plastic and paper bags	B-9

County of Fairfax, Virginia

MEMORANDUM

DATE: November 13, 2014

TO: Board of Supervisors

FROM: Stella Koch, Chairman
Environmental Quality Advisory Council

SUBJECT: Support for grant funding through the Stormwater Local Assistance Fund

In order to reduce non-point source pollution from stormwater runoff, the Virginia General Assembly included Item 360 in Chapter 860 of the Acts of Assembly (the Commonwealth's 2013 - 2014 Budget) which created and set forth specific parameters for the administration of the Stormwater Local Assistance Fund (SLAF).

There is presently funding available for these grants. Last year, Fairfax County received $2.2 million from this fund and this year has applied for an even larger grant. However, funding for SLAF is not presently scheduled for FY16.

Roughly a dozen local governments have already sent letters to Governor McAuliffe asking that this funding be included in his next biennial budget. We are asking that Fairfax County also submit a letter requesting continued funding for the SLAF.

Thank you for your consideration of this request

cc: Edward L. Long, Jr., County Executive
David J. Molchany, Deputy County Executive
Robert A. Stalzer, Deputy County Executive
James Patteson, Director, Department of Public Works and Environmental Services
Randy Bartlett, Deputy Director, DPWES, Stormwater and Wastewater Programs
EQAC file, November 2014

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/

County of Fairfax, Virginia

MEMORANDUM

DATE: January 22, 2015

TO: Board of Supervisors

FROM: Stella Koch, Chairman Stella M. Koch
Environmental Quality Advisory Council

SUBJECT: EQAC position on the county's fall cankerworm spray program

The Environmental Quality Advisory Council (EQAC) has reviewed the County's fall cankerworm spray program. Several organizations have questioned whether cankerworm spraying is needed, largely because the fall cankerworm is native to this area and because it serves as a food source for birds. In order to review the spray program, EQAC invited presentations from representatives of a coalition of organizations opposing the spraying program and from County staff at the December EQAC meeting. EQAC concluded that the County cankerworm spraying program is important to avoid the loss of trees in Fairfax County and that the program follows accepted practices for minimizing the use of pesticides to control the cankerworm threat.

The County's Urban Forest Management Division places its priority on the health of the trees and health of the urban forest ecosystem. Urban Forest Management staff explained and provided references to support the widely held conclusion among forestry professionals that, while a single defoliation event by cankerworms is not expected to be fatal for a tree, a defoliation event makes a tree more susceptible to subsequent insect attacks and alters the quality of the leaves produced. With multiple defoliations, tree mortality will become much more common. While studies have not been conducted to specifically examine tree mortality associated with cankerworms in Fairfax County, the impact of cankerworms in other nearby Virginia areas, such as in the Richmond area and in the Bull Run Mountain area, is clear.

Both County staff and representatives of the coalition of organizations agreed that urban trees are more susceptible to being overstressed by cankerworms because trees in the urban forest face stresses that are worse than the stresses found in the natural environment. Examples of these stresses include the loss of native understory vegetation, compaction of ground near and around trees, and drought.

In order to address the threat of cankerworms to the Fairfax County urban forest, the County employs Integrated Pest Management (IPM) practices, which rely on monitoring insect pest

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 703-653-9447
www.fairfaxcounty.gov/eqac/

populations, determining the most appropriate course of action based on this monitoring and then taking that action. Trees are targeted for monitoring based on aerial surveys that identify areas that appear to be damaged by cankerworms. County staff only sprays when female cankerworm counts exceed 90 per tree (the cankerworms are trapped on a sticky band around a tree). The County has only aerially sprayed four times since 2000 and those spray events covered less than one percent of the County.

In the absence of this spraying program, County staff and the State forester assigned to Fairfax County assert that they not only fear the loss of valued trees, such as oaks, but they also expect impacts on the birds, insects and other wildlife that depend on trees for habit. Moreover, this spraying program has not been shown to, and is not expected to, adversely affect any bird or insect population, including the overall population of cankerworms. The spraying program simply keeps the cankerworm populations from exploding in the urban forest where trees are already stressed from the urban environment.

EQAC appreciates the real concerns raised by individuals and organizations and hopes that the County will continue to pursue alternatives to spraying.

EQAC concludes that the limited and targeted spraying program is a prudent action to protect trees within Fairfax County.

cc: Edward L. Long, Jr., County Executive
David J. Molchany, Deputy County Executive
James W. Patteson, Director, Department of Public Works and Environmental Services
Keith Cline, Director, Urban Forest Management Division, DPWES
Troy Shaw, Chief, Forest Pest Management Branch, DPWES
EQAC file, January 2015

County of Fairfax, Virginia

MEMORANDUM

DATE: February 16, 2015

TO: Planning Commission Environment Committee

FROM: Stella Koch, Chairman
Environmental Quality Advisory Council

SUBJECT: MITRE Building Energy Technology Report

The Environmental Quality Advisory Council (EQAC) has reviewed the report from the MITRE Corporation entitled "Building Energy Technology Recommendations to Fairfax County" and the related county staff perspectives on this report.

We think that the MITRE report provides some insights in developing an energy policy for the county. The staff comments add an important perspective on the practicality of these recommendations. Technological advances are continually evolving, and flexibility is an important factor in the development of county policy. We also note the MITRE report deals primarily with dense high-rise development planned for Tysons Corner, so some of the statements regarding renewable energy may not be applicable to other areas of Fairfax County.

EQAC is supportive of reporting, renewable energy and energy efficiency efforts and we would like to review and contribute to follow up steps.

We thank you for consideration of these comments.

cc: Board of Supervisors
Edward L. Long, Jr., County Executive
David J. Molchany, Deputy County Executive
EQAC file, February 2015

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 703-653-9447
www.fairfaxcounty.gov/eqac/

County of Fairfax, Virginia

MEMORANDUM

DATE: March 18, 2015

TO: Board of Supervisors

FROM: Stella Koch, Chairman Stella M. Koch
Environmental Quality Advisory Council

SUBJECT: Follow-up to January 22, 2015 memorandum on the county's fall cankerworm spray program

EQAC is writing this memorandum because a representative of the coalition of organizations opposing the fall cankerworm spraying program has expressed concern to us that our January 22, 2015 memorandum to you regarding the fall cankerworm spray program has presented the coalition's position inaccurately. We are writing to clarify the coalition's position. This matter was discussed at EQAC's meeting on March 11, 2015, and, by a unanimous vote of members present at that meeting, EQAC approved this follow-up transmittal to you.

Specifically, in an e-mail dated February 17, 2015, Katherine Wychulis took issue with the following language in our January 22 memorandum: *"Both County staff and representatives of the coalition of organizations agreed that urban trees are more susceptible to being overstressed by cankerworms because trees in the urban forest face stresses that are worse than the stresses found in the natural environment."* She stated that this is not an accurate representation of the position taken by the coalition.

The EQAC memorandum built upon statements made by county staff and coalition representatives at EQAC's December 10, 2014 meeting. Because of the concern raised by Ms. Wychulis, we reviewed the recording of the discussion in order to determine if we had inaccurately represented statements from coalition members. County staff was clear in its presentation that urban trees face more stress than trees in other areas; there are several reasons for this increased stress, including a relative lack of diversity of native plants in the understory (there is often competition from non-native species), soil compaction and availability of water. The presentation from representatives of the coalition referenced a study from North Carolina State University that indicated that there are higher populations of fall cankerworm in urban areas as compared to more natural areas; it was suggested that the relative lack of diversity of native plants in urban areas may explain this difference. Also both county staff and coalition representatives noted that providing chickadee nesting boxes could be used to help control cankerworm populations and that this could be explored as a control strategy. However, while statements made by the coalition members agree with observations of county staff that led

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 703-653-9447
www.fairfaxcounty.gov/eqac/

county staff to conclude that urban trees face stresses that make them more susceptible to the fall cankerworm, the coalition members did not draw such a conclusion, and therefore Ms. Wychulis's concern about how we represented the coalition's position is understood. We appreciate the coalition's clarification.

Despite this misunderstanding, EQAC has not changed its conclusion.

We apologize for any confusion about the coalition's positions that was caused by our January 22, 2015 memorandum.

cc: Edward L. Long, Jr., County Executive
David J. Molchany, Deputy County Executive
James W. Patteson, Director, Department of Public Works and Environmental Services
Keith Cline, Director, Urban Forest Management Division, DPWES
Troy Shaw, Chief, Forest Pest Management Branch, DPWES
Katherine Wychulis, Esq.
Ashley Kennedy
EQAC file, January 2015

County of Fairfax, Virginia

MEMORANDUM

DATE: April 9, 2015

TO: Board of Supervisors

FROM: Stella Koch, Chairman
Environmental Quality Advisory Council

SUBJECT: Testimony in Support of Proposed Budget for the Environment

EQAC is pleased to thank the Board for its continued support of the county's environmental initiatives.

We encourage the Board to adopt the environmental funding levels included in the FY 2016 Advertised Budget Plan. We especially note the ongoing support for the Stormwater Program with the increase of the ¼ penny in the Stormwater Service District rate and the funding of the environmental initiatives identified beginning on page 100 of Volume 2 of the Advertised Budget Plan.

Again, thank you for your continued support. Please do adopt the budget as advertised.

SMK

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 703-653-9447
www.fairfaxcounty.gov/eqac/

EQAC Support for Board of Supervisors Legislative Position
on Reducing Environmental Contamination from Plastic and Paper Bags
September 9, 2015

The Board of Supervisors' adopted 2015 Fairfax County Legislative Program included the following position statement:

Reducing Environmental Contamination from Plastic and Paper Bags
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 2015. Such legislation would need to be examined by the County for efficacy, cost, and ease of administration.
(Updates and reaffirms previous position.)

At its September 9, 2015 meeting, EQAC, through a unanimous vote of members present, approved a motion to recommend that the Board of Supervisors retain this position in its next legislative program.

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 2015 Environmental Excellence Awards were:

County Resident Award:	Duane DeBruyne
County Resident Award:	Stephen Robinson
Organization Award:	Friends of Accotink Creek
Organization Award:	McLean Trees Foundation

Duane DeBruyne has been recognized for his dedication and initiative in support of volunteer cleanup efforts in the Occoquan Reservoir. For many years, he has assisted Friends of the Occoquan with its biannual cleanup events, and he has greatly enhanced these events through his enlistment of the Lake Braddock Secondary School's Crew. The nomination that was submitted for Mr. DeBruyne highlights his leadership role in ensuring the success of cleanup efforts by personally collecting trash using his own motor boat and by staying after the cleanup events to ensure the proper disposal of filled trash bags. The nomination also highlights his "let's get this done" spirit by citing his efforts to remove a refrigerator from the water and an abandoned motor vehicle near the reservoir—it concludes that "no clean up challenge is too big for him." The nomination further notes his efforts to inspect and clean up hard to reach areas and his determination to clean up the Bull Run Marina area even when organized clean-up efforts have been focused elsewhere. Mr. DeBruyne's nomination describes him as a "true volunteer committed to keeping the main Fairfax watershed clean" and a "big contributor to the 60 tons of trash pulled from the river."

Stephen Robinson serves as the Grounds Committee Chair of the Spring Hill Community Association. In that capacity, he has developed good working relationships with the account and branch managers of the landscaping vendor for the community in support of environmentally-sensitive maintenance practices, and he has become a valuable source of information to his community about environmentally-sensitive approaches to tree and lawn care. Mr. Robinson also maintains a comprehensive snow removal program for the community, and he coordinates closely with the community's snow removal company to minimize the use of chemicals—he ensures that chemicals are not used unless they are necessary and that, when they are needed, mechanical spreaders are used to reduce product use (by an estimated 50 percent). Other

environmental initiatives Mr. Robinson has championed have included (but have not been limited to):

- Reductions in hours of operation and lighting for a community fountain, thereby saving energy.
- Mitigation of drainage problems around a community gazebo through the installation of catch basins, a French drain and landscaping.
- Management of the community's annual spring cleanup event.
- Support for the installation of two "Solar Sync" advanced weather sensors to reduce irrigation needs (by an estimated 25-30 percent).
- Leadership of efforts to obtain grant funds for implementation of a "Spring Hill Rainwater Mitigation and Filtering Project," resulting in the construction of a 1,200 square foot rain garden.

As noted in its nomination, **Friends of Accotink Creek** is a nonprofit volunteer organization dedicated to restoring, promoting and protecting the water quality, natural habitat and ecological well-being of the Accotink Creek watershed. This organization is being recognized for an impressive range of efforts, including the following:

- Twice-yearly cleanups, each spanning multiple weekends and each involving as many as 300 (or more) volunteers, at key points along a 15-mile stretch of Accotink Creek.
- Partnerships with county agencies, the Northern Virginia Soil and Water Conservation District and private sector entities on stream restoration projects.
- Enhancement of public awareness of watershed issues through a stream naming effort (leading to the naming of Wakefield Run).
- Leadership of plant rescue efforts in conjunction with a stream restoration project construction site.
- Implementation of a freshwater mussel rescue program through which volunteers return stranded mussels back into the stream bed after severe storms.
- Collaboration with the Friends of Lake Accotink Park on a contract for a private study of mussels in order to determine their overall health and sustainability, and the funding of environmental scholarships at Lake Accotink Park.
- Invasive plant removal programs at least twice per month (two sites).
- The planting of native plants at Americana Park and native habitat restoration in a wetland area.
- Additional environmental assessments, cleanup, outreach/education and advocacy efforts, as well as support for other similarly-oriented Fairfax County Park Authority-recognized friends' groups focused on the Accotink Creek watershed.

The **McLean Trees Foundation** was founded in 1970 as a semi-autonomous working committee of the McLean Citizens Association before incorporating in 2004 as a tax-exempt, nonprofit organization. The organization is being recognized for its efforts in support of the maintenance, restoration and enhancement of McLean's urban forest, both on public and private property. Efforts that have been highlighted in the nomination include:

- The planting of thousands of trees and shrubs in parks, on school grounds, at government sites, in commercial corridors, in residential areas, on traffic islands and along sidewalk rights-of-way.
- Community outreach and volunteer efforts supporting tree maintenance/care.
- Other educational, fundraising and community/public relations projects.
- Creation of the McLean Neighborhood Tree Program, through which trees are planted in front yards of residences.

EQAC congratulates all award recipients.

In past years, Environmental Excellence Awards have been awarded to the following people and organizations:

2014

County Resident Award:	John DeNoyer and Ann Csonka (posthumous)
Organization Award:	Potomac Environmental Research and Education Center, George Mason University
Business Award:	Davis, Carter, Scott Ltd
Business Award:	Guernsey Office Products
County Employee Award:	Joyce Doughty

2013

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

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
FAIRFAX COUNTY
ENVIRONMENTAL IMPROVEMENT PROGRAM
PROJECT SELECTION

The following text has been largely copied from the FY 2016 Fairfax County Sustainability Initiatives, available on the Fairfax County website at: http://www.fairfaxcounty.gov/living/environment/sustainability/.

Fairfax County supports environmental initiatives in the board-adopted Environmental Excellence 20-year Vision Plan (Environmental Agenda) through several county agencies and funds. There are also many environmental initiatives and projects carried out by individuals and groups each year.

In its 2012 Annual Report on the Environment, the Environmental Quality Advisory Council (EQAC) recommended that the Environmental Improvement Program (EIP) project selection process be formalized. In response to this recommendation, an interagency staff committee developed a rigorous project selection process to support the board-adopted Environmental Agenda. This process, which was reviewed and supported by EQAC, resulted in funding for several high-quality environmental projects each year, starting in FY 2014.

Under this process, each fiscal year, county agencies have the opportunity to submit proposed projects for review, scoring and consideration. An agency must include technical analysis, including cost/benefit information, as part of its submission. After the submission period closes, a staff committee conducts agency interviews for each project, then evaluates and prioritizes all proposals. A final matrix of prioritized projects is submitted to an executive team comprised of members of the Department of Management and Budget and a deputy county executive for consideration in the county executive's advertised budget.

Staff-developed submission criteria provide guidance to the agencies as they identify and develop their project proposals. Selection criteria guide committee members as they evaluate and prioritize the projects. Both the submission and selection criteria are derived from the board's Environmental Agenda and the six topic areas it addresses: Growth and Land Use; Air Quality and Transportation; Water Quality; Solid Waste; Parks, Trails and Open Space; and Environmental Stewardship.

FY 2016 Funding and Projects

As a result of this process, the FY 2016 adopted budget included funding of $535,000 for environmental initiatives. The specific projects are detailed below:

- **Invasive Management Area Program** – An amount of $150,000 was included to continue the Invasive Plant Removal Program. The Park Authority manages this volunteer program, as well as other invasive removal initiatives. These programs restore hundreds of acres of important natural areas, protect tree canopy and reach thousands of volunteers. Currently more than 10,000 trained volunteer leaders have contributed 34,000 hours of service since the program's inception in 2005, improving over 1,000 acres of parkland.

- **Energy Education and Outreach** – An amount of $75,000 was included for energy education and outreach initiatives. This program is intended to increase the awareness of Fairfax County residents and businesses regarding their energy consumption and to encourage them to reduce consumption. Program objectives include educating residents and businesses about home and workplace energy consumption, explaining the energy assessment (audit) process, and encouraging residents and businesses to undertake energy-savings measures.

- **Green Purchasing Program** – An amount of $10,000 was included for the Green Purchasing Program. This program is designed to support two interns to assist in clearly specifying environmental attributes during the county's procurement process. Fairfax County has a current inventory of over 2,400 contracts and emphasizing environmental attributes such as recycling, energy efficiency, durability and reduced toxicity during the procurement process can contribute to the purchase of green products, creating fiscal and environmental saving.

- **Watershed Protection and Energy Conservation Matching Grant Program -** An amount of $75,000 was included for the Watershed Protection and Energy Conservation Matching Grant Program. This program is intended to support the energy education and outreach initiatives and promote community engagement around sustainability and conservation issues. Specifically, the Watershed Protection and Energy Conservation matching grant program would provide financial incentives to empower homeowners through their associations to implement on-the-ground sustainability projects. The initiative would build on current programs that provide technical assistance, hands-on support, outreach and education to Fairfax County homeowners and residents. Projects would improve water quality, reduce greenhouse gas emissions and conserve energy and water. The $75,000 program funding level would include printing and materials, matching grants of $500 - $3,500 up to $35,000 total for all grants and one limited term full-time position to support the program, conduct outreach and education, site assessments, inspections and other responsibilities.

- **Water Conservation Measures** - An amount of $95,000 was included to install Water Smart Web-based irrigation controllers utilizing evapotranspiration weather technology at 20 park

facilities that have existing irrigation systems with the opportunity to reduce energy use, water consumption and reduce environmental impacts.

- **Lighting Retrofits** – An amount of $105,000 was included for lighting retrofits and upgrades at Fairfax County Park Authority facilities for energy efficiency and conservation. Lighting will be upgraded to LED fixtures and lighting controls will be installed to manage operating hours more efficiently. These energy saving retrofit replacements will reduce approximately 80 percent of energy usage, improve lighting, reduce emissions of greenhouse gases and contribute to the dark skies initiative.

- **Energy Efficiency Measures** – An amount of $25,000 was included to install Variable Frequency Drives (VFDs) at two RECenter pools. A VFD is a type of adjustable-speed drive used to control motor speed by varying motor input frequency and voltage. VFDs have been shown to increase performance in pool pumping applications. A VFD could save up to 60% or more on a pump's electricity usage. The pool pump will operate more efficiently, which will result in a cost savings to the county due to lower electricity use and reduced maintenance costs.

EIP Delivered Projects History

EIP projects were first funded as part of the FY 2004 Carryover Review (September 2004). To date, the total EIP project funding, including the FY 2016 Adopted Budget Plan is roughly $7.7 million. These initiatives generally support the Board of Supervisors Environmental Agenda.

The projects listed below have been supported by the county's General Fund; however other environmental projects have been supported by the Energy Efficiency and Conservation Block Grant (as part of the American Recovery and Reinvestment Act of 2009) and by the county's Contributory Fund (the latter of which funded tree planting partnerships with three non-profit organizations). In addition, several important environmental program areas and initiatives are supported through funding sources outside of the EIP and General Fund.

Projects funded through the EIP to date include:

- Purchase of wind energy.
- Air quality education and Clean Air Partners (media sponsorship to continue public outreach to improve air quality).
- Conversion of 163 Fairfax Connector buses to ultra-low sulfur fuel and the addition of particulate traps to reduce emissions.
- Community cleanup/revitalization/blight abatement projects.
- Toxicity reduction public outreach program.
- Expansion of the business recycling program.
- Pedestrian improvements in the Richmond Highway corridor.
- Riparian buffer restoration.
- Cleanup of unauthorized dumpsites.
- Park Authority stewardship education.
- GIS-data green infrastructure for park natural resource management.

- Low impact development demonstration projects.
- Park trails mapping (comprehensive mapping program to allow the Park Authority to better manage and plan the trail system).
- Invasive Management Area program.
- Landfill gas utilization project at the I-95 Landfill.
- Remote household hazardous waste collection events.
- Tree canopy campaign at county facilities.
- Energy efficiency/renewable energy at county facilities.
- Litter campaign.
- Lighting retrofits and upgrades at Fairfax County Park Authority facilities.
- Energy education and outreach.
- Green Purchasing Program.
- Water conservation and efficiency measures at park golf courses and facilities.

APPENDIX E

ACRONYMS AND ABBREVIATIONS USED WITHIN THE 2015 ANNUAL REPORT

A&F	**Agricultural and Forestal**
ACPAC	**Air and Climate Public Advisory Committee (regional)**
AEDT	**Aviation Environmental Design Tool**
AO	**Administrative Order**
AOSS	**Alternative onsite sewage systems**
APR	**Area Plans Review**
AVC	**Animal-vehicle collision**
BEEAC	**Built Environment and Energy Advisory Committee (regional)**
BEMS	**Building Energy Management System**
BMP	**Best Management Practice**
BMP	**Bicycle Master Plan (county)**
BOS	**Board of Supervisors (county)**
BTU	**British Thermal Units**
C&I	**Commercial and Industrial**
CAA	**Clean Air Act (federal)**
CADD	**Computer-Aided Design and Drafting**
CAP	**Conservation Assistance Program (NVSWCD)**
CAP	**Corrective Action Plan**
CASE	**Corrective Action System Evaluation**
CBC	**Community business center**
$CBOD_5$	**Chemical and Biological Oxygen Demand (5-day test)**
CCL	**Contaminant Candidate List (federal)**
CCTV	**Closed circuit television**
CDC	**Centers for Disease Control and Prevention (federal)**
CEEPC	**Climate, Energy and Environment Policy Committee (regional)**
CESQG	**Conditionally Exempt Small Quantity Generator**
CFL	**Compact fluorescent light**
cfu	**Colony forming units**
CHPS	**Collaborative for High Performance Schools**
CIP	**Capital Improvement Program (county)**
CLF	**Community Labor Force**
CO	**Carbon monoxide**

CO_2	**Carbon dioxide**
CO_2e	**Carbon dioxide equivalent**
COG	**Metropolitan Washington Council of Governments (regional)**
CO-OP	**Section for Cooperative Operations for Water Supply on the Potomac, Interstate Commission on the Potomac River Basin (regional)**
CPN	**Community Power Network**
CRA	**Commercial Revitalization Area (county)**
CRD	**Commercial Revitalization District (county)**
CSAPR	**Cross State Air Pollution Rule (federal)**
CSYP	**County Six-Year Plan for transportation**
CTB	**Commonwealth Transportation Board (state)**
CTP	**Comprehensive Transit Plan (county)**
CHD	**Chronic Wasting Disease**
CY	**Calendar Year**
dB	**Decibel**
dBA	**Decibel (A-weighted level scale)**
DC	**District of Columbia**
DCMP	**Dulles Corridor Metrorail Project**
DECE	**Department of Extension and Continuing Education (county)**
DEET	**N,N-diethyl-meta-toluamide**
DEIS	**Draft Environmental Impact Statement**
DEQ	**Department of Environmental Quality (state—also VDEQ)**
DGIF	**Department of Game and Inland Fisheries (state)**
DIT	**Department of Information Technology (county)**
DMME	**Department of Mines, Minerals and Energy (state)**
DMS	**Dynamic message signs**
DNA	**Deoxyribonucleic Acid**
DNL	**Day-Night Average Sound Level**
DOE	**Department of Energy (federal)**
DOT	**Department of Transportation (county; also FCDOT)**
DPWES	**Department of Public Works and Environmental Services (county)**
DPZ	**Department of Planning and Zoning (county)**
DRPT	**Department of Rail and Public Transportation (state)**
DSWPP	**Drinking Source Water Protection Partnership (regional)**
DTM	**Digital terrain model**
DU/AC	**Dwelling Units per Acre**
DVS	**Department of Vehicle Services (county)**
E&S	**Erosion and sediment**

E/RRF	**Energy/Resource Recovery Facility**
EA	**Environmental Assessment**
EAB	**Emerald Ash Borer**
ECC	**Environmental Coordinating Committee (county)**
EHD	**Epizootic hemorrhagic disease**
EIP	**Environmental Improvement Program (county)**
EPA	**Environmental Protection Agency (federal)**
EQAC	**Environmental Quality Advisory Council (county)**
EQC	**Environmental Quality Corridor (county)**
ES	**Elementary School**
ESF	**Emergency Support Function**
EV	**Electric vehicle**
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**
FHA	**Federal Highway Administration**
FHMIS	**Fire and Hazardous Materials Investigative Services Section (county)**
FIDO	**Fairfax Inspections Database Online (county)**
FJLEPC	**Fairfax Joint Local Emergency Planning Committee (regional)**
FMD	**Facilities Management Department (county)**
FMN	**Fairfax Master Naturalists**
FOG	**Fats. Oil and Grease**
FTA	**Federal Transit Administration**
FY	**Fiscal Year**
g/bhp-hr	**grams per brake horsepower hour**
GHG	**Greenhouse gas**
GIS	**Geographic Information System**
GMU	**George Mason University**
gpm	**Gallons per minute**
GWMA	**Groundwater Management Area**
Hazmat/HazMat	**Hazardous Materials**
HB	**House Bill (state)**
HHW	**Household Hazardous Waste**
HJ	**House Joint Resolution (state)**
HMRT	**Hazardous Materials Response Team (county)**
HMSAMS	**Herndon Metrorail Station Access Management Study**

HOA	**Homeowners association**
HOT	**High Occupancy Toll**
HOV	**High Occupancy Vehicle**
HPwES	**Home Performance with ENERGY STAR**
HSUS	**Humane Society of the United States**
HVAC	**Heating, Ventilation and Air Conditioning**
HWA	**Hemlock Woody Adelgid**
I & I	**Inflow and infiltration**
IAQC	**Interstate Air Quality Council (regional)**
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 (county)**
IPLS	**Integrated Parcel Lifecycle System (county)**
IPM	**Integrated Pest Management**
IT	**Information Technology**
kBTU	**Thousands of British Thermal Units**
kWh	**Kilowatt hours**
LAVC	**Lake Anne Village Center**
LCA	**Land Conservation Award (county)**
LDS	**Land Development System (county)**
LEAP	**Local Energy Alliance Program**
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**
LID	**Low Impact Development**
LT2ESWTR	**Long Term 2 Enhanced Surface Water Treatment Rule (federal)**
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**
$MMTCO_2e$	**Million metric tons carbon dioxide equivalent**
MOU	**Memorandum of Understanding**
MS4	**Municipal Separate Storm Sewer System**
MSMD	**Maintenance and Stormwater Management Division (county)**
MSW	**Municipal Solid Waste**

MT	**Metric tons**
$MTCO_2e$	**Metric tons carbon dioxide equivalent**
MWA	**Metropolitan Washington Area**
MWAA	**Metropolitan Washington Airports Authority (regional)**
MWAQC	**Metropolitan Washington Air Quality Committee (regional)**
NAAQS	**National Ambient Air Quality Standards**
NASA	**National Aeronautics and Space Administration**
NCTR	**National Center for Transit Research**
NEPA	**National Environmental Policy Act**
NMCPCP	**Noman M. Cole, Jr. Pollution Control Plant (county)**
NNIAP	**Non-native Invasive Assessment Protocol**
NOAA	**National Oceanographic and Atmospheric Administration**
NO_2	**Nitrogen Dioxide**
NOx	**Oxides of Nitrogen**
NPS	**National Park Service**
NRMP	**Natural Resource Management Plan**
NRO	**Northern Regional Operations, Virginia Department of Transportation**
NTU	**Nephelometric Turbidity Unit**
NVCT	**Northern Virginia Conservation Trust**
NVRC	**Northern Virginia Regional Commission**
NVRPA	**NOVA Parks/ Northern Virginia Regional Park Authority**
NVSWCD	**Northern Virginia Soil and Water Conservation District**
NVTA	**Northern Virginia Transportation Authority**
NWR	**National Wildlife Refuge**
OCR	**Office of Community Revitalization (county)**
OWML	**Occoquan Watershed Monitoring Laboratory**
PACE	**Property Assessed Clean Energy**
PAWS	**Plan and Waiver System (county)**
PCB	**Polychlorinated Biphenyl**
PDC	**Planned Development Commercial District (county Zoning Ordinance)**
PDRP	**Pre-Disaster Recovery Plan (county)**
PFM	**Public Facilities Manual (county)**
PLT	**Project Learning Tree**
$PM_{2.5}$	**Particulate matter less than 2.5 microns in diameter**
PMT	**Project management team**
ppb	**Parts per billion**
ppm	**Parts per million**

PRM	**Planned Residential Mixed Use District (county Zoning Ordinance)**
PV	**Photovoltaic**
PZP	**Porcine zona pellucida**
QA/QC	**Quality Assurance/Quality Control**
RA	**Reston Association**
RACT	**Reasonably Available Control Technology**
RFP	**Reasonable Further Progress**
RPA	**Resource Protection Area**
RSF	**Recovery Support Function (county)**
SARA	**Superfund Amendments and Reauthorization Act of 1986 (federal)**
SAV	**Submerged aquatic vegetation**
SB	**Senate Bill (state)**
SCR	**Selective Catalytic Reduction**
SDID	**Site Development and Inspection Division (county)**
SDWA	**Safe Drinking Water Act (federal)**
SEA	**Special Exception Amendment (county)**
SFHA	**Special Flood Hazard Area (federal)**
SI2K	**Site Inspection 2000**
SIP	**State Implementation Plan**
SJ	**Senate Joint Resolution (state)**
SLAF	**Stormwater Local Assistance Fund (state)**
SO_2	**Sulfur Dioxide**
SOCs	**Synthetic Organic Compounds**
SOS	**Save Our Streams**
SOV	**Single Occupancy Vehicle**
SQI	**Stream Quality Index**
SRTS	**Safe Routes to School (federal program)**
STEAM	**Science, Technology, Engineering, Art and Math**
SWCB	**State Water Control Board**
SWMP	**Solid Waste Management Plan (county)**
SWPD	**Stormwater Planning Division (county)**
TAC	**Technical Advisory Committee**
TAFIE	**Trash Assessment for Improved Environments**
TCC	**Transportation Coordinating Council (regional)**
TCD	**Thousand cankers disease**
TDM	**Transportation Demand Management**
TMDL	**Total Daily Maximum Load**
TMSAMS	**Tysons Metrorail Station Access Management Study**
TOD	**Transit Oriented Development**
TPB	**Transportation Planning Board (regional)**
TRC	**Thermostat Recycling Corporation**
TSA	**Transit Station Area**

TSG	**Transportation Services Group (county)**
UCMR3	**Unregulated Contaminant Monitoring Rule, third publication (federal)**
UFMD	**Urban Forest Management Division (county)**
µg/m^3	**Micrograms per cubic meter**
µg/L	**Micrograms per liter**
UOSA	**Upper Occoquan Service Authority**
USACE	**United States Army Corps of Engineers**
USDA	**United States Department of Agriculture**
USGS	**United States Geological Survey**
USWG	**Urban Stormwater Work Group (Chesapeake Bay Program)**
UTC	**Urban tree canopy**
VA	**Virginia**
VAC	**Virginia Administrative Code**
VCTIR	**Virginia Center for Transportation Innovation and Research**
VDACS	**Virginia Department of Agriculture and Consumer Services**
VDEQ	**Virginia Department of Environmental Quality (also DEQ)**
VDH	**Virginia Department of Health**
VDOF	**Virginia Department of Forestry**
VDOT	**Virginia Department of Transportation**
VDRPT	**Virginia Department of Rail and Public Transit**
VFD	**Variable Frequency Drive**
VIMS	**Virginia Institute of Marine Science**
VRE	**Virginia Railway Express**
VOC	**Volatile Organic Compound**
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 and Assessment Branch (county)**
WSCA	**Water Supply Coordination Agreement (regional)**
ZAPS	**Zoning and Planning System (county)**
ZEV	**Zero-emission vehicle**
ZOAWP	**Zoning Ordinance Amendment Work Program (county)**