ENVIRONMENT FOR EVERYONE

Environmental Sustainability, Resilience, and Natural Resources Chapter of the City's Comprehensive Plan

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Introduction: Context and Vision

Environmental Leadership

Environmental sustainability, the ability to maintain resources into the future, is a community priority for the City of Falls Church. The City's 2040 Vision affirms that the City will strive to be a leader in environmental sustainability. In many ways the City has matched or exceeded the accomplishments of jurisdictions many times its size. For example, it was named the first Tree City USA in Virginia and first Green Power Community in Virginia. It has been recognized as a SolSmart community and a Community Wildlife Habitat, and has achieved Platinum certification in the Virginia Municipal League Green Community Challenge. The City often leads the state in recycling rates. These accomplishments are supported by hundreds of volunteers who contribute their time and energy to making the City a better place to live. They demonstrate the community's longstanding commitment to environmental protection and improvement.

The City is changing rapidly. Redevelopment, population growth and a changing climate are all impacting the environment. In order to adapt to these changes, environmental goals must go beyond protecting and improving existing natural resources. Incorporating "green infrastructure"[1] in development and infrastructure systems will enhance community quality of life and sustainability. It will also

[1] Green infrastructure uses vegetation, soils and other elements and practices designed to protect, restore or mimic natural processes to manage and improve water and air quality. *US EPA & AmericanRivers.*

Figure 1: Tree canopy cover on commercial streets increases pedestrian traffic, commercial profitability and property values. It also provides shade, cooling, air pollution control, stormwater management and a host of other environmental benefits.

Figure 2: Community involvement and education are essential to the City's environmental protection and enhancement.

improve resilience, the ability to cope with and recover from the impacts of disruptions such as extreme weather events.

Adapting to Change – Population Growth

Falls Church is a small community in which increasing population and significant land redevelopment drive vibrant growth. According to the 2019 update of the Demographics chapter of the Comprehensive Plan, between 2019 and 2045, the City's population is expected to increase by 42 percent. Increased population can mean increased solid waste (trash) generation, increased transportation needs, and increases in noise, air, and water pollution. As the population grows, broader social and communications networks may be required to maintain the cohesion and neighborliness that support environmental awareness and activism in Falls Church.

Adapting to Change - Redevelopment

Between 2000 and 2015, commercial area redevelopment and retrofits affected a total of 34 acres, about 2.3 acres per year[2]. In addition, more than 187 acres of commercial land have been identified as possible future redevelopment sites.

Redevelopment within the City also impacts single-family residential areas. For the five-year period of 2013 to 2017, 129 single-family homes were constructed (primarily tear downs and rebuilds), affecting an estimated 5.5 acres of land per year[3]. This pace of redevelopment in residential neighborhoods will likely continue. Of the 2,300 detached homes in the City, approximately 1,000 are valued less than the land on which they are located, which serves as an estimate of the older housing stock that might be redeveloped in the future.

Redevelopment provides many positive benefits, including increased economic opportunities, opportunities to update architecture, and to reduce energy use and stormwater runoff. Redevelopment can also have negative impacts. Land disturbance affects soils, vegetation, and water management. Failure to plan for the preservation and integration of green space in redeveloped areas can result in the loss of tree canopy and its many environmental benefits. Loss of green space also increases stormwater runoff and associated water pollution, and loss of wildlife habitat and plants.

Figure 3: The use of green infrastructure for stormwater management in redevelopment can make the area more attractive and commercially valuable.

[2] Memo "Pace of redevelopment" January 17, 2017 from Paul Stoddard and Shelley Mastran to Chair Wodiska and Members of the Planning Commission.

[3] Assuming a conforming lot size larger than R-1B (7,500 sq ft) and smaller R-1A (11,250 sq ft).

Adapting to Change - Climate

In addition to the changes within the City, there are ongoing changes outside its boundary. It is important to plan for and protect against the negative impacts of these changes, especially climate change. According to the U.S. Global Change Research Program[4], gradually increasing average temperatures, higher temperature extremes, increased precipitation, and more frequent and severe storm events are anticipated. Strategies to enhance sustainability and resilience will be needed. Mitigation of the City's contribution to climate change can be achieved through reduced greenhouse gas emissions.

Figure 4: Planning for climate change means doing our best to prepare for the worst.

[4] USGCRP, 2018: *Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II* [Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycock, and B.C. Stewart (eds.)]. U.S. Global Change Research Program, Washington, DC, USA, 1515 pp. doi: 10.7930/NCA4.2018.

Vision Statement – Environmental Leadership

Increase the resilience and environmental sustainability of the City by protecting, enhancing and expanding the City's natural resources; increasing the use of green infrastructure; reducing consumption and waste of both energy and materials; and using all possible means to achieve beneficial environmental impacts and enhance community quality of life.[5]

The following goals are based on the vision statement above. These goals should be integrated across all City policies, programs and projects.

- **Climate, Air and Energy:** Enhance livability, sustainability and resilience. Protect the community from air pollution and the effects of climate change, while reducing pollution and greenhouse gas emissions in the City.
- **Stormwater, Streams and Natural Springs:** Protect the water resources of the City and the Chesapeake Bay from the adverse effects of pollution and climate change, reduce flooding, and improve water quality.
- **Urban Forest and Biodiversity:** Protect and enhance the network of trees, green spaces and naturalized land on public and private property throughout the City, and the plants and wildlife it supports.
- **Consumption and Waste:** Avoid waste generation and reduce the harmful pollution and financial costs of waste management and disposal.
- **Community:** Inform, educate, and engage the community in environmental action. Maximize the City's capacity to address environmental issues through participation in regional, statewide, national, and international organizations.

Figure 5: Restoring streams from buried piping to daylight reduces water pollution, flow rate and temperature, and creates opportunities to enhance open spaces and the urban forest.

Figure 6: Reducing waste through mindful consumption, reuse and recycling reduces the environmental and financial costs of its disposal.

[5] In the context of the Comprehensive Plan, a vision statement is a broad, inclusive statement of what is wanted. Goals are general statements about what to do, maintain or change to help achieve the vision.

Environment for Everyone – Scope of the Chapter

This chapter of the comprehensive plan addresses:

- **Climate, Air and Energy:** climate change adaptation and mitigation, sustainability and resilience, air quality, greenhouse gas emissions, energy, green buildings, clean transportation;
- **Water:** water resources, watersheds, floodplains, and stormwater management;
- **Urban Forest and Biodiversity:** the urban forest, including open space, streamside plantings and rain gardens, green roofs, and habitat;
- **Consumption and Waste:** consumption, reuse and solid waste management in industrial, construction, commercial, public and residential activities;
- **Community:** residents, business owners, public entities and visitors in the City, and the broader communities of regional, state, national and international government networks and connections.

This chapter includes goals related to other chapters of the Comprehensive Plan such as transportation (Mobility for all Modes) and parks and open spaces (Parks for the People). This chapter does not explicitly address plans for economic and social sustainability and resilience. Those topics are addressed in other chapters.

Chapter Organization

The remainder of this chapter describes the existing conditions, needs, and planned changes to increase the resilience and environmental sustainability of the City. Each of the goals is addressed in turn. Due to the overlap of environmental issues, the chapter sections are interlinked. Each section concludes with a set of strategies, broad statements about how to achieve the goal under discussion. Policy and program actions are tabulated together, since most address multiple environmental goals.

How To Use This Plan

The Comprehensive Plan serves as the City's official policy guide for shaping the future of the City. This chapter of the Plan establishes priorities for environmental sustainability and resilience and natural resources in planning efforts and projects. This chapter also recognizes that implementation must remain flexible to adapt to changing conditions and priorities. Therefore, this chapter should be used as a "living document."

This chapter should be used as a framework for scheduling projects and documenting completed projects. Project elements described in this chapter are conceptual. Specific design decisions are intended to be worked out on a project-by-project basis during implementation.

Specific tasks in the Plan are scheduled in one of three time frames: short-term, medium term, and long term. Those terms refer to the following ranges:

Timeframe	Expected Completion
Short Term	2020 to 2022
Medium Term	2023 to 2025
Long Term	2026 or later

Development Review

During development review, developers, staff, and boards and commissions should refer to the vision, goals, and strategies enumerated in this chapter as well as specific policies and projects. Additionally, implementation plans that are adopted pursuant to this chapter, as well as any implementation plans that are included in the chapter by reference, should also be considered. All of these referenced plans supplement and complement the City's Comprehensive Plan and should be used to guide development of the City. A list of these plans is included in Appendix A.

Climate, Air and Energy

Goal: *Enhance livability, sustainability and resilience. Protect the community from air pollution and the effects of climate change, while reducing pollution and greenhouse gas emissions in the City.*

The changing climate (see projections for the DC metropolitan area in Figure 7) jeopardizes human health and well-being. Both flooding and high temperatures pose risks to human health and safety. Severe weather also impacts economic stability. Storms and increased precipitation can disrupt power supplies, transportation and commercial operations. Higher average temperatures and temperature extremes may overload building cooling systems and the electrical grid.

Air pollution increases when temperatures rise. Rising air pollution is especially dangerous for vulnerable populations, such as children and the elderly. Air quality in the area has improved significantly in the past 30 years. However, ground-level ozone, mainly a by-product of internal combustion vehicles and equipment, still exceeds federal health-based air quality standards.

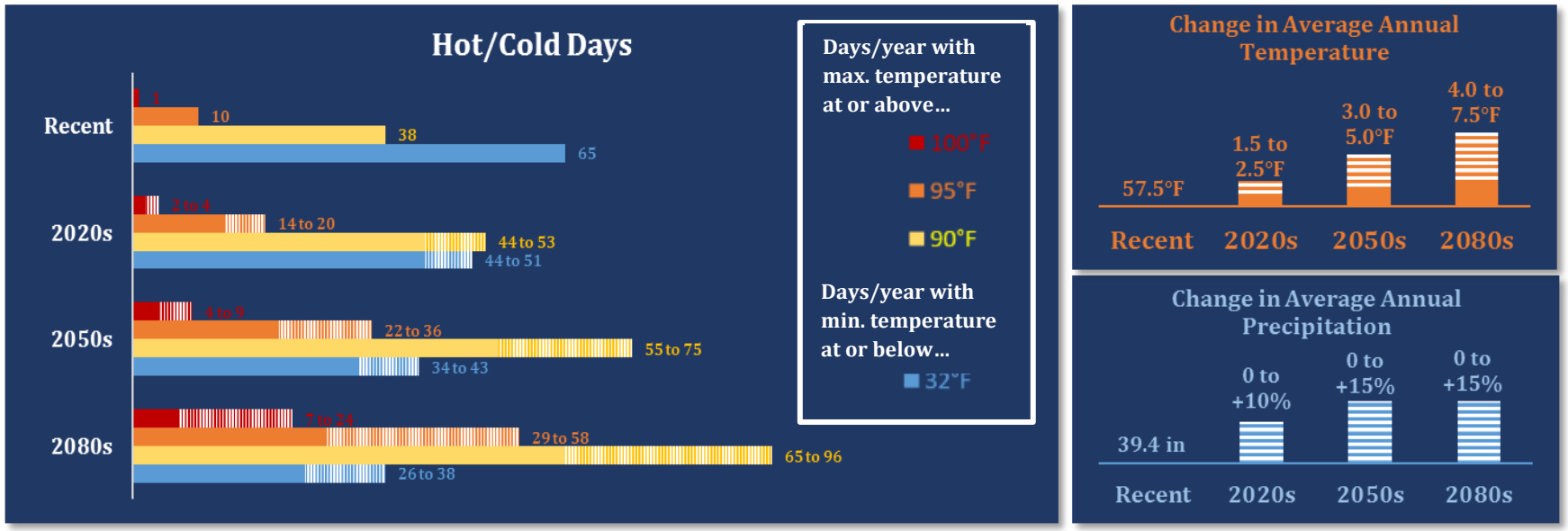

Figure 7: Increasing average temperatures, higher temperature extremes, increased precipitation and more frequent and severe storm events are occurring and are predicted for the future in the D.C. metropolitan region as a result of global climate change. *Graphic derived from NASA_Washington_Metro_Area_Climate_Informaton_Handout accessed 5:44 p.m. 6/8/2019 on* https://www.mwcog.org/documents/2016/3/2/nasa-washington-metro-area-climate-information-handout-climate-change/

Existing Policies, Programs, and Projects

Air Pollution and Noise Ordinances: The City of Falls Church has an air pollution ordinance to preserve, protect, and improve its air resources.[6] The ordinance covers emissions from stationary sources such as power generation plants, waste incinerators and manufacturing facilities; on-road mobile sources such as vehicles; and off-road mobile sources such as construction equipment and lawn and garden equipment. The City also has a noise ordinance that limits the times at which trucks and small equipment are allowed to operate.

Greenhouse Gas Emissions Reduction Resolution: City Council Resolution 2017-12 adopted as goals for the City the regional greenhouse gas reduction goals established by the Metropolitan Washington Council of Governments. The commitment is to mitigate impact on climate change by reducing emissions of greenhouse gases below 2005 levels by 20 percent by 2020 and 80 percent by 2050.

Energy Transition Subcommittee: Recognizing the need for specific action to address energy use and greenhouse gas emissions, the City formed an energy efficiency/climate change task group in 2009, which reformed in 2016 as the Energy Transition Subcommittee of the Environmental Sustainability Council. The group's mission is to take actions to establish the City as a leader in community energy management in Virginia.

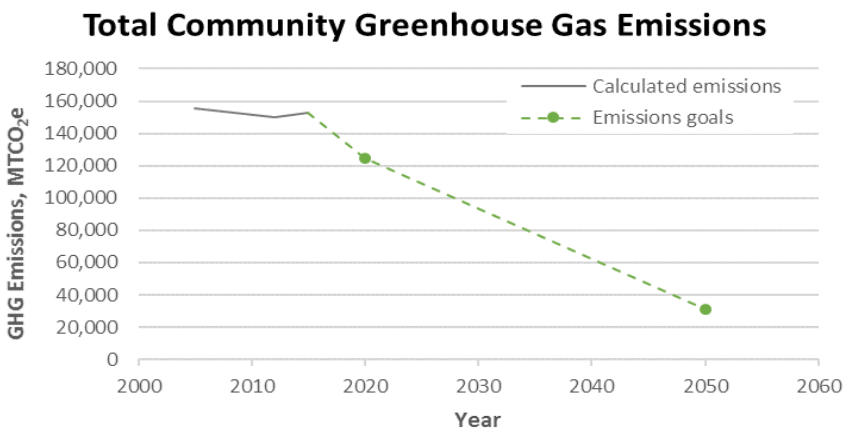

Figure 8: The greenhouse gas emissions reduction goals established by MWCOG and adopted by the City cannot be achieved by local actions alone. However, the City can implement policies, programs, and projects that will contribute to their achievement, and can work with neighboring jurisdictions and other organizations to contribute to the reduction of emissions on a broader scale.

Greenhouse Gas Emissions Inventory: The Metropolitan Washington Council of Governments provides the City with data on community greenhouse gas emissions derived from their regional inventory. These data enable the City to identify major sources of emissions and prioritize efforts to reduce them.

Decreasing energy use: The City has replaced all its traffic signals and some of its streetlights with lower energy use light-emitting diode (LED) lighting. Energy efficiency improvements are implemented in public buildings as failed or aging equipment is replaced. Home and business owners are encouraged to check for energy waste using thermal cameras available at the Mary Riley Styles Public Library.

[6] City Code, Chapter 14.

Green Commercial Buildings: The "Voluntary Concession" process in development planning and review (where special exceptions to zoning have been requested) has been used to encourage sustainable construction and US Green Buildings Council Leadership in Energy and Environmental Design (LEED) certification of new buildings and the inclusion of environmentally beneficial features such as green roofs and electric vehicle charging stations. As of 2019 there are six LEED-certified commercial buildings in the City.

Green Public Buildings: The City has a green building policy for publicly owned non-school facilities, which aims for a minimum of LEED Silver certification.

Green Homes: This City program recognizes single-family homeowners who build to certified sustainability standards. Falls Church has at least 36 certified green homes.

EPA Green Power: Residents, businesses, and government operations together offset two to three percent of the City's grid emissions through the purchase of renewable energy certificates.

Solsmart Silver: The City has achieved Solsmart Silver designation through simplification of solar installation permit procedures and participation in Solarize NOVA. At least 25 homes and businesses in the City have solar installations, with a power generation capacity of more than 150kW.

Evaluation of Needs

Flooding and heat are the primary climate concerns in the City. Local adaptation and resilience to the changing climate are essential for the well-being of the community. They must be a key focus of infrastructure improvement and future community development. The City must also continue to mitigate its impact on climate change by reducing greenhouse gas emissions, contributing what it can to address an important global issue. Clean energy generation from non-fossil fuels and reduced energy use in both transportation and buildings are essential to achieve this goal.

Infrastructure, buildings, and landscapes, should be designed or modified to reduce the impacts of weather extremes. Heat mitigation and resilience requires forethought in building, landscape, and infrastructure design[7]. Building orientation, construction material selection and site landscaping can all contribute to optimal protection from increasing heat and extreme weather.

Reducing building energy use also reduces the impact of weather extremes. In public, commercial, and residential buildings (except in specialist sectors such as food sales and service), energy use is highest for heating, ventilation, air-conditioning (HVAC) and lighting[8]. The key to energy use reduction in most buildings is therefore to minimize losses by improving insulation and air sealing and using more efficient HVAC equipment and lighting.

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[7] https://www.epa.gov/green-infrastructure/reduce-urban-heat-island-effect. Accessed 11/6/2019 12:02 p.m.
[8] https://www.eia.gov

Buildings are the largest contributors to greenhouse gas emissions in the City (see Figure 9). Building for optimum resilience contributes significantly to emissions reductions. Adding renewable energy sources and reducing the use of fossil fuels such as natural gas, as well as incorporating net-zero-ready building designs, can also improve building resilience and decrease greenhouse gas emissions.

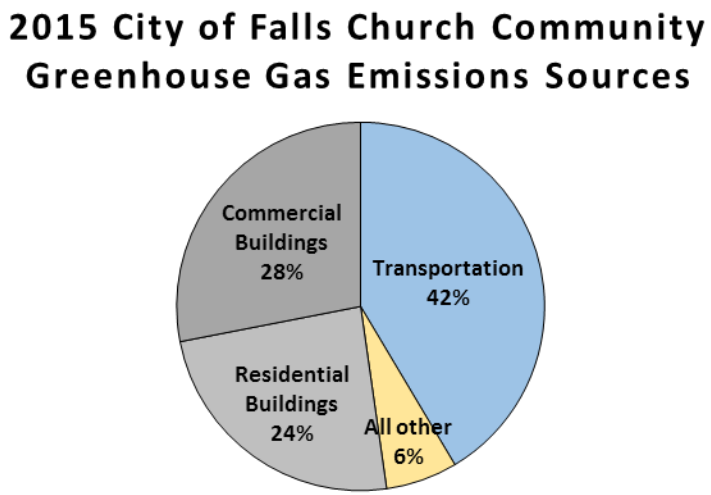

Figure 9: Greenhouse gas emissions in the City of Falls Church come primarily from the electricity and natural gas used to power, heat and cool buildings. Transportation is also a big contributor – mostly cars and trucks, which contribute more than 85% of transportation-related emissions.

Transportation is the other major contributor to greenhouse gas emissions in the City (see Figure 9), and is also a major source of air and ground pollution. Changing transportation use away from a reliance on automobiles to meet future travel demands is addressed in the Mobility for all Modes chapter of the Comprehensive Plan. Many of the actions proposed in that chapter, such as increasing

Figure 10: Local generation of renewable energy increases community resilience and decreases greenhouse gas emissions.

walking, cycling and the use of transit options, and managing cut-through traffic, also support the goal of reducing local pollutant emissions. Switching to alternative cleaner modes of transport such as electric vehicles is an important path to reducing pollution and urban heat.

Strategies

The following strategies will support the City's efforts to meet its climate, air and energy goal:

1. Ensure that sustainability and resilience are addressed as a priority in all refurbishment, development and redevelopment planning, for public, commercial and residential buildings and all infrastructure.

2. Reduce energy consumption and increase energy efficiency, especially through building design and refurbishment.
3. Use renewable energy sources and reduce the use of fossil fuels (including natural gas) for public facilities, and install renewable energy generation facilities where possible. Support and encourage businesses and residents to do the same.
4. Actively promote and support changes in transportation use away from reliance on automobiles, to increased walking, cycling and transit options.
5. Reduce the use of fossil fuels in the City, especially in transportation, by creating infrastructure for electric vehicle charging, and supporting and promoting the use of electric cars.
6. Maintain and protect mature tree canopy coverage, and extend the urban forest and green spaces, to lower air and ground temperatures, reduce pollutant emisisons from asphalt, and absorb airborne pollution.
7. Inform, educate and engage the public in actions they can take to support this goal.

Figure 11: The provision of electric vehicle charging infrastructure supports and encourages the use of quiet, cool, near-zero emissions vehicles and attracts visitors to the city.

Stormwater, Streams, and Natural Springs

Goal: *Protect the water resources of the City and the Chesapeake Bay from the adverse effects of pollution and climate change, reduce flooding and improve water quality.*

Impervious surfaces such as buildings, roads, parking lots, and driveways cover an estimated 45 percent of City land. When it rains, impervious surfaces contribute to fast-moving, high-volume runoff water flows. As the climate changes, stormwater volumes and flow rates are expected to increase. Higher flow rates raise the risk of flooding streets and homes. Stormwater can also enter the sanitary sewer system, causing sewer back-ups and cross-contamination.

Runoff and flood waters carry sediment and other pollutants into the storm drain system. From there the contaminated water flows directly to City streams, where heavy drainage flows can damage stream function, infrastructure and biodiversity. Heat from elevated air and land temperatures is also detrimental to streams. Stream water ultimately flows into the Potomac River and the Chesapeake Bay. It is not treated or mechanically filtered. In compliance with Virginia's Watershed Implementation Plan for the Chesapeake Bay Total Maximum Daily Load, the City is mandated under state and federal laws to reduce both chemical and sediment pollutant loads to its streams.

Figure 12: Most of Tripps Run, one of the City's two main waterways, runs underground or in concrete channels. Natural processes of sedimentation and filtration cannot occur in these types of manmade water courses.

The City has plentiful springs. They are also vulnerable to pollution from fertilizers, weed/pest control chemicals, and lawn and garden equipment, which contributes to degraded water quality.

Existing Policies, Programs and Projects

Stormwater Enterprise Fund: In 2014, the City created a fund for stormwater management. Its revenues, generated by a fee based on impervious coverage, fund the stormwater program. Voluntary concessions from commercial and mixed-use development in the City have provided payments to the stormwater fund to plant vegetation within the Four Mile Run and Tripp's Run watersheds.

Stormwater Ordinance: The City has a stormwater ordinance (Chapter 35 of the municipal code) that ensures land is used, developed and redeveloped in a manner that protects water quality. It prohibits illicit discharges and provides that adequate stormwater management and erosion and sediment control measures are taken before, during, and after land disturbance, development, and construction. The ordinance also limits the area of land disturbance to protect existing vegetation, which helps to prevent erosion. Through the redevelopment process, developers must meet the requirements of the latest Virginia Stormwater Act, which improves the quality of stormwater runoff and reduces the quantity of runoff from existing levels.

Municipal Separate Storm Sewer System (MS4): The Virginia Department of Environmental Quality requires the City to operate under an MS4 permit, which requires that pollution discharged through the City's stormwater system is minimized. Pollution reduction targets for nitrogen, phosphorus, and sediment are mandated by the State.

System Maintenance: A full-time Operations crew inspects and maintains the City's stormwater conveyance infrastructure. Street sweeping conducted in five cycles per year collects between 200 and 250 tons of debris. Fall leaf collection helps keep excessive amounts of organic matter out of the drain system.

Floodplain Districts: These are defined and protected by the provisions of the Municipal Code (Chapter 48, Article IV, Division 14). The City participates in the National Flood Insurance Program and the associated Community Rating System Program.

Chesapeake Bay Program: The City participates in the Chesapeake Bay Program, which directs the restoration of the Chesapeake Bay. As part of this program, the City has identified Resource Protection Areas, which include 100-foot buffers on both sides of City streams and non-tidal wetlands. Development is strictly limited in these areas. The rest of the City is designated as Resource Management Areas, where development is managed to protect water quality.

Stream Restoration: The City has restored several streams, including Coe Branch and Pearson Branch, and has identified others for future restoration and potential restructuring to create open streams, a process known as daylighting.

Stormwater Detention and Filtration: The City has installed and now maintains stormwater detention and filtration systems as well as several raingardens in parks and on the streets.

RainSmart: The City has contracted with the Village Preservation and Improvement Society to run RainSmart, an education, outreach and grant funding program to support stormwater management on residential properties.

Rainwater Reuse: The City has a rainwater collection cistern at the Property Yard which is used for irrigation and vehicle and equipment washing. Rainbarrels have been available to homeowners in the City at cost for several years, and are now available with grant funding through the RainSmart program.

Pesticide Use: The City minimizes the use of chemical pest control on public property. Private entities are encouraged to do the same.

Evaluation of Needs

The City's existing stormwater conveyance system is undersized in comparison to the volume of runoff entering the system. Flooding occurs frequently in parts of the City where the system is overwhelmed, especially by high-intensity rainstorms. Recent storm-related flooding has posed severe risks to public safety and impacted commerce. Inflow to the sanitary sewer system from flooded streets contributes to sanitary sewage backups into homes, causing property damage and health risks.

Capital maintenance of the existing stormwater system is required. Approximately 28 percent of the system is composed of corrugated metal piping, most of which has exceeded its service life. Pipe failures not only impact stormwater flow, but could also cause sinkholes, a public safety hazard and road maintenance risk.

As the climate changes, annual rainfall and the frequency and severity of storms are anticipated to increase. In order to ensure future sustainability and resilience, stormwater runoff speeds and volumes need to be reduced. The capacity of the drainage system will also need to be increased, within the limitations imposed by downstream infrastructure. The 2012 Stormwater Management Plan focused on water quality improvements. Attention must now turn to decreasing runoff and increasing system capacity.

Redevelopment projects in commercial zones are required to keep stormwater runoff at or below pre-development rates, and some have achieved flow reductions. Redevelopment in residential zones needs to meet similar standards. Residential properties that are not being redeveloped also have the potential to retain and reduce run-off through tree planting, landscaping alterations, and other stormwater management practices.

Figure 13: Rain gardens, such as this one at the Thomas Jefferson Elementary School, detain and filter stormwater runoff. With appropriate signage, they can also be useful educational tools. Home-scale rain gardens can be constructed.

The City's two main streams, Four Mile Run and Tripp's Run, are partially channelized, eroded, polluted, and overgrown with invasive species. Both streams, as well as other smaller branches, need restoration to better manage flow and reduce pollution. Large portions of Tripp's Run are underground. Daylighting the stream would provide water quality and community benefits as well as potentially increased flow capacity.

Compliance with state and federal mandates to reduce sediment, nitrogen, and phosphorus from stormwater runoff will be a challenge. Even if funding were available, there is insufficient public

land available to construct the facilities needed to adequately manage the City's stormwater.

Strategies

The following strategies will support the City's efforts to meet the goal for stormwater, streams and natural springs:

1. Reduce stormwater runoff flow velocity and volume, including anticipated climate-related volume increases.
2. Reduce pollution entering the stormwater system.
3. Protect the City's water resources, and restore or daylight streams where possible.
4. Expand green spaces and develop greenways, including waterways, to connect them.
5. Use green infrastructure (such as trees, rain gardens and other landscaping) rather than grey infrastructure (pipes, detention ponds, filtration structures) for stormwater management whenever possible.
6. Maximize reuse of rainwater to reduce stormwater system capacity needs.
7. Monitor the Stormwater Utility Fee to ensure it is sufficient to support necessary capital improvements.
8. Convert floodplain properties to parks and buffer zones.
9. Educate and incentivize residents and businesses to manage stormwater and reduce impervious area on their properties.
10. Increase water-efficient landscaping, including tree canopy cover, on residential, commercial, and public properties.
11. Build infiltration and retention systems for flow control and pollution reduction where space is available.
12. Repair, rehabilitate and expand stormwater conveyance infrastructure.

Figure 14: Grey infrastructure such as underground pipes, detention tanks and filters can be used for stormwater management. It can be very expensive to build and maintain, and lacks the environmental, aesthetic and community benefits of more natural, green infrastructure such as restored streams.

Urban Forest and Biodiversity

Goal: *Protect and enhance the network of trees, green spaces and naturalized land on public and private property throughout the City, and the plants and wildlife it supports.*

The urban forest—the network of trees and green spaces on public and private property throughout the City—is a critical part of the City's economic and civic well-being. It provides many environmental benefits, including carbon capture, oxygen emission, filtration and capture of air pollution, reduced energy use through shading and shelter, stormwater flow management and filtration, improved soil condition, diverse wildlife habitat, beauty, and increased human health. The urban forest also contributes to real estate values and to the appeal and walkability of City business districts.

Falls Church has a 46 percent tree canopy cover based on 2013 data.[9] Native trees are still prevalent on public and private property throughout the City, providing a forest habitat for wildlife. City-owned natural areas comprise about 20 acres, primarily in Crossman, Howard E. Herman, Cavalier Trail, and Cherry Hill Parks. Much of this land has been cleared of invasive plants and replanted with native species.

Figure 15: Trees on residential streets provide environmental, health and aesthetic benefits and increase real estate values.

[9] "A Report on Greater Fairfax County's Existing and Possible Tree Canopy," Draft Report, University of Vermont Spatial Analysis Laboratory, 2013.

Existing Policies, Programs and Projects

Tree City USA: Falls Church was the first community in Virginia to celebrate Arbor Day and the first Tree City USA in the Commonwealth.

Specimen Trees Program: The City has about 50 Specimen Trees, which have special protection against damage or removal.

Urban Forestry Staff: The City has an Arborist and an Urban Forester, who are responsible for managing all City-owned trees and overseeing urban forest-related permits and enforcement.

Urban Forestry Commission: The City's five-member Urban Forestry Commission makes recommendations on relevant legislation, plans, policies, and programs. It also advises the City Arborist, City Council, and City Manager on tree-related matters.

Tree Inventory: The City has a complete inventory of City-owned or -regulated trees. The original dataset was generated in 2004, and the tree inventory has been updated on a continual basis since 2015.

Tree Ordinance: The City's tree ordinance regulates tree removal and tree contractors. Other City codes require single-family residential developments to preserve/replant trees to achieve 20 percent canopy coverage within 10 years.

Community Wildlife Habitat: The City has been designated a Community Wildlife Habitat by the National Wildlife Federation. This all-volunteer program tracks individual Certified Wildlife Habitats in the City and links residents with educational resources.

Neighborhood Tree Program: The City partners with the Village Preservation and Improvement Society on the Neighborhood Tree Program, to plant shade trees in street rights-of-way and on private property within 15 feet of public streets.

Evaluation of Needs

The City needs to protect and expand tree canopy coverage to ensure environmental sustainability and resilience, city character, and adequate wildlife habitat. Although current coverage is high for an urban area, the pace of residential redevelopment is resulting in the replacement of mature trees with young ones, as mature trees often cannot be saved when building to lot limits. Commercial and mixed-use development projects are not replacing all removed trees. This can affect stormwater management and give rise to higher local temperatures where the shade and evaporative cooling effects of trees have been lost. Removing trees also results in missed opportunities to create a unique sense of place in the City of Falls Church.

The city is experiencing a pace of development not seen in decades. The rapid rate of change in population, redevelopment and climate mean the city's development ordinances and regulations should be revisted and updated. Broader outreach is necessary to educate homebuyers and developers on the importance and benefits of the urban forest, and engage them in its support. Planning and zoning ordinances and processes (including residential and commercial

area development), need to be updated to better preserve and expand tree canopy.

Climate change not only increases the need for the benefits trees deliver, but may also affect the forest itself - for example, it may alter the selection of the best species for long term forest maintenance and tree succession planning. These issues can be addressed in an Urban Forest Management Plan. Such a plan would also improve program efficiency and accountability by defining responsibilities and prioritizing urban forestry resources and goals.

Strategies

The following strategies will support the City's efforts to meet the goal for urban forest and biodiversity:

1. Optimize the use of the City's resources in achieving urban forestry goals.
2. Protect the City's tree canopy cover and increase overall tree coverage to 50 percent.
3. Preserve mature trees during residential redevelopment.
4. Implement green space requirements on all mixed use and commercial development projects, including projects to which "special exceptions" apply.
5. Continue to expand space for tree plantings and stormwater control in public areas, through increased street tree planting areas, greenways, park space, urban agriculture, publicly recognized historic landscapes and other green infrastructure.
6. Inform, educate, and engage the community in actions to support the urban forest and habitat, and increase City support for urban forestry volunteer programs.
7. Restore and protect the natural vegetation in stream corridors and other natural areas.
8. Encourage conservation landscaping, including native plantings, leaf- and lawn-mulching, and urban agriculture on public and private property.

Figure 16: Habitat restoration, such as this volunteer project in Crossman Park, helps to stabilize the landscape, control invasive species and provide native plants to support local wildlife. It also brings community members together in a healthy and beautiful outdoor environment.

Consumption and Waste

Goal: *Avoid waste generation and reduce the harmful pollution and financial costs associated with waste management and disposal.*

Material resources, all of the things used, bought, worn, or eaten by people in their work or daily lives are environmentally costly. Rather than thinking of these things as disposable, one of the key tenets of environmental sustainability is to avoid waste. The familiar slogan for sustainable waste management, "Reduce-Reuse-Recycle", is expressed in order of preference – *reduction* of material use is the best way to avoid waste; *reuse* is the next best approach; *recycling* is less desirable because it generally requires the input of energy. Waste disposal, which inevitably generates pollution, should be avoided whenever possible.

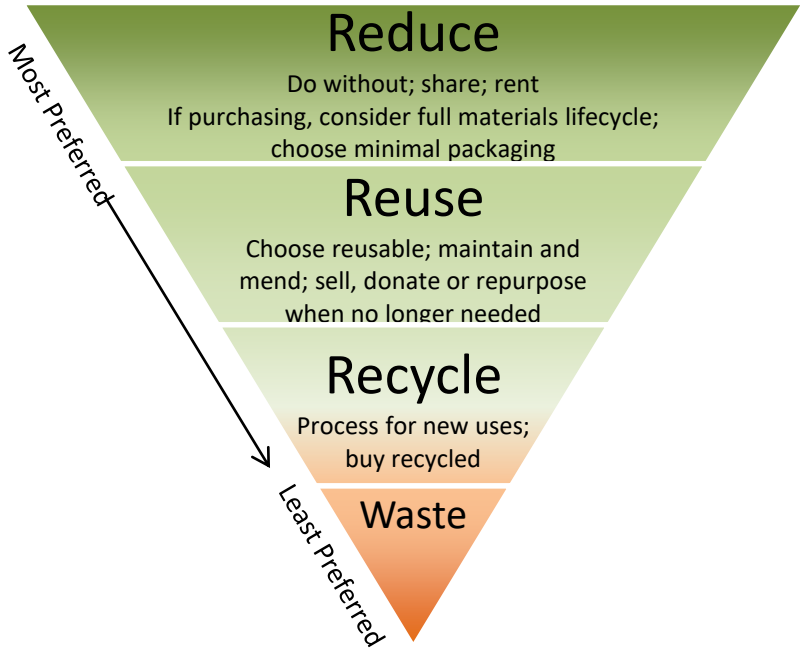

Figure 17: Waste avoidance is an important consideration when making decisions about the purchase and use of material goods.

City residents and businesses discard an estimated 12,000 tons of materials every year. More than half goes to mixed-use recycling facilities. Most of the remainder is burned in a waste-to-energy incinerator. Even without the City's anticipated population growth and rapid redevelopment, waste disposal poses significant challenges.

Waste avoidance not only preserves material resources, but also reduces the pollution and costs associated with waste management and disposal.

Existing Policies, Programs and Projects

Waste Removal: The City has a contract with a waste hauling company for removal of trash, recyclables and yard waste from just over 3,000 single-family homes and townhouses. Businesses and multi-family homes (apartments and condominiums) arrange private contracts for trash and recycling disposal.

Pay As You Throw: The City charges a small supplement for excess residential trash and yard waste. A fee is also charged for pick-up of bulky items such as furniture and appliances.

Recycling: Recyclable materials from residents, City offices and recycling cans in streets and parks are delivered to a mixed-use recycling facility for sorting and resale or disposal. A simple app, RecycleCoach, provides waste disposal information customized for City residents. The City also has a recycling center where residents and businesses can drop off separated metal, glass and plastic containers, cardboard and paper, and used textiles.

Composting Program: The City's comprehensive composting program includes subsidized residential curbside compost pick-up, a drop-off facility open to residents and businesses, and free classes in backyard composting.

Figure 18: About 30% of America's food supply goes to waste. Composting redirects food from the waste stream, makes better use of the embodied nutrients and reduces greenhouse gas emissions and pollution from waste transportation and rotting food.

Community Clean-Up: The City conducts two annual volunteer-led Community Clean-up Days and one Household Hazardous Waste and Recycling Extravaganza.

Library: The Mary Riley Styles Public Library is and has always been a center of reuse for the community. In addition to hard media such as books, and audio and video recordings, it has extensive electronic collections. Innovative lending programs such as thermal cameras and patio gardening tools support positive environmental action.

Equipment and Supply Resale: The City participates with other governments in the resale of used equipment and supplies.

Construction Material Recycling: Asphalt roads in the City are maintained using a process which mills and reuses existing surfacing materials on-site. Broken concrete from City operations is delivered to a specialized recycling facility.

Figure 19: The recycling center on Gordon Road offers free drop-off of sorted recyclable materials for businesses and residents.

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Evaluation of Needs

Many communities globally and across the US are adopting "Zero Waste" goals. This concept does not literally mean achieving no waste at all. The term is used to embody "the conservation of [all] resources by means of responsible production, consumption, reuse, and recovery of products, packaging, and materials…",[10] with the overall goal of getting waste as close to zero as possible. Because the City is a center of consumption, not production, the ideal approach to waste management would therefore focus directly on consumption reduction.

City government has no direct control over what businesses and residents choose to consume or waste. Program options for Zero Waste include managing the City's own procurement and operations processes, and conducting education and outreach to the community. Zero Waste has been a goal for some recent public and private events. Policies regarding commercial and residential redevelopment could incentivize "Zero Waste" goals for construction management processes.

Opportunities to reuse materials could be expanded. The City sells unwanted equipment in a local inter-government auction, and the library sells used books. Several businesses in the City buy and sell used consumer goods, from cars to clothing. The annual Recycling Extravaganza also collects items for reuse. There is more potential for reuse of unwanted materials and goods from City businesses and residents.

Global markets for recyclable materials have recently shifted. The recyclability of materials from business and household waste is increasingly limited. Only cardboard, some types of plastic, and aluminum and other metal cans currently have value as recyclable commodities. Glass is recyclable locally only if it is collected separately. As part of mixed recyclable materials collection, it is a contaminant that is difficult to handle and remove.

The City provides waste collection services for single-family homes, but not for commercial enterprises or multi-family homes. Changing this approach might offer the opportunity to consolidate and organize waste pick-up to reduce the costs, inefficiencies, and pollution associated with multiple independent contractors operating across the City.

Figure 20: The City may have to consider separate drop-off containers or dual stream curbside pick-up for glass. Both options are costly and potentially environmentally detrimental.

[10] https://www.epa.gov/transforming-waste-tool/how-communities-have-defined-zero-waste Zero Waste Alliance International definition, December 2018.

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Strategies

The following strategies will support the City's efforts meet the goal for consumption and waste:

1. Continue to provide comprehensive waste disposal services for City residents.
2. Educate homeowners, businesses and building owners about solid waste management and support and incentivize efforts to improve. Consider providing waste management services to businesses and multi-family dwellings.
3. Support and incentivize reuse programs, including businesses, organizations and expanded City programs.
4. Incorporate waste reduction management specifications in development requirements.
5. Expand the composting program to enable full community participation.
6. Implement education and outreach initiatives on "Zero Waste" principles and how they can be achieved.

Figure 21: Bikes for the World, who participate in the City's Recycling Extravaganza, repair donated bikes and ship them to developing countries, where having a bicycle can transform a life. Reuse opportunities across the City include commercial ventures such as the auction house, antique and clothing resale stores and automobile trading; on-line exchange and sales networks such as Craigslist and NextDoor, charitable organizations such as Homestretch and VPIS's "Treasures from the Attic", and home yard sales.

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Community

Goal: *Inform, educate and engage the community in environmental action. Maximize the City's capacity to address environmental issues through participation in regional, statewide, national and international organizations.*

Community members and visitors have a significant effect on the environment within the City. The City's internal community includes residents, business owners and public entities (City government and schools). Many visitors also come to the City. Some work in or patronize local businesses, and some come to visit residents, cultural attractions, parks and other amenities. Others pass through the City on their way to other destinations. Individual and group actions by community members and visitors in every goal area of this Plan chapter, whether consciously chosen or inadvertent, affect the environment.

The wider world also impacts environmental sustainability in the City. The actions of many wider community groupings — regional, statewide, national and international — have local effects. Cooperative action and advocacy at all levels can support and enhance capacity to achieve local goals.

Existing Policies, Programs and Projects

Boards & Commissions: The City Council has eighteen advisory Boards and Commissions, whose volunteer members provide advice on regulations, policies, practices and plans. The Urban Forestry Commission, Environmental Sustainability Council, and Recreation

Figure 22: Direct interaction between government and the public through pop-up displays and public meetings stimulates community conversations and informs decision-making.

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and Parks Advisory Board all have special responsibility to support environmental and green space management in the City.

Village Preservation and Improvement Society: The Village Preservation and Improvement Society (VPIS), founded in 1885, is an active nonprofit citizen volunteer organization in the City of Falls Church. The Society works to preserve the City's natural and built environment, historic structures and landmarks, and promotes cultural activities. VPIS works closely with the City on environmental programs including the Neighborhood Tree Program, Rainsmart and Operation EarthWatch.

Other Volunteer-Led Programs: Community members lead some of the City's most effective environmental programs, and hundreds of volunteers participate in environmental action in the City every year. Volunteers organize and lead the City's Community Clean-up Days, and help with the Recycling Extravaganza. The City's Habitat Restoration Team and Community Wildlife Habitat certification are also volunteer-led programs. High school students and their teachers help with water quality monitoring and other citizen science projects.

Communications: Residents and others may subscribe to the City's electronic newsletter, the Focus, which provides information about City programs and events every week. The City also has Facebook and Twitter accounts. These channels are used to communicate not only general information about government activities and special events, but also emergency information. The City has a separate electronic emergency alert system, accessible through the website, to which people can subscribe. Government actions and some events are advertised in the local free newspaper, the Falls Church News Press. Letters are sent to property owners when infrastructure improvements such as paving or traffic calming are planned, but no direct communication goes to residents in multi-family housing, the largest and fastest-growing sector of housing in the City.

Intergovernmental Cooperation: Formal cooperative working agreements and informal information and resource sharing help to manage interactions between the City and the adjoining jurisdictions (Arlington and Fairfax Counties).

City staff, elected officials and volunteers participate in international and national organizations such as the Urban Sustainability Director's Network and Climate Mayors, and regional coalitions including the Metropolitan Washington Council of Governments, Virginia Municipal League, Virginia Energy Purchasing Governmental Association, and the Northern Virginia Regional Commission. These cooperative ventures provide essential support to the City's environmental programs and help to achieve far more than would otherwise be possible for a small jurisdiction. For example, they provide regional data, assessments and plans that are locally adaptable. Technical assistance and grants are also available. The negotiating power of intergovernmental purchasing cooperatives can help save taxpayer funds.

Legislative Advocacy: The City Council adopts a legislative program each year that includes environmental goals coordinated with the advisory Boards and Commissions. Council members and staff advocate for state legislation that will enable the City to enact

ordinances. Advocacy at the state level is particularly important because Virginia is a "Dillon Rule" state, and therefore must be enabled by the state to regulate. Local governments in Virginia can pass ordinances only when the General Assembly (which meets in the state capitol in Richmond) has granted clear authority. The legislative program is strengthened by joining with other jurisdictions to not only influence state law-making, but also support national and international legislation that helps achieve local goals.

Evaluation of Needs

The policy changes proposed to support the vision and goals of this chapter will need to be discussed and disseminated broadly if they are to be successfully implemented. The changing climate is likely to bring greater need for information sharing about how to mitigate weather-related impacts on homes and businesses, as well as disaster-preparedness and emergency responses to extreme weather events. As the City's population grows, communication with community members and visitors may become more challenging simply because there are more people to communicate with. A new focus on reaching individual multi-family housing residents is important.

Social networking can greatly enhance the capacity for both information dissemination and the exchange of ideas. The renovation and expansion of the library also offers the opportunity to reach the community more broadly.

Figure 23: We all share responsibility for our future.

Volunteer leadership and participation in group activities such as tree planting, habitat restoration, and urban agriculture are not only directly beneficial to the environment, but also build community engagement and information sharing.

Strategies

The following strategies will support the City's efforts to meet the goal for community.

1. Increase the City's communications capacity to reach a broader audience including all housing and community sectors.

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2. Support, enhance, and expand community-led environmental programs in the City.
3. Create a community-wide communicatons network to stimulate and enable neighbor-to-neighbor conversations, information-sharing, education, and environmental action.
4. Encourage and support environmental education programs in City schools.
5. Inform, educate, and engage the community in actions to support all of the goals of this chapter.
6. Continue to provide resources and support from City government to sustain and enhance environmental volunteer activities and programs.
7. Integrate equity and health considerations into environmental policies and programs. Consider impacts on vulnerable populations.
8. Continue active participation in cooperative programs at regional, statewide, national and international levels to enhance the City's capacity for action and influence.

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Implementation

This Plan sets out a long-term vision for the City's environmental resources and resilience and includes strategies to help achieve that vision. Achieving the vision and goals of this plan will require the implementation of numerous policy actions programs and projects.

Policy Actions and Project Priorities

Some of the policy actions and projects will be decades in the making. This section details proposed policy actions and projects and indicates the general timeframes in which they should be implemented to ensure the City addresses the highest priority needs first.

The timeframes are split into three levels – **S**hort term (2020 to 2022), **M**edium term (2023 to 2025), and **L**ong term (2026 or later). Item numbers are provided for ease of reference only, and do not indicate priority.

A separate table lists programs that will support these actions, whether ongoing or planned.

Developing Priorities

These priorities reflect the interests expressed during the planning process. Many channels of input were utilized, including community meetings, market pop-ups, a survey, work sessions with City Boards and Commissions, and news releases in the *Falls Church News Press*.

Flexibility and Opportunities

This plan serves as a guide for implementation, but is also flexible so that the City can be responsive to opportunities. For example, private development projects, new grant programs (such as brownfield grant funding for redevelopment of light industrial zones), and new partnerships all provide opportunities to advance projects. The City should pursue these opportunities when they arise even if it means advancing something outside the schedule shown here.

Funding Limitations

The total project costs required to implement this plan are significant. Many of these projects will not be feasible without cost sharing, such as joint ventures between jurisdictions, public/private partnerships, and grant funding. This priority schedule assumes that cost sharing for capital projects is required.

Plan Is a Guide, Not a Budget

Current funding levels are insufficient to accomplish all of the projects identified in this plan. Therefore, this plan provides guidance on which policies and projects to pursue. It is not a budget document that commits the City to funding these efforts.

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Proposed Policy Actions

Goal Icons	Climate, Air & Energy	Stormwater, Streams, and Natural Springs	Urban Forest & Biodiversity	Consumption & Waste	Community

ITEM #	PROPOSED POLICY ACTION	GOALS ADDRESSED					TIMEFRAME
1	**Update the Watershed Management Plan** to reflect changing needs for stormwater management and the possible effects of climate change. Include stream restoration, especially of Four Mile Run and Tripp's Run, where possible. Consider expanding designated RPAs and redefining floodplains.	✓	✓	✓	✓	✓	S
2	**Update the Chesapeake Bay Preservation Ordinance** to meet state requirements.		✓	✓		✓	S
3	**Update the Solid Waste Management Plan** to address new challenges in recycling, using the EPA "Managing and Transforming Waste Streams"[11] tool to chart a path toward a Zero Waste Plan for the City.				✓	✓	S
4	**Implement a Commercial Property Assessed Clean Energy (CPACE) program** to lower the cost of financing energy and water supply improvements, and stormwater management and resilience measures, for private building owners.	✓	✓				S
5	**Expand the tree canopy fund** of payments in lieu of plantings to allow commercial properties to participate.	✓	✓	✓		✓	S
6	***Establish a green procurement policy for City government** including replacement of existing fleet with electric vehicles, electric powered maintenance equipment, and low lifecycle emissions products of all kinds. Prioritize energy efficiency and low emissions in building HVAC systems, lighting, and emergency generators. Incorporate Zero waste principles.[12]	✓	✓		✓		S
7	**Develop a standard tree maintenance agreement** for non-residential properties.		✓	✓		✓	S

[11] https://www.epa.gov/transforming-waste-tool

[12] Items marked * are goals to be achieved by all jurisdictions by 2020 from the MWCOG CEEPC Regional Climate and Energy Action Plan March 2017

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Item #	Proposed Policy Action	Goals Addressed					Timeframe
8	**Establish a program to acquire floodplain property or easements**, so that such properties could be converted to riparian buffers and wetlands.						S
9	**Incorporate standards and requirements in the City's development regulations**, including special exceptions, site plans, subdivision plans and grading plans to support resilience goals.						S
10	**Develop a climate risk assessment[13] and a climate resilience plan for the City**, in consultation with the community, to better understand the risks to the City from climate change and make appropriate risk management decisions for buildings, infrastructure and emergency planning.						S
11	**Establish a green building policy and incentive program for private residential and commercial and mixed-use development and redevelopment in the City** to pursue the highest sustainability standards for energy use reduction and energy efficiency. Include incentives for stormwater runoff reduction practices, increased green space and preservation of existing trees, as well as provisions for contributions to reserved funds when tree or planting requirements cannot be met, and requirements for waste management during construction and operation. Promote legislative change if needed to support this policy.						M
12	**Develop an Urban Forest Management Plan** to include short-term and long-term tree-canopy goals and forest management policies for public lands.						M
13	**Develop policies and regulations and explore zoning changes and incentives to preserve more mature trees** during commercial and residential redevelopment, and update tree-related code provisions to harmonize across City Code.						M
14	**Develop a plan to protect paper streets from changes of use.** Provide signage to indicate public rights-of-way.						M
15	***Establish an infrastructure policy** that encourages the use of green rather than gray infrastructure features across the City, including in Capital Improvement Program projects.						M
16	**Strengthen the City's green building policy for all publicly owned facilities** to achieve high standards for sustainability in construction and renovation and address climate resilience.						M

[13]Building on the Northern Virginia Regional Commission assessment, *Climate Resiliency in the Metropolitan Washington Region*, November 2016.

Proposed Programs and Projects

Item #	Proposed Program/Project	Goals Addressed					Timeframe
1	***Conduct energy audits and implement energy use reduction plans for public buildings.** Track and publicly disclose sustainability measures such as energy consumption and greenhouse gas emissions in public buildings and operations showing progress against policy and program actions.[14]						S
2	**Continue Solarize and support Power Purchase Agreements** to promote renewable energy technology and storage installation on homes and businesses.						S
3	**Develop mechanisms to deal with collected leaves and wood waste** that reduce the need for materials handling and storage on City property.						S
4	***Implement incentives and education programs for public employees** on energy conservation and sustainability practices.						S
5	**Promote, incentivize and enforce anti-idling** for public and commercial vehicles and construction equipment.						S
6	**Establish and implement a plan to support electric vehicle adoption** by government and community members, including charging infrastructure installation and possible incentives for electric vehicle use.						S
7	**Establish a Community Environment Network** to provide environmental outreach and educational programs, forums and resources to inform and engage the community about the local planning process, environmental programs and decision-making and encourage environmentally responsible action.						M
8	**Create a one-stop community resource** to enable developers, businesses and residents to easily find information related to environmental programs in the City.						M
9	***Promote energy-efficiency, renewable energy and energy storage incentives and programs from federal and state governments and utilities, and provide local incentives** to residents and businesses. Ensure opportunities are accessible by vulnerable populations.						M
10	***Adopt a comprehensive green fleet policy** including low emissions and electric vehicles, vehicle sharing and other transportation modes for government fleet.						M

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ITEM #	PROPOSED PROGRAM/PROJECT	GOALS ADDRESSED					TIMEFRAME
11	**Develop a plan of outreach and support to businesses and multifamily homes** to reduce and better manage waste.						M
12	***Expand the City's composting programs** and devise a more accessible solution than the current program for commercial and multi-family property participation.						M
13	**Develop and implement Zero Waste goals** across all public facilities.						M
14	**Establish an Urban Agriculture program** with goals of promoting urban agriculture through ongoing programming and partnerships; providing education and incentives for urban agriculture; adopting urban agriculture friendly zoning regulations; and establishing sites for community gardens and urban farms on public and private property.						M
15	**Develop an Historical Landscapes Recognition Program** to encourage the protection of historic landscapes and landscape features in the City**.**						M
16	**Encourage WELL Certification for** commercial and institutional buildings**.** The program evaluates the impacts of building design on human health and well-being.						M
17	***Install renewable energy generation and storage facilities** on City buildings and schools as soon as practicable.						L
18	**Deploy high-efficiency, low energy-use, dark-sky compliant street and outdoor lighting City-wide,** and in accordance with the adopted Streetscape Standard where it applies**.**						L
19	**Restore streams and waterways,** including Four Mile Run, Tripp's Run and other smaller branches.						L
20	**Purchase renewable energy** to offset local emissions and maintain EPA Green Power partnership status, including possibility investing with other jurisdictions in solar farms (Large Off-site Renewable Energy).						L
21	**Study the risks and opportunities of autonomous vehicle** use in the City						L

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Appendix A: Related Plans

The City's Comprehensive Plan is a family of documents. The Comprehensive Plan includes specific elements, like this chapter on environmental sustainability, resilience and natural resources. It also includes specific functional plans. The table below is a list of the plans that inform this chapter of the Comprehensive Plan.

Planning Document	Adoption Year
North Washington Street Small Area Plan	2012
South Washington Street Small Area Plan	2013
Mobility for All Modes, Transportation Chapter of Comprehensive Plan	2014
Downtown Small Area Plan	2014
Parks for People, Parks and Recreation Chapter of Comprehensive Plan	2015
Watershed Management Plan	2015
Bicycle Master Plan	2015
West Broad Street Small Area Plan	2016
Metropolitan Washington Council of Governments: Regional Climate and Energy Action Plan (2017 -2020)	2017
Solid Waste Management Plan	2004, updated 2010 and 2015

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Appendix B: Natural Resource Base

The Land

Topography

The topography of the City consists primarily of gentle to undulating slopes with elevations ranging from 280 feet to slightly more than 430 feet above sea level. Steeper slopes are found along stream banks and on some hillsides. Tripps Run and Four Mile Run form two subtle valleys that traverse the City roughly from northwest to southeast. Topography once played a significant role in identifying where one lived within the City. Many of the oldest place names in Falls Church are associated with its hills, including Green Hill, Winter Hill, Taylor Hill, Cherry Hill, and Tinner Hill.

Geology

Falls Church is situated within the Piedmont physiographic province. The Piedmont consists primarily of the fragments of other continents or ocean crust that were swept up and plastered onto the North American continent in the process of tectonic plate collisions and separations. As a result, the Piedmont is enormously complex with highly folded and intricately sliced metamorphic and igneous rock formations. With the exception of the floodplains immediately surrounding Tripps Run and Four Mile Run, the geologic strata underlying Falls Church consist of crystalline rock and saprolite (highly weathered rock). Approximately two-thirds of the City consists of metamorphic rock including gneiss, schist, and metagraywacke. The southwestern portion of the City is dominated by an igneous mass of granitoid rock, from which the Tinner Hill pink granite, trondhjemite, was quarried. In both areas, the saprolite is greater than three meters thick above the bedrock. Areas along Tripps Run and Four Mile Run are underlain by non-consolidated alluvial materials associated with floodplains and valley fill. Non-consolidated alluvial materials consist primarily of sands, silt, clay, and gravels transported and deposited by streams. Small outcrops of upland gravel, consisting of pebbles and cobbles left from older Coastal Plain deposits that have been eroded away elsewhere, occupy some of the higher points within the City. A small outcrop of mafic rock occurs in a small wedge in the western portion of the City straddling West Broad Street.

Soils

Most soils in the City have been permanently altered or disturbed by development; therefore, while general observations are possible, site-specific soil tests are necessary for development and engineering purposes. With the exception of areas underlain by mafic rocks and floodplains, most areas of the City are generally suitable for development purposes with proper engineering. Appling soils, which make up most of the Appling-Louisburg-Colfax association, found in the eastern portion of the City, are favorable for most engineering characteristics. The less hilly areas of Louisburg soils are also suitable as material for housing developments, while Colfax soils are poor materials for housing developments and many types of construction. The Fairfax-Beltsville-Glenelg association soils, predominant in the western portion of the City, are mostly moderately well drained. Soils found in the City's stream valleys consist of mixed alluvium and are subject to frequent flooding. Floodplain soils tend to have a high water table and variable shrink-swell potential. These soils are generally not suitable for development.

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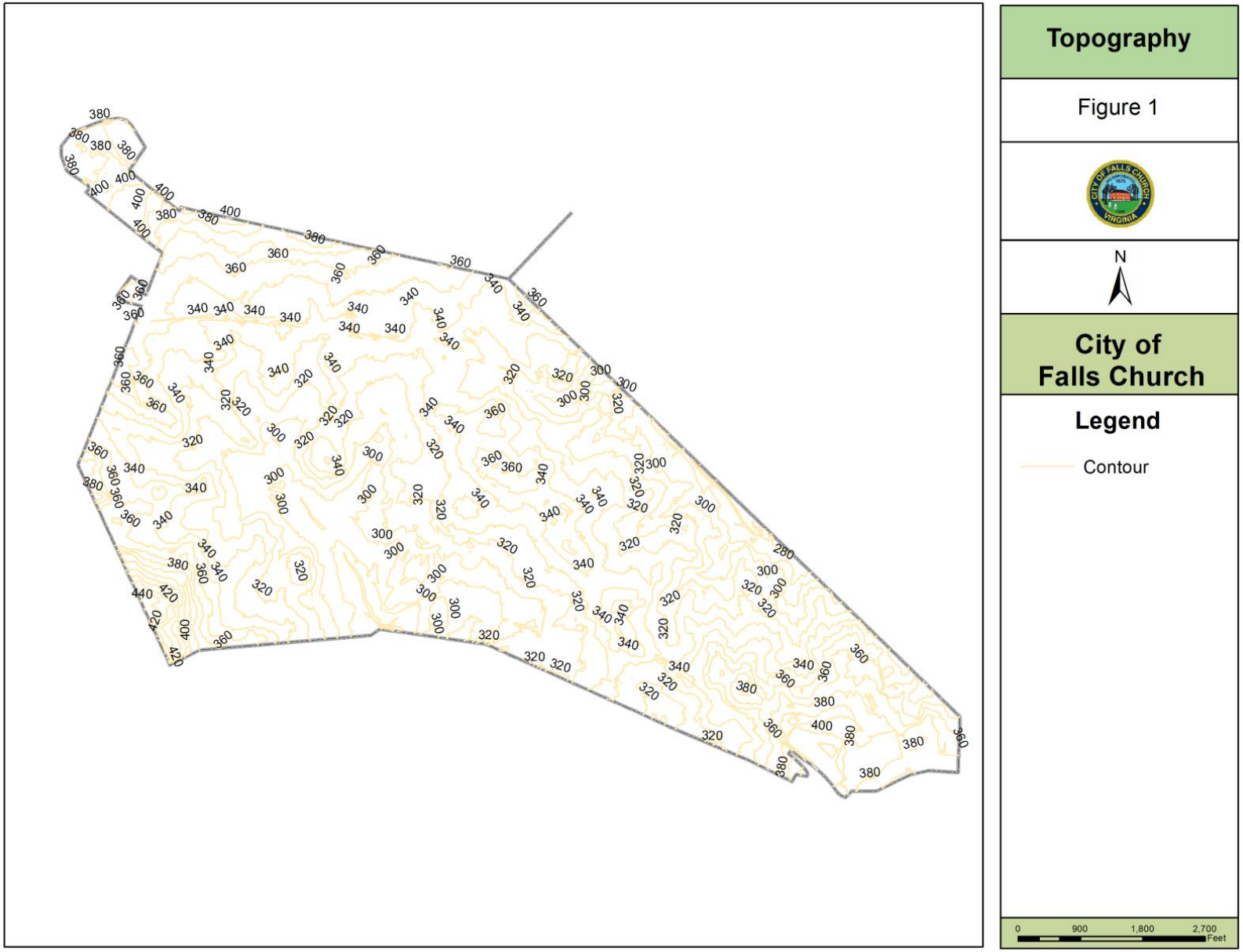
Topography
Figure 1
N
City of Falls Church
Legend
Contour
0
900
1,800
2,700
Feet

Water Features

Groundwater

In the D.C. Metro area the underground supply of water is fairly close to the earth's surface. Although the City receives a treated water supply from the Dalecarlia Reservoir, groundwater from sources in the Falls Church area, with few exceptions, are suitable for domestic, public, industrial, and irrigation purposes. In general, the potential for groundwater pollution in the Piedmont is not high except near streams due to the high water table and soils characteristics.

Watersheds

A watershed is the geographic region within which surface water drains into a particular river, stream or body of water. The boundaries of watersheds are defined by the topographic ridges that separate the directions of water flow. Falls Church straddles three watersheds (Figure 2): Four Mile Run, Cameron Run and Pimmit Run, all of which drain into the Potomac River and eventually the Chesapeake Bay. The Four Mile Run watershed drains the northeastern portion of the City, the Tripps Run sub-watershed (within the Cameron Run watershed) drains the southwestern portion of the City, and the Pimmit Run sub-watershed drains to the northwestern portion of the City.

Streams

Four Mile Run begins in Fairfax County one mile north of the City and empties into the Potomac River at the border between Arlington County and the City of Alexandria. It flows on or near the boundary between Falls Church and Arlington County from the W&OD Trail at Little Falls Street to Arlington's Benjamin Banneker Park. Land use in the City's portion of the Four Mile Run watershed consists primarily of a mix of residential and commercial uses. From its intersection with South Washington Street to Van Buren Street the channel width of the City's portion of Four Mile Run ranges from 13 feet to 35 feet, with a mean of approximately 24 feet. Bank height ranges from three and one-half feet to eight feet. Fine sediment, primarily sand and silt, is the most prevalent substrate material. The low gradient of the stream (0.14 percent) causes heavy silt deposition throughout the channel and is particularly noticeable in the upper segments. Downstream reaches are less sediment-laden and the bottom is composed of alternating sand and gravel bars with clay deposits in some areas.

Tripps Run begins in Falls Hill near Shreve Road in Fairfax County and drains to Lake Barcroft, where it converges with Holmes Run to form Cameron Run. In the City, Tripps Run is mostly piped underground or channelized with concrete. Land use in the City's portion of the Tripps Run watershed is primarily residential. Where it is unaltered, the width of Tripps Run rarely exceeds 25 feet and during normal dry weather flow, the water is less than one foot deep. Stream banks rise vertically, averaging about three to four feet above the channel. The stream follows an essentially straight course with gentle curves. The bottom composition in the natural reaches is a mixture of sand, gravel, and cobble.

At one time, both Four Mile Run and Tripps Run were fed by a manifold of small tributaries traversing the landscape. Over time, many of these small tributaries were bulldozed or diverted. Increased impervious surfaces as a result of development have caused flooding and erosion in the Tripps Run watershed. In response to these problems, several sections of Tripps Run were straightened and piped. In addition, many exposed channel portions of Tripps Run were straightened and/or lined with concrete during the late 1960s and 1970s to prevent erosion and to expand the watercourse's carrying capacity and speed the flow of stormwater through the City. A very small percentage of the City's existing

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waterways are now unpiped and an even smaller percentage are natural.

Overall, the City now has an impervious surface area of approximately 45 percent. Increased imperviousness means that stormwater, rather than infiltrating through the soil, runs off as overland surface flow. As a result, stormwater reaches the local stream course faster, increasing the potential for flooding; gains velocity and volume as it runs, increasing the chances for erosion in unprotected areas and scoured streambeds; and it carries natural and man-made pollutants, once absorbed by vegetation or filtered through the soil, directly into local stream courses.

Stream Banks

Stream banks are part of the critical buffer areas of streams. They are the medium for a variety of trees, shrubs and smaller plants that shade the water to keep it cool and help trap sediment before it enters the streams. Stream banks are constantly threatened by erosion, largely due to high velocity storm flow. Erosion has exposed the clay layer on the banks of Tripps and Four Mile Runs in many areas. Branch restoration within the Howard E. Herman Stream Valley Park in 2014-2015 restored floodplain function to the area, moved the stream bed away from adjacent residences, and armored the stream banks against erosion. Pearson Branch work at the same time had similar effects.

Four Mile Run's banks in the area of the Washington Street culvert were rip-rapped during the 1990s. However, the six- to twelve-inch diameter stones used were reported to be too small to withstand the force of high stream flows and have since eroded into the channel. Geowebbing was installed in this same area of the stream channel in 1990 just downstream of Gresham Place to protect the banks from construction runoff. The regrading of the slope for geoweb installation and the growth of vegetation has increased the stability of the banks in this reach. Erosion and sedimentation from upstream areas has been identified as a major problem for the stream. The stream does not have sufficient velocity to regularly flush out sediment deposits, and several sections of the streambed are covered with several feet of sediment.

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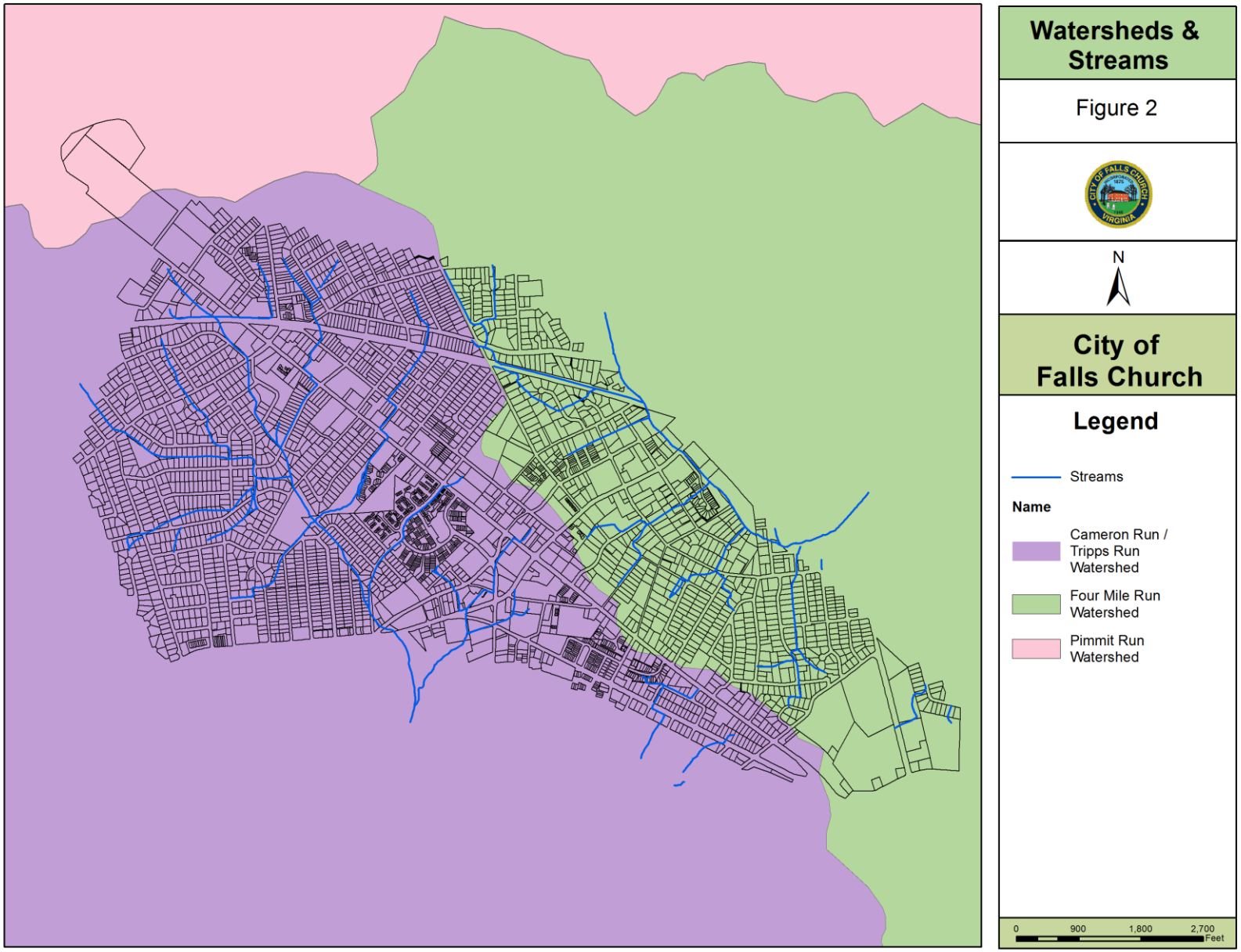
Watersheds & Streams
Figure 2
N
City of Falls Church
Legend
Streams
Name
Cameron Run / Tripps Run Watershed
Four Mile Run Watershed
Pimmit Run Watershed
0
900
1,800
2,700
Feet

Floodplain

A floodplain is the relatively flat or low land area adjoining a river, stream, or watercourse that is subject to partial or complete inundation during storms. Encroachment into floodplains, such as artificial fill, reduces a stream's flood-carrying capacity, increases flood heights, and increases flood hazards in areas beyond the encroachment itself. Floodplain soils are often unsuitable for development. Floodplains also provide important habitat for a range of vegetative and animal species.

The 100-year floodplain in Falls Church lies alongside Tripps Run and Four Mile Run. It is mapped by FEMA as an Overlay District to the City's underlying zoning districts and regulated by the City's Floodplain Ordinance. The Overlay District severely limits the type and location of any development in the floodplain. Figure 3 displays the 100-year and 500-year floodplain area as defined in 2004 for Tripps Run and Four Mile Run. FEMA maps are updated periodically.

Wetlands

According to the US Fish and Wildlife Service National Wetlands Inventory, there are no federally identified wetlands within Falls Church. Preliminary site evaluation of portions of the Four Mile Run floodplain by the Village Society in 1991 identified potential floodplain wetlands. However, this evaluation has never been verified. Work on the Harrison Branch in Crossman Park in 2018-2019 created a 3.82 acre wetland area between the outfall of the piped Harrison Branch and Four Mile Run.

Water Quality

The increase of imperviousness, erosion and siltation, and the removal of tree canopy cover and vegetative buffer areas have a generally negative effect on the quality of stream water in the City. Water quality is also decreased by pesticide and fertilizer-laden runoff from adjacent lawns and by runoff from parking lots that may contain nutrients, heavy metals, and hydrocarbons. Other contributing factors include illegal dumping into storm sewers, antiquated sewer lines, trash and litter, leaking underground storage tanks, abandoned wells, or underground storage tanks.

Point Source Pollution

Point source pollution is a specific source that flows into a stream. Industries and municipalities, under the Federal Clean Water Act, National Pollution Discharge Elimination System (NPDES), are required to report pollution discharges to water courses above a certain threshold, and to the maximum extent practicable, mitigate the effects of the pollution on the environment. There is one NPDES point source discharge point upstream of the City in Fairfax County that impacts water quality in Tripps Run. This is a concrete batching plant located on the Pearson Branch of Tripps Run. Water discharged from this plant is treated for high levels of alkalinity. There are currently no municipal discharge points in Falls Church that fall under NPDES regulations. Other sources of point source pollution are leaks in antiquated sewer lines and underground storage tanks.

Nonpoint Source Pollution

Nonpoint source pollution comes from many diffuse sources. Most commonly, non-point source pollution is caused by rainfall running off of roadways, parking lots, roof tops, and other urban land uses. Urbanization increases the imperviousness of the land area, thereby increasing the amount and velocity of stormwater runoff delivered to nearby streams. Pollutants that would normally settle out or infiltrate through the soil are carried directly to local waterways. The City's Chesapeake Bay Preservation Ordinance, Stormwater Management Ordinance, and Erosion & Sediment Control Ordinance regulate non-point source pollutants (City Code Chapter 35).

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Water Quality Data

For water quality standards, both Tripps Run and Four Mile Run are classified as Class III streams, which are non-tidal in nature in the Coastal and Piedmont zones. Under the federal Clean Water Act (CWA), all state waters are expected to be maintained to support "swimmable and fishable goals," that is recreational use and the propagation and growth of all aquatic life reasonably expected to inhabit them. The parameters used to determine these are minimum and daily average dissolved oxygen content (DO), pH (acidity/alkalinity), maximum temperature, and fecal coliform bacteria levels.

Water quality testing has been conducted in both Four Mile Run and Tripps Run. Four Mile Run was placed on the State's impaired list in 1998 and was required to create a plan for reducing the Total Daily Maximum Load (TMDL) of fecal coliform. This study and plan was created by the Northern Virginia Regional Commission and adopted in 2002. The study and implementation plan may be found on the NVRC website at http://www.novaregion.org/DocumentCenter/View/288/Final-Implementation-Plan-Fecal-Coliform-TMDL-304.

Arlington County monitors water quality at Bannekar Park, located downstream of the Arlington County and City of Falls Church boundary line. Monitoring efforts at this site include assessments for macroinvertebrates and bacteria. This site is part of the Upper Four Mile Run site group, spanning from Banneker Park to Bluemont Park. The Upper Four Mile Run group had the second highest E. Coli levels of the County's four site groups.

No recent specific oxygen or fecal coliform indicator data is available at this time for Tripps Run; however, Fairfax County in its *2017 Stormwater Status Report*, rated the overall Cameron Run watershed conditions for sampling years 2004 – 2017 as "poor". This rating is relative to a poor index of biotic integrity or low level of diversity in benthic macroinvertebrates. Cameron Run was also rated "very poor" in terms of fish species. These criteria are all indicators of water quality.

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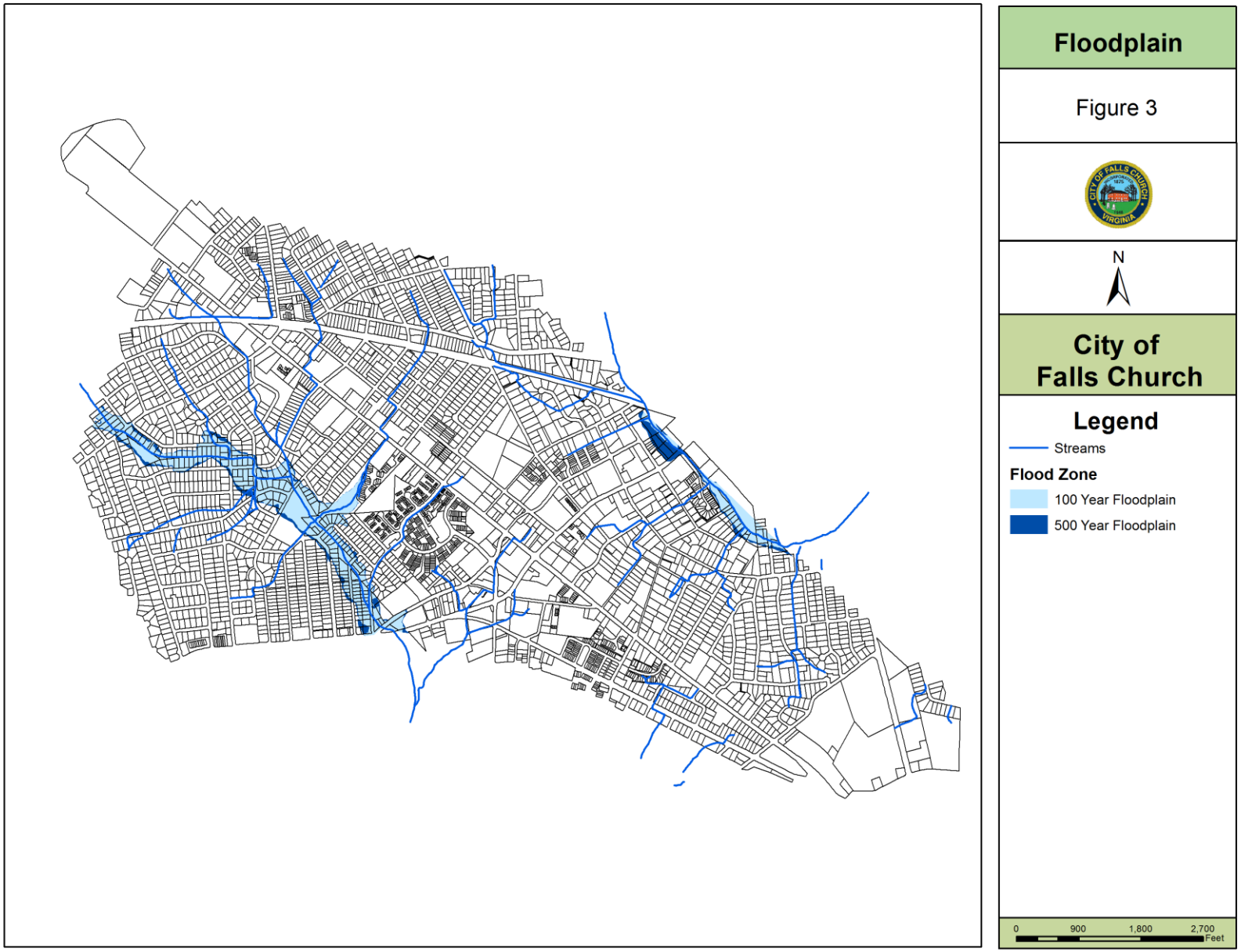
Floodplain
Figure 3
N
City of
Falls Church
Legend
Streams
Flood Zone
100 Year Floodplain
500 Year Floodplain
0
900
1,800
2,700
Feet

Trees and Habitat

The City's network of backyard habitats, parks, and stream valleys provides a limited wildlife habitat known to ecologists as "typical suburban." While the City has maintained a good urban tree cover and enough parks and open space to provide habitat to many terrestrial animals and birds, the bulk of the City's wildlife habitat is located along the green corridors associated with Tripps Run and Four Mile Run and their tributaries. Some of the most commonly sighted animal species include Eastern cottontails, squirrels, chipmunks, foxes, raccoons, deer, opossums, beavers, rats and mice. The most common bird species include cardinal, sparrow, purple finch, dove, robin, catbird, chickadee, wren, starling, nuthatch, crow, blue jay, tufted titmouse, goldfinch, hawk and woodpecker.

Tree Species Diversity

To minimize the impact of any particular pest or disease outbreak, it is best to maintain a wide distribution of tree species. The City's goal is to have no one species make up more than 5 percent of the tree population. In 2019, Red Maples make up 8 percent of City-owned trees, and 5 percent are Eastern Redbuds. This is a slight improvement over 2004, in that all of the top species are now native, and one less species makes up 3 percent or more of the tree population.

Not all native tree species are adapted to urban life, and not all non-native species are invasive. By making sure that a majority of the trees in Falls Church's urban forest are native species, we are providing habitat for more native wildlife, and maintaining the character of Falls Church as a Northern Virginia community.

Tree Age and Size Diversity

Tree age (planting year) was not recorded regularly until 2015. In 2019, 42 percent of the City's trees were between 24 and 36 inches in diameter, 24 percent were between 12 and 24 inches in diameter, and 24 percent were between 6 and 12 inches in diameter.

Management of City Trees

The City's primary tree management goals are longevity and public safety. Also necessary are clearance pruning to prevent conflicts with traffic, utilities and signage. Trees that are in poor condition often provide vital wildlife habitat features, so we remove them only when/where they pose a danger to people or structures. In 2019, there are nearly 9,500 live trees in the City's inventory, including street and park trees, as well as privately-owned trees that are regulated or affect the public street. Not all tree records have been updated since the original inventory in 2004. 58 percent of City-owned trees are in good condition, with 26 percent in fair condition and 16 percent in poor condition.

Canopy Cover

The City's tree canopy cover was estimated at 46% in 2014, using two different analyses of aerial photos. We anticipate higher resolution data, including LiDAR, in 2019. Better-quality data may give us a different result, so at this time, we can't be sure that 46% is a reasonable baseline. Factors that affect canopy cover include tree pests and diseases, property development, and property owner preference. Trees can be replanted after a pest outbreak or property development, but trees won't be replaced where property owners don't want them – therefore, it is crucial to encourage voluntary maintenance of trees on private property.

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Renewable Energy

Solar

Solar radiation in the City varies from 3.0 to 6.4 kWh/m^2/day through the course of a year[15]. It can be used for passive solar heating (controlling indoor temperatures by window shading), or solar photovoltaic panels can be used to convert solar radiation to electricity. The amount of power that can be generated depends on the installation orientation, panel efficiency and light exposure. Solar heat exchangers are not commonly used in this region.

Ground Source Heat

Metropolitan Washington's mean ground temperature is 56°F year-round. Geothermal heat pumps (GHPs) which use the ground as a "heat source" for heating in the winter and as a "heat sink" for cooling in the summer are a common technology used in metropolitan Washington. There are several residential GHP installations in the City, and the new high school under construction in 2019 will have a GHP system.

Wind and Water

The average annual wind speed in the City is less than 4 meters/second, making wind power generation impracticable[16]. Nor is water power generation a viable option.

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[15] National Renewable Energy Laboratory data from https://pvwatts.nrel.gov/pvwatts.php Accessed 11/19/2019 16:00

[16] Energy.gov https://www.energy.gov/energysaver/installing-and-maintaining-small-wind-electric-system and https://windexchange.energy.gov/maps-data/325 Accessed 11/19/2019 16:17

Appendix C: Planning Process and Public Engagement

This chapter was developed with significant public input and collaboration. Announcements regarding the planning effort were posted to the City's eFocus tool, on the City's website and social media accounts, and in *The Falls Church News-Press*. The plan was developed and refined with community input during the public meetings listed in table below.

Date	Groups	Event
May 7, 2018	Planning Commission (PC)	Project Launch
May 16, 2018	Tree Commission (TC)	Regular Meeting
May 17, 2018	Environmental Sustainability Council (ESC)	Regular Meeting
June 18, 2018	City Council (CC)	Work Session
June 20, 2018	TC	Work Session
June 21, 2018	ESC	Work Session
August 18, 2018	General Public	Community Meeting
August/September 2018	Other Events	Farmers Market
April 15, 2019	PC	Work Session
April 18, 2019	Arts & Humanities Council	Regular Meeting
May 1, 2019	Recreation & Parks Board	Regular Meeting
May 5, 2019	Citizens Advisory Commission on Transportation	Regular Meeting
May 9, 2019	Village Preservation & Improvement Society	Regular Meeting
May 16, 2019	Chamber of Commerce	Regular Meeting
May 20, 2019	CC	Work Session
June 4, 2019	Economic Development Authority	Regular Meeting
June 6, 2019	ESC	Regular Meeting
June 27, 2019	Historical Commission and Historic Architectural Review Board	Regular Meeting
September 3, 2019	PC	Work Session
September 4, 2019	Architectural Advisory Board	Regular Meeting
September 16, 2019	CC	Work Session
September 18, 2019	Library Board	Regular Meeting
September 19, 2019	ESC	Regular Meeting
October 4, 2019	City Staff	Internal Meeting
October 8-31, 2019	General Public	Survey (on-line and paper)
October 17, 2019	General Public	ESC Public Forum
October 17, 2019	Human Services Advisory Council	Regular Meeting
October 23, 2019	General Public	Pop-up in Mr. Brown's Park
October 23-31, 2019	General Public	Paper survey in MRSPLibrary
December 2, 2019	PC	Work session
January 6, 2019	CC	Work session
February 3, 2020	*PC*	*Action**
February 10, 2020	*CC*	*Action**

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Appendix D: Plan Approval

Planning Commission Approval and Recommendation

Following a public hearing, the Planning Commission [*insert vote result*] at their February 3, 2020 meeting.

RESOLUTION TO AMEND THE 2005 COMPREHENSIVE PLAN TO UPDATE AND REPLACE CHAPTER 5, "NATURAL RESOURCES AND THE ENVIRONMENT" WITH "ENVIRONMENT FOR EVERYONE: ENVIRONMENTAL SUSTAINABILITY, RESILIENCE, AND NATURAL RESOURCES CHAPTER OF THE CITY'S COMPREHENSIVE PLAN"

WHEREAS, the Virginia Code, section 15.2-2223 provides that the comprehensive plan is general in nature and is designed to guide and accomplish a coordinated, adjusted and harmonious development of the city which will, in accordance with present and probable future needs and resources, best promote the health, safety, morals, convenience, prosperity and general welfare of the City and its inhabitants; and

WHEREAS, Chapter 5 of the City's Comprehensive Plan, "Environment for Everyone: Sustainability, Resilience, and Natural Resources" will replace the existing chapter "Natural Resources and Environment" and will provide the City Council and City Staff with updated, valuable information regarding sustainability, resilience, and natural resources on which to base planning decisions; and

WHEREAS, Section 17.04 of the City Charter makes the Planning Commission responsible for preparation of the City's Comprehensive Plan; and

WHEREAS, Section 17.06 of the City Charter enables the Planning Commission to prepare and adopt individual components of the Comprehensive Plan; and

WHEREAS, Section 15.2-2228 of the State Code also gives the City Council the authority to grant final approval to Comprehensive Plan changes previously approved by the Planning Commission; and

WHEREAS, "Environment for Everyone: Sustainability, Resilience, and Natural Resources" was developed with substantial public engagement that included community meetings, a survey, and review by the City's advisory boards and commissions; and

WHEREAS, "Environment for Everyone: Sustainability, Resilience, and Natural Resources" describes and maps the City's natural resources;

WHEREAS, "Environment for Everyone: Environmental Sustainability, Resilience, and Natural Resources Chapter of the City's Comprehensive Plan" identifies a new chapter vision which supports and advances the City's "Falls Church 2040" vision

WHEREAS "Environment for Everyone: Environmental Sustainability, Resilience, and Natural Resources Chapter of the City's Comprehensive Plan" sets goals for climate, air and energy; stormwater, streams and natural springs; urban forest and biodiversity; consumption and waste and community in the context of sustainability and resilience; and

WHEREAS "Environment for Everyone: Environmental Sustainability, Resilience, and Natural Resources Chapter of the City's Comprehensive Plan" identifies strategies and actions that

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should be pursued to implement the “Falls Church 2040” vision and the new chapter vision.

NOW, THEREFORE, BE IT RESOLVED by the Planning Commission of the City of Falls Church, Virginia that (i) Chapter 5, “Environment for Everyone: Sustainability, Resilience, and Natural Resources,” which is attached hereto is hereby adopted by the Planning Commission as an updated and revised “Environment and Natural Resources Chapter” of the City’s Comprehensive Plan, replacing the version of Chapter 5 that was adopted on October 24, 2005 as part of the 2005 Comprehensive Plan and (ii) that the Planning Commission recommends that City Council grant final approval of the amendment to the Comprehensive Plan to replace the existing Chapter 5 of the Comprehensive Plan with “Environment for Everyone: Sustainability, Resilience, and Natural Resources.”

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City Council Approval and Recommendation

Following a public hearing, the City Council approved the following resolution [*insert vote result*] at their February 10, 2020 meeting.

RESOLUTION TO AMEND THE 2005 COMPREHENSIVE PLAN TO UPDATE AND REPLACE CHAPTER 5, "NATURAL RESOURCES AND THE ENVIRONMENT" WITH "ENVIRONMENT FOR EVERYONE: ENVIRONMENTAL SUSTAINABILITY, RESILIENCE, AND NATURAL RESOURCES CHAPTER OF THE CITY'S COMPREHENSIVE PLAN"

WHEREAS, the Virginia Code, section 15.2-2223 provides that the comprehensive plan is general in nature and is designed to guide and accomplish a coordinated, adjusted and harmonious development of the city which will, in accordance with present and probable future needs and resources, best promote the health, safety, morals, convenience, prosperity and general welfare of the City and its inhabitants; and

WHEREAS, Chapter 5 of the City's Comprehensive Plan "Environment for Everyone: Environmental Sustainability, Resilience, and Natural Resources Chapter of the City's Comprehensive Plan" will replace the existing chapter "Natural Resources and the Environment" and will provide the City Council and City staff with updated, valuable information regarding environmental sustainability and resilience on which to base planning decisions; and

WHEREAS, Section 17.06 of the City Charter gives the City Council the authority to grant final approval to Comprehensive Plan changes previously approved by the Planning Commission; and

WHEREAS, Section 15.2-2228 of the State Code also gives the City Council the authority to grant final approval to Comprehensive Plan changes previously approved by the Planning Commission; and

WHEREAS, following a properly advertised public hearing held on February 3, 2020, the Planning Commission adopted "Environment for Everyone: Environment Sustainability, Resilience, and Natural Resources Chapter of the City's Comprehensive Plan" and recommended final approval by Council; and

WHEREAS, "Environment for Everyone: Environmental Sustainability, Resilience, and Natural Resources Chapter of the City's Comprehensive Plan" was developed with substantial public engagement that included community meetings, a survey, and review by the City's advisory boards and commissions; and

WHEREAS, "Environment for Everyone: Environmental Sustainability, Resilience, and Natural Resources Chapter of the City's Comprehensive Plan" describes and maps the City's natural resources;

WHEREAS, "Environment for Everyone: Environmental Sustainability, Resilience, and Natural Resources Chapter of the City's Comprehensive Plan" identifies a new chapter vision which supports and advances the City's "Falls Church 2040" vision

WHEREAS "Environment for Everyone: Environmental Sustainability, Resilience, and Natural Resources Chapter of the City's Comprehensive Plan" sets goals for climate, air and energy; stormwater, streams and natural springs; urban forest and

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biodiversity; consumption and waste and community in the context of sustainability and resilience; and

WHEREAS "Environment for Everyone: Environmental Sustainability, Resilience, and Natural Resources Chapter of the City's Comprehensive Plan" identifies strategies and actions that should be pursued to implement the "Falls Church 2040" vision and the new chapter vision.

NOW, THEREFORE, BE IT RESOLVED by the City Council of the City of Falls Church, Virginia that Chapter 5, "Environment for Everyone: Environmental Sustainability, Resilience, and Natural Resources Chapter of the City's Comprehensive Plan," which is attached hereto is hereby adopted by the City Council as an updated and revised "Environment and Natural Resources Chapter" of the City's Comprehensive Plan, replacing the version of Chapter 5 that was adopted on October 24, 2005 as part of the 2005 Comprehensive Plan.

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