

Executive Summary

Stormwater is [precipitation that is discharged](#) across lands or through natural and/or constructed systems to one or more waterways. Land disturbing activity on natural land surfaces can impact the volume, rate, and timing of stormwater. The removal of vegetation can increase erosion and sediment production, while also reducing the amount of water returned to the water cycle. This, combined with impervious surfaces that limit infiltration into the soil, increases the volume and flow rate of stormwater runoff.

In addition to erosion and flooding of infrastructure and property, unmanaged stormwater can carry excess nutrients, sediment and other contaminants into rivers and streams, impairing the health of these systems and reducing capacity for future flooding events. Unmanaged stormwater runoff can introduce excess freshwater into tidal/estuarine habitats, diluting marsh salinity and negatively impacting marshes. Further, runoff from impervious surfaces can have elevated temperatures adversely impacting cooler water species and resulting in dissolved oxygen depletion. Increased erosion, siltation, and nutrients can also lead to homogenization of stream habitat, thus decreasing biodiversity.

Stormwater may be managed in a variety of methods. Conventional, or “gray”, infrastructure examples include storm sewer systems and detention basins. Green infrastructure examples include green roofs, rain gardens, bioretention planters, and permeable pavement. Preventative practices for stormwater management include tree and green space preservation which protect groundwater from pollutants, reduce soil erosion and flooding, and increase soil organic matter through decomposition of leaf litter and other vegetation resulting in increased water retention of the soil. Stormwater management methods used should ideally integrate environmental conservation and ecological restoration concepts with the goal of restoring, or at least mimicking, the natural processes that are disrupted during and after development. Methods should also aim to incorporate features that provide [ecosystem services and co-benefits](#) in addition to stormwater management.

This paper provides information on what stormwater runoff is as it pertains to county policies, codes, and plans used for addressing stormwater runoff during redevelopment. Included in this paper are references and information that are informing the Policy Plan update, including: brief summaries of adopted plans, policies, and codes at state and county levels addressing stormwater management, examples of Comprehensive Plan policies, and potential policy areas that could be addressed in the Policy Plan update.

Existing Plans, Policies, And Codes

Fairfax County has numerous existing plans, policies and codes that address stormwater runoff, as shown in *Table 1*. Proposed entitlement applications (primarily Rezoning, Special Exception and some Special Permit applications) must meet the county **code** requirements discussed below, as well as many state, local, or federal requirements, and are also reviewed for conformance/harmony with the Comprehensive Plan. The **policies** listed below help determine an entitlement application’s conformance with county codes and the Comprehensive Plan. All other development, typically referred to as “by-right-development” must meet the county code requirements, in addition to other state, local, or federal requirements. County **plans**, such as those listed below, describe a vision or goal on a specific topic, with strategies for implementation which may include new or revised policies or codes. General overviews are provided for the referenced documents; the table is not intended to include all guidance or regulations pertaining to stormwater management.

Table 1: Fairfax County Plans, Policies, and Codes related to Stormwater Runoff

| Document Title | Plan | Policy | Code |
|--|-------------|---------------|-------------|
| Comprehensive Plan, Policy Plan, Environment Element, and Chesapeake Bay Supplement | | X | |
| Comprehensive Plan Area Plans and Site-Specific Guidance | | X | |
| Urban Design Guidelines | | X | |
| Zoning Ordinance, Residential-Conservation Zoning District, Water Supply Protection Overlay District (WSPOD), and Floodplain Regulations | | | X |
| Chesapeake Bay Preservation Ordinance (County Code Chapter 118) | | | X |
| Erosion and Stormwater Management Ordinance (County Code Chapter 124.1) | | | X |
| Public Facilities Manual | | | X |
| Community-Wide Energy and Climate Action Plan (CECAP) | X | | |
| Resilient Fairfax Plan | X | | |
| Strategic Plan | X | | |
| One Fairfax | X | | |
| Board of Supervisors Environmental Vision | X | | |
| Tree Action Plan | X | | |
| Parks and Recreation Open Space Access Strategy (PROSA) | X | | |
| Fairfax County Park Authority Natural Resources Management Plan | X | | |
| Department of Public Works and Environmental Services (DPWES) Watershed Management Plans | X | | |
| Active Fairfax Transportation Plan | X | | |

County Policy

The following provides summaries of County planning documents that provide stormwater management guidance in the land development process.

Comprehensive Plan

A comprehensive plan is general in nature, and with its goals, objectives, and accompanying maps, shows a locality's long-range recommendations for the general development of its land. Per [Virginia Code Sec. 15.2-2223](#), the purpose is to guide and accomplish "a coordinated, adjusted and harmonious development of the territory" in order to "best promote the health, safety, morals, order, convenience, prosperity and general welfare of the inhabitants, including the elderly and persons with disabilities."

The Code of Virginia provides for localities to include guidance for groundwater and surface water protection and for addressing resiliency in their comprehensive plans. Specifically, [Sec. 15.2-2223.C.4](#) states "The designation of areas for the implementation of reasonable measures to provide for the continued availability, quality, and sustainability of groundwater and surface water"; and subsection F. states "The comprehensive plan is encouraged to consider strategies to address resilience. As used in this subsection, "resilience" means the capability to anticipate, prepare for, respond to, and recover from significant multi-hazard threats with minimum damage to social well-being, health, the economy, and the environment."

The Policy Plan of Fairfax County's Comprehensive Plan provides objectives, policies, and guidelines to guide planning and development activities while also protecting the environment, among other redevelopment goals. The Plan is an advisory document with certain guidance implemented through regulations such as the Zoning Ordinance, Chesapeake Bay Preservation Ordinance, and the Public Facilities Manual.

Environment Element of the Policy Plan

The [Environment Element](#) of the Policy Plan provides guidance for achieving a balance between the need to protect the environment, while planning for the orderly development and redevelopment of the county. Numerous existing policies, contained in Objectives 2, 3, 7, 9, 10, and 13, provide both county and land development guidance related to stormwater management, specifically quality and quantity; erosion control; impervious cover; green infrastructure; flooding and floodplains; Chesapeake Bay; tree preservation, and green building and site design.

- The intent of Objective 2 is to prevent and reduce surface and groundwater pollution, and to protect and restore stream ecological value. Policies encourage the creation and monitoring of best management practices programs, the minimization of fertilizer, pesticide, and herbicide use, the incorporation of low impact development techniques in new and redevelopment projects, meeting of tree cover requirements through

preservation and exceeding preservation code requirements, and encouraging the protection and/or restoration of stream channels and associated buffer areas.

- Objective 3 provides policies to protect the Potomac Estuary and Chesapeake Bay from avoidable impacts from land use activities. These policies are intended to ensure compliance with the Chesapeake Bay Preservation Ordinance and recommendations in the Chesapeake Bay Supplement, encourage development that minimizes adverse impacts to tidal shorelines, and mitigate losses to wetlands.
- Objective 7 seeks to minimize exposure to potential flood impacts by prohibiting new residential structures in flood impact hazard areas, namely those areas that would be impacted by potential dam failures in the county.
- The intent of Objective 9 is to identify, protect and enhance an integrated network of ecologically valuable land and surface waters. The two policies associated with this objective are the preservation of Environmental Quality Corridors (EQC) and providing incentives for EQC preservation through density transfers. The core of the EQC system is the county's stream valleys, along with additional areas that augment the stream valley habitats and buffers, and representative elements of the landscapes not represented within stream valleys. Two of the purposes for establishing EQCs are related to stormwater runoff by mitigating impacts of runoff velocities and volumes and providing significant pollution reductions. EQCs are delineated through the entitlement process based on policy criteria.
- Objective 10 establishes policies for the preservation of tree cover, new tree plantings on developing sites and public rights of way and using open space/conservation easements to preserve woodlands, monarch trees, and/or rare stands of trees.
- Objective 13 establishes policies encouraging the application of green building practices including those aimed at reducing stormwater runoff volumes and low impact development techniques.
- Appendix 1 of the Environment Element provides guidance for tidal shoreline erosion control measures. The appendix states that only living shoreline approaches should be permitted unless the best available science shows that such approaches are not suitable, per state law. Living shorelines, along with protection of non-tidal wetlands and the adjacent riparian buffers provide key roles in maintaining the health of the Chesapeake Bay, including the filtering of stormwater runoff.

Chesapeake Bay Supplement

The [Chesapeake Bay Supplement](#) to the Comprehensive Plan was adopted in 2004 with the purpose and intent of satisfying comprehensive plan requirements in the Chesapeake Bay Preservation Act. It provides a more detailed consideration of water quality issues and recommended actions to address these issues. The supplement includes a map depicting the county's Chesapeake Bay Preservation Area components, and a series of policy statements, subsequently adopted within the Policy Plan, related to pollution sources, infill development,

redevelopment, shoreline erosion control, and shoreline access. An update to this supplement is anticipated in Phase 2 of the Policy Plan update. The neighboring jurisdictions of Arlington County and the City of Alexandria also have Chesapeake Bay Supplements and have undertaken updates to them in 2023 and 2022, respectively.

Area Plans and Site-Specific Guidance

The [Area Plan volumes](#) of the Comprehensive Plan contain detailed long-range planning recommendations organized by four geographic areas of the county and in certain cases contains site-specific Plan amendment (SSPA) text related to stormwater management. Stormwater management guidance is provided for 53 planning districts, suburban centers, community business centers, community planning sectors, or site-specific locations throughout the Plan. Appendix 1 of this paper provides an overview of the types of stormwater management guidance found within the Area Plans. In summary,

- Approximately half of the geographic locations include guidance encouraging incorporation of low-impact development or innovative stormwater management techniques.
- Approximately half of the geographic locations also include guidance related to reducing total runoff and/or peak flow volumes, or other methods to reduce water quantity.
- Approximately one-fifth encourages exceeding minimum code requirements, attaining LEED rainwater management credits, and/or being consistent with recommendations in county watershed management plans.
- There are several instances where guidance closely matches existing guidance in the Environment Element.
- There are also examples of guidance provided for several geographic locations that could be considered for incorporation into the Environment Element, thereby applying county-wide.

Specifically related to the Occoquan Reservoir watershed, the Area III Plan and, to a lesser extent the Area II Plan, provides guidance on development of land zoned to the Residential-Conservation (R-C) District and adjacent to the Occoquan River and a portion of the Occoquan Watershed. Seven community planning sectors within these two Area Plans includes the following text:

Non-residential uses requiring special exception or special permit approval should be rigorously reviewed. In general, these uses, [if permitted at all, should only]¹ be located at the boundary of Low Density Residential Areas and Suburban Neighborhoods or where their

¹ This language is present in the F7-George Mason Community Planning Sector of the Area II, Fairfax Planning District, and the BR2-Upper Cub Run, BR5-Stone Bridge, and BR7-Braddock Community Planning Sectors of the Area III, Bull Run Planning District. In the P1-Twin Lakes, P3-Johnny Moore, and P5-Dominion Community Planning Sectors of the Area III, Pohick Planning District, the language is “*In general, these uses should be located at the boundary of...*”. The remainder of the guidance is identical.

impact on existing residences is minimal. These uses should be granted only if the following conditions are met:

- *Access for the use is oriented to an arterial roadway;*
- *The use is of a size and scale that will not adversely impact the character of the area in which it is located; and*
- *The use is designed to mitigate impacts on the water quality of the Occoquan Reservoir.*

Urban Design Guidelines

Volume I of the [Urban Design Guidelines](#) applies to all Community Revitalization Districts (CRDs) and Community Revitalization Areas (CRAs) (except Lake Anne) identified in the Comprehensive Plan and includes broad recommendations and urban design guidance for streets, streetscapes, parks, landscaping, parking, building exteriors, and special placemaking features. Volume II includes companion documents for each CRD/CRA that is tailored to the community's vision for the specific area.

The guidelines provide principles and strategies on how to incorporate thoughtful stormwater management design into urban areas and their streetscapes. A key principle is the consideration of streets as part of the larger urban natural system, providing not just mobility but also performing important biological functions. Design strategies include using permeable paving materials, bioretention planters with native vegetation, and green roofs, while educating the public about the benefits of such facilities.

Volume I of the Guidelines is being updated which would include the latest best practices for tree planting, stormwater management and cool street designs, among others. The update is expected to be completed in 2025.

County Codes

County codes provide the regulatory framework for development within the county. Codes range from providing guidance on site and building design, to construction and beyond.

Zoning Ordinance

The [Zoning Ordinance](#) is intended to promote the health, safety, and general welfare of the public and to implement the Comprehensive Plan for the orderly and controlled development of the County. One specific intent is to promote the conservation of natural resources and encourage the preservation of stream valleys, steep slopes, lands of natural beauty, forests, scenic vistas, and other similar areas; and to protect against water pollution. In addition to general zoning regulations such as setbacks, open space requirements, and front yard and rear setback coverage limitations, the Zoning Ordinance includes the following sections specifically pertaining to stormwater management: Residential-Conservation (R-C) zoning district, Water Supply Protection Overlay District (WSPOD), and floodplain regulations.

The R-C zoning district and WSPOD have specific relevance to stormwater management, water quality, and the [health of the Occoquan Reservoir](#). This reservoir is an approximately 9.8-billion-gallon impoundment that forms the southern boundary of Fairfax County. It is owned by the Fairfax County Water Authority and is a principal source of the drinking water supply for a large percentage of the Northern Virginian population, an environmentally important feature, and a source of recreation for the public.

Between the reservoir's original construction and expansion in the 1950s and up to the early 1970s, serious water quality problems were a common occurrence due to increased development and poorly treated wastewater being discharged into the reservoir from eleven small, outdated wastewater treatment plants. In 1971, the Policy for Water Treatment and Water Quality Management in the Occoquan Watershed (the "[Occoquan Policy](#)") was adopted by the Virginia State Water Control Board and supported by local governments. The policy required replacement of the outdated wastewater treatment plants with no more than three state-of-the-art advanced water reclamation plants and the creation of the independent Occoquan Watershed Monitoring Lab.

In 1980, the Fairfax County Board of Supervisors (Board) authorized the Occoquan Basin Study and appointed an Occoquan Basin Citizen's Task Force. The principal water quality concern was the accelerated eutrophication caused by nonpoint source pollution primarily from increased development and associated impervious surfaces. In 1982, the Board implemented the recommendations of the Occoquan Basin Study to protect the public water supply. A water quality goal of no further increase in nonpoint source pollution from the Fairfax County portion of the Occoquan Watershed was adopted. To meet this goal and to ensure compatible infill development in the watershed area, 40,000 acres of land within the watershed were planned low density and zoned to the Residential-Conservation (R-C) zoning district which allows residential densities not to exceed an average of one dwelling unit per five acres. The purpose of the [Residential-Conservation zoning district \(R-C\)](#), as stated in the ordinance, is to protect water courses, stream valleys, marshes, forest cover in watersheds, aquifer recharge areas, rare ecological areas, and areas of natural scenic vistas. Another purpose of the R-C District is to minimize impervious surface and protect the quality of water in public water supply watersheds by encouraging open areas for agriculture and large lot single-family subdivisions.

In addition, the entire Occoquan Watershed area within Fairfax County (over 63,000 acres) was placed in an overlay zoning district named the Water Supply Protection Overlay District. The [Water Supply Protection Overlay District](#) (WSPOD) was created for the purpose of promoting the public health, safety, and welfare through the protection of public water supplies from the danger of water pollution. Regulations were established to prevent water quality degradation due to pollutant loadings within the watersheds of public water supply reservoirs; to provide for specific review and approval of residential, commercial, industrial and other development proposals that may have adverse water quality impacts; to encourage land uses and activities that will be compatible with water quality protection; and to assure that structures and uses will

be developed to serve the health, safety, and welfare objectives of preserving the environmental integrity of public water supply reservoirs.

Additional use standards are applicable for certain uses within the WSPOD, including water quality control measures designed to reduce the projected phosphorus runoff pollution by one-half for the proposed use; and submission of hazardous or toxic material or waste usage, storage, disposal information, dependent upon the use.

The [floodplain regulations](#), contained in the Zoning Ordinance, further the County's participation in the National Flood Insurance Program, provide protection from flooding, and preserve floodplains in as natural a state as possible for ecological purposes. The ordinance provides regulations for types of permitted and special exception uses, use limitations, setbacks, and general review processes.

Chesapeake Bay Preservation Ordinance (County Code Chapter 118)

The [Chesapeake Bay Preservation Ordinance](#) (CBPO, County Code [Chapter 118](#)) was adopted to protect local streams and one of the world's most productive estuaries (§118-1-4.(a)), the Chesapeake Bay, from pollution due to land use and development. In an effort to protect and improve the quality of these waterways, Fairfax County designated certain environmentally sensitive areas as Resource Protection Areas (RPAs):

1. Tidal wetland;
2. Tidal shore;
3. Water body with perennial flow;
4. Nontidal wetland connected by surface flow and contiguous to a tidal wetland or water body with perennial flow;
5. Buffer area that includes any land within a major floodplain and any land within 100 feet of a feature listed in 1-4.

RPAs provide benefits such as protecting water quality, filtering pollutants out of stormwater runoff, reducing the volume of stormwater runoff, preventing erosion and performing other important biological and ecological functions. The CBPO regulates development, uses and activities within RPAs. Generally, no development, land disturbance, nor vegetation removal is allowed within the RPA boundary without prior county approval. In Fairfax County, any area that is not considered as an RPA is designated as a Resource Management Area (RMA). Development is permitted in RMAs as long as it meets water quality goals and performance criteria for these areas.

Recent updates incorporated provisions for the preservation of mature trees and coastal resilience and adaptation to climate change.

Erosion and Stormwater Management Ordinance (County Code Chapter 124.1)

The [Virginia Erosion and Stormwater Management Act](#) consolidated existing Virginia Erosion and Sediment Control and Stormwater Management Programs and requires the Virginia Department of Environmental Quality (VDEQ) to permit, regulate, and control Virginia soil erosion and stormwater runoff. The Virginia Erosion and Stormwater Management Regulation (VESMR) purpose is to clarify program requirements, eliminate redundancies, and correct inconsistencies among the various regulations. Requirements for water quality controls in the WSPOD from the Zoning Ordinance have been incorporated in the Stormwater Management Ordinance, [Section 124.1-4-2](#).

To meet the intent of the Virginia Erosion and Stormwater Management Act and the VESMR, the Fairfax County Board of Supervisors recently adopted [Chapter 124.1](#) (and repealed Chapters 104 and 124 of the County Code) to consolidate the erosion and sediment control and stormwater management requirements into a single ordinance, clarify program requirements, eliminate redundancies, and correct inconsistencies between the existing ordinances. The ordinance applies to land disturbing activities in Fairfax County unless they are specifically exempted.

The purpose of Chapter 124.1 is to *“ensure the general health, safety, and welfare of the citizens of Fairfax County and to protect the quality and quantity of state waters from the potential harm of unmanaged stormwater and soil erosion, including protection from a land disturbing activity causing unreasonable degradation of properties, water quality, stream channels, and other natural resources, and to establish procedures whereby stormwater requirements related to water quality, water quantity, soil erosion, sediment deposition, and non-agricultural runoff shall be administered and enforced”*.

Public Facilities Manual

[Chapter 6](#), Storm Drainage, of the Public Facilities Manual includes specific regulations for how stormwater management plans and techniques should be provided to meet the water quantity and quality requirements detailed in the Erosion and Stormwater Management Ordinance.

[Section 6-0401.2](#) of the PFM states that water quality control measures in the WSPOD must be designed to reduce the projected phosphorus runoff by at least one-half for any subdivision or use requiring site plan approval unless a modification or waiver is approved by the Director.

[Chapter 11](#) provides specific regulations for the submission of erosion and sediment control plans when a land development activity will change the contour of the land by grading, excavating or the removal or destruction of the natural topsoil, trees or other vegetative covering.

Related County Plans

In addition to the Comprehensive Plan and county codes governing stormwater management, there are numerous other county plans that discuss the importance of stormwater

management and provide recommendations on how to achieve that purpose. While there are recommendations from these plans that warrant consideration and potential incorporation in the updated Policy Plan, it should be noted that many recommendations from these plans are captured in existing Policy Plan policies or may be applicable to programs overseen by other County agencies.

- The [Community-Wide Energy and Climate Action Plan \(CECAP\)](#) was adopted by the Board in 2021 as a roadmap for Fairfax County to reduce greenhouse gas emissions and provide a way to engage the community in emissions reduction efforts. A strategy and associated actions related to stormwater management are supporting the preservation, restoration, and expansion of natural systems, green spaces, and soil quality (Strategy 12).
- The [CECAP Implementation Plan](#), published in December 2022, includes an Implementation Action Recommendation to “Update the Comprehensive Plan, Zoning Ordinance and associated codes and policies in regards to...sustainable development and land use, and natural resources, to be in alignment with CECAP and RF climate goals” (Implementation Action NR.10).
- The [Resilient Fairfax](#) Plan was adopted by the Board in 2022 as a method for Fairfax County to address the impacts of climate change. This plan includes four goals with associated strategies and implementation actions related to stormwater management. These goals and strategies support stream corridor, wetlands and floodplain restoration; flood resilience guidance including green infrastructure; policy updates for flood risk reduction; and inventorying and updating the Comprehensive Plan policies related to land use patterns that may mitigate impacts to flooding, floodplains, wetlands, shorelines, Environmental Quality Corridors, Resource Protection Areas, trees, green infrastructure, and impervious cover in order to enhance resiliency.
- The [Strategic Plan](#) was adopted by the Board in October 2021 and revised in May 2023. It includes Environment and Energy strategies to improve water quality and meet Chesapeake Bay clean water requirements through upgrading stormwater management facilities; improve the health of county waterways through effective stormwater controls and regulating development to protect environmentally sensitive areas to lessen adverse community impacts; and prioritize stormwater and wastewater infrastructure and capacity reinvestments decisions to support development and redevelopment of more dense communities.
- [One Fairfax](#), adopted in 2017, is a joint racial and social equity policy of the Fairfax County Board of Supervisors and School Board. One of the focus areas is to achieve a healthy and quality environment to live and work in that acknowledges the need to breathe clean air and to drink clean water now and for future generations.
- The Board of Supervisors 2017 [Environmental Vision](#) provides an overview of the visions and supporting objectives of the board in support of environmental sustainability. Objectives related to protecting water resources include landscaping and open space to increase tree canopy and reduce stormwater runoff, applying LID techniques and retrofit established areas, increasing capital reinvestment in stormwater infrastructure, use of stormwater for irrigation and cooling water, implementation of watershed management plan

recommendations, and continued collaboration with other agencies, jurisdictions, regional partners on water related issues.

- The [Tree Action Plan](#), updated in 2019, includes five framework goals with recommendations. Under the goal of *Protect and Improve What We Have* are recommendations to improve water quality and stormwater management through tree conservation with an emphasis on reducing impacts to and restoring forests and open space resources when constructing and managing stormwater infrastructure.
- The [Parks, Recreation, Open Space and Access \(PROSA\) Strategy](#), endorsed by the Park Authority in 2023, provides a framework for equitable access to the FCPA park system, partly by enriching habitat connectivity between environmental corridors. The two primary metrics used for assessing habitat connectivity are tree canopy and habitat quality at Fairfax County parks. Healthy tree canopies provide many benefits including reducing stormwater runoff and as stated in PROSA; the county's tree canopy policy and tree preservation ordinance have stewardship implications for trees on Park Authority land.
- A related Park Authority plan is the [Natural Resource Management Plan](#) (updated in 2019). A management theme of the plan is Protecting Natural Capital, which includes actions to protect water resources and quality from impacts of stormwater runoff and excessive flows, such as protecting streams, wetlands, and associated buffers, and utilizing LID practices.
- The County has developed comprehensive [watershed management plans](#) for each of the county's thirty watersheds. The plans identify issues affecting the watersheds and provide guidance for protecting and restoring the county's stream corridors. Each year, projects from the plans are put into the stormwater management annual work plan. The work plan is developed to balance work done in each of the watersheds and districts, and to spread resources among infrastructure maintenance, dam safety, flooding issues, water quality, watershed restoration, and plan implementation. These plans are consulted during entitlement application reviews and comprehensive plan amendments.
- The proposed [Active Fairfax Transportation Plan](#) aims to provide a framework for safe, comfortable and convenient active transportation and recreational routes. Goal 5 - Sustainability and Conservation and associated objectives encourage sustainable and carbon-neutral transportation options, that increase active transportation trips to reduce greenhouse gas emissions, improve air and water quality and reduce noise pollution; and protecting, preserving and restoring environmentally sensitive areas and natural habitats during planning, design, construction and maintenance of active transportation facilities.

Local, Regional and State Initiatives

The following provides brief summaries of a few local, regional and state initiatives related to stormwater management that could help inform new or enhanced Plan policies.

- **Fairfax Countywide Flood Risk Reduction Policy:** County staff continues to work on the Countywide Flood Risk Reduction Policy; an [update](#) on this work was provided to the Board of Supervisors Environment Committee on May 14, 2024. Key flood risk reduction strategies that could inform the Policy Plan include:

- Identifying where the County should obtain additional storm drainage easements and assume maintenance responsibility.
- Evaluating stormwater management options to reduce downstream flows for all County projects. The updated Public Facilities Element of the Comprehensive Plan includes objectives and policies related to stormwater management planning at the individual county facility and regional scale.
- Evaluating efforts related to drainage and flooding in vulnerable areas.

The update also provided results for Phase 1 of a Flood Risk Reduction Proof-of-Concept Study with research and analysis intended to guide regulatory change to reduce flood risk associated with forecasted climate change². Phase 2 of the proof-of-concept study will build upon Phase 1 and propose specific regulatory and policy changes required to meet the flood mitigation level of service stated in the Phase 1 work and is expected to be completed in 2025.

- **Virginia Stormwater Management Handbook:** The Virginia DEQ consolidated the Virginia Stormwater Management Handbook and Erosion and Sediment Control Handbook, and numerous other approved standards, specifications and policies, into a new [Stormwater Management Handbook](#). The Handbook provides guidance for siting and designing construction and post-construction best management practices (BMPs), as well as providing construction and maintenance guidelines that facilitate long-term performance of BMPs. A Virginia Runoff Reduction Method spreadsheet for use with the new handbook was also developed, with updates anticipated to go into effect in the summer of 2025.
- **Virginia Coastal Resilience Master Plan (CRMP):** The Virginia Department of Conservation and Recreation (DCR) is the state agency responsible for developing the [CRMP](#). Phase 1 of the CRMP focused on the impacts of tidal and storm surge coastal flooding on social, natural, and built assets in coastal Virginia but did not address rainfall-driven stormwater flooding. In addition to the plan, a [Coastal Resilience Web Explorer](#) was developed to present hazard and impact data, an inventory of resilience projects, and potential funding opportunities. Phase 2 of the CRMP, currently under development, will include anticipated impacts from rainfall-driven, riverine, and compound flooding.
- **Freshwater Salinization Syndrome Studies and Initiatives:** Increased salinity in water resources can have adverse implications on public health, infrastructure, and the environment. Several regional entities have public education initiatives on this issue. The Metropolitan Washington Council of Governments (MWCOCG) has a community engagement campaign on how to be [Winter Salt Smart](#) and the Virginia Department of Environmental Quality (VDEQ) developed a [Northern Virginia Salt Management Strategy](#) (SaMS) and toolkit in 2020 (hosted on Northern Virginia Regional Commission’s website). The focus of these two efforts is to create public awareness and provide recommendations for efficient salt use

² Climate change is a long-term change in average weather patterns because of human activities (e.g. burning fossil fuels) that trap greenhouse gases in Earth’s atmosphere, thus raising the average surface temperature.

while maintaining the same levels of safety. Fairfax County's Department of Public Works and Environmental Services (DPWES) is coordinating with various agencies on salt management efforts:

- Phasing in of SaMS components into County operations in 2018, with others in the process of being implemented or planned for future adoption. The County is in the process of drafting a formal Chloride total maximum daily load (TMDL) Action Plan, a requirement of the Municipal Separate Storm Sewer System (MS4) Permit that was recently reissued in January 2024. The TMDL Action Plan will provide additional detail and is expected to be available for public comment later in 2025.
 - Participation on the expert stakeholder group and the Executive Committee on the Occoquan Sewershed (ECOS), to help define scopes of research for the Virginia Tech Occoquan Monitoring Laboratory's multi-year Growing Convergence Research (GCR) grant from the National Science Foundation to address salinization in the Occoquan Reservoir.
 - Member of the NVRC Occoquan [MWCOG's regional salinization monitoring work](#), which includes U.S. Geological Survey (USGS), University of Maryland (UMD), and Virginia Tech's Occoquan Water Monitoring Lab (VT OWML).
 - In cooperation with the USGS, Fairfax County DPWES operates a network of stream gages across the county that monitors trends in salinization and specific ions and uses this information to better inform salt management in the watershed. Currently, the USGS is developing a watershed salt loading model from these data and results are expected to be published in 2025.
- **Poly- and per-fluoroalkyl substances (PFAS)** are a group of over 6,000 manufactured chemicals used in industry and consumer products since the 1940s. Certain PFAS, such as perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS), do not breakdown in the environment, can bioaccumulate in living beings, and can adversely impact human health and the environment. On October 29, 2024, [Fairfax Water presented](#) to the Board of Supervisor's Environment Committee that the majority (two-thirds or more) of human exposure to PFOA/PFOS comes from diet, and approximately one-quarter comes from drinking water. New U.S. Environmental Protection Agency [standards](#) will become effective in 2029 for six PFAS present in drinking water. Fairfax Water initiated watershed monitoring in January 2024 and found that PFOS levels would be in marginal compliance, and PFOA levels would not comply with the new federal standards at the Griffith Water Treatment Plant which treats water from the Occoquan Reservoir. It would cost an estimated \$389,000,000 to install the necessary equipment to the plant to meet PFAS federal standards. One of Fairfax Water's goals is to *"Identify and reduce sources of PFAS in the Occoquan and Potomac water supplies to preserve these vital resources for future generations and reduce costs for customers."*

Stormwater Policy Examples

The following provides a short list of examples of how recent comprehensive plans from other jurisdictions are addressing stormwater management, particularly related to resiliency, equity, and promoting stormwater management that serve multiple purposes.

- **Washington, D.C. 2021 Comprehensive Plan:** [Chapter 6 Environmental Protection](#), Policy E-1.1.5: *“Resilient Infrastructure Design infrastructure, such as roads and parks, to withstand future climate impacts, and increase Washington, DC’s’ resilience by having roads and parks serve multiple purposes where possible, including flood risk reduction, urban heat island mitigation, and stormwater management.”* 603.9 *“See the Infrastructure Element for more information on resilient infrastructure.”*
- **Richmond 300,** [Chapter 6 Thriving Environment](#): *“Objective 16.4 Increase green stormwater infrastructure throughout the city, prioritizing areas with a high heat vulnerability index score. Objective 17.3 Reduce urban heat, prioritizing areas with a high heat vulnerability index rating...policy b. Identify opportunities for green roofs on public facilities, and encourage green roofs in private development. Objective 17.5 Reduce the effect from heavy rainfall events and sea level rise.”*
- **Imagine Boston 2030:** *“Partner with federal, state, and private entities to invest in nature-based and hard-engineered flood protection. These defenses will protect our neighborhoods and strengthen our shoreline. As we develop this new infrastructure, we will prioritize shoreline investments that integrate co-benefits, such as open space, and support infrastructure investments including improved stormwater infrastructure, as part of public and private capital projects.”*

Policy Recommendations

Fairfax County has a robust set of plans, policies, and codes aimed at managing stormwater runoff to avoid or minimize adverse impacts. In addition, current efforts are underway to develop strategies aimed at addressing topics that have risen to the forefront since the last Policy Plan update, such as climate change, freshwater salinization, equity, and health. Through the review of existing county policies, related county and regional efforts, and recent Plan amendments and entitlement applications, staff has identified several topics where policies could be enhanced or added in the Environment Element related to stormwater management. Staff will continue to coordinate with County staff and applicable stakeholders to develop policies to address topics listed in this paper, as well as any additional policies that are appropriate for incorporation into the Comprehensive Plan’s Policy Plan.

Identified policy topics are presented in three general groups: new policy topics, improved existing policies, and formalized practices. These are presented as topics for consideration; policy text based on these topics will be developed in the coming months.

New Policy Topics

- **Climate Resiliency:** Potential stormwater related impacts of climate change identified for Fairfax County include more frequent and intense storms, more extreme flooding events, an expansion of flood-prone areas, and increased flood risk due to sea level rise and tidal surges.
 - Update Objective 7 and related policies to recognize different types of flooding hazards (e.g. inland flooding, coastal flooding, dam failures, etc.) and develop policies in coordination with appropriate county staff and plans (e.g. Resilient Fairfax, Flood Risk Reduction Policy and Proof-of-Concept Study, etc).
 - Recognize the adverse impacts of urban heat island effect and develop and/or identify existing policies that can mitigate those impacts, such as green roofs, increased tree conservation/plantings, green infrastructure and other elements that also have stormwater management benefits.
- **Equitable Development:** develop and identify stormwater management policies that could provide the greatest benefits in vulnerable communities and emphasize the implementation of those in applicable project reviews.
- **Community Health:** develop and identify stormwater management policies that could emphasize health benefits and the implementation of those in applicable project reviews.
- **Co-Benefits Approach:** Encourage the design of functional stormwater features as amenities that provide multiple benefits, including environmental, habitat creation, species diversification, traffic calming, educational, and aesthetic benefits.
- **PFAS:** As presented by Fairfax Water, a potential Fairfax County action to address PFAS in drinking water could be requiring initial PFAS monitoring of wastewater and stormwater discharges for proposed land uses known or likely to use PFAS. In the context of the Policy Plan update, potential policy language encouraging PFAS monitoring for proposed land uses known or likely to use PFAS could be considered.

Improve Existing Policies

- **Environment Element, Objective 2:** the existing policies within this objective could be organized into types of approaches such as programmatic, broader landscape, site-level design, and specific techniques with greater focus on the following areas:
 - Encourage the incorporation of stormwater site design principles to mimic natural hydrologic runoff characteristics through avoidance, minimization, and mitigation. Such principles seek to preserve as much natural vegetation and healthy soils as possible, restore degraded soils, discourage excessive grading, capturing stormwater on-site, etc.
 - Encourage an ecosystem approach to green infrastructure techniques that emphasize more than stormwater management benefits, e.g. improved air quality,

temperature regulation, space for recreation, climate resiliency, and increased biodiversity, such as (but not limited to):

- Encourage green roofs on parking structures throughout the county (already encouraged in Urban Design Guidelines Volume I, Sec. 5A.1.H).
 - Incorporate BMPs that are designed to adapt landscapes for the impacts of a changing climate.
 - Use native vegetation within bioretention facilities to provide for multiple benefits including nutrient cycling, energy transfer, improved water quality, support for wildlife and insects, and enhanced aesthetics.
- **Area Plans/SSPAs:** Incorporate guidance from area plans/site-specific guidance into the Environment Element that may be appropriate at a county-wide level based on pending discussions with applicable stakeholders. Potential guidance may include:
- Exceed minimum code requirements for water quality and quantity with consideration towards establishing a county-wide goal, e.g. good-forested condition, certain percentage of runoff reduction, obtaining LEED rainwater management credits (or equivalent), etc.
 - Encourage coordinated stormwater controls on-site and/or over multiple development sites by incorporating multiple BMPs in sequence (sometimes called “treatment trains”) to enhance the treatment of runoff; and which could be designed to provide a variety of ecological functions and aesthetic amenities.
 - Encourage pollution reduction requirements to be met on-site.

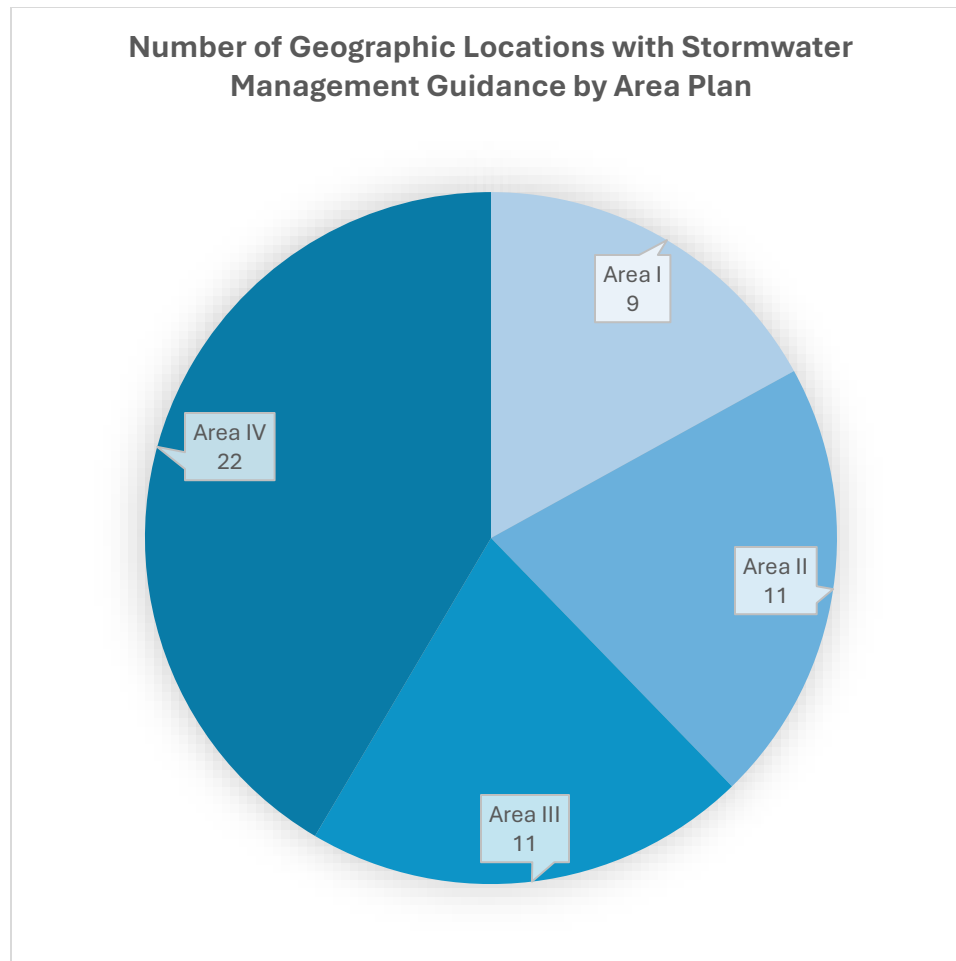
Formalizing Practice

- **Salt management:** while recent entitlement commitments have been made for the proper management of road salt use for some private developments, the monitoring and enforcement of such commitments can be challenging. The development of a formal policy that provides for meaningful implementation should be explored. This could include encouraging commitments for the preparation of salt management plans that are provided to building owners/property managers. The purpose of these plans would be to create awareness of the adverse impacts of excess salt use and provide recommendations for efficient salt use while maintaining the appropriate safety. Policy language should also be developed for commercial/industrial uses that encourage monitoring of cooling system discharge into the wastewater system and, if needed, providing pre-treatment. Additionally, for such uses within the Upper Occoquan Service Authority (UOSA) service area, encourage the use of cooling systems that do not discharge to the wastewater or stormwater systems, or non-chemical and non-water-based cooling systems.
- **Soil remediation:** a routine commitment for development projects is to amend soils through aeration, additional organic matter, and provide dense plantings of native perennials to reduce foot traffic compaction in non-walking/activity areas. This is

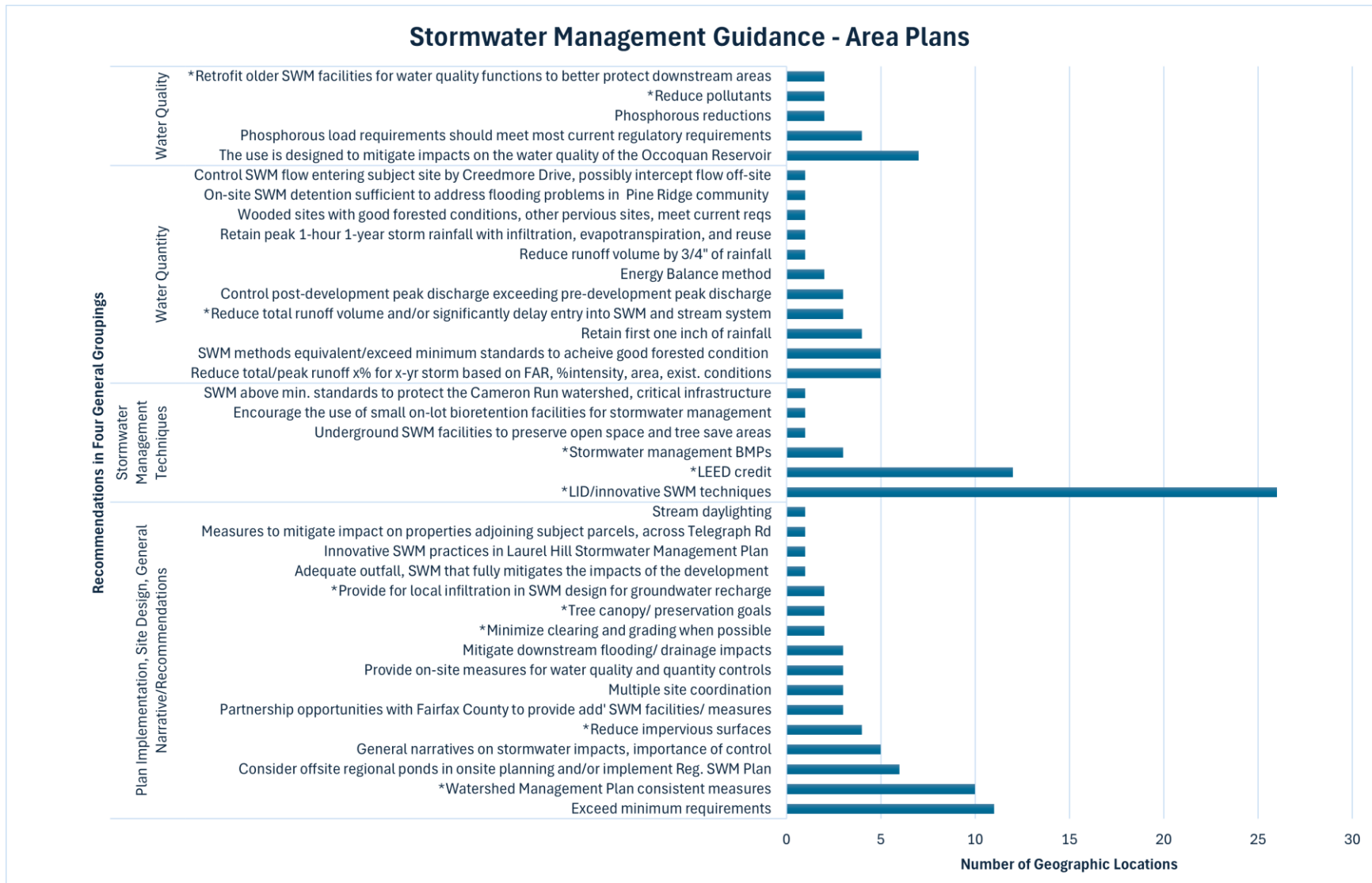
intended to promote both plant health and stormwater infiltration. A formal policy should be developed to ensure this practice is routinely performed.

- **R-C/WSPOD formalization of practice of preserving 50% undisturbed open space:** To implement the last bullet of the applicable Area Plan guidance, *“The use is designed to mitigate impacts on the water quality of the Occoquan Reservoir”*, County staff utilizes an approach that a minimum of 50% undisturbed open space be maintained along with BMP controls for developed portions of a site. This approach is reflected in most special exception and special permit applications approved in the R-C District and serves to satisfy the BMP requirement of the WSPOD.
 - Establishing a policy that formalizes the practice of 50% undisturbed open space within the R-C zoning district for nonresidential developments requiring special exception or special permit approval would further the Comprehensive Plan goals of mitigating impacts on the water quality of the Occoquan Reservoir, as well as furthering the purpose of the R-C district to “to minimize impervious surface and to protect the quality of water in public water supply watersheds”.
 - A formal policy for this practice should also encourage tree preservation and/or other environmentally sensitive area preservation (as applicable) as part of the 50% undisturbed open space. Preserving tree canopy cover is critical to maintaining local hydrology and the protection of the County’s streams and aquatic habitats.

Appendix 1: Stormwater Management Guidance Found in Area Plans



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*Similar guidance also found in Environment Element