




County of Fairfax, Virginia

MEMORANDUM

DATE: May 6, 2020

TO: Board of Supervisors

FROM: Bryan J. Hill
County Executive 

SUBJECT: Climate Adaptation and Resilience Planning in Fairfax County

One of the 19 action items in [Fairfax Green Initiatives](#), a joint Board Matter unanimously approved by the Board of Supervisors in February 2019, directed staff to report back on a timeframe for developing a Climate Adaptation and Resilience Plan. The Board requested that this item be brought forward for consideration at a Board of Supervisors Environmental Committee meeting by spring 2020. Due to scheduling restrictions associated with the COVID-19 pandemic, and the cancelled May 12 Environmental Committee meeting, the Office of Environmental and Energy Coordination (OEEC) has prepared this proposal for a plan, including a scope, framework, timeline and structure, to be considered by the Board of Supervisors.

Developing a Climate Adaptation and Resilience Plan will require significant resources. The ongoing COVID-19 pandemic has placed an enormous burden on the county, making it a challenge to find the resources required to fund adaptation and resilience planning. However, the pandemic has highlighted the importance of having resilience strategies in place before disaster strikes. Climate change is capable of causing widespread destruction on par with the COVID-19 pandemic. In fact, in addition to expected increases in extreme storms and weather events, studies have found that climate change may result in the spread of other zoonotic diseases, causing pandemics to occur more often. The proposed Climate Adaptation and Resilience Plan will use community-wide and expert input to identify the county's climate risks and vulnerabilities and to develop adaptation and resilience strategies. When implemented, these strategies are expected to help county government, authorities, residents and community members prepare and respond to direct climate threats, reducing the social, economic and environmental impacts of short- and long-term climate change.

The sections below further explain the need for a Climate Adaptation and Resilience Plan, discuss comparable planning efforts in other jurisdictions and outline the scope, framework, timeline and structure of the proposed plan. Additional information is included in Attachment 1A, a white paper on Developing a Climate Adaptation and Resilience Plan in Fairfax County, and 1B, a matrix outlining climate adaptation and resilience planning in other jurisdictions.

I. Need for a Climate Adaptation and Resilience Plan

Climate change is already having a significant impact on Fairfax County. Over the past several years, the county has seen rising average annual temperatures and more frequent heat waves, precipitation events and extreme storms. Responding to each of these events as they occur can cost millions of dollars. For instance, the July 8, 2019 rainfall event, the intensity of which has been attributed to climate change, lasted only a few hours but managed to cause over \$12 million in damages to county roads, homes and businesses. Precipitation and extreme weather events like the July 8 rainfall are expected to become more frequent and severe in coming years, even as the county and its surrounding jurisdictions adopt and implement aggressive climate mitigation plans, such as the Community-wide Energy and Climate Action Plan (CECAP). Costs over time are expected to increase exponentially as damages become more extreme, and as climate change takes an ever-growing toll on the natural environment and public health.

Developing and implementing a plan allows the county to avoid economic, social and environmental risks associated with climate change. Putting in place strategies that prepare the community for long-term climate impacts reduces the costs of future damages and the need to respond to emergencies as they arise. For example, updating the county's stormwater management systems to handle projected extreme precipitation events can reduce the likelihood of significant flood damage during these events, thereby reducing the need to fund cleanup and disaster relief efforts. Investing in adaptation and resilience strategies has proven effective for other jurisdictions, such as Asheville, North Carolina. After a severe precipitation and flooding event caused \$200 million in damages in 2004, the city adopted a number of measures, including upgrades to stormwater infrastructure, to prepare against future disasters. When a similar extreme weather event struck in 2018, associated damages added up to only \$2 million.

Climate adaptation and resilience planning provides further economic advantages by signifying to bond rating agencies that the county is able to manage climate risks. Already, Moody's, Standard and Poor's (S&P) and Fitch Ratings have indicated that they will increasingly assess a municipality's ability to respond to climate change when developing bond ratings. Miami Beach's investments in climate adaptation strategies were cited in high ratings recently assigned by Moody's and S&P. While Fairfax County may not face the same climate risks as jurisdictions in Florida, sometime in the near future, having a Climate Adaptation and Resilience Plan in place may be necessary to maintain the county's triple-AAA bond rating and all the financial benefits this rating entails.

In addition to county-wide economic impacts, climate change will cause significant challenges for the county's frontline community members, those who may already be dealing with the effects of climate change, and who will continue to face disproportionate effects due to entrenched social and economic factors. Climate change acts as a multiplier of risks, exacerbating preexisting conditions, such as poverty and chronic health issues, for those who are least able to absorb additional stress. Failing to produce long-term solutions puts these populations in jeopardy, aggravating existing equity concerns and placing added burdens on the local economy and public health sector. A Climate Adaptation and Resilience Plan allows the county to identify how and which populations are most at risk from climate change, develop and implement adaptation and resilience strategies that meet the needs of all community members,

especially frontline community members, and advance the objectives in existing plans and policies such as One Fairfax and the Strategic Plan.

Fairfax County has begun taking steps towards adaptation and resilience planning. The county has participated in ongoing regional efforts at the Metropolitan Washington Council of Governments (COG) and the Northern Virginia Regional Commission (NVRC). Several county agencies, including the Department of Public Works and Environmental Services, the Department of Health, the Department of Information Technology and the Facilities Management Department, are addressing current and projected climate impacts through existing policies, plans and programs. However, even with these efforts in place, staff believe that a more holistic and coordinated approach to adaptation and resilience planning is needed at the county level. A county-wide plan would ensure the use of common baselines to assess climate impacts, coordination amongst agencies toward implementation of cross-cutting strategies, and a consolidated approach to community outreach. In addition, a coordinated planning approach can better ensure that the needs of all community members are met in an equitable manner.

II. Climate Adaptation and Resilience Planning in Other Jurisdictions

Staff researched best practices and planning efforts from jurisdictions across the nation to better understand the resources and effort required to develop a Climate Adaptation and Resilience Plan in Fairfax County. Ultimately, staff focused on plans from Washington, D.C., Virginia Beach, Norfolk, Boston and Houston. Funding in these jurisdictions ranged from \$200,000 to \$1.8 million, with one exception; Virginia Beach's climate adaptation and resilience plan cost \$3.8 million to develop, due to an extended five-year planning effort. The remaining jurisdictions developed their plans in one to two years. All plans required significant resources to procure contractual support. Several jurisdictions, such as Boston and Houston, used funding to staff new positions within existing departments, while other jurisdictions like Norfolk created a dedicated Office of Resilience to oversee plan development. A matrix in Attachment 1B provides additional detail on the timing, staff and budget requirements to develop climate adaptation and resilience plans in these five jurisdictions.

Jurisdictions with plans on the lower end of the funding range (~\$200,000), like Washington, D.C. and Boston, had preexisting climate action plans and well-staffed environmental departments from which to draw. Jurisdictions with higher funding levels (\$1.69- \$3.8 million), like Norfolk, Houston and Virginia Beach, tended to lack departments or dedicated staff to tackle environmental and energy initiatives. Fairfax County staff expect that funding requirements for a local plan will fall in the lower- to middle-range compared to these five jurisdictions. County leadership has demonstrated a strong commitment to environmental and energy initiatives by funding a dedicated office (OEEC) to oversee projects such as a Climate Adaptation and Resilience Plan. However, the OEEC is not as robust as Washington D.C's Department of Energy & Environment or Boston's Environment Department, and as such, the county will likely require more funding than these jurisdictions to secure additional staff and procure contractual support for adaptation and resilience planning.

III. Developing a Climate Adaptation and Resilience Plan in Fairfax County

A study of planning efforts in other jurisdictions as well as a review of best practices from national climate planning experts have informed the proposed scope, framework, timeline structure and expected resource and staffing requirements for a Fairfax County Climate Adaptation and Resilience Plan, which are outlined in the following subsections. Planning components are dependent upon the approval of resource needs and Fairfax County's ability to ride an existing COG contract.

A. Proposed Scope, Framework, Timeline and Structure

Scope

The Climate Adaptation and Resilience Plan will address direct climate impacts to Fairfax County, including higher temperatures and heat waves, colder temperatures, blizzards, superstorms, changes to precipitation patterns or events, flooding (coastal, tidal, riverine and inland) and sea level rise. The plan will examine how county government, utilities and authorities, businesses and residents can prepare for these impacts as they grow more intense or frequent over time.

Framework and Timeline

The proposed framework and timeline are contingent on Fairfax County riding an existing COG contract with one of two consultants. That contract is currently set to expire in June 2021. COG staff anticipates extending the contract for an additional year, or until June 2022. After June 2022, however, the county will be unable to utilize consultants without conducting a lengthy procurement process. Missing the opportunity to ride the COG contract would delay the planning process by up to two years after such time as the Board dedicates resources.

Staff proposes developing a five-phase Climate Adaptation and Resilience Plan, including: I) project initiation; II) a vulnerability and risk assessment; III) strategy and plan development; IV) implementation; and V) monitoring and evaluation. It is expected that a final Climate Adaptation and Resilience Plan would be completed by June 2022 in Phase III, prior to the expiration of the COG contract. It is difficult to estimate timelines for Phases IV and V, as they may occur over several years. At this time, staff does not anticipate requiring contractual support for the remaining phases of implementation, monitoring and evaluation; therefore, these phases are not restricted to the June 2022 timeline. Additional detail for each phase is provided below. Timing estimates for the first three phases are also provided, however a final timeline will be developed by staff and consultants, following the procurement of contractual support.

- **Phase I**, project initiation, will include securing additional staff, procuring contractual support, negotiating a final contract and developing project management goals and deliverables. Stakeholder groups will be convened, and introductory meetings held before planning kicks off in Phase II. Project initiation is expected to take place from September 2020 – February 2021, with contractors brought on board in January 2021.
- The **Phase II** vulnerability and risk assessment will identify the county's climate risks and vulnerabilities through the development of localized climate projections over time and the

analysis of how communities and sectors will be able to prepare for, respond to and adapt to projected climate impacts. Phase II will include a policy audit to identify gaps in existing county plans and programs that address climate adaptation and resilience. Results from the Phase II analysis will be presented to stakeholder groups and the broader community. Community-wide feedback will be incorporated into future deliverables. Staff anticipates a six-month vulnerability and risk assessment, taking place from February to July 2021.

- In **Phase III**, the planning team will rely on stakeholder and community input to develop climate adaptation and resilience strategies. Strategies, which will be developed from May to November 2021, partially overlapping with the vulnerability and risk assessment, will address community-wide actions, as well as actions targeted to the county's diverse range of community members, including county government, residents, businesses, utilities and authorities. An implementation roadmap will be developed to identify leads, partners and timelines for each strategy. The final Climate Adaptation and Resilience Plan will also be developed in Phase III, from November 2021 to May 2022. The plan will summarize the results of the climate projections, vulnerability and risk assessment, policy audit, climate adaptation and resilience strategies and the implementation roadmap. The Board of Supervisors, stakeholder groups and the greater community will be able to review a draft of the plan and provide feedback. Recommendations will be incorporated into the final plan. The final plan will be presented to the Board for endorsement at a spring 2022 Environmental Committee meeting, and, if endorsed, adopted at a subsequent Board of Supervisors meeting. Supplementary outreach materials will be developed at the same time as the final Climate Adaptation and Resilience Plan. Once the plan is adopted, likely in June 2022, these outreach materials will be shared to educate and engage community members on climate adaptation and resilience strategies.
- **Phase IV**, implementation of climate adaptation and resilience strategies, will require community-wide participation. Dedicated county staff will coordinate implementation of county-specific strategies and work with external partners to facilitate certain community-wide strategies. Implementation of programs and projects identified in the planning process may be put in motion before the plan is finalized in June 2022, as funding and resources allow.
- Full-scale implementation as well as **Phase V**, monitoring and evaluation, will occur following Board adoption of the plan, occurring in June 2022 and beyond. Phase V will include evaluating the success of the Climate Adaptation and Resilience Plan, which may reveal the need to revisit or redraft certain adaptation and resilience strategies at a future date.

Structure

Stakeholder and community input will be a critical component of the planning process. Input from internal agencies and external groups will allow for the development of feasible strategies and encourage buy-in from these groups when the county moves to the implementation phase. The Climate Adaptation and Resilience Plan will require the participation of the following groups:

- **Planning Team:** Consisting of dedicated OEEC staff and consultants, the planning team will facilitate plan development and community outreach. The planning team will coordinate review of deliverables from relevant staff and the Board of Supervisors. OEEC staff and consultants will meet regularly to develop and review planning material.
- **Steering Committee:** The Steering Committee will consist of representatives from relevant county agencies and departments, who will review deliverables and submit recommendations. Staff on the Steering Committee will be expected to attend a kickoff meeting and will likely coordinate virtually thereafter.
- **Advisory Groups:** Two advisory groups, each with its own areas of focus and interest, will play a key role in reviewing deliverables and developing strategies. The **Infrastructure Advisory Group** will consist of relevant county agencies and representatives from regional authorities, state agencies, utilities, telecommunication companies and entities providing other critical services to Fairfax County residents. The **Community Advisory Group** will include three representatives from each of the county's magisterial districts, individuals from boards, authorities and commissions and representatives from the environmental, religious, non-profit, civil rights, residential and business communities. Each advisory group will have a kickoff meeting, one meeting during Phase I and two meetings during Phase III.
- **Community:** The public will be given opportunities to review and comment on deliverables. Three community-wide meetings will be held toward the end of Phase II to allow for community-wide feedback. Deliverables will be posted online for public comment for those who cannot attend a meeting. Before the Climate Adaptation and Resilience Plan is finalized, a draft will be posted online and a public comment period opened.

B. Staffing and Resource Requirements

The Climate Adaptation and Resilience Plan, as proposed, will require significant funding, specifically for two additional positions within the OEEC and contractual support. Staff are requesting funding from the FY 2020 Carryover for two full-time employees, including a Division Manager, Climate and Resiliency Services (S31) and a Senior Community Specialist (S29), and contractual support to oversee development of the plan. Annual funding of \$371,400.75 is required to support these two staff positions. One-time funding in the amount of \$640,000 is required to procure contractual support.

IV. Recommendation and Conclusion

The ongoing COVID-19 pandemic has placed an immense burden on the Fairfax County community. While the pandemic presents challenges to funding a Climate Adaptation and Resilience Plan, it also highlights the need to have a long-term plan in place that builds community resilience to unanticipated disasters. Climate change is expected to produce short-term extreme events, as well as long-term changes that will equal, if not exceed, the toll the COVID-19 pandemic has taken on the county, creating added stress on the local economy, environment, and society. Over the coming years, impacts associated with climate change are

expected to cause millions of dollars' worth of damage to the county's built environment, threaten the county's bond rating, exacerbate public health challenges, particularly for frontline communities, and wreak havoc on the natural environment. Having a plan in place will allow the county to better prepare and respond to these short- and long-term climate impacts, reducing the economic, environmental, and social costs of climate change, and enhancing the quality of life for current and future generations of community members.

Staff consulted national best practices and planning efforts to develop its proposed scope, timeline and structure for a Climate Adaptation and Resilience Plan. Developing the plan as proposed requires additional staff, contractual support, and a strict adherence to the timeline. Staff recommend that the Board put forward a consideration item of \$1.0 million for FY 2020 Carryover to procure contractual support and provide for two new positions within the OEEC to oversee the planning effort. Carryover funding is imperative if the county wants to ride an existing COG contract. Missing the opportunity to ride this contract will delay the adaptation and resilience planning process beyond the anticipated June 2022 plan release date by up to two years. A deferred timeline will increase the costs of plan development and delay county preparations for impending climate disasters.

Supervisors who have any questions on the proposed Climate Adaptation and Resilience Plan should contact Kambiz Agazi at 703-324-1788 or at Kambiz.Agazi@fairfaxcounty.gov.

Attachment 1A: Developing a Climate Adaptation and Resilience Plan in Fairfax County

Attachment 1B: Climate Adaptation and Resilience Planning in Other Jurisdictions

cc: Joseph M. Mondoro, Chief Financial Officer
Kambiz Agazi, Director, Office of Environmental and Energy Coordination

Developing a Climate Adaptation and Resilience Plan in Fairfax County

As Fairfax County begins to grapple with the effects of climate change, including changes in precipitation patterns, more intense and frequent storm events and increases in average annual temperatures, the county and its community members are encountering a number of related economic and social challenges. The county is developing its Community-wide Energy and Climate Action Plan (CECAP) to mitigate countywide greenhouse gas emissions that contribute to the changing climate. However, even with aggressive mitigation actions in place, Fairfax County and the surrounding region can expect climate impacts to grow increasingly more severe over the coming decades.

To prepare for these expected impacts, there has been a growing consensus among county leaders, advisory councils and community groups that Fairfax County should develop a Climate Adaptation and Resilience Plan. Supervisors Storck, Foust, and (now Chairman) McKay directed staff to identify a timeframe to develop a county-specific Climate Adaptation and Resilience Plan in their Fairfax Green Initiatives Board Matter, released in February 2019. The Environmental Quality Advisory Council (EQAC) has twice called for such a plan in the 2018 and 2019 versions of their Annual Report on the Environment. Local environmental groups, such as the Great Falls Group of the Sierra Club and Mount Vernon's Environmental Advisory Committee, have made similar recommendations.

The development of a Climate Adaptation and Resilience Plan will require significant resources to acquire contractual support and fund up to two full time equivalent employees within Fairfax County's Office of Environmental and Energy Coordination (OEEC). A study of best practices and planning initiatives in other jurisdictions have informed the proposed scope, framework, structure and timeline for a Climate Adaptation and Resilience Plan, outlined below.

Need for a Climate Adaptation and Resilience Plan

As climate change continues to threaten the quality of life for current and future generations, by burdening environmental, economic and social systems, it has become increasingly clear that Fairfax County has a role to play in developing and implementing community-wide climate adaptation and resilience strategies. Almost all members of the Fairfax County community are vulnerable to climate change, including county government, residents, business owners, utilities and authorities. Strategies developed under a Climate Adaptation and Resilience Plan would allow the Fairfax County community to reduce its vulnerability to climate impacts, while increasing its ability to respond to and recover from these impacts. Putting adaptation and resilience strategies in place provides numerous co-benefits to the local economy and public health.

Reducing Economic Risks Associated with Climate Change

The expected economic advantages to developing a Climate Adaptation and Resilience Plan are particularly compelling. Climate change is already having a substantial fiscal impact on Fairfax County and the surrounding region. Climate impacts, such as extreme precipitation and flash flooding events, which can cause millions of dollars' worth of damage to county homes,

businesses, government buildings, utilities and infrastructure, are becoming more intense and frequent. The intensity of the July 8, 2019 rainstorm, in which over a month's worth of rain fell in an hour, wiping out roads, flooding homes and businesses and stranding drivers in rising waters throughout the county, has been attributed to a warming climate.¹ Over 270 county residents and businesses logged \$6.8 million in damages connected to the July rainfall event; the Virginia Department of Transportation recorded \$6 million more in damages to county roads.²

In addition to precipitation and flash flooding events, extreme weather events, heat waves and storm surges are expected to become more common in this region over the coming decades.³ Costs associated with these damages can be expected to grow exponentially. Implementing strategies identified in a Climate Adaptation and Resilience Plan, such as updating infrastructure to handle projected climate impacts, would directly reduce some of these expected community-wide economic challenges.

Developing a Climate Adaptation and Resilience Plan could provide indirect economic benefits as well. For decades, Fairfax County has maintained a triple-AAA bond rating, allowing the county to sell its bonds at a low interest rate, and saving millions of dollars for county taxpayers.⁴ The three bond rating agencies that rate Fairfax County, Moody's, Standard and Poor's and Fitch Ratings, have all signaled that they will start to look at climate risks, and a municipality's ability to respond to such risks, in their assessments of local governments.⁵ While ratings agencies have been slow to incorporate climate risk into their credit ratings, there may come a time in the near future where the development and implementation of a Climate Adaptation and Resilience Plan is necessary to maintain the county's triple-AAA bond rating and all the financial benefits that entails. Putting a plan in place now that addresses climate impacts preemptively demonstrates to these bond rating agencies that the county can appropriately identify, respond to and manage risks.

Reducing Threats to Public Health Posed by Climate Change

The economic advantages to developing a Climate Adaptation and Resilience Plan may be the most compelling, but they are not necessarily the most important. Climate change will cause devastating public health effects on the region as impacts grow more severe. Over the coming

¹ Jason Samenow, Ian Livingston and Jeff Halverson, "How and Why the D.C. Area Was Deluged by a Month's Worth of Rain in an Hour Monday," *The Washington Post*, July 8 2019, <https://www.washingtonpost.com/weather/2019/07/08/washington-dc-flash-flood-how-why-area-was-deluged-by-months-worth-rain-an-hour-monday/>

² Catherine Moran, "Flash Flooding Damage in Fairfax County Costing Millions for Repairs," *Tysons Reporter*, July 30, 2019, <https://www.tysonsreporter.com/2019/07/30/flash-flooding-damage-in-fairfax-county-costing-millions-for-repairs/>

³ Northern Virginia Regional Commission (NVRC), *Resilient Critical Infrastructure: A Roadmap for Northern Virginia*, NVRC, February 2018, <https://www.novaregion.org/DocumentCenter/View/11933/Resilient-Roadmap-Final-PDF>

⁴ Fairfax County, Virginia, "County Retains Triple-A Bond Rating," Board of Supervisors – Chairman, January 30, 2020, <https://www.fairfaxcounty.gov/chairman/county-retains-triple-bond-rating>

⁵ Four Twenty Seven, *Assessing Exposure to Climate Change in U.S. Munis*, Four Twenty Seven, May 2018, <http://427mt.com/wp-content/uploads/2018/05/427-Muni-Risk-Paper-May-2018-1.pdf>; Fitch Ratings, *ESG in Credit White Paper*, Fitch Ratings, 2020, <https://your.fitch.group/esgwhitepaper.html>

years, individuals working and living in the state of Virginia will be especially vulnerable to climate change impacts such as heat-related illnesses, food and water contamination, air quality issues and the spread of infectious diseases. Some impacts will be more direct than others: More frequent heat waves can cause heatstroke and aggravate other preexisting health issues for certain individuals, such as those with cardiovascular and kidney problems; extreme precipitation and weather events can threaten access to critical goods and services, such as clean drinking water; and warmer temperatures can result in the spread of vector-borne diseases, such as Lyme disease and West Nile virus. At the same time, individuals may have to contend with climate impacts that occur further afield, such as changes to agricultural growing seasons in surrounding regions that affect the quality and cost of food sources on which these individuals rely.⁶

These direct and indirect impacts to public health can be particularly challenging for frontline community members, those, such as the elderly, youth, low-income, the unsheltered and individuals who primarily work outdoors, who may be more vulnerable to climate impacts. Not only may these community members experience preexisting public health issues that can be exacerbated by climate change, but these community members, due to related social and economic challenges, may also be the least able to adapt to a changing environment without support from the public and private sectors.⁷

Under a Climate Adaptation and Resilience Plan, the county can determine the extent to which climate change will affect public health over time and develop cross-cutting strategies that reduce the burden climate change impacts will have on its community members. Having a plan in place will protect Fairfax County's frontline communities, helping the county advance objectives in its related programs, plans and policies such as One Fairfax, the Strategic Plan, Health in All Policies and the Environmental Vision.

Climate Adaptation and Resilience Planning at the Local, Regional and National Levels

Ongoing Regional and Local Planning Efforts

Fairfax County is an active participant in regional climate adaptation and resilience planning efforts. Both the Metropolitan Washington Council of Governments (COG) and the Northern Virginia Regional Commission (NVRC) are engaged in adaptation and resilience planning. COG is developing a *2030 Regional Climate and Energy Action Plan* as an update to the *2017-2020 Regional Climate and Energy Action Plan*.⁸ The 2030 Plan will identify climate mitigation and adaptation goals and strategies for 2021-2025 and 2026-2030. COG will produce a regional climate risk and vulnerability assessment to help inform these goals and strategies. Fairfax

⁶ Natural Resources Defense Council (NRDC), *Climate Change and Health in Virginia*, April 2018,

<https://assets.nrdc.org/sites/default/files/climate-change-health-impacts-virginia-ib.pdf>

⁷ Yale School of Forestry and Environmental Studies, "How Climate Change Threatens Public Health," Yale Climate Connections, August 19, 2019, <https://www.yaleclimateconnections.org/2019/08/how-climate-change-threatens-public-health/>

⁸ Metropolitan Washington Council of Governments (COG), *2017-2020 Regional Climate and Energy Action Plan*, MWCOC-Climate, Energy and Environment Policy Committee, March 2017,

<https://www.mwcog.org/documents/2017/03/23/regional-climate-and-energy-action-plan-climate--energy-climate-change-energy/>

County is coordinating with COG and other member jurisdictions on planning elements. A draft of the 2030 Plan is anticipated in October 2020.⁹

The NVRC has an ongoing climate adaptation initiative. It produced a report, *Resilient Critical Infrastructure: A Roadmap for Northern Virginia*, in 2018. Fairfax County provided input on the roadmap as it was developed. The roadmap identifies high-level regional goals and strategies.¹⁰ The NVRC continues its adaptation work as it conducts climate modelling and long-term infrastructure planning with George Mason University and the American Geophysical Union under the Thriving Earth Exchange. Updates are shared with the county as they become available.

Neither of these regional planning efforts are intended as a replacement for individual plans from member jurisdictions. The COG and NVRC plans act more as a guide for jurisdictions as they engage in their own adaptation and resilience planning. The strategies in these plans reflect this purpose, suggesting that jurisdictions conduct their own assessments of vulnerabilities and identification of community priorities.

In addition to regional work, several county agencies, including the Department of Public Works and Environmental Services (DPWES), the Health Department and the Department of Information Technology (DIT) are addressing current and projected climate impacts through existing policies, plans and programs. The Department of Information Technology (DIT) promotes flood risk management strategies by mapping annual changes to stream banks and land cover. These changes are used to generate flooding impact models and stormwater mitigation assessments in vulnerable areas. The Health Department monitors and addresses population health trends associated with climate change impacts, such as impacts from extreme weather conditions, increases in vector-borne illnesses and spreads in food and waterborne diseases. DPWES, the Facilities Management Department (FMD) and the Fairfax County Park Authority (FCPA) incorporate projected climate change impacts into planning for their capital projects. DPWES has installed stormwater and wastewater system upgrades to improve flood predictability, while FMD and FCPA have installed emergency generators in centralized facilities and RECenters so these facilities can serve as emergency shelters in extreme weather events.

These and other programs and policies provide useful services to government operations and community members affected by climate change. A Climate Adaptation and Resilience Plan will bring these individual programs into one coordinated county-wide response to current and projected climate impacts. Doing so will allow the county to identify and address gaps in existing programs, ensure the use of common baselines to assess climate impacts, coordinate implementation of cross-cutting strategies and develop a consolidated approach to community outreach.

⁹ COG, "Resilience Goals and Actions For Regional 2030 Climate and Energy Action Plan," Presentation, posted April 14, 2020, https://www.mwcog.org/events/2020/?F_committee=56

¹⁰ NVRC, 2018.

A Review of Climate Adaptation and Resilience Plans in Other Jurisdictions

Jurisdictions at the regional, state and national levels provide useful examples of the staffing and resource requirements needed to develop a Climate Adaptation and Resilience Plan in Fairfax County. Five jurisdictions stand out from a review of climate adaptation and resilience planning efforts throughout the nation. These jurisdictions include Washington, D.C., Norfolk and Virginia Beach at the regional and state levels, and Boston and Houston at the national level.

Each of these five jurisdictions developed plans unique to their needs. For instance, while most plans identified comprehensive strategies, targeting all climate impacts a jurisdiction is expected to face, Virginia Beach's *Sea Level Wise Adaptation Strategy (2020)* focused on a single issue – sea level rise – expected to have the biggest impact on its community. Despite key differences, common themes related to staff and resource needs emerged from these plans.

All five jurisdictions relied heavily on contractor support to develop a climate adaptation and resilience plan and to facilitate community outreach. Several jurisdictions created either a dedicated office or new positions within existing departments to oversee plan development and implementation. For instance, to oversee its two plans, *Resiliency Strategy (2015)* and *Vision 2100 (2016)*, Norfolk created an Office of Resilience, led by a Chief Resilience Officer and staffed with three additional full-time employees.¹¹ Boston created the Climate Resilience Program Coordinator and Climate Ready Boston Project Coordinator positions within its Environment Department to oversee *Climate Ready Boston (2016)*.¹² Houston brought on a Chief Resilience Officer within the Office of the Mayor to oversee *Resilient Houston (2020)*.¹³ Regardless of organizational structure, all jurisdictions depended on internal advisory groups, made up of agencies that oversee public works and infrastructure, transportation, health, housing, parks, schools and other resources expected to be affected by climate change.

There was a wide range of funding for the development of climate adaptation and resilience plans across the five jurisdictions, starting at \$200,000 and going up to \$3.8 million. Boston and Washington, D.C.'s plans cost the least to develop, likely because these jurisdictions had a significant level of preexisting work and robust environmental departments from which to draw. Norfolk, Virginia Beach and Houston were almost starting from scratch in their climate planning efforts, both in the development of planning and outreach materials and in the creation of dedicated offices and positions. These latter jurisdictions were able to draw on generous grant funding sources. Norfolk was a recipient of \$500,000 from the U.S. Department of Housing and Urban Development and almost \$2 million from 100 Resilient Cities, an organization created by the Rockefeller Foundation, which has since shuttered.¹⁴ Virginia Beach, which allocated \$3 million of its own funds toward planning efforts, utilized \$844,000 in funding from NOAA's

¹¹ Norfolk, Virginia, *Adopted Fiscal Year 2020 Budget*, Norfolk, Virginia, 2019,

<https://norfolk.gov/DocumentCenter/View/50347/FY-2020-Adopted-Budget-Document?bidId=>

¹² Boston, Massachusetts "Preparing for Climate Change," Environment Department, February 2020, <https://www.boston.gov/departments/environment/preparing-climate-change>

¹³ Houston, Texas, *FY 2020 Adopted Operating Budget*, Office of the Mayor, 2019, https://www.houstontx.gov/budget/20budadopt/FY2020_Adopted_Budget.pdf

¹⁴ Norfolk, Virginia, 2019.

Regional Coastal Resiliency Grant.¹⁵ Houston was granted almost \$2 million from the Shell Oil Company.¹⁶

The chart in Attachment 1B provides more detail on timeframes, levels of community engagement and staff and budget requirements for plans developed in each of the five jurisdictions described above.

A Review of Best Practices for Climate Adaptation and Resilience Planning

Leading organizations in the climate planning realm, including the Environmental Protection Agency (EPA), the National Wildlife Federation (NWF), the National Institute of Standards and Technology (NIST) and Local Governments for Sustainability (ICLEI), have produced planning guides documenting best practices and frameworks for jurisdictions undertaking climate adaptation and resilience planning. The frameworks produced by each of these organizations typically range from five to eight planning phases, however many of these frameworks share common elements. Two examples of adaptation and resilience planning frameworks from ICELI (Figure 1) and NWF (Figure 2) are included. The NWF framework is specific to ecological conservation and adaptation, however the phases can easily be converted to fit other scopes. The ICLEI example is a much more simplified framework, adaptable to a variety of adaptation and resilience planning efforts.

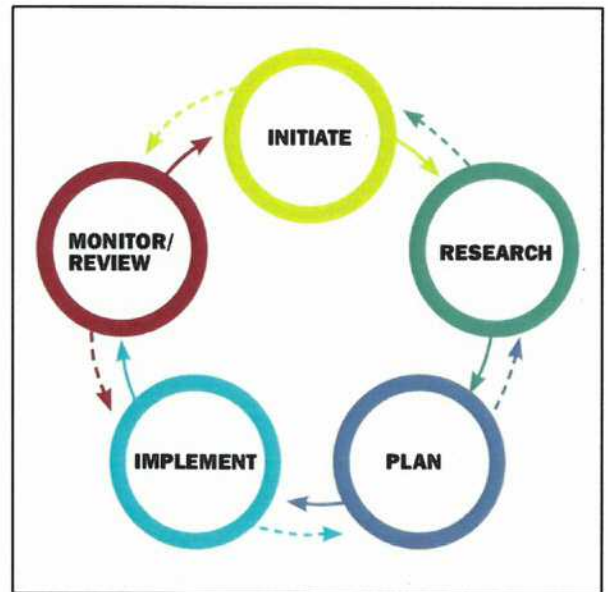


Figure 1: ICLEI's framework for climate adaptation and resilience planning, available at <https://icleicanada.org/wp-content/uploads/2019/07/Guide.pdf>

¹⁵ Virginia Beach, Virginia, "Sea Level Rise," Department of Public Works, 2020, <https://www.vbgov.com/government/departments/public-works/comp-sea-level-rise/Pages/default.aspx>

¹⁶ Houston, Texas, "Mayor Turner Launches the Resilient Houston Strategy and Signs Historic Executive Order to Prepare the City for Future Disasters" Office of the Mayor, February 2020, <http://houstontx.gov/mayor/press/2020/resilient-houston-strategy.html>

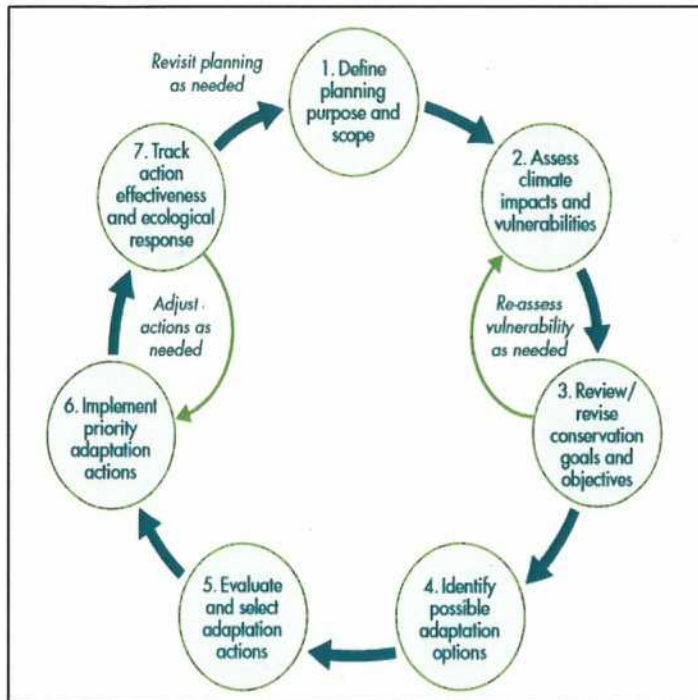


Figure 2: NWF's framework for climate adaptation and resilience planning, available at https://www.nwf.org/-/media/PDFs/Global-Warming/2014/Climate-Smart-Conservation-Final_06-06-2014.ashx

In addition to developing a framework for climate adaptation and resilience planning, organizations such as ICLEI highlighted common goals and guiding principles jurisdictions should set when developing plans. These include:

- Reduce exposure to hazards,
- Reduce vulnerability to climate impacts,
- Increase the ability to respond to and recover from climate impacts,
- Build adaptation and resilience goals into existing programs and policies,
- Develop anticipatory rather than reactive plans,
- Increase public awareness of climate change impacts,
- Prioritize the most vulnerable,
- Strengthen community partnerships that reduce vulnerability and risk to climate change impacts, and
- Continuously evaluate performance.¹⁷

Setting common goals and using industry-approved elements to develop climate adaptation and resilience plans allows jurisdictions to use a common language, increasing their ability to share best practices and lessons learned as they develop and implement their own plans.

Developing a Climate Adaptation and Resilience Plan in Fairfax County

A study of planning efforts in other jurisdictions as well as a review of best practices from national climate planning experts have informed the proposed scope, framework, structure, timeline and expected resource and staff requirements for a Fairfax County Climate Adaptation and Resilience Plan, which are outlined in the following subsections.

¹⁷ Goals were adapted from ICLEI and the 2010 White House Council on Environmental Quality. ICLEI, *Changing Climate, Changing Communities: Guide and Workbook for Municipal Climate Adaptation*, ICLEI, 2019, <https://icleicanada.org/wp-content/uploads/2019/07/Guide.pdf>; Executive Office of the President of the United States, *Progress Report of the Interagency Climate Change Adaptation Task Force: Recommended Actions in Support of a National Climate Change Adaptation Strategy*, the White House Council on Environmental Quality, October 2010, <https://obamawhitehouse.archives.gov/sites/default/files/microsites/ceq/Interagency-Climate-Change-Adaptation-Progress-Report.pdf>

Proposed Scope

The proposed Climate Adaptation and Resilience Plan will address direct climate impacts to Fairfax County, including higher temperatures and heat waves, colder temperatures, blizzards, superstorms, changes to precipitation patterns or events, flooding (coastal, tidal, riverine, inland) and sea level rise. The plan will examine how county government, residents, businesses, utilities and authorities can prepare for these impacts as they grow more intense or frequent over time.

Proposed Framework

A proposed five-phase framework for a Fairfax County Climate Adaptation and Resilience Plan is outlined below. This framework has been adapted from guides consulted in a review of best practices for climate adaptation and resilience planning.

Phase I – Initiation: Project initiation includes several key components that need to be put into place before a plan can be developed. These components include setting up a planning team by hiring any necessary additional staff, procuring contractual support, negotiating a final contract and developing project management goals and deliverables. Initiation will also include convening stakeholder groups and facilitating kickoff meetings for these groups.

Phase II – Vulnerability and Risk Assessment: Phase II includes four major tasks:

- The planning team will develop localized climate projections for the climate impacts identified in the scope. Projections will need to be extended to appropriate timing intervals (e.g. baseline, 2030s, 2050s, 2080s), and align with the mitigation goals and scenarios developed in the CECAP.
- The planning team will use climate projections to develop a vulnerability and risk assessment. As part of this assessment, the planning team will analyze the county’s exposure and sensitivity to direct climate impacts across communities and sectors (e.g. utilities, buildings). The planning team will evaluate how these communities and sectors are able to prepare for, respond to and adapt to current and projected climate impacts.
- The planning team will conduct a policy audit of existing county plans, programs and policies that address climate adaptation and resilience. The audit is intended to identify existing strategies and any potential planning gaps.
- The planning team will present the results of the climate projections, vulnerability and risk assessment and policy audit to stakeholder groups and the broader community. Public meetings will be facilitated, and online materials generated during this phase. Feedback will be collected and incorporated into development of Phase III deliverables.

Phase III – Strategy and Plan Development: Phase III will include the development of climate adaptation and resilience strategies and a final technical report (the Climate Adaptation and

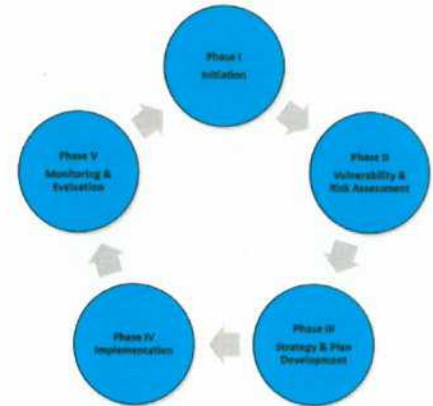


Figure 3: Proposed framework for a Fairfax County Climate Adaptation and Resilience Plan

Resilience Plan). The planning team will consult with stakeholders to develop, analyze, prioritize and refine strategies; community members will be asked to review and provide feedback on these strategies. Strategies shall address community-wide actions, as well as actions targeted to the county's diverse range of community members, including county government, residents, businesses, utilities and authorities. The planning team will consult existing county policies and programs, such as One Fairfax and CECAP, to ensure strategies align with county priorities. An implementation roadmap will be developed to identify leads, partners and timeframes for each strategy.

The final Climate Adaptation and Resilience Plan will summarize the results of the climate projections, vulnerability and risk assessment, policy audit, climate adaptation and resilience strategies and the implementation roadmap. A draft of the plan will be shared with stakeholders and the community. Recommendations and public comments will be accepted and incorporated into the final plan. When finalized, the plan will be presented to the Board of Supervisors for adoption.

Supplementary outreach materials will be developed in tandem with the Climate Adaptation and Resilience Plan. Once the plan is adopted, these outreach materials will be shared to educate and engage community members.

Phase IV – Implementation: Implementation of climate adaptation and resilience strategies will require annual appropriations through the budget processes and community-wide participation. Dedicated county staff will coordinate implementation of county-specific strategies and will work with external partners to facilitate certain community-wide strategies.

Phase V – Monitoring and Evaluation: The county will monitor community-wide implementation of climate adaptation and resilience strategies and evaluate the success of these strategies. Long-term evaluation may reveal the need to revisit or redraft certain strategies at a future date.

Proposed Structure

Stakeholder and community input will be a crucial component of the planning process. Input from external groups will allow for the development of feasible strategies and encourage buy-in from these groups when the county moves to the implementation phase. The following groups will make up the structure of the Climate Adaptation and Resilience Plan:

- **Planning Team:** The planning team will include dedicated staff from the OEEC and the consultants. The planning team will oversee plan development and community outreach.
- **Steering Committee:** A staff Steering Committee made up of representatives from relevant county agencies and departments will be formed to review planning materials and develop recommendations. Many of these county agencies will be involved in implementation; their participation in the development of climate adaptation and resilience strategies will be vital to the success of the plan.
- **Advisory Groups:** The community outreach structure reviewed in *Climate Ready Boston* inspired the proposed advisory groups for Fairfax County - an Infrastructure Advisory Group and a Community Advisory Group. The two groups will operate similarly to the

CECAP Task Force, by developing strategies and reviewing deliverables as they become available. Breaking up the advisory groups allows the planning team to better manage recommendations from such a large, varied group of organizations. The Infrastructure Advisory Group will be able to focus on the technical feasibility of any proposed strategies, while the Community Advisory Group may focus on broader, community-wide strategies. Each advisory group will have a kickoff meeting, one meeting during Phase I and two meetings during Phase III.

- The **Infrastructure Advisory Group** will include representatives from utilities and authorities, telecommunication companies and entities providing other critical services to Fairfax County residents. Regional and state partners, such as VDOT, will be asked to participate.
- The **Community Advisory Group** will consist of up to three representatives from each of the county's magisterial districts; representatives from environmental, religious, non-profit, civil rights and residential organizations; leaders from the business community; and individuals from boards, authorities and commissions.
- **Community:** The greater community will have an opportunity to review and comment on deliverables. Staff are proposing holding three community-wide meetings toward the end of Phase II, to give the public a chance to review and comment on the climate projections, vulnerability and risk assessment and policy audit. Materials will be posted online for those who cannot attend a meeting. Before the Climate Adaptation and Resilience Plan is finalized, a draft will be posted online, and a public comment period opened. Comments will be reviewed and incorporated into the final plan.

Proposed Timeline

The proposed timeline is dependent on Fairfax County's ability to ride an existing COG contract with one of the two consulting firms COG has on retainer that specializes in climate adaptation and resiliency services. This existing COG contract is set to expire on June 30, 2021; however, the county can request that this contract be extended for an additional year. If extended, the county has until the end of June 2022 to use contractual support to develop and finalize a Climate Adaptation and Resilience Plan. Riding the COG contract will expedite the initiation phase of the planning process; failure to ride this contract will result in a lengthy procurement process for contractual support.

Following procurement of contractual services, the Planning Team will develop a final timeline for the first three planning phases. Estimated timelines for these phases are provided below:

Phase I – Initiation: Plan initiation will require an FY 2020 Carryover request for annual funding for two new positions within OEEC and one-time funding for contractual services. Pending Board approval and release of funds, the hiring, procurement and kickoff processes are anticipated to take place from September 2020 – February 2021.

Phase II – Vulnerability and Risk Assessment: The vulnerability and risk assessment is expected to take six months to complete, with analysis and outreach occurring from February to July 2021.

Phase III – Strategy and Plan Development: Adaptation and resilience strategies will be developed from May to November 2021, partially overlapping with the vulnerability and risk assessment. The Climate Adaptation and Resilience Plan, along with any supplementary outreach materials, will be developed from November 2021 to May 2022. The plan, when finalized, will be presented at a spring 2022 Board of Supervisors Environmental Committee meeting, and, if endorsed, adopted at a following Board meeting.

Phase IV – Implementation: This phase will likely be ongoing before the plan is finalized. Programs and projects that address strategies in the Climate Adaptation and Resilience Plan may be developed and implemented as funding and resources allow. Full-scale implementation will occur following Board adoption of the plan

Phase V- Monitoring and Evaluation: This phase will occur following Board adoption of the plan. It is difficult to estimate timelines for Phases IV and V, as they may occur over several years. At this time, it is not anticipated that the county will require contractual support for implementation, monitoring and evaluation; therefore, these phases are not restricted to the June 2022 timeline.

Staff and Resource Requirements

The Climate Adaptation and Resilience Plan, as proposed, will require significant funding for two additional positions within the OEEC. Hiring two full-time employees, including a Division Manager, Climate and Resiliency Services (S31) and a Senior Community Specialist (S29), to oversee development and implementation of the plan, will require annual funding of \$371,400.75.

One-time funding will also be required to secure contractual support. Contractual services are needed to support plan development, specifically, to develop a vulnerability and risk assessment, adaptation and resilience strategies, a final technical report, outreach materials and deliverables associated with project management. Support is also required to facilitate community outreach. Contractual services are expected to cost up to \$640,000.

Recommendation and Conclusion

As cities and counties around the nation continue to face ever-worsening threats from climate change, local governments are recognizing their responsibility to develop and implement climate adaptation and resilience plans. Fairfax County, which is facing its share of climate-related challenges, has the opportunity to emerge as a leader at the regional and national levels by developing a county-wide Climate Adaptation and Resilience Plan. By consolidating stakeholders, the county can ensure that climate adaptation and resilience strategies are tailored to its community. If implemented successfully, the county's plan could serve as a model to other jurisdictions looking to develop similar initiatives.

Developing a county-wide Climate Adaptation and Resilience Plan will require significant resources to fund two full-time equivalent employees within the OEEC and procure contractual support. While developing a plan may be costly, especially as the county deals with other

pressing challenges, it is expected that the implementation of strategies identified in the Climate Adaptation and Resilience Plan will ultimately lead to significant savings. Putting mechanisms in place now that reduce the county's exposure and vulnerability to climate change will reduce the fiscal impact of future extreme climate and weather events. In addition to economic benefits, the implementation of climate adaptation and resilience strategies is expected to create a number of co-benefits throughout society, leading to advances in public health and improving conditions for the county's frontline communities. Finally, the development of a plan will allow the county to continue to meet objectives in its existing programs and policies, such as One Fairfax, the Strategic Plan, Health in All Policies and the Environmental Vision, safeguarding the needs of current and future generations of Fairfax County community members.

CLIMATE ADAPTATION AND RESILIENCE PLANNING IN OTHER JURISDICTIONS

Climate Adaptation & Resilience Planning – Local and State Jurisdictions						
Municipality	Plan Name	Plan Development Timeframe	Cost of Plan Development	Dedicated Office	Oversight	Community Engagement
Washington, DC Pop: 702,455 Area: 68 mi ² Med. Household Income: \$82,372	Climate Ready DC (2016)	~24 months	~\$250,000	Department of Energy and Environment, Urban Sustainability Administration 15 FTE	Deputy Director, Urban Sustainability Administration	10-member Internal Advisory Group 13-member Equity Advisory Group in Ward 7 4+ community-wide Community Conversations
Norfolk, VA Pop: 244,703 Area: 54 mi ² Med. Household Income: \$49,146	Resiliency Strategy (2015)	~12 months	~1,690,000*	Office of Resilience 4 FTE	Chief Resilience Officer	6 months community-wide outreach
	Vision 2100 (2016)	~12 months	\$500,000*			14-member Steering Committee 3 working groups (Coastal, Neighborhood, Economic Resilience) 6 months community-wide outreach Engaged over 500 residents through social media, community meetings, mapping workshops
Virginia Beach, VA Pop: 452,602 Area: 497 mi ² Med. Household Income: \$75,623	Sea Level Wise Adaptation Strategy (Draft, 2020)	Plan emerged from the 5-year Sea Level Wise effort	\$3,844,000*	Department of Public Works, Engineering Group 5 FTE	Director, Department of Public Works	City Manager's Working Group on Sea Level Rise 13 community-wide workshops Engaged over 500 residents through workshops, online portal

* Partially or fully funded through federal or private sector grant programs (e.g. the Rockefeller Foundation, HUD and NOAA).

Climate Adaptation & Resilience Planning – National Jurisdictions						
Municipality	Plan Name	Plan Development Timeframe	Cost of Plan Development	Dedicated Office	Oversight	Community Engagement
Boston, MA Pop: 685,094 Area: 89.6 mi ² Med. Household Income: \$63,621	Climate Ready Boston (2016)	~12 months	~\$200,000*	Environment Department 30 FTE	Climate Ready Boston Project Coordinator Climate Resilience Program Coordinator	9-member Steering Committee 5-member Project Team 33-member Infrastructure Advisory Committee 13-member Community Advisory Group 17-member Research Advisory Group
Houston, TX Pop: 2,320,000 Area: 627.49 mi ² Med. Household Income: \$63,802	Resilient Houston (2020)	~15 months	\$1,800,000*	Office of the Mayor 38 FTE	Chief Resilience Officer	6+ workshops for 100-member Working Group 2 community-wide workshops Community-wide surveys, public comment periods

* Partially or fully funded through state, federal or private sector grant programs (e.g. Barr Foundation and Shell Oil Co.).