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LAND USE: POLICY VERSUS PRACTICE

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Constituent areas include: Adelphi, Beltsville, Calverton, North College Park, Laurel, Montpelier, South Laurel, West Laurel and Vansville

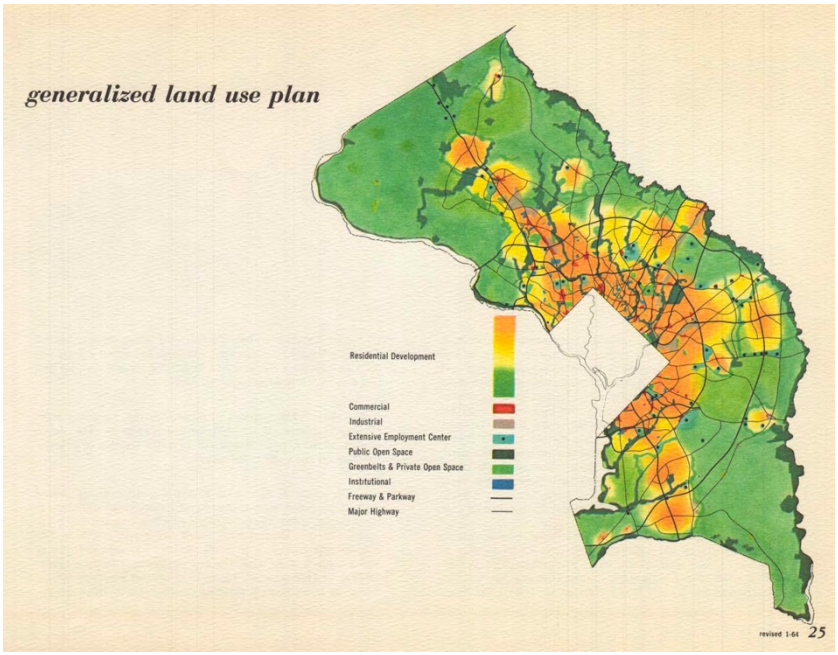
Prince George's County Land Use: Policy Versus Practice

For decades, Prince George's County officials have set goals to promote Smart Growth through transit-oriented development and other techniques. However, achieving these goals has been elusive. Results have included sprawl development, long commutes increasing vehicle miles traveled, a skewed economic base, unaffordable infrastructure costs, and a larger carbon footprint.

The initial general plan for the Maryland metropolitan region was the **1957 General Plan for the Maryland Washington Regional District**, which included only 294 square miles. Soon thereafter, the Regional District quickly expanded to more than 900 square miles, covering most of Montgomery and Prince George's Counties.[1] Development planning took off at the time resulting in 1959 *Mass Transportation Survey Report* and the 1961 *A Policies Plan for the Year 2000*.[2]

The sudden changes in the area under planning analysis, and the rapid changes in planning policy, led to the first real comprehensive plan for the metropolitan region in Maryland: *"… on wedges and corridors (a general plan for the Maryland Washington Regional District"* (January 1964).

The **1964 General Plan** recommended that Maryland suburban development be reflected in a radial corridor shape with four corridors emanating from downtown Washington. Prince George's County development was to be concentrated in the urban ring within the Capital Beltway and in three development corridors: (1) the I-95 corridor extending to Laurel; (2) the area along US 50, extending to Bowie and beyond to Annapolis; and (3) along a new southeast freeway between Indian Head Highway and Branch Avenue, extending to Charles County. Each corridor was planned to be served for its entire length by high-speed rail transit. Between these urban development corridors, large wedges of open space would be preserved.[3]

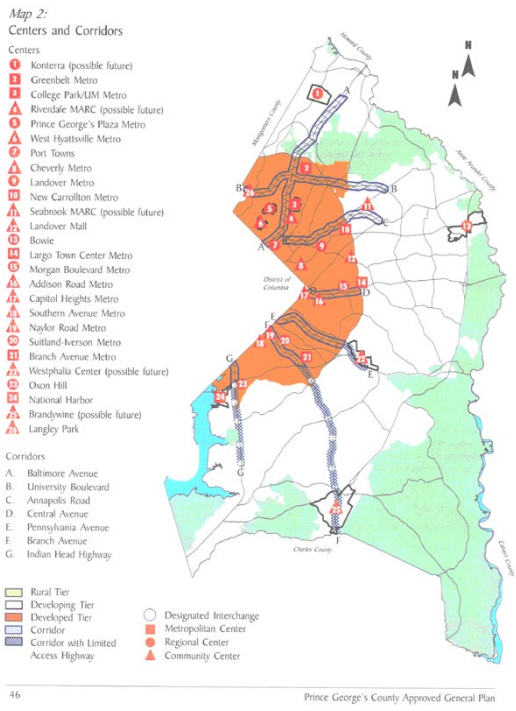


[1] *on wedges and corridors (a general plan for the maryland-washington regional district"* (January 1964) at 9.
[2] *on wedges and corridors (a general plan for the maryland-washington regional district"* (January 1964) at 9.
[3] *on wedges and corridors (a general plan for the maryland-washington regional district"* (January 1964) at 24-26.

In 1982, the County Council approved a new general plan that focused primarily on the interrelationship of future development with other elements, such as economic development, environment, transportation, housing, and public facilities. Generally, the plan set forth policies without recommendations for the location and intensity of specific land uses.[4] The **1982 General Plan** did make more specific recommendations for transportation facilities; the transportation element of the General Plan served as the Master Plan for Transportation.

The 1998 report ***Managing Growth in the 21st Century: A Smart Growth Proposal for Prince George's County*** determined that the 1982 General Plan was no longer adequate to guide future county growth and development. Development in the intervening years had focused on new development as opposed to the protection and revitalization of older, established areas.[5] This resulted in establishment **Commission 2000** to make recommendations concerning the county's future growth and development.[6]

The County Council adopted **Commission 2000**'s consensus recommendations as an interim General Plan ("**Biennial Growth Policy Plan**"). Commission 2000 reviewed four possible alternative growth patterns, and as reflected in the Biennial Growth Policy Plan, ultimately recommended a comprehensive Smart Growth initiative that utilized a system of growth Tiers, Corridors, and Centers to guide future land use and development. The three Tiers encompassed the Developed, Developing, and Rural areas of the county. The plan also recommended policy overlays to encourage revitalization of older communities and to protect environmental resources.[7]



In 2002, County council adopted a new General Plan to formalize the Biennial Growth Policy Plan, adopting the system of Centers, Corridors and Growth Tiers. The **2002 General Plan** established Goals and Guiding Principles.[8] The Plan was structured around three "Elements": (1) the

[4] 2002 General Plan at 16.
[5] 2002 General Plan at 16.
[6] 2002 General Plan at 16.
[7] 2002 General Plan at 16-17.
[8] 2002 General Plan at 21-22.

Development Pattern Element;[9] (2) Infrastructure Elements;[10] and (3) Economic Development, Housing and Community Character Elements.[11] Each Element, and the components thereof, identified a hierarchy of Goals, Objectives, Policies and Strategies that allowed for a biennial examination of the success of the General Plan.

The Development Pattern Element continued the three Tier structure of the Biennial Growth Policy Plan: Developed, Developing and Rural Tiers. Within the Tiers, an overlay designation of Centers and Corridors was established. The Centers and Corridors were intended to provide opportunities for mixed-use, transit-oriented and transit-supporting development. Many of the Centers were located at Metrorail or MARC stations or at significant bus service hubs.

The Infrastructure Elements included Environmental Infrastructure, Transportation Systems and Public Facilities.[12] The Economic Development, Housing and Community Character Elements focused on providing high quality economic development, high-end housing and a balance of housing choices, older community revitalization, and historic preservation.[13]

The 2002 General Plan established three dozen measurable objectives.[14] Residential growth objectives for the next 25 years were set at 33% in the Developed Tier, 66% in the Developing Tier, and 1% in the Rural Tier. In addition, The Plan targeted growth to seven identified Corridors and **26** Centers (divided into Metropolitan, Regional and Community categories). The Plan set residential growth objectives to capture in Centers or Corridors by 2025 greater than 50% of the Developed Tier's housing growth and greater than 20% of the Developing Tier's.[15]

Other notable measurable objectives included:

- Increase average automobile occupancy by 25 percent by 2025.
- Reduce average commuter vehicle miles traveled countywide by 25 percent by 2025.
- Increase the proportion of transit trips by 25 percent by 2025.

As sprawl development continued its pace, actual results never approached the growth and transportation objectives.

In 2008, the Metropolitan Washington Council of Governments (COG) Board of Directors formed the Greater Washington 2050 Coalition to create a new, comprehensive, regional approach to solving the Region's challenges. The result of the 2050 Coalition's work was **Region Forward** (2010), a plan adopted by the region's local governments as a voluntary Compact.

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[9] 2002 General Plan at 23-54.
[10] 2002 General Plan at 55-72.
[11] 2002 General Plan at 73-86.
[12] 2002 General Plan at 23-54.
[13] 2002 General Plan at 73-86.
[14] 2002 General Plan at 27-30.
[15] 2002 General Plan at 27. The Plan designated 21 centers and five possible future centers. The Bowie MARC Station was added subsequently.

Region Forward set interconnected goals and targets presented in overarching categories: Accessibility, Sustainability, Prosperity, and Livability.[16] Region Forward contains a host of targets and indicators to help regularly measure regional progress toward the goals.[17] A key target is: Beginning in 2012, capture 75% of the square footage of new commercial construction and 50% of new households in COG Regional Activity Centers.[18]

In December 2012, the Planning Department published **Looking Back, Moving Forward**, an assessment of the County's progress toward achieving the goals of the 2002 General Plan. This report analyzed the successes and shortcomings of the 2002 General Plan.[19] One conclusion was that the County's development trends for its tiers were inconsistent with the 2002 General Plan's vision and were not meeting growth targets. The Developing and Rural Tiers were experiencing growth in excess of the Plan targets.[20] Second:

> **Development has not been concentrated to effectively capitalize on our existing transportation network, and decision makers have not strategically prioritized public investment.** Growth, development, and investments in public infrastructure and facilities have been allowed to spread thinly across a large number of locations throughout the County—in the Developed and Developing Tiers, 27 centers, and eight corridors—and, overall, have failed to create a critical mass of residents, economic activity, and amenities essential to fostering vibrant and sustainable communities and regionally competitive business environments (see Table 2).[21]

Looking Back, Moving Forward identified several issues for consideration that included prioritizing the 27 centers, updating the center classification system, identifying measurable metrics, and removing or renaming the 2002 General Plan tier categories.[22]

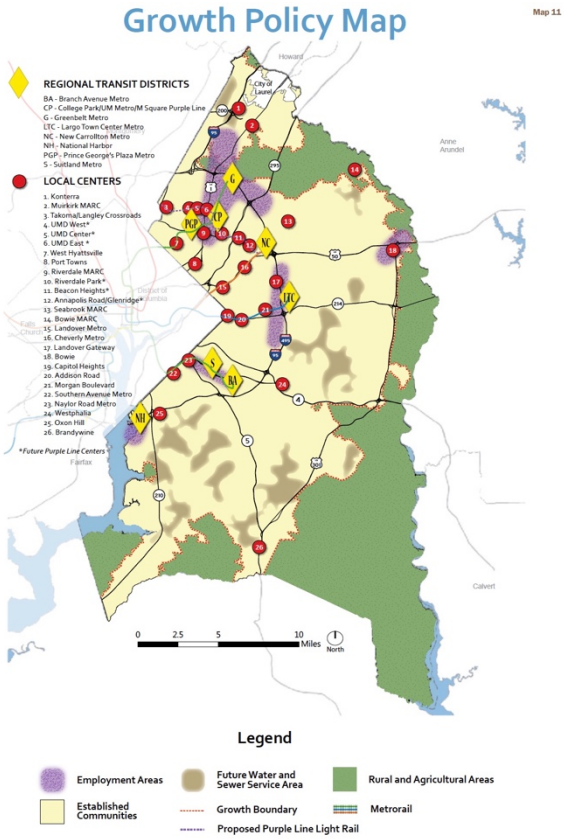
In 2013, the County Council decided to embark on the development of a new General Plan to address existing, changing, and new priorities such as transit-oriented development, sustainability, neighborhood reinvestment, and agricultural protection. The result was **Plan 2035** (2014). Initiated merely a dozen years after 2002 General Plan, Plan 2035 justified its need due to the failings of its predecessor "to target and prioritize its efforts and reconcile diverging goals."[23]

The first of Plan 2035's guiding principles is to concentrate future growth:

> It is critical that new development not disproportionately use our county's limited resources and harm our natural environment. One way to do this is to proactively encourage development to build on our existing infrastructure—our transit, roads, trails, water and sewer system, and public facilities—rather than to build new

[16] Region Forward at 2.
[17] Region Forward at 63-66 (Appendix B).
[18] Region Forward at 17.
[19] Plan 2035 at 39.
[20] Plan 2035 at 39 (Table 1).
[21] Plan 2035 at 40 (emphasis in original).
[22] Plan 2035 at 41.
[23] Plan 2035 at 6.

infrastructure. This will help ensure we use our tax dollars efficiently and protect our rural and agricultural communities and open spaces. **Plan 2035 commits to concentrating future growth to achieve our 2035 vision and illustrates where and how we should grow in the Growth Policy Map (see Page 18).**[24]



The Plan's Second guiding principle is *Prioritize and Focus our Resources*.

> **Plan 2035 commits to aligning work programs across County agencies, supporting financial incentives and infrastructure improvements, and streamlining processes to accelerate growth in these different, but complementary areas.**[25]

Plan 2035 followed the recommendations of Looking *Back, Moving Forward* by prioritizing the 27 centers and updating the center classification system, identifying measurable metrics, and removing or renaming the 2002 General Plan tier categories. In addition to a new Growth Policy Map, Plan 2035 introduced a Strategic Investment Map to target public sector funding and incentives to four areas: Downtowns, the Innovation Corridor, Neighborhood Revitalization Areas, and Priority Preservation Areas.[26] Plan 2035 refers to the designation of Downtowns and the Innovation Corridor as its two "transformative" recommendations.[27]

The Plan 2035 process included a scenario-planning exercise to identify a preferred County growth scenario. The "Grow Primarily in the Beltway with Prioritized Centers" scenario earned the highest ranking, followed by "Grow Everywhere—Prioritized." The lowest ranked scenario was "Primarily in Suburbs—Not Prioritized (maintaining the trend from the past 50 years)."[28] The Plan specifically rejected a "Business As Usual" approach going forward.

> Contrary to the 2002 Prince George's County Approved General Plan's development objectives and regional trends to cluster employment in transit-accessible urban centers, the majority of recent development in the County occurred in suburban locations outside the Capital Beltway and outside of designated growth centers and corridors. . . .

[24] Plan 2035 at 14 (emphasis in original).
[25] Plan 2035 at 15 (emphasis in original). Plan 2035's four additional guiding principles may be found at 15-16.
[26] Plan 2035 at 21-24.
[27] Plan 2035 at 23.
[28] Plan 2035 at 46.

> . . . While the methodologies, scale, scope, and purpose of the studies have varied widely, there is general agreement that sprawl is a more costly form of development than compact growth. The tangible costs of sprawl can easily be measured from a financial standpoint. Per capita, geographically dispersed or sprawling development typically requires greater physical infrastructure (such as longer roads and water and sewer extensions), and the provision of public services (namely schools, bus and transit, police, fire, and emergency services) are provided over large geographic areas. . . . Compact areas typically create greater economic activity and more jobs per acre than sprawling development, which generates a higher proportion of tax revenue in relationship to the amount of land that they consume.[29]

Plan 2035 also recognized the County's neglect for its environment and the backlog of costs associated with this history of neglect.

> Environmental conditions in Prince George's County—reflected by poor water and air quality—are especially troubling for the well-being of its current and future generations. The County is also faced with the high cost of implementing ambitious greenhouse gas emission reduction, impervious surface retrofit, and stream restoration goals.[30]

Plan 2035 set forth a clear "Land Use Goal" with the intent to break from the longstanding pattern of sprawl development outside of the Beltway.

> Direct future growth toward transit-oriented, mixed-use centers in order to expand our commercial tax base, capitalize on existing and planned infrastructure investments, and preserve agricultural and environmental resources.[31]

Plan 2035 recognized that the pipeline of development projects approved was going to create a challenge and that there were too many Centers.[32] Unfortunately, recognizing these problems challenges does nothing to address the negative consequences. Plan 2035 did "prioritize" eight Regional Centers; however, the Plan ended up with 34 Centers in total.

To implement Plan 2035's "Land Use Goal," the Plan established a dozen land use policies.[33] Policy 1 states:

> Direct a majority of projected new residential and employment growth to the Regional Transit Districts in accordance with the Growth Policy Map and the Growth Management Goals set forth in Table 17.

[29] Plan 2035 at 78-79.
[30] Plan 2035 at 83.
[31] Plan 2035 at 93.
[32] Plan 2035 at 102-04.
[33] Plan 2035 at 110-118.

Policies and Strategies

Policy 1 Direct a majority of projected new residential and employment growth to the Regional Transit Districts in accordance with the Growth Policy Map and the Growth Management Goals set forth in Table 17.

Table 17. Growth Management Goals

Growth Policy Map Areas	Percentage of New Dwelling Units	Projected Dwelling Units	Percentage of New Jobs	Projected New Jobs
Regional Transit Districts	**50%**	**31,500**	**50%**	**57,000**
Local Centers	**25%**	**15,750**	**20%**	**22,800**
• Local Transit, Neighborhood, and Campus Centers	15%	9,450	15%	17,100
• Town Centers	10%	6,300	5%	5,700
Employment Areas	**4%**	**2,520**	**20%**	**22,800**
Established Communities	**20%**	**12,600**	**9%**	**10,260**
Future Water and Sewer Service Areas	**0%**	**0**	**0%**	**0**
Rural and Agricultural Areas	**1%**	**630**	**1%**	**1,140**
Total County Projected Growth	**100%**	**63,000**	**100%**	**114,000**

**The goals identified in Table 16 are 25-year goals that provide guidance on the success of the Growth Policy Map and Plan 2035. These goals are not designed to be applied to, and shall not be tested against, individual development projects.*

Source: MWCOG 8.1 Projections, 2012

This policy is consistent with the MWCOG's *Region Forward* compact that the County signed on to. However, the footnote to Table 17 identifies a significant problem with the Growth Management Goals. *"These goals are not designed to be applied to, and shall not be tested against, individual development projects."*[34] Plan 2035, like all of its predecessor plans, relies on limited incentives for targeted growth and contains no impediments to sprawl. By looking at periodic reviews of aggregate development, Plan 2035's "Land Use Goal," is not being met and the County is falling farther behind.

There are other Land Use policies relevant to reducing carbon emissions.

> **LU1.4** Annually review and report on County growth trends to measure progress toward meeting Plan 2035 growth management goals. Identify potential revisions to policies and ordinances to assist with meeting the goals.

[34] Plan 2035 at 110.

In 2020, MNCPPC provided a **5-year** review, discussed below.

> **LU1.5** Annually review the CIP program to ensure consistency with the Plan 2035 vision, goals, and policies.
>
> **LU1.6** Identify and coordinate the key capital improvement projects for each of the centers that are necessary to promote and facilitate economic and residential development within the center.

There does not appear to be a concerted annual agency review of key capital improvement projects in relation to the Plan 2035 vision, goals, and policies.

> **Policy 4** Phase new residential development to coincide with the provision of public facilities and services.
>
> **LU4.2** Address the magnitude of the residential pipeline in Established Communities and Rural and Agricultural Areas. Consider limiting validity periods, reevaluating approved adequate public facilities for projects that have not provided assurances that public infrastructure will be constructed in a timely manner, etc.
>
> **LU4.3** Evaluate strategies to phase development countywide, including a residential allocation process.

There has not been a concerted effort to address the residential pipeline or phase residential development.

> **Policy 7** Limit future mixed-use land uses outside of the Regional Transit Districts and Local Centers.
>
> **LU7.1** Reevaluate mixed-use land use designations outside of the Regional Transit Districts and Local Centers as master plans are updated.

There has been no effort to limit mixed-use development outside Centers, and the new Zoning Ordinance actually promotes scattered mixed-use development.

> **Policy 10** Retain Future Water and Sewer Service Areas in water and sewer categories S5 and W5 until additional residential development capacity is needed to meet growth projections.

This Policy has not been followed. [Council Resolution Amendments]

On September 11, 2019, the COG Board of Directors adopted **Resolution R27-2019** setting new targets to address the Region's future housing needs. At the COG Leadership Retreat in July 2018 the Board engaged in discussions on the Region's current housing production challenges, housing affordability, and the potential need for additional housing in the future to support likely new job growth. After extended analysis and discussion, the COG Board of Directors resolved to set regional

housing targets to provide at least 75 percent of all new housing should be in Activity Centers or near high-capacity transit; to provide at least 75 percent of all new housing should be affordable to low- and middle-income households; and to adopt targets at the local level to address housing production, accessibility, and affordability within each jurisdiction.

In January 2020, MNCPPC provided a **Plan Prince George's 2035 Five Year Review Status Update** to the County Council. The review focused on multiple benchmarks, showing both positive and negative results. With regard to land use and climate related measures, the results were mostly negative.

Plan 2035 5-year Review 2020								
Growth Policy Map Areas	**% Goal for New DUs**	**Projected DUs**	**Growth 2014-2019**	**% of New DUs 2014-2019**	**% Goal New Jobs**	**Projected New Jobs**	**New Jobs 2014-2019**	**% of New Jobs 2014-2019**
Regional Transit Districts	**50%**	**31,500**	**4,035**	**24.5%**	**50%**	**57,000**	**7,041**	**43.8%**
Local Centers	**25%**	**15,750**	**3,401**	**20.7%**	**20%**	**22,800**	**812**	**5.1%**
Local Transit, Neighborhood, and Campus Centers	15%	9,450	-	-	15%	17,100	-	-
Town Centers	10%	6,300	-	-	5%	5,700	-	-
Employment Areas	**4%**	**2,520**	**1,079**	**6.6%**	**20%**	**22,800**	**2,199**	**13.7%**
Established Communities	**20%**	**12,600**	**7,497**	**45.6%**	**9%**	**10,260**	**6,329**	**39.4%**
Future Water and Sewer Service Areas	**0%**	**0**	**304**	**1.8%**	**0%**	**0**	**(137)**	**-0.9%**
Rural and Agricultural Areas	**1%**	**630**	**129**	**0.8%**	**1%**	**1,140**	**(181)**	**-1.1%**
Total County Projected Growth	**100%**	**63,000**	**16,445**	**100.0%**	**100%**	**114,000**	**16,063**	**100.0%**

Residential growth exhibited continuing suburban sprawl with almost half of all development occurring in the Established Communities.[35] Growth in the targeted Regional Transit Districts was less than half the Plan 2035 goal. Inexplicably, 304 dwelling units were constructed in Future Water

[35] The term "Established Communities" is a misleading misnomer. Under the 2002 General Plan, the same area was divided into the "Developed Tier" (preferred growth) and the "Developing Tier." At the same time, County Council members had pushed back on the widespread use of the perceived pejorative term "inner Beltway," working to substitute "Established Communities" to refer to the area of the Developed Tier. Thus, "Established Communities" and the "Developed Tier" were synonymous terms. Under Plan 2035, the "Established Communities" encompasses both the "Developed Tier" and the "Developing Tier" (excluding Centers). This redefinition masks the fact that most of the residential growth that has occurred in the "Established Communities" has been sprawl development outside of the Beltway (*i.e.*, the "Developing Tier").

and Sewer Service Areas. Not surprisingly, Vehicle Miles Traveled increased (total and per capita) and the ratio of Commercial to Residential Tax base decreased. Also, Household Net Worth declined. Most of the positive benchmarks related to social and economic indicators (*e.g.*, crime rates, foreclosure rates, unemployment rates, etc.).

MNCPPC packaged this benchmark data into a 76-page booklet **"2019 Prince George's Plan 2035 Five-Year Evaluation"** (September 2020). The booklet puts a very positive sheen on the data, and there are many positive social and economic gains to highlight. This report did acknowledge that County greenhouse gas emissions have been increasing under Plan 2035.

> There is no clear evidence that transportation projects to reduce overall vehicle miles traveled or increase transit ridership within downtowns and reinvestment areas, as suggested in TM 6.1, have been prioritized. As suggested in TM 7.1 and 7.2, a countywide strategy should be developed to promote the use of alternative fuel vehicles in addition to a priority parking initiative. These efforts are pending, so further actions will need to be taken to reduce County greenhouse gas emissions.[36]

Overall, however, MNCPPC seeks to paint a positive picture of the Growth Management Data by pointing to the pipeline backlog of sprawl development projects and the fact that the new Zoning Ordinance's tools have not yet been implemented.

This defense ignores that plan 2035 discussed the pipeline concern at length 78-80, 102-03,[37] and that the strategies to address the pipeline have not been implemented by the MNCPPC or the County Council. Land Use Policy 4 proposed limiting validity periods, reevaluating approved adequate public facilities for certain projects or developing a residential building permit allocation process. [38] Seven years after the adoption of Plan 2035, the only Council actions have been to continue extending validity periods without distinction of whether a project furthers the Growth Management goals. Further, Land Use Policy 7 states that future mixed-use land uses should be limited outside of the Regional Transit Districts and Local Centers.[39] However, the Council has continued to approve such mixed-use projects, including one major project that was incentivized with Tax Increment Financing. Another major development, while in a Local Town Center (with no rail access), also was incentivized with Tax Increment Financing.

Positive results in the past ten years include transit-oriented development in the downtown Centers of New Carrollton and Largo, and along the Innovation Corridor. Looking forward, MNCPPC believes that the new Zoning Ordinance has tools that should facilitate and even incentivize mixed-use development at Activity Centers.

In July 2021, the Climate Action Commission requested updated development data from MNCPPC:

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[36] **2019 Prince George's Plan 2035 Five-Year Evaluation at 27.**
[37] Plan 2035 at 78-80, 102-03.
[38] Plan 2035 at 113.
[39] Plan 2035 at 114.

1. Updated data showing the county's success in achieving the goals in Plan 2035 and in conformity with commitments made to MWCOG in 2015 and the revised 2019 MWCOG commitments (*i.e.*, at least 75% of all new housing should be in Activity Centers or near high-capacity transit).

2. Updated data showing the number of SFD, SFA and MF dwelling units, retail SF, commercial SF, industrial SF, etc. approved by the Planning Board in 2018, 2019 and 2020 within and without Activity Centers.

MNCPPC provided the best information available for the period of 2010-present, but with caveats about limitations on data gathering. Based on data derived from CoStar, Neustar and Zonda, about 24% of all new units have been built in COG Activity Centers. The percentage of new units in COG Activity Centers with Rail is only 16.45% of all new units. The percentage of new units in Regional Transit Centers is less than 18% of all new units.

MNCPPC also provided the best information available for the period of 2018-present, again with caveats about limitations on data gathering. MNCPPC only counted approved subdivision plans. Based on data available, since the County committed to the new COG growth goals, 25% of the approved dwelling units in the County will be in Activity Centers and 75% of the approved dwelling units will be outside of Activity Centers.

For nearly 60 years, Prince George's County has espoused the desire to develop through smart growth principles. Every general plan of development, and every commission and study, points the County in this direction. And, for more than 20 years, every general plan of development, and every commission and study, criticizes the preceding plan as being ineffective in achieving its smart growth goals. Now, the County is a third of the way through the life span of Plan 2035, and there is little-to-no evidence that the Growth Management Goals are being achieved. As noted above, many Land Use Policies and Strategies have yet to be adopted, and the County has even taken some actions in direct contravention to certain Land Use Policies. Even the resolution adopting Plan 2035 contained provisions undermining Land Use Policies.

This history demonstrates that smart growth incentives have been inadequate. Suburban sprawl has not been discouraged and in too many cases has been supported. The County must change its longstanding laissez faire approach to suburban sprawl and implement Land Use policies that limit such development. In order to be successful in combating climate change, the County will have to be more disciplined and more serious about adhering to Growth Management Goals. This will mean implementing numerous policies recommended in Plan 2035 and incorporating additional measuring and tracking tools to inform decisions based on timely data.

Finally, growth (and the Land Use Policies related to growth) implicates much more than land development itself. These policies are intertwined with impacts on forest conservation, transportation planning, stormwater management and water quality, potential flooding impacts, and more. The Land Use and Environmental recommendations are related to, and should be coordinated with, Recommendation #12 (No Net Loss Tree Conservation Regulation) and Recommendation #17 (Increase support for Activity Centers).

GREENHOUSE GAS INVENTORY

COMMUNITY GREENHOUSE GAS INVENTORY

DETAILED EMISSIONS RESULTS TABLE - PRINCE GEORGE'S COUNTY TOTALS

Emissions Type (Main ClearPath Tab)	Emissions Activity or Source (ClearPath Calculator)	Inventory Records (Entered in ClearPath)	Emissions ($MTCO_2e$)					Emissions ($MMTCO_2e$)				
			2005	2012	2015	2018	% Change, 2005-2018	2005	2012	2015	2018	% Change, 2005-2018
BUILT ENVIRONMENT												
Residential Energy	Emissions from Grid Electricity	Residential Electricity	1,830,576	1,229,146	1,188,005	1,115,119	-39%	1.8306	1.2291	1.1880	1.1151	-39%
	Emissions from Stationary Fuel	Residential Natural Gas	875,930	712,292	892,551	942,614	8%	0.8759	0.7123	0.8926	0.9426	8%
		Residential Fuel Oil	138,289	69,572	101,428	75,581	-45%	0.1383	0.0696	0.1014	0.0756	-45%
		Residential LPG	18,360	17,486	21,802	21,616	18%	0.0184	0.0175	0.0218	0.0216	18%
Commercial Energy	Emissions from Grid Electricity	Commercial Electricity	2,382,776	1,686,242	1,488,062	1,459,638	-39%	2.3828	1.6862	1.4881	1.4596	-39%
	Emissions from Stationary Fuel Combustion	Commercial Natural Gas	648,094	512,650	562,745	660,620	2%	0.6481	0.5127	0.5627	0.6606	2%
		Commercial Fuel Oil	4,592	6,985	7,155	7,377	61%	0.0046	0.0070	0.0072	0.0074	61%
		Commercial LPG	3,742	3,485	3,401	3,507	-6%	0.0037	0.0035	0.0034	0.0035	-6%
TRANSPORTATION AND MOBILE EMISSIONS												
Transportation and Mobile Emissions	On Road Transportation	On Road Mobile Emissions	4,248,712	4,391,472	4,332,833	4,185,376	-1%	4.2487	4.3915	4.3328	4.1854	-1%
	Aviation Travel	Passenger Air Travel	179,703	103,992	93,206	134,646	-25%	0.1797	0.1040	0.0932	0.1346	-25%
	Rail Transportation	Rail Transportation	0	7,569	8,591	9,115	#DIV/0!	0.0000	0.0076	0.0086	0.0091	#DIV/0!
	Emissions from Off Road Vehicles	Off Road Mobile Emissions	307,612	230,405	220,517	235,316	-24%	0.3076	0.2304	0.2205	0.2353	-24%
WASTEWATER TREATMENT												
Water and Wastewater	Fugitive Emissions from Septic Systems	Septic System Emissions	1,388	1,086	1,100	1,496	8%	0.0014	0.0011	0.0011	0.0015	8%
	Nitrification/Denitrification Process N2O Emissions from Wastewater Treatment	Sewer System Emissions	2,146	2,253	2,272	2,352	10%	0.0021	0.0023	0.0023	0.0024	10%
	Process N2O from Effluent Discharge to Rivers and Estuaries	N2O Effluent Discharge Emissions	1,442	1,018	849	929	-36%	0.0014	0.0010	0.0008	0.0009	-36%
AGRICULTURE												
Agriculture	Emissions from Agricultural Activities	Enteric Fermentation	8,500	7,802	6,948	6,481	-24%	0.0085	0.0078	0.0069	0.0065	-24%
		Manure Management	4,095	4,235	3,830	3,673	-10%	0.0041	0.0042	0.0038	0.0037	-10%
		Ag Soils	17,007	16,927	15,912	15,785	-7%	0.0170	0.0169	0.0159	0.0158	-7%
SOLID WASTE TREATMENT												
Solid Waste	Waste Generation	Landfill Waste Generation	151,854	109,227	108,309	108,998	-28%	0.1519	0.1092	0.1083	0.1090	-28%
	Combustion of Solid Waste Generated by the Community	Combustion of Solid Waste	0	0	0	0	#DIV/0!	0.0000	0.0000	0.0000	0.0000	#DIV/0!
OTHER												
Process and Fugitive Emissions	Hydrofluorocarbon & Refrigerant Emissions	HFCs	311,555	405,372	467,684	470,918	51%	0.3116	0.4054	0.4677	0.4709	51%
	Fugitive Emissions from Natural Gas Distribution	Natural Gas Fugitive Emissions	44,399	35,686	42,397	46,707	5%	0.0444	0.0357	0.0424	0.0467	5%
TOTAL GREENHOUSE GAS EMISSIONS			**11,180,772**	**9,554,902**	**9,569,594**	**9,507,863**	**-15%**	**11.18**	**9.55**	**9.57**	**9.51**	**-15%**

Column Header	Description
Emissions Type	This column lists the main tabs in the online ClearPath tool's GHG inventory entry pages in the same order listed in ClearPath.
Emissions Activity/Source	This column lists the ClearPath calculators used in for the development of these inventotes. These calculators are found under each of the main tabs in the same
Inventory Records	This column lists COG's inventory record entries according to which calculator was used to create that entry.
Emissions	Metric Tons of CO2 Equivalent (MTCO2e) and Million Metric Tons of CO_2 Equivalent ($MMTCO_2e$) by emissions activity or source for 2005, 2012, 2015 and percent change between 2005 and 2015.

Legend:

	Table organization only. Do not alter, enter or calculate data in gray-shaded cells.
	Light blue are data entry cells.
	Shades of green are cells that contain calculations. Moderate green colored cells contain subtotals, darker green cells contain grand totals.

LOCAL GOVERNMENT OPERATIONS GREENHOUSE GAS INVENTORY

DETAILED EMISSIONS RESULTS TABLE - PRINCE GEORGE'S COUNTY

Emissions Type (Main ClearPath Tab)	Emissions Activity or Source (ClearPath Calculator)	Inventory Records (Entered in ClearPath)	Emissions ($MTCO_2e$) 2018
BUILT ENVIRONMENT			
Buildings and Facilities	Emissions from Grid Electricity	Housing Authority	1,068
		Memorial Library System	2,195
		Public Safety	2,762
		Environmental Services	720
		DPW&T	690
		Health & Human Services	930
		Management & Budget	461
		Office of Central Services	5,552
		Prince George's County Government	12,352
		Revenue Authority	334
	Emissions from Stationary Fuel Combustion - Natural Gas	Housing Authority	484
		Memorial Library System	427
		Prince George's County Government	4,604
Street Lights and Traffic Signals	Emissions from Grid Electricity	Street Lights and Traffic Signals	3,403
TRANSPORTATION AND MOBILE EMISSIONS			
Vehicle Fleet	Fleet Vehicle Emissions	County Police Vehicle Fleet - Unleaded Gasoline	16,267
		County Police Vehicle Fleet -Diesel	23
		County Agencies Vehicle Fleet - Unleaded Gasoline	6,184
		County Agencies Vehicle Fleet - Diesel	8,355
		County Agencies Vehicle Fleet - LP Autogas GGE	273
		Outside Customers Vehicle Fleet - Unleaded Gasoline	1,907
		Outside Customers Vehicle Fleet - Diesel	502
	Emissions from Off Road Vehicles	County Agencies Off Road Vehicle Fleet - Diesel	1,555
Transit Fleet	Transit Fleet Emissions	County Transit Fleet	9,931
SOLID WASTE FACILITIES			
Solid Waste	Waste Generation	Landfill Waste Generation	108,998
		TOTAL GREENHOUSE GAS EMISSIONS	**189,977**

Column Header	Description
Emissions Type	This column lists the main tabs in the online ClearPath tool's GHG inventory entry pages in the same order listed in ClearPath.
Emissions Activity/Source	This column lists the ClearPath calculators used in for the development of these inventotes. These calculators are found under each of the main tabs in the same order listed in
Inventory Records	This column lists COG's inventory record entries according to which calculator was used to create that entry.
Emissions	Metric Tons of CO2 Equivalent (MTCO2e) by emissions activity or source for 2018.

Legend:

	Table organization only.
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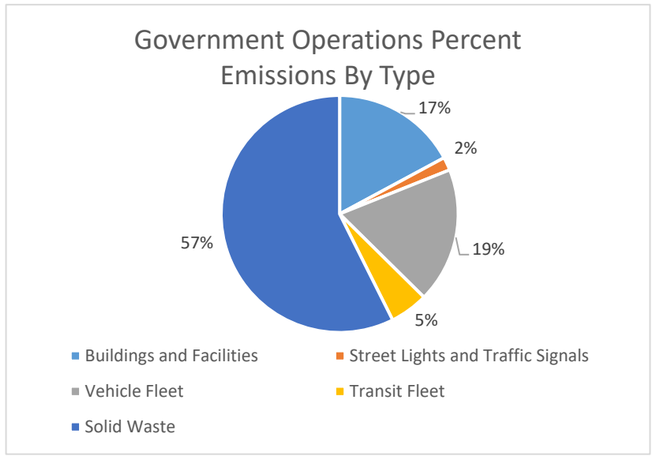
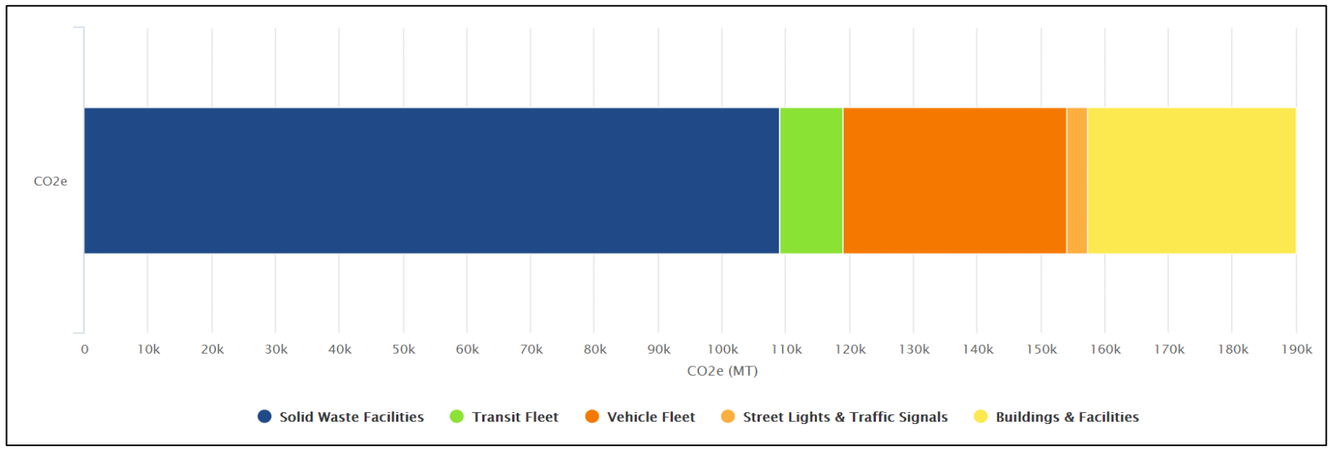
LOCAL GOVERNMENT OPERATIONS GREENHOUSE GAS INVENTORY

GREENHOUSE GAS SUMMARY CHART - PRINCE GEORGE'S COUNTY

Emissions Type / Sector	Emissions ($MTCO_2e$)	% of Total
Buildings and Facilities	32,579	17%
Street Lights and Traffic Signals	3,403	2%
Vehicle Fleet	35,066	18%
Transit Fleet	9,931	5%
Solid Waste	108,998	57%
TOTAL GREENHOUSE GAS EMISSIONS	**189,977**	100%





Source: ClearPath output

Note: ClearPath is an online greenhouse gas inventory tool. ClearPath is a product of ICLEI - Local Governments for Sustainability.

LOCAL GOVERNMENT OPERATIONS GREENHOUSE GAS INVENTORY

DETAILED EMISSIONS RESULTS TABLE - PRINCE GEORGE'S COUNTY

Emissions Type (Main ClearPath Tab)	Emissions Activity or Source (ClearPath Calculator)	Inventory Records (Entered in ClearPath)	Emissions ($MTCO_2e$) 2018
BUILT ENVIRONMENT			
Buildings and Facilities	Emissions from Grid Electricity	Housing Authority	1,068
		Memorial Library System	2,195
		Public Safety	2,762
		Environmental Services	720
		DPW&T	690
		Health & Human Services	930
		Management & Budget	461
		Office of Central Services	5,552
		Prince George's County Government	12,352
		Revenue Authority	334
	Emissions from Stationary Fuel Combustion - Natural Gas	Housing Authority	484
		Memorial Library System	427
		Prince George's County Government	4,604
Street Lights and Traffic Signals	Emissions from Grid Electricity	Street Lights and Traffic Signals	3,403
TRANSPORTATION AND MOBILE EMISSIONS			
Vehicle Fleet	Fleet Vehicle Emissions	County Police Vehicle Fleet - Unleaded Gasoline	16,267
		County Police Vehicle Fleet -Diesel	23
		County Agencies Vehicle Fleet - Unleaded Gasoline	6,184
		County Agencies Vehicle Fleet - Diesel	8,355
		County Agencies Vehicle Fleet - LP Autogas GGE	273
		Outside Customers Vehicle Fleet - Unleaded Gasoline	1,907
		Outside Customers Vehicle Fleet - Diesel	502
	Emissions from Off Road Vehicles	County Agencies Off Road Vehicle Fleet - Diesel	1,555
Transit Fleet	Transit Fleet Emissions	County Transit Fleet	9,931
SOLID WASTE FACILITIES			
Solid Waste	Waste Generation	Landfill Waste Generation	108,998
		TOTAL GREENHOUSE GAS EMISSIONS	**189,977**

9,507,863 2018 Community-Wide Emissions (MTCO2e)

2% % of Community Wide Emissions attibuted to Government Operations

Column Header	Description
Emissions Type	This column lists the main tabs in the online ClearPath tool's GHG inventory entry pages in the same order listed in ClearPath.
Emissions Activity/Source	This column lists the ClearPath calculators used in for the development of these inventotes. These calculators are found under each of the main tabs in the same order listed in ClearPath.
Inventory Records	This column lists COG's inventory record entries according to which calculator was used to create that entry.
Emissions	Metric Tons of CO2 Equivalent (MTCO2e) by emissions activity or source for 2018.

Legend:

	Table organization only.
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LOCAL GOVERNMENT OPERATIONS GREENHOUSE GAS INVENTORY

INVENTORY INPUTS - PRINCE GEORGE'S COUNTY

Emissions Type (Main ClearPath Tab)	Emissions Activity or Source (ClearPath Calculator)	Inventory Records (Entered in ClearPath)	Local Data Input	
			Metric	2018
BUILT ENVIRONMENT				
Buildings and Facilities*	Emissions from Grid Electricity	Housing Authority**	Consumption (kWh)	3,271,527
		Memorial Library System	Consumption (kWh)	6,721,541
		Public Safety	Consumption (kWh)	8,459,586
		Environmental Services	Consumption (kWh)	2,204,023
		DPW&T	Consumption (kWh)	2,113,690
		Health & Human Services	Consumption (kWh)	2,847,799
		Management & Budget	Consumption (kWh)	1,411,694
		Office of Central Services	Consumption (kWh)	17,002,979
		Prince George's County Government	Consumption (kWh)	37,826,803
		Revenue Authority	Consumption (kWh)	1,024,157
	Emissions from Stationary Fuel Combustion - Natural Gas	Housing Authority**	Consumption (Therms)	90,962
		Memorial Library System	Consumption (Therms)	80,271
		Prince George's County Government**	Consumption (Therms)	865,789
Street Lights and Traffic Signals	Emissions from Grid Electricity	Street Lights and Traffic Signals	Consumption (kWh)	10,420,983
TRANSPORTATION AND MOBILE EMISSIONS				
Vehicle Fleet	Fleet Vehicle Emissions	County Police Vehicle Fleet - Unleaded Gasoline	Annual Fuel Use	1,852,787
		County Police Vehicle Fleet -Diesel	Annual Fuel Use	2,252
		County Agencies Vehicle Fleet - Unleaded Gasoline	Annual Fuel Use	704,268
		County Agencies Vehicle Fleet - Diesel	Annual Fuel Use	818,331
		County Agencies Vehicle Fleet - LP Autogas GGE	Annual Fuel Use	31,063
		Outside Customers Vehicle Fleet - Unleaded Gasoline	Annual Fuel Use	217,244
		Outside Customers Vehicle Fleet - Diesel	Annual Fuel Use	49,191
	Emissions from Off Road Vehicles	County Agencies Off Road Vehicle Fleet - Diesel	Annual Fuel Use	150,958
Transit Fleet	Transit Fleet Emissions	County Transit Fleet	Annual Fuel Use	972,688
SOLID WASTE FACILITIES				
Solid Waste	Waste Generation	Landfill Waste Generation	MSW Landfilled (Tons)	322,956

Column Header	Description
Emissions Type	This column lists the main tabs in the online ClearPath tool's GHG inventory entry pages in the same order listed in ClearPath.
Emissions Activity/Source	This column lists the ClearPath calculators used in for the development of these inventotes. These calculators are found under each of the main tabs in the same order listed in ClearPath.
Inventory Records	This column lists COG's inventory record entries according to which calculator was used to create that entry.
Local Data Inputs	This column lists the main local input data that impacts the greenhouse gas emission outputs (Metric Tons of CO_2 Equivalent -$MTCO_2e$).

Notes:

* The electricity data breakouts in the Summary file were broken out in the way that data was received from the utilities or county.

** Fiscal Year (June 2018 - June 2019)

Legend:

	Table organization only.
	Light blue are data entry cells.
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CLIMATE RISK AND VULNERABILITY ASSESSMENT REPORT

Prince George's County
Climate Risk & Vulnerability Assessment Report

October 2021

Prepared for:

Department of Environment

Prince George's County,

1801 McCormick Drive

Suite 500

Largo, MD 20774

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Figures

I. Introduction

With a rapidly changing climate, historic trends are no longer effective proxies for predicting current and future climate conditions. Prince George's County is already facing climate change impacts through extreme weather events that stress the County's natural and built infrastructure, community resources, and economic interests. In the past 5 years alone, the County has experienced unprecedented flooding, prolonged periods of extreme heat, record-breaking snow days, and a series of severe storms. Extreme weather events like these are expected to become more frequent and more severe as the climate crisis accelerates. Understanding these trends and the potential risks to residents and infrastructure is fundamental to building resilience and making informed decisions about future investments.

The purpose of this Climate Risk and Vulnerability Assessment report is analyze the climate hazards projected to impact the County and provide insights about the vulnerability of populations and infrastructure and the associated risks and climate impacts on various County sectors. This Climate Risk and Vulnerability Assessment (CRVA) is the first of its kind for Prince George's County and serves as an important first step in strengthening the County's resilience to withstand climate change impacts for generations to come.

A. Methodology

This CRVA report follows the Global Covenant of Mayors for Climate and Energy (GCoM) Climate Risk and Vulnerability Assessment framework. GCoM is an international coalition of local governments that help drive voluntary action to combat climate change. The GCoM framework consist of two main parts: evaluation of climate hazards and evaluation of factors impacting adaptive capacity. This exercise is conducted for all 6 climate hazards discussed: extreme heat, drought, episodic winters, inland flooding, coastal flooding, and severe storms. A "Risk Level" is determined for each climate hazard by assessing the probability of hazard (i.e., likelihood of occurrence) and the consequence of that hazard (i.e., gravity of the hazard). Impacts and vulnerability are also assessed for each climate hazard and is supported by climate projections and GIS analysis of relevant County layers. The results of this analysis are summarized in this report.

B. Structure of Document

This CRVA is organized around the most significant climate trends likely to impact the County in the coming decades – more extreme temperatures, more frequent flooding events, and more severe storms. A total of 6 climate hazards assessed fall into these categories (Table 1).

Table 1. Description of Climate Hazard by Trend

Climate Trend	Climate Hazard and Description
More Extreme Temperatures	***Extreme Heat:*** Increasingly warmer temperatures and longer, more frequent heat waves.
	Drought: Drier weather conditions, closely tied with periods of extreme heat. May result in lower water supply and reduced crop yields.
	Episodic Winters: Though winters will become milder overall, extreme and episodic winter weather will occur more frequently (e.g., winter storms, extremely cold temperatures)

More Frequent Flooding Events	***Inland Flooding:*** This type of flooding typically occurs as a result of heavy precipitation that overwhelming stormwater drainage infrastructure (flash flooding) or rivers and stream (riverine flooding).
	Coastal Flooding: This type of flooding typically occurs as a result of sea level rise or storm surge pushing up against Prince George's County's tidally influenced rivers.
More Severe Storms	***Severe Storms:*** Large storms such as hurricanes, nor'easters, and derechos are being energized by warming air and more moisture in the atmosphere.

This Report outlines: A. Climate Projections; B. Vulnerability; and C. Risks & Impacts for each of the 6 climate hazards listed above. The contents of these subsections are described in more detail below:

A. Climate Projections: This section provides an overview of the climate hazard, current conditions, and a summary of how the hazard is projected to worsen given climate change, particularly in the short- and medium-term. Climate projections data was sourced from the U.S. Climate Resilience Toolkit[1] and Climate Central Risk Finder[2] for coastal flooding.

B. Vulnerability: This section describes the vulnerability of the County's assets, systems, and populations to be adversely affected by the climate hazards. This section is divided into vulnerable populations and vulnerable infrastructure.

Vulnerable Populations describes how populations may be disproportionately exposed, sensitive, and/or lack the adaptive capacity to withstand or adapt to the climate hazard. See Appendix A for a more comprehensive examination of the County's social vulnerability, Equity Emphasis Areas (EEAs), and stakeholder-identified vulnerable populations.

Vulnerable Infrastructure describes how key assets across the County (e.g., critical facilities, residential/ commercial properties) may be vulnerable to the climate hazard. Where applicable, this section includes results of quantitative or GIS analysis that aims to better capture the extent of vulnerability.

Assessing Vulnerability

VULNERABILITY is a function of exposure, sensitivity, and adaptive capacity:

Exposure: The presence of people, livelihoods, species or ecosystems, environmental functions, services, resources, infrastructure or economic, social, or cultural assets in places and settings that could be adversely affected (GCoM, 2019). For example, neighborhoods located in floodplains are more exposed to flooding.

Sensitivity: The susceptibility to harm or the degree to which an asset or population group will be adversely affected by a climate hazard. Biological factors (e.g., age, disabilities, chronic illnesses) and socio-economic factors (e.g., wealth, social isolation, access to internet/phone/vehicle, etc.) significantly influence sensitivity to climate change. For example, older adults are biophysiological more sensitive to extreme heat.

Adaptive Capacity: The ability of systems, institutions, humans, and other organisms to adjust to potential damage, to take advantage of opportunities or to respond to consequences (GCoM, 2019). Assets or populations with greater adaptive capacity (e.g., back-up power at a critical facility) are better equipped to adapt to and cope with adverse climate impacts.

[1] U.S. Climate Resilience Toolkit, https://toolkit.climate.gov/

[2] Climate Central Risk Finder, https://riskfinder.climatecentral.org/

C. **Risk & Impacts:** This section outlines the climate risks and impacts of each climate hazard on the following key sectors and systems within the County. The systems that support Prince George's County and the quality of life of residents, including energy, public health, the economic system, transportation, and water are all likely to experience adverse impacts from the intensifying climate hazards and extreme weather events brought on by climate change. These effects can threaten public health, damage property and critical infrastructure, disrupt vital community services, and negatively affect the economy, emphasizing the need for resiliency. captures the relative risks that the climate hazards assessed pose to these fundamental systems.

Table 2 provides a high-level summary of the climate projection and assessment of climate risks and impacts for each climate hazard.

Table 2. Hazard Projection and Impacts Summary Table

Hazard	Summary of Climate Projection	Impacts				
						
Extreme Heat	**Average temperatures are rising, and the frequency and intensity of extreme heat days are increasing.** • Relative to a 1950-2010 historic baseline, daily maximum temperature is projected to increase by 8°F by 2040 and up to 10°F by 2060. • The average number of days/year with a maximum temperature >90°F is projected to increase from a 26-day historical average to roughly 61 days by 2040, and 68 - 81 days/year by 2060. • The average number of days/year with a maximum temperature >100°F is projected to increase from near zero to approximately 5 days by 2040 and 8 to 25 days by 2080.	Moderate	High	Low	High	Moderate
Drought	**Droughts are projected to increase in frequency, severity, and duration.** • Droughts are closely correlated with extreme heat. As temperatures and extreme days increase, so too will droughts in frequency, severity, and duration.	Low	Low	Moderate	Low	High
Extreme Winter	**Average winter temperatures are projected to become milder, yet extreme winter storms will become more episodic.** • Studies show the severity and frequency of winter storms in the mid-latitude regions are already increasing from the long-term average. This trend is forecasted to continue and intensify.	High	Moderate	Moderate	Moderate	Moderate
Inland Flooding & Extreme Precipitation	**Frequency and intensity of extreme precipitation events are projected to increase, resulting in more frequent inland flooding.** Relative to a 1980-2006 historic baseline, annual maximum precipitation is projected to increase by approximately 10% by 2040, and up to 60% by 2060.	Moderate	High	High	High	Moderate

Coastal Flooding	**Coastal, or tidally influenced, flooding events are projected to increase in frequency and severity due to the rising sea level rise and increasing tidal flooding days.** • Sea level is expected to increase to 1.5 feet by 2040 and 2.4 feet by 2060, relative to a 1992 baseline, and by over 4.5 feet by the end of this century • From 1980 to 2016, the County area saw an average of 2 days of high tide flooding per year. This figure is projected to increase substantially – even under a low emissions scenario, high tide flooding is projected to increase to roughly 25 days by 2040 and 67 days by 2060.	Moderate	Moderate	Moderate	Moderate	Moderate
Severe Storms	**Severe wind events are projected to increase in frequency and intensity.** • The percent of Atlantic hurricanes categorized as major storms (category 3 hurricane of greater) has nearly doubled since 1979, and this trend is forecasted to continue and intensify.	High	High	High	Moderate	Moderate

C. Summary of Work to Date

The County, state, and region have conducted numerous assessments, plans, and other adaptation work to prepare for and mitigate hazards, assess vulnerability, and strategize solutions to enhance resiliency. The list below is not a comprehensive list of all adaptation and resiliency work to date, but rather an informative snapshot of existing efforts.

Prince George's County Climate Action Plan: Adaptation Work Group, 2020-2021

To support the development of the County's Climate Action Plan, Prince George's County convened a series of stakeholder working groups, including the Adaptation Work Group (AWG). The AWG met regularly to inform the CRVA and identify adaptation strategies for consideration.

In April 2021, the AWG participated in a two-part CRVA workshop to evaluate the vulnerabilities of assets and populations across the County and brainstorm opportunities to enhance resilience through adaptation strategies. A summary of this workshop is presented in Appendix B; a summary of the vulnerable assets identified are listed in Appendix C.

Prince George's County & the City of Laurel Hazard Mitigation Plan, Updated 2017[3]

Through their joint Mitigation Advisory Committee, Prince George's County and the City of Laurel led a coordination effort with departments and agencies to facilitate the development of the Hazard Mitigation Plan (HMP) in conformance with state and federal guidelines. The HMP was prepared pursuant to the federal Hazard Mitigation and Pre-Disaster Mitigation Programs (44 CFR Parts 201 and 206), the Flood Mitigation Assistance Program (44 CFR 78.6), and the process outlined in materials prepared by the Federal Emergency Management Agency (FEMA) for the Community.[4] The HMP outlines the hazard identification and risks assessment, mitigation goals and strategies unique to the area, and a community-specific capability assessment and implementation plan in line with broader state goals.

Maryland Hazard Mitigation Plan, 2016[5]

The State of Maryland's Hazard Mitigation Plan, in line with the mitigation and planning requirements outlined in FEMA's State Mitigation Review Guide,[6] summarizes the State's commitment to meet national hazard mitigation standards. The HMP is divided into 8 sections that cover state-specific hazard mitigation and risk assessment, a vulnerability assessment, mitigation strategies, and a detailed overview of planning processes and information gathering procedures the State will use to prioritize

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[3] Prince George's County Office of Emergency management (2017). Prince George's County & the City of Laurel Hazard Mitigation Plan Update. https://www.princegeorgescountymd.gov/DocumentCenter/View/29942/2017-PGC-Hazard-Mitigation-Plan-Update_ADOPTED

[4] Ibid.

[5] Maryland Emergency Management Agency (2016). State of Maryland 2016 Hazard Mitigation Plan. https://mema.maryland.gov/community/Documents/2016_Maryland_Hazard_Mitigation_Plan_final_2.pdf

[6] Federal Emergency Management Agency (2015). State Mitigation Plan Review Guide. https://www.fema.gov/sites/default/files/2020-06/fema-state-mitigation-plan-review-guide_03-09-2015.pdf

mitigation and resiliency measures moving forward. The overarching themes of the MD HMP include integration with other Local, State, and Federal planning initiatives, creation of a common Maryland-centric data sharing platform, verification of critical facilities and assets, and an emphasis on collaboration between organizations to maximize the State's success in dealing with the natural hazards now and in the future through cohesive mitigation and resiliency efforts.[7]

Metro Washington 2030 Climate and Energy Action Plan, 2020

The Metro Washington Council of Governments completed a Climate and Energy Action Plan in 2020 outlining a series of priority actions for local governments and partners to take to meet the region's 2030 climate mitigation and resiliency goals. The Plan also includes a Climate Risk and Vulnerability Assessment to better understand the climate hazards and risks. The results found that extreme heat and flash and riverine flooding are the top risks and infrastructure conditions/maintenance is the top adaptive capacity challenge in the region.

[7] Maryland Emergency Management Agency (2016). State of Maryland 2016 Hazard Mitigation Plan. https://mema.maryland.gov/community/Documents/2016_Maryland_Hazard_Mitigation_Plan_final_2.pdf

II. More Extreme Temperatures

Human-led emissions are warming the atmosphere at an unprecedented rate causing average temperatures to increase globally. In the D.C. area, the average summer temperature has already increased by 2.2 degrees F since 1970.[8] While a 2 degrees F is seemingly insignificant, small changes in the average results in significant changes in temperature extremes, resulting in more severe and unpredictable summer and winter conditions.

Extreme and unpredictable temperature events increase the prevalence of heat- and cold-related illnesses, particularly among the most vulnerable populations and communities. Excessively high and low temperatures stress the County's infrastructure making it susceptible to service disruptions. Native plants, animals, and ecosystems are also sensitive to temperature extremes, as are local trades and businesses that rely on these resources for crop production and other outdoor services.

This section outlines the climate projections, vulnerabilities, and risks and impacts for extreme heat, droughts, and extreme winters.

A. Extreme Heat

Extreme heat, typically felt during the summer months, occurs when the temperature is substantially hotter and/or more humid than average. A heat wave occurs when a period of extreme heat lasts for 2 or more days. Extreme heat is the leading cause of weather-related deaths in the United States.[9] According to Maryland Department of Health more than 2,400 people in Maryland suffered from heat-related illnesses from June 1 to July 12, 2021.[10]

Figure 1 depicts the National Weather Service Heat Index. The Heat Index indicates the perceived temperature, incorporating the interaction between relative humidity and air temperature.[11] When the atmospheric moisture content (i.e., relative humidity) is high, the rate of evaporation from the body decreases, making the human body feel warmer.[12] The Heat Index has important considerations for the human body's comfort, creating potentially dangerous conditions, as outlined in Table 3., if left unmitigated.

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[8] Climate central (2021). 2021 Summer Package. https://medialibrary.climatecentral.org/resources/2021-summer-package

[9] American Public Health Association (2018). Differences in Heat-related Mortality by Citizenship Status: United States 2005-2014. https://www.apha.org/-/media/Files/PDF/topics/climate/Heat_Related_Deaths.ashx

[10] Maryland Office of Preparedness and Response (2021). Reports: Heat. https://health.maryland.gov/preparedness/Pages/Reports_Heat.aspx

[11] National Weather Service, National Oceanic and Atmospheric Administration (2020). What is the heat index? https://www.weather.gov/ama/heatindex

[12] Ibid.

Figure 1. National Weather Service Heat Index.

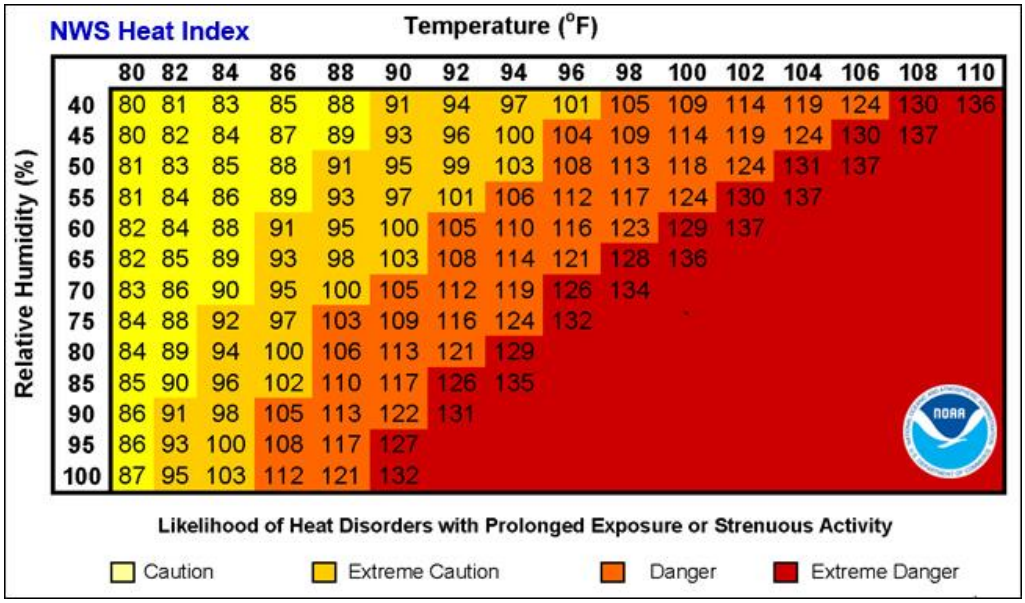


Table 3. Heat Index classification and effect on human body.

Classification	Heat Index	Effect on the body
Caution	80°F - 90°F	Fatigue possible with prolonged exposure and/or physical activity
Extreme Caution	90°F - 103°F	Heat stroke, heat cramps, or heat exhaustion possible with prolonged exposure and/or physical activity
Danger	103°F - 124°F	Heat cramps or heat exhaustion likely, and heat stroke possible with prolonged exposure and/or physical activity
Extreme Danger	125°F or higher	Heat stroke highly likely

Climate Projection: Extreme Heat

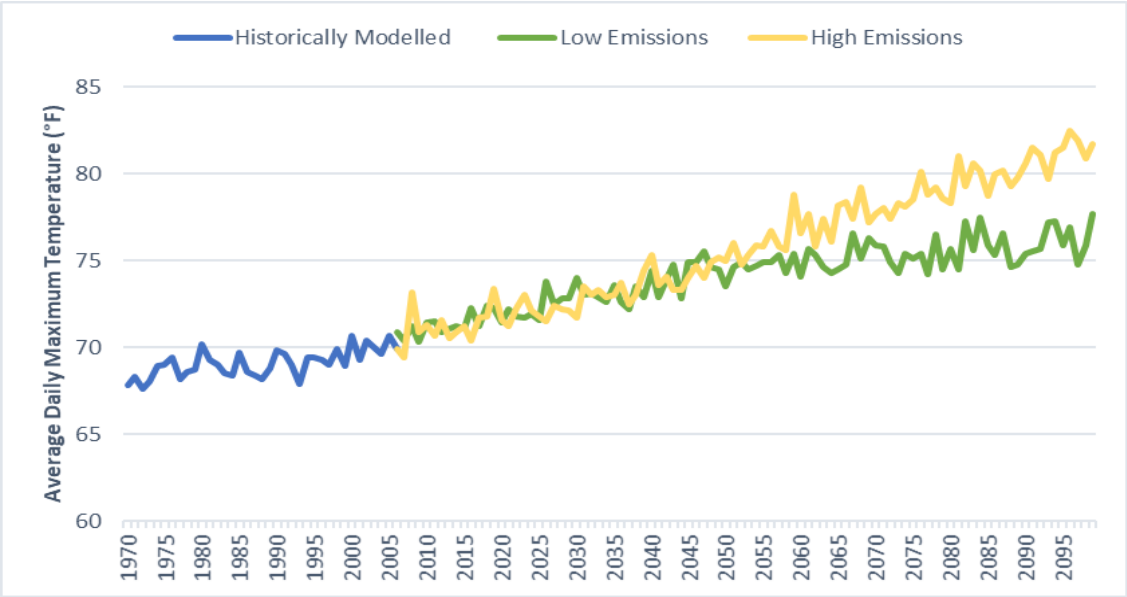
Rising Temperatures

The average annual temperature in Maryland has risen by more than 1.5°F since the beginning of the 20th century, and average temperatures are projected to continue increasing.[13] For example, the historical average (1950 – 2010) daily maximum temperature in Prince George's County is 66°F and

[13] NOAA National Centers for Environmental Information (2017). Maryland State Climate Summary. https://statesummaries.ncics.org/chapter/md/

projected to increase by about 8°F by 2040 and up to 10°F by 2060, as displayed in Figure 2.[14] Summer temperatures peak in July, when the average monthly temperature has historically been 87.7°F.[15] Average July temperatures are also expected to increase to 90°F by 2025 and, depending on the future emission scenario, can reach a monthly average of 96°F by 2075.[16]

Figure 2. Projected increase of average daily maximum temperature in Prince George's County (U.S. Climate Resilience Toolkit Climate Explorer).



More Extreme Heat Days

In addition to higher annual temperatures, the County is projected to experience more frequent, intense, and longer-lasting heat waves. Historically, the County experiences about 26 days per year where the maximum temperature exceeds 90°F (approximately twice as many as the state average) and less than one day per year with a maximum temperature reaching above 100°F.[17] The number of heat days with a maximum temperature above 90°F is projected to increase to roughly 61 days by 2040, and 68 to 81 days per year by 2060. The average number of heat days with a maximum temperature above

[14] U.S. Climate Resilience Toolkit (2021). Climate Explorer: Prince George's County, MD. https://crt-climate-explorer.nemac.org/climate_graphs/?county=Prince%2BGeorge%27s%2BCounty&city=Prince%2BGeorge%27s%2BCounty%2C%20MD&fips=24033&lat=38.784921100000001&lon=-76.8720961&zoom=7&nav=local-climate-charts

[15] U.S. Federal Government (2020). U.S. Climate Resilience Toolkit Climate Explorer. https://crt-climate-explorer.nemac.org/

[16] Ibid. (Data only available for 2025, 2050 and 2075.)

[17] U.S. Federal Government (2020). U.S. Climate Resilience Toolkit Climate Explorer. https://crt-climate-explorer.nemac.org/

100°F is projected to increase from near zero to approximately 5 days by 2040 and 8 to 25 days by 2080.[18]

Figure 3. Number of days with maximum temperature above 90°F (U.S. Climate Resilience Toolkit Climate Explorer).

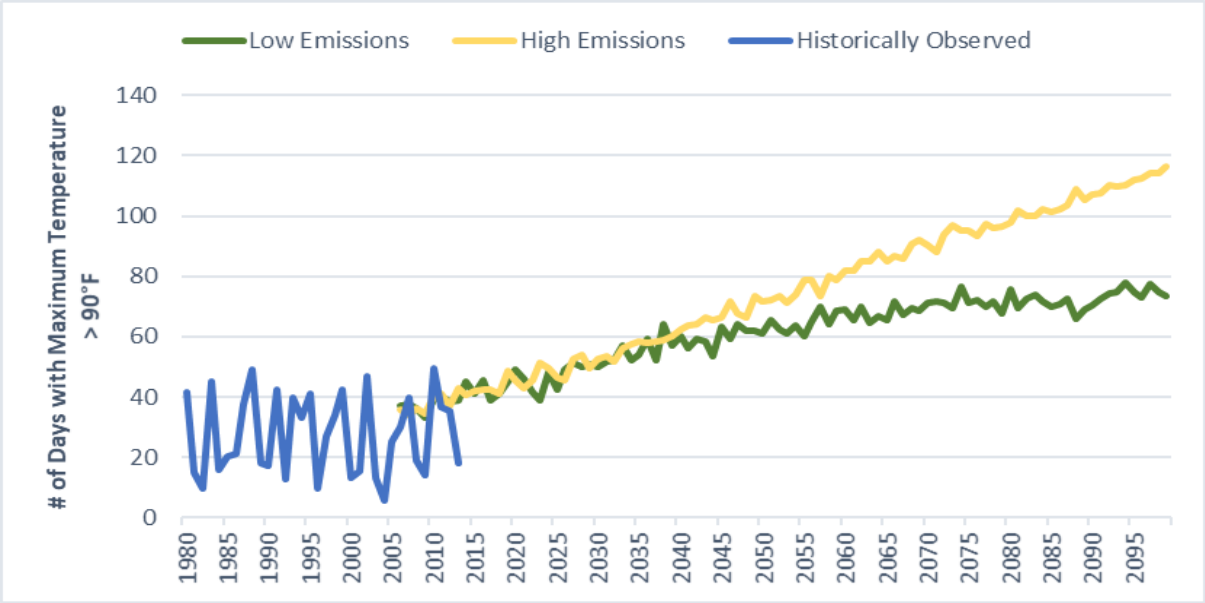
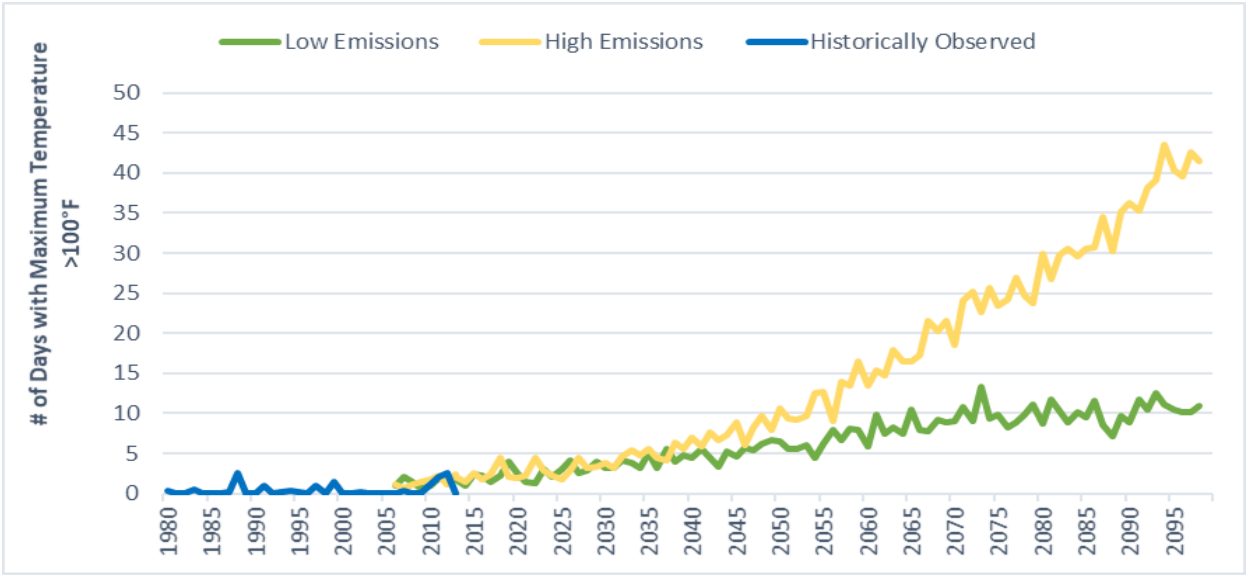


Figure 4. Number of days with maximum temperature above and 100°F (U.S. Climate Resilience Toolkit Climate Explorer).



[18] Ibid.

Figure 6 illustrates the *increase* in heat days (days where the maximum daily temperature exceeded 90°F) from 2006-2016, relative to a historic baseline average from 1986-2006, by Census Tract. The map demonstrates the County is not warming at an equal rate. The southwest region, for example, has seen a greater increase in extreme heat days relative to the historic average than other parts of the County.

Past Impacts

Summers in Prince George's County are warm and humid, and heat advisories are not uncommon. June to August are the warmest months, with average temperatures in the mid to high 80s.[19] Summer of 2020 was the hottest on record in Prince George's County.

EXTREME HEAT HIGHLIGHT

In the summer of 2012, Prince George's County and the greater metro Washington area experienced a historic heat wave that saw 11 days in a row exceed 95°F, and peak temperatures reach 105°F.

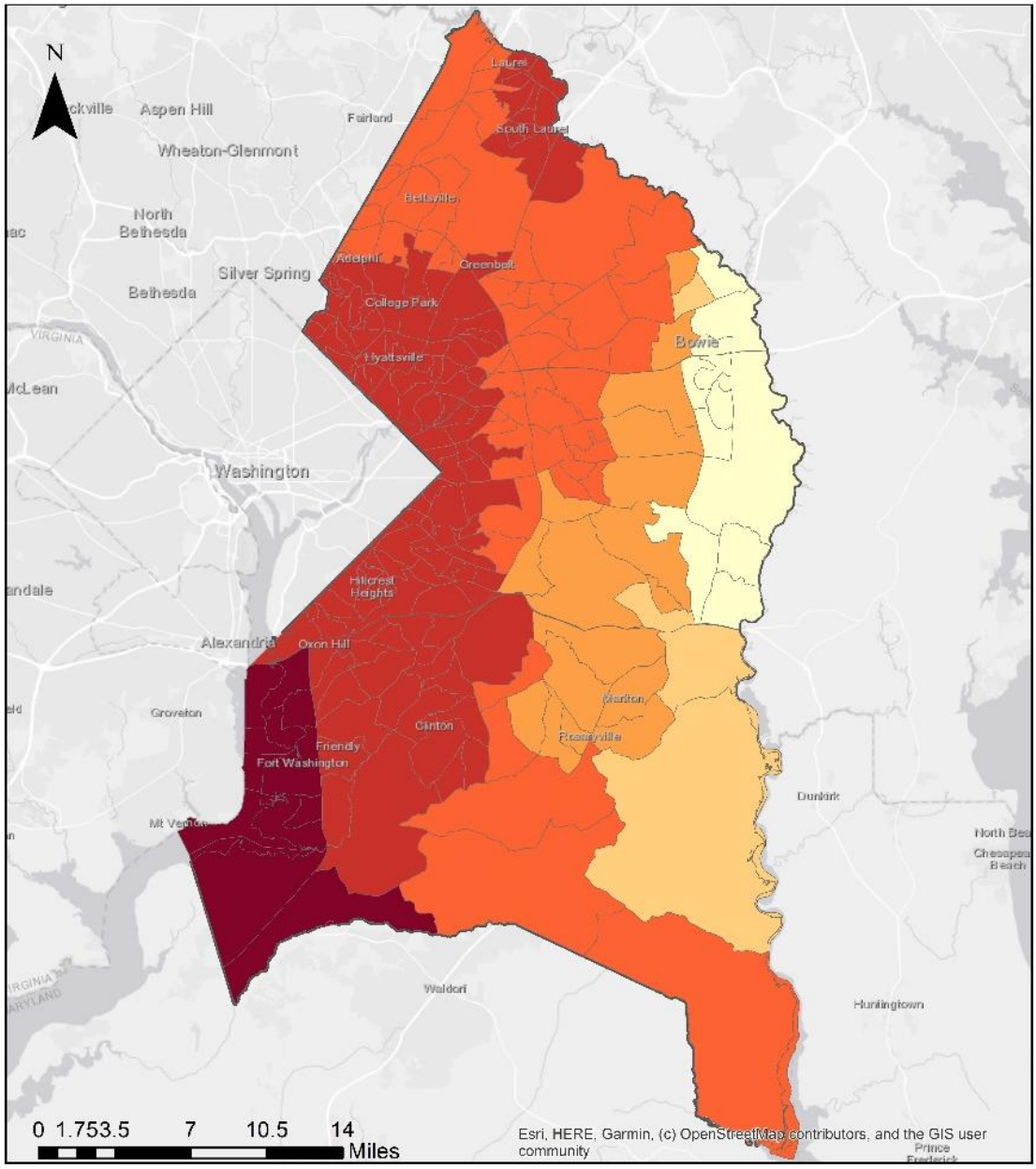
The heat wave was preceded by severe thunderstorms that left millions in the region with a crippling loss of power, and therefore air conditioning, for several days. In total, these events resulted in dozens of lives lost and billions of dollars' worth of damages, including costly disruptions to public transportation networks. For example, in Hyattsville, 3 green line train cars were derailed after the tracks suffered a heat kink (misalignment as a result of expansion of metal rails caused by extremely high and prolonged temperatures).

Figure 5. Commuters wait for shuttle buses at the East Hyattsville station after heat-induced train derailments suspended service (Juana Arias/The Washington Post).

[19] Best Places (n.d.). Climate in Prince George's County. https://www.bestplaces.net/climate/county/maryland/prince_george's

Figure 6. Warming is not occurring equally across the County; the southwest region of the County has seen a greater increase in extreme heat days.

Increase in heat days from 2006-2016, relative to historic baseline average from 1986-2006, by Census Tract.



Increase in Heat Days (Days)

3.7 - 5.9	10.3 - 12.5
5.9 - 8.1	12.5 - 14.7
8.1 - 10.3	14.7 - 16.9

Average increase of heat days from 2006 -2016, relative to a 1986-2006 baseline.

Heat day: daily maximum temperature exceeds 90F.

Source: CDC National Environmental Public Health Tracking Network, 2016

Vulnerability

For residents and communities, vulnerability to extreme heat can be influenced by various factors such as access to air conditioning, proximity to and awareness of cooling centers, extent of heat exposure, and biological factors, like age and presence of disabilities and/or chronic illnesses, among others. For community assets and critical infrastructure, the age of the infrastructure and presence of cooling strategies (e.g., green infrastructure) will impact the structure's ability to withstand heat impacts.

The following sections elaborate on populations and infrastructure vulnerable to extreme heat in Prince George's County.

Vulnerable Populations

Exposure
Residents who remain outdoors for prolonged periods of time (e.g., outdoor workers and people experiencing homelessness) face greater exposure to heat and are more at-risk of heat-related illnesses. Residents located in Urban Heat Islands (urbanized areas that experience higher temperatures than their surroundings as a result of less tree canopy cover and green space, and more impervious surface cover) are also more exposed to heat. Trees provide shading and a cooling effect through evapotranspiration; therefore, neighborhoods with low tree canopy cover have less relief from the heat. Stakeholders shared that while the County has a 40% tree cover, the inner part of the Beltway is only at 8% of cover. Figure 7 maps tree canopy cover in the County and outlines the EEAs.
Sensitivity
Age is closely related to heat sensitivity – the elderly is at greater risk of dehydration and are more likely to be dependent on caretakers, have limited mobility, and/or physical or cognitive health conditions. Young children (e.g., new-borns to 5 years old) are also physiologically more sensitive to heat given a reduced sweating capacity and more rapid heat intake. The presence of physical and/or mental disabilities and chronic illnesses can impair the body's ability to properly regulate temperature and/or face challenges with limited mobility and the ability to protect themselves. This demographic is also more likely to require additional support during heat emergencies, such as transportation to cooling centers and specialized care.
Adaptive Capacity
Low-income households are more likely to be energy burdened or have less disposable income to purchase or run their AC units. Figure 16 illustrates the extent of energy burden by area median income (AMI) for both renters and owners in Prince George's County. As displayed, lower-income residents are significantly more energy burdened than moderate- and high-income residents paying more than double in percent of income going to energy costs. People of color may also have lower adaptive capacity given higher rates of health disparities due to historical and structural patterns of inequity, marginalization, and discrimination, making them more susceptible to heat-related illnesses. Residents with low English proficiency may also lack access or awareness to education and awareness materials, such as heat advisories and factsheets.

Figure 7. Tree canopy cover and equity emphasis areas in Prince George's County. (Planning Department)

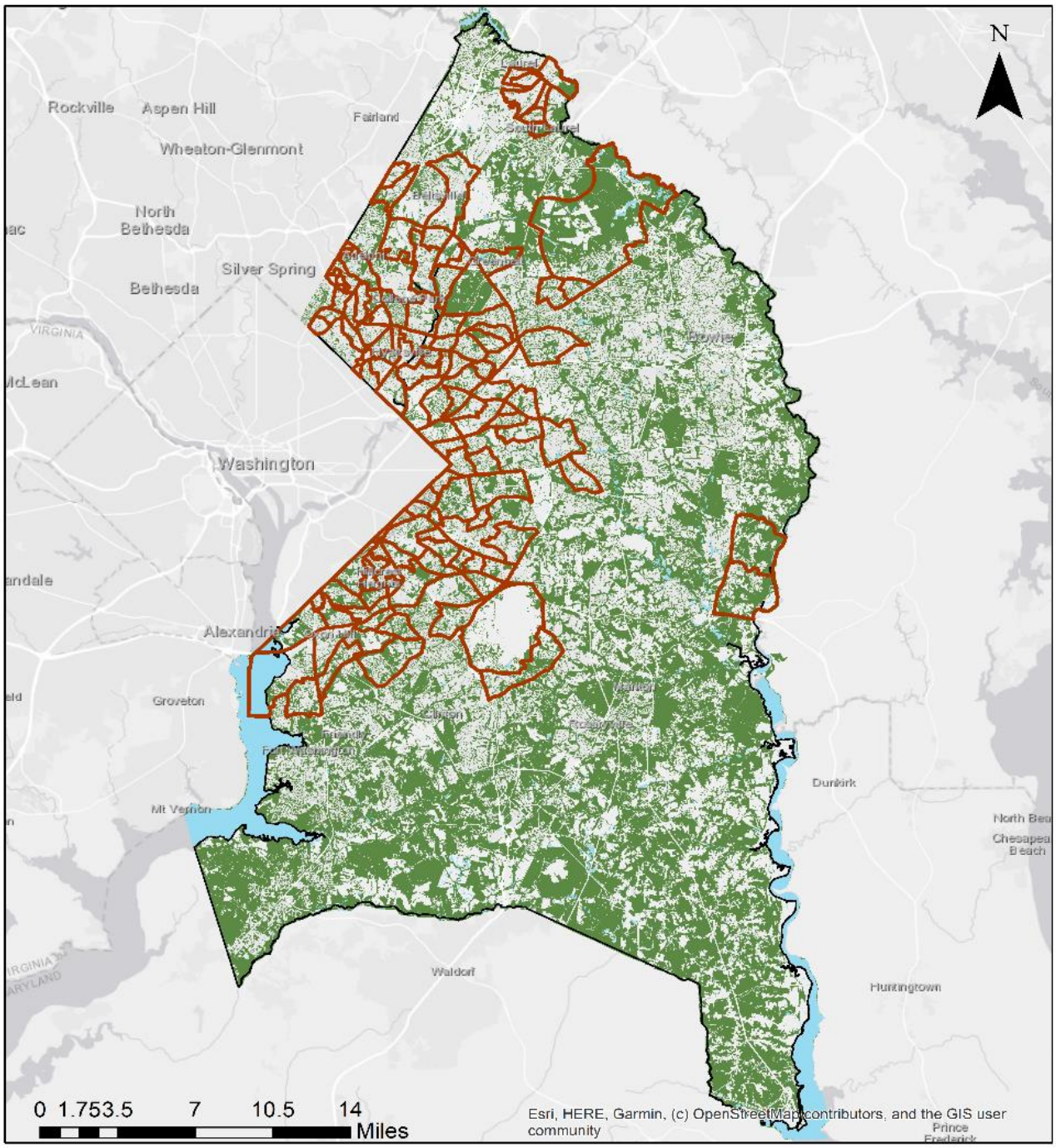
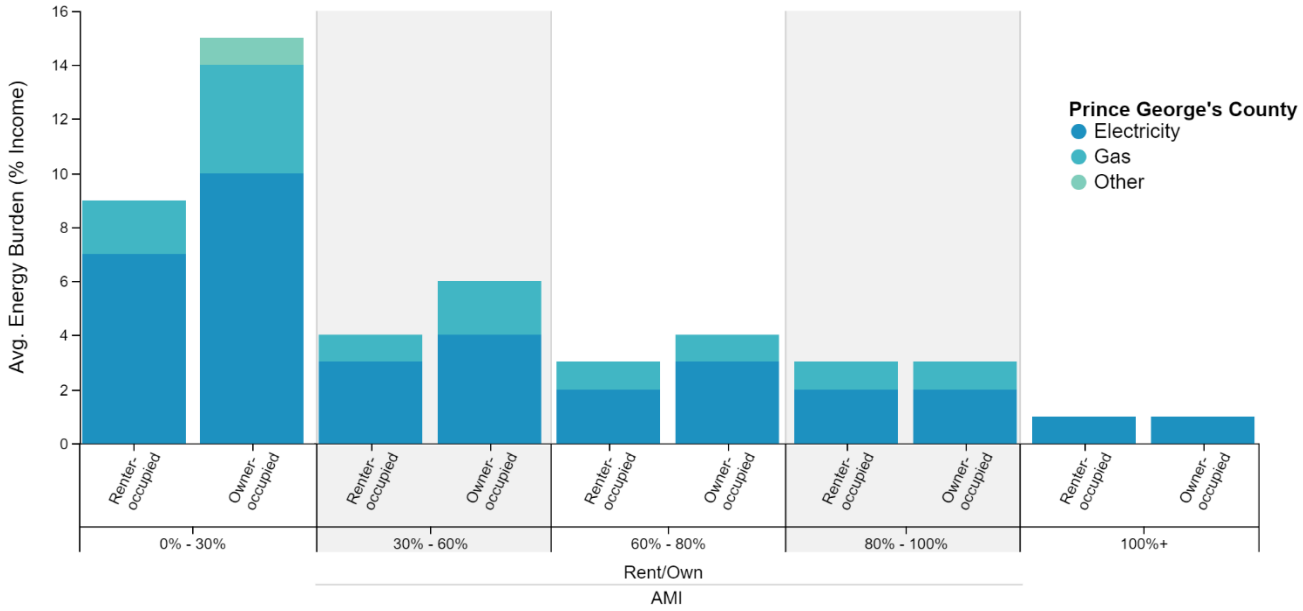


Figure 8. Average energy burden, as a percent of income, in Prince George's County, by area median income (AMI).



Vulnerable Infrastructure

Warming annual and summer temperatures stress the County's critical infrastructure, such as energy and transportation infrastructure. While buildings and infrastructure across the County are susceptible to heat, those located in Urban Heat Islands and areas with lower tree canopy cover face greater exposure and are therefore more vulnerable. Above ground infrastructure, such as power transmission lines and railroad tracks, are also more exposed to heat. Critical facilities and infrastructure were not designed to withstand excessively high temperatures and can therefore be susceptible to service disruptions.

Risks & Impacts

Climate change is projected to increase the average temperature, in addition to the number, intensity, and duration of heat waves. This will in turn likely increase the prevalence of heat-related illnesses and other adverse impacts to the County's assets, systems, and populations. There is also an increased likelihood that the resiliency threshold of current systems may be exceeded due to projected increased heat impacts.

The Table below summarizes impacts to key systems and sectors in Prince George's County.

Systems/Sectors	***Impact Magnitude***	***Description***
Energy/ Utilities	Moderate	As extreme heat days increase, consumer demand for power is expected to increase, stressing the grid more frequently and for longer periods of time as the need for cooling resources and refrigeration increases. This strain on the electrical power system may result in potential brownouts or blackouts more frequently and

		for longer periods of time. The additional load coupled with warmer air can cause transmission lines to swell and become less efficient. Rising air temperatures have been found to reduce transmission capacity by 2 to 6% on average, relative of a 1990-2020 base period.[20] Above-ground infrastructure with prolonged exposure to heat can stress equipment.
 *Public Health*	High	Extreme heat poses serious and potentially fatal threats to human health and is the leading cause of climate-related deaths in the United States. Extreme heat coupled with high humidity slows evaporation, limiting the body's ability to cool itself which can catalyze heat-related illnesses. Residents may experience dehydration, heat rash, heat exhaustion, and heat stroke, the latter of which can be fatal due to direct and prolonged heat exposure. Rates of hospitalization due to the above effects of extreme heat are expected to increase as high heat days increase and as heat waves become more frequent and last for longer periods of time. Increasingly warming temperatures also mean longer growing seasons (i.e., longer allergy season) and longer mosquito growing season (i.e., greater prevalence of mosquito-borne diseases). Extreme heat is often coupled with worsening air quality, which traps pollutants and can aggravate respiratory illnesses, such as asthma. Studies have shown a correlation with increased rates of suicide and homicide during periods of extreme heat.
 *Commercial/ Economy*	Moderate	Studies have shown extreme heat is linked to decline in worker productivity and therefore profitability in an economically meaningful way. Worker productivity is estimated to decline by 2% for every degree Celsius above normal ambient temperature.[21] Data centers and related information and communication technology (ICT) equipment and systems facing increased temperatures for longer periods of time can face heat damage, shorter lifespans, and need for more frequent repair and replacement. If prolonged, extreme heat can lead to droughts, often accompanied by reductions to crop yields and therefore income loss for the agricultural community. See Drought Section for more information.
 *Transportation*	High	Pavement and rail tracks may expand and buckle, placing strain on transportation infrastructure. Train tracks exposed to high temperatures are increasingly at risk of warping or buckling and can

[20] Bartos et al. (2016). "Impacts of Rising Air Temperatures on Electric Transmissions Ampacity and Peak Electricity Loads In The United States." https://iopscience.iop.org/article/10.1088/1748-9326/11/11/114008/meta

[21] Park, J. (2015). "The Labor Productivity Impacts of Climate Change: Implications for Global Poverty." https://www.worldbank.org/content/dam/Worldbank/document/Climate/Climate%20and%20Poverty%20Conference/D2S3_Park_Labor%20Productivity%20Impacts%20from%20Climate%20Change%20-%20Feb%2010%202015%20v13short.pdf

		create dangerous accident-prone conditions.[22] The risk of buckling increases significantly as temperatures reach 110°F.[23] In addition to dangerous accidents, track buckling can result in travel delays and faster deterioration of the infrastructure. Airport runways are also vulnerable to extreme heat, which can cause asphalt to soften and deteriorate. Smaller, regional aircraft cannot fly safely if the heat index exceeds 118°F.
 *Water Sanitation/ Supply*	Moderate	Increasing instances of high heat is correlated with droughts and is often accompanied by a decrease in the available water supply. For more information, see Drought Section.

[22] For example, in the summer of 2002, an Amtrack bus headed to DC derailed in Kensington, Maryland as a result of heat stress buckling the tracks. The accident resulted in 97 injured passengers, and 6 out of 13 train cars faced heavy damages and costly repairs.
Rowan E. et al. (2013). Assessing the Sensitivity of Transportation Assets to Extreme Weather Events and Climate Change.
https://www.researchgate.net/publication/264730154_Assessing_the_Sensitivity_of_Transportation_Assets_to_Extreme_Weather_Events_and_Climate_Change

[23] Union of Concerned Scientists (2018). Heat Waves and Climate Change.
https://www.ucsusa.org/sites/default/files/attach/2018/08/extreme-heat-impacts-fact-sheet.pdf

B. Drought

Droughts are complicated phenomena that can be defined differently, depending on the impact. The National Centers for Environmental Information defines droughts in four ways:

- **Meteorological drought** happens when dry weather patterns dominate an area.
- **Hydrological drought** occurs when low water supply becomes evident, especially in streams, reservoirs, and groundwater levels, usually after many months of meteorological drought.
- **Agricultural drought** happens when crops become affected.
- **Socioeconomic drought** relates the supply and demand of various commodities to drought.[24]

While droughts do not impact Maryland as severely as other U.S. regions, "flash droughts," or the rapid onset or intensification of drought conditions, have the potential to cause extensive damage to agriculture, economies, and ecosystems.[25] Unlike slow-evolving droughts caused by a decline in precipitation, flash droughts occur when low precipitation is accompanied by abnormally high temperatures (e.g., heat waves), high winds, and/or changes in solar radiation.[26]

Though intense droughts occur infrequently, the region may experience them more frequently and more severely in the coming decades as a result of the increased prevalence of extreme heat (see Extreme Heat Section for more information) and increased variability in precipitation. These sometimes-rapid changes can quickly raise evapotranspiration rates and deplete available water from the landscape, triggering more acute flash drought events that can quickly evolve into dangerous situations without proper mitigation measures in place. Additionally, the likelihood of flash flooding increases when high heat decreases the moisture content of the soil.

Table 4. Drought severity classification and possible impacts as determined by the State of Maryland. (U.S. Drought Monitor).

Classification	Description	Possible Impacts
D0	**Abnormally Dry** (precursor to drought, not actual drought)	• Crop growth is stunted; planting is delayed • Fire danger is elevated; spring fire season starts early • Lawns brown early; gardens begin to wilt
D1	**Moderate Drought**	• Irrigation use increases; hay and grain yields are lower than normal • Honey production declines • Wildfires and ground fires increase

[24] National Centers for Environmental Information (n.d.). Definition of Drought. https://www.ncdc.noaa.gov/monitoring-references/dyk/drought-definition#:~:text=Meteorological%20drought%20happens%20when%20dry,happens%20when%20crops%20become%20affected.

[25] National Integrated Drought Information System (2020). Flash Drought. https://www.drought.gov/what-is-drought/flash-drought

[26] Ibid.

D2	**Severe Drought**	• Specialty crops are impacted in both yield and fruit size • Producers begin feeding cattle; hay prices are high • Warnings are issued on outdoor burns; air quality is poor
D3	**Extreme Drought**	• Crop loss is widespread; Christmas tree farms are stressed; dairy farmers are struggling financially • Well drillers and bulk water haulers see increased business • Water recreation and hunting are modified; Wildlife disease outbreak is observed
D4	**Exceptional Drought**	• Maryland has experienced little or no exceptional drought, so there are no D4-level drought impacts recorded in the Drought Impact Reporter.

Climate Projection: Drought

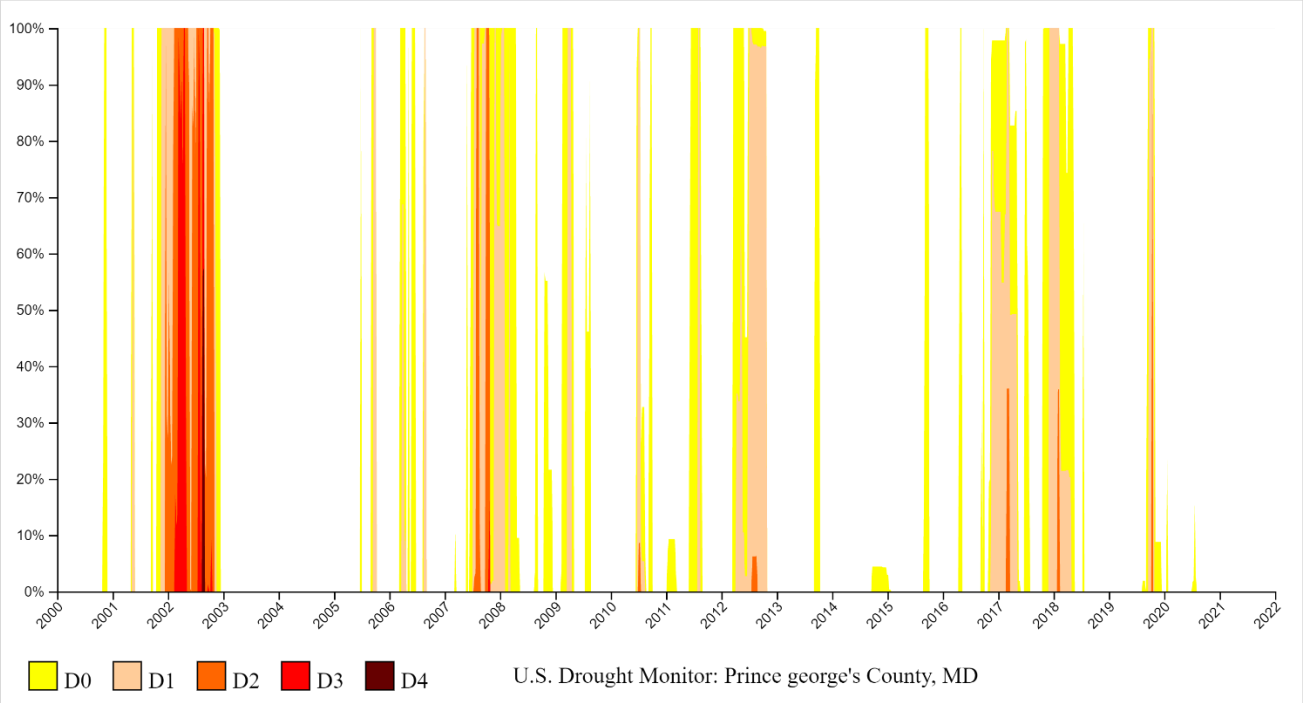
Droughts and flash droughts are most likely to occur during the summer as temperatures warm. In comparison to other regions of the United States, droughts are of lower risk in Maryland. There is significant uncertainty across climate models in projecting future drought conditions, though meteorological drought conditions may rise given increasing temperatures in the summer months.

Past Impacts

Drought conditions occur occasionally in Prince George's County. As demonstrated in Figure 9, D0 abnormally dry conditions occur almost annually while D1 moderate drought conditions occur less frequently. D2 Severe, D3 extreme, and D4 exceptional droughts are rarer; however, in 2002, the County experienced a D3 severe drought that lasted for much of the year with conditions briefly developing into a D4 exceptional drought. This drought was the driest period in Maryland's history since record-keeping began in 1871; groundwater level and steam flows hit record lows in much of the state.[27]

[27] Roylance F. (2002). Md. Drought Deepens, No Relief in Sight. https://www.baltimoresun.com/news/nation-world/bal-te.md.drought21aug21-story.html

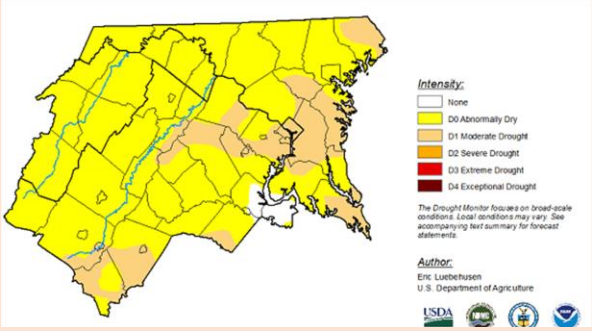
Figure 9. Historical drought conditions in Prince George's County from 2000 to present day. (U.S. Drought Monitor).



FLASH DROUGHT HIGHLIGHT

In September of 2019, Prince George's County, along with much of Maryland, experienced a flash drought. Very little precipitation and an unusually late warm season contributed to the development of the D1 Moderate Drought. Agricultural interest groups reported drought-related stress to pasture, hayfields, and crops. The drought conditions did not warrant water restrictions, yet streamflow fell below average levels.

Figure 10. U.S. Drought Monitor, September 2019 (NottinghamMD).



Vulnerability

Residents, businesses, and infrastructure that are heavily water-dependent are most vulnerable to the impacts of droughts. In the event a drought reduces the water supply, resulting in low-flow conditions, the quantity and pressure of water available for other critical uses (e.g., drinking water, water in power plants, water to fight fires) is subsequently reduced.

The following sections elaborate on populations and infrastructure vulnerable to drought in Prince George's County.

Vulnerable Populations

Exposure
Droughts are often geographically expansive, and so the County as a whole (and region) will typically be exposed.
Sensitivity
Residents who are rely on high water-consumption for income are most sensitive to droughts. This may include agricultural workers, laundromats, car washes, communications facilities, water recreation activities, and more.
Adaptive Capacity
Lower income residents who are heavily dependent on water consumption for income are less able to cope with the financial impacts of water restrictions potentially imposed by drought.

Vulnerable Infrastructure

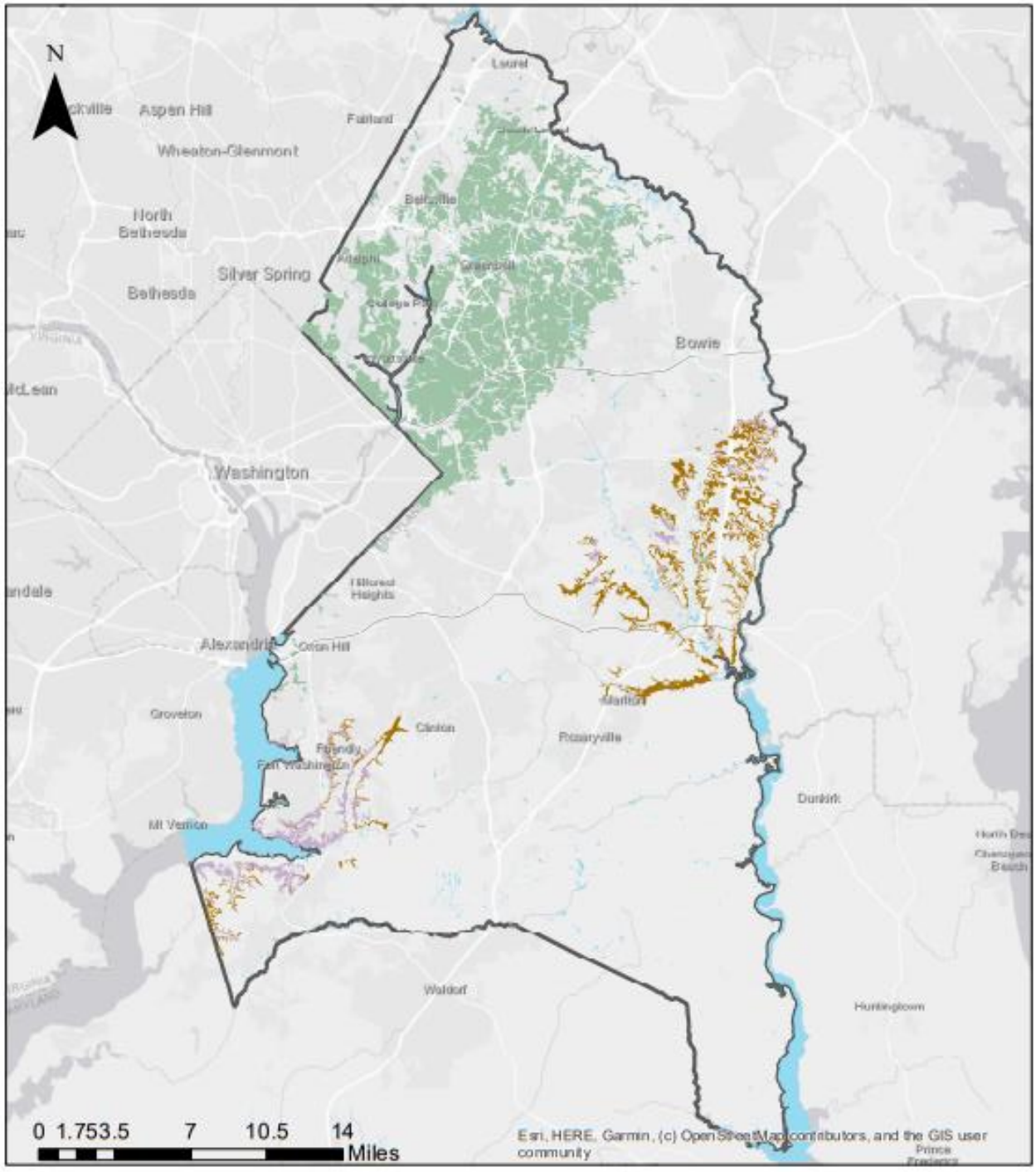
While droughts have mostly moderate direct impacts on physical infrastructure, succeeding water scarcity can challenge or disrupt important community services, such as firefighting equipment and water sanitation infrastructure. For example, reduced water supply can compromise firefighting efforts as equipment has a minimum water pressure level needed to activate and work effectively.[28] Also, the County's water sanitation systems and equipment can be jeopardized during low-flow conditions, possibly resulting in contamination of the water supply. As flow levels in rivers and aquifers decrease, saltwater can move inland, contributing further to water contamination as water sanitation plants are often not equipped to treat saline intrusion.[29]

As water supplies are depleted during drought and groundwater is withdrawn, the sinking of the ground (subsidence) can occur, sometimes leading to sinkholes. Problematic soils conditions – such as Howell, Christiana and Marlboro Clay soils present mainly in South County – which have high shrink/swell (movement) and deformation/slip (failure) properties subject to changes in soil moisture content from drought, flooding, or extreme precipitation may make buildings and structures unstable, as they may crack and compromise foundations leading to structural instability. Figure 11 maps problematic soils across the County, including Christiana Complexes, Marlboro Clay, Howell Complexes.

[28] Operational Analysis Division, U.S. Department of Homeland Security (2015). Drought Impacts to Critical Infrastructure. https://content.govdelivery.com/attachments/USDHSFACIR/2015/04/30/file_attachments/386553/Drought+Impacts+to+Critical+Infrastructure.pdf

[29] Ibid.

Figure 11. Problematic soils in Prince George's County.



Risks & Impacts

As climate change increases the frequency, severity, and duration of extreme heat events, an increased number of assets, systems, and populations may be affected by drought. Droughts can increase the likelihood that the resiliency threshold of agriculture and other water-dependent systems will be exceeded.

The Table below summarizes impacts to key systems and sectors in Prince George's County.

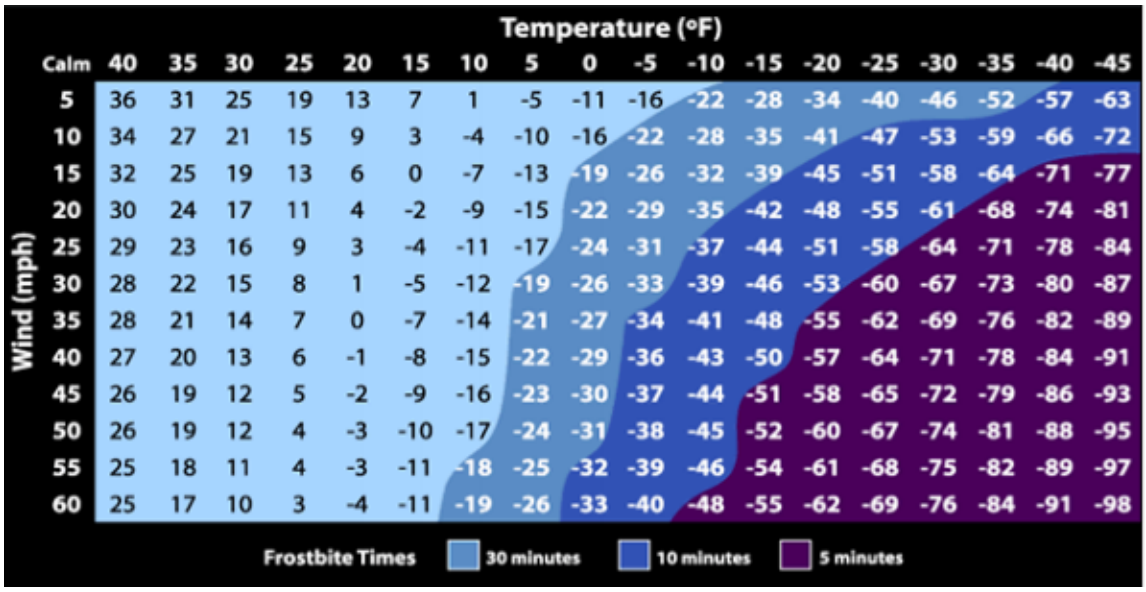
Systems/Sectors	***Impact Magnitude***	***Description***
 *Energy/ Utilities*	Low	Energy production requires water for cooling in thermal processes and other energy production activities, regardless of energy source. Limited water supply can constrain the operation of power plants and production of energy and compromise the energy system's resilience.
 *Public Health*	Low	Droughts are closely correlated with periods of extreme heat; therefore, the health impacts are typically as it relates to heat-related illnesses and poor air quality. Droughts can reduce crop yield loss causing mental and behavioral stress for agricultural workers and may cause food insecurity.
 *Commercial/ Economy*	Moderate	The most significant economic impact of droughts is on agriculture. Droughts can stunt crop growth, reducing crop yields and therefore income. Consumers may see an increase in prices as farmers cope with lower yields. Additionally, if a prolonged drought imposes water restrictions, businesses with high water consumption rates (e.g., laundromats, car washes, communications facilities) will be forced to operate at a reduced capacity.
 *Transportation*	Moderate	Droughts are closely correlated with periods of extreme heat; therefore, the health impacts are typically as it relates to heat-related impacts, such as pavement and rail tracks expanding and buckling. As groundwater supply is depleted, the sinking of the ground (subsidence) can occur, sometimes leading to sinkholes, affecting infrastructure, including roads. Drought also increases the risk of wildfire, the smoke from which can severely affect visibility and result in road and airport closures.
 *Water Sanitation/ Supply*	High	Droughts reduce the availability of water, and therefore drinking water supply. If prolonged, competition over water resources (e.g., irrigation, drinking water, etc.) can trigger water restrictions. Low water flow can result in decreased sewage flows and subsequent increases in contaminants in the water supply. At the same time, sanitation systems operate at reduced efficiency as sediment accumulation increases, reducing reservoir safety of drinking water. Subsidence resulting from groundwater depletion can harm water sanitation and supply lines.

C. Extreme Winter

Extreme winter conditions occur when the temperature is unusually lower than average for prolonged periods of time, often accompanied by high winds and heavy snow (e.g., extreme cold, blizzards, ice storms, etc.). Extreme cold events are typically caused when a Polar Vortex of low pressure and cold air moves out of its usual path near Earth's poles. The rate of winter event is increasing as the impacts of climate change continue to disrupt regular weather patterns.[30]

Figure 12 depicts the National Weather Service Wind Chill Chart. Like the Heat Index, the Wind Chill Chart is a more accurate depiction of actually perceived temperature, or "wind chill temperature," by integrating air temperature and wind speed. The Wind Chill Chart outlines the safe amount of time to stay outside before frostbite ensues.[31]

Figure 12. National Weather Service Wind Chill Chart.



Climate Projection: Extreme Winter

While the increase in average temperature is projected to result in fewer days below freezing and milder winters, the frequency of extreme winter conditions and events in the region is increasing. Warmer temperatures create more moisture in the atmosphere leading to greater intensification of winter storms.

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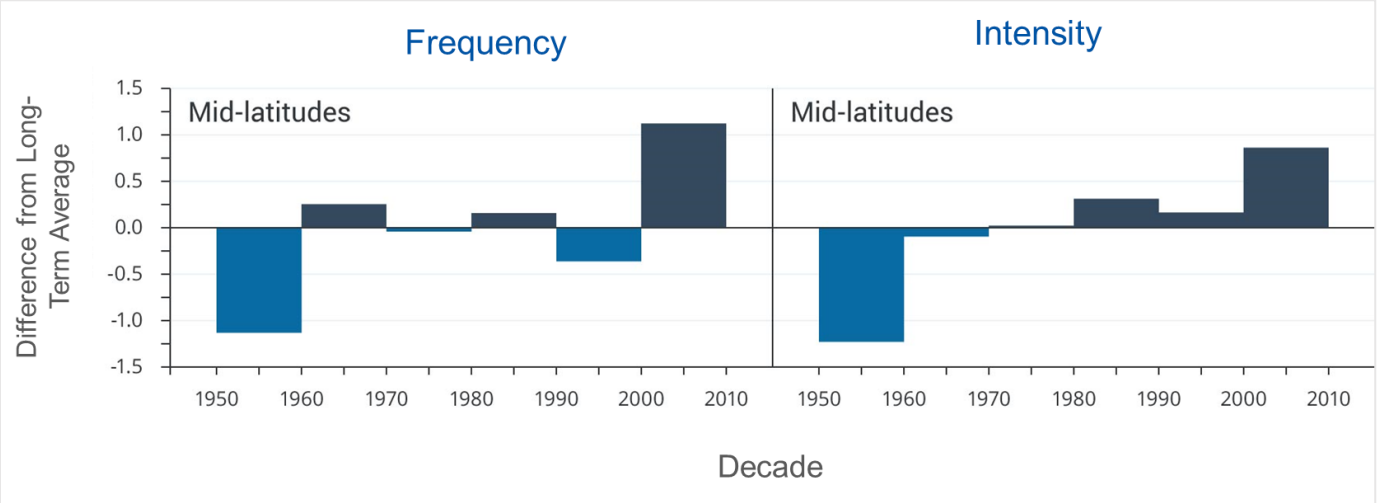
[30] National Oceanic and Atmospheric Administration, Unites States Department of Commerce (2019). The science behind the polar vortex: You might want to put on a sweater. https://www.noaa.gov/multimedia/infographic/science-behind-polar-vortex-you-might-want-to-put-on-sweater

[31] National Weather Service (n.d.). Wind Chill Chart. https://www.weather.gov/safety/cold-wind-chill-chart

Historically, the County experiences about 94 days per year where the minimum temperature is below 32°F.[32] Due to rising global temperatures, the number of cold days is expected to decrease. A study conducted by U.S. Global Change Research Program found that both the frequency and intensity of winter storms in the mid-latitude regions are increasing relative to the long-term average, as seen in Figure 13.[33] This trend is forecasted to continue in coming decades.

Figure 13. Variation of storm frequency and intensity during the cold season (November – March) in mid-latitude regions.[34]



Past Impacts

Winters in Prince George's County are cold and moderately snowy, with approximately 90 days per year where the nighttime low temperature is below freezing. December to February are the coldest months of the year, with lows in the high 20s. January is the snowiest month of the year, with an average of about 6 inches of snowfall; the County sees an average of 14 inches of snow per year.[35]

[32] U.S. Federal Government (2020). U.S. Climate Resilience Toolkit Climate Explorer. https://crt-climate-explorer.nemac.org/

[33] U.S. Global Change Research Program (2018). Impacts, Risks, and Adaptation in the United States: Third National Climate Assessment. https://nca2014.globalchange.gov/report/our-changing-climate/changes-storms

[34] Ibid.

[35] Best Places (n.d.). Climate in Prince George's County. https://www.bestplaces.net/climate/county/maryland/prince_george's

The County occasionally experiences winter storms, with a number of notable storms in the past couple of decades. According to the Maryland Hazard Mitigation Plan, more deaths were attributed to winter storms in the state than any other hazard in the Hazard Identification Risk Assessment.[36]

WINTER STORM HIGHLIGHT

A winter storm in February of 2021 brought ice and freezing rain to much of the mid-Atlantic region; Prince George's County was under an ice storm warning. Ice weighed down trees and power lines causing downed power lines and damaged electrical equipment. Dominion Energy reported nearly 290,000 customers were left without power, and the restoration effort took multiple days. One COVID-19 vaccination site in the County was forced to close early.

Figure 14. Downed powerlines resulting from the ice storm (WUSA9).

Vulnerability

Extreme winter conditions and events pose significant threats to residents, homes, businesses, and critical infrastructure and facilities. Vital community services can be interrupted as a result of extreme winter causing a power outage or pipe burst in a critical facility.

The following sections elaborate on populations and infrastructure vulnerable to extreme winter in Prince George's County.

Vulnerable Populations

Exposure
Residents who remain outdoors for prolonged periods of time (e.g., outdoor workers and people experiencing homelessness) face greater exposure to cold temperatures making them more at-risk of hypothermia, frostbite, and other cold-related illnesses.
Sensitivity
The elderly, young children, people with chronic illnesses or other health conditions that limit the ability to thermoregulate are more susceptible to cold-related illnesses.
Adaptive Capacity
As with extreme heat, people of color are more likely to have existing health disparities as a result of historical and structural patterns of inequity, marginalization, and discrimination, making them more susceptible to cold-related illnesses. Extreme cold disproportionately impacts lower income

[36] Maryland Emergency Management Agency (2016). State of Maryland 2016 Hazard Mitigation Plan. https://mema.maryland.gov/community/Documents/2016_Maryland_Hazard_Mitigation_Plan_final_2.pdf

communities who are more likely to have inefficient heating systems, improperly insulated homes or be energy burdened (i.e., little to no financial security to afford stable heating), as seen in Figure 8. In many cases, energy-burdened households resort to unsafe heating practices such as running a generator, gas stove, or using a barbecue or fire inside their house, which can cause fires or carbon monoxide poisoning.

Vulnerable Infrastructure

Prolonged freezing temperatures, ice, and snowstorms pose notable threats to homes, businesses, and critical infrastructure and facilities. In buildings, heavy snow and ice accumulation can cause roof collapse and other structural damage. Rail lines can crack or break under prolonged sub-freezing conditions, especially along older tracks with existing wear and tear.[37]Damage to electrical utility equipment and powerlines, particularly overhead lines near trees, can face substantial damage or be brought down, resulting in power outages or energy service interruptions. Additionally, sub-freezing temperatures can cause pipes to expand and burst. Aging water infrastructure is even more vulnerable to extremely cold conditions.

Risks & Impacts

Though average temperatures are increasing causing milder winters overall, extreme winter conditions and events are projected to increase in frequency and intensity. This will in turn likely increase the prevalence of cold-related illnesses and other adverse impacts to the County's assets, systems, and populations. Extreme winter can increase the likelihood that resiliency thresholds are exceeded.

The Table below summarizes impacts to key systems and sectors in Prince George's County.

Systems/Sectors	***Impact Magnitude***	***Description***
Energy/ Utilities	High	The increasing frequency and intensity of winter storm events may impact utility buildings and equipment such as power generation stations, substations, towers, or electrical transformers, and limit access to the facilities for operations and management staff as with increasing frequency and severity. Snow and ice can accumulate on trees and power transmission lines, resulting in damage to the electric system and likely cause power outages to homes, businesses, and critical facilities for longer periods of time. Damage to above-ground utilities, which are more prevalent in older neighborhoods and EEA areas, may disproportionally affect vulnerable populations. Undergrounded utilities, while protected from the elements, may give false sense of security if above-ground interconnections are not addressed. After several severe winter storms, the Potomac Electric

[37] Keolis (n.d.). Broken Rails. https://www.keoliscs.com/broken-rails/

		Power Company (PEPCO) updated its power restoration response procedures.[38]
 *Public Health*	Moderate	Extreme cold inhibits the body's ability to warm itself effectively; overexposure may result in frostbite and hypothermia, which can lead to death. Hazardous road conditions during winter storm events increase the rate of automobile accidents. Frozen precipitation can make sidewalks slippery and can result in injuries if a resident slips and falls. Communities may face increased delays for longer periods of time to emergency response or medical services due to transportation failures and/or electric service interruptions for longer periods of time. When residents resort to unsafe heating practices (e.g., generator, indoor fire, gas stove), either during longer periods of power outage or otherwise, the risk of household fires and carbon monoxide poisoning may increase.
 *Commercial/ Economy*	Moderate	Disruption to business operations can occur when employees are unable to travel or in the event of a prolonged power outage. Frozen water pipes can cause substantial damage to a home or business and will likely require costly repairs. If severe ice or snow conditions reduce road capacity, shipment deliveries can be delayed. Weather-related delays are estimated to cost trucking companies between $2.2 to $3.5 billion annually.[39] These impacts are expected to increase with increased winter storm frequency and intensity.
 *Transportation*	Moderate	Snow and ice accumulation can create unsafe road conditions, resulting in traffic delays, road closures, and automobile accidents. Extreme cold can cause railway infrastructure to crack or break. Rail lines can be up to 5 degrees colder than the air temperature, creating tension in the steel.[40] Electrified rails will temporarily shut down above-ground operations if more than 6 inches of snow is accumulated.[41] Air travel may be delayed or canceled if winter conditions make flight activity unsafe.
	Moderate	Sub-freezing conditions can cause water mains to freeze and therefore expand and burst. If this occurs, a home, business, or

[38] Prince George's County Office of Emergency management (2017). Prince George's County & the City of Laurel Hazard Mitigation Plan Update. https://www.princegeorgescountymd.gov/DocumentCenter/View/29942/2017-PGC-Hazard-Mitigation-Plan-Update_ADOPTED

[39] U.S. Department of Transportation, Federal Highway Administration (2014). How Do Weather Events Impact Roads? www.ops.fhwa.dot.gov/weather/q1_roadimpact.htm

[40] Keolis (n.d.). Broken Rails. https://www.keoliscs.com/broken-rails/

[41] National Protection Programs Directorate, Homeland Security (2014). Critical Infrastructure Security and Resilience Note: Winter Storms and Critical Infrastructure. https://www.npstc.org/download.jsp?tableId=37&column=217&id=3277&file=OCIA_Winter_Storms_and_Critical_Infrastructure_141215.pdf

Water Sanitation/ Supply		critical facility can be without water service from several hours to several days. For example, in early January of 2014, Prince George's County Fire/EMS Department received over 2,000 calls regarding frozen or broken water pipes in homes and businesses across the County.[42] Heavy snow accumulation coupled with rainfall can overwhelm storm drains resulting in localized flooding. This is of particular concern in heavily urbanized areas.[43] Water supply can also be stressed as ice, or frozen slush can restrict intake by blocking valves.

[42] Belt, D. (2014). Cold Maryland: Concerned About Freezing Pipes? https://patch.com/maryland/silverspring/cold-maryland-concerned-about-freezing-pipes_2cd8fa4b-silverspring

[43] University of British Columbia Okanagan campus (2020). https://www.sciencedaily.com/releases/2020/02/200205132345.htm

D. More Frequent Flooding Events

While flooding is a natural phenomenon, the increase in impervious surfaces including parking lots and roads, as well as the infringement on rivers and floodplains increases the potential for flooding and the cost of flood damage. Flash and riverine flooding, which typically follow extreme precipitation events, are the two main types of flooding in Prince George's County. The County is also susceptible to coastal flooding from sea level rise, storm surge, and high tide. As sea levels rise and extreme precipitation events become more frequent, the County is projected to experience more frequent flooding events.

This section outlines the climate projections, vulnerabilities, and risks and impacts for inland flooding/extreme precipitation and coastal flooding.

A. Inland Flooding & Extreme Precipitation

Flooding is a temporary increase of water levels on land that is normally not submerged. It can occur along a river channel or stream when excessive rainfall surpasses the river's capacity, known as riverine flooding. Prince George's County is surrounded by two main rivers: the Patuxent River to the east and the Potomac River to the west. Flash flooding refers to instances of inundation resulting from heavy precipitation over a short period of time or in the event of a dam or levee failure. [44] Flooding is most common in low-lying areas and in heavily urbanized zones where the ground is largely covered by impervious surfaces, such as in North County, Upper Marlboro, the City of Laurel, Oxon Hill, Landover, and Joint Base Andrews.[45]

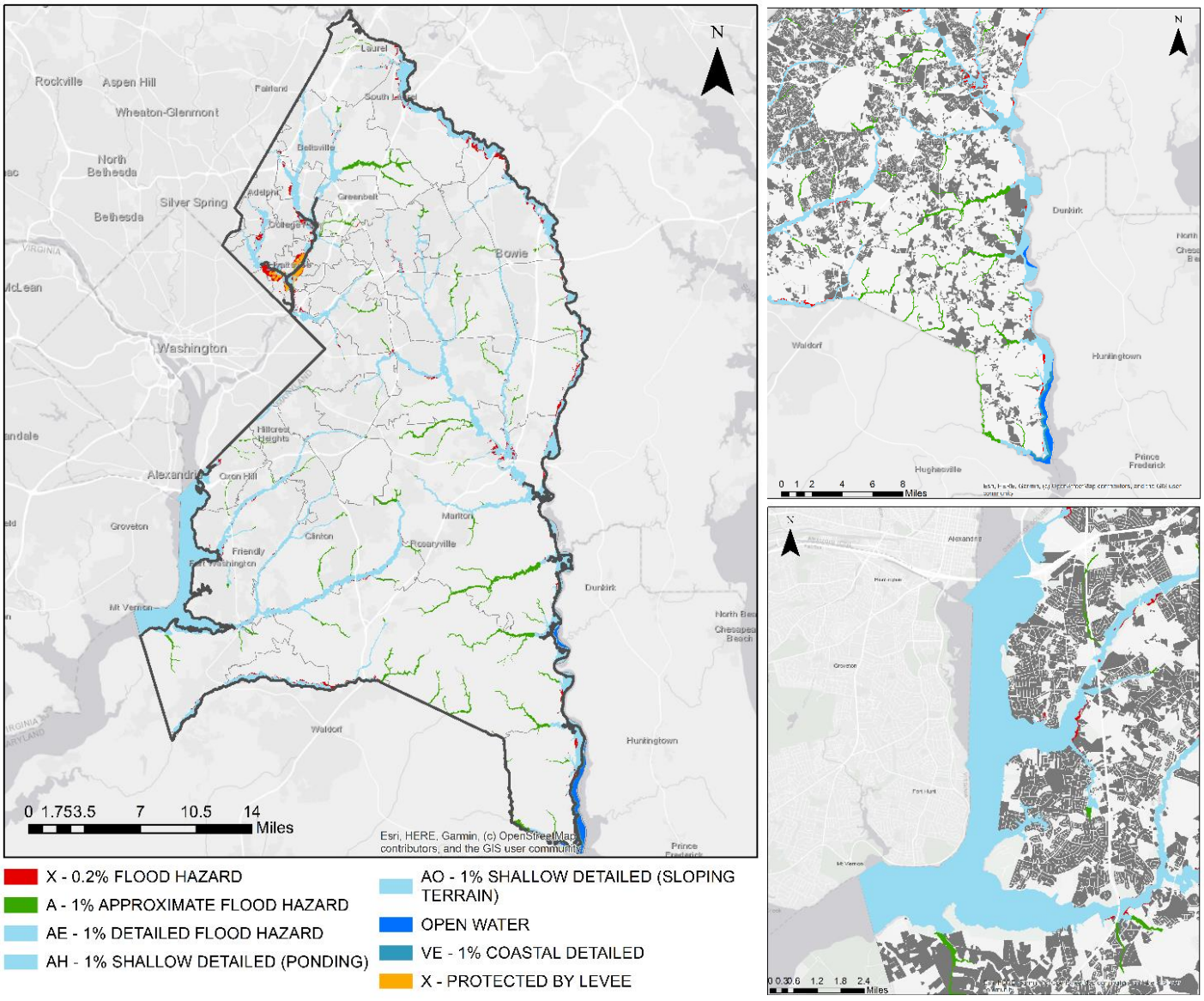
According to the 2017 Prince George's County Hazard Mitigation Plan, nearly 11% of the total County area is located within the 100-year FEMA floodplain,[46] of which 0.6% is located either within the 500-year floodplain or at risk of levee failure. Figure 15 demonstrates the current FEMA floodplain in Prince George's County and alongside the Patuxent and Potomac Rivers. Full-length maps are available in 0.

[44] Low-Impact Development Center (LIDC)'s 'nuisance' flooding reports – which are intended to analyze both 'nuisance' flooding from flash and riverine sources as well as coastal flooding impacts in Prince George's County – have been submitted for approval, but were not available at the release of this Report.

[45] It should be noted that data on impervious surfaces is insufficient to provide sufficient guidance as to which areas of the County may be urbanizing, which itself presents a risk.

[46] Data is included for FEMA floodplains as currently defined at publication. FEMA floodplain maps currently only account for historical conditions, and have not been updated to reflect climate change projections. Floodplain designations are subject to modification and expansion. County should coordinate and reassess periodically.

Figure 15. Floodplains in Prince George's County (Left), near the Patuxent River (Top, Right), and near the Potomac River (Bottom, Right).



Climate Projection: Inland Flooding & Extreme Precipitation

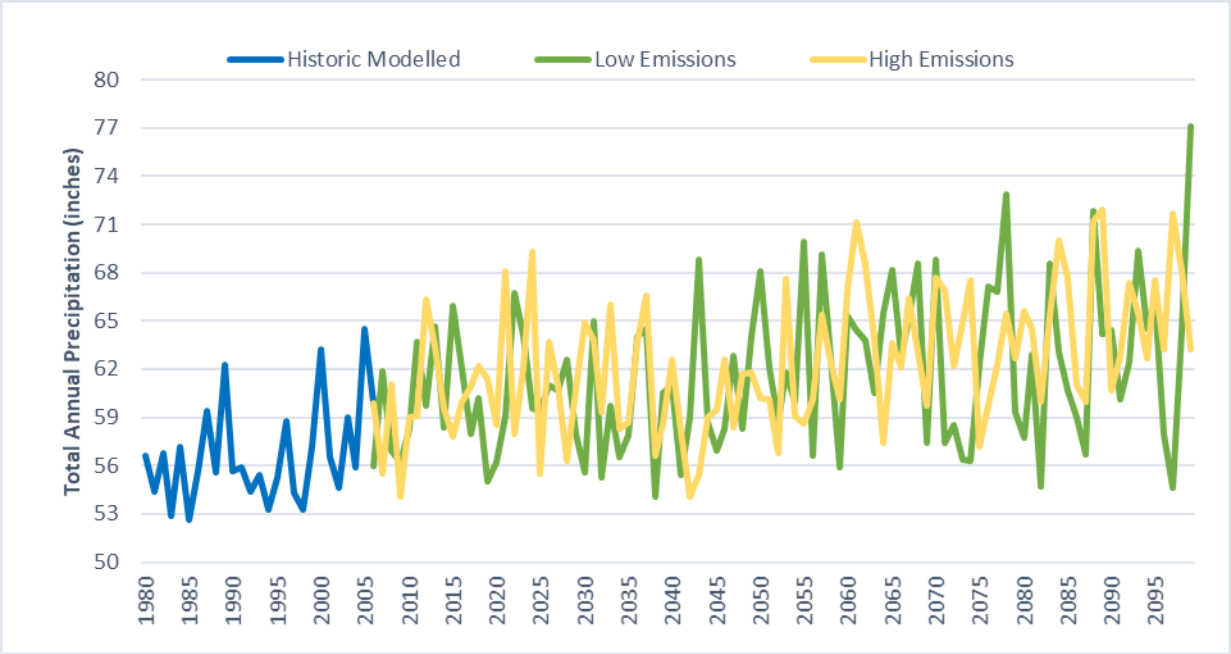
Climate models show warming temperatures are increasing the rate of evaporation, intensifying the water cycle, and increasing the frequency and intensity of extreme precipitation events in most locations. In the region, extreme precipitation events have increased by 27% from 1958 to 2016.[47]

Increasing Average Precipitation

While precipitation models are less certain than temperature projections, forecasts show a sustained rise in annual precipitation. The historic baseline average of annual maximum precipitation from 1980 – 2006 in the County is approximately 56 inches. As illustrated in Figure 16, this average is projected to steadily increase to roughly 62 inches by 2040, and up to 67 inches by 2060, a 10 and 60% increase respectively.[48]

Extreme precipitation can overwhelm stormwater drainage infrastructure or overflow rivers and streams, further contributing to flooding.

Figure 16. Total annual maximum precipitation projection for Prince George's County. (U.S. Climate Resilience Toolkit Climate Explorer).



[47] U.S. Global Change Research Program (2017). Climate Science Special Report: Precipitation Change in the United States. https://science2017.globalchange.gov/chapter/7/

[48] U.S. Federal Government (2020). U.S. Climate Resilience Toolkit Climate Explorer. https://crt-climate-explorer.nemac.org/

High Water Tables

With this projected increase in precipitation, the County will experience more frequent incidents of elevated groundwater levels, an already chronic issue in the County and the source of one of the most frequently cited drainage complaints. Without proper infiltration, excess stormwater may reach the water table, raising the water table. High groundwater levels can cause persistently wet basements and yards, septic system failure, crop destruction, and health concerns from standing water.

High water tables are more common in low-lying areas that receive excess water from higher elevations.

Past Impacts

The County frequently experiences flooding events, many of which have caused substantial property damage. Between 1996 and 2016, 33 historical flood events were recorded, with an average of $14,200 in total damages per year.[49] From 2018-2021, there were 4,362 complaints to the County's 311 hotline that were water-related, including: flooded basements, backyards, streets, and sinkholes.[50]

EXTREME PRECIPITATION HIGHLIGHT

In September of 2020, Prince George's County experienced historic flash flooding after a series of severe thunderstorms brought heavy rain to the region.

Substantial flooding occurred across the County, especially in low elevated areas, like along Route 50 (Figure 17), which flooded with over 5 feet of impassable water. Emergency responders were called to rescue residents trapped in vehicles. Additionally, many homes experienced substantial property damage, such as in North Brentwood, Mount Rainier, and Riverdale, among others.

Figure 17. Flooding on Route 50, September 2020. (WTOP/Dave Dildine)

[49] Prince George's County Office of Emergency management (2017). Prince George's County & the City of Laurel Hazard Mitigation Plan Update. https://www.princegeorgescountymd.gov/DocumentCenter/View/29942/2017-PGC-Hazard-Mitigation-Plan-Update_ADOPTED

[50] Prince George's County Department of the Environment (2021). Countywide Drainage Complaints February 2018 through February 2021. Motorola Data not including 911 calls.

HIGH WATER TABLES HIGHLIGHT

Drainage issues as a result of high water tables are a reality many homeowners across the County face. High water levels can result in the intrusion of groundwater into basements or water being trapped and ponding in yards, like in Figure 19. High water tables can interfere with the septic system, causing premature failure and sewage backup inside homes.

Figure 18. Saturated soil resulting from high water table (Department of the Environment).

Vulnerability

Flood vulnerability is influenced by a number of factors, such as land elevation, duration of the precipitation event, volume of runoff, velocity of flood waters, land use type, and percentage of impervious surfaces, among others. While residences, buildings, and facilities located in the floodplains are most exposed, the risk of flooding is far-reaching.

The following sections elaborate on populations and infrastructure vulnerable to inland flooding and extreme precipitation in Prince George's County.

Vulnerable Populations

Exposure
Residents living in low elevation areas, within floodplains, and/or near riverbanks are more exposed, and therefore vulnerable, to flooding.
Sensitivity
Sensitive populations include residents who may require special assistance to evacuate or relocate, such as those with mobility impairments, physical or cognitive disabilities, or those dependent on caretakers.
Adaptive Capacity
Adaptive capacity heavily influences an individual or community's vulnerability to flooding. For example, a well-socially connected community is a more resilient community as residents are in closer contact and therefore better able to assist one another evacuate or check in on vulnerable neighbors. Additionally, economic conditions play a significant role in an individual's ability to protect and recover from flooding. Lower-income residents, such as those living in EEAs, are more likely to lack the financial means to protect their homes before flooding and cover the cost of damage after flooding occurs. Of the County's 118 EEAs, 85 are located in the floodplain. Similarly, residents living in substandard housing conditions are at greater risk of flood damage.

Vulnerable Infrastructure

Flooding can result in substantial property damage to homes, businesses, and critical infrastructure and facilities. Damages can range from superficial damage such as loosening floorboards, damaged siding, and molding in basements and crawlspaces to more indelible damage such as harming appliances and other electrical equipment, cabling, and conduits. Compromising of the building's structural integrity is also a concern from undermining of foundations, floors, and stairs; damage to structural elements such as beams, columns, walls, and roofs; resulting in cracking, differential settlement, and reduced or inoperability of windows, doors, and other critical life safety egress openings.

To characterize flood vulnerability across the state, researchers at Maryland Department of Environment and Salisbury University modeled the amount of direct potential economic losses to buildings from 100-year flood events. Prince George's County had the most significant potential losses at $1.28 billion, or 15% of the state total. The study also indicated that Prince George's County is among the top counties for greatest number of buildings which may be potentially damaged by future 100-year flood events.[51]

Cadmus conducted a GIS analysis of properties that intersect the FEMA floodplain to better understand the magnitude of structures most exposed to flooding. In Prince George's County, nearly 9,000 structures, or about 4% of the total stock, are located within the FEMA floodplain.[52] Residential properties represent the greatest number of structures within the floodplain. Table 5 breaks this figure down by land use type. While 60% of properties in the floodplain are single-family homes, they cover only 16% of the total acreage. The Table also includes the extent of County-owned properties located in the FEMA floodplain; more than 500 of the properties located in the floodplain are County-owned. Table 6 lists critical infrastructure located in the floodplain.

Table 5. Number and types of buildings located in the current FEMA floodplain (M-NCPPC, GIS Data Catalog).

Land Use Type[53]	# of Properties	% Properties	Acres	% Acreage
Residential (Single Family)	5,419	60.4%	9,930.5	16.4%
Residential (Multi-Family)	125	1.4%	1,026.5	1.7%
Residential (Townhouse)	345	3.8%	464.8	0.8%
Residential (Attached)	866	9.7%	84.3	0.1%
Transportation and Utilities	290	3.2%	4,737.5	7.8%

[51] Joyce J. and Scott M. (2005). An Assessment of Maryland's Vulnerability to Flood Damage. https://www.researchgate.net/publication/237388828_An_Assessment_Of_Maryland's_Vulnerability_To_Flood_Damage

[52] Data is included for FEMA floodplains as currently defined at publication. FEMA floodplain maps currently only account for historical conditions and have not been updated to reflect climate change projections. Floodplain designations are therefore subject to modification and expansion. County should coordinate and reassess periodically.

[53] Database last updated in April 2018.

Commercial (including Offices)	455	5.1%	3,131.6	5.2%
Industrial	409	4.6%	1,632.7	2.7%
Institutional (including Churches)	690	7.7%	19,706.6	32.5%
Other[54]	375	4.2%	19,844.9	32.8%
TOTAL	**8,974**		**60,559.5**	
County-Owned Properties	**535**	**6%**	**7,270**	**12%**

Table 6. Critical infrastructure and buildings located in the current FEMA floodplain (Planning Department).

Infrastructure Type	Total Structures	Within Floodplain
Hospitals	9	0
Day Care Centers	1144	16
Schools	377	2
Fire Stations	97	4
Police Stations	10	0
Libraries	44	1
Senior Housing	65	0
Senior Activity Center	6	1
Recreation Center / Community Center	66	11
Historic Sites	544	39
Rail Transit Stops (Existing and Proposed)	31	0
TOTAL	**2393**	**74**

Prince George's County is currently working with FEMA and the Maryland Department of the Environment to update flood hazard mapping.[55] The updated floodplains are expected to cover a greater area within the County, therefore containing additional properties and critical infrastructure than accounted for in this analysis.

The number of at-risk properties is expected to increase by 4.4% over the course of the next 30 years relative to current standings, resulting in an estimated $15.8 million of annual flood damage, an 18% increase from today.[5657] The number of at-risk properties is expected to grow with the increase in amount and frequency of extreme precipitation events, in addition to expansion of the floodplain.

[54] "Other" includes: Mixed-Use and Agricultural (Natural Resources).

[55] Prince George's County (2019). Hazard Mitigation Plan Status of Mitigation Actions to Address Flood Hazards. https://www.princegeorgescountymd.gov/DocumentCenter/View/29943/510-Progress-Report_Prince-Georges_2019

[56] Flood Factor (n.d.). Flood risk is increasing for Prince George's County. https://floodfactor.com/county/prince-george's-county-maryland/24033_fsid#summary

[57] Flood Factor (n.d.). Flood risk is increasing for Prince George's County. https://floodfactor.com/county/prince-george's-county-maryland/24033_fsid#summary

Larger infrastructure such as levees, which protect more than 2,000 buildings from riverine flooding, may be overtopped or fail due to increased pressure from extreme precipitation and flooding, leading to interior (inland) flooding.[58] For high hazard dams, Prince George's County has identified a need to revisit approved dam breach analyses to account for projected precipitation increases and related increased risks to downstream communities.[59]

Risks & Impacts

As climate change intensifies and increases the frequency of inland flooding events, an increased number of assets, systems, and populations may be affected. Inland flooding can cause pose serious risk to lives and property and increase the likelihood that resiliency thresholds of vital services and systems are exceeded.

The Table below summarizes impacts to key systems and sectors in Prince George's County.

Systems/Sectors	*Impact Magnitude*	*Description*
Energy/ Utilities	Moderate	Extreme precipitation flooding may impact an increasing number of utility buildings and equipment such as power generation stations, substations, towers, or electrical transformers, and limit access to the facilities for operations and management staff. Power lines, towers, or trees may be felled, and/or equipment damaged, potentially resulting in power outages. Damage to above-ground utilities, which are more prevalent in older neighborhoods and EEA areas, may disproportionally affect vulnerable populations. Undergrounded utilities, while protected from the elements, may give false sense of security if at-risk above-ground interconnections are not addressed.
Public Health	High	Adverse health impacts associated with flooding and extreme precipitation may include disaster-related deaths (e.g., drowning) and indirect disaster-related deaths (e.g., disruption of utility or medical care services); mental health impacts before, during, and after flooding (e.g., evacuation, population displacement); exposure to mold; and possible outbreaks of water-borne diseases. In the event of a power outage, air conditioning or heating systems may stop operating for long periods of time aggravating heat- or cold-related illnesses. Inoperable elevators may prevent those with limited mobility from evacuating, and lack of lighting may result in more accidents or falls.

[58] Levees identified in descending order of priority are: Anacostia Levee Improvements, Northeast Branch - East West Highway, Northeast Branch – Bladensburg, Oxon Run - Forest Heights, Beaverdam – Landover, Paint Branch - Cherry Hill Road, Indian Creek - U.S. Route 1, Northwest Branch - East West Highway. https://www.princegeorgescountymd.gov/364/Countywide-Flood-Damage-Reduction-Strate

[59] Prince George's County Office of Emergency management (2017). Prince George's County & the City of Laurel Hazard Mitigation Plan Update. https://www.princegeorgescountymd.gov/DocumentCenter/View/29942/2017-PGC-Hazard-Mitigation-Plan-Update_ADOPTED

		In the event of downed power lines, live exposed wires can pose the life-threatening risk of electrocution.
 *Commercial/ Economy*	High	Flooding can cause substantial property damage to local businesses, lower property value, more and longer breakdowns of supply and distribution chains, increased business interruption, and limit access to commercial buildings with greater frequency. Relief and recovery efforts costs, which are already high, are expected to increase with increased severity with the increasing frequency and intensity of extreme precipitation events, negatively impacting local and regional investments in infrastructure and other development. Recurring and increasing periods of flooding may disincentivize private and public investment in disaster-prone areas, further crippling the local economy. Commuting workers may be increasingly displaced for longer periods of time if flood disrupts transportation systems, causing significant wage losses.
 *Transportation*	High	Roads and other transportation systems are expected to flood more frequently and with increased severity. More roads may be impassable and road closures may last longer. Major intersections, especially those that have flooded in the past or flood frequently, are of particular concern.[60]
 *Water Sanitation/ Supply*	Moderate	Extreme precipitation events may impact an increasing number of water / wastewater buildings and equipment (e.g., treatment plants, pumping stations) and limit access to the facilities for operations and management staff. Heavy precipitation may damage or overtax toxic waste sites, with flood waters spreading waste and effluent from brownfields or Superfund sites to surrounding areas. High water tables (i.e., the level at which soil is saturated with groundwater) and problematic soils conditions have been identified as a key concern in the County.[61] In low-lying areas and/or areas where soil is not well drained, high water tables can cause premature failure of septic systems and sewage backup.[62] Rainfall, wind, and runoff can affect the turbidity level of water in the watershed area, which can negatively impact the disinfection process of drinking water. Undersized storm drainage systems may be increasingly strained during extreme precipitation events and are a key concern in many locations. A 2020 vulnerability assessment of Duckett Dam assessed a 2065 100-yr flood and found that, while the dam itself is structurally stable, its pumping station need infrastructural upgrades to avoid disruption of potable water services.[63]

[60] Major intersections include: Rte. 50 / I-295 intersection, as well as other low-lying locations in the floodplain such as I-295 at Oxon Creek, Route 210 at Piscataway Creek, Croom Rd. (Rte. 382) at Black Swamp Creek, Full Mill Branch, Mataponi Creek (and other creek intersections), Rte. 4 / Rte. 408 at Patuxent River, Rte. 50 / Rte. 301 / N. Crain Hwy. (Rte 3) at Patuxent River, Baltimore Ave / Bladensburg Rd. / Rte. 202 at Anacostia River.

[61] See also 'Drought: Vulnerable Infrastructure" for discussion of highly problematic soils conditions.

[62] For example, in 2019, a wastewater pipe overflowed for approximately 12 hours spilling more than 5 million gallons of sewer water into Broad Creek in the Fort Washington area. https://wtop.com/prince-georges-county/2019/08/5-22-million-gallons-of-sewer-water-overflows-into-prince-georges-co-s-broad-creek/

[63] Climate Resilience and Vulnerability Assessment (CRVA) workshop findings, April 16, 2021.

B. Coastal Flooding

Located between the tidally influenced Patuxent and Potomac Rivers, Prince George's County is at risk of coastal flooding from sea level rise, storm surge, tidal flooding from high tide. The three main causes of coastal flooding are as follows:

- **Sea level rise** is the increase in global ocean levels as a result of melting sea ice and expansion of seawater as it warms**.** Sea level rise is correlated with land subsidence. In coastal areas, sinking land, known as subsidence, leads to higher sea-level, increasing the flood risk.[64]
- **Storm surge** occurs when high winds from hurricanes, tropical storms, or other coastal storms force water ashore.
- **Tidal flooding** occurs in the event of exceptionally high tides.

The global rise in sea level is largely due to sea ice melting and thermal expansion of seawater as temperatures warm. Even a small and seemingly insignificant rise in sea level can pose serious threats by contributing to storm surge and high tides and making rare flood events more common. Figure 19 maps projected sea level rise in Prince George's County.[65] The southern areas along the two rivers, such as Fort Washington, Aquasco, and Eagle Harbor, are anticipated to be most impacted by sea level rise and coastal flooding. Full-length maps are available in Appendix D.

Climate Projection: Coastal Flooding

Increasing Sea Level Rise

As global temperatures rise, sea ice is melting at unprecedented rates, contributing to a global rise in sea level. Over 65% of coastal floods in the Prince George's County area have occurred as a result of climate change-driven sea level rise. That is, from 1950 to 2016, a tide station at the U.S. Naval Academy recorded 915 days that have exceeded local National Weather Service flood thresholds, yet only 288 were not caused by climate- related sea level rise, Figure 20.

Figure 21 illustrates the projected sea level rise based on data collected from a U.S. Naval Academy water level station, 22 miles from Prince George's County.[66] Based on the National Climate Assessment "intermediate-high sea level rise scenario," sea level is expected to increase to 1.5 feet by 2040 and 2.4

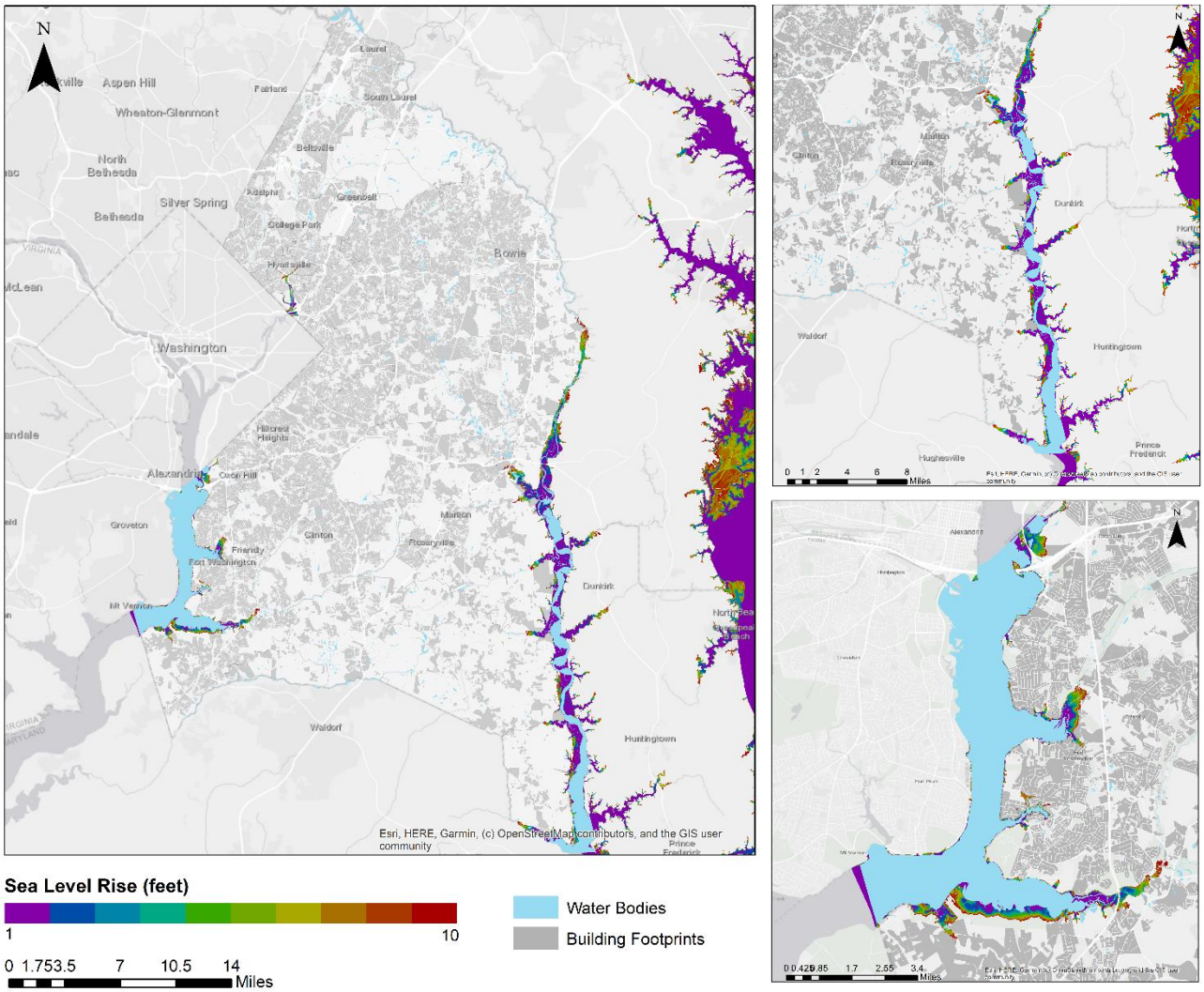
[64] https://sealevel.nasa.gov/understanding-sea-level/regional-sea-level/subsidence

[65] Department of Commerce (DOC), National Oceanic and Atmospheric Administration (NOAA), National Ocean Service (NOS), Office for Coastal Management (OCM) 2017 Charleston, SC NOAA's Ocean Service, Office for Coastal Management (OCM) https://coast.noaa.gov/slrdata

[66] Analysis uses median local sea level projections based on the intermediate high scenario from NOAA Technical Report NOS CO-OPS 083 (2017), intended for the 2018 U.S. National Climate Assessment. Sea level rise is relative to a 1992 baseline.

feet by 2060, relative to a 1992 baseline, and by over 4.5 feet by the end of this century, significantly increasing the risk and impacts of coastal flooding.[67]

Figure 19. Projected sea level rise in Prince George's County (Left), near the Patuxent River (Top, Right), and near the Potomac River (Bottom, Right). (NOAA).



[67] Surging Seas Climate Central (2016). Coastal Risks for Prince George's County, MD. https://riskfinder.climatecentral.org/county/prince-georges-county.md.us?comparisonType=county&forecastType=NOAA2017_int_p50&impact=Land&impactGroup=Land&level=6&unit=ft&zillowPlaceType=postal-code

Figure 20. Coastal flood days in Prince George's County Area. Data pulled from a U.S. Naval Academy water level station, 22 miles from Prince George's County. (Climate Central Risk Finder).

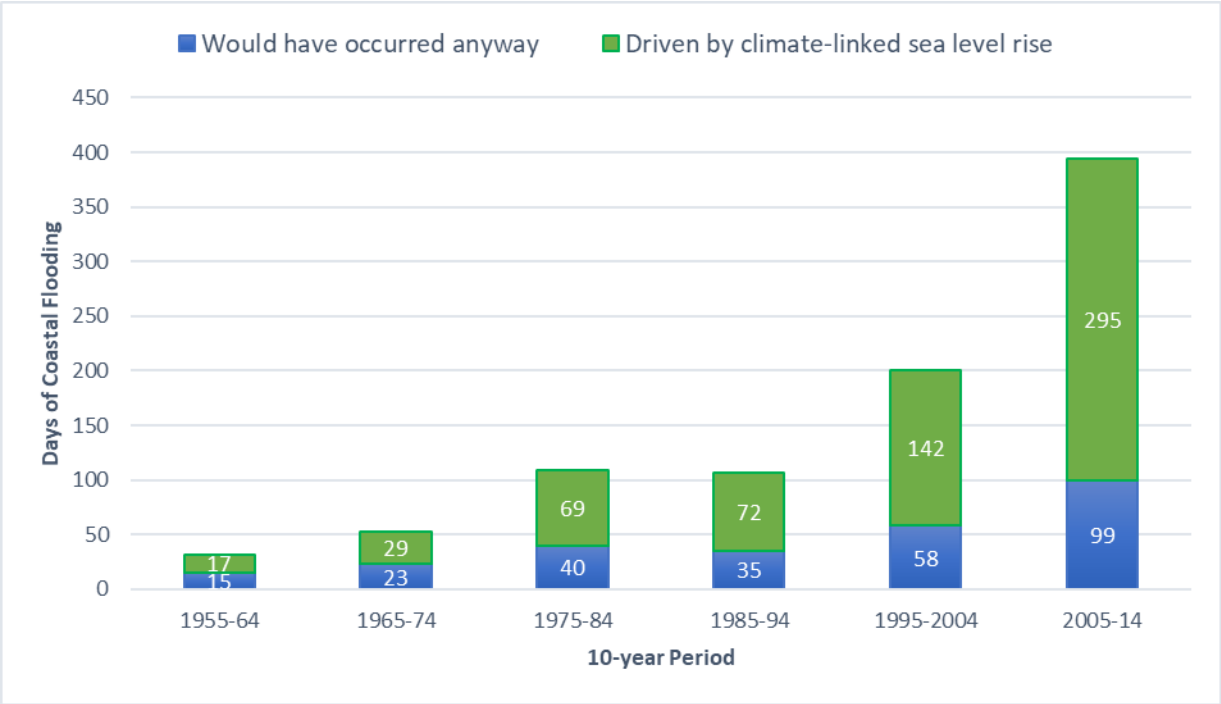
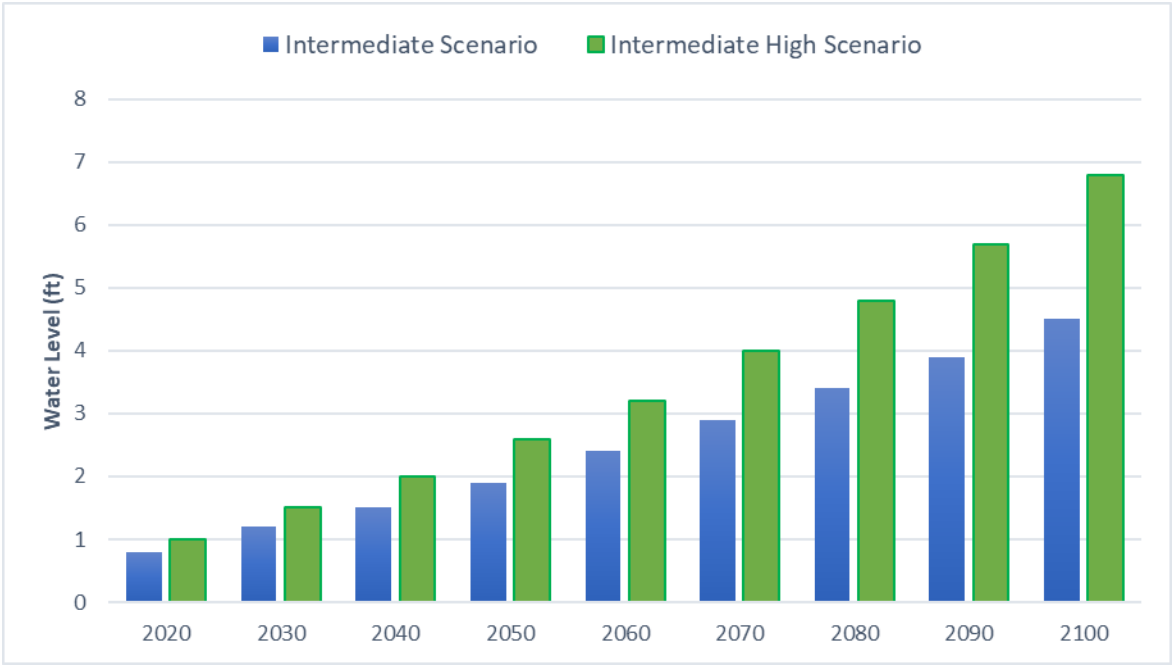


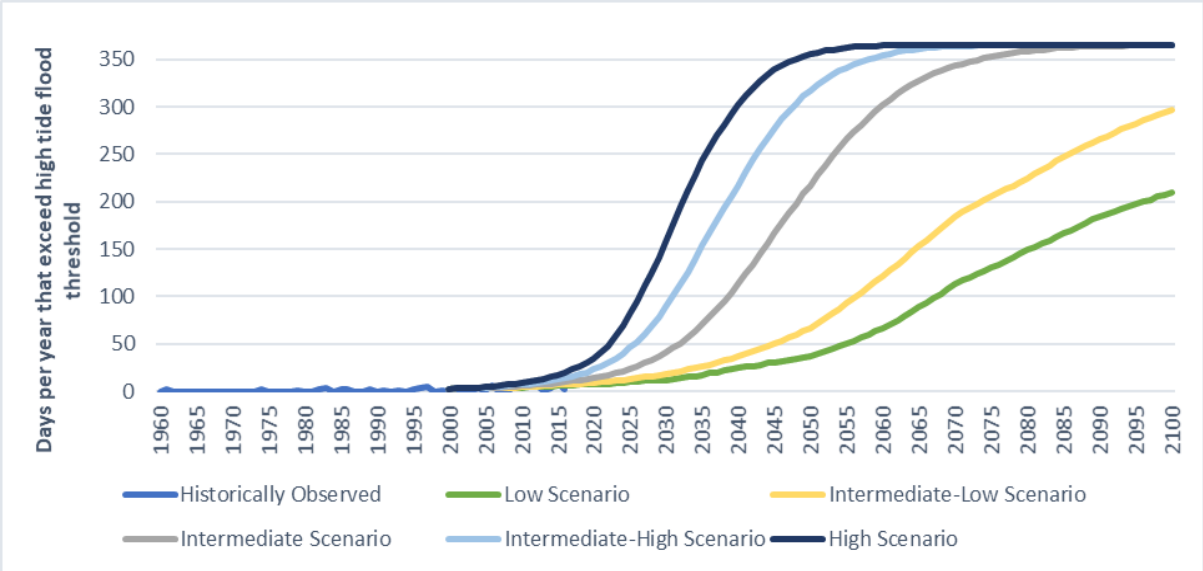
Figure 21. Projected Sea Level Rise in the Prince George's County area (Climate Central Risk Finder).



Increasing High Tide Flooding Days

One of the most considerable climatic changes projected in the coming decades is regarding high tide flooding days. From 1980 to 2016, Prince George's County area saw an average of 2 days of high tide flooding per year. This is projected to increase significantly by the end of the century. Even under a "Low Emission Scenario", the annual days per year with high tide flooding is projected to increase to roughly 25 days by 2040 and 67 days by 2060, as seen in Figure 22.

Figure 22. Projection of High Tide Flooding in Prince George's County Area. (Sweet, W.V., G. Dusek, J. Obeysekera, J.)



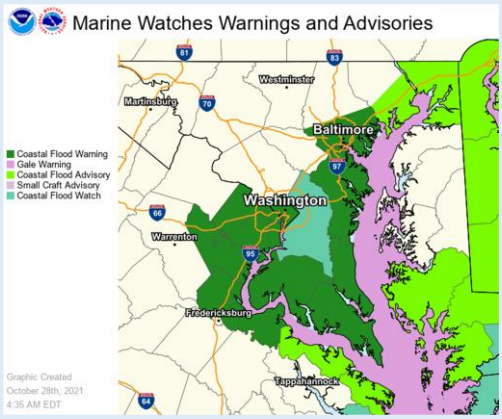
Past Impacts

While not as common as inland flooding, coastal flooding typically occurs as a result of tidal flooding from large storms. Neighborhoods along the tidally influenced rivers, like Fort Washington, have been identified as particular areas of concern.

COASTAL FLOODING HIGHLIGHT

At time of writing, Prince George's County is under a Coastal Flood Watch and is preparing to experience potentially the largest tidal flooding event since Hurricane Isabel in 2003. Areas along the Potomac River are most at risk, with low-lying coastal areas expected to experience 2-4 feet of tidal inundation.

Figure 23. Marine Watches, Warnings, and Advisories (WTOP/NWS Baltimore-Washington)



Vulnerability

Coastal flood vulnerability is influenced by a number of factors, such as proximity to the rivers, land use type, severity of coastal storms, land elevation, among others.

Vulnerable Populations

Exposure
Residents living near riverbanks or projected storm surge areas are more exposed to coastal or tidally influenced flooding and are therefore more vulnerable.
Sensitivity
Sensitive populations include residents who may require special assistance to evacuate or relocate, such as those with mobility impairments, physical or cognitive disabilities, or those dependent on caretakers.
Adaptive Capacity
Adaptive capacity heavily influences an individual or community's vulnerability to flooding. For example, a well-socially connected community is a more resilient community as residents are in closer contact and therefore better able to assist one another evacuate or check in on vulnerable neighbors. Additionally, income status plays a significant role in an individual's ability to protect and recover from flooding. Lower-income residents are more likely to lack the financial means to pre-emptively retrofit (e.g., elevate, floodproof) their homes to reduce damage and/or repair their properties in the event of significant damage.

Vulnerable Infrastructure

Buildings and infrastructure near the tidally influenced rivers are at risk of coastal flooding, sea level rise, and storm surge. Sea level rise can lead to permanent inundation of certain areas, forcing existing structures to either relocate, permanently close, or undergo stringent flood protection measures. Storm surge elevations can be much higher than pluvial and fluvial flooding, and thus have more extensive impact on buildings, infrastructure, and other assets.

Table 7 outlines how much land, buildings, and roads are exposed to potential flooding or permanent submergence within areas of the County expected to be impacted by 1, 2, and 3 feet of sea level rise. Again, the projected sea level rise by 2040 is 1.5 feet and 2.4 feet by 2060. The values listed exclude areas potentially protected by levees and other features.

Table 7. Total land, homes, property value, and roads at risk by increments of sea level rise (Climate Central Risk Finder).[68]

	1 foot	2 feet	3 feet
Total land	1 sq. miles	2 sq. miles	2 sq. miles
Homes	27	38	53
Property value (homes)	$34 million	$49 million	$67 million
Roads	173 miles	434 miles	726 miles

Larger infrastructure such as levees, which protect more than 2,000 buildings from riverine flooding, may be overtopped or fail due to increased pressure from extreme precipitation and flooding, leading in turn to interior (inland) flooding. For high hazard dams[69], Prince George's County has identified a need to revisit approved dam breach analyses to account for precipitation increase and related increased risks to downstream communities.

The effects of sea level rise and the risks associated with higher tides and stronger storm surges have also been exacerbated by the ongoing deterioration of the natural watershed environment through urbanization and development. In the Patuxent watershed, for example, where the population has doubled, urban land use increased by 11% between 2000 and 2010 with a similar rate of increase for impervious surfaces.[70] Assuming similar trends persist, the County's resilience to coastal flooding events will continue to be negatively impacted as existing natural buffers and green infrastructure are overburdened due to increased development along the rivers. This will expose more vulnerable populations and key assets that are inadequately protected by County infrastructure that cannot keep up with the regularity and intensification of flood conditions.

Risks & Impacts

As climate change results in rising sea level, stronger storm surge, and more high tide flooding days, coastal flooding can impact an increasing number of assets, systems, and populations. Coastal flooding

[68] Data sources include: US Census Bureau 2010, LIDAR elevation data, raw homes and property value data, and Neumann et al. (2011). The economics of adaptation along developed coastlines. http://onlinelibrary.wiley.com/doi/10.1002/wcc.90/abstract

[69] Prince George's County (2017). Hazard Mitigation Plan

[70] The Patuxent River, Maryland (2015). http://www.paxcon.org/uploads/5/7/6/6/5766937/pax_white_paper_final_-_basic.pdf

can pose serious risk to lives and property and increase the likelihood that resiliency thresholds of vital services and systems are exceeded.

The Table below summarizes impacts to key systems and sectors in Prince George's County.

Systems/Sectors	*Impact Magnitude*	*Description*
Energy/ Utilities	Moderate	Coastal flooding may impact increasing numbers of utility buildings and equipment such as power generation stations, substations, towers, or electrical transformers, and limit access to the facilities for operations and management staff with increased frequency and intensity of tidal flooding events and sea level rise. Power lines, towers, or trees may be felled, and/or equipment damaged, resulting in power outages. Damage to above-ground utilities, which are more prevalent in older neighborhoods and EEA areas, may disproportionally affect vulnerable populations. Undergrounded utilities, while protected from the elements, may give false sense of security if at-risk above-ground interconnections are not addressed.
Public Health	Moderate	Adverse health impacts associated with coastal flooding may include disaster-related deaths (e.g., drowning) and indirect disaster-related deaths (e.g., disruption of utility or medical care services); mental health impacts before, during, and after flooding (e.g., evacuation, population displacement); exposure to mold; and possible outbreaks of water-borne diseases. In the event of a power outage, air conditioning or heating systems may stop operating for long periods of time aggravating heat- or cold-related illnesses. Inoperable elevators may prevent those with limited mobility from evacuating, and lack of lighting may result in more accidents or falls. In the event of downed power lines, live exposed wires can pose the life-threatening risk of electrocution.
Commercial/ Economy	Moderate	Coastal flooding can cause substantial property damage to local businesses, lower property value, more and longer breakdowns of supply and distribution chains, increased business interruption, and limit access to commercial buildings with greater frequency. Increasing relief and recovery efforts costs negatively impact local and regional investments in infrastructure and other development. Recurring and increasing periods of tidally influenced flooding or permanent inundation from sea level rise disincentivizes private and public investment in disaster-prone areas, further crippling the local economy. Marina traffic (i.e., arrivals / departures) and fishing may be similarly negatively impacted.
Transportation	Moderate	Roads and other transportation systems near tidally influenced areas may be expected to flood more frequently and with increased severity. More roads may be impassable and road closures may last longer. Transportation infrastructure adjacent to rivers will need to consider short-term impacts and long-term shifting of shoreline/banks (e.g., bridge abutments).
Water Sanitation/ Supply	Moderate	Coastal flooding may impact increasing numbers of water / wastewater infrastructure (e.g., waterlines) alongside riverbanks. Undersized storm drainage systems may be increasingly strained during coastal flooding events and are a key concern in many locations.

E. More Severe Storms

Large storms are becoming energized by warmer temperatures and more moisture in the atmosphere. These storms are often characterized by high-speed wind gusts and accompanied by other potentially dangerous conditions, such as lightning and heavy rains that can lead to flooding and power outages.[71] Severe wind events can generate prolonged periods of dangerous conditions, placing lives and property at-risk and impacting the local economy.

This section outlines the climate projections, vulnerabilities, and risks and impacts of severe storms.

A. Severe Storms

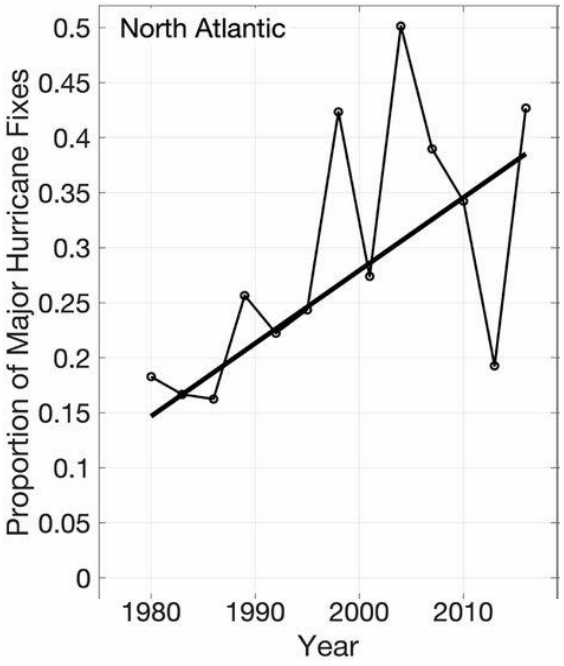
Severe storms, such as hurricanes, tropical storms, and derechos, are often characterized by high-speed wind gusts and often accompanied by other potentially dangerous conditions, such as lightning and heavy rains that can lead to flooding.[72]

Climate Projection: Severe Storms

In addition to global temperature increase, climate change also causes more moisture in the atmosphere and warmer ocean temperatures. These conditions create the perfect breeding ground for hurricanes and tropical storms, and as a result, Atlantic hurricanes are notably intensifying. As seen in Figure 24, the percent of Atlantic hurricanes categorized as major storms, Category 3 hurricane or greater, has increased by nearly 50% since 1980.[73] The "Proportion of Major Hurricane Fixes" indicates the proportion of tropical cyclones that hit "major" status in a given year (e.g., in 2010, roughly 35% of tropical storms were categorized as major hurricanes).

According to the Prince George's County Hazard Mitigation Plan, severe thunderstorms occur every 5-6 years and hurricanes occur in the County approximately once a decade.

Figure 24. Percent of North Atlantic Hurricanes as major storms. (Kossin et al. 2020).



[71] National Oceanic and Atmospheric Administration, U.S. Department of Commerce (2016). Severe Storms. https://www.noaa.gov/explainers/severe-storms

[72] National Oceanic and Atmospheric Administration, U.S. Department of Commerce (2016). Severe Storms. https://www.noaa.gov/explainers/severe-storms

[73] Kossin, et al. (2020). Global increase in major tropical cyclone exceedance probability over the past four decades. https://www.pnas.org/content/117/22/11975

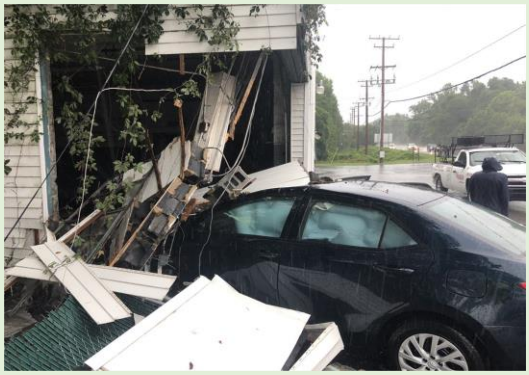
Past Impacts

While a major hurricane (category 3 or higher) has never directly hit the County,[74] significant storm effects from Atlantic hurricanes are felt virtually every year. Hurricane-force winds and heavy rains can lead to significant storm surge and extensive flooding. For example, in 2003, a category 5 hurricane that made landfall in North Carolina left 5,000 tons of debris in the County, closed 3 roads, left 200,000 County residents without power, and resulted in nearly $4 billion in damages.[75] [76] The power outage also caused 96 million gallons of hazardous untreated sewage from two separate facilities to mix with stormwater to overflow into Western Branch and Broad Creek, prompting the Washington Suburban Sanitary Commission (WSSC) to install generators.[77]

STRONG WINDS HIGHLIGHT

In the summer of 2020, Prince George's County was hit with heavy rainfall and strong winds from Tropical Storm Isaias. In all, the storm caused more than 1,000 power outages in the County. The storm caused flooding on the Upper Marlboro Pike, with the Interstate 95 corridor feeling the heaviest downpours. Dangerous driving conditions during and after the storm also persisted, with heavy rains making roads slick and high winds disrupting power lines and littering the roadways with debris.

Figure 25. Property damage resulting from Tropical Storm Isaias. (Prince George's County Fire/EMS Department Twitter).



[74] Since recordkeeping began in 1851.

[75] NOAA Satellite and Information Service (2003). Event Record Details. https://web.archive.org/web/20110520010055/http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~ShowEvent~499561

[76] Prince George's County Office of Emergency management (2017). Prince George's County & the City of Laurel Hazard Mitigation Plan Update. https://www.princegeorgescountymd.gov/DocumentCenter/View/29942/2017-PGC-Hazard-Mitigation-Plan-Update_ADOPTED

[77] Wilcock, D. (2003). WSSC to Install Generators After Huge Sewage Overflows in Prince George's. https://web.archive.org/web/20060901122111/http://www.journalism.umd.edu/cns/wire/2003-editions/12-December-editions/031222-Monday/PGPollution_CNS-UMCP.html

Vulnerability

Severe storms pose significant threats to residents, homes, businesses, and critical infrastructure and facilities. Vital community services can be interrupted as a result of high winds causing a power outage in a critical facility or limiting transportation access.

The following sections elaborate on populations and infrastructure vulnerable to extreme winter in Prince George's County.

Vulnerable Populations

Exposure
Due to the expansive nature of major windstorm events, large swaths of the County will feel strong impacts even without being on the direct path of exposure. Individuals and communities along high storm surge areas may be more exposed to subsequent flooding consequences.
Sensitivity
Sensitive populations include residents who may require special assistance to evacuate or relocate, such as those with mobility impairments, physical or cognitive disabilities, or those dependent on caretakers.
Adaptive Capacity
Adaptive capacity heavily influences an individual or community's vulnerability to severe storms. For example, a well-socially connected community is a more resilient community as residents are in closer contact and therefore better able to assist one another evacuate or check in on vulnerable neighbors. Economic conditions play a significant role in an individual's ability to protect and recover from major storms and subsequent flooding. Lower-income residents, such as those residing in EEAs, are less likely to have resources to fortify their homes to withstand strong winds, cover the cost of damage following the event, and/or evacuate prior to the event. Similarly, residents living in substandard housing conditions are at greater risk of damage, such as roof collapse or indoor flooding.

Vulnerable Infrastructure

Severe wind events can cause significant harm to homes, businesses, and critical infrastructure and facilities. Damage can occur as a result of flooding and/or from flying or fallen debris, like downed trees or power lines. Above-ground utilities and telecommunication lines across the County at risk of being knocked over by strong winds or by fallen trees, which can result in power outages and service disruptions.

Risks & Impacts

With climate change triggering more frequent and intense wind events, more assets, systems, and populations are expected to be adversely affected. Individuals and communities can be impacted by these storms through loss of life, loss of access, property damage, and through disruptions of vital community services, in addition to indirect impacts like flooding.

The Table below summarizes impacts to key systems and sectors in Prince George's County.

Systems/Sectors	*Impact Magnitude*	*Description*
 *Energy/ Utilities*	High	Severe wind and storm events may impact a greater extent of utility buildings and equipment such as power generation stations, substations, towers, or electrical transformers, and limit access to the facilities for operations and management staff. Power lines, towers, or trees may be felled, and/or equipment damaged, by flying debris, resulting in power outages. Damage to above-ground utilities, which are more prevalent in older neighborhoods and EEA areas, may disproportionally affect vulnerable populations. Undergrounded utilities, while protected from the elements, may give false sense of security if above-ground interconnections are not addressed.
 *Public Health*	High	The impacts of severe windstorms on public health and well-being will worsen with increasingly dangerous storms. Direct storm-related deaths (e.g., drowning) and indirect health impacts (e.g., disruption of medical care services, mental health stress from evacuation or displacement, mold exposure, etc.). In the event of a power outage, air conditioning or heating systems may stop operating for long periods of time aggravating heat- or cold-related illnesses. Inoperable elevators may prevent those with limited mobility from evacuating, and lack of lighting may result in more accidents or falls. In the event of downed power lines, live exposed wires can pose the life-threatening risk of electrocution.
 *Commercial/ Economy*	High	The compounding impact of high winds and severe storms can limit the movement of people and goods. Power outages and possible debris from high wind can disrupt business operations, and even force some businesses to permanently shut down. Additionally, these businesses may be the places that provide necessary supplies or resources to those impacted by the storm.
 *Transportation*	Moderate	Flying debris impact can damage railways, block roads, and contribute to flooding on roads. With an increasing number of severe storms, road blockage, flooding, and disaster relief costs are expected to increase. High winds can impact air travel, delaying flight schedules impacting those within and outside of the region.
 *Water Sanitation/ Supply*	Moderate	Hurricanes and other strong storms can have disastrous impacts on water sanitation and supply, even when the County is not on the storm's direct path. For example, Hurricane Sandy in 2012 dropped more than 80 million gallons of sewage into Maryland and resulted in combined sewage overflows.[78] When coupled with extreme precipitation, an increasing number of water / wastewater buildings and equipment (treatment plants, pumping stations) may be impacted. See Inland Flooding & Extreme Precipitation Section.

[78] Climate Central (2013). Sewage Overflows from Hurricane Sandy. https://www.climatecentral.org/pdfs/Sewage.pdf

III. Next Steps

Climate risk and vulnerability is a dynamic field with new data being collected, reports being released, and a variety of tools and data sets being launch every year. This CRVA is the first for Prince George's County, and represents an initial analysis of the climate risks and vulnerabilities at a higher level. Future iterations should develop local downscaled climate projections to assess the County's critical infrastructure against. Collaboration with other Departments and partners (e.g., Pepco, WSSC, etc.) will be needed to obtain necessary the data to conduct a more thorough impact modelling and analysis of the critical facilities and infrastructure vulnerable to the various hazards. Future iterations may also focus on a small number of neighborhoods to assess vulnerability and risk at a more localized scale.

Appendix A. Social Vulnerability in Prince George's County

Climate change does not impact all residents and communities equally. Studies have demonstrated that racial and ethnic minorities and lower income households are disproportionately at risk and vulnerable to the impacts of climate change.[79] These groups tend to be more sensitive (e.g., as a result of historical and structural patterns of inequity, marginalization, and discrimination) and/or have lower adaptive capacity (e.g., lack the disposable income to take measures to fortify home against climate change, such as flood retrofitting or owning a generator). As a result, these populations are more socially vulnerable and less able to anticipate, withstand, cope with, and recover from climate hazards.

The Center for Disease Control and Prevention (CDC) Agency for Toxic Substances and Disease Registry assesses social vulnerability using a Social Vulnerability Index based on four themes, outlined in Table 8.[80] The CDC defines social vulnerability as *"a community's capacity to prepare for and respond to the stress of hazardous events ranging from natural disasters, such as tornadoes or disease outbreaks, to human-caused threats, such as toxic chemical spills."* Prince George's social vulnerability profile is displayed in Figure 26.

Table 8. Variables included in CDC's Social Vulnerability Index.

Social Vulnerability Theme	Variables Included in Analysis
Socioeconomic Status	Poverty, Unemployed, Per Capita Income, No High School Diploma.
Household Composition/Disability	Aged 65 and Over, Aged 17 and Younger, Single-parent Household, Aged 5 and over with a Disability
Race/Ethnicity/Language	Racial Minority, English Language Ability
Housing Type/Transportation	Multi-unit, Mobile Homes, Crowding, No Vehicle, Group Quarters.

To identify neighborhoods with high social vulnerability, the National Capital Region Transportation Planning Board developed a vulnerability index that combines significant concentrations of racial minorities (i.e., African Americans, Asians, and Hispanic/Latinos) and low income (defined as household income less than one-and-a-half times the federal poverty threshold) populations. The results help to identify Equity Emphasis Areas (EEAs).[81] Prince George's County has 118 EEAs mostly concentrated near

[79] EPA (2021). Climate Change and Social Vulnerability in the United States: A Focus on Six Impacts. https://www.epa.gov/cira/social-vulnerability-report

[80] CDC Agency for Toxic Substances and Disease Registry (2020). CDC Social Vulnerability Index 2018: Prince George's County, Maryland. https://svi.cdc.gov/Documents/CountyMaps/2018/Maryland/Maryland2018_Prince%20George's.pdf

[81] National Capital Region Transportation Planning Board (2017). Methodology for Equity Emphasis Areas. http://www1.mwcog.org/clrp/performance/EJ/resources/methodology.pdf

the D.C. border, as seen in Figure 27. In one exercise of the CRVA Workshop, stakeholders were asked to identify vulnerable populations in Prince George's County. The results are listed below:
Socially vulnerable populations in Prince George's County, as identified by the Adaptation Working Group:

Demographics:

- Older adults
- Young children
- Socially isolated individuals
- Pregnant women/parents of young children
- Immigrants / Undocumented Immigrants
- Refugees / Asylum-seekers
- Returning citizens
- Non-English speakers (e.g., Mayan speakers in Langley park)

Socio-economic:

- Residents in Equity Emphasis Areas (EEAs)
- Income-limited households
- Single-headed households
- Renters
- Individuals experiencing homelessness or living in informal settlements

Health:

- Individuals with disabilities (limited mobility, hearing impaired, visually impaired, etc.)
- Individuals with chronic illnesses
- Individuals with mental health conditions
- Individuals without medical insurance

Occupational:

- Healthcare workers
- Service and manual labor workers
- Civil works employees / frontline workers

Adaptive capacity:

- Individuals without a vehicle
- Individuals without a computer, mobile phone, and/or working internet
- Individuals without home or renter's insurance

Other:

- Populations at the intersections of hazards
- Civil works employees / frontline workers
- Residents in rural areas
- Commuters

Figure 26. CDC Social Vulnerability Index, summarized by (in clockwise order) socioeconomic status, household composition/disability, race/ethnicity/language, and housing type/transportation.

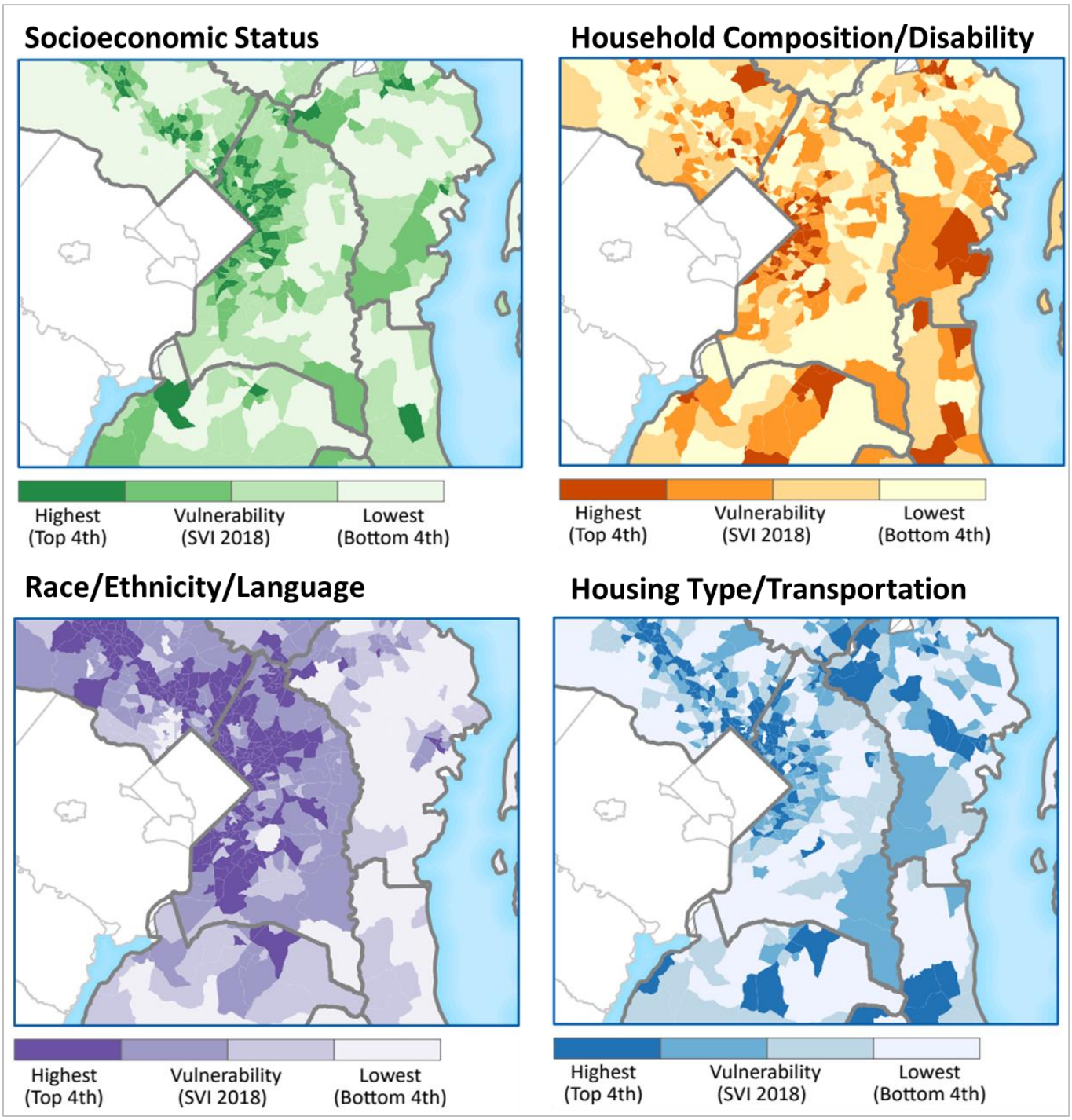
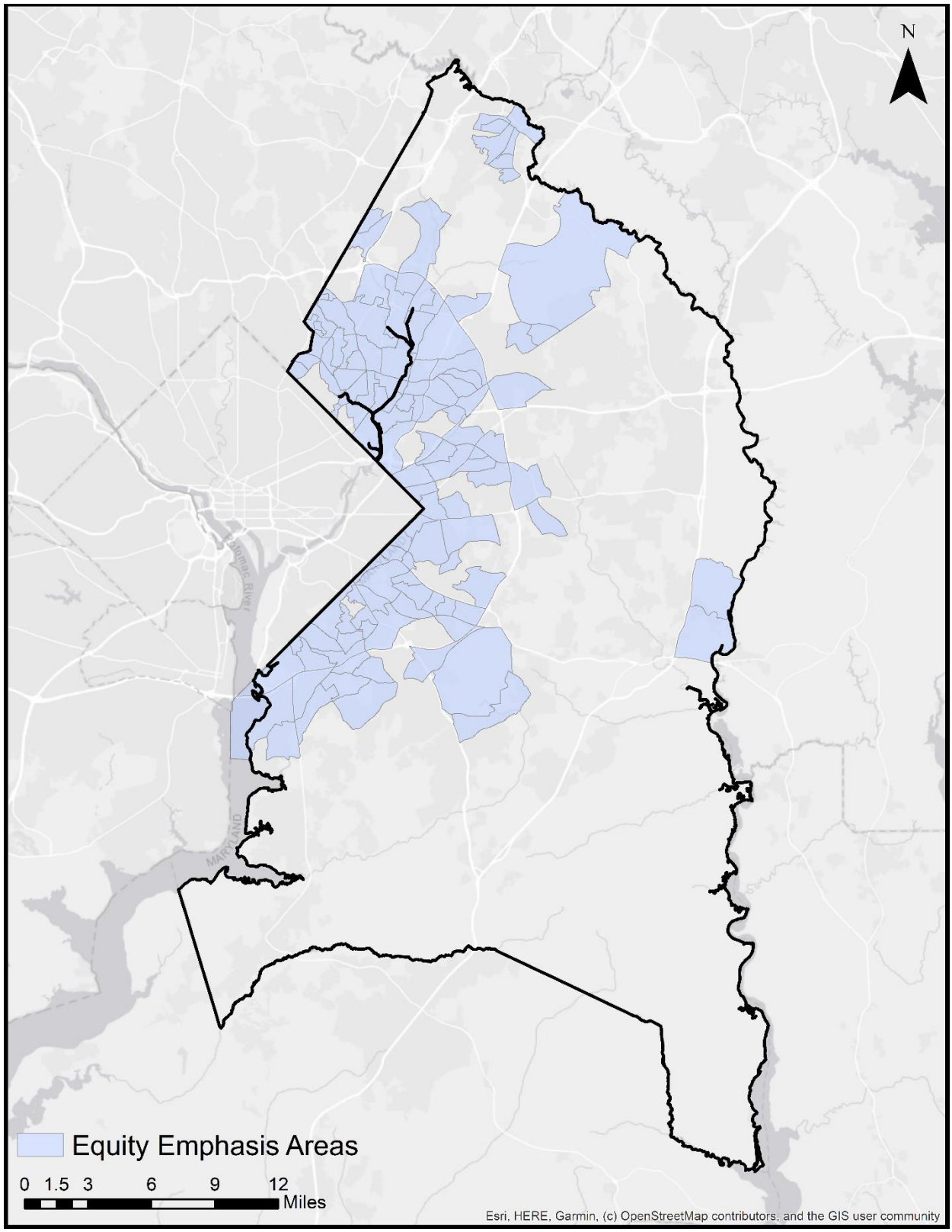


Figure 27. Equity Emphasis Areas in Prince George's County.



Appendix B. CRVA Workshop Summary

Prince George's County held a 2-part Climate Resiliency & Vulnerability Workshop in April 2021 to convene key stakeholders that own, manage, or operate infrastructure and public services. This included representatives from Washington Gas, Pepco, Joint Base Andrews, US Army Corps of Engineers, MWCOG, Water and Wastewater Services, Public Health, Department of Environment, and more. The goals of the workshop included to:

- Inform the draft Climate Risk and Vulnerability Assessment report
- Present and ground-truth preliminary CRVA report findings
- Add new insight from stakeholders who own and operate key vulnerable infrastructure assets and systems and interact with at-risk populations.
- Develop a common understanding of climate vulnerabilities and risks.
- Identify both vulnerabilities and strengths of assets, systems, and populations within the County.
- Transition from climate vulnerabilities to identifying strengths and opportunities for increasing resilience and adaptive capacity through Actions.

The following summarizes specific assets, systems, and populations that were discussed and captures participant insights on climate vulnerabilities and potential actions to reduce risk.

Asset/System/Population	Summary of Concerns and Potential Actions
Residential buildings in floodplain	Increasing risk for homes in floodplains, homes in urban areas with high impervious surface. Need education and outreach. Promote NFIP participation, CRS, and discounts. Consider needs of renters. Implementation to include sump pumps in basement, battery backup; keep drains/gutters clean; elevating mechanical/electrical equipment. How can County focus on certain neighborhoods or make funding available? How to disincentive development in repeat flood areas?
Commercial buildings in floodplain	Commercial buildings provide goods/services that people need in disasters; if buildings are flooded the community isn't served, can't get supplies, employees unable to work. Disruptions to these buildings result in loss of economic prosperity. If repeated flooding, will these owners leave/move to higher ground? Potential loss of tax revenue if businesses close or move. Flooded building also causes risk to the energy system. Flooding can cause indoor air quality issues. Consider grant opportunities for flood proofing, enable them to continue to be used safely. Education to help people understand insurance options. Educate owners of flood prone buildings. Offer green energy loans to commercial entities to microgrids, EVs, community solar. Expand CPACE to include resilience.

Parks and other open public space (ex. Waterfront Pk)	Parks and open space store flood waters and trees create shade & reduce heat island affect. There are opportunities to create more green space in vacant lots. Parks could provide a place for cellphone charging w/ solar and be utilized as staging areas during emergency response. Look at opportunities to create additional green space on vacant county properties and opportunities for new parks. Look at companies that sell a "multi-use station" with seating and solar charging. Increase shading at parks. Consider establishing "tree banks" in county (forested area that's preserved). Consider opportunities to host resilience hubs.
Transportation and utilities system	With electrification of transportation need to consider grid resilience. Overhead utilities more vulnerable to climate stressors, tends to be near vulnerable populations (Inner beltway, Anacostia watershed area - most utilities above ground). Even in areas with more underground utilities what's feeding them is above ground.
School system	The school system provides location for shelters during disasters and is a hub of community education related to climate action. It is vulnerable as a high concentration of young people in a location. Need further assessments. Some schools susceptible to flooding; many older buildings; HVAC systems likely not equipped for extreme heat (HVAC systems being renovated due to Covid- potential synergy to explore). Do schools have backup energy systems? There are opportunities for solar on schools and schools are doing a comprehensive energy program.
Public Safety Facility (new building housing fire, police & HHS)	Building is home to critical services; emergency vehicles need to be able to get in/out
Libraries	Similar to schools in many ways (hub for community and education, older buildings); reliability of service during storms & high wind events- libraries provide a central point for people to access the internet; great opportunity for resiliency hubs
Senior Activity Center in floodplain	Vulnerability/priority may depend on the climate hazard and main function of the center. Should assess HVAC capability, assess natural/env protections (trees, GI), impervious surfaces, energy resilience, renewable energy potential. Need funds to support building retrofit, rebate program. Short term action (<3 years) - developing list of where property owners can access resources for building improvements/retrofits, federal funding, etc. Mid-term action (<3 years) - assess HVAC system, assess building standards/zoning ordinances. Create resiliency checklist for building owners, plan for mitigating climate impacts tied to climate projections (state vs federal projections).
Historic Sites in floodplain (ex. Adelphi Mill)	Most vulnerable because built prior to floodplain regs. There are stringent rules around modification. Must recognize cultural value to the community and some provide rental space for community events.
Duckett Dam	Did a vulnerability assessment last year; Considered 2065 100y flood and found dam is ok but pumping station needs hardening/upgrade. Disruption to the pumping station would create lack of potable water. Do we have adequate backup energy (looking at potential microgrid)?

High hazard dams	Is there a need to revisit approved dam breach analysis to account for precipitation increase? Will risks to downstream communities increase due to this increase?
Levees - Flood Control Structures	Levees provide protect 2,000+ buildings from riverine flooding but these structures also cause interior flooding. Will areas behind levees be inundated more frequently due to climate change?
Wastewater Treatment System	Wastewater Treatment facilities can be impacted by heat, flooding, and drought. A climate resiliency study was completed for 3 wastewater treatment facilities. There is a need for back-up power at 2 WWTPs.
Water Treatment Facilities (drinking water)	Need to ensure community has potable water during droughts. There have been assessments of drought reliability but should ensure these include current climate projections.
Utilities (above ground)	Communities are at risk for frequent and extended power outages and communication interruptions due to severe storm events; older communities are particularly at risk
Problematic soils conditions	These soils have a high shrink/swell (movement) and deformation/slip (failure) properties making them unstable for buildings, and other structures, as they may crack and compromise foundations leading to structural instability
Storm drains	Lack of storm drain capacity to capture and convey stormwater runoff. Storm drain sized 50 years ago, cannot handle today's volume, senior citizen centers and others can inundate vulnerable facilities/areas (upgrade these structures first). Reevaluate standards (short term), prioritize implementation near vulnerable facilities and highly impervious. Use smart tech to monitor storm drains (UMD). Need education. Incorporate NOAA Atlas updates into design criteria. Regularly evaluating/updating climate projections (e.g., 3-5 years), conduct infrastructure/ needs assessment, evaluate outcomes. Retrofits are extremely costly and difficult to reach in <8 years. Determine community expectations and priorities: what level of resiliency is needed. Need additional technical support and guidance.
Green infrastructure	Green infrastructure (GI) is an important community strength that both supports heat mitigation and stormwater retention. The Green Infrastructure Plan for 2035 contains actions to enhance resiliency through GI. Efforts are underway to study precipitation estimates and update Atlas 14. Need to evaluate statutes and develop comprehensive approach to manage quantity of water. Need integrated stormwater management in urban areas. Support urban forestry programs to maximize canopy in vulnerable communities. Win-win strategy to employ residents and reduce urban heat. Green Area Ratio in DC is good model for GI in urban areas. Should preserve existing tree canopy and expand GI in areas with high development pressure. Challenge of trees and overhead utility lines and a need to find balance. Need to consider equity concerns.
Grocery stores	Grocery stores are an important aspect of resiliency. If given a shelter in place order, grocery stores must remain open to ensure community is able to shelter in place.

Resiliency hubs	Resiliency hubs are community strengths; must be well equipped with back-up power generation.
Vulnerable populations	Know that some members of the community are more at risk of social & economic challenges; hit harder by disaster; may have older housing; worse HVAC; more susceptible to extreme heat events. There is a need for social cohesion network (e.g., neighbors taking care of neighbors, like NYC's Be-A-Buddy system). Examine the human capital that can be mobilized during emergencies and traditional modes of outreach. Ensure health as a key criterion is baked into other actions. Data monitoring & evaluation should be incorporated to measure impact of climate change in specific vulnerable communities. Likely a proposed action of CAP: how to measure vulnerable populations. Invest in risk communication and communication during emergencies. Need to involve civic groups to activate communication channels. Continue work to make materials available in more languages; reach with workshops; get their insights about what is needed. Across all categories assess condition of evacuation plans, plans for outages, understand special considerations. Review emergency response plans with equity lens.
Immigrants, non-English speakers, refugees, or undocumented immigrants	This population has many compounding variable (low income, underlying health conditions, communication barriers). Lack of transportation, lack of trust in government. Won't get information they need in emergency. Will be more impacted by disaster. Population has housing challenges. Many live in urbanized areas of county. May be predisposed to climate risks including heat and flooding. Access whether current cooling centers those are sufficient. Consider how to improve green infrastructure and increase shading. Expand opportunities for renewable energy and address inadequate HVAC in older buildings. Prioritize stormwater improvements in urbanized communities. Ports Town areas home to many immigrant families and to levee systems. Sept 2020 have opportunities to upgrade pumping stations in levee systems to have more capacity and convey flood waters. Standing water=communicable disease. Consider education related to water quality post-flood.

Appendix C. Summary of Vulnerable Assets

The Table below lists specific vulnerable assets identified and discussed during the April CRVA workshop. Assets include a range of public service buildings that are located in the floodplain, Equity Emphasis Areas, and/or a high-heat census tract.[82] These assets are mapped in Figure 28.

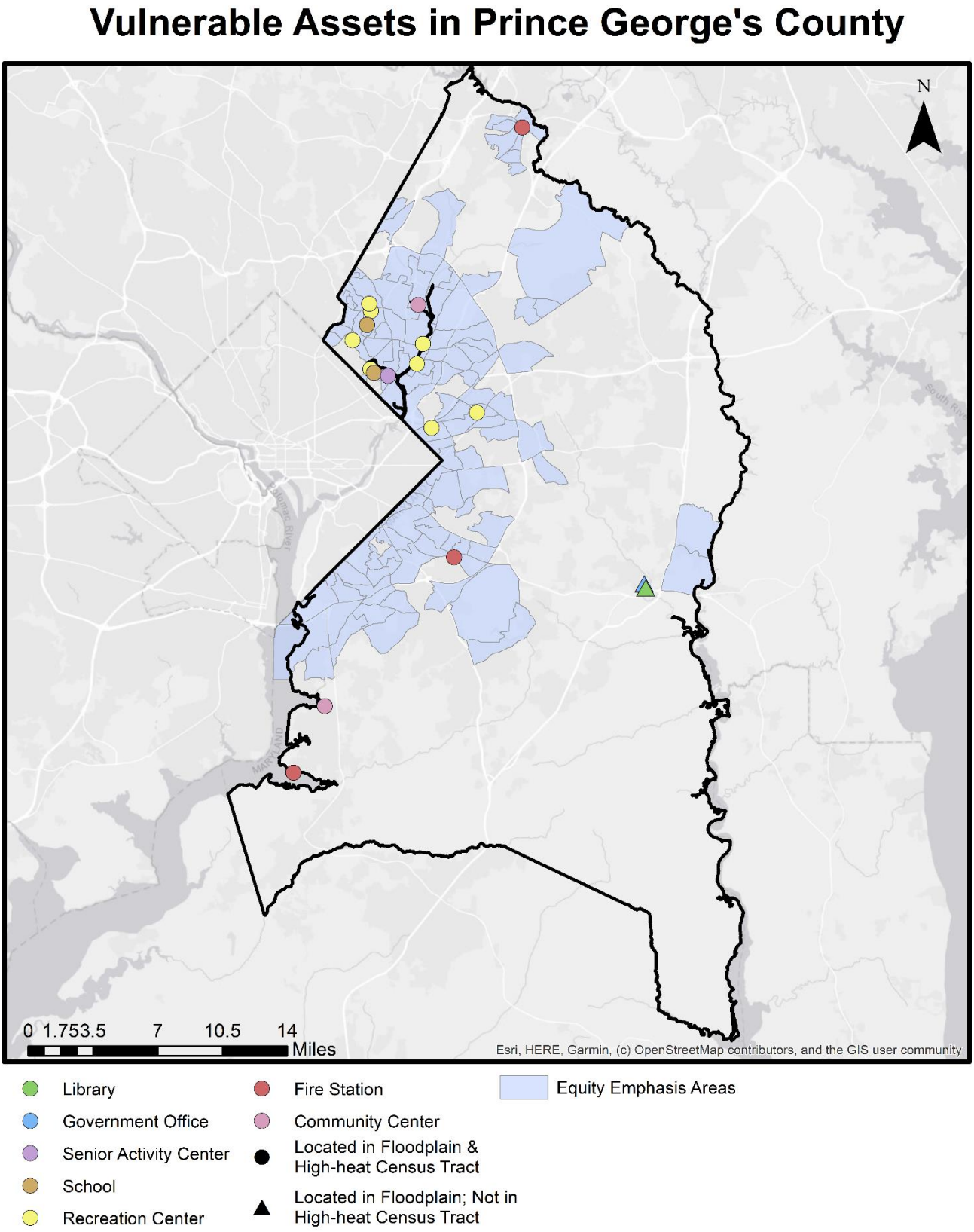
Table 9. Select Vulnerable Assets in Prince George's County

Type	Name	Location	In FEMA floodplain?	In Equity Emphasis Area?	In high-heat census tract?
Fire Station	Morningside	Morningside	Y	Y	Y
Fire Station	Laurel Rescue Squad	Laurel	Y	Y	Y
Fire Station	Marine Rescue 857	Fort Washington	Y	N	Y
Library	Circuit Court Law Library	Upper Marlborough	Y	N	N
Senior Activity Center	Gwendolyn Britt Senior Activity Center	Brentwood	Y	Y	Y
Community Center	Harmony Hall Community Center	Fort Washington	Y	N	Y
Community Center	College Park Community Center	College Park	Y	Y	Y
Community Center	North Brentwood Community Center	Brentwood	Y	Y	Y
School	Thomas S. Stone Elementary School	Mount Rainier	Y	N	Y
School	Lewisdale Elementary School	Hyattsville	Y	Y	Y
Recreation Center	Jesse J. Warr, Jr. Neighborhood Recreation Center	Fairmont Heights	Y	Y	Y
Recreation Center	Kentland Neighborhood Recreation Center	Kentland	Y	Y	Y

[82] Based on whether census tract had greater than 30 average annual heat days (i.e., days above 90 degrees Fahrenheit), 2006 – 2016. Data from CDC National Environmental Public Health Tracking Network.

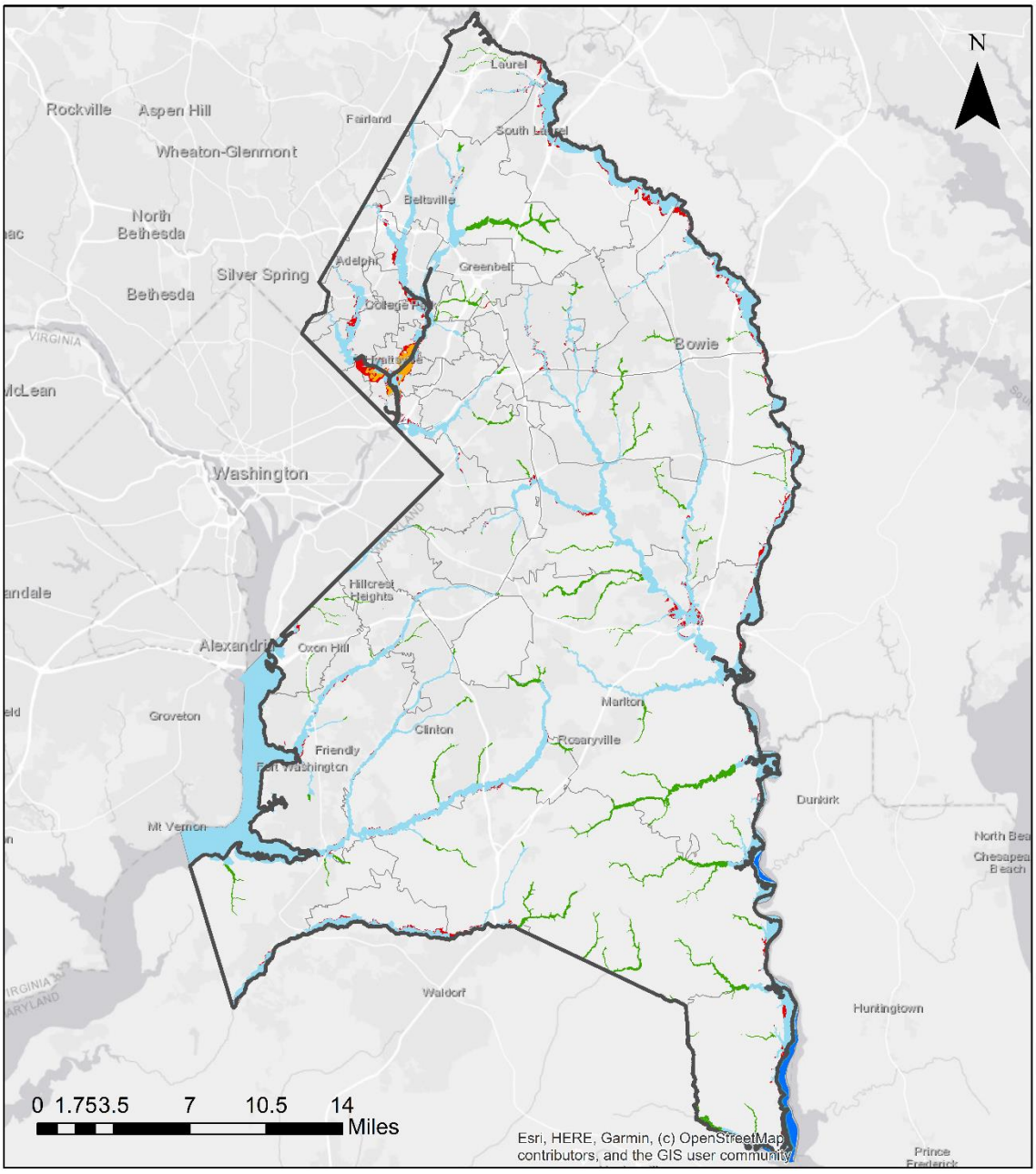
Recreation Center	Mt. Rainier Neighborhood Recreation Center	Mt. Rainier	Y	Y	Y
Recreation Center	Edmonston Neighborhood Recreation Center	Edmonston	Y	Y	Y
Recreation Center	Riverdale Community Recreation Center	Riverdale	Y	Y	Y
Recreation Center	Green Meadows Community Recreation Center	Hyattsville	Y	Y	Y
Recreation Center	Lane Manor Community Recreation Center	Adelphi	Y	Y	Y
Recreation Center	Adelphi Manor Community Recreation Center	Adelphi	Y	Y	Y
Government Office	Peoples Zoning Council	Upper Marlborough	Y	N	N
Government Office	Prince George's County Credit Union	Upper Marlborough	Y	N	N
Government Office	Human Relations Commission	Upper Marlborough	Y	N	N

Figure 28. Select Vulnerable Assets in Prince George's County



Appendix D. Maps

FEMA Floodplains in Prince George's County



X - 0.2% FLOOD HAZARD

A - 1% APPROXIMATE FLOOD HAZARD

AE - 1% DETAILED FLOOD HAZARD

AH - 1% SHALLOW DETAILED (PONDING)

AO - 1% SHALLOW DETAILED (SLOPING TERRAIN)

OPEN WATER

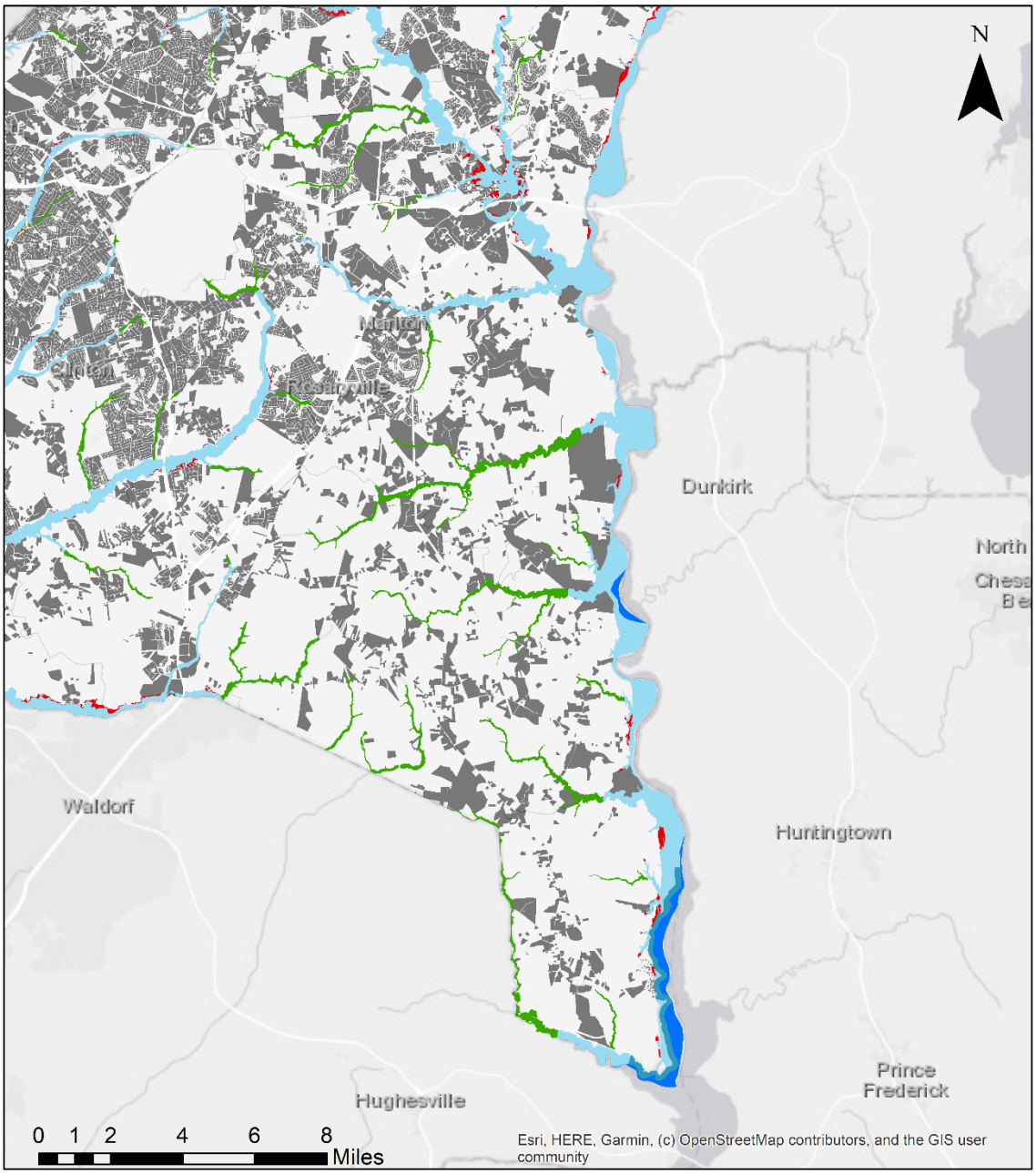
VE - 1% COASTAL DETAILED

X - PROTECTED BY LEVEE

FEMA Floodplain along the Potomac River

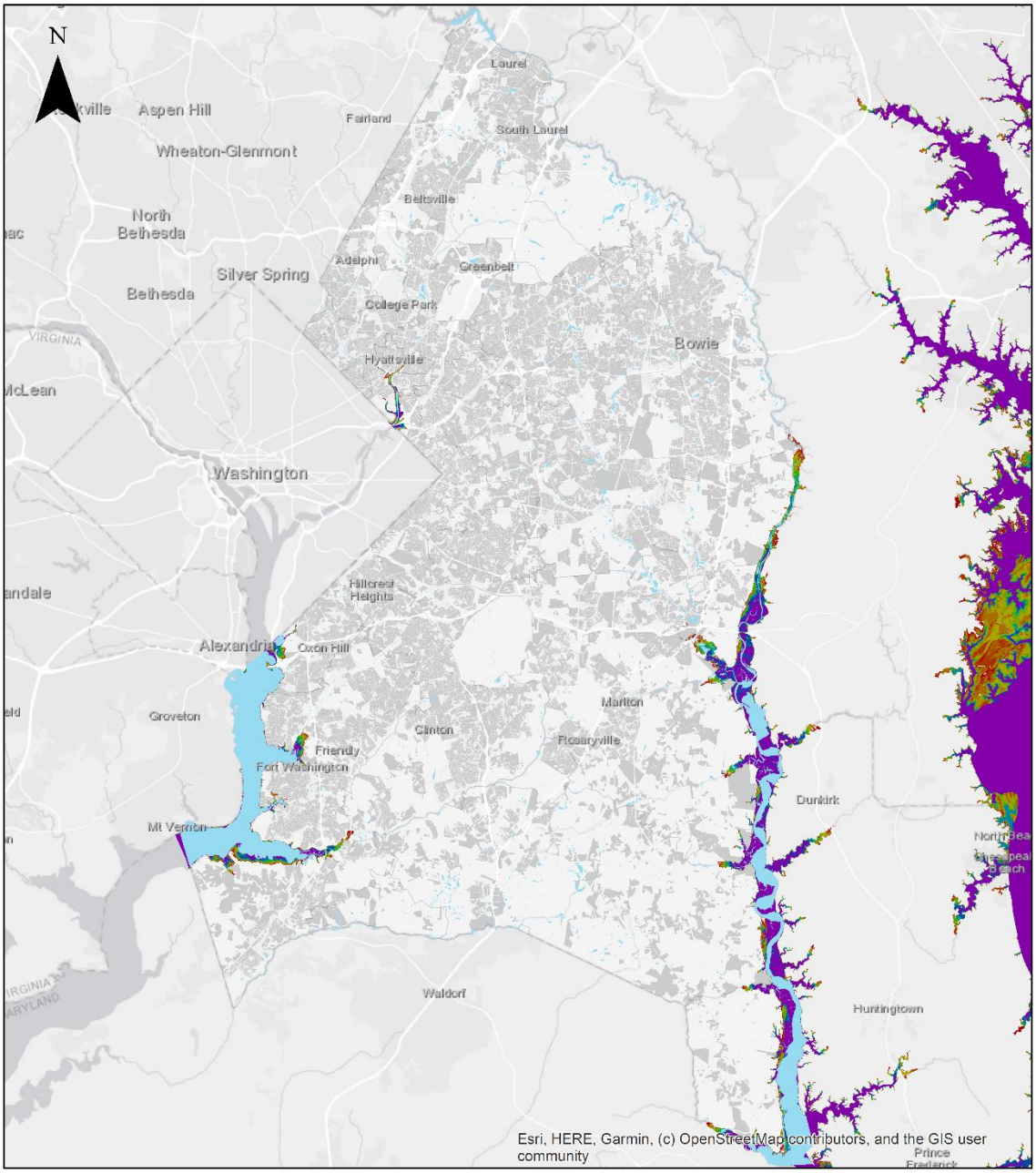
- X - 0.2% FLOOD HAZARD
- A - 1% APPROXIMATE FLOOD HAZARD
- AE - 1% DETAILED FLOOD HAZARD
- AH - 1% SHALLOW DETAILED (PONDING)
- AO - 1% SHALLOW DETAILED (SLOPING TERRAIN)
- OPEN WATER
- VE - 1% COASTAL DETAILED
- X - PROTECTED BY LEVEE

FEMA Floodplain along the Patuxent River



- X - 0.2% FLOOD HAZARD
- A - 1% APPROXIMATE FLOOD HAZARD
- AE - 1% DETAILED FLOOD HAZARD
- AH - 1% SHALLOW DETAILED (PONDING)
- AO - 1% SHALLOW DETAILED (SLOPING TERRAIN)
- OPEN WATER
- VE - 1% COASTAL DETAILED
- X - PROTECTED BY LEVEE

Sea Level Rise in the Prince George's County



Sea Level Rise (feet)

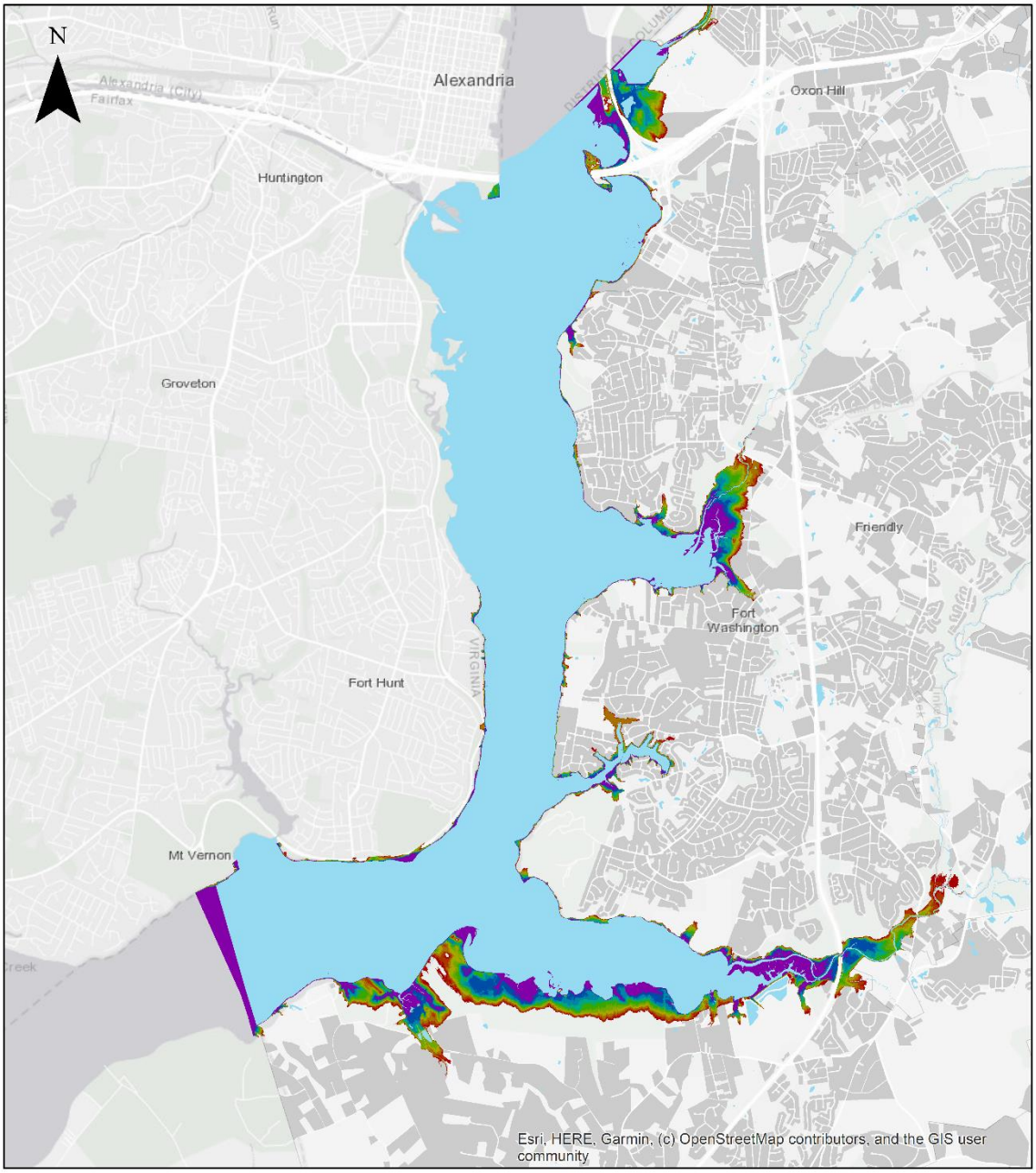
1 — 10

0 1.753.5 7 10.5 14 Miles

Water Bodies

Building Footprints

Sea Level Rise in the Potomac River



Sea Level Rise (feet)

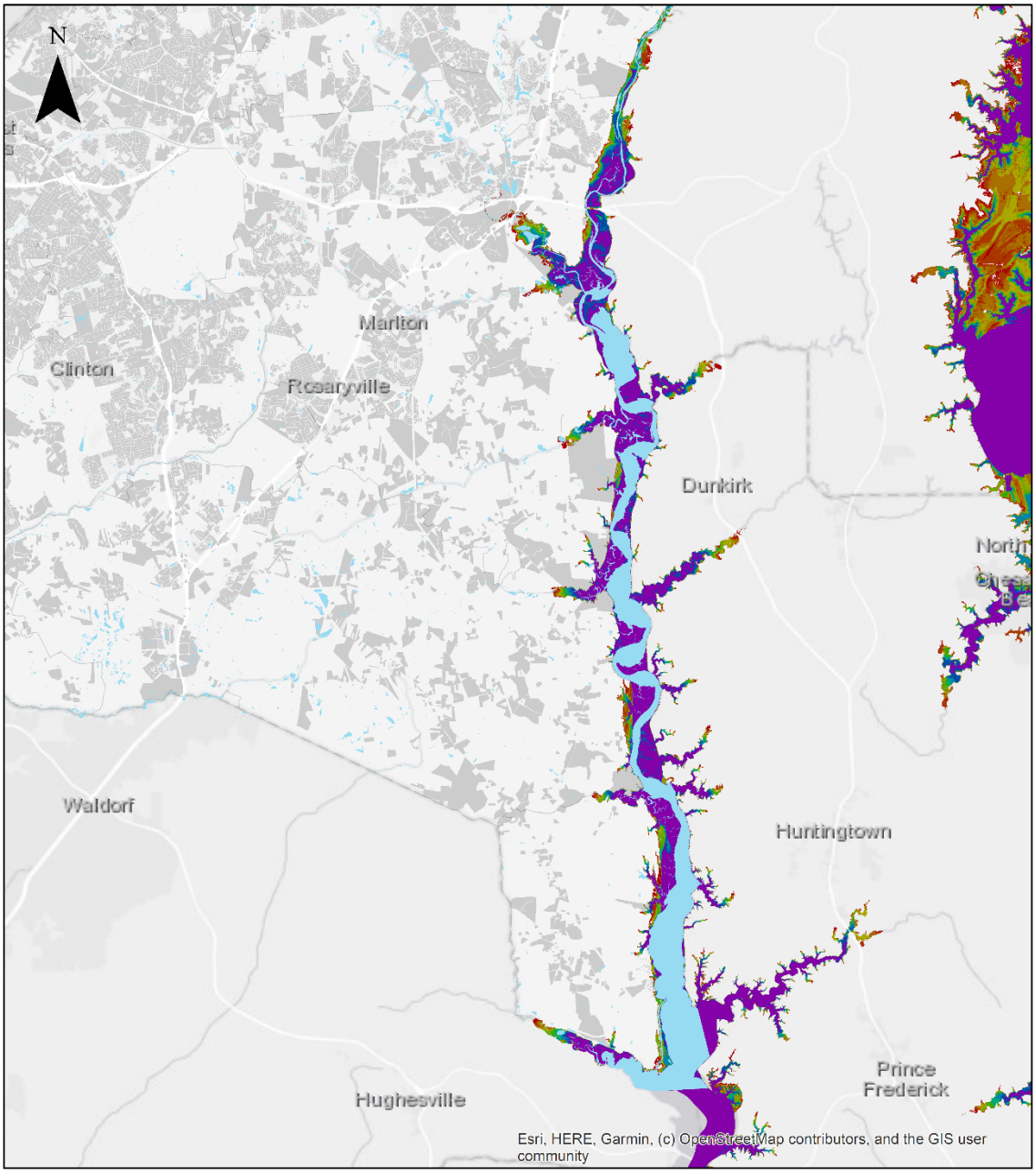
1 10

0 0.45 0.9 1.8 2.7 3.6 Miles

Water Bodies

Building Footprints

Sea Level Rise in the Patuxent River



Sea Level Rise (feet)

1 — 10

Patuxent River

0 1 2 4 6 8 Miles

CLIMATE ACTION RANKING MATRIX

											Notes Related to Evaluation Criteria														
											Draft: Tier 1														
#	Action Area	MWCOG Action Group	MWCOG Strategy 2	Actions	Heat	Water	Storm	Existing Program/Background Information	Source	Source 2 (Line/Page)	Within County Control	Available technology/ pathway "Feasible"	Timeframe to implement	Adaptation Impact	Bonus LMI points	Total (with LMI bonus)	Mitigation and resilience synergies	Alignment with Existing Programs	Measureable progress	Community Health and QoL Impact	Cost-effectiveness	Capacity / funding to enact	Economic and jobs impact	Total Score	Notes/Thoughts from MWG Members	AWG Meeting Notes 5.12.21
1	Planning	PL-3-Develop Integrated Approach to Climate Resilience Planning	vi. Improve the resilience of critical infrastructure	Develop Resiliency Checklist for building developers to submit during permitting of new development, construction, and substantial retrofits. Link to climate projections which are updated on a regular basis (5 years max.) - Link to climate projections which are updated on a regular basis (5 years max.)2 - Monitor regularly and evaluate the performance of County facilities projects for compliance with climate resilience standards. - Conduct [number? type] post-construction case studies of implemented County facilities projects for compliance with climate resilience standards. - Publish recommendations for incorporating lessons learned into the planning of new - or retrofits of existing - facilities and/or design standards.4. - Integrate climate projections, risks, and strategies into existing community outreach programs. - Incorporate climate risks and adaptation strategies into natural resource	X	X	X	NOAA Atlas 14 updates, Building Codes: https://www.princegeorgescountymd.gov/1436/Building-Codes-Bulletins	CRVA Workshop 2, Cadmus (Dave)	BR 1- Line 8	2	2	2	2	0	8	1	2	2	1	2	2	1	19		This was the top response in Poll #1. This is an actual action to help in decision-making. The checklist will send a message to the building development community that the County is serious about resilincy and raise awareness.
2	Planning	PL-3-Develop Integrated Approach to Climate Resilience Planning	ii. Update plans to address climate risks	Develop and make publicly available locally downscaled climate projections with top hazards identified.	X	X	X	NOAA Atlas 14 updates, MD Coastal Atlas: https://maryland.maps.arcgis.com/apps/MapSeries/index.html?appid=c76b3b66b57747c6aca654a33db68f0a	CRVA Workshop 2, Cadmus (Dave)	BR 1- Line 15	2	2	2	2	0	8	1	2	2	1	2	2	0	18		A lot of the other ones aree more focused on down-scale client data that is already done a lot elsewhere. PGC shouldn't spend time on downscaling climate suggestions, should more so acknowledge and utilize this information.
3	Planning	PL-3-Develop Integrated Approach to Climate Resilience Planning		Evaluate and update locally downscaled climate projections on a regular basis (every 5 years max.)	X	X	X	NOAA Atlas 14 updates	CRVA Workshop 2	BR 1- Line 15	2	2	1	2	0	7								7		
4	Planning	PL-3-Develop Integrated Approach to Climate Resilience Planning	vi. Improve the resilience of critical infrastructure	Conduct [number? type] post-construction case studies of implemented County facilities projects for compliance with climate resilience standards. Publish recommendations for incorporating lessons learned into the planning of new - or retrofits of existing - facilities and/or design standards	X	X	X		CRVA Workshop 2, Cadmus	BR 1- Line 15	2	2	1	2	0	7								7		
5	Planning	PL-3-Develop Integrated Approach to Climate Resilience Planning	vi. Improve the resilience of critical infrastructure	Monitor regularly and evaluate the performance of County facilities projects for compliance with climate resilience standards.	X	X	X	Krist Zimmerman, Joint Base Andrews: DOD assessing climate impacts on new and existing buildings, need to upgrade to newest standards. Retrofit funds: good idea, but extremely costly and difficult to reach in <8 years. Can identify priority areas/infrastructure, but challenging to retrfoit across spectrum. + monitoring/evaluation plan.	CRVA Workshop 2, Cadmus	BR 1- Line 15	2	2	2	2	0	8	1	1	1	1	1	1	1	15	Conduct [number? type] post-construction case studies of implemented County facilities projects for compliance with climate resilience standards. Publish recommendations for incorporating lessons learned into the planning of new - or retrofits of existing - facilities and/or design standards. 1. Require floodplain study with set parameters for all planning level studies which considere rezoning or alternatie use. Parameters would require climate resliency impacts for downstream and future issuees of the developed land. Require the Planning Board to have a climate resiliency independent review prior to approval of plans. This may eliminate waiver. Currently, 10 or fewer houses is a loophole for many measures. These are the very type of developments which tend to get waivers in the floodplain to build or do not require significant study.	
6	Planning	PL-3-Develop Integrated Approach to Climate Resilience Planning	viii. Enhance green infrastructure networks	Adopt and enforce Plan 2035 Land Use Policies 1-12 to: - Target all new development to follow Low impact Development principles - Control sprawl by limiting new commerical zoning and future mixed-use land uses outside of the Regional Transit Districts and Local Centers - Preserve and protect the Rural and Agricultural Areas to conserve agricultural and forest resources. Enforce through: - Pipeline review process - Development plan review	X	X	X	Plan 2035, pp. 110-119	CRVA Workshop 2 Cadmus	BR 1- Line 16	2	2	2	2	2	10	1	2	1	2	2	1	1	20		We have done a lot of planning, and this strategy spans across several very important areas.
7	Planning	PL-3-Develop Integrated Approach to Climate Resilience Planning		Land Use: Ensure zoning codes enable multi-family or multi-generational homes.	X	X	X	Plan 2035	CAP Community Meeting 1: Adaptation Breakout Room		2	2	2	0	1	7								7	what does the action have to do with Resliency	

8	**Planning**	PL-4 Update Local and Regional Plans to Address Climate Risks	ix. Implement measure to reduce flood risk	Continue to partner w/ FEMA on updated Flood Insurance Rate maps (FIRM)s		X	X	FEMA FIRMs	CRVA Workshop 2	BR 1- Line 4	1	1	1	2	0	5	1	2						8		
9	**Planning**	PL-4 Update Local and Regional Plans to Address Climate Risks	i. Develop integrated approach to climate resilience planning	Collaborate regionally, with the District, and with neighboring states to achieve consensus on locally-downscaled climate data esp. future precipitation estimates		X	X	Ask Dawn: "Efforts underway..."	CRVA Workshop 2	BR 1- Line 16	1	2	1	2	0	6	1							7		
10	**Planning**	PL-4 Update Local and Regional Plans to Address Climate Risks	vi. Improve the resilience of critical infrastructure	Conduct assessment of County-owned buildings and assets in locations with high waters tables and highly problematic soils, esp. Howell, Christiana and Marlboro Clays		X	X		Cadmus, Dave	BR 1-Line 14	2	1	1	2	0	6								6		While this is important for the County to do, this could be more crucial for non-county owned buildings. Less concerned about County-focused strategies due to much smaller percentage of emissions contributions?
11	**Planning**	PL-4 Update Local and Regional Plans to Address Climate Risks		Make clear messaging on County's approach to climate resilience publicly available such as a dedicated CAP section on the County website.	X	X	X		AWG #1		2	2	2	0	0	6								6	Expand the initial findings and recommendations of this report with a comprehensive vulnerability assessment of the AM/FM, TV, cellular communication and internet systems.	This strategy scored second highest in the second batch.
12	**Planning**	PL-4 Update Local and Regional Plans to Address Climate Risks		Update zoning, building codes, ordinances, and the development review process to ensure new development is more resilient to forward-looking local climate impacts. -Share best practices of resiliency planning and integrate common climate projections, metrics, and design standards across all County departments. -Incorporate climate projections, climate risks, and long-term energy and resilience planning into emergency and other government plans.	X	X	X		MWCOG CEAP	PG 75	2	2	2	2	2	10	2	2	2	2	2	1	1	22		Mitigation co-benefits, this scored the highest in the second batch of polling. Dawn commented that regulation is likely the best way to get results, cannot rely on good will. Code updates ensures the County will be required to make progress. This also has a high-degree of county control.
13	**Equity**	EQ-3-Support Engagement of the Public on Climate Risks, with a Particular Emphasis on Potentially Vulnerable Populations	ix. Implement measure to reduce flood risk	Position County to improve NFIP CRS rating by one or more Class levels for the purposes of: - Reducing and avoiding flood damage to insurable property, especially EEA / LMI households - Lowering flood insurance rates - Strengthening and supporting the insurance aspects of the National Flood Insurance Program - Fostering more comprehensive floodplain management		X	X	NFIP	CRVA Workshop 2	BR 1- Line 4	2	1	0	2	2	7	1	1	1	1	2	1	0	14		Belief that Action 13 can happen in parallel to many of the others that address flood risk reduction - it would be more a matter of tracking and documentation if plenty of other flood actions are selected and implemented.
14	**Equity**	EQ-3-Support Engagement of the Public on Climate Risks, with a Particular Emphasis on Potentially Vulnerable Populations		Pass County resolution to require properties in flood hazard areas to purchase flood insurance for properties without mortgages or mortgaged properties whose lenders do not require insurance.		X	X	NFIP	CRVA Workshop 2	BR 1- Line 4	2	2	2	2	0	8	1	1	1	2	1	1	0	15		
15	**Equity**	EQ-3-Support Engagement of the Public on Climate Risks, with a Particular Emphasis on Potentially Vulnerable Populations		Offer financial incentives such as cost-sharing or matching to cover flooded building contents.		X	X		CRVA Workshop 2	BR 1- Line 4	1	2	0	2	2	7	1	0	1	1	0	1	0	11		
16	**Equity**	EQ-3-Support Engagement of the Public on Climate Risks, with a Particular Emphasis on Potentially Vulnerable Populations		Offer financial incentives such as cost-sharing or matching to address flood insurance premium affordability gap for LMI households.		X	X	NFIP	CRVA Workshop 2	BR 1- Line 4	2	2	1	2	2	9	1	1	1	1	1	1	0	15		
17	**Equity**	EQ-3-Support Engagement of the Public on Climate Risks, with a Particular Emphasis on Potentially Vulnerable Populations		Update County's existing (residential) flood risk / mitigation programs such as rain check rebates, basement sump pumps, etc. to meet the needs of high-risk, LMI households.		X	X	Ask Dawn or Brittney Drakeford: "Potential to provide additional funds for higher risk populations under existing incentives ($4,000 raincheck rebate). Maybe don't make people spend the money upfront before being reimbursed, this is an extra burden. Its advertised well but people are still reluctant." - Raincheck rebates - every single family program - up to $4,000 to dig up impervious surfaces, install trees/rain gardens, etc. (does not include sump	CRVA Workshop 2	BR 1- Line 4	2	2	2	2	2	10	1	2	2	2	1	1	1	20		
18	**Equity**	EQ-3-Support Engagement of the Public on Climate Risks, with a Particular Emphasis on Potentially Vulnerable Populations	v. Support Establishment of resilience hubs	Develop and make publicly available resources for climate resilient building improvements/retrofits, federal funding, etc. to property owners	X		X		CRVA Workshop 2, Cadmus (Dave)	BR 1- Line 8	2	2	2	2	0	8	2	1	1	2	2	1	1	18		
19	**Equity**	EQ-3-Support Engagement of the Public on Climate Risks, with a Particular Emphasis on Potentially Vulnerable Populations		Make County climate risk communication resources publicly available.Direct outreach to LMI and EEA communities.	X	X	X	FEMA resources	CRVA Workshop 2 Cadmus	BR 1- Line 19	2	2	2	2	2	10	1	2	1	2	2	1	0	19		

20	**Equity**	EQ-3-Support Engagement of the Public on Climate Risks, with a Particular Emphasis on Potentially Vulnerable Populations		Encourage active participation in climate planning training initiatives from a diverse group of community and local government stakeholders, especially from EEA residents and LMI households. -Provide training and capacity-building across governmental departments and sectors to address climate risks and resiliency planning.	X	X	X		MWCOG CEAP	PG 73	2	2	2	1	2	9	1	2	1	2	2	1	0	18		
21	**Equity**	EQ-3-Support Engagement of the Public on Climate Risks, with a Particular Emphasis on Potentially Vulnerable Populations		Integrate climate projections, risks, and strategies into existing community outreach programs.	X	X	X		MWCOG CEAP	PG 76	2	2	2	2	0	8	1	2	1	2	2	1	0	17		
22	**Equity**	EQ-3-Support Engagement of the Public on Climate Risks, with a Particular Emphasis on Potentially Vulnerable Populations		Further build partnerships with community groups and leaders to improve communication and engagement strategies.	X	X	X		MWCOG CEAP	PG 76	1	2	2	1	0	6								6		
23	**Equity**	EQ-3-Support Engagement of the Public on Climate Risks, with a Particular Emphasis on Potentially Vulnerable Populations		Engage potentially vulnerable communities in assessing their vulnerabilities (social, ecological, economic, public health) to climate impacts.	X	X	X		MWCOG CEAP	PG 76	2	2	2	2	2	10	1	2	1	2	2	1	0	19		This received the most votes in cohort 3. Part of our mission should be talking to the people who will be impacted the most by any decision the County makes. Need to make sure we here from underserved groups first hand and hear the potential impacts to ensure buy-in after implementation. This action could pair well with the microgrid deployment, as microgrid deployment could be part of the solution for these communities. Resiliency hubs/community center hub/cooling center/evacuation could all be paired together.
24	**Equity**	EQ-3-Support Engagement of the Public on Climate Risks, with a Particular Emphasis on Potentially Vulnerable		Provide direct assistance (technical and financial) to potentially vulnerable populations.	X	X	X		MWCOG CEAP	PG 76	1	2	2	2	2	9	1	2	1	2	2	1	1	19		
25	**Equity**	EQ-3-Support Engagement of the Public on Climate Risks, with a Particular Emphasis on Potentially Vulnerable Populations		Develop metrics to measure the effectiveness of outreach efforts with diverse communities.	X	X	X		MWCOG CEAP	PG 76	2	2	2	1	2	9	1	2	1	2	2	1	0	18		
26	**Equity**	EQ-4-Support Equitable Secure Energy Access	vi. Improve the resilience of critical infrastructure	Conduct feasibility assessment for utilities line undergrounding. Prioritize EEA / Inner Beltway. Link to No Net Tree Loss strategy to preserve existing canopy.		X	X		CRVA Workshop 2	BR 1- Line 16	2	2	2	2	2	10	2	2	2	2	2	1	1	22		
27	**Equity**	EQ-4-Support Equitable Secure Energy Access		Direct technical assisstance, resilience incentives, and local government energy assurance/security initiatives to potentially vulnerable communities.	X	X	X		MWCOG CEAP	PG 77	2	2	2	1	2	9	1	2	1	2	1	1	0	17		
28	**Equity**	EQ-4-Support Equitable Secure Energy Access		Coordinate with utilities and promote electric grid and natural gas resiliency measures, including pipeline hardening, bulk fuel suppliers to promote resilient supply chains, and prioritize infrastructure improvements in potentially vulnerable communities.	X	X	X		MWCOG CEAP	PG 77	1	2	2	2	2	9	1	1	1	2	1	1	1	17		
29	**Equity**	EQ-4-Support Equitable Secure Energy Access		Prioritize microgrid deployment in potentially vulnerable communities.	X	X	X		MWCOG CEAP	PG 77	1	2	2	1	2	8	2	2	2	2	1	1	1	19		
30	**Resilient Infrastructure**	RI-5-Implement Measures to Reduce Flood Risk	iii. Support engagement of the public on climate risks with a particular emphasis on potentially vulnerable populations	Offer financial incentives for building retrofits (elevation, wet/dry floodproofing) in flood zones.		X	X		CRVA Workshop 2	BR 1- Line 4, BR 2 Line 4	1	2	0	2	2	7	1	2						10		
31	**Resilient Infrastructure**	RI-5-Implement Measures to Reduce Flood Risk	vi. Improve the resilience of critical infrastructure	Retrofit County-owned buildings and infrastructure assets in flood zones to be climate-ready. - Prioritize locations in EEA / serving LMI households, esp.: - - Fire Stations / EMS - - Schools - - Public Safety Facilities - - Senior Activity Centers - Prioritize assets with (or immediately adjacent to) highly impervious surfaces - Develop a priority list of assets to be retrofitted by _____ [insert year] - Issue RFPs to flood retrofit top __ [insert number} buildings / infrastructure assets - Retrofit top __ [insert number} buildings / infrastructure assets	X	X	X	Ask Dawn - is there something more in-progress (and shorter, more prioritized) than the HMP list or County critical infrastructure data layers?	Cadmus, Dave CRVA Workshop 2	BR 1- Line 15	2	2	0	2		6	2	0					8		
32	**Resilient Infrastructure**	RI-5-Implement Measures to Reduce Flood Risk	iii. Support engagement of the public on climate risks with a particular emphasis on potentially vulnerable populations	Provide access to information on County's flood risk / mitigation programs such as rain check rebates, basement sump pumps, etc. Actively promote within EEAs / to LMI households		X	X	Ask Dawn or Brittney Drakeford: "Potential to provide additional funds for higher risk populations under existing incentives ($4,000 raincheck rebate). Maybe don't make people spend the money upfront before being reimbursed, this is an extra burden. Its advertised well but people are still reluctant." - Raincheck rebates - every single family	CRVA Workshop 2 CAP Community Meeting 1: Adaptation Breakout Room	BR 1- Line 4	2	2	2	2	2	10	1	2	1	2	1	1	1	19		
33	**Resilient Infrastructure**	RI-5-Implement Measures to Reduce Flood Risk	iii. Support engagement of the public on climate risks with a particular emphasis on potentially vulnerable populations	Mold protection and remediation for non-County owned buildings: - Provide mold abatement technical assitance resources - Require landlords to install protections against basement flooding and to reduce mold issues in EEA / LMI housing within a certain time frame after being identified to the Office of Landlord-Tenant Affairs. - Provide financial assistance for landlords that demonstrate need.					CRVA Workshop 2 Community Mtg #1 Cadmus	BR 2- Line 4	2	2	1		2	7								7		

34	**Resilient Infrastructure**	RI-5-Implement Measures to Reduce Flood Risk	iii. Support engagement of the public on climate risks with a particular emphasis on potentially vulnerable populations	Update NFIP CRS Repetitive Loss (RL) and Severe Repetitive Loss (SRL) properties and County Critical Facilities database as FEMA redefines flood maps. County should coordinate and reassess periodically. Update regularly to coincide with updated climate projections (every 5 years max.)		X	X	NFIP	CRVA Workshop 2	BR 1- Line 4	2	2	2	2		8	1	1	1	1	1	1	1	15		
35	**Resilient Infrastructure**	RI-5-Implement Measures to Reduce Flood Risk	i. Develop integrated approach to climate resilience planning	Adopt codes to limit impervious concrete surfaces and require the use of pervious pavements.	X	X	X	Plan 2035 (pp. 163-179) Green Infrastructure Plan (2017? confirm)	CRVA Workshop 2 Montgomery Co CAP	BR 1- Line 4	2	1	0		2	5	1	1						7		
36	**Resilient Infrastructure**	RI-5-Implement Measures to Reduce Flood Risk	iii. Support engagement of the public on climate risks with a particular emphasis on potentially vulnerable populations	Revise County's flood risk / mitigation (incentives) programs to meet the needs of high-risk, LMI households by providing up-front assistance rather than rebate		X	X	Green Infrastructure Plan (2017? confirm)	CRVA Workshop 2	BR 1- Line 4	2	2	1	2	2	9	1	2	1	1	1	1	1	17		Vulnerable communities= Energy burden households is often a better indicator than LMI, not specifically for this strategy, but another useful indocator to consider (PSC). Anicostia communities are focal point of energy burden (subset of LMI), also susceptible to flooding.
37	**Resilient Infrastructure**	RI-5-Implement Measures to Reduce Flood Risk	ii. Update plans to address climate risks	Update planning guidance documents (i.e. zoning, land use plan) to prevent new construction or substantial retrofits in high risk, repeated flood areas		X	X	Plan 2035, http://www.pgparks.com/1002/Zoning-Ordinance-Use-Tables	CRVA Workshop 2, Cadmus	BR 1- Line 4	2	2	2	2	2	10	1	2	2	1	1	1	1	19		
38	**Resilient Infrastructure**	RI-5-Implement Measures to Reduce Flood Risk		Re-evaluate stormwater drain (and other systems components) sizing standards to consider future climate projections. Seek federal guidance on updating.		X	X	Ask Mary Giles	CRVA Workshop 2	BR 1- Line 15	2	2	1	2	0	7								7		Extremely important, increased flooding events are a result of stormdrain capacity and addressing flood risks. CWP is focussed on stormwater QUALITY MGMT, stormwater QUANTITY MGMT falls on the County unless CWP role is expanded,
39	**Resilient Infrastructure**	RI-5-Implement Measures to Reduce Flood Risk		Assess CSO outfalls and storm drains for coastal / riverine flooding and storm surge risk. Use smart tech monitoring		X	X		Cadmus, Dave CRVA Workshop 2	BR 1- Line 15	2	2	1	2	0	7								7		
40	**Resilient Infrastructure**	RI-5-Implement Measures to Reduce Flood Risk		Retrofit CSO outfalls at greatest risk of coastal / riverine flooding and storm surge risk with backflow preventers.		X	X		Cadmus (Dave)		2	2	0	2	0	6								6		
41	**Resilient Infrastructure**	RI-5-Implement Measures to Reduce Flood Risk	vi. Improve the resilience of critical infrastructure	Prioritize Stormwater Plan serving urbanized communities, esp. EEA / LMI households considers all climate change impacts, accounts for service or demand interruptions, and is updated on a regular basis (every 5 years max.).	X	X	X		Cadmus, Dave CRVA Workshop 2	BR 2- Line 17	1	2	1	2	2	8	1	2	1	1	1	1	1	16		
42	**Resilient Infrastructure**	RI-5-Implement Measures to Reduce Flood Risk	vi. Improve the resilience of critical infrastructure	Assess climate impacts on high-hazard dams (esp. Duckett and Brighton), including future preciptiation projections. Include associated equipment (e.g. pumping stations). Consider increased risks to downstream communities.	X	X	X	HMP Duckett Dam 2020 vulnerability assessment	CRVA Workshop 2 Cadmus, Dave	BR 2- Line 10 BR 1- Line 13	1	2	1	2	2	8	1	2	2	2	1	1	2	19		If we don't do this evaluation, it is a high risk to life and property in the County. The dams are not adequately prepared for increased precipitation and other impacts of climate change
43	**Resilient Infrastructure**	RI-5-Implement Measures to Reduce Flood Risk	viii. Enhance green infrastructure networks	Reduce residential flood risk by implementing County's Mid-Term Recommendations (DPIE / DPW&T / DOE): - Require use of the higher range runoff coefficient factors - Increase minimum allowable yard and swale slopes to 3%. - Require swales with drainage area exceeding 5 acres located at least 100 feet set back from any residential lot line		X	X	Ask Dawn: - DoE Capital Improvement Program (Priority Drainage Relief Program)	031621 - Drainage and Flooding in Prince George's County - County Council Presentation Binder		2	2	2	2	2	10	1	2	2	2	1	2	1	21		
44	**Resilient Infrastructure**	RI-5-Implement Measures to Reduce Flood Risk	viii. Enhance green infrastructure networks	Reduce County flood risk by implementing County's Long-Term Recommendations (DPIE / DPW&T / DOE):		X	X	Ask Dawn:	031621 - Drainage and Flooding in		2	2	2	2	2	10	1	2	2	2	1	2	1	21		
45	**Resilient Infrastructure**	RI-5-Implement Measures to Reduce Flood Risk	vi. Improve the resilience of critical infrastructure	Seek funding to reduce County flood risk by implementing County's Long-Term Recommendations (DPIE / DPW&T / DOE): - Provide funding to update Watershed Models to incorporate Built SWM Ponds and watershed		X	X	Ask Dawn:	031621 - Drainage and Flooding in Prince George's County - County		1	2	0	1	2	6	1							7		
46	**Resilient Infrastructure**	RI-5-Implement Measures to Reduce Flood Risk		Implement County-wide measures to reduce flood risk: -Identify at-risk facilities based on flooding and sea level rise. Prioritize resilience strategies based on age of facilities and critical need. - Use nature-based solutions, non-structural, and structural measures to reduce flood risks. -Increase the resilience of water, stormwater, and wastewater system. Secure investments for green and grey infrastructure to improve the capacity of these systems. -Prioritize existing properties vulnerable to flooding for buyouts, incentives and easements. -Adopt and implement green street policies and programs.		X	X		MWCOG CEAP	PG 82	2	2	0	2	0	6								6		Linked to 47, it is easier to protect natural resources we have than recreate them once they are gone. Green street policy has already been done, Complete and Green Streets policy, with projects underway that were in discussions.
47	**Resilient Infrastructure**	RI-5-Implement Measures to Reduce Flood Risk	viii. Enhance green infrastructure networks	Maximize the flood retention capacity of existing floodplains and natural areas by enacting Plan 2035 Natural Environment Policies 1, 2, 4,5. Recognize floodplains and natural areas as foundational elements of mitigation and prevention.				Plan 2035 pp. 172-177 Frederick Co MD tree legislation Frederick Co MD zoning law changes that prioritize development that protects the most valuable natural areas such as freshwater recharge zones,	Virtual Open House 3/4/2021 Cadmus		2	2	1	2	2	9	2	2	2	2	2	1	1	21		Top action for poll 5. If we already have plans written and some work has been done, seems like this is an easy thing to target to move forward.
48	**Resilient Infrastructure**	RI - 1-Support Establishment of Resilience Hubs	vii. Implement measures to equitably address urban heat islands	Perform assessment of existing adult daycare centers for capacity to provide Resilience Hub functions such as: - Cooling / heating during extreme heat and cold - Back-up power, power islanding w/ RE systems - Operating in passive survivability mode (i.e. sited in secure location,	X		X	Ask Dawn	CRVA Workshop 2	BR 1- Line 8	2	2	1	2	2	9	2	1	2	1	1	1	1	18		Resliency hubs must be captured in some shape or form in the final list of actions.

49	**Resilient Infrastructure**	RI - 1-Support Establishment of Resilience Hubs	vii. Implement measures to equitably address urban heat islands	Provide funding to support building retrofits for adult daycare centers to provide Resilience Hub functions (see above)	X		X	Ask Dawn	CRVA Workshop 2	BR 1- Line 8	2	2	0	2	2	8	2	0	2	1	2	1	1	17		
50	**Resilient Infrastructure**	RI - 1-Support Establishment of Resilience Hubs	vii. Implement measures to equitably address urban heat islands	Perform assessment of existing recreation centers for capacity to provide adequate Resilience Hub functions such as: - Cooling / heating during extreme heat and cold - Back-up power, power islanding w/ RE systems - Operating in passive survivability mode (i.e. sited in secure location, independent power source, operable windows, trees & shading, limiting solar heat gain with shading strategies, robust communication links)	X	X	X	Ask Dawn re: Resilience Hubs progress	CRVA Workshop 2 Cadmus, Dave	BR 2- Line 17	2	2	1	2	2	9	2	0	2	1	2	1	1	18		
51	**Resilient Infrastructure**	RI - 1-Support Establishment of Resilience Hubs	vii. Implement measures to equitably address urban heat islands	Provide funding to support building retrofits for existing recreation centers to provide adequate Resilience Hub functions (see above)	X	X	X	Ask Dawn re: Resilience Hubs progress	CRVA Workshop 2 Cadmus, Dave	BR 2- Line 18	1	2	0	2	2	7	2							9		
52	**Resilient Infrastructure**	RI - 1-Support Establishment of Resilience Hubs		Identify most climate vulnerable communities and assess the potential to establish Resilience Hubs in those communities. -Leverage relationships with community organizations and leaders to identify needs of the community and implement resilience hubs and other neighborhood-scale resilience solutions. -Partner with energy providers to develop resilience hubs with an uninterruptable energy supply. -Assess existing and future cooling centers based on extreme heat projections and needs of vulnerable populations. Consider factors including accessibility, language interpreters, backup power support, medical assistance, and food and water supplies. - See other Resilience Hubs action(s) for Resilience Hubs functions	X	X	X	Ask Dawn	MWCOG CEAP	PG 78	2	2	2	2	2	10	2	1	2	2	2	1	1	21		
53	**Resilient Infrastructure**	RI-2-Improve the Resilience of Critical Infrastructure	ix. Implement measure to reduce flood risk	Prioritize flood retrofits of critical County infrastructure and buildings (approx 74 per 2018 data) in FEMA SFHA (AE, A) flood zones, especially the following serving EEA / LMI household areas: - Fire Stations / EMS - Schools - Public Safety Facilities - Senior Activity Centers Elevations: +3 feet above base flood elevation (BFE) Wet/dry floodproof: where possible		X	X		Cadmus, Dave CRVA Workshop 2		1	1	0	2	2	6								6		
54	**Resilient Infrastructure**	RI-2-Improve the Resilience of Critical Infrastructure	ix. Implement measure to reduce flood risk	Prioritize flood retrofits of homes in FEMA SFHA (AE, A) flood zones to +3 feet above base flood elevation (BFE)		X	X		Cadmus, Dave		1	1	0	2	2	6								6		
55	**Resilient Infrastructure**	RI-2-Improve the Resilience of Critical Infrastructure	ix. Implement measure to reduce flood risk	Implement flood retrofits (esp. back-up power) on County high-priority wastewater treatment plants (WWTP).		X	X		CRVA Workshop 2	BR 2- Line 12	1	2	1	2	0	6								6		
56	**Resilient Infrastructure**	RI-2-Improve the Resilience of Critical Infrastructure	ii. Update plans to address climate risks	Ensure Potable Water Plan considers all climate change impacts, accounts for service or demand interruptions, and is updated on a regular basis (every 5 years max.)	X	X	X		CRVA Workshop 2	BR 2- Line 13	1	2	2	2	2	9	1	2	1	2	2	1	1	19		
57	**Resilient Infrastructure**	RI-2-Improve the Resilience of Critical Infrastructure		Assess climate impacts on levees, including future preciptiation projections. Consider related hazards such as tree, & vegetation removal which obstruct identification of potential erosion, burrowing animals that may weaken structures. Levees include: Anacostia Levee Improvements, Northeast Branch - East West Highway, Northeast Branch – Bladensburg, Oxon Run - Forest Heights, Beaverdam – Landover, Paint Branch - Cherry Hill Road, Indian Creek - U.S. Route 1,	X	X	X		Cadmus, County DOE		2	2	2	2	2	10	1	2	2	2	2	1	1	21		
58	**Resilient Infrastructure**	RI-2-Improve the Resilience of Critical Infrastructure		Assess vulnerability of existing and planned critical infrastructure for transportation, communication, energy, and water system assets.	X	X	X		MWCOG CEAP	PG 79	1	2	2	2	0	7								7		This could fall under 61.
59	**Resilient Infrastructure**	RI-2-Improve the Resilience of Critical Infrastructure		Flood proof critical water, stormwater, and wastewater systems to reflect climate projections.		X	X		MWCOG CEAP	PG 79	1	2	2	2	0	7								7		
60	**Resilient Infrastructure**	RI-2-Improve the Resilience of Critical Infrastructure		Revise infrastructure design standards to be more resilient to heat, flooding, and other climate impacts.	X	X	X		MWCOG CEAP	PG 79	1	2	2	2	0	7								7		This could fall under 61.
61	**Resilient Infrastructure**	RI-2-Improve the Resilience of Critical Infrastructure		Incorporate resilient critical infrastructure investments into long-range County plans.	X	X	X		MWCOG CEAP	PG 79	2	2	2	2	0	8	2	2	1	2	2	1	1	19		Top in cohort 6

62	**Resilient Infrastructure**	RI - 3-Implement Measures to Equitably Address Urban Heat Island	i. Develop integrated approach to climate resilience planning	Develop a County comprehensive extreme heat strategy to include: - Perform assessments of existing cooling centers to determine whether they are adequate in number to serve projected County needs. - Assess resilience of indidivual cooling centers to ensure they remain operational during periods of extreme heat - Set resiliency standards for cooling centers - Analyze heat using satellite imagery to map land surface temperature and identify which parts of the County are most heat exposed - Conduct more localized heat assessments to supplement satellite data for a more accurate assessment of the actual perceived temperature (e.g. ambient air temperature monitoring, crowdsourcing mapping, and other decentralized methods) - Integrate with County health, wellness, open space, land use, and growth plans [integrate what with County plans?] - Prioritize cooling resources and services in vulnerable EEA / LMI household neighborhoods	X			Plan 2035 (open space, GI)	Cadmus		2	2	1	2	2	9	1	2	1	2	2	1	1	19		Second highest in cohort 6
63	**Resilient Infrastructure**	RI - 3-Implement Measures to Equitably Address Urban Heat Island		Make existing adult daycare centers climate-ready: - Develop priority list of centers in EEA / serving LMI households - Prioritize assets with (or immediately adjacent to) highly impervious surfaces - Prioritize retrofitting to perform cooling center functions, at minimum, and Resilience Center functions such as cooling / heating during extreme heat and cold, operation in passive survivability mode (i.e. sited in secure location, independent power source, operable windows, trees & shading, limiting solar heat gain with shading strategies, robust communication links) - Prioritize inclusion of green infrastructure (GI) concepts to mitigate temperature extremes and flooding. - Issue RFPs for retrofits / improvements - Make improvements	X	X	X		CRVA Workshop 2	BR 1- Line 8	2	2	1	2	2	9	2	1	2	1	2	1	1	19		
64	**Resilient Infrastructure**	RI - 3-Implement Measures to Equitably Address Urban Heat Island		Perform thermal mapping to identify urban heat island hot spots, impacted vulnerable populations, and potential areas for mitigation strategies.							2	2	2	1	0	7								7		Top Action in Poll 7. Not sure if the County has a formal map of Urban Heat Islands and/or the data behind it. There are groups and resources that can help accomplish this, very feasible. This information will also help guide decision on where we recommend RE and EE projects in these vulnerable communities. Many co-benefits of tghis mapping and insights from it.
65	**Resilient Infrastructure**	RI - 3-Implement Measures to Equitably Address Urban Heat Island		Design and plan for resilient green infrastructure before development occurs, preserving ecologically valuable spaces in urban, suburban, and rural communities.	X	X	X		MWCOG CEAP	PG 81	1	2	2	2	0	7								7		
66	**Resilient Infrastructure**	RI-4-Enhance green infrastructure networks	viii. Enhance green infrastructure networks	Adopt codes to require green infrastructure (GI) practices for new and existing properties, including: native plantings	X	X	X	Plan 2035 (pp. 163-179) Green Infrastructure Plan (2017? confirm)	CRVA Workshop 2 Montgomery Co CAP	BR 1- Line 4	2	2	1	2	2	9	2	2	2	2	2	2	1	22		
67	**Resilient Infrastructure**	RI-4-Enhance green infrastructure networks	iii. Support engagement of the public on climate risks with a particular emphasis on potentially vulnerable populations	Promote a more expanded understanding of "green infrastructure" (GI) as active, comprehensive network for integrated stormwater management, cooling, and other resiliency benefits rather than only environmental asset for good water quality -Develop incentives, training and technical assistance programs for significant water use reductions including rainwater and greywater harvesting and onsite blackwater treatment and to be considered a stormwater management volumen reduction practice. - Conduct a citywide analysis of flood zones to understand the impact of setbacks, buffers, and zoning and land use policies on existing and future developments. - Prioritize existing properties vulnerable to flooding and sea level rise for buyout programs and conservation easements as part of County-wide masterplanning process. - Propose amendments to floodplain regulations and zoning and land use policies to ensure that waterfront setbacks and buffers allow for future sea-level rise, changes in precipitation patterns, sustainable landscaping practices, erosion, and reduce flood risks.	X	X	X	Mary Abe: "Need for integrated stormwater management, currently "green infrastructure" is more so for water quality but lacking on the topic of green infrastructure. There are other resiliency benefits to protecting existing forests and river sheds, which is defined separately in Maryland." Plan 2035 (pp. 163-179) Green Infrastructure Plan (2017? confirm)	CRVA Workshop 2, Cadmus	BR 1- Line 16	2	2	2	2	0	8	1	2	1	1	1	1	1	16	See my comment about DPWT green infrastructure as it relates to SWM . Also the definitiion of GI is very confusing in PGC>	
68	**Resilient Infrastructure**	RI-4-Enhance green infrastructure networks	i. Develop integrated approach to climate resilience planning	Adopt Countywide No Net Tree Loss strategy to preserve existing tree canopy and which weights EEA communities. Incorporate requirement into building permitting.		X	X	•Replace trees in hottest neighborhoods. •Plant 500,000 trees in urban underserved areas (EEA) within the Beltway in 5 years (HB1133: https://legiscan.com/MD/bill/HB1133/2021) •Link strategy to receipt if building permit. Plan 2035, p. 176 Senate Bill 414: https://legiscan.com/MD/bill/SB414/2021 Plan 2035 p. 169 MD Forest Preservation Act of 2013	CRVA Workshop 2 Community Mtg #1	BR 1- Line 16	2	2	2	2	2	10	2	2	2	2	2	2	1	23		No Net lost covers woodland, conservation, and canopy in the state of MD. Has not yet been integrated into County Woodland Conservation Act. Also have a canopy act that can be acted on more effectively if prioritized at the local/County-level. This is feasible in a growing community, Mapping urban heat islands and overlap with vulnerable communities could help target where to target with tree plantings.
69	**Resilient Infrastructure**	RI-4-Enhance green infrastructure networks	vii. Implement measures to equitably address urban heat islands	Priotize the creation of additional publicly-accessible open, green spaces on County properties in EEAs / LMI household areas that are: - Vacant - Open space conversions from private property flood buy-outs	X	X	X	Open Space Ordinance	CRVA Workshop 2 Cadmus (Dave)	BR 2- Line 5	2	2	1	2	2	9	2	2	2	2	2	2	1	22	perfect location for resilience hubs.	

70	**Resilient Infrastructure**	RI-4-Enhance green infrastructure networks	vi. Improve the resilience of critical infrastructure	Integrate green infrastructure (GI) projects into County capital improvement budgets	X	X	X		AWG #1		2	2	2	2	2	10	2	2	2	2	2	2	1	23		
71	**Resilient Infrastructure**	RI-4-Enhance green infrastructure networks		Prioritize nature-based solutions for carbon sequestration, flood prevention, and extreme heat mitigation in EEAs / LMI household areas	X	X	X		CAP Community Meeting 1: Adaptation		2	2	1	2	2	9	2	2	2	2	2	1	1	21		
72	**Resilient Infrastructure**	RI-4-Enhance green infrastructure networks		Promote a healthy food system supported by low-carbon, conservationist agricultural practices which emphasize: - Carbon sequestration - No / low till - Agroforestry - Silvopasturing - Intercropping - Organic practices - Zero food waste goals, i.e. composting	X	X	X	The region has recently started work on food/ag initiatives, including forming a new committee, in cooperation with the Chesapeake Bay Policy Committee. A report was prepared too - "What the Region Grows". Definite interest in finding ways to support local ag. There is interest too in "green" procurement. https://www.mwcog.org/environment/planning-areas/agriculture-and-forestry/regional-agriculture-initiative/	Cadmus, Dave CAP Community Meeting 1		1	2	2	2	2	9	2	2	2	2	2	1	1	21		Feel as though this is the only strategy that addresses food and food systems. Did not see any reference to renewable energy in the adaptation actions, may need to link this to the microgrid strategy or others. Food and DER are missing.
73	**Planning**	PL-2-Support Capacity Building for Climate Resilience Planning		Require climate change training for staff and County poilitical leadership responsible for capital infrastructure and large development projects to educate them about climate risks and how to manage them Develop a plan for monitoring and evaluation including the identification of key indicators of climate vulnerability and successful adaptation. Integrate monitoring and evaluation into existing performance management processes.	X	X	X		County		2	2	2	2	0	8	1	2	1	1	1	2	1	17		
74	**Planning**	PL-2-Support Capacity Building for Climate Resilience Planning		Identify potential sources of funding and financing including emerging financing tools like green/climate bonds. Leverage existing capital budgets (for public and private infrastructure) to implement upgrades over time.					County		2	2	1	2	0	7								7		
75	**Planning**	PL-2-Support Capacity Building for Climate Resilience Planning		Develop a system to regularly evaluate sea level rise and changes in the 100-year and 500-year flood plainin order to provide clear guidance to developers and regulators		X	X		County		2	2	2	2	0	8	1	2	1	1	1	2	1	17		
76	**Planning**	PL-2-Support Capacity Building for Climate Resilience Planning		Establish a public-private task force with key stakeholders including community organizations, businesses, and infrastructure owners and operators to oversee and coordinate implementation of the plan, identify funding opportunities, and develop crosscutting policy recommendations and design guidelines.					County		2	2	2	1	0	7								7		
				.																						

i. Develop integrated approach to climate resilience planning
ii. Update plans to address climate risks
iii. Support engagement of the public on climate risks with a particular emphasis on potentially vulnerable popul
iv. Support equitable secure energy access
v. Support Establishment of resilience hubs
vi. Improve the resilience of critical infrastructure
vii. Implement measures to equitably address urban heat islands
viii. Enhance green infrastructure networks
ix. Implement measure to reduce flood risk

	Assessment context	Scoring
Within County Control	*Is implementation of the action directly in the sphere of control of the County and its constituents or does it rely on regional/state/federal implementation?*	0 – No or very limited direct control 1 – Some direct control or opportunity for strong influence 2 – Complete direct control
Available technology/pathway "Feasible"	*Does the action rely on technologies that are currently available and cost competitive with conventional technologies?*	0 – Technology is not currently available 1 – Technology is available, but not at scale 2 – Technology is available at scale
Timeframe to implement	*Is the action implementable within the next 10 years?*	0 – >8 years to implement 1 – 3-8 years to implement 2 – <3 years to implement
GHG Impact	*Does the action have potential to significantly reduce greenhouse gas emissions in the County?*	0 – No impact on reducing GHG emissions 1 – Indirect impact on reducing GHG emissions 2 – Direct impact on reducing GHG emissions
Adaptation Impact	*What is the severity, immediacy, and current exposure to the hazards addressed by the action?*	0 – Low risk mitigation 1 – Moderate risk mitigation 2 – High risk mitigation
LMI Bonus		actions directly targetting or benefiting low/moderate income households will receive 2 bonus points in tier 2
Mitigation and resilience synergies	*Does this action advance both emissions mitigation and climate resiliency goals?*	0 – Advances neither goal 1 – Advances one goal but not the other 2 – Advances both goals
Alignment with Existing Programs	*Does the action align with existing or ongoing initiatives, plans, strategies, or programs at the County/regional/State level?*	0 – No support or alignment 1 – Some support or alignment 2 – Multiple points of support or alignment
Measurable Progress	*Is it possible to accurately track implementation progress of the action using defined tracking metrics?*	0 – No data available to track progress 1 – Limited data availability, some ability to track progress 2 – High quality, regularly updated data available to track progress
Community Health and QoL Impact	*Does the action have the potential to improve community health (air quality, water quality, etc.) and overall quality of life (public transit, open space, walkability, etc.) for residents, particularly those in vulnerable communities?*	0 – No positive health + quality of life impact 1 – Some positive health + quality of life impact 2 – Significant health + quality of life impact
Cost-effectiveness	*Does implementation of the action pay for itself and offer a positive return on investment for the County, residents, and businesses?*	0 – Negative financial return 1 – Cost neutral 2 – Positive financial return
Capacity/ funding to enact	*Does an internal or external champion have the capacity to adequately implement and maintain the action? Are financial resources existing or readily available to support the implementation of the action by the County, residents, and businesses?*	0 – No clear champion or funding 1 – Has clear opportunity for a champion or funding source, but prioritization of this action has yet to be finalized. 2 – Has both clear champion and funding, denoted by a similar existing program(s).
Economic and jobs impact	*Does the action have potential to stimulate economic growth and create local jobs?*	0 – No economic growth/job creation 1 – Some economic growth/job creation 2 – Significant economic growth/job creation

Criteria	**Assessment context**	**Scoring**
Within County Control	*Is implementation of the action directly in the sphere of control of the County and its constituents or does it rely on regional/state/federal implementation?*	0 – No or very limited direct control 1 – Some direct control or opportunity for strong influence 2 – Complete direct control
Available technology/pathway "Feasible"	*Does the action rely on technologies that are currently available and cost competitive with conventional technologies?*	0 – Technology is not currently available 1 – Technology is available, but not at scale 2 – Technology is available at scale
Timeframe to implement	*Is the action implementable within the next 10 years?*	0 – >8 years to implement 1 – 3-8 years to implement 2 – <3 years to implement
GHG Impact	*Does the action have potential to significantly reduce greenhouse gas emissions in the County?*	0 – No impact on reducing GHG emissions 1 – Indirect impact on reducing GHG emissions 2 – Direct impact on reducing GHG emissions
LMI Bonus	*Does the action specifically serve low income or vulnerable populations?*	0 – Does not specifically serve low income or vulnerable populations 2 – Does specifically serve low income or vulnerable populations
Mitigation and resilience synergies	*Does this action advance both emissions mitigation and climate resiliency goals?*	0 – Advances neither goal 1 – Advances one goal but not the other 2 – Advances both goals
Alignment with Existing Programs	*Does the action align with existing or ongoing initiatives, plans, strategies, or programs at the County/regional/State level?*	0 – No support or alignment 1 – Some support or alignment 2 – Multiple points of support or alignment
Measurable Progress	*Is it possible to accurately track implementation progress of the action using defined tracking metrics?*	0 – No data available to track progress 1 – Limited data availability, some ability to track progress 2 – High quality, regularly updated data available to track progress
Community Health and QoL Impact	*Does the action have the potential to improve community health (air quality, water quality, etc.) and overall quality of life (public transit, open space, walkability, etc.) for residents, particularly those in vulnerable communities?*	0 – No positive health + quality of life impact 1 – Some positive health + quality of life impact 2 – Significant health + quality of life impact
Cost-effectiveness	*Does implementation of the action pay for itself and offer a positive return on investment for the County, residents, and businesses?*	0 – Negative financial return 1 – Cost neutral 2 – Positive financial return
Capacity/ funding to enact	*Does an internal or external champion have the capacity to adequately implement and maintain the action? Are financial resources existing or readily available to support the implementation of the action by the County, residents, and businesses?*	0 – No clear champion or funding 1 – Has clear opportunity for a champion or funding source, but prioritization of this action has yet to be finalized. 2 – Has both clear champion and funding, denoted by a similar existing program(s).
Economic and jobs impact	*Does the action have potential to stimulate economic growth and create local jobs?*	0 – No economic growth/job creation 1 – Some economic growth/job creation 2 – Significant economic growth/job creation

					Notes Related to Evaluation Criteria													
					Tier 1						Tier 2							
Sector (from MDE)	MWCOG Strategy	Actions	Existing Program/Background Information	Source	Within County Control	Available technology/ pathway "Feasible"	Timeframe to implement	GHG Impact	LMI Bonus	Tier 1 Total (with LMI bonus)	Mitigation and resilience synergies	Alignment with Existing Programs	Measureable progress	Community Health and QoL Impact	Cost-effectiveness	Capacity/ funding to enact	Economic and jobs impact	Tier 1+2 Scoring Total	Notes/Thoughts from MWG Members
Carbon Sequestration on Natural and Working Lands	Enhance Incentives and Financing Mechanisms for Tree Planting and Preservation on Privately Owned Lands	Create new or expand existing **incentives for residents and local business to plant trees** that expand urban tree canopy	Tree ReLEAP Grant Program, Rain Check Rebate Program, Arbor Day Every Day Program, and Tree Planting Demonstrations available. https://www.princegeorgescountymd.gov/512/Plant-Trees#:~:text=Start%20Planting%20Native%20Trees.&text=Prince%20George's%20County%20will%20reimburse,from%20DoE%20at%20NO%20COST. Lanugage to protext existing tree canopy: The County Code – Prince George's County, Maryland Subtitle 25. – Trees and Vegetation Sec. 25-107. - Protection of trees during construction.	MW CEAP	2	2	2	1	0	7	2	2	2	2	1	2	0	18	
Carbon Sequestration on Natural and Working Lands	Enhance Regulatory Capacity to Manage Tree Canopy and Forest Protection	Calculate and establish **tree canopy goals** for major land use categories. Establish a no net loss of tree canopy goal.	N/A	MW CEAP, MWG	2	2	2	1	0	7	2	2	2	2	0	1	0	16	
Carbon Sequestration on Natural and Working Lands	Strategically Plant New Trees on Publicly Owned Land	Identify areas on County-owned lands appropriate for **additional tree plantings** and fund tree planting efforts at those prioritized locations	Tree ReLEAP Grant Program, Rain Check Rebate Program, Arbor Day Every Day Program, and Tree Planting Demonstrations available. https://www.princegeorgescountymd.gov/512/Plant-Trees#:~:text=Start%20Planting%20Native%20Trees.&text=Prince%20George's%20County%20will%20reimburse,from%20DoE%20at%20NO%20COST.	MW CEAP, MWG, Montgomery County CAP	2	2	2	1	0	7	2	2	2	2	0	1	0	16	
Carbon Sequestration on Natural and Working Lands	Enhance Regulatory Capacity to Manage Tree Canopy and Forest Protection	Strengthen **woodland conservation act** and preserve existing forests	Park and planning is marked as reviewing development permits and implementing the woodland conservation policy and fees - referenced to action CW 10.1 in the 2020 review of the 2012 CAP draft.	MWG 1	2	2	1	1	0	6									
Electricity Generation	Accelerate Deployment of Battery Storage	Provide or promote incentives to **community for energy storage systems**	Green Energy Loan Fund. FSC First serves as the Green Energy Loan Fund Manager and provides loan guaranty to participating lenders to compel them to provide financing for sustainable energy projects. Eligible projects include, but are not limited to: energy storage, community solar and other distributed energy generation, energy and water efficiency in buildings, microgrids, clean transportation, resiliency measures, and more.	MWG 1	2	2	2	2	0	8	2	2	2	2	2	2	2	22	
Electricity Generation	Accelerate Deployment of Battery Storage	Implement **energy storage pilot initiatives** at county facilities.	N/A	MWG 1, MW CEAP	2	2	2	2	0	8	1	1	2	1	2	1	1	17	This is more about adaptation. It is not really mitigation. Unless it is directly tied to solar WIlliam Ellis Dirty in dirty out
Electricity Generation	Accelerate Deployment of On-Site Renewables	**Install renewable energy systems** on new and existing county buildings and facilities, including schools.	Sustainable Energy has installed over 1MW of solar on government properties and will install an additional 4MW over the next 2 years (See Sustainable Energy Program website). Has partnered with Prince George's County Public School to install its first solar systems. The county has clean energy for public facilities legislation in place. **CB-083-2013 An Act concerning Clean Renewable Energy Technology in Public Buildings** for the purpose of requiring clean renewable energy technology in the contruction of public buildings; defining clean renewable energy technology; providing for a clean renewable energy technology project feasibility assessment by the Purchasing Agent; establishing a Clean Renewable Energy Fund; specifying the purposes and uses of the Fund; providing for the financing and	MWG 1, Community Meeting #1, MW CEAP	2	2	2	2	0	8	2	2	2	2	2	2	2	22	
Electricity Generation	Accelerate Deployment of On-Site Renewables	Continue to promote **solar energy co-operative** in Prince George's County.	See 2019 solar co-op here: https://www.solarunitedneighbors.org/co-ops/maryland/completed/. Note a regional solar co-op was launched in 2021 and any residents in the region (including PGC) can particiate. https://mygreenmontgomery.org/2021/capital-area-solar-co-op/	Community Meeting #1, MW CEAP	2	2	2	2	0	8	2	2	2	2	2	2	2	22	If you leverage buying power in the community, it helps provide a favorable rate. This has an equity or incentive component. Just setting up these cooperatives. Prioritize the municipalities here so that folks are
Electricity Generation	Accelerate Deployment of On-Site Renewables	Provide or promote incentives to encourage **installation of solar on existing buildings** in the community	County has **solar and geothermal tax credit** and the MEA Residential Clean Energy Grant Program for solar systems. Energy Resilience Zones target EERE in underserved communities: https://www.princegeorgescountymd.gov/2866/Sustainable-Energy-Resources Also see: **Green Energy Loan Fund.** FSC First serves as the Green Energy Loan Fund Manager and provides loan guaranty to participating lenders to compel them to provide financing for sustainable energy projects. Eligible projects include, but are not limited to: energy storage, community solar and other distributed energy generation, energy and water efficiency in buildings, microgrids, clean transportation, resiliency measures, and	MWG 1, MW CEAP	2	2	2	1	0	7	2	2	2	2	2	2	2	21	
Electricity Generation	Accelerate Deployment of On-Site Renewables	Establish new **construction ordinances** or incentives that require the installation of solar or solar-ready construction	N/A	MW CEAP	2	2	2	2	0	8	2	1	2	1	2	1	1	18	Gary supports any incentives for renwable on private residence. As well as requirements. Technical feasability of renewable isn't quite there yet so what is the transition plan. County provide a collaborative partnership so county and development of solar farms and low value soil areas, or
Electricity Generation	Accelerate Deployment of On-Site Renewables	Streamline **solar PV permitting** in the County. Achieve SolSmart Designation.	Rooftop Solar Challenge Grant - The County received a technical assistance grant from the U.S. Department of Energy (DOE) via MWCOG to develop and promote the Solar Road Map a web tool that provides a guidance on how to transform the local solar market by reducing "soft costs". According to DOE, non-hardware costs or "soft costs" - including permitting, installation and interconnection - can make up as much as 60% of the total installed cost of a rooftop PV system. The County in partnership with MWCOG is taking actions in four areas to bring down these soft costs and make it faster, easier, and cheaper to go solar.	Community Meeting #1	2	2	2	1	0	7	1	2	2	1	2	2	1	18	Gary supprts Maybe the action is just SolSmart and streamlining is a part of that
Electricity Generation	Accelerate Deployment of On-Site Renewables **AND** Accelerate Development of	Establish a **Purchase Power Agreement (PPA)** to provide clean electricity to County government facilities, potentially aggregating	N/A	MW CEAP	2	2	2	1	0	7	1	2	2	1	2	1	1	17	The County needs to put a foot in the ground and come up with a specific date. All municipal buildings by XXX will be powered by renewable. William Ellis Low hanging fruit
Electricity Generation	Accelerate Development of Large-Scale Off-Site Renewables	Purchase **renewable energy credits** for use in County Facilities	N/A	PGC 2012 CAP	2	2	2	1	0	7	1	2	2	1	0	1	0	14	

Electricity Generation	Accelerate Deployment of On-Site Renewables	Explore **potential solar PV installation sites** across the county including in power line rights of way, parking canopies, and mall/factory roofs.	Solar energy carport system installed at the Wayne K Curry Administration Building with three additional systems totalling 4 MW planned.	MW CEAP, Community Meeting #1	1	2	2	1	0	6										
Electricity Generation	Accelerate Deployment of On-Site Renewables	Explore feasibility of **other renewable options** like geothermal in the County	The schools actively look for geothermal opportunities including at least 6 schools.	MW CEAP	1	1	2	1	0	5										Tom is very interested in geothermal - Maryland has some great stability for geothermal for because of stability. This might be more appropriate for Building Energy (i.e. heat pumps)
Electricity Generation	Accelerate Deployment of On-Site Renewables **AND** Accelerate Development of Large-Scale Off-Site Renewables	Educate the **public on options for purchasing renewable energy** from their utility or alternative power providers.	Noted as an ongoing action (CW 4.2) in the 2020 review of the 2012 CAP	PGC 2012 CAP	1	2	2	1	0	6										More specific how we are going to involve these issues. Not enough to do tabling and flyers. Mass education. How to decide what to replace your dead furnance with? Classes at the community college, finacning, grants, - how do we provide county outreach that is a trusted source. Churches and nonprofits have a real time with financing issues because no specific property owner.
Electricity Generation	Accelerate Development of Microgrids for Critical Infrastructure	Assess feasibility of and implement **microgrids** for critical infrastructure and to support potentially vulnerable populations and underserved communities.	FY20 MEA funding to the County for resilience hub initiative for low income multi-family housing. Considering solar, battery storage, and CHP. https://news.maryland.gov/mea/wp-content/uploads/sites/15/2020/06/MEA-Resilient-Maryland-FY-20-Award-List.pdf	MWG 1, MW CEAP	1	1	1	1	2	6										
Electricity Generation	Advocate for Aggressive Renewable Portfolio Standards	Support the implementation of strong **state-level RPS** and encourage REC markets.	N/A	MWG 1, MW CEAP	0	2	2	1	0	5										
Electricity Generation	Advocate for and Implement Community Choice Aggregation	Implement **Community Choice Aggregations (CCAs)** and reduce barriers to CCA adoption	N/A	MW CEAP	0	1	1	1	0	3										
Other	County and Community Engagement, Education and Outreach	Provide accessible and meaningful **engagement opportunities for underserved communities** and develop a shared understanding of community needs and provide data, information, and resources to underserved communities and engage community members in citizen science so they are a part of developing relevant data for their community.	N/A	MW CEAP	2	2	2	1	2	9	2	2	2	2	1	1	1	20		
Other	Expand Proper Disposal and Leak Detection of Refrigerants	Institute best practices in **refrigerant management** in County operations, including leak monitoring and reporting and retrofitting or retiring older systems	N/A	MW CEAP	2	2	2	2	0	8	1	2	2	1	1	1	1	17		
Other		County to **stop approving new development** that is not transit oriented or planned with **smart growth principles**.	N/A	Community Meeting #1	2	1	2	2	0	7	2	2	2	1	1	1	0	16		
Other	Build Markets for Circularity	Advance climate planning through **continued assessment and setting of GHG emissions reduction goals** and climate/energy plans. Track progress toward climate goals through continued local government and community operations inventories	MWCOG GHG inventory effort update for CAP.	MW CEAP	2	2	2	1	0	7	1	2	2	1	0	2	0	15		Not that it matters since this doesn't seem like a high priority, but to me it doesn't really seem like this falls under "circularity" but perhaps a more general "climate planning" category.
Other	Build Markets for Circularity	Look to create **carbon offset purchases for County** scope 3 emissions like air travel and commuting	N/A	MWG 1	2	2	2	1	0	7	1	2	2	1	0	0	0	13		Not that it matters since this doesn't seem like a high priority, but to me it doesn't really seem like this falls under "circularity" but perhaps a more general "climate planning" category.

Other	Build Markets for Circularity	County to **set a directive for County departments** should consider how to reduce emissions in their their own operations and broader community-wide programs.	N/A	Montgomery County CAP	2	2	2	0	0	6										Not that it matters since this doesn't seem like a high priority, but to me it doesn't really seem like this falls under "circularity" but perhaps a more general "climate planning" category.
Other	County and Community Engagement, Education and Outreach	Define and develop the future **role of the Prince George's County Sustainability Action Group** (SAG) through a multi-year workplan.	Discussed and partially began in 2012 CAP draft.	PGC 2012 CAP	2	2	2	0	0	6										
Other	Build Markets for Circularity	Support efforts to establish a **national carbon fee** or other **carbon tax**	N/A	Community Meeting #1	1	1	2	1	0	5										Not that it matters since this doesn't seem like a high priority, but to me it doesn't really seem like this falls under "circularity" but perhaps a more general "climate planning" category.
Other		**Ban poisonous chemicals** in yards and fields.	N/A	Community Meeting #1	2	1	2	1	0	6										
Other		Reconsider infrastructure and system for the County's **wastewater treatment plants** (Broad Creek and Piscataway).	N/A	Community Meeting #1	0	1	2	2	0	5										
Other	County and Community Engagement, Education and Outreach	Develop roles and processes for **County departments and agencies to form subgroups** around specific climate initiatives	N/A	Montgomery County CAP	2	2	2	0	0	6										
Residential & Commercial Buildings	Accelerate Deep Building Retrofits	Build upon the existing **commercial property improvement program** to make improvements related to energy efficiency and clean energy eligible for grants.	County currently matches between 50-350k for commercial improvements. Would be great to include energy efficiency improvements and other items to this grant program. https://www.princegeorgescountymd.gov/DocumentCenter/View/23909/COMMERCIAL-PROPERTY-IMPROVEMENT-PROGRAM-NOTIFICATION-OF-FUNDING-AVAILABILITY-AND-GUIDELINESPDF?bidId=#:~:text=The%20Redevelopment%20Authority%20of%20Prince%20George's%20County%20Commercial%20Property%20Improvement,enhance%20retail%20competitiveness%20and%20viability.	Community Meeting #1	2	2	2	1	0	7	2	2	2	2	2	1	2	20	Seems repetitive of "Offer innovative energy financing solutions for residential or commercial sectors (e.g. green bank) or expand existing programs (C-PACE).". Suggest combining.
Residential & Commercial Buildings	Accelerate Deep Building Retrofits	**Retrofit existing County facilities** to net zero energy	The County entered into energy performance contracts with energy service companies Pepco and Johnson controls, Inc., to perform energy and water improvements to 10 county government buildings. This project, known as Phase I EPC, generates approximately $1,000,000 of energy savings annually.	MWG 1, MW CEAP	2	2	2	2	0	8	2	2	2	1	2	1	1	19		
Residential & Commercial Buildings	Accelerate Deep Building Retrofits	Offer assistance to **seniors and low-income communities to retrofit homes** or provide energy efficiency upgrades to homes.		Community Meeting #1	2	2	2	1	2	9	2	1	1	1	2	1	1	18		Utilities offer incentives? DHCD, State MEA LMI program Supplemental incentives for those who dont qualify for those programs. Health and safety issues that prevent this from being done (i.e. mold and roof)
Residential & Commercial Buildings	Accelerate Deep Building Retrofits	Promote **state and utility incentives and technical assistance** for residential and commercial deep energy retrofits. Consider supplementing with local incentives.	See Sustainable Energy Program links above and here: https://www.princegeorgescountymd.gov/936/Sustainable-Energy-Program	MWG 1, MW CEAP, Community Meeting #1	2	2	2	1	0	7	2	1	1	2	2	1	2	18		
Residential & Commercial Buildings	Accelerate Deep Building Retrofits	Offer innovative **energy financing solutions** for residential or commercial sectors (e.g. green bank) or expand existing programs (C-PACE).	C-PACE is established and the County administers. https://md-pace.com/where-is-pace-in-md/	MW CEAP, PGC 2012 CAP	2	2	2	1	0	7	2	2	1	1	2	2	1	18		
Residential & Commercial Buildings	Accelerate Deep Building Retrofits **OR** Enhance Green Building Codes and Policies to Facilitate Net Zero Energy Building Development	Establish incentives and awareness programs to support the **electrification of fossil-fuel based buildings technologies**		MW CEAP	2	2	2	1	0	7	2	2	1	2	1	1	1	17		Which category this would fall underdepends on if you are talking about new or existing buildings. For COG, actions under Deep Retrofits refer to actions for existing buildings and actions for new buildings were falling under GB codes.
Residential & Commercial Buildings	Enhance Green Building Codes and Policies to Facilitate Net Zero Energy Building Development	Adopt net zero energy codes for new residential and commercial buildings by 2030.	2020 review of the 2012 PGC CAP draft notes the following completed action (CW 3.2 and 3.3): Adopt and implement a county-wide green building standard for commercial and residential buildings and amend the zoning and building codes in ways that increase energy efficiency and promote green building construction and retrofitting.	MWG, MW CEAP, PGC 2012 CAP	2	2	2	2	0	8	2	2	2	2	2	1	1	20		Need to explore this and then educate those who are required to implement. How do County standards relate to national standards. Focus on building codes All new Net Zero by XXXX

Residential & Commercial Buildings	Enhance Green Building Codes and Policies to Facilitate Net Zero Energy Building Development	Adopt policy for **all new County facilities to be net zero energy**	N/A	MW CEAP, MWG	2	2	2	2	0	8	2	2	2	1	2	1	1	19	Lead by example - county should be doing this.
Residential & Commercial Buildings	Enhance Green Building Codes and Policies to Facilitate Net Zero Energy Building Development	Establish new **construction ordinances** or incentives that focus on improving energy efficiency requirements for buildings	N/A	MW CEAP, Community Meeting #1	2	2	2	2	0	8	1	1	2	2	2	1	1	18	educate contractors so that they are advocates for the climate strategies This overlaps with the zero energy code action "Adopt net zero energy codes for new residential and commercial buildings by 2030" unless it's a precursor for that action.
Residential & Commercial Buildings	Enhance Green Building Codes and Policies to Facilitate Net Zero Energy Building Development	**Educational campaigns** to share information on reducing gas use (for cooking and heating) in buildings (including environmental and health considerations)	N/A	Community Meeting #1	1	2	2	1	0	6									Are there any fuel switching incentives? None at this time but this would be a good point.
Residential & Commercial Buildings	Expand Building Benchmarking Requirements **OR** Accelerate Deep Building Retrofits	Develop and implement a **benchmarking program in County** operations to track energy consumption at County buildings and identify least efficient buildings. Retrofit County buildings to improve energy efficiency measures.	Similar program to this noted on action 3.2 and 6.1 from the 2020 update on the 2012 CAP draft plan. Ongoing use of EnergyCAP software to create energy data repository for County facilities. The County entered into energy performance contracts with energy service companies Pepco and Johnson controls, Inc., to perform energy and water improvements to 10 county government buildings. This project, known as Phase I EPC, generates approximately $1,000,000 of energy savings annually.	MWG 1, MW CEAP	2	2	2	2	0	8	1	2	2	1	1	1	1	17	go aggresive here to align with regional peers. even if it is just reporting for now, but at the very least this should start now. What agency collects this information? DoE or someone else? OCS - based on the County buildings they lead these efforts in 2012. DoE would get involved in community wide efforts.
Residential & Commercial Buildings	Expand Building Benchmarking Requirements	Develop and implement a community commercial and multifamily building benchmarking ordinances and/or provide incentives to buildings that agree to annual benchmarking	N/A	MW CEAP	2	2	2	1	0	7	1	2	2	1	1	1	1	16	...and reporting and recognizing those that achieve ENERGY STAR rating?
Residential & Commercial Buildings	Expand Building Benchmarking Requirements	**Benchmark County's building codes and standards** against others and identify areas to strengthen it.	N/A	Community Meeting #1	1	2	2	1	0	6									important If going to benchmark against others specifically call out that you are going to do ENERGY STAR benchmarking (again, no reason to reinvent the wheel as this is the benchmarking standard). By stengthen it, you can be more clear and say strive to achieve ENERGY Star rating.
Transportation	Bring Jobs and Housing Closer Together	Coordinate local policy revisions to zoning and plans to provide for **additional housing units, particularly affordable housing units, in Activity Centers and near high capacity transit**, especially underused Metro stations	See revised zoning plan in 2018 here: http://zoningpgc.pgplanning.com/	MW CEAP. Community Meeting #1, Montgomery CAP	1	2	2	2	2	9	1	2	2	2	1	2	1	20	
Transportation	Build Out Electric Vehicle Charging Network	Develop **electric vehicle (EV) infrastructure plans** for community deployment	County is currently working on kicking off a plan for development. Marked as ongoing action CW 7.2 in 2020 review of 2012 PGC CAP draft.	MWG 1, MW CEAP, Community Meeting #1	2	2	2	1	0	7	1	2	2	2	2	2	2	20	
Transportation	Build Out Electric Vehicle Charging Network	Require new construction to install electric vehicle (EV) infrastructure or be EV-Ready to	N/A	MW CEAP	2	2	2	2	0	8	1	1	2	2	2	1	2	19	Important. No Brainer.
Transportation	Build Out Electric Vehicle Charging Network	**Deploy EV infrastructure** at County facilities, garages, and refueling facilities	3 bus charging stations have been built for County electric buses.	MW CEAP	2	2	2	2	0	8	1	2	2	1	2	2	1	19	Pepco has a program for this.
Transportation	Enhance Options for Commuters	Subsidize **public transit**	County has RideSmart Solutions for alternative transportation options and subsidized transit programs. https://www.princegeorgescountymd.gov/1147/Alternative-Commuting	Community Meeting #1	2	2	2	1	2	9	1	2	1	2	1	1	1	18	
Transportation	Expand Light-Duty Electric Vehicle Deployment	Implement community-wide **electric vehicle (EV) buying co-ops**	N/A	MW CEAP	2	2	2	2	0	8	1	2	2	2	1	1	1	18	

Transportation	Expand Light-Duty Electric Vehicle Deployment	Reevaluate the green fleet policy to **transition County fleet** to zero emission vehicles	The County Council approved a Green Fleet Policy further promote the purchase of clean and efficient vehicles. To this end, the Fleet Division has purchased liquefied petroleum gas (LPG) powered vehicles, innovative XL hybrid vehicles and other energy vehicles to comply with the plan. Current policy includes a fleet petroleum reduction plan and the recent completion of an EV infrastructure plan for county fleet. In 2015, COG partnered with Vision Fleet to conduct local government fleet electrification assessments for several COG members. The fleet was evaluated and recommendations for fleet electrification and efficiency improvements were provided. The County's Smart Energy Communities Policy and Petroleum Reduction and Renewable Energy Action Plan declare the County's intent to take a leadership role in reducing transportation petroleum consumption and increasing renewable energy generation by partnering with the Maryland Energy Administration (MEA) and enrolling as a Smart Energy Community.	MW CEAP	2	2	2	2	0	8	1	2	2	1	2	2	0	18	
Transportation	Enhance Options for Commuters **OR** Invest in Infrastructure that Increases Transit, Carpooling, and Non-Motorized Travel	Increase walkability and bikeability by i**nvesting in infrastructure like designated bike lanes and widened sidewalks**, with a particular emphasis on areas that improve access to transit	VisionZero plan includes efforts to make streets safer for walking and biking as well as other traffic accidents. https://www.princegeorgescountymd.gov/2266/BikingWalking-Resources Jurisdictions and partners from across the region are committed to VisionZero and at least coordinate via and annual summit. COG coordinates for the region the Street Smart Safety Campaign. https://www.mwcog.org/transportation/planning-areas/walking-and-biking/streetsmart-safety-campaign/. COG also coordinates with the County, other jurisdictions and partners every year on Bike to Work and Car Free Days. This effort is lead by our Commuter Connections Program and they coordinate steering committees to launch the events each yeat. Ongoing action of incorporating principles of complete streets into land use planning and urban design in order to create bike and pedestrian friendly communities (CW 5.1) in 2020 reivew of 2012 PGC CAP.	MWG 1, MW CEAP, Community Meeting #1, Montgomery CAP	2	2	1	2	0	7	1	2	1	2	1	2	2	18	Janet is interested in safe streets - overlaps with land use and adaptation.
Transportation	Bring Jobs and Housing Closer Together	Encourage and **incentivize telecommutting** and work from home for County employees	N/A	MWG 1, MW CEAP, Community Meeting #1, PGC 2012 CAP	2	2	2	2	0	8	2	1	1	2	1	2	0	17	
Transportation	Accelerate Electrification of Medium- and Heavy-Duty Vehicles	**Electrification of public buses** (transit and school)	Received funding in October 2020 to purchase 8 Proterra battery-electric buses for TheBus. Builds upon 4 prior Proterra buses purchases and three charging stations. https://content.govdelivery.com/accounts/MDPGC/bulletins/2a5ae3d	MWG 1, MW CEAP, Montgomery CAP	2	2	1	2	0	7	1	2	2	2	1	1	1	17	Prioritize overburdned communities. Those who suffer air quaity issue and lack metro
Transportation	Build Out Electric Vehicle Charging Network	**Streamline permitting** for EV infrastructure	N/A	Community Meeting #1	2	2	2	1	0	7	1	2	2	1	2	1	1	17	Change permiting for Gas Stations, reduce exemptions and stop extending waivers
Transportation	Enhance Options for Commuters	**Expand The Bus service** through either increased frequency, increased stops or weekend service.	MWCOG (Maia Davis) could ask transportation staff that work with public transportation bus coordinators what actions related to this that The Bus has already taken or what need there is to do this for The Bus.	MWG 1	1	2	2	2	0	7	1	2	1	2	1	1	1	16	This action item should specifically refer to the County's public transit system The Bus. In addition to The Bus, Metro operates bus routes in the County and MDE operates commuter buses through the region.
Transportation	Bring Jobs and Housing Closer Together	Commission a study looking at the overall **environmental impact of working from home versus working in an office**.	N/A	Community Meeting #1	2	2	2	1	0	7	2	1	2	2	0	1	0	15	WFH - Most folks are working from home during COVID. Are there incentives for incentivizing work from home policies. How do we not go back to "normal" ? Normal wasn't working. Tom - doesn't think that County has authority here. State or Feds maybe. How does this affect land use planning? Does this contradict mass transit planning? COG provides incentives to provide Local Government and employeers to provide telecommuting incentives
Transportation	Invest in Infrastructure that Increases Transit, Carpooling, and Non-Motorized Travel	Conduct an **employee commute survey** at major facilities in the County	Planned as an upcoming action (4.5) from the 2020 review of the 2012 CAP draft.	PGC 2012 CAP	2	2	2	1	0	7	1	2	1	1	1	2	0	15	
Transportation	Invest in Infrastructure that Increases Transit, Carpooling, and Non-Motorized Travel	Explore opportunities for **car sharing** in the county-owned fleet	Discussed and ongoing action (3.4) from the 2020 review of the 2012 CAP draft. County has Commuter Connections program to promote ride share, and transportation alternatives.	PGC 2012 CAP	2	2	2	1	0	7	1	2	1	1	1	1	0	14	Commuter Connections is more of a "enhance options for commuters" program than this action that relates to car sharing within the fleet.
Transportation	Build Out Electric Vehicle Charging Network	Provide or promote **incentives for electric vehicle (EV) infrastructure** deployment in the community.	Currently promote utility incentives including the Pepco and BGE EV Charging Pilot Programs. https://www.princegeorgescountymd.gov/2866/Sustainable-Energy-Resources	MWG 1, MW CEAP	1	2	2	1	0	6									
Transportation	Bring Jobs and Housing Closer Together	Pursue transit oriented development and smart growth strategies	N/A	MWG	1	2	2	1	0	6									COG is not an authority and we can't dictate local transportation or land use decisions; therefore, one can't "comply" with COG. The detailed "blueprint" for this action could highlight the region goals for number of new homes in Acivity Centers and high capacity transit cooridors. But this is really just a repeat of the action in row 21; therefore, I recommend deleting this row.

Transportation	Invest in Infrastructure that Increases Transit, Carpooling, and Non-Motorized Travel	Invest further in **MARC** Train Service	N/A	Community Meeting #1	0	2	2	2	0	6										The County doesn't have control over MARC train service. Its a state function that contracts Amtrack to operate MARC. Is this more about advocating for the state and Amtrack to invest or really looking at something more under County control like investing in infrastructure that increases non-motorized accessibility to train stations or TOD around MARC stations?
Transportation	Expand Light-Duty Electric Vehicle Deployment **OR** Accelerate Electrification of Medium- and Heavy-Duty Vehicles	Implement and enforce **anti-idling programs** in the community.	Action CW 7.4 marked as incomplete in the 2020 review of the 2012 CAP draft. For a number of years COG - in partnership with DC, MD, and VA - has operated a Regional Diesel Idle Reduction Campaign - Turn Off Your Engine. The purpose of the campaign is to increase idle reduction awareness and control diesel emissions; promote idle reduction as a positive behavior that helps bus and truck drivers to avoid fines, save money, and cut fuel costs; and to improve public health and protect the environment The program features a driver recognition program.	PGC 2012 CAP	1	2	2	1	0	6										
Transportation	Invest in Infrastructure that Increases Transit, Carpooling, and Non-Motorized Travel	**Discontinue free parking** at employment sites within Activity Centers and near high capacity transit stations	N/A	MW CEAP	1	2	2	1	0	6										
Transportation	Enhance Efficiency of Non-Road Equipment	Encourage the use of **electric battery powered yard and garden equipment**/require professional lawn care companies to use electric power mowers and blowers	N/A	Community Meeting #1	1	1	2	1	0	5										This would be a Transportation Non-Road measure or you could put it in your "other" category. If you want to keep a Non-Road measure here you may want to expand it to other non-road uses, such as construction equipment.
Transportation	Invest in Infrastructure that Increases Transit, Carpooling, and Non-Motorized Travel	Support the state in participating in the **Transportation Climate Initiative** (TCI)	COG (CEEPC and TPB) are engaged in TCI. We are engaging and educating our members, encouraging state and local participation, coordinating with GCC and regional agencies throughout the mid-Atlantic and NE, supporting data needs for TCI modeling, etc. The County has representation on CEEPC and TPB but if you need more on how engaged the County is or if they participated in stakeholder sessions, etc I could inquire (Maia).	MW CEAP, Community Meeting #1	0	2	2	1	0	5										
Transportation	Invest in Infrastructure that Increases Transit, Carpooling, and Non-Motorized Travel	**Join the Purple and Silver lines** to create a loop around the city.	COG helped area leaders forge consensus on the transit system's capital needs and then supported dialogue among the District of Columbia, Maryland, and Virginia officials that resulted in a landmark dedicated funding agreement in 2018. The $500 million-a-year in new, dedicated funding will allow Metro to implement its $15.5 billion, 10-year capital improvement program. I'd have to reach out to our Transporatation team to get the details on what was committed to re: silver and purple lines and County specific details (Maia).	Community Meeting #1	0	1	1	1	0	3										This action item should specifically refer to the County's public transit system The Bus. In addition to The Bus, Metro operates bus routes in the County and MDE operates commuter buses through the region.
Waste Management	Implement Curbside Organics Recycling Programs	Prioritize **expansion of the food scraps curbside collection program** so more households and business have access to organic diversion	Have the first launched pilot in the region that's been expanding. https://www.mwcog.org/newsroom/2019/10/10/officials-applaud-local-actions-advancing-regional-climate-goals/ See action CW 11.1 on promoting local agriculture, farmers, markets, and community gardens in the 2020 review of the 2012 CAP draft.	MWG 1, MW CEAP, Community Meeting #1	2	2	2	2	0	8	2	2	1	2	1	2	1	19		
Waste Management	Reduce Solid Waste Generation	Implement and enforces**ingle-use plastic and polystyrene ban**s (e.g. restaurants, grocery stores)	"Foam Free in PGC" ban as of 2016 which bans foam articles and packaging from use or sale in the County. Plastic straw ban as of 2020 (CB-52-2019) banning straws and stirrers that are nto reusable or home-compostable.	MW CEAP, Community Meeting #1	2	2	2	1	0	7	2	2	2	1	1	2	0	17		
Waste Management	Reduce Solid Waste Generation	**Enhance solid waste recycling** at County facilities	Discussed and ongoing action (6.3) from the 2020 review of the 2012 CAP draft.	PGC 2012 CAP	2	2	1	2	0	7	2	2	2	1	1	2	0	17		
Waste Management	Reduce Solid Waste Generation	**Educate students** about agroecological and regenerative farming.	N/A	Community Meeting #1	2	2	2	0	0	6										Combine with organic school garden action?
Waste Management	Reduce Solid Waste Generation	Promote **paper use reduction**	Discussed and ongoing action (6.1) from the 2020 review of the 2012 CAP draft.	PGC 2012 CAP	1	2	2	1	0	6										
Waste Management	Reduce Solid Waste Generation	Add organic gardens in schools and offer organic food from local farms.	Hillcrest Heights Elementary set up urban organic garden beds to grow fruits and vegetables in 2019.	Community Meeting #1	1	2	2	0	0	5										Combine with agroecological and regenerative farming education action?
Waste Management	Reduce Solid Waste Generation	Incentivize exchange programs and **markets for second-hand products**.		MW CEAP	1	1	2	1	0	5										

Sector (from MDE)	MWCOG Strategy	Actions	Notes on combination/filtering	CADMUS Recommended Top Actions
Electricity Generation	Accelerate Deployment of Battery Storage	Provide or promote incentives to **community for energy storage systems**	likely to complement resilience recommendations; may be opportunities to merge	1. Provide or promote incentives available to the community for energy storage systems paired with solar PV.
Electricity Generation	Accelerate Deployment of On-Site Renewables	**Install renewable energy systems** on new and existing county buildings and facilities, including schools.		2. Continue to install renewable energy systems on new and existing county-owned buildings and facilities, including schools.
Electricity Generation	Accelerate Deployment of On-Site Renewables	Provide or promote incentives to encourage **installation of solar on existing buildings** in the community	Cadmus recommends merging these into a single recommendation	3. Continue work to promote and incentivize solar energy installations on residential and commercial properties. This includes continuing to promote solar cooperatives and streamlining solar permitting.
Electricity Generation	Accelerate Deployment of On-Site Renewables	Streamline **solar PV permitting** in the County. Achieve SolSmart Designation.		
Electricity Generation	Accelerate Deployment of On-Site Renewables	Continue to promote **solar energy co-operative** in Prince George's County.		
Electricity Generation	Accelerate Deployment of On-Site Renewables	Establish new **construction ordinances** or incentives that require the installation of solar or solar-ready construction	Combine Net Zero buildings actions into one. Separation between new and existing and county vs community	4. Further Net Zero emissions goals in the County: adopt net zero codes for new County, residential, and commercial buildings by 2030. Simultaneously develop a plan to retrofit County facilities to Net Zero.
Residential & Commercial Buildings	Enhance Green Building Codes and Policies to Facilitate Net Zero Energy Building Development	Establish new **construction ordinances** or incentives that focus on improving energy efficiency requirements for buildings		
Residential & Commercial Buildings	Enhance Green Building Codes and Policies to Facilitate Net Zero Energy Building Development	Adopt policy for **all new County facilities to be net zero energy**		
Residential & Commercial Buildings	Enhance Green Building Codes and Policies to Facilitate Net Zero Energy Building Development	Adopt net zero energy codes for new residential and commercial buildings by 2030.		

Residential & Commercial Buildings	Accelerate Deep Building Retrofits	**Retrofit existing County facilities** to net zero energy		
Residential & Commercial Buildings	Accelerate Deep Building Retrofits	Build upon the existing **commercial property improvement program** to make improvements related to energy efficiency and clean energy eligible for grants.	Combine actions related to financing for energy efficiency efforts	5. Offer financing solutions for residential and commercial buildings to improve energy efficiency and facilitate clean energy purchases. Includes building on the commercial property improvement program, promoting state and utility incentives and financial assistance, and offering green bacnk or C-PACE programs.
Residential & Commercial Buildings	Accelerate Deep Building Retrofits	Promote **state and utility incentives and technical assistance** for residential and commercial deep energy retrofits. Consider supplementing with local incentives.		
Residential & Commercial Buildings	Accelerate Deep Building Retrofits	Offer innovative **energy financing solutions** for residential or commercial sectors (e.g. green bank) or expand existing programs (C-PACE).		
Residential & Commercial Buildings	Accelerate Deep Building Retrofits	Offer assistance to **seniors and low-income communities to retrofit homes** or provide energy efficiency upgrades to homes.	Stand alone action - focus on assistance to low-income and seniors to target improvements to populations less likely to seek them on their own.	6. Offer assistance to **seniors and low-income communities to retrofit homes** or provide energy efficiency upgrades to homes.
Transportation	Build Out Electric Vehicle Charging Network	Require new construction to install electric vehicle (EV) infrastructure or be EV-Ready to **accommodate future EV charging infrastructure**		7. Require new construction to install electric vehicle (EV) infrastructure or be EV-Ready to **accommodate future EV charging infrastructure.**
Transportation	Build Out Electric Vehicle Charging Network	**Deploy EV infrastructure** at County facilities, garages, and refueling facilities	Combine EV infrastructure actions	8. Establish EV infrastructure plans for County buildings and the broader Community and deploy charging stations on a near-term timeline.
Transportation	Build Out Electric Vehicle Charging Network	Develop **electric vehicle (EV) infrastructure plans** for community deployment		
Transportation	Expand Light-Duty Electric Vehicle Deployment	Reevaluate the green fleet policy to **transition County fleet** to zero emission vehicles	Combine EV purchasing actions	9. Support purchase of electric vehicles. At the County level, update the green fleet policy to transition County fleet to EVs. At the Community level, support electric vehicle buying co-ops.
Transportation	Expand Light-Duty Electric Vehicle Deployment	Implement community-wide **electric vehicle (EV) buying co-ops**		
Transportation	Enhance Options for Commuters	Subsidize **public transit**	Stand alone - incentives for public transit.	10. Subsidize **public transit**.

Transportation	Enhance Options for Commuters **OR/AND** Invest in Infrastructure that Increases Transit, Carpooling, and Non-Motorized Travel	Increase walkability and bikeability by i**nvesting in infrastructure like designated bike lanes and widened sidewalks**, with a particular emphasis on areas that improve access to transit	Stand alone - infrastructure support for non-vehicular modes of transport	11. Increase walkability and bikeability by i**nvesting in infrastructure like designated bike lanes and widened sidewalks**, with a particular emphasis on areas that improve access to transit.
Transportation	Bring Jobs and Housing Closer Together	Coordinate local policy revisions to zoning and plans to provide for **additional housing units, particularly affordable housing units, in Activity Centers and near high capacity transit**, especially underused Metro stations	Stand alone - action to support zoning and planning to manage land use/urban sprawl	12. Coordinate local policy revisions to zoning and plans to provide for **additional housing units, particularly affordable housing units, in Activity Centers and near high capacity transit**, especially underused Metro stations.
Waste Management	Implement Curbside Organics Recycling Programs	Prioritize **expansion of the food scraps curbside collection program** so more households and business have access to organic diversion	Stand alone - waste management action	13. Prioritize the strategic **expansion of the food scraps curbside collection program** so more households and high-use/waste generating businesses have access to composting.
Carbon Sequestration on Natural and Working Lands	Enhance Incentives and Financing Mechanisms for Tree Planting and Preservation on Privately Owned Lands	Create new or expand existing i**ncentives for residents and local business to plant trees** that expand urban tree canopy	merge with larger goal of "no net loss" (will likely be opportunities to merge with recommendations coming from adaptation working group)	14. Create new or expand existing i**ncentives for residents and local business to plant trees** that expand urban tree canopy in service to larger County-wide goal of no net loss of forest.
Other	County and Community Engagement, Education and Outreach	Provide accessible and meaningful **engagement opportunities for underserved communities** and develop a shared understanding of community needs and provide data, information, and resources to underserved communities and engage community members in citizen science so they are a part of developing relevant data for their community.	Stand alone - dedicated community program for underserved community vis-à-vis climate mitigation	15. Provide accessible and meaningful **engagement opportunities for underserved communities** and develop a shared understanding of community needs and provide data, information, and resources to underserved communities and engage community members in citizen science so they are a part of developing relevant data for their community.