

**Ms. Adriana Hochberg**, Assistant Chief Administrative Officer and Climate Change Coordinator  
**Mr. Stan Edwards**, Chief, Energy, Climate, & Compliance Division  
Montgomery County Government  
Executive Office Building  
101 Monroe Street, 2nd Floor  
Rockville, MD 20850

**Comments submitted by:**

Karen Metchis  
[REDACTED]  
[REDACTED]

Thank you for the opportunity to comment on the Montgomery County Climate Adaptation Plan (CAP). It is a comprehensive and complex undertaking, and I commend you and your team for all the work in producing this excellent document. I do have several recommendations for improvement. While I have signed on to comments submitted by other coordination groups, I am submitting the following comments on my own behalf.

**Prioritization and Implementation Actions**

In general, the draft Climate Action Plan(Plan) includes a lot of useful information and analyses. However, while the Plan is comprehensive in some respects, it seems to be a statement of potential options rather than an action plan. Are these all high priority actions that you intend to do? If so, fine. But I suspect that the County will need to pick and choose what to do. Therefore, in my view, it would benefit greatly from having a list of prioritized actions. I agree with others that the final Plan should include this kind of information for the three GHG reduction areas – energy, transportation and buildings. ***Here, I am emphasizing that the Plan also should include a similar set of priority actions for adaptation, sequestration, governance, and community outreach and engagement. Prioritization could include criteria such as: critical path, urgency, low hanging fruit, ability to upscale existing programs, co-benefits, and level of risk (probability vs. impacts).***

**Vulnerability Assessment**

Despite the many times I inquired during calls with the contractor on how they were going to do the vulnerability assessment, I never got a complete answer and in the end, I find the vulnerability assessment to be incomplete and, with one exception, it is at a very conceptual level analysis. It is hard to see how this vulnerability assessment actually informed specific actions in the adaptation plan.

I recognize this requires a level of analysis that the contract (time frame, funding, contractor’s skill, data, etc.) didn’t allow, the CAP should articulate the intent and plan to pursue this in greater depth. I compliment you on the thorough analysis done for understanding and prioritizing equity for the most socially vulnerable but the analysis in other aspects is lacking. In other regards, a more thorough vulnerability analysis will not only improve targeting of investment, but it will also help characterize the nature of the climate emergency to County residents.

For example, there is no topographic overlay to understand risk to homes and businesses; there is no discussion of areas targeted for densification and undergoing significant change in impervious cover; and the analysis ignores areas with older housing stock (pre-1970's) that are typically owned by moderate income or older homeowners that are still economically or epidemiologically at risk when impacts occur. I detail other limitations below.

***To remedy this in the final CAP, the discussion should include intention to do something more in-depth, that includes more bottom up modeling and not just downscaling.*** Given this will take additional time, I urge you to proceed with taking adaptation actions now which can be further refined after such analyses are done.

### **Specific Comments**

My detailed comments are organized by section.

#### **Climate Hazards (pp. 33ff)**

In contrast to the thorough social vulnerability discussion, the section on Climate Hazards is unbalanced with regard to heat, precipitation and wind.

- **Heat:** Specifically, it is stated that the vulnerability assessment does not directly quantify the urban heat island effect “but it would likely increase.” This is a huge blind spot. The urban heat island effect can increase affective air temperature some 15 degrees F. It is essential to evaluate not just number of high heat days, but to overlay areas with high heat island effect for targeting cooling strategies. Including such analysis would reveal the urgent priority for and aggressive campaign to expand tree canopy, green space, and strategies to cool the exterior aspect of buildings.
- **Precipitation:** The discussion of precipitation is inadequate given the clear and widespread potential impacts, second only to extreme temperature. It relies on the existing outdated NOAA statistics as the baseline (Table 3, without attribution), and asserts moderate risk based on highly uncertain downscaling. It dispenses with a discussion of the observed and expected phenomenon that rain is falling in more intense, short duration events (due to limitations of the contractor's FLEx model). The discussion actually states that the 1-,5-, and 10- year event will have little or no change! On what basis - on an admittedly limited FLEx model?

By the way, the last paragraph on page 38 states that roadways are designed for ‘current’ precipitation conditions. This is inaccurate. In fact they are designed for **historical** precipitation conditions. These design statistics have not been updated by NOAA since 2000, and those were based on old data. NOAA's current modeling has other limitations as well, including assuming stationarity of the climate, does not capture changing trends, and other technical limitations.

The vulnerability analysis later does not discuss or compare the ability of our stormwater and drainage infrastructure to handle short-duration downpours. These parameters should be discussed and recommendations made for further analysis as a high priority.

Furthermore, there needs to be more recognition that 'nuisance' flooding is misnamed in common parlance. While not catastrophic in the conventional sense, nuisance flooding is catastrophic to those affected economically. There are gradations of vulnerability.

A note on the box on page 46, "Impacts of Urban Flooding on Climate Vulnerable Communities." The discussion may be accurate nationwide, but not necessarily in Montgomery County - and there is no analysis to explicate how this discussion manifests in our county.

- **Wind:** The Climate Hazards section also gives short shrift to a discussion of risks from hurricanes and high winds...because the contractor's FLEx tool doesn't have the data. In this case, there should be at least a literature search on the state of the science that leads us to expect more intense wind events in our area. FYI: Earl Stoddard present the Adaptation Workgroup information on increasing trends in wind damage among other County level observations.

### **Climate Risk Reduction (pp. 48ff)**

Figure 15 needs an explanatory key for interpretation.

This analysis is confusing and I don't understand its basis or how you used it. Maybe you need to include how these numbers were determined.

- Why is A-11 rated so low? (climate-adapted building code)

### **Action Prioritization (p. 74ff)**

p. 75 Feasibility criteria: I would add whether there is an existing program for which the action can be enhanced or mainstreamed. This would lend weight to low-hanging fruit opportunities.

Figures 23,26, and 27 need an explanatory key for interpretation.

Figure 28: It would be easier to understand what you are conveying if you could provide a ranked list of actions. Kind of confusing.

### **How to Read CAP Actions (pp. 83ff)**

Re: County Investment: the scale is so low that everything will seem like high cost. To me, low cost is less than \$500K, and high cost would be greater than \$5M.

### **Sequestration (pp. 139ff)**

Table 16 evaluation seems somewhat off.

S-1 - retain forests is not just about extreme precipitation...it is also heat. And why does it get three dollar signs to "retain" forests?

S-2 is a huge racial equity action, and does it really merit the dollar signs? isn't this offset by a fee developers pay for removing trees? isn't there a surplus?

S-3: three dollar signs?

S-4: high winds? three dollar signs?

**S-1:**

- Page 140: summary at top: Climate Risk Reduction is not just about extreme precipitation....it is also about reducing the urban heat island effect that is given short shrift in this entire document
- Text box (Equity-Enhancing Measures)
- First bullet in textbox: It is counter-intuitive to *prioritize retention of forests* where there is less 'access' to green space – this should be: “prioritize retention **and expansion** of forests...”
- Fourth bullet: What does it mean to enhance the wood products industry? What does that mean? How does this increase opportunities to retain forests???

**S-2**

- p. 141: last paragraph: add co--benefit for reducing the heat island effect.
- p. 142: S-2: text box: “Prioritize” - generically stating ‘prioritize’ doesn’t convey action or outcome. change to “Prioritize the expansion of green corridors in more urban areas...”

**S-3**

- p. 144: text box: same comment as above. Change “prioritize” to an action word.
- Native plants are mentioned in both sequestration (S3, S5) and adaptation (A: 6,10,12). When native species are discussed within the community, the assumption tends to be local (e.g. state, neighboring states and there can be confusion about the appropriateness of local natives for changing climate). In the report *native* takes on a regional perspective, such as in S3 “All planting projects should rely heavily on native tree species that will likely be able to adapt to the County’s changing climate”. This is clear to those with some technical knowledge but not for the general community.

**Climate Adaptation Actions (pp. 149ff)**

In general, it is a good section and reflects many of the Adaptation Workgroup’s recommendations.

There doesn’t seem to be a conceptual thread about protecting or managing the health of our natural resources other than for either the purpose of sequestration or reducing impacts on people (i.e., green infrastructure or protecting drinking water sources). It ignores the whole section in the Adaptation workgroup’s recommendations on natural resources. The section on Sequestration doesn’t bridge this gap either. To that end, I refer you in more specificity to the comments submitted by Phil Bogdonoff on behalf of the Sequestration team that I worked with.

**What’s Missing**

1. **Infrastructure** - A1, A2, A4, A5, A6, A9, A10, A11, A12, A13, A14. Taken as a whole, these items need to be arranged and discussed in the context of how the county can cumulatively strengthen how to address abatement of runoff and flooding in light of increasingly intense rainfall, impervious cover, and topography to address so-called ‘nuisance’ flooding as well as catastrophic flooding. Furthermore, these actions cumulatively should be tagged as high priority.

2. **Sequestration and Natural Resource Adaptation Actions** - Thank you for the several actions stipulated for Sequestration. I have two comments for this section.
  - a. Goal 6 of the Adaptation Technical Workgroup Report included several actions related to natural resource adaptation. The intent of natural resource adaptation goal and actions was to address the fact that natural resources as well as human communities are impacted by climate change. Changes in climate will exacerbate invasive species, pests, and diseases; alter species composition (both plant and animal); and change the habitats those species rely on. The strategies necessary to promote natural resource adaptation are not the same as those for carbon sequestration. While many sequestration actions are helpful for natural resource adaptation, (e.g., such as retaining forests and restoring habitats), they are not the same as targeted natural resource adaptation actions that address invasives, manage beneficial migration, and preserve diversity. We recommend that the final Plan include specific actions for natural resource adaptation such as those recommended by the Adaptation Technical Workgroup.
  - b. I note that you have included a recommendation to ban stormwater waivers per our workgroup's recommendation. I would also like to see inclusion of the Adaptation Workgroup's recommendation to adjust the county tree ordinance to ensure that the function of the lost trees is replaced within the watershed, and that fees on developers removing trees be increased to pay for expanding the tree canopy and installing green infrastructure in the same watershed.
  
3. **Human Health Adaptation Actions** – Similarly, Goal 4 of the Adaptation Technical Workgroup Report included several actions to address climate change impacts related to human health. The draft Plan includes actions related to heat and weather-related human health and safety, but missed other risks such as the increase in insect-borne disease (e.g.,, mosquito and tick-borne diseases), and increased risk of harmful algal blooms in water bodies. Regarding the health impacts of heat, the plan should expressly call out artificial turf as being counter to climate adaptation. Furthermore, it is essential that the County Health Department to address climate-related health risks.

**Action Specific Comments:**

**\*A1and A2**

- If A1 is about treatment systems, not conveyance, then I am ok with it. If it includes the stormwater conveyance infrastructure then this action is inadequate.
- Similarly, while I appreciate the priority given to repair culverts, the action actually needs to be upgrade culvert and stormwater system design (gray as well as green infrastructure). As precipitation falls in more intense, shorter duration events, current design is increasingly inadequate, resulting in flooding and damage to culverts, stormwater systems, and the community relying on the effective performance of conveyance and drainage systems. Simply repairing to the same specification will result in recurrence of damage.
- Either A1 or A2 must address the very significant, priority issue of design of stormwater and drainage systems.

**A6**

- Anything that cools the urban heat island effect is an equity issue. It should be rated with a 'plus' sign.

## A9

- While A9 has language about design criteria and building permits, it is buried and not given the importance it merits. Further, this isn't only about mold protection; it is also about economic damage to homeowners and renters. So-called 'nuisance' flooding is more than a nuisance, it causes real economic as well as health impacts. (I can speak personally to this as can many in my neighborhood in Bethesda that is seeing larger homes and more flooding in the last few years.)

## A10

- Generally, I like A10 on green infrastructure.

## A11

- Retitle: *Climate—Adapted Building and Infrastructure Codes*
- *I am actually a little confused as to what type of infrastructure you are referring to, versus A1, A2, A4, and A9.*
- Discuss the fact that precipitation is getting more intense *and is falling in short-duration cloudbursts* that overwhelm infrastructure. And combined with land use change (i.e., more impervious cover) this is creating more runoff and flooding.
- This section should be more explicit that it is about not just buildings but also infrastructure – e.g., roads, water infrastructure, bridges, dams, etc. It needs a discussion of the need for updating precipitation statistics and floodplain maps in order to inform building and infrastructure codes.
- Not all building codes need to be designed to the (future) 500 year rain storm or floodplain—primarily critical infrastructure does. But if you want to simply adopt the current 500-year storm for all building codes, fine!
- Following the prior comment: Different types of infrastructure are typically designed according to different size storms To be more explicit, Below is a chart with typical design codes (although MD and MoCo may be somewhat different)
- To build resilience for long-lived infrastructure, we need more stringent design standards to account for increasingly large storms. The Vulnerability Assessment discusses how their modeling shows marginal increases in precipitation – this should not be the end of this discussion. Downscaling of precipitation is suspect at this time so we need to conduct additional assessments or take different risk management approaches. For example, some jurisdictions are trying these:
  - build in margins of safety to accommodate increasingly larger storm events. Some jurisdictions are upsizing by 20%.
  - conduct sensitivity analyses (volume and duration) to see what would prompt failures ○ simply adopt more stringent design storms. For example, instead of the 24-hr, 2 year rain storm for ESD and stormwater controls, adopt a 3-hr annual rain storm.

Highway culverts	
Low traffic	5–10
Intermediate traffic	10–25
High traffic	50–100
Highway bridges	
Secondary system	10–50
Primary system	50–100
Farm drainage	
Culverts	5–50
Ditches	5–50
Urban drainage	
Storm sewers in small cities	2–25
Storm sewers in large cities	25–50
Airfields	
Low traffic	5–10
Intermediate traffic	10–25
High traffic	50–100
Levees	
On farms	2–50
Around cities	50–200
Dams with no likelihood of loss of life (low hazard)	
Small dams	50–100
Intermediate dams	100+
Large dams	—
Dams with probable loss of life (significant hazard)	
Small dams	100+

**Generalized design criteria for water-control structures.**  
**From Chow, Applied Hydrology**

- Conduct comprehensive hydraulic and hydrologic modeling, including dynamic models, to test system performance and identify areas to target for improvements

### A13

- Good – but – our current building codes very weakly mention that runoff onto neighboring properties is not allowed and they don't include any analysis, remedies or enforceability. If a homeowner is affected, they must take it on themselves to go to court without help from the County. This needs to be revised. Please add something to this effect:
- **Furthermore, construction requirements should be amended to ensure that potential runoff onto neighboring properties is mitigated, and the County code should be amended to provide recourse for homeowners affected.**
- Actions can include an assessment of potential increased runoff during the permitting process (including topography, drainage patterns, change in impervious area) and inclusion of on-site or off-site remedies (e.g., installing drainage or additional ESDs on the affected neighboring property or subsidizing homeowners to do so, and at the least notifying the homeowner of potential impacts). This can include proactively facilitating access to the County raingarden program where such potential exists. (I speak from experience – homeowners are sitting ducks until impacts happen).

### A14

- Last paragraph, amend last sentence: *“Requiring unmapped ~~floodplains-watersheds~~ in the vicinity....”*
- I suggest this because I am not sure what you mean by unmapped floodplain. A) you don't know it's a floodplain till you map it. B) are you thinking only of the (historically derived) 100 year floodplain? 30-acre floodplain? HUC12 floodplain? Future climate-influenced floodplain?

p. 172, Figure 31: how about a map showing frequently flooded homes?

p.s. I note that most home flooding occurs *outside* of designated floodplains.

### A20

- I like this Action and it has real potential with some additions. My comments here can also be related to my comments on both A11 and A13.
- This recommendation should reference G-16 on conducting vulnerability assessments, and should emphasize the need to conduct a thorough vulnerability assessment, e.g., that incorporates a combination of factors, e.g., land use change, topography, rainfall, floodplains, and capacity (and age) of stormwater and drainage infrastructure. A dynamic model could help with this.
- Amend paragraph 2: this is not just about *catastrophic* flooding or (in paragraph 3) *extreme* flooding. The mis-named 'nuisance' flooding is just as important. Harms include both health impacts (mold and asthma) and financial harm for cleanup and restoration.
- It should be noted that most flooding does not occur within FEMA floodplain areas. In addition, most people do not know that a) even if they are not technically in a designated floodplain, there is still risk of flooding; b) even people who are not in a designated floodplain can buy FEMA flood insurance at a modest price, c) that their home insurance does not cover such flooding from runoff, or d) that they are vulnerable to flooding from runoff

(especially in areas undergoing redevelopment). There should be an aggressive public education campaign about this at the very least. I view this as urgent.

- Page 177 map of Buildings within FEMA Floodplain: add the 500 year floodplain layer; add areas with increasing impervious cover.
- p. 176: As an aside, I don't understand how sealing building doors and cracks causes unintended consequences for stormwater drainage. What a strange thing to say.

## Governance

- Important and well done section

### G-4

- Great!

### G-7

- This is an important Action
- Add **Codes** to the title
- Add **stormwater management** to the second sentence
- Revise the discussion so you are underscoring a recommendation to actually have county departments undertake evaluations of their programs to identify areas for improvement. As written, this is not an action - it's a description of a concept.

### G-11

- How will metrics and goals be set? What is the prioritization process?

### G-15

- Totally concur!!!!
- Add creation of a publicly accessible GIS for analyzing all this data
- Include demographics, location of infrastructure, age of infrastructure, areas of development and redevelopment, impervious cover, topography, etc.
- Build modeling tools for conducting 'what-if' analyses (what if it rained x% more, or was 3 degrees hotter) for assessing decision sensitivity.

### G-16

- This action needs more discussion. (Most people won't read Appendix C.) Also, while I appreciate what you did in Appendix C, I think the approach needs some modification for future assessments. It is underbaked – I know there was limited time and money for doing the vulnerability assessment; it's a good start; **but the discussion should include intention to do something more in-depth, that includes more bottom up modeling and not just downscaling.**
- Are you recommending vulnerability assessments only for 'key assets' and only in areas of 'high hazard'? Further, how do you know where the high hazard areas are before doing an assessment? I suggest revising as follows: *"The County should conduct more fine-tuned*

*assessments to identify current and future of key assets located within areas of high climate hazards and vulnerabilities.”*

### **Partnerships P-11**

- I really like this action. I would add the very last sentence to the Adaptation Section. Furthermore, the County should be a formal member of the MD Climate Change Commission to secure the necessary actions administered by the executive agencies (not just legislative)

### **What Can I Do?**

- I am disappointed that you didn't include anything on Adaptation in here! So much of resilience depends upon people protecting themselves, their families, their homes, their businesses. ***Please integrate, or add a corollary section, on what people can do to build their own resilience - including flood proofing***
- Nothing is said about mosquito abatement or food spoilage due to heat.

### **Looking Forward**

- I appreciate that there were time constraints for dealing with economic development (same happened for the Adaptation group). I appreciate that you plan to produce a companion report on this topic. Please be sure to include Adaptation in it!
- Also, there is the issue of climate refugees and climate migration. As sea level rises and flooding is worsened, people will be relocating from coastal, more vulnerable, areas. Part of economic development is leveraging such population movement to our economic benefit (and minimizing socio-economic disruption). Perhaps this should be acknowledged as a potential for consideration by the economic development group.
- Finally, I don't recall reading anywhere in the CAP about worst case scenarios. We dodged the bullet when Superstorm Sandy narrowly bypassed us; Hurricane Harvey could happen here; it is not inconceivable for weather induced power outages to occur, not unlike what just happened in Texas. I think it is OK that this CAP is focused on basic adaptation and resilience, but it behooves us to think through and anticipate plans of action should a worse case scenario happen here. Perhaps the Office of Emergency Management & Homeland Security should be tasked with conducting such an analysis, taking future climate change into consideration.

## **APPENDIX C: VULNERABILITY ASSESSMENT**

### **General Comments:**

- It is hard to see how this vulnerability assessment actually informed specific actions in the adaptation plan. It is a very conceptual level analysis.
- We are in fact subject to influences from hurricanes and related high wind events but I don't see any discussion of that.

### **2.0 Asset Data**

Were any of these included?

- Transportation: Bridges?
- Utilities: Water mains? Sanitary sewer system? Dams (e.g. Lake Needwood)?
- Stormwater Management System: inventory of storm sewer system?
- Parks, Wetlands, and Trees: Tree inventory?
- People and Homes: Land use, impervious cover, topography?

### **3.0 Future Conditions Climate Assessment**

General question: when evaluating floodplains, what rationale did you use to select the 500-foot buffer around floodplain areas or frequently flooded areas. Just curious.

#### **3.4 Precipitation:**

- Unclear about the percentage of increase in precipitation – increase over what?
- What precipitation data are you using? NCEI raw data? Or something else? Or is this just modeled data? Has there been any trend analysis of raw monitored data collected within the county over the years?
- I don't understand table 3-2. 1985-2035 as a baseline analysis makes no sense. It is well known that changes became more notable after 1970 versus before 1970. If you want 50-year periods of analysis, why not do: 1920-1970; 1970-2020; 2000-2050; 2050-2100
- Last paragraph before table 3-12: I'm glad you noted the likelihood that sub-daily precipitation will increase – this merits more discussion. Water managers are noticing that rain is coming down in short cloudbursts over periods of hours rather than a day or longer. This discussion needs to be emphasized it must be noted that stormwater and drainage system codes are typically based on 24-hr rates, whether it be an annual storm, or a 100-year storm.

#### **3.5 High Winds**

- Earl Stoddard has data showing an increase in high wind events in the County

#### **3.8 Uncertainty**

- Needs a discussion about the importance of not relying solely on statistical downscaling, but that they are useful for supplemental other assessment methods. Bottom up vulnerability analysis or sensitivity analysis of specific systems can be used to identify thresholds of failure, for example.
- Table 4-1: please define the floodplains. (100-yr? 30-acre?) je ne comprends pas. The blue colors look the same on the map.

### **4.0 Results of Vulnerability Assessment**

In general, I found this section pretty thin. I do appreciate that more in-depth analysis is needed for specific actions. That said, I would like to have seen a discussion of your intention and approaches for conducting more in depth analysis at the very least, since they couldn't be done here.

#### **4.6 Parks, Wetlands and Trees**

- Not very in depth analysis at all.

## 4.7 People and Homes

- The precipitation analysis seems rather inadequate. Using the 100 yr. FEMA floodplain tells us nothing.

## 5.0 Conclusions

You really can't just look at the downscaled projections or precipitation estimates. You have to compare changes to the design and performance of our built environment. Although you indicate that precipitation is projected to show modest increases, this has significant implications for our stormwater and drainage systems and other infrastructure, depending on how they were designed.

The sentence on page 70 (bottom of 2<sup>nd</sup> paragraph) should be moved up and emphasized, especially with regard to the stormwater section:

***“Complex systems such as transportation, power, water, and sewer will require a more focused consideration if limited resources are to be allocated and used effectively. Additionally, detailed hydraulic models should be used in conjunction with the projections of future extreme precipitation scenarios developed in this study to develop future conditions floodplains and prioritize stormwater system improvements. TYPOS”***

page 38: first par: 'internal' should be 'interval' same

paragraph, should “or” be “for”?

page 45: missing word “Heat” in title of text box

page 74: Evaluation Criteria: missing a work between “Likert scale approach” and “the strengths and weaknesses”