

## Climate Change Adaptation in the Metropolitan Washington Region DRAFT Buildings Sector Vulnerabilities

Building maintenance plans and future development design should factor in potential impacts from climate change. This year, EPA is supporting a climate adaptation project, part of the Metropolitan Washington Council of Governments' (COG) broader climate change initiative. As one element of this project, COG staff conducted a preliminary buildings sector vulnerability assessment to identify possible impacts of climate change to the sector. Many current regional weather-related issues affecting buildings and developments such as energy utility costs/disruptions and flooding will increase with climate change. Future actions, emissions scenarios, and the characteristics of future growth and development will influence the extent of the impacts.

**Background:** Evidence of climate-related changes has already been observed in the metropolitan Washington region. Over the last century the average temperature rose 3.3°F in the District, 1.9°F in Maryland, and 0.6°F in Virginia (NOAA). The Potomac Estuary has experienced one foot of relative sea level rise (NCPC, 2008). In the Mid-Atlantic major weather events increased 12-20% compared to the previous century (UMD, 2008). Projections indicate that these trends will continue at an increased rate and lead to expanded riparian flood plains and coastal inundation zones and more frequent droughts, heat waves and record-setting events (IPCC, 2007; GCRP, 2009).

**Methods and Sources:** This vulnerability assessment is based on historic climate data, a regional climate change literature review, spatial data, and a regional application of issues identified in other climate adaptation<sup>1</sup> plans. Pertinent plans in the region that informed the assessment include the Virginia Governor's Commission on Climate Change Final Report, the Northern Virginia Regional Commission's Hazard Mitigation Plan, the State of Maryland's Climate Action Plan, and the National Capital Planning Commission's Report on Flooding and Stormwater in Washington, DC. The District is also developing a climate change resilience plan.

**Results:** Table 1 summarizes climate-related trends expected in a 50 year timeframe<sup>2</sup> according to numerous sources (see References). These trends will likely have a range of impacts on buildings, listed in Table 2. Regional conditions, issues and priorities helped shape the impacts highlighted here. Further expert analysis is needed to determine the full spectrum of potential local risks.

**Limitations:** This preliminary assessment does not prioritize or quantitatively assess relative risk to and exposure of infrastructure, community assets, human health and well-being, and the environment. It does not identify priority hazard areas, such as flood plains and storm surge zones, and their relationship to community assets. Rigorous regional climate modeling would assist in planning. Analysis of future costs of impacts and equity considerations are not included. Further data is needed to complete these analyses.

**Table 1. Climate-Related Drivers Expected to Affect the Mid-Atlantic Region**

Heat	Precip. Variability	Severe Storms	Sea Level Rise
Warmer average temperatures More frequent heat waves and days over 90°F Fewer freezing days Warmer nights relative to days Increased frequency of drought	More precipitation concentrated in fewer events  Increased precipitation variability	Increase in intensity of coastal storms such as hurricanes and nor'easters	Sea level rise combined with local subsidence  Worst case: intense hurricane at high tide

Note: These drivers reflect trends which have already been observed in recent past and are projected to continue with high confidence, except for drought frequency (medium).

<sup>1</sup> Climate Adaptation: Actions to cope with or ameliorate climate change-related impacts. Emissions mitigation is seen as critical to reducing risks from climate change (EPA <http://www.epa.gov/climatechange/effects/adaptation.html> ).

<sup>2</sup> Some degree of climate change effects will continue to occur for a time regardless of near-term emissions reductions due to lifespan of greenhouse gases in the atmosphere.

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**Table 2. Possible Regional Climate Change Impacts to the Buildings Sector in the Next Half-Century**

IMPACT	SITE COMPONENT AFFECTED	CLIMATE-RELATED DRIVER			
		Heat	Precip. Variability	Severe Storms	Sea Level Rise
1. Increase in damage to property from weather-related events	CS	X	X	X	X
2. Increased demand for emergency management response to extreme weather events	MO, HH, DE	X	X	X	X
3. Increase in health impacts due to basement flooding	CS, HH		X	X	X
4. Increased cost of insurance in flood-prone areas	MO		X	X	X
5. Increased potential for erosion	CS, MO, DE		X	X	X
6. Increased strain on on-site stormwater management facilities	MO, DE		X	X	X
7. Possible changes in water table, impacting development	CS, MO, DE	X	X		X
8. Possible changes in lifetime of roofs, façades, parking lots, sidewalks	CS	X	X	X	
9. Changes in roof, parking lot, and sidewalk maintenance	MO	X	X	X	
10. Effects from changes in humidity levels such as mold	CS, MO, HH	X	X	X	
11. Increase in plant replacement and landscape maintenance activities	MO, DE	X	X	X	
12. Increase in short-term power disruptions and resulting economic losses	CS, MO, HH	X	X	X	
13. Possible increase in threat from brush fires and wildfires	MO, DE, CS, HH	X	X		
14. Increase in heat-related health impacts, especially in homes without air conditioning	HH	X			
15. Increase in poor outdoor air quality days	DE, HH	X			
16. Increased cost of public water service during drought	MO	X			
17. Increase in cooling costs; small decrease in heating costs	MO, HH	X			

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