

**Climate Resilience Zoning Task Force
City of Cambridge, Massachusetts**

**Summary Meeting 4
Wednesday April 24, 2019
5:30 PM to 8:00 PM
Citywide Senior Center, First Floor
806 Massachusetts Ave, Cambridge, MA**

<https://www.cambridgema.gov/CDD/Projects/Zoning/climateresiliencezoning>

Task Force members present:

1. Jason Alves East Cambridge Business Association
2. Doug Brown West Cambridge
3. Ted Cohen North Cambridge/Planning Board
4. Conrad Crawford East Cambridge/Cambridge Redevelopment Authority
5. Nancy Donohue Cambridge Chamber of Commerce
6. Iram Farooq Assistant City Manager for Community Development
7. Brian Goldberg MIT Office of Sustainability
8. Joe Maguire Alexandria
9. Lauren Miller Climate Consultant, CDM Smith
10. Margaret Moran Cambridge Housing Authority
11. Jim Newman Resilience Consultant, Linnaean Solutions
12. Craig Nicholson Just-a-Start
13. Mike Owu MITIMCo
14. Kathy Watkins City Engineer/Assistant Commissioner

Project staff and facilitation team members present:

1. Shabnam Bista Zoning and Development Intern, City of Cambridge
2. Nathalie Beauvais Project Manager, Kleinfelder
3. Elizabeth Cooper Facilitation team, Consensus Building Institute
4. Ona Ferguson Facilitation team, Consensus Building Institute
5. Eric Kramer Urban Forest Master Plan consultant, Reed-Hildebrand
6. Jeff Roberts Director of Zoning and Development, City of Cambridge

Next steps:

- The next meeting will be a joint meeting with the Health and Environment Committee of the City Council, on May 29. The purpose of the meeting will be to share the progress of

the Task Force with the Committee, solicit input from the Committee, and continue discussion on flooding impacts and mitigation strategies.

- The June 26 meeting will begin discussion of heat impacts and mitigation strategies.
- The City will schedule meetings through the summer and fall.
- The City will work to provide additional information to the Task Force on the following topics, in response to questions posed during the meeting:
 - 10-year sewer and drain plan and analysis to explain the level of protection that separated systems provide to prevent contamination in high precipitation events. The 10-year plan is available here: www.cambridgema.gov/theworks/tenyearplan
 - Higher-level analysis projecting how zoning changes would impact new construction and major renovations in terms of the number of people affected and the rate at which construction and renovations are expected to occur in relation to the existing inventory of buildings.

Meeting Overview

Participants reviewed the key impacts associated with the two key kinds of flooding Cambridge faces: precipitation/riverine and sea level rise/storm surge (SLR/SS). The group discussed the priority of addressing specific impacts that flooding might cause, and discussed the benefits, costs, and challenges of different development strategies as framed by the city's CCPR planning to date. *See slides reviewing key impacts and vulnerabilities online.*

This summary captures the comments made by Task Force members and staff, grouping similar ideas for clarity.

I. FLOODING PREDICTIONS: Comments and questions regarding a) the types of flooding for zoning changes to address, and b) the levels of risk that should be prioritized for protection and recovery (*responses from city staff in italics*):

- How will infrastructure improvements affect risk predictions? The data and projections the City is using assumes no infrastructure change, though the City is doing substantial infrastructure improvements, sewer separations, and also requiring large property owners to do substantial infrastructure improvement. Between these improvements and the uncertainty in projections out to 2070, the predicted impacts may not be representative of the reality in 50 years.
 - *The city infrastructure improvements will improve our system performance, but we cannot simply build ourselves out of climate change. It is imperative that we look at both improvements to our system and improvements to buildings. The model is using the 2070 projections and recent data shows climate change impacts are happening sooner than anticipated, so projections that seem conservative or far off may not be so conservative. If collective city infrastructure and private development improvements exceed expectations or projections turn*

out to be very conservative, then improvements could offer protection to 2100 instead of just 2070, since climate change does not stop in 2070.

- Technology changes quickly – Are there potential ways to mitigate climate change that we do not know about yet that might be coming in the next decade or two?
 - *See above. The City is planning with the best available information, and many things could change, but not everything is within the City’s control.*
- Our estimation of risk is inherently uncertain. We should focus on what we can act on with certainty. There are multiple dimensions of risk that we do not understand well or have the ability to predict accurately, such as flash floods or the joint probability of multiple types of events happening simultaneously. Knowing we have uncertainty and that projections will change as the science and information available improve, recommendations should not be tied to a specific point in time. The metrics and numbers will change.

Sewer and stormwater drain management:

- Can the capacity of the stormwater drainage system be improved to mitigate street flooding? Where does the storm water that flows into the system go? How long will it take the City to build completely separated stormwater and sewer infrastructure? Will complete separation address the risk of sewage contamination from flooding?
 - *45% of stormwater goes into combined stormwater and sewer systems; 55% flows into separated systems. In combined systems, the water flows through Massachusetts Water Resources Authority (MWRA) infrastructure, north through Boston to Deer Island. In the separated system, sewage flows to Deer Island and the stormwater flows to the Charles River or Alewife Brook. Under certain high-precipitation conditions, the combined sewer system overflows and drains directly into the water bodies. Even with eventual complete separation, contamination will still occur during extreme events due to the City tying into MWRA systems going through the City. Planning for storms should still account for floodwaters being contaminated. The City has just published a 10-year sewer and drain plan, www.cambridgema.gov/theworks/tenyearplan, including a map of separated and unseparated areas, which will be shared with the Task Force.*
 - *The capacity of the stormwater system is constrained in part by the amount of water that can be directed to the Charles River or Alewife Brook, because downstream residents and communities would be flooded by overloading. The City cannot build sufficient sewer system infrastructure to resolve precipitation-driven street flooding. If property owners across the board (not just those affected by flooding) make interventions, including green infrastructure, to manage precipitation onsite and reduce what goes into the sewer system, that can bear long-term benefits. Upstream properties are equally important because they help reduce loading leading to riverine flooding downstream.*
- What is the condition of the City’s systems? For separated drain systems, are there functioning plates on the systems that can lift to cause relief in events that exceed drainage capacity?

- *The City system traditionally only provided protection from a 2- to 10-year storm in many low lying areas of the city. As we are designing new infrastructure projects, the goal is to design to 2070 10-year storms. The City spends \$30M per year in addition to significant work from private developers on these systems.*

II. FLOODING IMPACTS: Comments and questions regarding which impacts from flooding are of most concern to the Task Force (*responses from city staff in italics*):

What are the most significant impacts of flooding on Cambridge residents and the City?

- *Basements and low-level first floors are the most vulnerable. Mold and indoor air quality is a significant long-term issue in below ground living spaces. Contaminated water is also a significant concern. Large-scale emergency response is a challenge to plan.*

Residential impacts:

- Vulnerable buildings may need “shelter-in-place” plans. Access to basic goods and services for people should be prioritized. People need access to emergency services and food and water. How long is a reasonable timeframe for sheltering in place due to flooding?
- The more vulnerable the population, the greater the need of protection. Prioritizing human lives indicates that we should prioritize residential above commercial and industrial spaces, and be sure that health and safety are maintained, as well as access to electricity and basic goods.
 - *One important consideration is what types of living space are flooded in a certain event – if basements are the only part of a structure flooded, are bedrooms in the basements? The use of space is a category that helps determine priority level.*
- In New York City, 80% of the housing that was flooded during Sandy was subsidized in some way, and the flooding impacted 20% of subsidized housing in the City. Flooding impacted a substantial number of people, and most of them were more economically vulnerable.
- In areas vulnerable to SLR/SS flooding, such as Alewife, elevation is the biggest concern. Residential spaces should not be on the ground floor in buildings being permitted.
 - *An important policy question is what impacts should be a collective concern that should be regulated by the City, and for what impacts should property owners manage their own risk?*
- It would be helpful to have more data about the relative overall impact of different strategies. How many people are living in new construction as opposed to older buildings? What is the rate of renovation for one-, two-, and three-family buildings?
 - *The City will seek more information to address this question. Currently, developers of larger buildings are subject to higher standards, including Planning Board review in some cases, and are being required to implement measures to protect against future conditions. The City is also seeing many basement use renovations for smaller buildings. Currently, the City provides information and encourages property owners to understand the risks, but there is significant*

pressure on increasing basement use. While a lot of new residential growth is happening in larger buildings, that growth compared to the overall population of the city is 1-2% per year. For the timeframes we are examining, the majority of the population will live in older homes. Careful thought is needed to balance protecting new and existing properties.

- Efforts to regulate protections for all properties need to be weighed against the financial costs, which may be infeasible for some residents. For new construction, it is easier to make rules about housing on the first floor. For existing housing, people need to be able to make their own choices weighing the options and their economic concerns against the risks.

Economic impacts:

- Flooding also has significant economic impact, so impacts on commercial buildings are a significant concern as well – recovery from more significant storms should be possible.
- The CCVA reported that the economic cost of disruption of business exceeded the costs of physical damage.

III. DEVELOPMENT STRATEGIES: Comments and questions regarding strategies property owners might employ to mitigate flooding impacts, and costs and benefits of these strategies (*responses from city staff in italics.*)

Build in flexibility, avoid one-size-fits-all approaches:

- Strategies should differ depending on the type and size of buildings, and there should be options to choose from. Solutions that are feasible in some scenarios might not work in others. Factors for property owners such as business plan or cash flow will impact how they would choose to protect against or recover from flooding. Durability and flexibility should be guiding principles.
- Performance-based standards with options to select from a menu rather than prescriptive regulations would offer some more flexibility to property owners, as would including a test of feasibility as a trigger. Performance-based standards often work better for larger developments; smaller properties may need more consistent, universal standards.
- Periodic review would help to assess the performance of regulations and whether new data or science is available to inform choices.
- Standards should be effective but not so onerous as to incent property owners to avoid triggering standards or review. Clarity early in the process is helpful.
- Incremental solutions, analogous to solar-ready roofs, should be considered, especially in the face of uncertainty about what will be needed. Property owners could be credited for taking steps that balance the risks and costs of today.
- Zoning primarily impacts larger buildings, and that should be the focus of this Task Force, rather than single-family homeowners.
 - *Zoning affects smaller buildings as well. The City is concerned about smaller buildings, particularly basements, because flooding could have widespread*

impacts on many buildings at once. Currently, for many smaller projects, the City provides advice and information while leaving decisions to property owners, while the City has the opportunity to influence larger projects through the Planning Board review process.

Integrate with other City efforts:

- Given that zoning regulates land use and development, not infrastructure, what type of flooding impacts can or can't be addressed by zoning?
 - *Different strategies can address impacts of both types of flooding. Managing stormwater helps to mitigate precipitation issues, but stormwater infrastructure does not protect against SLR/SS. Protecting buildings through design – specifically elevation – is effective for both. In areas vulnerable to SLR/SS, the elevation that would be needed is almost always higher than that which would be needed for precipitation-based flooding.*
 - *The City cannot alone build infrastructure to address SLR/SS, such as improved dams, but it partners with other municipalities to advocate and work together for regional improvements.*
- A number of strategies are already encompassed in the CCPR, so they may still be a priority even if they are not practical to enact through zoning. What strategies could be most impactful to protect against and recover from flooding? How do zoning strategies compare to other tools available to the City to manage flooding?
 - *Protecting the building is one issue. The city proposes that buildings are designed to not be damaged by a 2070 10-year storm and recover from a 2070 100-year storm. Stormwater management is another issue. Planning for longer time horizons and adopting stricter standards would add additional protection. Thus far, green infrastructure has not been prescribed in zoning, but it can help with infiltration and has benefits for heat too. The City has heard consistent interest in having more green infrastructure in zoning requirements.*
 - *Development standards govern how buildings are built, to a certain degree of specificity, including size and scale. Green building standards are performance-based design standards met by integrating characteristics into development that promote sustainability on a range of metrics. Stormwater is partly managed through city utilities and partly through development standards, which can work in concert. This group will need to make judgments about where flood management strategies should be codified in zoning on par with requirements for building form and size, or whether they are better suited for other tools or to be addressed through non-zoning regulations.*
- Should the risk tolerance in zoning follow the City's current benchmarks (i.e., protect against 2070 10% probability flooding and recover from 2070 1% probability flooding)?

Use holistic strategies with cobenefits:

- There is an opportunity to incorporate cobenefits, remove barriers to resilient energy grids/distributed facilities, and foster passive resilience principles in building standards, particularly if considered early in the design process.

- Creative solutions can tackle related problems, such as helping the City move away from auto-dependency. Houston is an example of how traffic congestion can hinder evacuation efforts in the case of an emergency.
- New construction or substantial investments in renovations should incorporate emergency planning to help residents—particularly vulnerable residents—shelter in place. Emergency planning also requires thinking about sharing resources and shelter among buildings.

Timely intervention:

- Looking at patterns of redevelopment in Boston, nearly the entire South End was rebuilt over 30 years. Sometimes, redevelopment can happen quickly, and regulations can have a significant impact over time if they are enacted before that redevelopment. Old commercial buildings can likewise be renovated quickly.

Public comment:

Susanne Rasmussen, Director of Environmental and Transportation Planning:

- a) Business disruption is vastly more costly than physical damage due to climate impacts. In many cases, if a business is forced to close for even two weeks, it cannot stay afloat: there is a very short window of survivability in terms of continuity for small commercial and retail businesses.*
- b) The City's historical analysis of property ownership patterns indicates that the average residential property is likely to be sold once between now and 2050. Sale would be the most likely point for renovation for many of these properties.*
- c) As the City considers how to transform built structures to be resilient to heat and flooding, we also need to think about the mechanisms through which they transition to renewable energy. This transition needs to be complete in 30 years. Strategies should be sought that address both of these challenges.*

The meeting was adjourned at 8 PM.