

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

**Summary of Meeting #14  
Wednesday, March 4, 2019**

**Task Force members present**

1. Jason Alves, East Cambridge Business Association
2. John Bolduc, Environmental Planner
3. Doug Brown, West Cambridge
4. Ted Cohen, North Cambridge/Planning Board
5. Conrad Crawford, East Cambridge/Cambridge Redevelopment Authority
6. Iram Farooq, Assistant City Manager for Community Development
7. Mike Nakagawa, North Cambridge
8. Craig Nicholson, Just-a-Start
9. Mike Owu, MITIMCo

**Project staff and facilitation team members present**

1. Jeff Roberts, Director of Zoning and Development, City of Cambridge
2. Daniel Messplay, Senior Zoning Manager, City of Cambridge
3. Cat Kemmett, Zoning and Development Intern, City of Cambridge
4. Elizabeth Cooper, CBI facilitator
5. Florangel Suero, CBI notetaker

**Next Steps**

- A follow-up survey will be sent out by Project Staff to collect Task Force members' thoughts and suggestions on the potential recommendations presented at the March 4<sup>th</sup> meeting.
- The Task Force will continue to discuss the potential recommendations at the next meeting, focusing primarily on those that were not covered during this meeting.

**Meeting materials:**

For more details of the analysis summarized below, see the meeting materials available at <https://www.cambridgema.gov/CDD/Projects/Zoning/climateresiliencezoning>.

**Presentation and discussion of potential range of zoning recommendations**

Task Force member comments and questions are in bullets within each section. *Direct responses from City staff are in italics.*

**Introduction**

Jeff Roberts, Director of Zoning and Development for the City of Cambridge, reviewed the potential recommendations of ways to amend the City of Cambridge Zoning Ordinance to incorporate the standards that have been discussed by the group.

Zoning recommendations of the Task Force will need to be translated by City staff into formal zoning language, which will then be brought back to the Task Force for feedback at some time in the future. In addition to the zoning recommendations themselves, the Task Force will present a report of its work, including members' analysis and deliberations. Task Force members will have the opportunity to review this report and provide feedback outside of meeting time.

The recommendations offered by this Task Force will not be the last opportunity to incorporate climate resilience into zoning, given that planning processes are ongoing and new information is always being learned.

The goal of this meeting is to collect the initial reactions to and input on the Potential Recommendations drafted by project staff based on the conversations that the Task Force has had. Task Force members will have the opportunity to provide further feedback on the Potential Recommendations via a survey that will be sent out by project staff following the meeting. During this meeting's discussions, Task Force members are not asked to commit to any specific recommendation.

Mr. Roberts reiterated the importance of striking an appropriate balance between preserving flexibility and having the greatest effects. He emphasized that it is possible to be both aggressive in addressing climate resilience and flexible in how zoning requirements are structured. Aggressive standards that allow for modifications and review can be created. Additionally, ambitious resilience goals will be reached via multiple mechanisms in zoning.

### ***Potential Zoning Recommendations***

Task Force members discussed the first two categories of potential recommendations (Defining Standards for Flood Resilience and Heat Resilience, and Incentivizing Improvement by Reducing Impediments in Current Zoning). The remaining categories of potential recommendations and how they might be applied will be discussed at the next Task Force meeting. Task Force members are also encouraged to share their thoughts on the potential recommendations via the survey that will be sent out by project staff.

*1A - Define “10%-Probability Long-Term Flood Elevation” (10%-LTFE) and “1%-Probability Long-Term Flood Elevation” (1%-LTFE) based on 2070 (approx. 50-year) projections of annual flood risk due to precipitation, storm surge, or sea level rise, whichever is higher (see FloodViewer), subject to periodic review and updating.*

**Discussion.** *Responses from City staff are italicized.*

- What are the downsides of using the FloodViewer rather than FEMA Flood Maps to predict flooding?
  - *By utilizing the FloodViewer the City would move away from the conventional use of historic flooding patterns to using 2070 flood projections, which assumes more water. The challenge with using the FloodViewer is that projections are dynamic*

*and likely to change when new information is incorporated into the model. Nevertheless, the dynamic nature of the FloodViewer allows for flexibility and takes into account the dynamic nature of climate change itself.*

- Zoning should give people some certainty. What information does the FloodViewer use to ensure accuracy in its predictions?
  - *Global climate models of precipitation from the Intergovernmental Panel on Climate Change have been down-scaled to Cambridge and are used to predict precipitation levels. Greenhouse gas emissions and their effects on the rate of change of climate are also taken into account. As models are refined and global emissions projections are updated, the City periodically updates its model.*
- There should be a disclaimer on the FloodViewer website about when new predictions will be made in accordance with the incorporation of new data. The FloodViewer should be updated regularly and expeditiously to keep up with all relevant new research findings.
- However, the zoning requirements based on the FloodViewer should be predictable and only adjusted on a set schedule to provide certainty to property owners about what standard they need to reach.
  - *The City tries to keep up with the science, and the point about creating some scheduled pattern for updates to the FloodViewer is important.*
- The FloodViewer is different than FEMA Flood Maps because it provides different probability flood elevation forecasts for individual parcels.
- How will the use of a FloodViewer rather than FEMA Flood Maps affect Cambridge residents' ability to get and be covered by flood insurance?
  - *Unknown -- the insurance field is evolving in response to climate change, although it is impossible to predict what decisions will be made about flood coverage. However, if a person resides in an area that is at risk of flooding and ensures that they are flood resilient, their insurance company may be likely to look upon that favorably.*
- Is there any way to challenge the accuracy of the models? For example, if one's land is different from what the model shows?
  - *The models predict flood elevations for different probability events, but land elevations in the FloodViewer might not be accurate. Although a survey conducted by the property owner would not change the flood elevations, it could be used to establish more accurate land elevations that could affect how flood resilience standards are applied.*
- How will this model take into account improvements in infrastructure that occur?
  - *The Department of Public Works (DPW) has a stormwater model that includes information about culverts and pipes, which estimates the capacity/speed of the drainage of stormwater. Although this model is not inexpensive to run, DPW has the capacity to run it regularly to incorporate updates in infrastructure.*
- The use of a dynamic tool like the FloodViewer in zoning creates a variety of zoning and legal questions. Is there a plan for how to answer these?
  - *Further legal analysis will be needed if this approach is recommended. Procedures need to be created to determine how flooding calculations are made,*

*how they get updated, how to ensure that people know what the standards are, and how these standards can be challenged by individuals.*

- Is there anything in the Zoning Ordinance that relies on a dynamic tool like the FloodViewer that could be used as an example of a policy that operates in a similar fashion to what is recommended by 1A?
  - *It depends on how this type of standard would be applied. Plans and guidelines that are applied through project review are often updated over time. Green Building Requirements, which are based on LEED standards, are another example of a requirement based on a system that has a built-in process of revisions and updates over time.*
- Could the FloodViewer be graphically altered so that entire parcels were not coded as being within the flood area, but that specific areas of parcels could be coded like in FEMA maps? This way, if you have a large site, and 30% of the site is in the flood area, you can still build on the other 70% of the site.
  - *The FloodViewer provides projected flood elevations for given parcels to be compared against the topography of the land and buildings on the parcel, so the information is “three dimensional” and not only map-based.*

**1B - “Flood Resilient”** means a building is entirely at or above both the 10%- LTFE and the 1%-LTFE, or if:

- (a) *All building spaces are elevated above the 10%-LTFE or are protected such that flood waters cannot penetrate, except for shared lobbies and similar entry spaces designed to recover from flooding without permanent damage, AND*
- (b) *All residential sleeping areas and critical building facilities are elevated above the 1%-LTFE or are protected such that flood waters cannot penetrate.*

Alternative formulations:

- *What other types of uses/spaces could fall under the “protect under 10%-probability flood scenario” and “protect under 1%- probability flood scenario”?*

**Discussion**<sup>1</sup>. Responses from City staff are italicized.

- All essential service buildings (e.g., hospitals) and those that will be converted into shelters in case of climate emergencies (e.g., schools) should be required to meet 500-year LTFE flood-resilience standards. In addition, spaces that count as critical facilities should be specified in the recommendations.
  - *FEMA defines critical facilities already, will look at that definition to align standards with that definition.*
- The phrase “protected such that flood waters can’t enter” is too broad and should be defined, since it allows for buildings that are not flood resilient as long as they protect against floods.
  - *The idea behind that is dry flood-proofing with, for example, walls and other physical barriers. This standard can be elaborated with further detail.*

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<sup>1</sup> See detailed comments on the “Potential Zoning Recommendations” document that Task Force member Tom Lucey from Harvard provided in writing in advance of the meeting, appended below in the Appendix.

- If buildings undergo flood-proofing, at some point during a flood they will become islands and access in and out will be an issue for those residing within them. How could they maintain social connectivity?
- This tension between structurally facilitating social connectivity and imposing proactive protections from flooding is a broader infrastructure issue which raises questions about whether the aesthetic of the City of Cambridge should be changed dramatically to enhance its resilience to extreme climate events. For example, if the City decides that basements should be vacated of everything, including critical building facilities, does this mean that Harvard Square and Central Square businesses be all raised up?
  - *This tension is one of the complications of trying to figure this out. Urban design is not only about aesthetics, it's about how people live and interact, which includes thinking about safety and the survivability of people's environment and their ability to recover. The Council is looking for the wisdom of this group to suggest guidance.*
  - *To address this question about businesses, one of the suggestions that has been raised is to inform people who rent low-cost spaces in flood-prone areas about the need to move things out when flooding is imminent. Floods and conditions that lead to flooding are routinely forecasted in weather reports, so people will know when flooding is likely to happen. This issue requires flexibility in its resolution.*
- What about including a special category of “hardened” spaces, like basements where there is something protecting the machinery from water damage, for example?
  - *Flooding in Cambridge tends to not be long-term; basements are vulnerable because water needs to be pumped out. We know from disasters in other areas that if a space like a basement gets wet, cleaning it up and drying it out to prevent mold issues is a challenge. All these interlocking issues need to be weighed.*
  - *Furthermore, it is important to remember that 10% flooding and 1% flooding were both included because 10% flooding is more likely to happen several times in the lifespan of a building, whereas 1% flooding is possible but less likely to occur with frequency, which is why there are different approaches to each.*

**1C - “Heat Resilient”** means a site achieves its “Cool Target” using the “Cool Factor” system, which calculates a weighted score based on site features including preservation of mature trees, planting of new trees, ground-level vegetation, green roofs (or white roofs, at minimum), canopy shading, and use of high-solar-reflectivity paving materials.

*Alternative formulations:*

- “Cool Target” is determined based on the Open Space requirement in the zoning district, with a baseline minimum of 15%.
- “Cool Target” is uniform across all zoning districts, but is greater for larger lots or development parcels.
- “Cool Target” is uniform across all zoning districts, but varies by land use (e.g., higher target for residential vs. non-residential uses).

- “Cool Target” is uniform across all zoning districts and all sites.

**Discussion.** *Responses from City staff are italicized.*

- Some of the success of the Cool Factor depends on the categories included and the differential weighting of different strategies. It would be helpful to have more sample cases for Cool Factor evaluation in buildings and parcels that don't lend themselves to passing the test, for example, in Harvard Square, where many buildings would not meet the score of 1.
- What role do older institutional buildings have to play in sustainability in Cambridge? Is it equitable to have a vastly different set of standards for buildings if older buildings are a big reason for Cambridge's current issues?
- The Cool Factor should be tweaked to be made more similar to Washington, D.C.'s Green Factor, where there is a 45x point differential between the score gained by a large tree compared to a medium tree, whereas the Cool Factor has only a 4x point differential between a medium tree and a large tree.
- The Cool Factor should take machines that are located outside and/or that heat the outside environment (e.g., the back of many types of ACs produce heat) into account as well as glazing and the reflection of the sun and heat from glass windows into account. Is there a way to manage either of these things?
- Additionally, whereas a Green Factor looks at the entirety of a site for the installment of climate structures, Cool Factor only targets open space parts of the site, which in some cases accounts for a relatively small part of the parcel.
  - *Originally, the Cool Factor was crafted with a “Cool Target” keyed to the open space requirements of a parcel to account for different contexts. Given discussions in this Task Force regarding the difficulty for smaller-sized parcels to meet the desired score, we are looking at alternative ways to set the target and how to make it equitable for all while maintaining practicality.*
- A Green Factor should be created to exist alongside the Cool Factor with different standards.
  - *We can look at how green building requirements, floodwater requirements, and the Cool Factor all fit together. It is important to keep in mind that we focused on a Cool Factor because of the resilience benefit for heat mitigation that many Green Factors don't focus as much on. Could look at a Cool Factor and a Green Factor as separate things, and get a temperature check on the support that exists for creating a Green Factor.*
- The difference in open space requirements is rooted in what the City built based on what was deemed appropriate for different districts; more useful than comparing a 10% open space parcel to another 10% open space parcel is comparing spaces that are more structurally similar.

## Category 2: Incentivize Improvement by Reducing Impediments in Current Zoning

### **2A: Open areas (parking, entryways, porches) covered by shade canopy:**

*Exclude from Gross Floor Area and yard (setback) limitations.*

- *Alternative: Also exclude from height limitations, when placed on a roof.*
- *Alternative: Possibly require high-SRI or solar panel surface.*

**2B: Elevated access:** *Ensure that stairs/ramps in front setbacks can be allowed as-of-right for Flood Resilient buildings.*

**2C: Functional Green Roof Area:** *Exclude from Gross Floor Area and height limitations as-of-right in all cases. (Currently requires a special permit if it is intended for use and enjoyment of occupants, to ensure ongoing viability.)*

- *Possibly require administrative review of a planting/maintenance plan.*

**2D: Headhouses for accessing usable roof space:** *Exclude from height limitations (with limitations on total area).*

- *Alternative: Allow relief only where a functional green roof is provided.*

**2E: Basements:** *Allow exclusion from Gross Floor Area limitations if the building is certified to be Flood Resilient. (Currently, this exclusion requires a special permit in multifamily and non-residential buildings; no flood resilience standards apply.)*

**2F: Height:** *Allow a compensating building height increase (within limitations) where the ground floor of the building is raised to meet Flood Resilience standards.*

**Discussion.** *Responses from City staff are italicized.*

- If buildings are raised to protect them from flooding, would they still be exempt from FAR (Floor Area Regulations) like basements currently are?
  - *Mechanical spaces don't count in basements, nor does any basement space that is less than seven feet in height.*
- Would it be appropriate to include reducing parking requirements within the incentive regime? It would allow, for example, for developments to have funding available to create green roofs because of the money it would save in a project's budget.
  - *That recommendation would require significantly more study and time, since it requires coordinating closely with transportation planners. If the Task Force supports this idea, it could be included as a suggestion for further study.*
- Could the point in 2A about physical canopies be clarified?
  - *2A would remove restrictions on floor area and setbacks that might discourage open shade structures.*
- There is nothing here about allowing anything in the setbacks to encourage more front yard shading than backyard shading.
  - *That raises the question around the pros and cons of encouraging incentives to the front rather than to the back. We can consider this.*

## Public Comments

- Councillor Carlone - This Task Force is working in more depth on the difficult tensions involved in developing these recommendations than City Council or the Planning Board will be able to do. From my experience, whatever this Task Force recommends will be watered down. When you go to the Council, you'll need to explain why a Green Factor was not promoted, because that was one of the things that members of that body expected to see from this Task Force. Emphasize open space as much as possible. We want to enhance the public domain over any building. We are going to become like Washington, D.C. climate-wise, and we need to look at their Green Factor.
  
- Lee Farris –
  - Consider adding the words “and/or sea level rise” to 1A.
  - Regarding #2, I suggest you do not include GFA. I would exclude it, and require high SRI on everything without giving any allowances. On 2C, I think it's okay to exclude green roofs from GFA whether the green roof is equipped to handle occupants or not.
  - Regarding 2D, do not provide carte blanche for the GFA, because it could result in clubhouses on the roof.
  - Regarding 2F, I suggest you offer no compensation in building height for the amount buildings are elevated to protect against flooding. The cost of building in the flood zone may be that there is room for one floor less, and it is okay if that discourages building there.
  
- Erika Johnson, Harvard University Planning –
  - The state building code is notably absent from these discussions. We also need a more substantive discussion of the proposed thresholds. Harvard has a lot of historic buildings with no setbacks. There are a lot of things that Harvard would not be able to do with the Cool Factor to meet the required score. For example, a lot of Harvard's buildings are on a quarter-acre lot, which limits what options are available to meet Cool Factor standards.
  - How do these objectives interact with other goals the City is working on? What does the Cambridge Historical Commission think of the implications for how these recommendations could change historic preservation?
  - Finally, we support reduced parking requirements, especially given how much transportation contributes to U.S. GHG emissions, and given the City's rich transit access. It would be great to see reduced parking requirements tied to green building requirements.

The Task Force also received a message (dated 3/4/2020) from Tom Lucey of Harvard University, who could not attend the meeting. The message contained detailed comments about the potential Cool Factor scoring system and its applicability in more constrained scenarios, such as existing buildings and districts with small or no building setbacks. Erika Johnson from

the Harvard University Planning Office discussed the content of this message during the public comment portion of the meeting.

Meeting adjourned at 8:03 PM.