

Zoning Amendments for a Flood and Heat Resilient Cambridge--Narrative

The purpose of this zoning petition is to protect the health and safety of the residents and businesses of Cambridge from the serious threats of significantly increased flooding and extreme heat identified in the City's Climate Change Vulnerability Assessment (CCVA), completed last year. The studies conclude that the impact of climate change will be both severe and city-wide.

The impetus for this zoning petition originated in the Alewife/North Cambridge neighborhoods due to the vulnerability of this area to extreme flooding and heat impacts, and the resulting initial focus on Alewife by the Envision city-wide master planning process. The goal of this petition and of the Envision planning process is "a more livable, sustainable and equitable Cambridge."

The timing of this petition is driven by the history of repeated attempts to direct development in a more sustainable direction. While some of these attempts have succeeded, but in the Alewife area they have largely failed. Given this background, there is a clear sense of urgency to ensure that all new development immediately start making our city more resilient and not instead undermine that goal.

We must all live with the consequences of every new development that is permitted now for the next 50 years or more. Do we want to solidify good consequences or bad? We must take preemptive action, not wait until residences and businesses are flooded and sweltering heat has created a public health crisis. We must act now to improve designs, because by then, the problems will be set in concrete.

Here is some relevant background. The City's most recent study of the Concord-Alewife area, completed in 2005, sought to incentivize residential development as an effort to encourage Transit Oriented Development around the Alewife MBTA Station. Zoning changes based on the study's recommendations were passed in 2006. However, the MBTA station is within the Alewife floodplain, which has historically experienced significant flooding. The flooding concerns were only superficially addressed by the 2005 study, even though there was a FEMA study underway at that time to update the flood plain delineations of that area on the flood insurance rate maps.

The FEMA flood study was completed in 2007, and final flood maps were approved by Cambridge in 2010. The maps showed a large increase in the floodplain area that encompassed hundreds of existing households in the new flood hazard area. Since 2006, 3 million square feet of development has been built or is approved for development within the floodplain delineated by the Study. Residential development has already exceeded the Concord-Alewife Plan's goal; buildout has reached 220% of the study's 20-year target, years ahead of schedule.

Since the Concord-Alewife Plan's completion, climate change concerns came to the forefront, and the Cambridge undertook a citywide Climate Change Vulnerability Assessment (CCVA). The Assessment for the first time changed the approach of studying flood risk, which had always used only historical data to determine the presumed current risk. Instead, the CCVA conducted a thorough analysis of weather and climate trends to determine future risks.

Part 1 of the CCVA, which was released in 2015, predicted a large expansion of flood-prone areas from precipitation, and corresponding larger flood depths, with depths reaching more than three feet above ground level in existing developed areas in Cambridge. It also for the first time quantified a new threat from extreme heat, which has been shown to cause severe health issues and deaths, with expectations of 68 days per year of 90 degree or higher temperatures in the 2070 planning horizon. Part 2 of the CCVA, released in February 2017, assessed the flooding threat from a combination of storm surge and rising sea levels surging up the Mystic River and Alewife Brook, flooding North Cambridge and Alewife areas,

including Fresh Pond. See Cambridgema.gov “Climate Change Preparedness & Resilience” for all studies, presentations, and map viewer.

As a result of the CCVA, the city started work to prepare a Climate Change Preparedness Plan, with a pilot focus on the Alewife area because it contained a confluence of factors: “Critical infrastructure systems, such as energy, roadways, public transit, water/wastewater, as well as socially vulnerable population and community resources are at increased flooding risk in the Alewife area.” (Meeting Report, Cambridge Flooding Preparedness Planning Alewife Working Group, June 16, 2016). A working group was assembled in mid-2016. It soon became apparent that the City would not be able to contain the volume of water expected to flood the area in future storms, so addressing resiliency to climate change events became an essential part of the discussion.

In November 2017, a draft Climate Change Preparedness and Resilience (CCPR) Alewife Preparedness Plan was released for public comment. The plan provides strategies and recommendations for the area. However, development has continued unabated without these strategies in place during the process. Over 1.5 million square feet of development has been approved or is under review in the Alewife area since the CCPR Alewife Focus Group had started meeting.

The Plan states: “The coordination between Envision Cambridge and CCPR Plan has resulted in a proposal that new residential, commercial, and light industrial buildings located in the floodplain be raised 4 feet above ground to minimize flooding risk” (p. 43). However, the last major project in the area approved by the Planning Board, on December 19, 2017 at 55 Wheeler Street, consists of 526 units of housing in the floodplain with 44 residential units located on the ground floor. On March 12, 2018, the Conservation Commission approved another project in the floodplain, 50 Cambridgepark Drive, which increased the total footprint of buildings on that site to 188% of the existing footprint, with a dramatic reduction of ground-level open space.

While this petition would not affect projects that have already been approved by the Planning Board, it is clear that further delay in putting in place common-sense protections will result in continued development that puts the city and its residents and businesses in harm’s way.

The plans for resilient infrastructure cannot be achieved if the ongoing proposals continue to place buildings that could be permanent impediments to desired infrastructure in the remaining buildable spaces. Infrastructure includes pedestrian and vehicular access and egress (especially emergency vehicles), storm water capture and treatment, and other open space. Increasing green open space is an essential component of building climate resilience in order to reduce morbidity and mortality during heat waves, in particular when there is loss of electricity, and especially among vulnerable populations.

In particular, with buildings occupying the majority of the formerly available open space, there will not be room for large shade trees. Mature trees provide multiple environmental benefits including the ability to transfer excess groundwater into the air by evapotranspiration, which also plays a significant role in reducing local summer temperatures. Trees also provide shading from the leaves, minimizing the storage of heat in the thermal mass of the buildings, and thereby minimizing the air conditioning load and subsequent heating from the compressors. Trees also improve air quality, catch and hold rainwater, reduce noise and light pollution, and sequester carbon dioxide. Because the floodplain is a natural resource area, a collection point for groundwater from higher elevations, mature trees in floodplains tend to withstand drought conditions because their roots can reach groundwater more easily.

In a previous site visit before a Superseding Order of Conditions was issued for another project in the Alewife floodplain, the representative from the Massachusetts Department of Environmental Protection stated that state environmental laws were not designed to control development within a municipality. The

laws were designed to indicate the resource areas, and the municipalities needed to develop local strategies for protecting those areas, such as land purchases or through zoning. It is therefore important to put into effect the knowledge that we already have well in hand through zoning changes that will address the developments currently being considered in the flood plain, as well as other parts of the city.

Because the city planners have not made the needed changes in the requirements for development in flood prone areas, even after the 2010 expansion of the flood zones, some citizens have decided not to wait for city planners and instead are proposing appropriate changes to zoning for the future health and safety of the residents and workers in Cambridge. By taking the initiative based on the nearly complete findings of the Alewife planning groups, the city can more quickly begin development with climate resilience instead of locking in building designs that may prevent resilience for the approximately 50-year lifespan of the new buildings. Several components of this proposed zoning change reflect the new guidelines already being used by our City's Department of Public Works.

While comparing climate resilience zoning with other communities, a method of scoring Green Factors was discovered. A score is given, similar to LEED scores on energy, for various green infrastructure measures that are used on the site, with weighted credits depending on the environmental performance. Developers can select their own combination of measures from a menu including green roofs, trees, or pervious paving to reach a target green factor ratio. This method is now proposed in the zoning amendment to be calculated for all large projects in the city, so that the city can collect data to determine optimal targets for different zoning districts. The only area that will have a required green factor at this time is within the Flood Plain Overlay District. It is hoped that the green factor analysis will encourage green infrastructure as a method for addressing climate change vulnerabilities, in particular the urban heating effects.

The other amendments herein proposed to the existing Flood Plain Overlay District are designed to encourage greater review of projects in areas vulnerable to flooding. The scope of applicability has been expanded to cover the areas of concern identified in the 2010 FEMA and the 2015/2017 Cambridge CCVA, as well as any superseding assessment, for flooding at a 0.2% probability per year (also known as 500-year flood) in the 2070 timeframe. This relates closely to the standard fifty-year building lifespan. Although the 0.2% floodplain creates the boundaries of applicability, different performance standard may apply depending on location, project size and/or land use as described in the zoning text as summarized below.

The following items are the essential components of the proposed zoning changes.

- Larger projects throughout the city must report their Green Factor number. There will be no city-wide specification for a minimum number, which could be implemented at a later time, but there is a recommended number for the Flood Plain Overlay District (0.35).

The rest of the items are specific to the Flood Plain Overlay District

- Increase the area of applicability to the 2070 100-year (for precipitation-based) and 500-year (for storm surge) flooding events as identified by the CCVA.
- Continue the exemption of 1-3 family homes from many of the new requirements
- Specify that large developers report on how their project fits with all parts of the environmental sections of city planning documents (not allowing them to pick and choose what to address) and specifically instructs the Conservation Commission and City Engineer to review the report and make recommendations. The changes also require reports for soil, groundwater, and hydrogeological testing (to show how foundations may displace water into neighboring properties), a storm water plan, and an emergency plan.

- For larger projects, specify a minimum Green Factor number (note: required value applies only to Flood Plain Overlay District jurisdiction; the rest of city just reports their number). In addition, there would be limits on individual components related to the Green Factor number:
 - minimum open space requirement (recommendation of 30% of the lot)
 - minimum permeable surface area (recommendation of 30% of the lot)
 - minimum tree canopy coverage (recommendation of 30% of the lot)
 - minimum setback (recommendation of 25 feet to allow mature shade trees)
- Specify the lowest elevations for relevant building elements, e.g., utilities and finished floor of any residential unit
- Building height that allows for increased height by special permit up to the amount of FAR already allowed, provided all other open space requirements are met.
- Specify emergency access requirements, such as minimum site access and building access, in the event of flooding.
- Offer reduced parking requirements by Planning Board review to allow an increase in permeable open space and possibly additional units without restricting non-parking uses. Maximum parking ratio shall be 0.5 for residential, 1 space per 1500 s.f. for commercial
- Add restrictions related to hazardous material processing and storage.
- Prohibit Class I Critical Facilities in areas with 0.2% per year or greater chance of flooding. Class I Critical Facilities include hospitals, nursing homes, police stations, jails.
- Elevate floor of Class II Critical Facilities to 3 feet above the 0.2% per year chance of flooding elevation. Class II Critical Facilities are important but do not need to remain open during a flood event, such as schools, libraries, and public record storage, as well as infrastructure such as water distribution or treatment that should remain operational but may be temporarily inaccessible.

We hope that you will find these reasons to be compelling and this petition to have merit. It is the result of many years of study, work, and engagement of volunteer residents with an abiding love of our city and hope for a safe and sustainable future for all of its residents. It will benefit from a broad review and discussion, always remembering that there is vanishingly little time remaining in which we can take the needed action.