This document outlines development review application requirements in relation to the long-term environmental sustainability and climate resilience of buildings within Somerville. Development proposals that require Site Plan Approval by the Somerville Zoning Ordinance must include a completed Sustainable & Resilient Buildings Questionnaire with the required Development Review Application. A Development Review Application is considered incomplete unless a completed questionnaire is submitted with the application.

The purpose of this questionnaire is to ensure that the impacts of future climate conditions are carefully evaluated and to encourage reasonable efforts to reduce or eliminate greenhouse gas emissions and mitigate the impacts related to climate change in the design, construction, and occupancy of buildings. Completion of this questionnaire raises awareness of site specific vulnerability, ensures that future climate conditions are considered throughout the stages of development.

Please review the following documents before completing the questionnaire:

- **Somerville Climate Change Vulnerability Assessment**
- **Carbon Neutrality Pathway Assessment**

## RESOURCES:

For information on net-zero and resilient building and site design, please review the following resources:

- **Architecture 2030 Palette (Net-zero design tools)**
- **Building Resilience in Boston**
- **Enhancing Resilience in Boston**
- **A Better City's Resiliency Toolkit**
- **Ready to Respond: Strategies for Multifamily Building Resilience**

**For additional information visit www.somervillema.gov/sustainaville**

## PROCEDURE:

A completed Sustainable & Resilient Buildings Questionnaire must be submitted with a Development Review Application for all development proposals that require Site Plan Approval. New construction or alterations to existing structures of 25,000 square feet or more must also submit an updated questionnaire prior to the issuance of the first Building Permit and prior to the issuance of the first Certificate of Occupancy to identify any design changes made subsequent to Site Plan Approval or additional information determined as the development process unfolds.

## BACKGROUND: CARBON NEUTRALITY

Understanding the global imperative to reduce greenhouse gas emissions in order to prevent extreme changes to the climate, Mayor Joseph A. Curtatone set a goal for Somerville to become carbon neutral by the year 2050. In 2017, the Somerville Board of Aldermen passed a resolution re-affirming the city's carbon neutrality goal. Carbon neutrality is defined as the net-zero release of carbon dioxide and other greenhouse gases (GHG) within Somerville's municipal boundary.

To achieve carbon neutrality by 2050, Somerville will need to drastically reduce greenhouse gas emissions from electricity, buildings, transportation, and waste disposal. Development within the city will need to be high performing and progressively improve its energy performance to become carbon neutral. Buildings should be designed to maximize energy efficiency, produce or procure renewable energy, and phase out fossil fuel use.

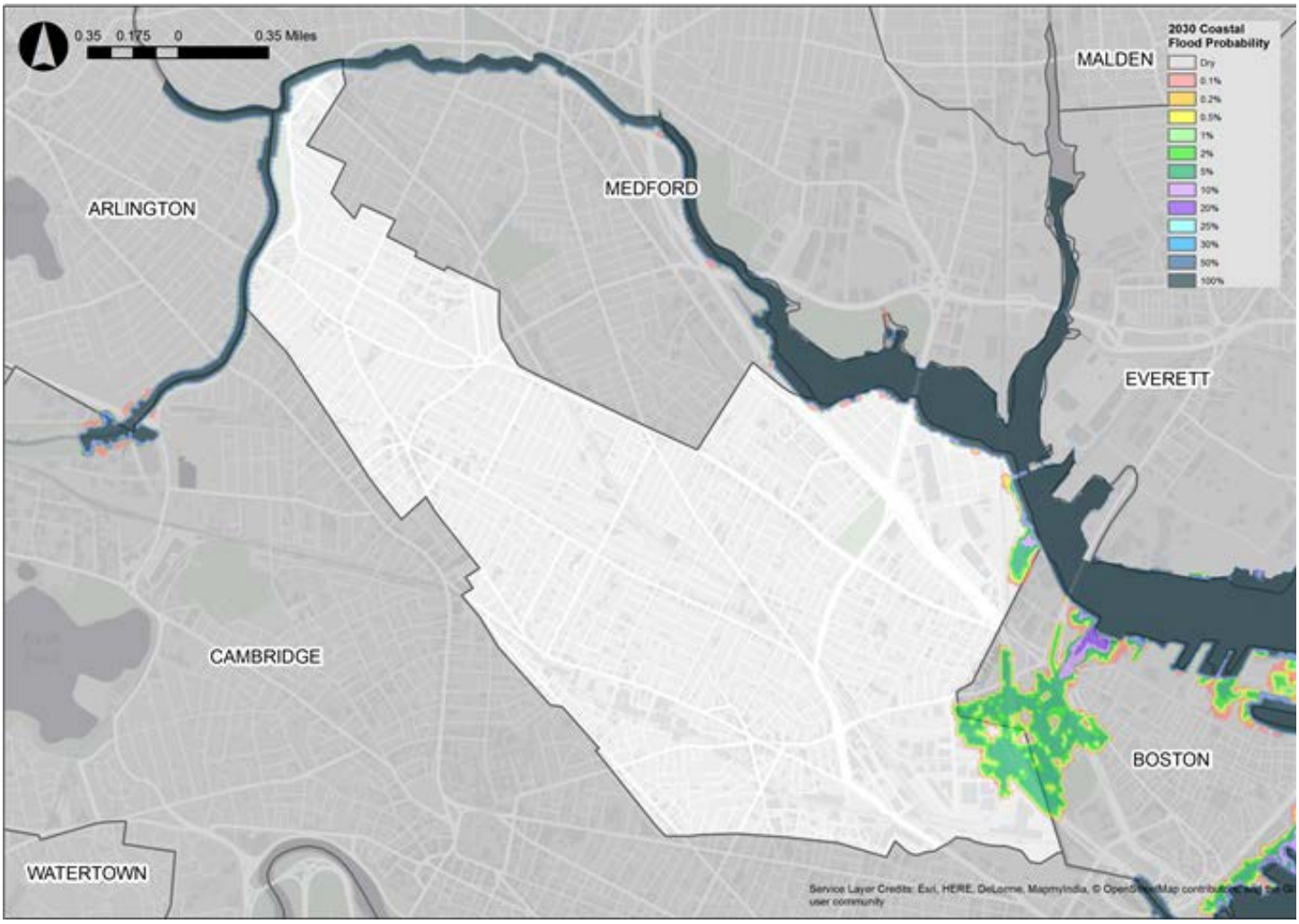
## BACKGROUND: CLIMATE CHANGE VULNERABILITY

Despite efforts to minimize greenhouse gas emissions, climate change is already impacting the City of Somerville and changes to the climate will continue to intensify unless global emissions are swiftly and significantly reduced. The City of Somerville's Climate Change Vulnerability Assessment analyses vulnerabilities associated with Somerville's key climate stressors: increased precipitation, sea level rise and storm surge, and higher temperatures. The analysis recommends that new development consider these climate impacts and take appropriate measures to address the projected climatic conditions described in the assessment.

Sea level rise and storm surge are already potential concerns for areas of East Somerville. By 2035-2040, the Amelia Earhart Dam could be regularly flanked by strong storms resulting in flooding for areas of Assembly Square, Ten Hills, and Winter Hill. Additionally, future 100-year (1% annual chance of occurrence) 24-hour storm events are projected to have a more than 30% increase in rainfall. This increased storm water will put additional stress on Somerville's water infrastructure and is likely to worsen precipitation-based flooding across many areas of the city. As the climate continues to change, average seasonal temperatures are expected to increase and the number of days above 90 degrees Fahrenheit (currently about 10 a year) could rise to 40 days by 2030, a third of the summer, and 90 days by 2070, nearly the entire summer.

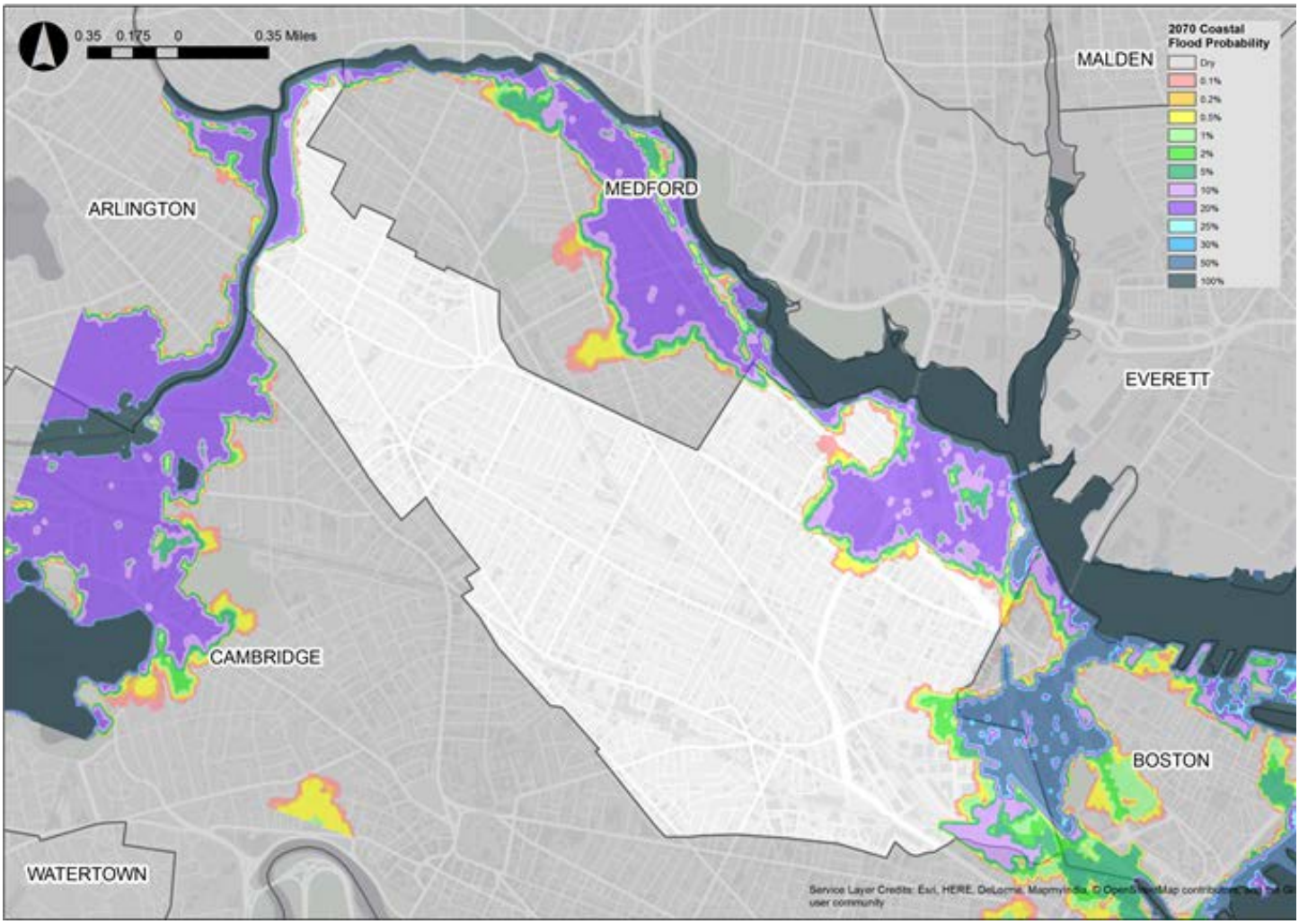
The following maps and figures provide an overview of projected climate exposure. Please review the Climate Change Vulnerability Assessment for more detailed analysis on Somerville's exposure, vulnerability, and risk to climate change.

## 2030 Coastal Flood Probability



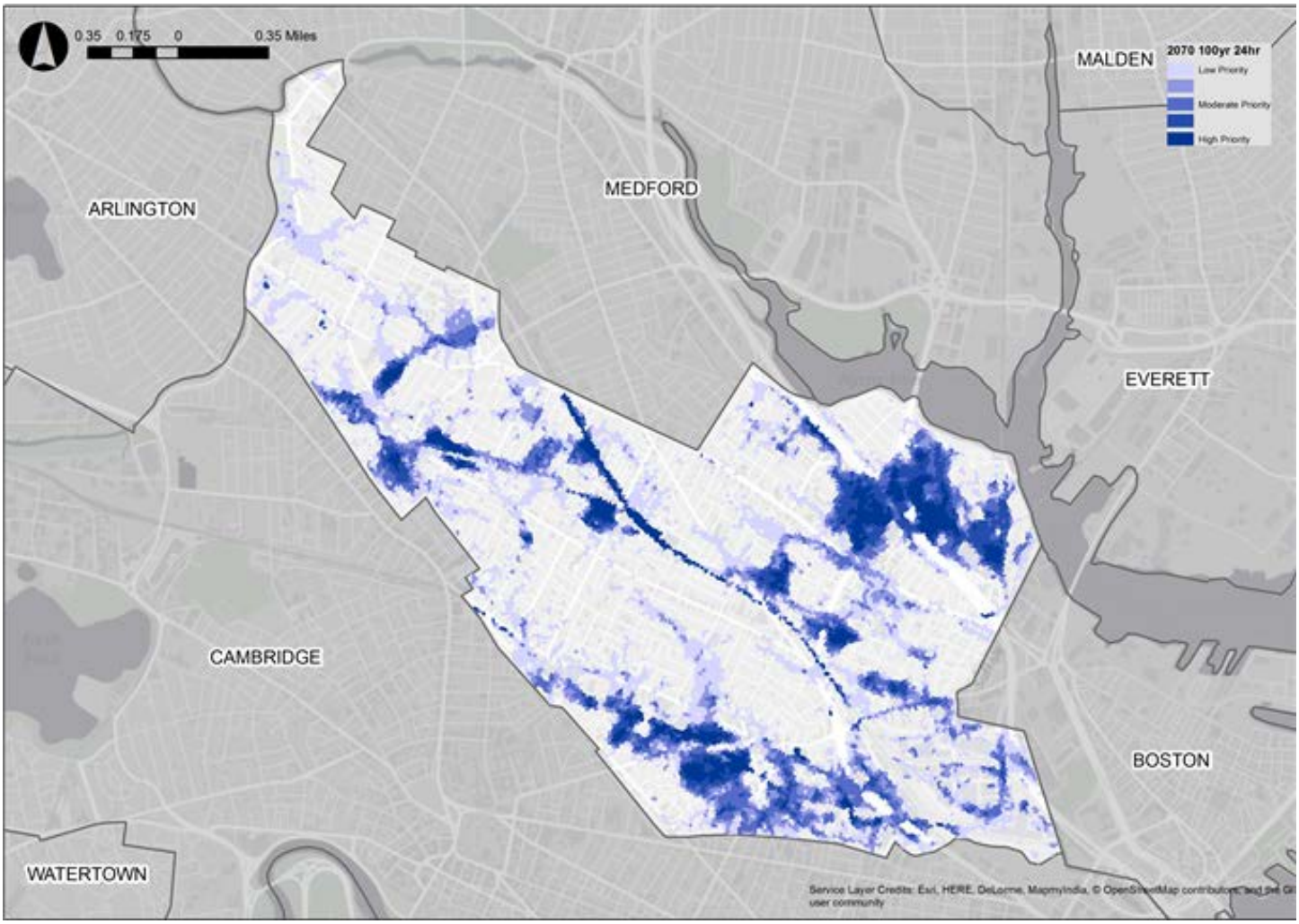

This map shows the annual chance of flooding from coastal storm events and sea level rise in 2030. A 100% chance of flooding means that area is very likely to flood that year, while a 50% chance means that there is an equal chance that it may or may not flood in a given year. A 1% chance of flooding corresponds with a '100-year event'. A 0.1% chance corresponds with a '1000-year event'. (Somerville Climate Change Vulnerability Assessment, 2017)

## 2070 Coastal Flood Probability




This map shows the annual chance of flooding from coastal storm events and sea level rise in 2070. A 100% chance of flooding means that area is very likely to flood that year, while a 50% chance means that there is an equal chance that it may or may not flood in a given year. A 1% chance of flooding corresponds with a 100-year event. A 0.1% chance corresponds with a 1000-year event. (Somerville Climate Change Vulnerability Assessment, 2017)

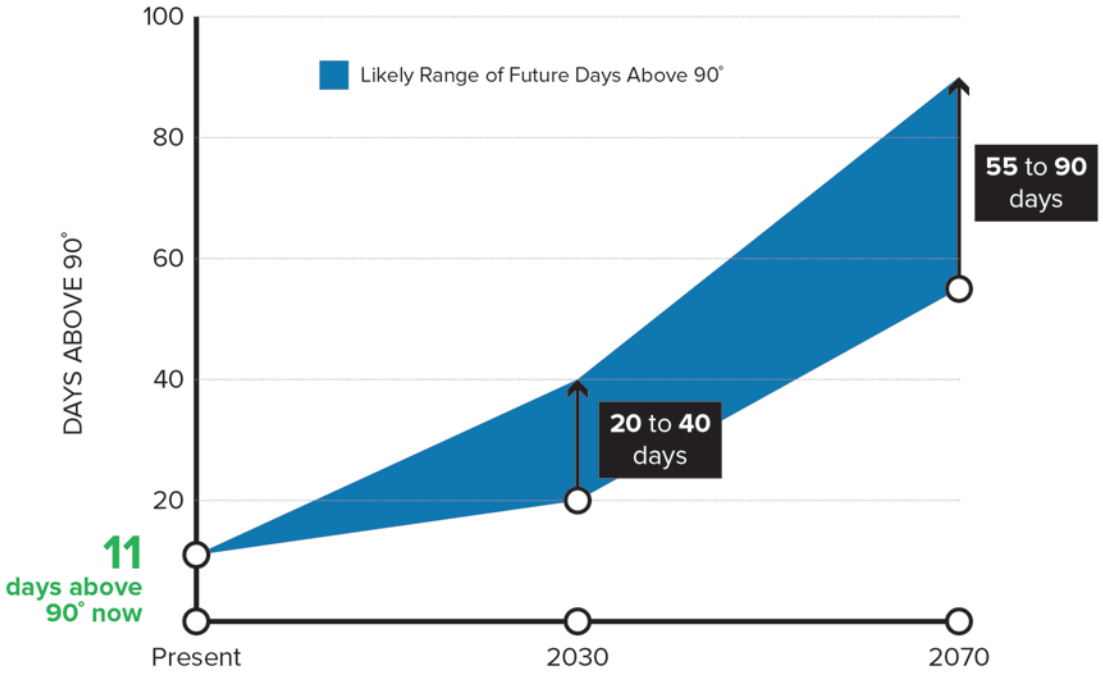
## Precipitation Projections




2070 100-year, 24-hour Design Storm Priority Areas of Flood Concern
(Somerville Climate Change Vulnerability Assessment, 2017)

| Storm Type | Present-day Rainfall | 2030 Rainfall | 2070 Rainfall |
|---|---|---|---|
| 10-year (10%), 24-hour | 4.9 in | 5.6 in | 6.4 in |
| 100-year (01%), 24-hour | 8.9 in | 10.2 in | 11.7 in |

## Temperature Projections




(Somerville Climate Change Vulnerability Assessment 2017)

| Temperature | 1971-2000 (average) | 2030 (low) | 2030 (high) | 2070 (low) | 2070 (high) |
|---|---|---|---|---|---|
| Annual | 50.0° F | 53.3° F | 53.5° F | 55.8° F | 58.7° F |
| Summer | 70.6° F | 74.5° F | 74.8° F | 77.4° F | 80.6° F |
| Winter | 29.8° F | 32.2° F | 33.0° F | 34.6° F | 38.0° F |

# SUSTAINABLE & RESILIENT BUILDINGS QUESTIONNAIRE

| | |
|---|---|
| Proposal Information | |
| Proposal Name | ALTA Xmbly(to be revised at a later date) |
| Address | 290 Revolution Drive Somerville,MA 02129 |
| ~~Owner~~/Developer | WP East Acquisitions, L.L.C. |
| Business Address | 3715 Northside Parkway NW,STE 4-600 Atlanta GA 30327 |
| Designated Contact | Jim Lambert |
| Telephone Number | (781)-541-5822 |
| Email Address | Jim.Lambert@woodpartners.com |
| Design Team | |
| Design Architect | The Architectural Team |
| Architect of Record | Michael D. Binette |
| Engineer | Wozny Barbar & Associates |
| Landscape Architect | Copley Wolff |
| Sustainability/LEED | New Ecology |
| Permitting | |
| Construction Management | TBD |
| State Review | |
| Is MEPA Approval Required? | Yes/No; Why? TBD |
| Building & Site Details | |
| Building Type | Type IA / IIIA Construction |
| Gross Floor Area | 424,702 sf |
| Principal Uses | Assembly, Business, Mercantile, Residential, and Storage |
| Ground Floor Uses | Assembly, Mercantile, Residential, and Storage |
| Site Elevation | Average Ground Level 13'-0" |
| Ground Story Elevation | 13'-0" |
| Building Height | # of Stories (feet) 84'-11" |
| Below Grade Levels | # of Stories (feet) N/A |
| Ground Water Elevation | 4'-0" - 5'-0" |
| Parking Spaces | 199 |
| EV Ready Spaces | 8 EV Ready Spaces |
| EV Charging Spaces | Number (by level) 4 @ Level One, 4 @ Level Two |
| Climate Vulnerability Exposure (check all that apply) | ☒ Sea Level Rise & Storm Surge<br>☒ Precipitation Induced Flooding<br>☐ Heat<br>☐ Other(s): |

| | |
|---|---|
| Green Building | |
| LEED Version | LEED for Homes Multifamily Mid-rise v4 |
| LEED Certifiable | (Yes)/No |
| LEED Rating | Silver/Gold/Platinum |
| LEED Point Score | 50 |

| | |
|---|---|
| Building Systems | |
| Expected Life of Building | Fifty Years |
| Critical Site Infrastructure | Water, Drainage, Sewer, Gas, Electrical, Telephone-Communications |
| Expected Life of Key Systems | Twenty Years |
| Type of Heating System(s) | Gas Hot Water |
| Type of Cooling System(s) | DX |

**Building Energy Use & Continuity**

Reducing greenhouse gas emissions is critical to avoiding the worst impacts of climate change. To achieve Somerville's 2050 carbon neutrality goal, new construction must be designed to maximize energy efficiency, produce or procure renewable energy, and phase out fossil fuel use. At the same time, new development should make efforts to improve resiliency to disruptions in utility services, which could become more frequent with more powerful storm events and heat waves.

1. Explain how building energy loads & performance were determined:

Energy loads & performance will be determined using Energy Star Target Finder.

| | | | | | |
|---|---|---|---|---|---|
| Annual Electric Load | 5348 | (kWh) | Peak Electric Load | TBD | (kW) |
| Annual Heating Load | TBD | (MMbtu/hr) | Peak Heating Load | TBD | (MMbtu) |
| Annual Cooling Load | TBD | (Tons/hr) | Peak Cooling Load | TBD | (tons) |

| | | |
|---|---|---|
| Energy Use Intensity | 107.4 | (kBtu/SF) |

2. Describe any strategies that will be implemented to support continued building operations during potential utility outages.

Generator will be provided to support continued building operations during potential utility outages.

Back-Up/Emergency Power Systems

| | | | |
|---|---|---|---|
| Electric Output | TBD | Number of Power Units | TBD |
| System Type | Generator | Fuel Source | Gas |

Emergency and Critical System Loads (in the event of service disruption)

| | | | |
|---|---|---|---|
| Electric | TBD (kWh) | Heating | TBD (MMbtu/hr) |
| | | Cooling | TBD (Tons/hr) |

2. How is the building designed to reduce energy usage? Please describe the key design features of the building including any active (equipment, controls, features, etc.) or passive (orientation, massing, systems, etc.) energy efficiency measures.

The building is designed to reduce energy by providing windows for both natural light and passive ventilations. The building will also reduce energy usage with the design of the exterior wall system.

| | | | |
|---|---|---|---|
| Energy Use below Mass Code | TBD % | Energy Use below ASHRAE 90.1 (current edition) | TBD % |

3. Will the building use air or ground source heat pumps or solar thermal systems? Please describe any such system. If no, please explain the building's heating and cooling systems and whether high efficiency electric or renewable powered systems were considered.

The building will not use air or ground source heat pumps or solar thermal systems. The buildings heating and cooling system will be vertical fan-coil units.

4. Describe any existing or planned connections to distributed energy or district energy systems.

The Project proposes to connect into existing electrical ductbanks provided in the adjacent roadways. Eversource is the electrical energy provider for the area.

5. Is on-site renewable energy generation feasible? Please describe your analysis and findings. If yes, will any renewable energy be produced onsite? If so, please describe (system type and capacity).

To be determined. This topic will be looked at further once an energy model has been created.

6. Describe any on-site energy storage systems.

To be determined. This topic will be looked at further once an energy model has been created.

7. Describe any other measures intended to reduce energy use and greenhouse gas emissions.

To help reduce energy and greenhouse gas emissions residential units will be equipped with operable windows to help lessen the need to use an active mechanical system.

8.Does the electric utility's infrastructure have enough capacity to support the addition of your

building's energy load? Please confirm that you have consulted with the local utility.

To be determined. This topic will be looked at further with the electricity provider.

9. Describe measures that will be implemented to reduce building energy demands on utilities and infrastructure, such as a demand response program.

To help reduce energy demands on utilities residential units will be equipped with operable windows to help lessen the need to use an active mechanical system.

The City of Somerville recognizes that as technology advances, incorporating design elements to mitigate carbon emissions and increase resilience may become more feasible. Applicants are encouraged to devise strategies that permit building systems to adapt and evolve over time to further reduce GHG emissions and to avoid path dependency that perpetuates reliance on fossil fuels. With this in mind, please answer the following questions:

10. Will the building be a net zero carbon building? A net zero carbon building is a highly energy efficient building that either produces or procures enough carbon-free renewable energy to meet building operations or offsets any remaining carbon emissions. If the building will not be a net zero carbon building, describe how the building's systems will be adapted over time to achieve net zero energy emissions. Changes could include, but are not limited to, additional renewable energy generation, energy storage, additional energy efficiency measures, or other measures that would further reduce greenhouse gas emissions.

No the building will not be a net zero carbon building.

11. Will the building's roof include any sustainability features? These may include, but are not limited to, high albedo roof materials, solar panels, or vegetation. If no features are included in the design, please describe why and if any features could be added in the future.

The high roof will not include any sustainability features. The internal courtyard will be landscaped and have both intensive and extensive vegetation system(s) as well as other building amenity spaces.

12. Has the building been planned and designed to accommodate any additional future resiliency enhancements? Please describe if designs could accommodate future additions of any of the following:

- Solar PV (roof or site is solar ready)
- Solar Thermal
- Connection to district energy system
- Potable water storage
- Wastewater storage
- Back up energy systems & fuel
- Electric Vehicle Charging

- Green roof

Current building design incorporates eight(8) electric vehicle charging spaces. The internal courtyard will be landscaped and have both intensive and extensive vegetation system(s) as well as other building amenity spaces.

**Climate Change Risk and Vulnerability**

13. How did you use climate change projections from Somerville's Climate Change Vulnerability Assessment (CCVA) to inform the building and site design of your project?

To be determined. This topic will be looked at further with during the production, coordination, and review of an energy model.

14. Based on the information in the Climate Exposure section of the CCVA, what are the projected climate change impacts that your site might vulnerable to? Please list and describe all relevant impacts from the CCVA.

There is no risk posed in the near term as evidenced in the 2030 flood map. The 2070 Coastal Flood high flood risk model shows that the Project Site has minimal risk of flooding (approximately 20 percent). Regardless of the minimal risk flood, the project is planning to locate critical building systems above grade. Additionally, at the appropriate time in the future, the project would consider implementing temporary flood barriers as necessary.

The next two sections ask specific questions about how the project is designed to manage climate-related risks from heat, coastal and inland flooding.

**Managing Heat Risks**

As temperatures increase, Somerville will become more susceptible to the urban heat island effect which causes hotter temperatures due to paved surfaces and waste heat generated by energy use when compared to less developed areas. Open space, trees coverage, and impervious surfaces can help reduce heat exposure and the intensity of the urban heat island effect.

Increasing average temperatures can have wide-ranging impacts on human life, the built environment, and natural ecosystems. Rising temperatures and more intense heat waves present significant public health concerns and can contribute toward kidney, lung, and heart problems. Vulnerable populations are particularly susceptible to heat-induced illness and mortality. Buildings also demand greater electricity for cooling. Even small changes in average temperatures can significantly impact the natural environment.

15. Describe how the building and its energy systems will be adapted to efficiently manage future higher average temperatures, higher extreme temperatures, additional annual heat waves, and longer lasting heat waves.

The MEP systems being provided will have a safety-factor to provide a system to meet future temperature fluctuations that are above average.

Temperature Design Conditions

| | | | | | |
|---|---|---|---|---|---|
| Low Temperature | 65 | Degrees | High Temperature | 65 | Degrees |
| Annual Cooling Days | 776 | # | Annual Heating Days | 5512 | # |

Days Above 90° | #

16. What design features will be implemented on site to minimize the site's contribution to the urban heat island effect? Please describe any and all design elements. Strategies could include, but are not be limited to, the following:

- High albedo pavement or roof materials
- Passive cooling or increased ventilation capacity
- Green roofs or walls
- Heat resistant trees and plants
- Additional landscaped areas

Heat/drought tolerant trees and planting in raised bed; Use of high albedo concrete (per LEED) at sidewalk; Planting at roof terrace.

17. What additional design and operations strategies will be implemented to protect building occupants during extreme heat events?

To protect building occupants during extreme heat events operable windows will be provided as well as fan coil units.

**Managing Flood Risks**

Several areas of Somerville are already prone to flooding from intense precipitation. As part of a wet region, Somerville is projected to experience more than a 30% increase in rainfall during a 100-year 24-hour event. With climate change, precipitation events will become more intense—meaning that a greater volume of rain will fall in a shorter period of time. This can lead to flooding in areas where the drainage system does not have sufficient capacity. It will be further exacerbated by the presence of impervious surfaces, such as roads and parking lots, where the water cannot be absorbed into the ground, but rather is funneled into storm drains, nearby water bodies or other low-lying areas.

In addition to flooding from precipitation, sea level rise and storm surge are already potential concerns for areas of East Somerville and by 2035-2040 the Amelia Earhart Dam could be regularly flanked by storms. More information can be found in the complete Vulnerability Assessment.

18. How has the site and building been designed to manage storm water from rain event?

Green infrastructure and LID BMPs are being used on site to reduce runoff and increase the time of concentration for the stormwater runoff on the project site. The project will use permeable paver's, rain gardens, tree box filters, proprietary separators, and green roofs to reduce runoff and improve runoff water quality.

19. Is the site susceptible to flooding from sea level rise and storm surge or rain events now or during its expected lifetime? Please refer to the Somerville Climate Change Vulnerability Assessment and restate your potential flood risks based on the CCVA.

There is no risk posed in the near term as evidenced in the 2030 flood map. The 2070 Coastal Flood high flood risk model shows that the Project Site has minimal risk of flooding (approximately 20%).

**If you answered YES to the previous question, please complete the next section.** Otherwise, you have completed the questionnaire. Thank you.

Flooding Design Considerations

| | | | |
|---|---|---|---|
| Site Elevation - Low | 10.25 (ft) | Site Elevation - High | 13.0 (ft) |
| Site Elevation - Avg. | Average Ground Level | Ground Level Elevation | 13.0 (ft) |
| Is any portion of the site in a FEMA SFHA? (1% chance floodplain) | Yes [No] | What FEMA zone(s) | Zone X |
| Base Flood Elevation | | Design Flood Elevation | |
| 2030 Flood Risk | 0 (%) | 2070 Flood Risk | 20 (%) |

20. What are the ground floor uses of the building? Are there any below ground stories of the building? If so, what uses are located below ground?

The ground floor uses of the building included assembly, mercantile, residential, and storage which are all located above grade. There is no below ground stories for this project.

21. Are there any flood-sensitive assets, utilities, mechanical equipment, or critical site infrastructure located in areas of the building that are at risk of flooding? What measures will protect building systems during a flood or severe storm? These might include, but may not be limited to, the following:

- Elevation of utilities and mechanical systems
- Water tight utility conduits
- Waste water back flow prevention
- Storm water back flow prevention
- Systems located above the ground floor
- Securing objects at risk of becoming dislodged

The project is planning to locate critical building systems above grade, and backflow preventers will be placed in all major utility connections. Additionally, at the appropriate time in the future, the project would consider implementing temporary flood barriers, as necessary.

22. Will any flood-damage resistant materials be used in design and construction in flood risk areas?

Flood-damage resistant materials have been incorporated into the exterior envelope design. The materials include precast concrete, cementitious panels, and masonry.

23. What flood control design elements will be used to mitigate a 2070 coastal flood event with a 10% chance to occur in any given year (a '10-year' event)? These might include, but may not be

limited to, the following:

- Elevation of the site
- Structural elevation of the building
- Non-structural elevation of the ground floor
- Wet flood-proofing (allowing water to flow through building envelope)
- Dry flood-proofing (preventing water from entering building)

Yes, at the appropriate time in the future, the project would consider implementing temporary flood barriers as necessary.

24. What is the recovery plan for a 2070 coastal flood event with a 1% chance to occur in any given year (a '100-year' event)? Summarize anticipated pre- and post-event policies, strategies, and actions necessary to facilitate post-flood recovery. These might include, but may not be limited to, the following:

- Flood mitigation design (see #23)
- Recovery management team
- Annual training & exercises
- Hazard evaluation & mitigation
- Damage assessment
- Demolition & debris removal
- Repair permitting
- Business resumption

The design team is evaluating their options in light of the robust Somerville Climate and Vulnerabilities reports and studies.

25. Will hazardous or toxic material be stored on site? Where will it be stored? How will you protect hazardous or toxic material from flooding?

Hazardous or toxic materials will not be stored on site.

26. Will the building employ any temporary measures to prevent flooding on site? These could include barricades, flood gates, and other measures. Please describe any temporary measures and include the elevation the measures are designed for.

THe building will not empoy any temporary measures to prevent flooding on site as we are out of the flood zone.

27. Will the site be accessible during a flood inundation? If yes, to what flood elevation?

The site will be accessible during a flood inundation.  The flood elevation is 13'-0".

28. Will any additional measures be employed to protect the building from storms and flooding?

The electrical room and vaults will be sealed to prevent any water infiltration during a flood event.