INTRODUCTION

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 (Questionnaire) with the required Development Review Application. A Development Review Application is considered incomplete unless a completed questionnaire is submitted with the application. It is strongly recommended that the development team meets with staff from the Office of Sustainability and Environment prior to submitting the Development Review Application.

The purpose of this Questionnaire is to minimize the adverse environmental impacts in the design, construction, and occupancy of buildings in Somerville and to ensure that the impacts of future climate conditions are carefully evaluated.

Please review the following documents before completing the Questionnaire:

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

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. Carbon neutrality is defined as the net-zero release of carbon dioxide and other greenhouse gases (GHG) within Somerville's municipal boundary. Reducing greenhouse gas emissions is critical to avoiding the worst impacts of climate change and to protecting the health, safety, and welfare of current and future generations. In 2017, the Somerville Board of Aldermen passed a resolution reaffirming the city's carbon neutrality goal. And In 2018, Somerville released its first community-wide climate action plan, Somerville Climate Forward.

To achieve carbon neutrality by 2050 and to minimize adverse environmental impacts, Somerville will need to drastically reduce greenhouse gas emissions from electricity, buildings, transportation, and waste disposal. To meet these goals, all buildings within the city will need to pursue net zero emissions. New development should

be designed to maximize envelope performance and energy efficiency, produce or procure renewable energy, and phase out fossil fuel use through electrification of building systems. 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 asked 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.

BACKGROUND: CLIMATE CHANGE VULNERABILITY

Despite efforts to minimize greenhouse gas emissions, climate change is already impacting Somerville and changes to the climate will continue to intensify. 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.

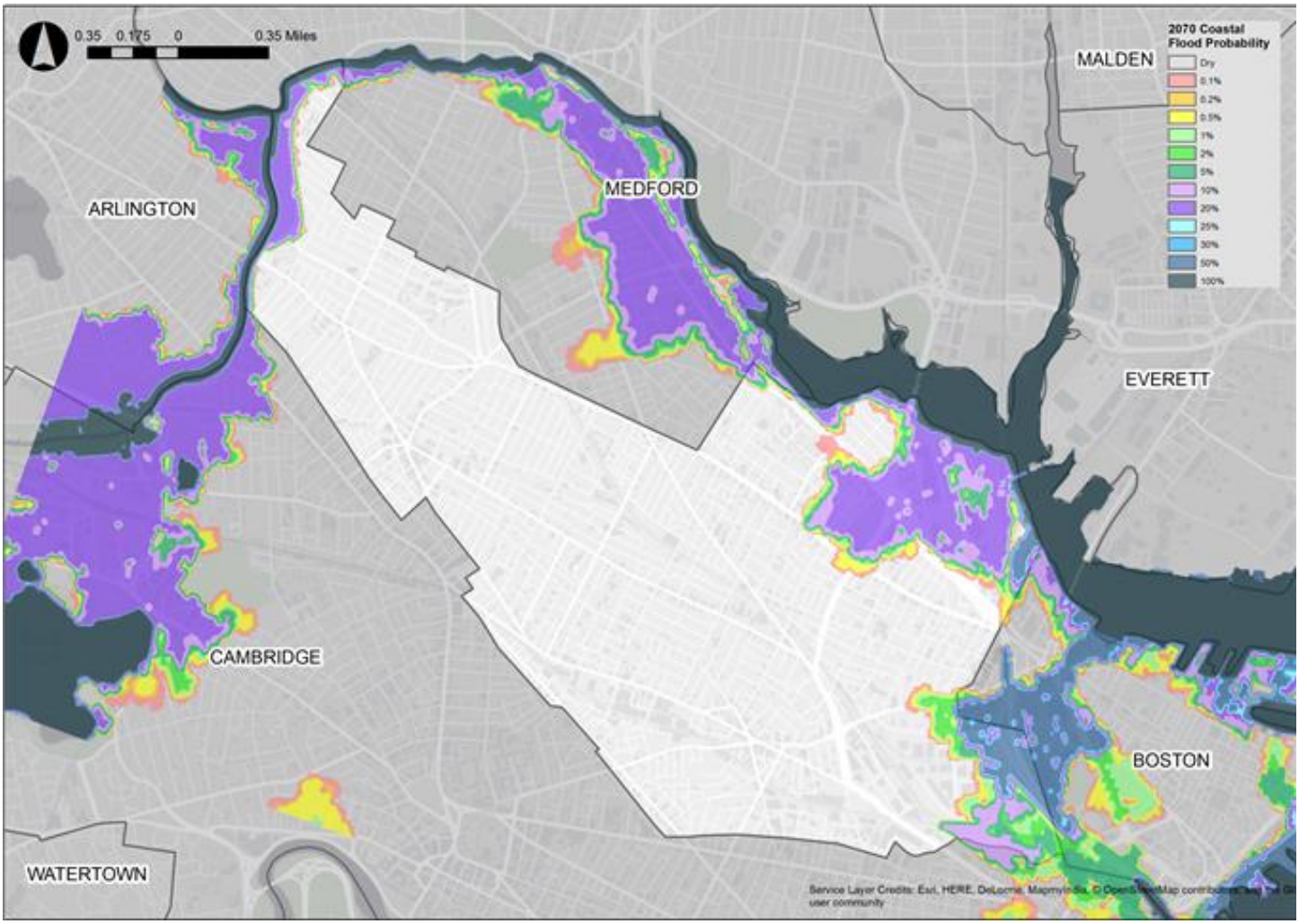
Several areas of Somerville are already prone to flooding from intense precipitation. With climate change, precipitation events will become more intense—meaning that a greater volume of rain will fall in a shorter period of time. Somerville is projected to experience more than a 30% increase in rainfall during a 100-year 24-hour event. This increase in precipitation will increase the risk of flooding in areas where the drainage system does not have sufficient capacity.

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, resulting in flooding for areas of Assembly Square, Ten Hills, and Winter Hill.

As the climate continues to change, average seasonal temperatures are also expected to increase and the number of days above 90 degrees Fahrenheit (historically 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. In 2018 there were 23 days over 90 degrees.
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. 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. There will also be increasing demand for indoor cooling.

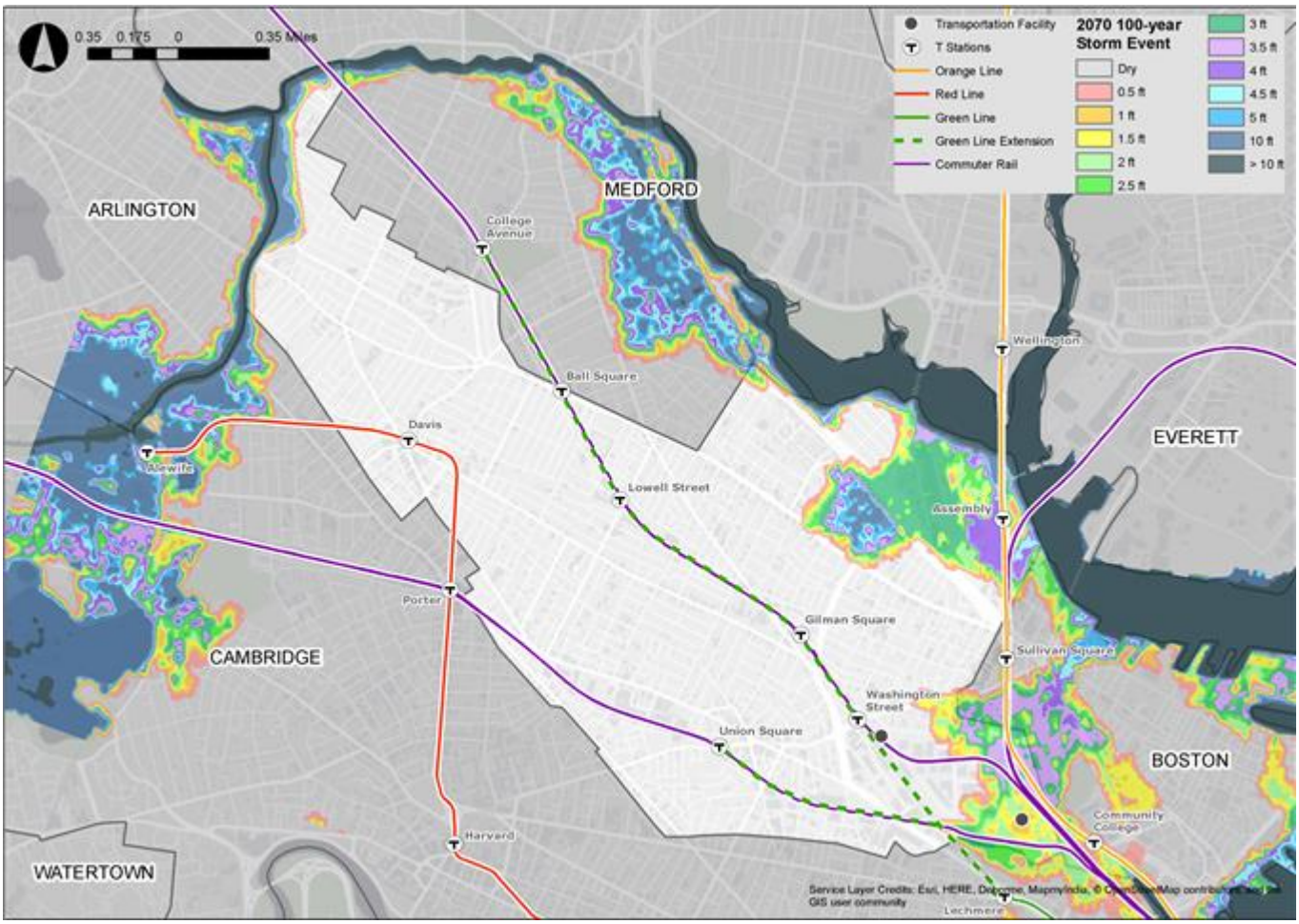
The following maps and figures provide an overview of projected climate exposure. Please review the Climate Change Vulnerability Assessment for more detailed analysis on Somerville's exposure, vulnerability, and risk to climate change. For higher resolution maps and GIS files, please contact the Office of Sustainability & Environmental staff at ose@somervillema.gov.

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 there is a nearly certain chance that the area will flood at least once in a given 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. This map does not account for drainage (Somerville Climate Change Vulnerability Assessment, 2017)

2070 Coastal Flood Depth from 2070 100-year Storm Event

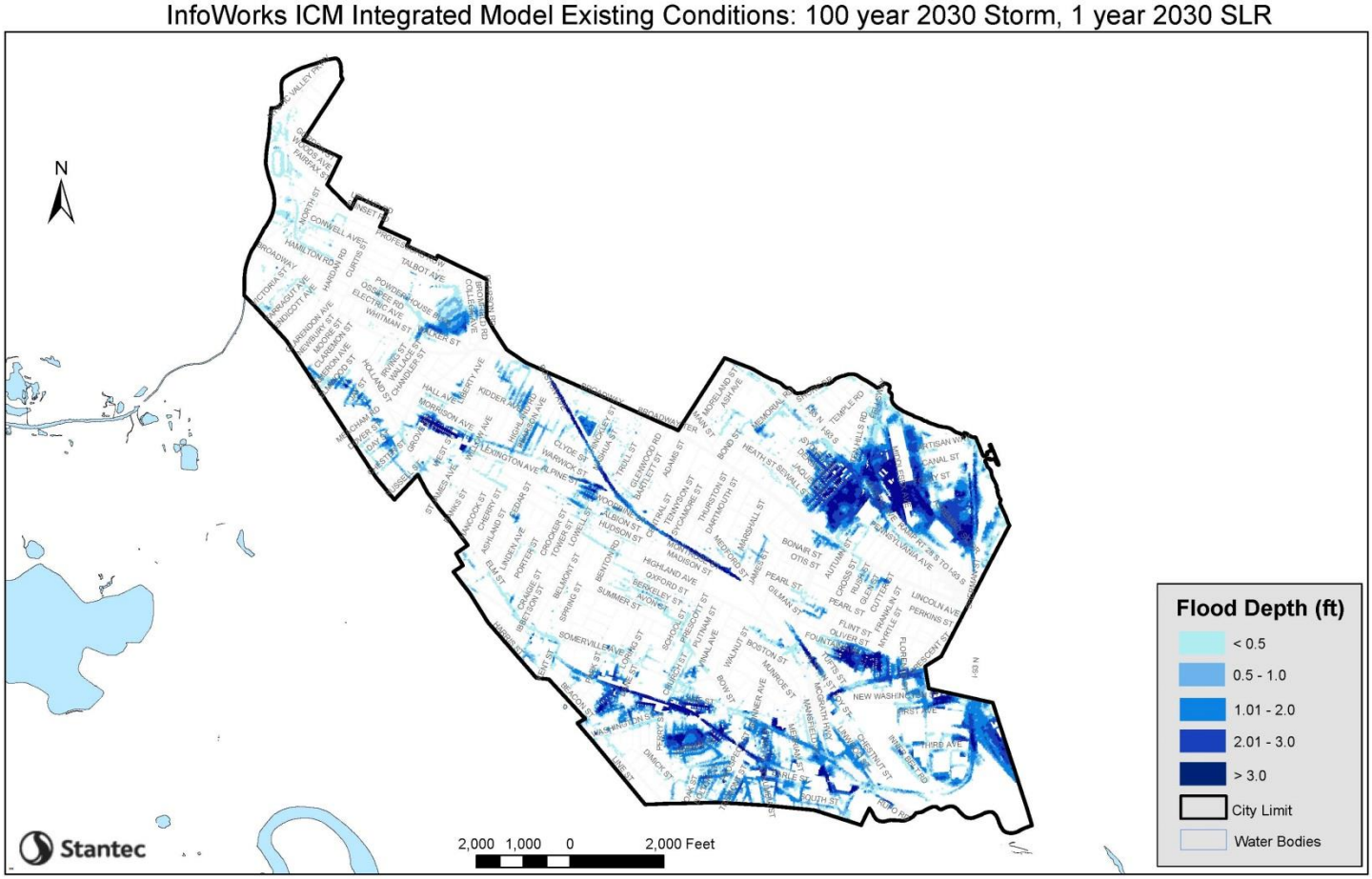


This map shows the projected flood depths of a 100-year coastal storm event in 2070 along with public transportation infrastructure assets. This map does not account for drainage (Somerville Climate Change Vulnerability Assessment, 2017)

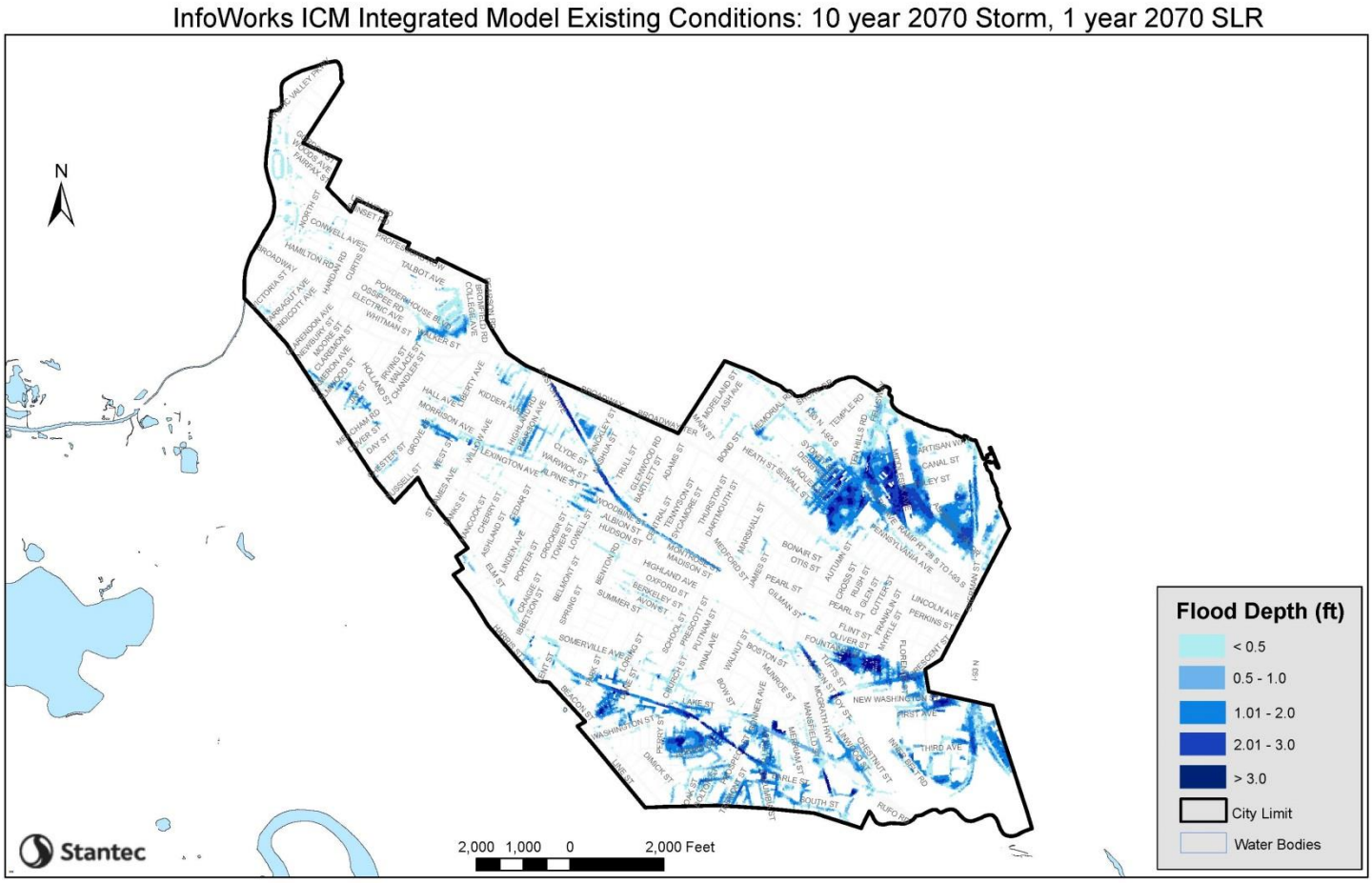
Precipitation Projections

Precipitation-based flooding is projected to increase in Somerville and is currently more of an immediate and widespread threat than sea level rise and storm surge. The intensification of both the frequency and intensity of rainfall events is likely to cause increased risk of flooding during rain events.

Storm Type	Present-day Rainfall	2030 Rainfall	2070 Rainfall
10-year (10% annual chance), 24-hour	4.9 in	5.6 in	6.4 in
100-year (1% annual chance), 24-hour	8.9 in	10.2 in	11.7 in



This map shows the impact of both precipitation-based flooding and sea level rise and storm surge. This map shows the modeled flood depths of a 100-year, 24-hour Design Storm with 1-year storm surge and sea level rise projections in 2030. Unlike the maps above, this includes modeling of the drainage system, which takes into account how water will be conveyed out of the city. The model is based on how the system is designed to function, so actual areas of flooding and depth of flooding could vary (Stantec, 2019).



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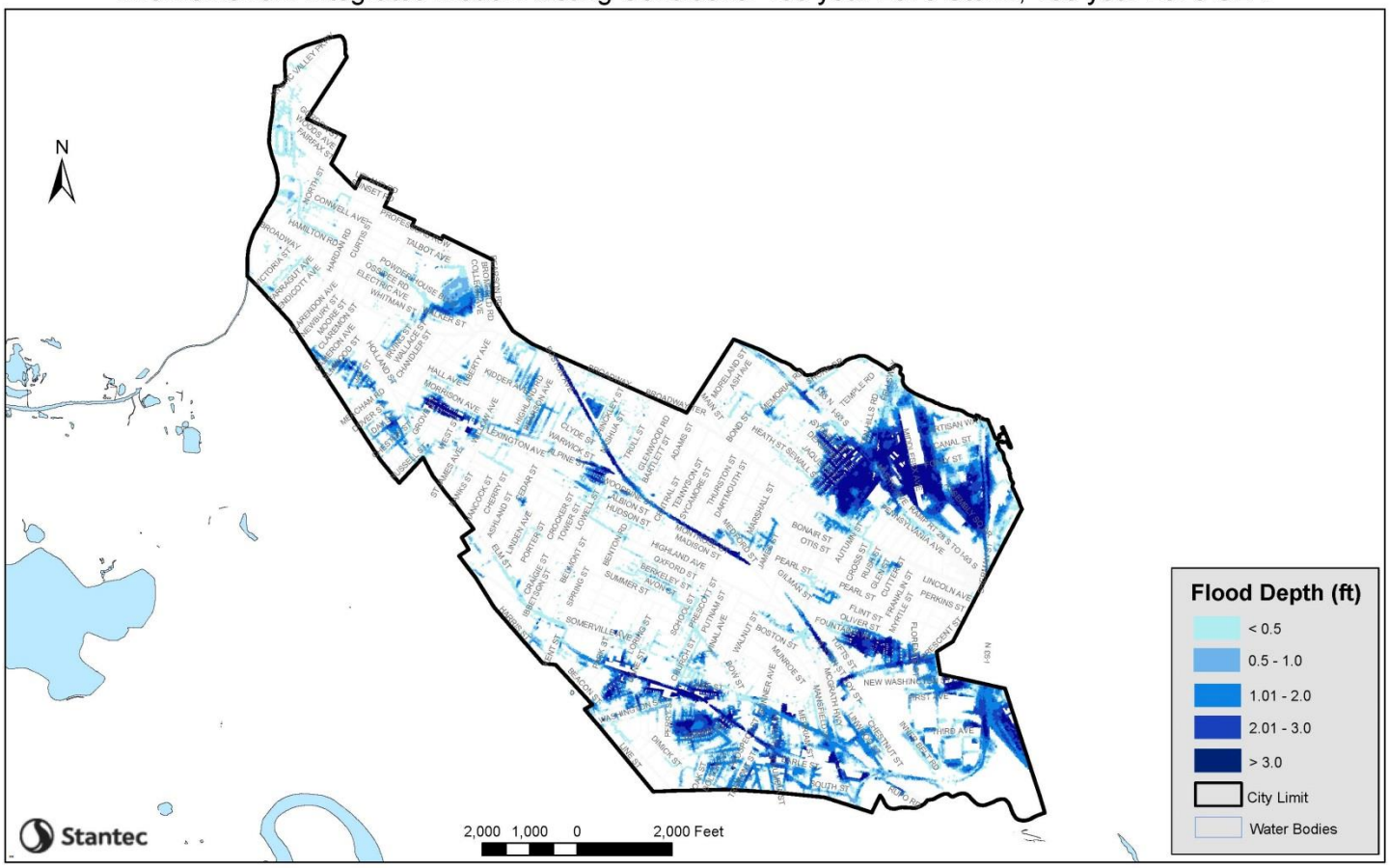
InfoWorks ICM Integrated Model Existing Conditions: 100 year 2070 Storm, 100 year 2070 SLR



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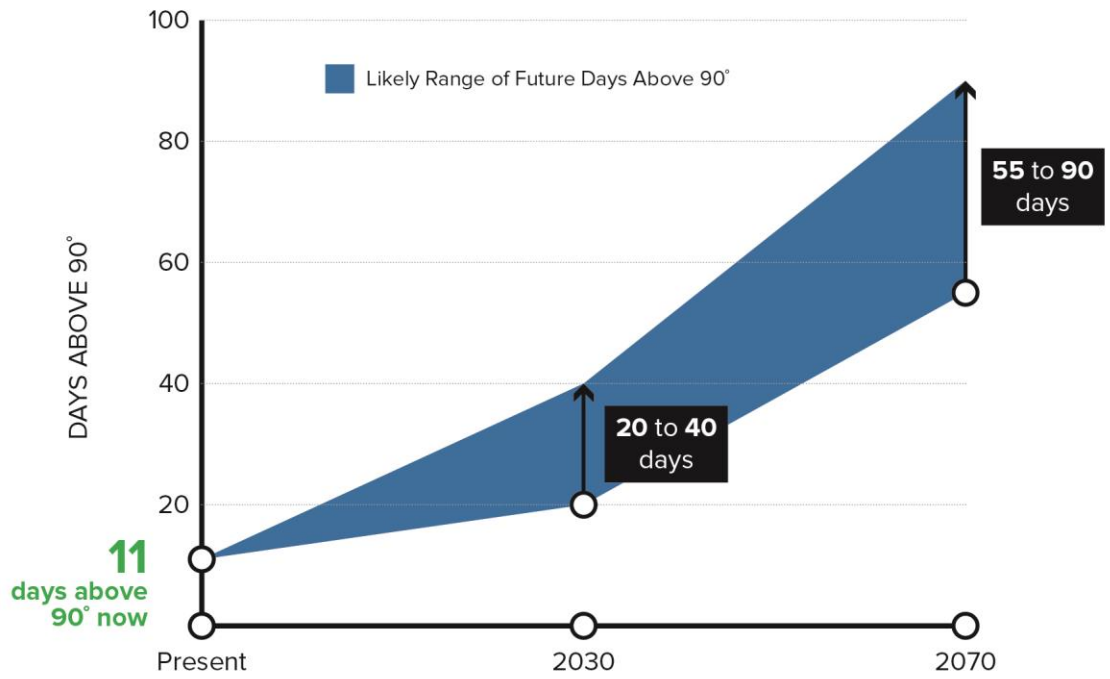
Temperature Projections



(Somerville Climate Change Vulnerability Assessment 2017)

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

RESOURCES:

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

- **Passive House Principles**
- **Architecture 2030 Palette (Net-zero design tools)**
- **Zero Energy Buildings in Massachusetts: Saving Money from the Start**
- **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

SUSTAINABLE & RESILIENT BUILDINGS QUESTIONNAIRE

Section 1: Proposal Information

Proposal Name	Parcel 1
Address	10 Washington Street – Somerville, MA 02143
Developer	Paradigm Properties
Business Address	93 Summer Street, 2nd Floor – Boston, MA 02110
Designated Contact	Noah Sparkman
Telephone Number	860-575-3675
Contact's Email Address	nsparkman@paradigmprop.com
Date Submitted	1/21/2022
Filing Type (Development review application, Building Permit, or CoA)	Development Review Application
Is this a revised Questionnaire?	No
Is MEPA Approval Required?	Yes/No; Why? No

Section 2: Building & Site Details

2.1 Building Information

Building Uses	Office / R&D / Laboratory
Gross Floor Area	77,245 SF
Expected Life of Building	75 Years
Please describe the following	
Building heating plant and distribution System	Main heating and cooling plants shall be accomplished by variable refrigerant condensing units coupled directly to the main air handling unit DX coils. Supplemental cooling and heating shall be provided to the office program via other, separate, VRF heating/cooling condensers serving VRF fan coil units. A supplemental heating plant is being provided to service the reheat requirements of the laboratory spaces. This supplemental heating plant shall utilize natural gas fired condensing boilers to create 140F reheat water.
Building cooling plant and distribution system	Main heating and cooling plants shall be accomplished by variable refrigerant condensing units coupled directly to the main air handling unit DX coils. Supplemental cooling and heating shall be provided to the office program via other, separate, VRF heating/cooling condensers serving VRF fan coil units.

Ventilation system	Two, 40,000 cfm, 100% outside air energy recovery rooftop units. These rooftop units shall be connected to the VRF cooling/heating condensing units mentioned above within the "cooling distribution" and "heating distribution" descriptions.
Domestic hot water system	Electrically fired hot water heaters for core restrooms. All other domestic water needs shall be provided by individual tenants. The proposed style of hot water generation shall be electrically fired hot water heaters.

2.2. Green Building

Green Building Professional(s): Name(s) and contact information	Brian Salazar – Entegra Development & Investment, LLC bsalazar@entegra-re.com P: 617.605.1922
Professional Credentials: Green Building Program Certification(s)	LEED AP BD+C, LEED AP ID+C, WELL AP
Building LEED Rating	Certifiable/Silver/Gold/Platinum
Building LEED Point Score	82-91
Will you pursue LEED certification through the USGBC?	Yes
Are any other green building certifications being pursued? (Passive House, Enterprise Green Communities, etc.). Please describe.	Not at this time.

2.3. Electric Vehicle Parking

The number of electric vehicles (EVs) in Somerville is expected to increase significantly over the next decade with more electric vehicles coming to market than ever before. Conservative estimates based on historical trends alone suggest 20% of personal vehicles in Somerville will be electric by 2040. Installing capacity for EV supply equipment (EVSE) has been shown to be more feasible and cost effective during construction than when retrofitting parking areas to support the installation of EVSE in the future[1]. Providing EVSE can increase the property value, become a future revenue source, and provide an amenity that more tenants and commuters will be looking for. It is recommended that parking facilities be designed to allow

[1] http://evchargingpros.com/wp-content/uploads/2017/04/City-of-SF-PEV-Infrastructure-Cost-Effectiveness-Report-2016.pdf; https://www.richmond.ca/__shared/assets/Residential_EV_Charging_Local_Government_Guide51732.pdf

for the most flexibility to adapt to future needs of electric vehicles and changing mobility needs. **The City of Somerville recommends 25% of spaces have installed charging access and up to 100% of spaces be "EV Ready"** (everything but the station installed). Eversource currently has a program to pay the associated infrastructure costs of EV charging, including infrastructure needed to be "EV ready." Please consult with Eversource to determine if any installation costs could be covered through their Make Ready Program.

Total # of Parking Spaces	# N/A (70 spaces allocated to 10 Washington Street in the neighboring parcel as part of previously approved masterplan agreement)
EVSE Plugs (number and voltage/ level of plugs)	EV plugs are included in neighboring parcel parking
EV Ready Spaces (everything but station is installed)	EV spaces are included in neighboring parcel parking
Please share any other information on your EV strategy. Have you spoken with Eversource? Are you talking with EVSE providers? Have you considered EVSE needs in conjunction with your parking and mobility management plans?	N/A

2.4 Energy Input Form
Required for projects over 25,000 SF, optional for all other projects

Download a copy of the Somerville Low Load Building Energy Input Form and follow the instructions included in the spreadsheet.

Pre-Submittal Phase

- Complete the 'PRE-SUBMITTAL INFO' tab of the Energy Input Form and submit to the Office of Sustainability and Environment (ose@somervillema.gov) 1 week prior to your pre-submittal meeting with OSE.

Development Review Phase

- Complete the 'DEVELOPMENT REVIEW INFO' tab of the Energy Input Form and submit to the Office of Sustainability and Environment (ose@somervillema.gov) at least 3 weeks prior to your application submittal for Board review.
- Projects pursuing Passive House certification from PHIUS or PHI do not have to complete the Development Review Info tab.

2.5 Net Zero Carbon Building Compliance
The City of Somerville encourages projects to eliminate the incorporation of fossil fuels in their building operations. Please explain the proposed building's electric heating system capacity and confirm it is consistent with Row 24 in 'Energy Input Form – Pre-submittal Dashboard Tab' or Row 28 if the project is a laboratory building. If the project intends to incorporate fossil fuels, please provide a rationale below and explain provisions that your project is taking to electrify base building systems in the future.

This project is a combination laboratory and office building (roughly 60% lab and 40% office). The electrical heating system capacity is approximately 2737 MBH. This heating system is accomplished via variable refrigerant condensing units directly coupled to the energy recovery rooftop units. There is also a supplemental heating system for the reheat component of the laboratory program. This heating system is composed of natural gas fired, condensing boilers, with heating hot water distribution throughout the building. With the building being predominantly lab program it is impractical to heat the entire building via electrical resistance. The building main electrical service size is 4000 amps. No provisions have been planned to 100% electrify the building in the future.

2.6 Describe any and all incentives, rebates, grants provided by utilities, government organizations, and other organizations being pursued to maximize building efficiency and to reduce emissions. Description must include any incentives that were considered but are not being pursued, including reasoning for each decision.

Please replace the list of potential incentive programs here with the incentive paths that your project is considering.

- Mass Save
- Smart metering options through utilities

2.7 Evaluate feasibility of on-site renewable generation. Please describe your analysis and findings. Analysis should consider incentives available. Will any renewable energy generation be incorporated into the project? If so, please describe (system type and capacity). If no, could it be added in the future? And will any off-site renewable energy be purchased?

Due to the layout of the site and the substantial roof area occupied by building systems, on-site renewable energy generation is not feasible at this time. The purchase of off-site renewable energy is being considered and may be included in operations depending on viability.

Section 4: Climate Change Risk and Vulnerability

4.1 Climate Vulnerability Exposure
(check all that apply)

- ☐ Sea Level Rise & Storm Surge
- ☒ Precipitation Induced Flooding
- ☐ Heat
- ☐ Other(s):

4.2 How is your site vulnerable to projected climate change impacts?

100 year flood elevation is higher than neighboring streets and anticipated 1st floor slab level.

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

Section 5: Managing Heat Risks

5.1 Describe all building features that will keep building occupants safe and comfortable during extreme heat, including mechanical systems and non-mechanical design elements to cool building (orientation, envelope, operable windows, etc.).

The mechanical system utilizes energy recovery to pre-temper outside air during the warmest months so as to reduce the temperature of incoming air before the cooling coil. Additionally, the cooling plant has been sized to account for a failure of the energy recovery. This sizing strategy will also allow the cooling system to respond to unusually high ambient temperatures beyond the ASHRAE 0.4% design criteria when said instances occur.

5.2 How has increased demand for indoor cooling been factored into the building design and energy management strategy?

Each building occupied space / zone is being provided with the capability for manual changes to temperature setpoint by plus/minus 3 degrees F in either heating or cooling mode. Automatic turndown / reset of temperature setpoints will occur during unoccupied times as a strategy to reduce colling and heating usage.

5.3 List any indoor spaces without cooling and their uses.

Not applicable. All interior occupied spaces shall be provided with conditioned and heated air.

5.4 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

High albedo paving materials, high albedo roofing, significant green roof area and green landscaped areas at streetscape.

Section 6: Managing Flood Risks

6.1 Is the site susceptible to flooding from sea level rise and storm surge and/or rain events now or during the building's expected lifetime? Please refer to the Somerville Climate Change Vulnerability Assessment and the updated stormwater flooding maps provided in the Background section of this Questionnaire. Additional maps and data are available by request (email hpayne@somervillema.gov)

Yes.

If you answered YES to the previous question, please complete the remainder of Section 6. Otherwise, you have completed the Questionnaire. Thank you.

6.2 Flooding Design Considerations

Proposed Site Elevation - Low	10.9(ft)	Proposed Site Elevation - High	12.5 (ft)
Lowest elevation of life-safety systems	13 (ft)	Proposed First Floor Elevation	12.5(ft)
Nearest flood elevation for the 2070 10-year storm	12.5	Nearest flood elevation for the 2070 100-year storm	13.0

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

First floor will consist of Main entry/Lobby/Tenant space/MEP infrastructure rooms and Loading area

6.4 Are there any flood-sensitive assets, utilities, mechanical equipment, or life-safety systems 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

Main electrical room, Fire pump room and other critical services will be elevated to be above the 100 year flood plain elevation

6.5. Residential and commercial buildings should be designed to maintain regular operations during a 10-year storm in 2070. **Describe how the site and building have been designed to maintain regular operations--meaning all systems will remain operational and all occupied spaces are protected from flooding--during the 2070 10-year storm.** Please refer to both the 2070 coastal flood probability map and the 2070 10-year storm and 1-year sea level rise scenario (pages 3 and 6). Resilience measures 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
- Energy storage and backup generation
- Wet flood-proofing (allowing water to flow through building envelope)
- Dry flood-proofing (preventing water from entering building)

Wet flood-proofing

6.6 Residential buildings should be designed to allow occupants to shelter in place during a catastrophic storm (100-year event) today and in the future, this means all life-safety systems should be above the 2070 100-year flood elevation. **How will your site and building be impacted by the 2070 100-year, 24-hour storm and how will your site and building be designed to protect against those impacts?** Please evaluate impact based on both the 2070 coastal flood depth model for the 100-year storm and the 2070 100-year, 100-year sea level rise model (pages 4 and 7). Summarize anticipated pre- and post-event policies, strategies, and actions necessary to facilitate post-flood recovery.

Critical MEP services will be elevated to 100-year flood elevation.

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

Yes, in limited amounts and storage components will be on elevated platforms at the 13’ threshold

6.8 Will the site be accessible by a typical vehicle during a 10-year event (up to 6 inches of water) and by emergency vehicles (up to 12 inches of water) during a 100-year event?

Yes.