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.

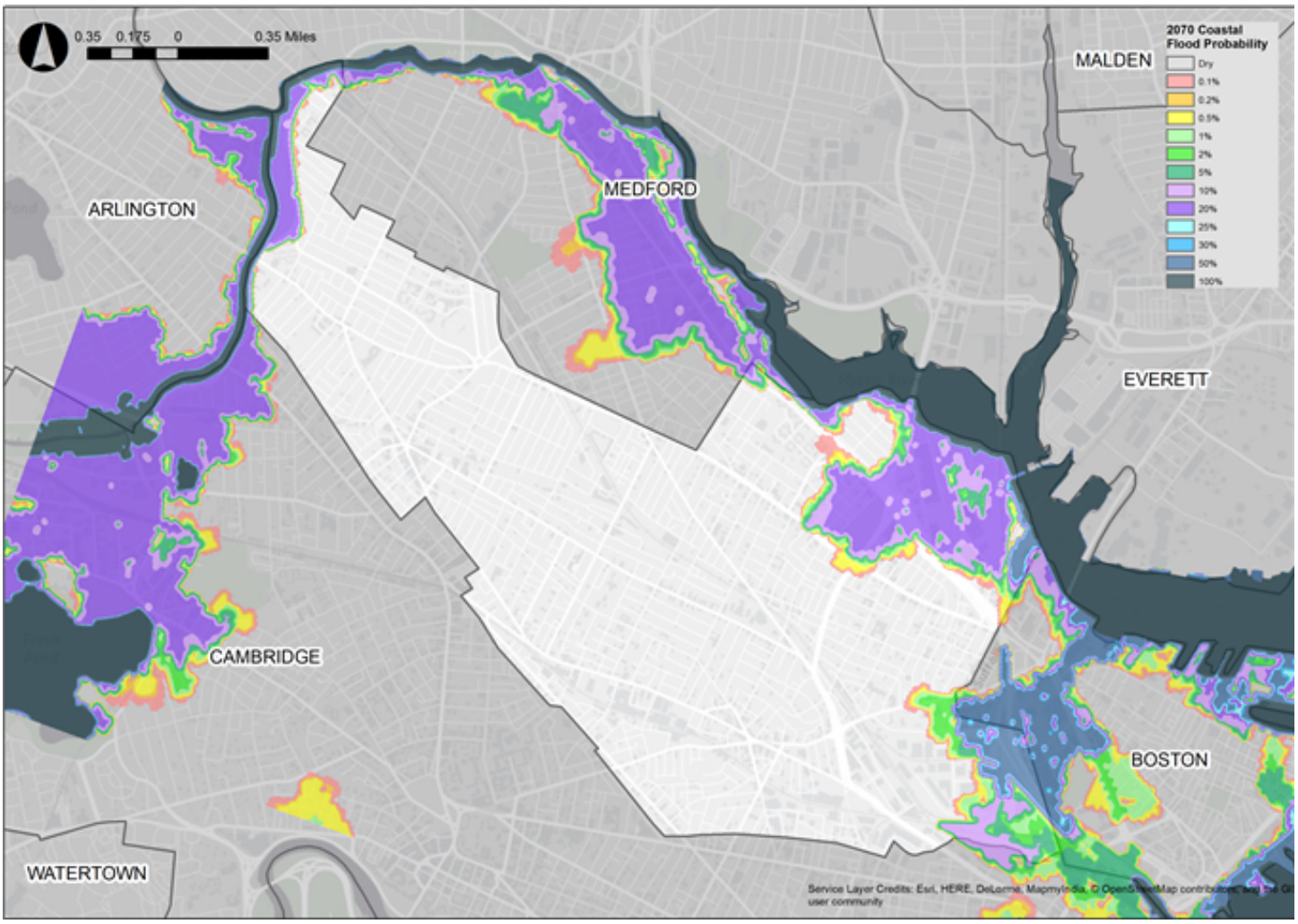
Several areas of Somerville are already prone to flooding from intense precipitation. With climate change, precipitation events will become more intense—meaning that a greater volume of rain will fall in a shorter period of time. Somerville is projected to experience more than a 30% increase in rainfall 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.

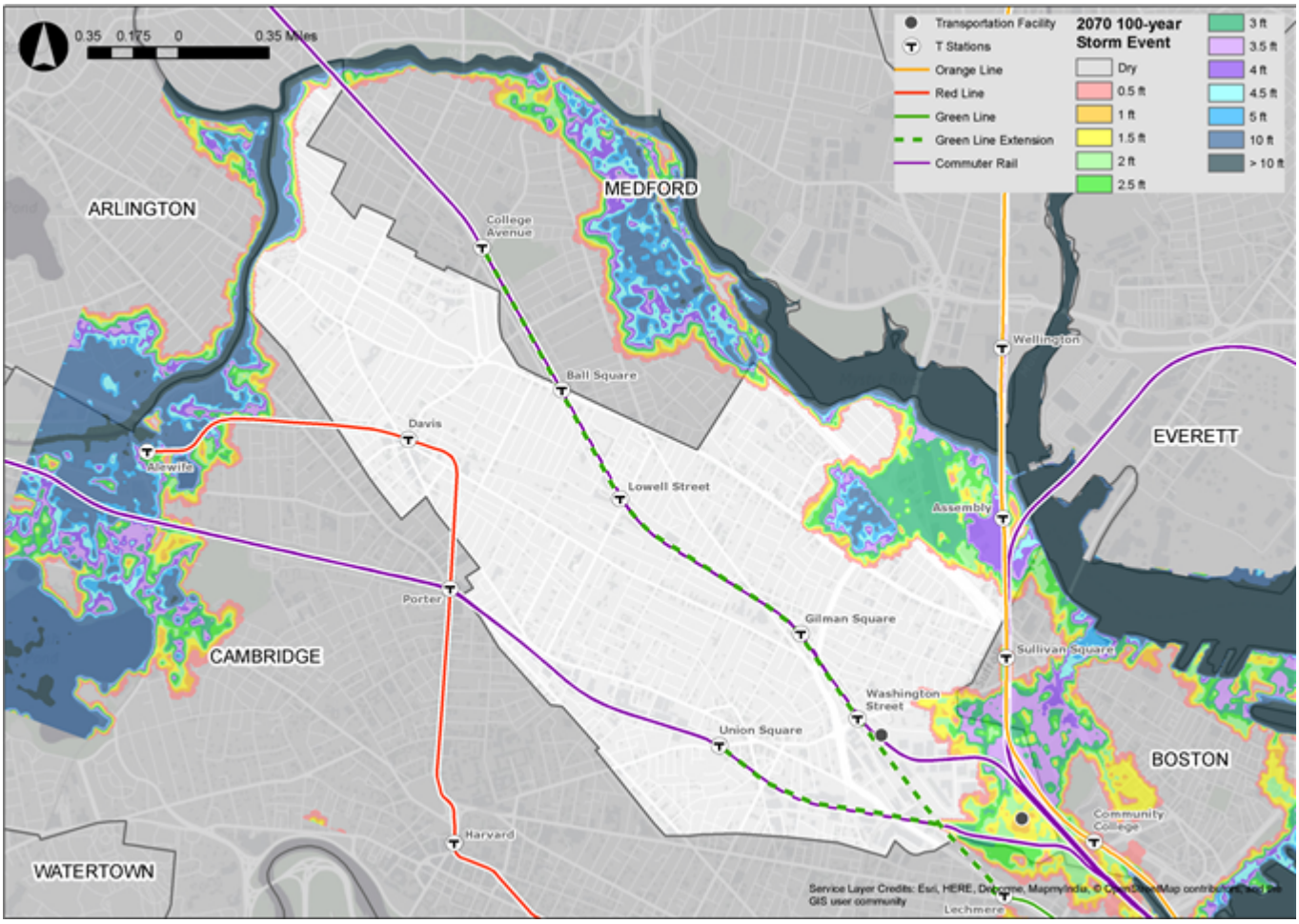
The following maps and figures provide an overview of projected climate exposure. Please review the Climate Change Vulnerability Assessment for more detailed analysis on Somerville's exposure, vulnerability, and risk to climate change. For higher resolution maps and GIS files, please contact Hannah Payne, Sustainability Coordinator, at hpayne@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

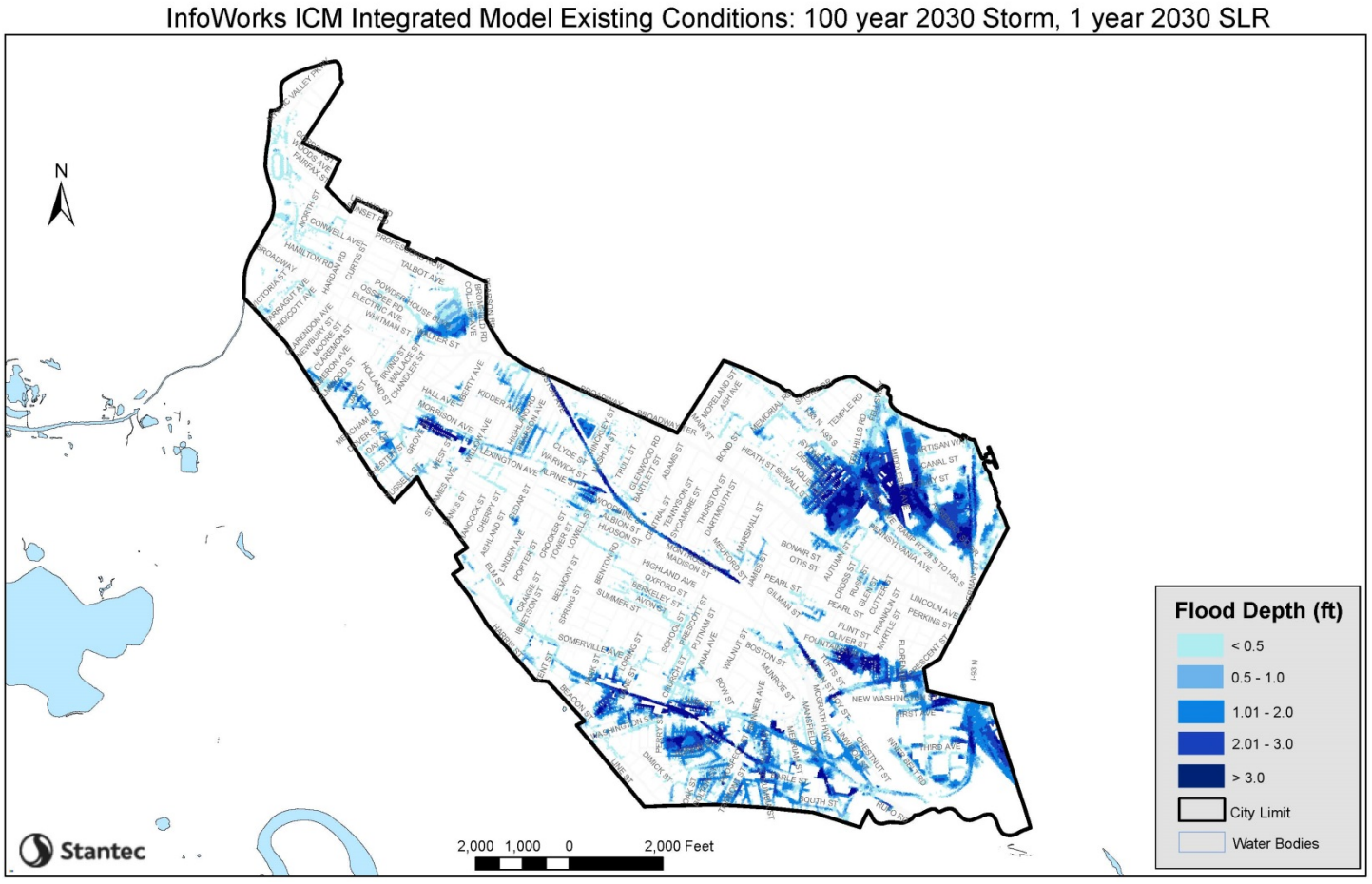


This map shows the projected flood depths of a 100-year coastal storm event in 2070 along with public transportation infrastructure assets. This map does not account for drainage (Somerville Climate Change Vulnerability Assessment, 2017)

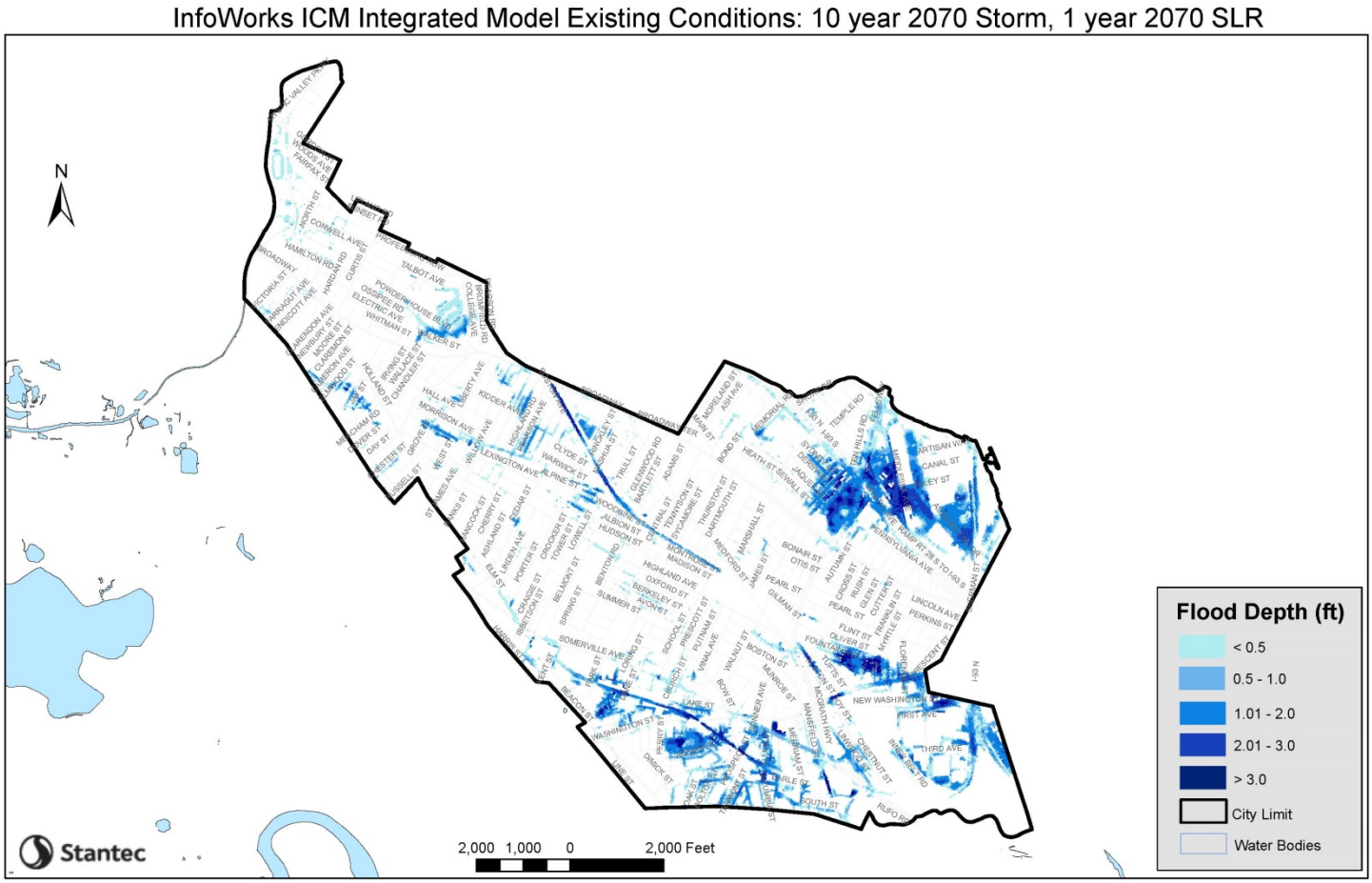
Precipitation Projections

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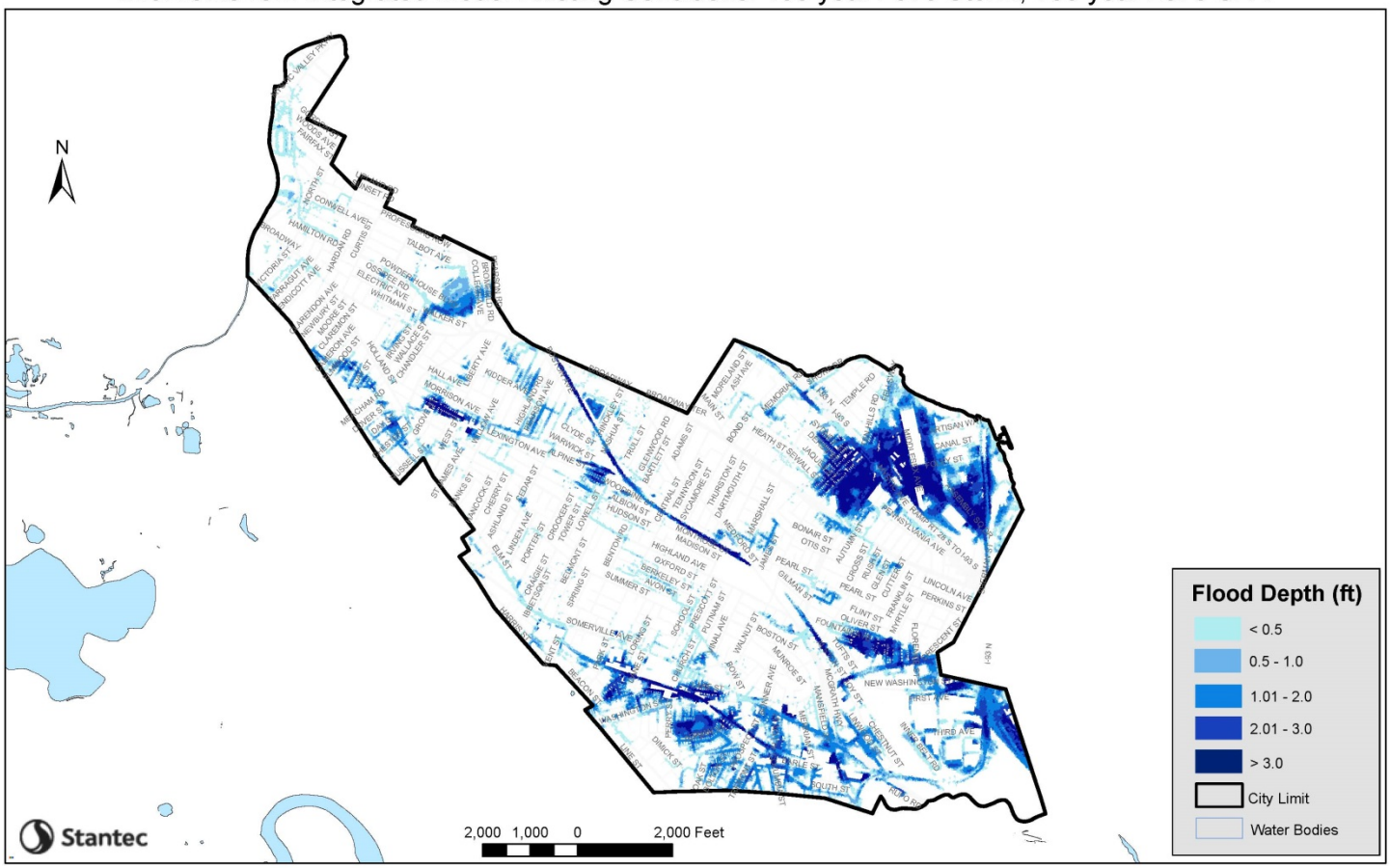
InfoWorks ICM Integrated Model Existing Conditions: 100 year 2070 Storm, 100 year 2070 SLR



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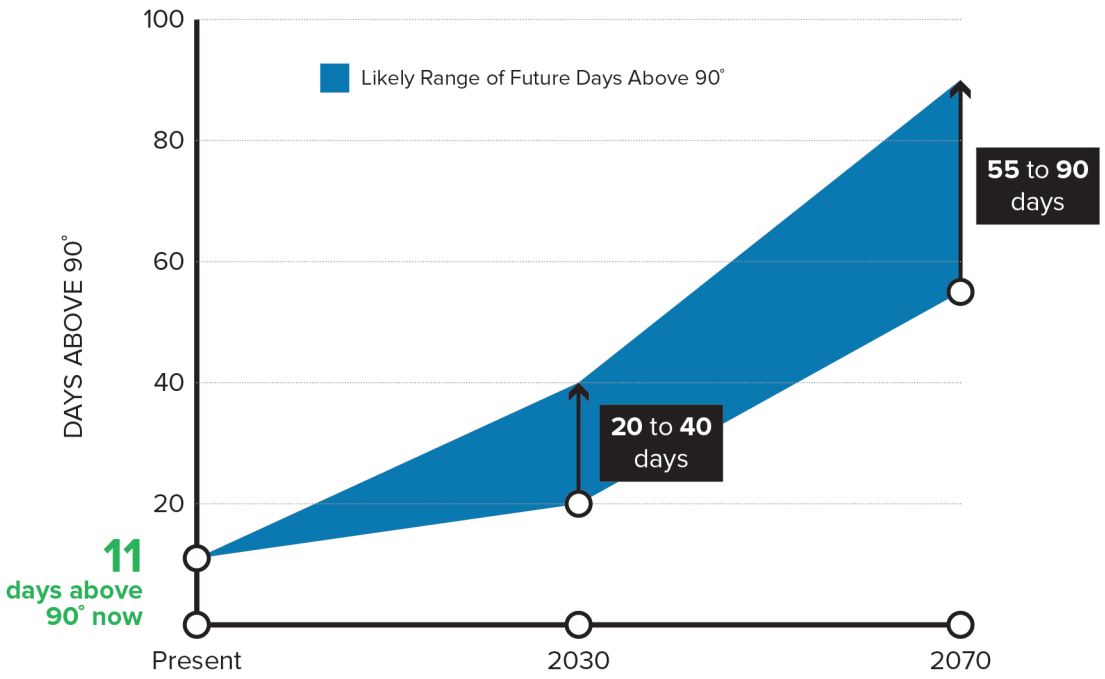
Temperature Projections



(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)**
- **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	Revolutionary Clinics Dispensary Expansion
Address	67 Broadway, Somerville
Developer	Revolutionary Clinics
Business Address	67 Broadway, Somerville
Designated Contact	Keith Cooper
Telephone Number	617-213-6006
Contact's Email Address	keithc@revclinics.org
Date Submitted	November 18, 2020
Filing Type (Development review application, Building Permit, or CoA)	Special Permit for adding Adult Use expansion
Is this a revised Questionnaire?	No
Is MEPA Approval Required?	Yes/No; Why? No. No MEPA Review Thresholds are triggered

Section 2: Building & Site Details

2.1 Building Information

Building Uses	Cannabis Retail Dispensary
Gross Floor Area	5579 sf (1176 sf expansion – existing garage)
Expected Life of Building	30 years
Expected Life of Building Systems: HVAC, electrical, boilers, plumbing, telecom, lighting, energy management.	HVAC 20 years, Electrical 30 years, Boilers 20 years, Plumbing 30 years, Telecom 20 years, Lighting 20 years, Energy Management 20 years
Type of Heating System(s)	Boiler to HydroAir for main building/ MiniSplits for expansion
Type of Cooling System(s)	Compressor to HydroAir/ MiniSplit for expansion

2.2. Green Building

Green Building Professional(s): Name(s) and contact information	Bruce Hampton, LEED AP, Elton+Hampton Architects, 617-708-1071 Travis Anderson, CPHC, Placetailor Design, 857-523-9287
Professional Credentials: Green Building Program Certification(s)	No Green Building Programs pursued.
Building LEED Rating	Certifiable/Silver/Gold/Platinum
Building LEED Point Score	n/a

Will you pursue LEED certification through the USGBC?	No.
Are any other green building certifications being pursued? (Passive House, Enterprise Green Communities, etc.). Please describe.	No.

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 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	#14 spaces exist
EVSE Plugs (number and voltage/ level of plugs)	#0
EV Ready Spaces (everything but station is installed)	#0
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?	We are not providing charging stations at this facility. The staff takes public transport or bicycles to work. The average stay in the parking lot is 10 minutes or less per client. Eversource recommends charging stations for those parking facilities with stay times exceeding 2 hours.

[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

2.4 Key Building Efficiency Metrics
The following should be provided for each building type (office, retail, multifamily, hotel, restaurant, etc.).

Vertical Envelope Performance

Vertical Envelope	ASHRAE Reference Building			Proposed Building		
	Percent of Vertical Area	**R value** *(see note 1)*	**U value** *(see note 2)*	**Percent of Vertical Area**	**R value** *(see note 1)*	**U value** *(note 2)*
Framed, insulated Wall	86.3%	6+12 R+Rc.i.	0.053 U-value	86.3%	6+16 R+Rc.i	0.044 U-value
Opaque glass, curtain wall, shadowbox, spandrel	NA – ASHRAE reference building has no spandrel			%	R+Rc.i	R+Rc.i.
Vision glass	13.7%	2.3 R-value	0.42 U-value *(note 3)*	13.7%	3.1 R-value	0.32 U-value *(note 3)*
	100%		***0.473 Aggregate U*** *(note 4)*	***100%***		***0.364 Aggregate U*** *(note 4)*
			Aggregate R			***Aggregate R***

Notes:

1. Show in format of R+R c.i. where first R is amount of discontinuous insulation and second R is amount of continuous insulation.

2. U values shall be based on indicated R+R c.i. and shall conform to Appendix A of ASHRAE 90.1 2013.

3. U value includes frame, per NRFC standard methods.

4. Aggregate U is calculated as: $(U_1\%_1 + U_2\%_2 + U_3\%_3)$ where U is the respective thermal transmittance values and $\%_1$ is the percent area of framed insulated wall; $\%_2$ is the percent area of opaque glass, curtain, or shadowbox; and $\%_3$ is the percent area of vision glass. Only areas adjacent to conditioned space are counted, areas adjacent to unconditioned spaces (e.g. parking garages, mechanical penthouses) are not counted. Aggregate R is the inverse of aggregate U. For percent areas for ASHRAE reference building, see Table G3.1.1-1 in ASHRAE 90.1 2013.

Other Performance Metrics

	ASHRAE Reference Building	Proposed Building
Air Infiltration (ACH 50)	1.4	1.0
Aggregate Vertical Envelope R	18.1	22
Roof R	30	38
Lowest level conditioned floor above unconditioned space (if any) R		
Cooling End Use (kBtu/sf-yr)	3.34	2.18
Heating End Use (kBtu/sf-yr)	30.74	5.48
Peak Heating (kBtu/hr-sf)	N/A as modeled	N/A as modeled
Peak Cooling (kBtu/hr-sf)	N/A as modeled	N/A as modeled
Site EUI (kBtu/sf- yr)	74.55	35.42

Section 3. Planning for Net Zero Emissions and Energy Resilience

3.1. How is the building currently designed to reduce energy usage? Please describe the key design features of the building including:

A) Building envelope performance (including roof, foundation, walls, and window assemblies)
B) How has the design team integrated energy performance into the building and site design and engineering (orientation, massing, mechanical systems, envelope, etc.)?
C) Efficiency of heating and cooling systems. Will these systems be electric? Provide reasoning for selection of heating and cooling systems.

Building for this application is the expansion of retail space into the existing 5 bay garage.

A) Existing masonry walls to be insulated with min. of R-12 continuous foam insulation on interior. Foundation is existing to remain. Roof shall be insulated with min. R-38 insulation. Overhead doors to be replaced with high performance Low-E argon filled storefront glass.
B) Design Team has designed the expansion to increase the energy efficiency of the existing building. There are no changes to orientation or massing since this is a existing building to remain.
C) New heating and cooling for expansion shall be electric heat pumps in minisplit configuration with a minimum SEER of 18.. ASHRAE Building(expansion only) was modeled with a Gas DX Split System with a COP of 0.8 and a cooling COP of 3.75
D) The Infiltration assumptions are based on EN 15242 standard
E) Analysis was performed using cove.tool set to ASHRAE 90.1 2013 and IECC 2015 Equivalent Expansion ONLY – 1176 GSF space.

Updates to the envelope, all LED lighting and operating the expanded space with all electric/efficient systems reduces the site EUI by ~50%

3.2 Will the building be a net zero carbon building? A net zero carbon building is a highly energy efficient building that does not burn fossil fuels and either produces or procures enough carbon-free electricity to meet the building's total energy demand. If the building will not be a net zero carbon building, provide a technical description of how the building's systems will be transitioned over time to achieve net zero carbon emissions, including how and when systems can be transitioned in the future to carbon-free alternatives (provide timeline including 2030, 2040, and 2050 targets). Description must include whether any remaining emissions will be offset with on-site or off-site renewables and at what quantity. Changes could include, but are not limited to, addition of on-site renewable energy generation, energy storage, additional energy efficiency measures, building electrification, or other measures that would further reduce greenhouse gas emissions.

The reuse of the existing garage into a cannabis retail space will add usable space without increasing the carbon load that new construction would entail. The client will review the cost implications of a photovoltaic installation on the limited roofscape and judge whether it is a worthwhile investment given its small area.

3.3 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.

The project shall pursue incentives provided by MassSave for :
Ductless minisplits electric heat pumps for units less than 5.4 tons and for lighting LEDs (troffers and for High/Low Bay 20w to 99 w fixtures with controls

3.4 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 small scale of this project, the feasibility of on-site generation was considered and rejected as not cost effective. Should the cost of photovoltaics continue to come down in the future, the client could still entertain them . The client is not pursuing off-site renewable energy.

3.5. Are any on-site energy storage systems planned? Please describe.

No.

3.6 Does the electric utility's infrastructure have enough capacity to support the addition of your building's energy load? Please provide confirmation from utility.

Yes. The added load of the garage was confirmed by the electrical engineer in his original plans for the building. The original use of the building was a funeral home with significant loads due to lifts and embalming machines in the basement.

3.7 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. Please describe what features could be added in the future (i.e. roof will be designed to support solar or green roof installation of X size).

When roofing is redone, the specifications shall be for light colored (high albedo) shingles.

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?

The site at 67 Broadway is not in a vulnerable location for precipitation and for coastal flooding. According to Figures 27 and 28, the 100yr events do not affect this location. We are designing the insulation and fenestration to meet the challenges of increased temperatures due to climate change and have previously added tree canopy to provide shade to the building and parking areas.

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.).

New insulation to meet or exceed code on walls and roof.
Low E argon filled glazing (Solarban 60) with operable sash for ventilation
High efficiency (SEER 18 or better) minisplit cooling.
LED lighting to avoid heat gain.
Vestibule entry to reduce infiltration
Air tight construction to reduce infiltration.

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

New insulation to meet or exceed code on walls and roof.
Low E argon filled glazing (Solarban 60) with operable sash for ventilation
High efficiency (SEER 18 or better) minisplit cooling.
LED lighting to avoid heat gain.
Vestibule entry to reduce infiltration
Air tight construction to reduce infiltration.

5.3 List any indoor spaces without cooling and their uses.

Bike storage

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

The site has significant existing and newly added tree canopy.

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)

According to Figures 27 & 28, the site at 67 Broadway is not vulnerable to precipitation or coastal flooding for now and until 2070.

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

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?

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

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)

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.

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?

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?