EXECUTIVE SUMMARY

Creating cities that are fair and inclusive requires a deep understanding of how environmental factors impact communities. This report delves into the complex relationship between temperature, tree coverage, energy costs, and health outcomes. By examining these factors, we shed light on how vulnerable populations often bear the brunt of environmental harm. The report, accompanied by an interactive StoryMap, sheds light on the intersection of environmental concerns and social vulnerability. Below is an overview of the report's structure:

PAGES 3-6 | DISCUSSES THE CONCEPT OF ENVIRONMENTAL JUSTICE

- The U.S. Environmental Protection Agency (EPA) refers to Environmental Justice (EJ) as the principle in which every individual is equally and fairly treated regarding environmental legislation, regulation, policy formulation, implementation, and enforcement.
- In Worcester, some relevant research on these topics include a WPI's 2011 report that found higher concentrations of environmental hazards in lower-income and higher-minority neighborhoods, and 2022 research by a Clark University's Ph.D. student who analyzed the uneven distribution of high heat in Worcester, disproportionately affecting areas of higher social vulnerability and found a relationship between temperature and historical development in these areas.
- The Massachusetts Executive Office of Energy and Environmental Affairs (EEA) defines EJ Populations according to criteria on income, minority status, and English proficiency. In November 2022, the Massachusetts EJ maps were updated, from 2016-2020 sample data from the American Community Survey (ACS) to 2020 Decennial Census data. This update increased the EJ block groups at the state level from 2,316 to 2,604 of a total of 4,985, that is, an increase from 46% to 51% of the total. For Worcester, this increase was from 126 to 141, of a total of 171 block groups (from 74% to 83%).

PAGES 7-12 | REVIEWS WORCESTER ENVIRONMENTAL OUTCOMES' GEOGRAPHIC DISTRIBUTIONS

- According to data provided by the City of Worcester, collected between June 1st and August 31st, 2020, and using grid cells of 100 meters by 100 meters as the unit of analysis, for the 2020 summer, Worcester's average temperature ranged from 52.7°F to 83.0°F and the surface covered by trees ranged from almost 0% to 90%.
- At the census tract level, for 2020, the average annual energy cost per household ranged from approximately $1,000 to $3,000, while energy burden (the percentage of income used for energy) ranged between 2% and 4%.
- Some health variables that correlate with temperature and air quality across the city range as follows among adults: asthma, 10%-15%; high blood pressure, 25%-36%; fair or poor self-rated health status, 8%-30%; and lack of health insurance (18-64), 4%-22%.
- Except for high blood pressure, all the environmental, energy, and health variables analyzed in this report are unequally distributed geographically, disproportionately affecting neighborhoods with higher levels of vulnerability.

PAGES 12-14 | ANALYZES WORCESTER SITUATION AND ITS RELATIONSHIP WITH REDLINING

- The areas of the city classified as less desirable by Worcester's 1930s redlining map (made public by The Research Bureau in its 2022 report *Static Income, Rising Costs*) positively correlate with higher temperatures, lower tree cover, higher energy burden, asthma, worse self-rated health status, and lacking health insurance.

PAGES 14-17 | EXPLORES SIMILAR CITIES FROM AN ENVIRONMENTAL JUSTICE PERSPECTIVE

- Considering climate region and population, the cities compared to Worcester in this report are Rochester, NY; Providence, RI; and Yonkers, NY. The three exhibit an uneven distribution of variables like excessive heat and tree cover, affecting vulnerable communities disproportionately.

PAGE 18 | SUGGESTS WHAT CAN BE DONE

- In 2020, the City contracted with the Urban Climate Lab to conduct a heat risk assessment, which produced data provided to the Bureau for this report. Additionally, they modeled different heat management scenarios , including increasing the tree canopy and using cooling materials for paved surfaces and rooftops.