



Climate Adaptation Plan

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Revised

Prepared by:



Table of Contents

Acknowledgements

Section 01 **Introduction**



Section 02 **Health and Safety**



Section 03 **Extreme Heat and Weather**



Section 04 **Air Quality**



Section 05 **Flooding and Water Quality**



Section 06 **Greenspace and Ecosystem Health**



Section 07 **Local Food and Agriculture**



Section 08 **Climate Economy**



Section 09 **Adaptation Capacity**

Section 10 **Implementation**





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City of Maplewood Project Lead

Shann Finwall Environmental Planner, City of Maplewood

Office of The Mayor

Marylee Abrams Mayor

City Council

Kathleen Juenemann	Councilmember
Bill Knutson	Councilmember
Rebecca Cave	Councilmember
Nikki Villavicencio	Councilmember
Sylvia Neblett	Councilmember (former)
Bryan Smith	Councilmember (former)

Environmental and Natural Resources Commission

Ann Palzer	Chair
Kayla Dosser	Vice-Chair
Keith Buttleman	Commissioner
Rebecca Bryan	Commissioner
Mollie Miller	Commissioner
Candace Okeson	Commissioner (former)
Ted Redmond	Commissioner
Stephen Todey	Commissioner (former)

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Planning Team

Ann Hutchinson	City of Maplewood, Lead Naturalist (former)
Carissa Glatt	Ramsey County, (SHIP) Grant Coordinator
Carole Germes	City of Maplewood, Natural Resources Coordinator
Emily Dunlap	City of Maplewood, Natural Resources Coordinator (former)
Jeff Thomson	City of Maplewood, Community Development Dir.
Joe Sheeran	City of Maplewood, Communications Manager
Jon Jarosch	City of Maplewood, Asst City Engineer
Karma Kumlin-Diers	Ramsey County, Emergency Management Coordinator
Kathleen Juenemann	City of Maplewood, City Council Member
Mary T'kach	Ramsey County, Energy and Resilience Planning
Michael Martin	City of Maplewood, Asst Community Development Dir.
Molly Miller	City of Maplewood, ENR Commissioner
Paige Ahlborg	Watershed Project Manager, RWMWD
Peter Lindstrom	Met Council, CERTS
Rachel Geiser	Resident and League of Women Voters Representative
Sage Passi	Ramsey Washington Watershed, Education Coordinator
Shann Finwall	Environmental Planner, City of Maplewood
Stephanie Shea	Police Records Specialist
Steve Lukin	City of Maplewood, Fire Chief
Tami Gunderzik	Xcel Energy, Partners In Energy

Consultant Team



Climate Planning

Ted Redmond
Colleen Redmond



Community Engagement Consultant

Sean Gosiewski

Section

01

Introduction



[Click here to
return to TOC](#)





Introduction

Significant weather events have caused substantial physical and economic damages in Maplewood. Without global action to address climate issues, Maplewood and the world will face threats to their economic livelihood, public health, and supplies of food, clean water, and power. Vulnerable populations, especially those with lower incomes and older residents, often bear the brunt of these extreme weather events.

In April 2017, paleBLUEdot developed a Climate Vulnerability Assessment for the City of Maplewood. The goal of the project was to serve as an assessment of Maplewood's forecasted climate change, impact exposure, sensitivity, and adaptive capacity to changing climate conditions. The Vulnerability Assessment mapped climate vulnerable populations in Maplewood and serves as a foundation for prioritizing climate adaptation needs and actions.

In June 2018, paleBLUEdot and the City of Maplewood jointly secured a grant from the MPCA to develop a Climate Adaptation Plan based on the 2018 Vulnerability Assessment. This plan is the result of that effort. This Climate Adaptation Plan outlines strategic goals and detailed actions to guide the City towards a more resilient, climate change ready condition.

The process

The plan was developed in collaboration with a 20 person planning team of community members, energy and watershed district representatives, economic development representatives, Ramsey County staff, and City of Maplewood staff. The planning team was organized into sub-teams aligned with each of the sectors included in this plan (see Plan Framework). The plan was developed through a number of planning workshops from May through December 2020.

Introduction

Climate Change in Minnesota

Climate change is a global phenomenon that creates local impacts. It presents one of the most profound challenges of our time. A broad international consensus exists among atmospheric scientists that the Earth's climate system is being destabilized in response to elevated levels of greenhouse gas emissions in the atmosphere. Two changes to Minnesota's climate are occurring already: shorter winters with fewer cold extremes, and more heavy and extreme precipitation.

Climate Change in Maplewood

The climate in City of Maplewood has already changed. From 1980 through 2018, the City has experienced an increase in annual average temperature, an increase in the number of days above 95 degrees, an increase in the number of heavy rain events, and a decrease in the number of days below 32 degrees.

Some of the most significant changes in the climate relate to variability. Climate variability can be seen in the changes in annual precipitation for Maplewood. Overall annual precipitation has increased, however, this increase is not evenly distributed throughout the year.

The City's climate is anticipated to continue to warm through this century. Precipitation is anticipated to increase in Spring and Fall while remaining the same or decreasing in the Summer and Winter seasons. The primary changes to climate characteristics for the City include:

- Warmer annual average temperatures with a more significant warming in winter months.
- Increase in extreme heat days.
- Increase in heavy rain fall events, with increase in flood potential.
- Increase in time between precipitation with increase in drought potential.
- Greater variability in temperature and precipitation trends.

Looking Back

From 1950 through 2015, Maplewood has experienced:

Increase in annual average temperature:	3.2°
Increase in annual precipitation:	21%
Increase in heavy precipitation events:	58%
Increase in Days above 95:	3 days
Decrease in Days below 32:	-10 days
Increase in growing season:	16 days

Looking Forward

By 2100, Maplewood Can Expect:

Increase in annual average temperature:	5-9°F
Increase in annual precipitation:	-5 to 5% <small>With Significant Seasonal Variation</small>
Increase in heavy precipitation events:	30%
Increase in Days above 95:	+55 days
Decrease in Days below 32:	-45 days
Increase in growing season:	30 days
Increase in Air Conditioning Demand:	288%



Climate Risks to Maplewood

The projected changes to the City's climate in the coming decades represent potential risks to residents. These risks are particularly acute in populations especially vulnerable to them such as children, seniors, and those with disabilities – see Vulnerable Populations section for more information. Below are some of the more significant risks to the City's population:



Extreme Heat and Weather:

Certain groups of people are more at risk of stress, health impacts, or death related to Extreme Weather events including tornadoes, wind storms, lightning, winter storms, hail storms, and cold waves. Vulnerability to heat stress can be increased by certain variables including the presence of health conditions like diabetes and heart conditions, demographic and socioeconomic factors, and surrounding land cover.



Air Quality

Climate change is expected to affect air quality through several pathways, including production and potency of allergens and pollen, and increase regional concentrations of ozone, increased potential of smoke from wildfires, increase in particulate air pollution, and dust.



Flooding

According to the latest National Climate Assessment, the frequency of heavy precipitation events has already increased for the nation as a whole as well as for Minnesota specifically. These heavy rain events are projected to increase throughout Minnesota. Increases in both extreme precipitation and total precipitation are likely to increasingly contribute to over-bank flooding (river and lake flooding) as well as flash flooding.



Vector-Borne Diseases

Vector-Borne diseases are diseases spread by agents such as ticks and mosquitoes. In Minnesota, rising temperatures and an increase in growing seasons will increase the geographic range of disease-carrying insects, while increased rainfall, flooding and humidity will create more viable areas and more rapid vector breeding.



Food Insecurity

Climate change is likely to destabilize cropping systems, interrupt transportation networks and trigger food shortages and spikes in food cost.



Water Quality

Water temperature will generally rise in streams, lakes, and reservoirs as air temperature rises. This leads to lower levels of dissolved oxygen in water with more stress on the fish, insects, crustaceans and other aquatic animals that rely on oxygen. Changes in precipitation, drought potential, and evaporation will put new pressure on drinking water supplies.



Waterborne Illness

Bacteria and viruses thrive in warmer water conditions, causing an increase in contact potential with humans and an increase in water-borne disease potential.



Infrastructure Failure

Extreme weather events, flooding and flash flooding, as well as increasing daily stresses caused by increasing climate variability all represent potential causes of failure of our aging infrastructure. Power outages, road damage, bridge collapse, water infrastructure failure - each of these represent significant physical climate risks to the community, especially individuals who are climate vulnerable.

Introduction

Maplewood's Vulnerability to Climate Risks:

The following highlight the vulnerabilities to climate risks facing Maplewood, excerpted from the 2020 Maplewood Climate Vulnerability Assessment:



Heat Stress (High)



Warmer temperatures and more extreme heat may lead to higher risk of heat-related illness.

Air Quality (High)



Increased heat may result in more days of poor air quality and exposure to allergens, impacting respiratory illnesses.

Vector-Borne Disease (Medium—Low)



Longer growing seasons and higher temperatures may increase vector-borne diseases like West Nile Virus and Lyme disease.

Mental Health (Medium)



Exposure to increased climate impacts and disasters may lead to increased anxiety and other mental health ramifications.

Extreme Weather (High)



Warmer temperatures, and resulting increases in atmospheric moisture, combined with more rapid shifts in seasonal weather may significantly increase the potential for heavy precipitation and extreme weather events which could cause damage to housing, cause power outages, and reduce mobility for portions of the community.

Flooding and Stormwater (High)



Heavier rains coupled with higher risk of surface drought conditions may increase demand on stormwater management and may cause more local flooding, particularly “flash flooding”. The city’s stormwater infrastructure may not be capable of handling the amount from more frequent heavy down pours, requiring resources to make needed upgrades.

Trees, Greenspace, and Agriculture (Medium)



Higher temperatures and precipitation changes will stress trees, greenspace, and agriculture. Conditions may be more favorable for disease, pests, and invasive species. Trees and crop species which thrived in the area’s climate may be less suited for future conditions. Fluctuations in agricultural production may create food price volatility, increasing food insecurity.

Surface Water Quality (Low)



Increases to heavy rain events and flooding/flash flooding risk may negatively impact water quality in the city’s lakes, streams, and rivers. Increased pollutants and contamination potential, combined with increased annual water temperatures could increase risk to algal and bacterial growth, harming habitats and limiting recreation.



Climate Mitigation:

reducing climate change – involves reducing the flow of heat-trapping greenhouse gases into the atmosphere.

Climate Adaptation:

developing ways to protect people and places by reducing their vulnerability to climate impacts.

Introduction

Why Create a Climate Adaptation Plan?

The creation, and dedicated implementation of a Climate Action Plan (CAP) is an organized way for a city to contribute to solving the global climate crisis while helping its resident and business communities create improved resilience to the current and future impacts and risks of climate change.

What is Climate Adaptation?

Some impacts of climate change are now inevitable. Climate Change Adaptation seeks to lower the risks posed by these impacts. Both mitigation and adaptation are necessary, because even if emissions are dramatically decreased, adaptation will still be needed to deal with the global changes that have already been set in motion.

What is a CAP Plan?

Climate adaptation plans are comprehensive road maps that outline the specific Strategies and Actions that a City will implement to build resilience to related climatic impacts. Climate Adaptation Plans do not address mitigation actions (greenhouse gas reductions), which can be addressed in a future Climate Mitigation Plan.

Climate Action As A Journey

This Climate Adaptation Plan represents a robust vision of the future with a comprehensive scope of action befitting the magnitude of our collective climate challenge ahead. This plan should be seen as a living document. Action progress and effectiveness should be reviewed at regular intervals through the plan's implementation and adjustments should be made to expand or modify the scope of individual actions and to augment the plan with new actions as appropriate to respond to ever-changing market and community conditions.

Introduction

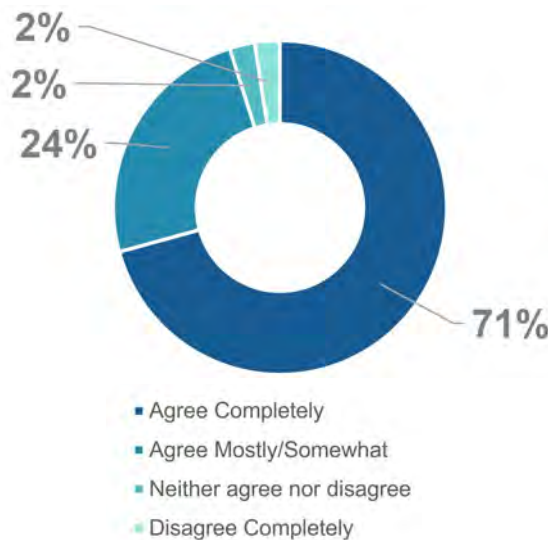
Gathering Community Input on Climate Concerns

Understanding the perspectives of community members and broad community input is key to any successful community sustainability or climate planning effort. With that in mind, the City of Maplewood issued this community survey to collect input from a broad range of community members. The intent of the survey was to help the city identify sustainability and climate adaptation needs, opportunities, priorities, and issues for the City of Maplewood. This survey was designed by paleBLUeDot and reviewed for edit by City of Maplewood planning staff. The survey was made available on-line on a dedicated webpage (<https://palebluedot.llc/Maplewood-climate-adaptation-survey>).

The graph above and to the right shows the percentage of respondents that identified each topic as a concern. Survey responses, along with other research and community input, helped to inform the strategic goals and actions identified in the Climate Adaptation Plan.

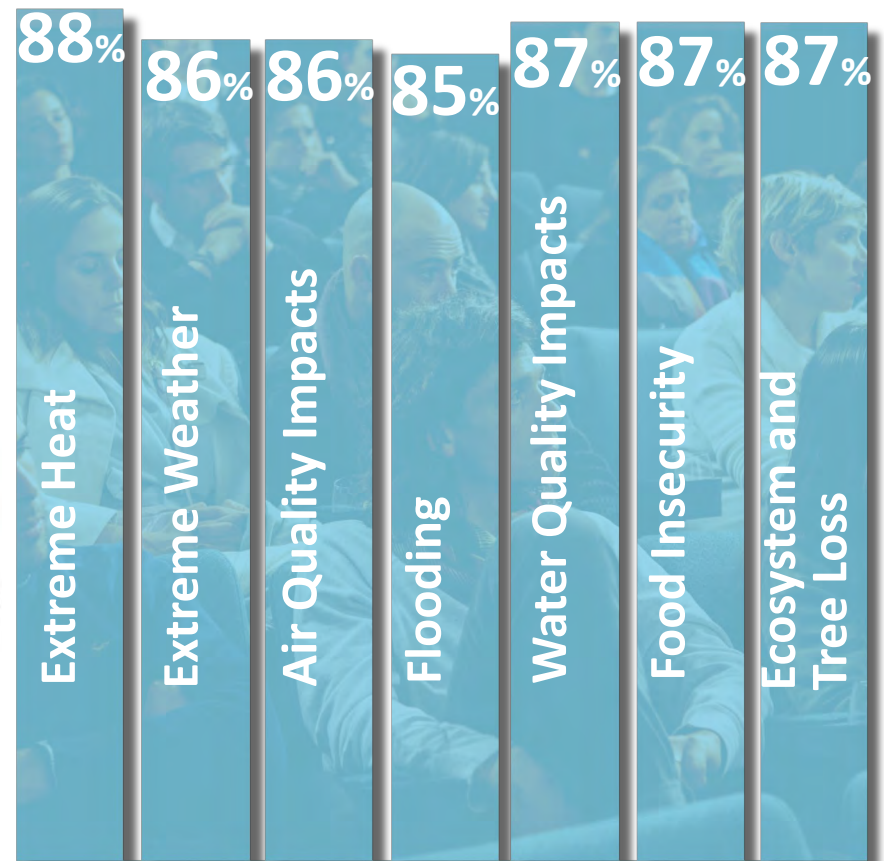
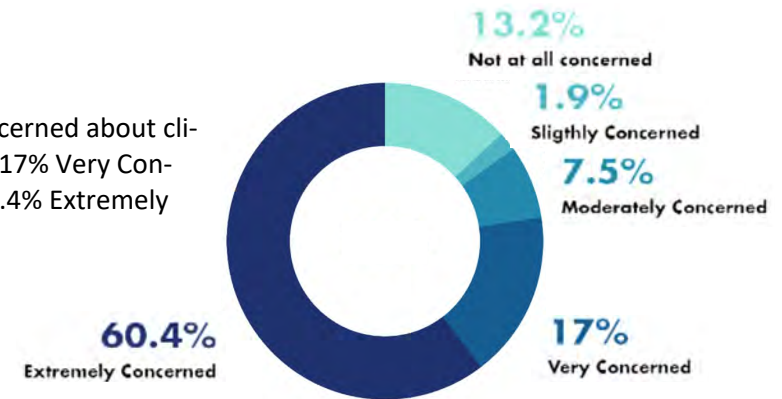
Maplewood Climate Adaptation Plan Review

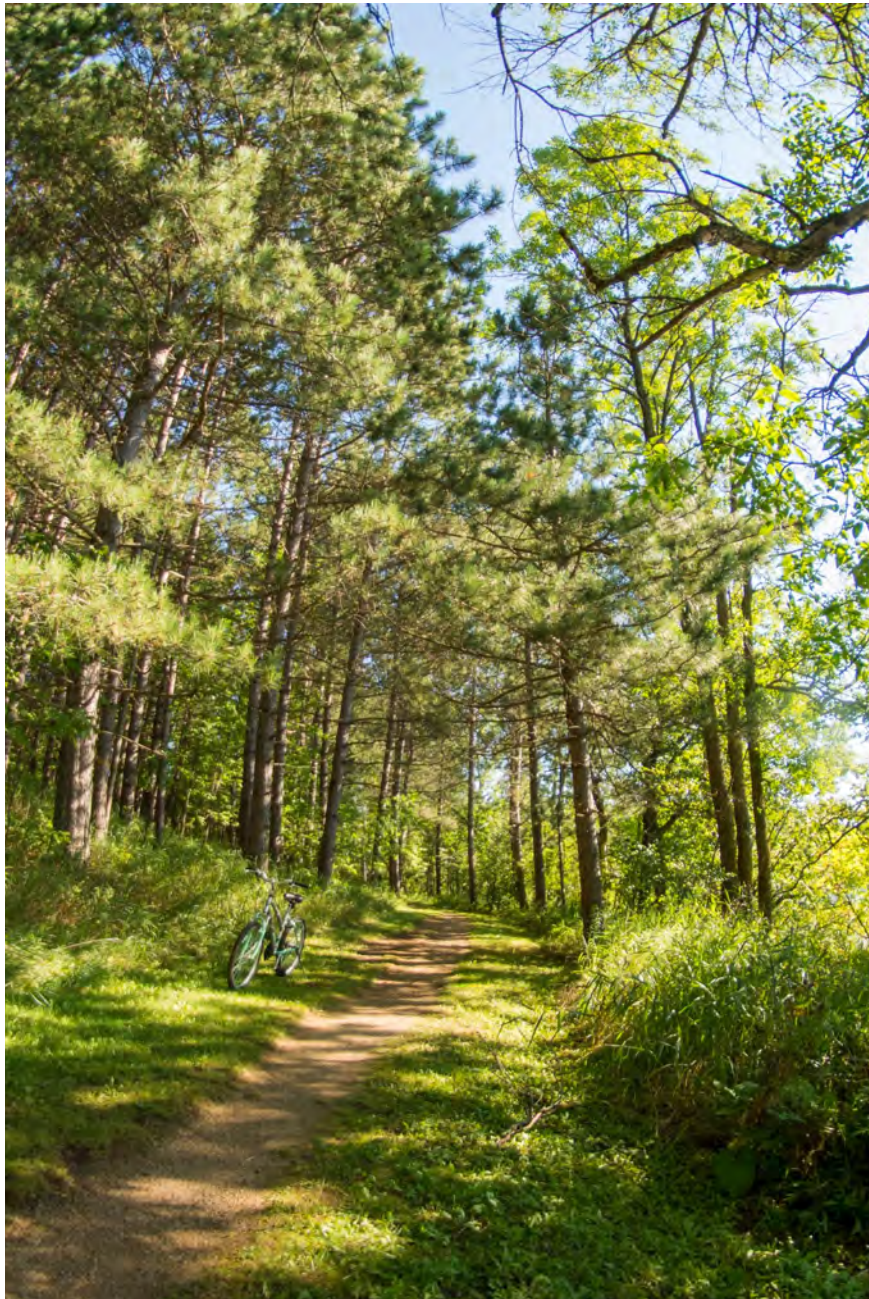
The final draft Climate Adaptation Plan was available for review by the public from the end of January through April 7th, 2021. A public workshop meeting was held to provide overview of the plan and to collect feedback from the public. In addition, all sections of the Climate Adaptation Plan were made available along with an on-line survey to collect additional public comments. The chart to the right summarizes the level of agreement with the Climate Adaptation Plan reported by those who took the survey.



Concerns

77.4% are concerned about climate change (17% Very Concerned and 60.4% Extremely Concerned).





Introduction

Developing The Plan

Development and implementation of the Maplewood Climate Adaptation Plan are opportunities for the City of Maplewood government (City) and partners in the community to research and articulate some of Maplewood's most pressing resilience challenges; identify specific, multi-benefit actions that contribute to solutions to those challenges; and secure additional resources, technical assistance, and partnerships to accelerate next steps.

The goals and actions identified in the Climate Adaptation Plan are grounded in community input, expert analysis, and best practices from other cities throughout the United States. Strategic goals and detailed actions were developed by the Planning Team through a series of workshop meetings. A preliminary draft of actions were reviewed against action screening criteria which enabled the Planning Team to evaluate, refine, finalize, and prioritize the actions to be incorporated in the final Climate Adaptation Plan.

Maplewood Action Screening Criteria

Support: How likely is the proposal to be adopted by the City or community-wide? Is it politically feasible? Is there community support? Is it consistent with the City's priorities and readiness to implement?

Effectiveness: How likely is it that the action will work to address the goal? Is this addressing a high-priority vulnerability or a major source of emissions? How likely is it that the action will effectively address vulnerable population needs?

Enforceability and Measurability: Can the program be enforced? Are there ways to measure the impact of the strategy?

Funding: What is the availability of funding? Include research and propose financial strategies that could facilitate City and community actions in fulfillment of this plan?

Introduction

Climate Action Plan Framework

This Climate Adaptation Plan includes an implementation framework designed to achieve community-wide goals for climate adaptation and resilience. This CAP is organized around a unifying framework organized by sector as illustrated to the right. Each sector has overarching strategic goals and detailed Actions for implementation.

Strategies:

are specific statements of direction that guide decisions about future public policy, community investment, and actions.

Actions:

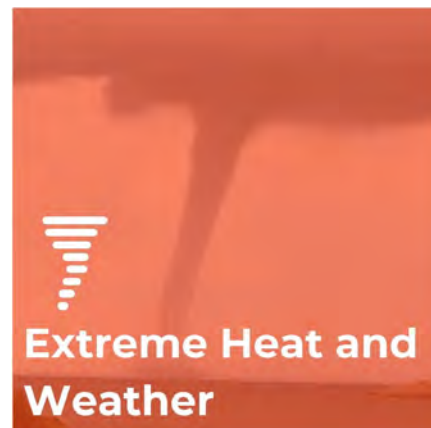
are detailed items that should be completed in order to carry out the vision and strategies identified in the plan.

Climate Adaptation:

seeks to lower the risks posed by the impacts of climate change which are now inevitable or likely.



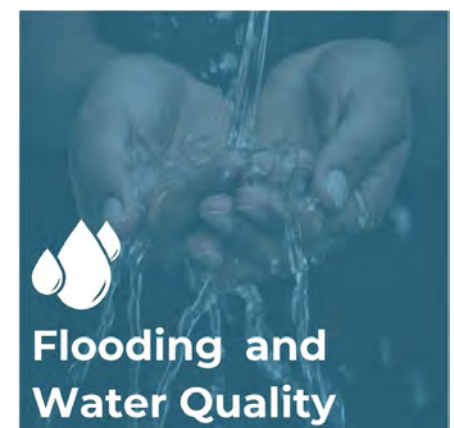
This sector area includes community health impacts and resilience in the face of current climate impacts and projected risks. Strategies in this sector focus on integrating climate change health and safety considerations in City operations and public communication.



This sector area includes extreme heat and weather events. Strategies in this sector focus community resilience to extreme heat and weather event impacts of climate change.



This sector area includes air quality impacts from increasing air temperatures, changing weather patterns, and other effects of climate change. Strategies in this sector focus community resilience to air quality impacts of climate change.



This sector area includes potable water distributed to Maplewood residents and businesses, stormwater collection, flood mitigation, and surface water health. Strategies in this sector focus on flood mitigation, and stormwater infiltration.



Introduction

Benefits of Climate Action

The strategies and actions contained in this plan seek to increase Maplewood’s resilience to climate impacts, prioritize sustainable uses of land and water, reduce waste, and support improved equity and livability. The CAP addresses next steps for Maplewood to adequately respond to climate change. If implemented successfully the CAP will enhance Maplewood’s economic vitality, resilience, and viability as a healthy, livable city.



This sector area includes the environmental, climate resilience and benefits of urban tree canopy, ground cover, community greenspace and parks, and ecosystems that rely on these natural elements. Strategies in this sector include resilience/expansion of urban tree canopy coverage, improvement of beneficial use of lawn areas.



This sector area includes commercial and non-commercial food cultivation and distribution, and food and nutrition insecurity. Strategies in this sector area include reduction of food waste, food system and distribution resilience, strengthening of local food production capacity, and equitable access to healthy food.



This sector includes the economic development, jobs, and business creation potential represented by the actions and goals of all sectors in this Climate Adaptation Plan. Strategies in this sector include workforce development, economic development and new business financing, and resilience of businesses in the community.



This sector area includes financial mechanisms, and systemic and organizational capacity to implement the actions and goals of all sectors in this Climate Adaptation Plan. Strategies in this sector focus on financing, resilience of social networks, education, engagement, and empowerment of the public.

Introduction

Our Strategies By Sector

Health and Safety

Strategy HS-1:

Prepare the community for anticipated climate change impacts.

Strategy HS-2:

Improve community health and well-being.

Strategy HS-3:

Educate, engage, and empower the public on health and safety risks of climate change impacts.

Strategy HS-4:

Implement City policies to address health and safety considerations of climate change.

Extreme Heat and Weather

Strategy EHW-1:

Address health impacts of extreme heat.

Strategy EHW-2:

Educate, engage, and empower the public on Extreme Heat and Weather and linkage with health.

Strategy EHW-3:

Implement effective systems and processes to manage and respond to extreme weather events.

Strategy EHW-4:

Improve the capacity of the City and community to provide support during extreme weather events.

Strategy EHW-5:

Decrease the urban heat island effect, especially in areas with populations most vulnerable to heat.

Air Quality

Strategy AQ-1:

Increase and maintain air quality for residents and businesses.

Strategy AQ-2:

Reduce auto-generated particulate matter, tailpipe pollutants, waste heat, and ozone formation.

Strategy AQ-3:

Educate, engage, and empower the public on Air Quality and linkage with health.

Flooding and Water Quality

Strategy FW-1:

Improve community stormwater preparedness and water conservation.

Strategy FW-2:

Promote and expand green infrastructure.

Strategy FW-3:

Strengthen emergency management capacity to respond to flood-related emergencies.

Strategy FW-4:

Increase the resilience of the natural and built environment to impacts of climate change.



Introduction

Greenspace and Ecosystem Health

Strategy G-1:

Increase the accessibility and quality of habitat for native plants and animals.

Strategy G-2:

Improve the resilience of the urban forest and watersheds to climate change.

Strategy G-3:

Expand and sustain urban tree canopy and forests.

Strategy G-4:

Manage ecosystems and landscapes to minimize heat island impacts.

Local Food and Agriculture

Strategy F-1:

Educate, engage, and empower the public on food linkage with climate and health.

Strategy F-2:

Integration of Local Food Considerations in City Plans.

Strategy F-3:

Increase production of local food.

Strategy F-4:

Strengthen demand for local foods.

Strategy F-5:

Increase food security for residents, especially those most vulnerable to food environment.

Strategy F-6:

Reduce and repurpose food waste and food-related waste.

Our Strategies By Sector

Climate Economy

Strategy CE-1:

Leverage the economic development opportunities of the Green Economy.

Strategy CE-2:

Enhance community resilience through economic resilience.

Strategy CE-3:

Include Economic Resilience in Emergency Response Planning.

Strategy CE-4:

Accelerate the transformation to a low-carbon economy.

Adaptation Capacity

Strategy AC-1:

Improve City staff capacity and knowledge of their role in meeting climate goals.

Strategy AC-2:

Support equitable climate action.

Strategy AC-3:

Establish a climate impacts mutual aid program.

Strategy AC-4:

Establish financing to support the City's Climate Action efforts.

Section

02

Health and Safety

[< Click here to
return to TOC](#)





Health and Safety

There is a strong relationship between human health and environmental health. This link between the environment and human health is a critical consideration of the impacts of climate change. As outlined in the City's Climate Vulnerability Assessment, changes in climate such as higher average temperatures and increased storm frequency and intensity, can intensify public health stressors. These climate change impacts endanger public health and safety by affecting the air we breathe, the weather we experience, our food and water sources, and our interactions with the built and natural environments. As the climate continues to change, the risks to human health continue to grow. In the Midwest, climate change is expected to negatively affect human health in a variety of ways and exacerbate existing health challenges.

In the same way local governments and the health care industry promotes healthy behaviors such as eating right and exercising; agencies should recognize the relationship between climate action, environmental stewardship and community health since the health of our environment affects public health. The specific impacts of extreme weather and heat, flooding, and air quality are addressed in later sections. The focus of this section is addressing foundational community health and safety in the face of current and anticipated climate impacts.

Equity Considerations:

- Critical components of climate vulnerability are pre-existing health status and living conditions—factors frequently shaped by economics and the distribution of social policies and influence, meaning low-income communities and communities of color are disproportionately affected by the health impacts of climate change.
- Vulnerable populations are disproportionately represented within the vulnerable environments of our cities and frequently lack resources to improve the adaptive capacity of their surroundings

Health and Safety

Likelihood of Climate Hazards for Maplewood Populations

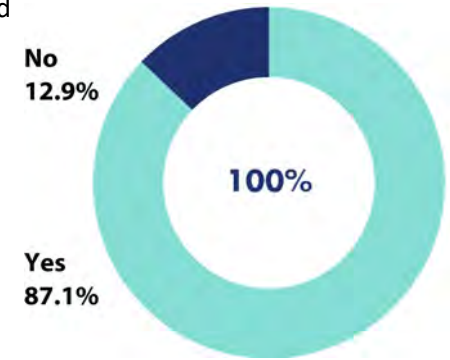
A “Climate Hazard” is a physical process or event (hydro-meteorological or oceanographic variables or phenomena) that can harm human health, livelihoods, or natural resources. Climate Hazards are reviewed based on current hazard level, anticipated change over time, and projected future hazard level.

The chart below reviews the current occurrence, potential future change, and timeline of change for each of the primary Climate Hazards for the city. In addition, the columns on the right illustrate the reported number of events, % change, and annualized economic impact of each of these hazards over the last 20 years. This review assists in determining the likelihood of each type of hazard.

Climate Hazard Type	Current hazard risk level	Expected change in intensity	Expected change in frequency	Timeframe	Number of Events 1999-2009 vs 2009-2019 (NOAA)	% Change	County Impacts over 20 year period
Extreme Heat	Low	Increase	Increase	Medium-term	0 events to 4 events	N/A	216 injuries
Extreme Cold	Moderate	Increase	Decrease	Medium-term	0 events to 8 events	N/A	2 deaths, 2 injuries
Extreme Precipitation	Moderate	Increase	Increase	Short-term	7 events to 7 events	0%	See Flood
Floods	Moderate	Increase	Increase	Short-term	9 events to 10 events	110%	\$5M
Droughts	Low	Increase	Increase	Medium-term	0 events to 0 events	N/A	N/A
Storms	Moderate	Increase	Increase	Short-term	74 events to 83 events	112%	\$26M
Forest/Wild Fires	Low	Not known	Not known	Not known	0 events to 0 events	N/A	N/A
Air Quality Impacts	Moderate	Increase	Increase	Long-term	N/A	N/A	N/A

Climate Impacts Already Felt

Over **87%** of respondents reported being personally impacted by the effects of Climate Change. The most noted personal impacts observed were Increased Air Conditioning Use, Increased Contact with Ticks and Mosquitos, Tree Loss Due to Storm, Flooding, or Drought, Longer Allergy Season, and Flooding/Flood Damage.



Climate Health Risks for Maplewood Populations

A “Climate Risk” is the potential for negative consequences and outcomes for human health, systems, or communities. The most common way of evaluating the level of risk associated is “likelihood of Occurrence” x “Impact Level” or vulnerability. The chart below reviews the expected impacts, likelihood of occurrence, impact level based on Population vulnerability reviewed in the Bloomington Climate Risk and Vulnerability Assessment, potential timeframe, and resulting overall risk level for Climate Risks to Population (Health Impacts).

Health Impacts	Expected Impact(s)	Likelihood of Occurrence	Impact Level (Population Vulnerability)	Timeframe	Risk (Likelihood x Impact)	Impact-related indicators
Extreme Heat	Increased demand for cooling; heat stress and emergency visits, heat related health	Likely	High	Medium-term	Very High	Cooling Degree Days, days above 95
Flooding	damage to property; flood related health impacts; infrastructure impacts	Likely	Moderate	Medium-term	Moderate	Flood events, flash flood occurrences, wettest 5-day periods, number of heavy rain events, disaster declarations, change in NOAA storm
Drought	Damage to crop/tree/ecosystem, reduced drinking water source, increased flash flood potential due to decreased soil permeability	Possible	Low	Medium-term	Low	Consecutive days without rain, aquafer level, surface water condition, river flow
Air Quality Impacts	Increased particulate matter, increased ozone impacts, increased instances of asthma	Likely	High	Medium-term	High	Air quality index
Vector-Borne Diseases	Increased instances of lyme disease, encephalitis, heart worm, malaria, zika virus,	Likely	Moderate	Long-term	Moderate	Disease records
Nutrition Insecurity	Food price volatility/change, fluctuation in availability	Possible	Moderate	Medium-term	Moderate	Food price index, Foodshelf demand, % of school children qualifying for free and reduced lunch
Water Quantity/Quality Impacts	Water shortage, surface water quality impacts due to heat and stormwater runoff	Possible	Moderate	Long-term	Low	Acquafer health; Water quality test results
Water Borne Disease	Bacteria exposure at infected surface water locations, contamination of drinking water due to flood	Likely	High	Medium-term	High	flood events; algae blooms

Health and Safety

Sensitivity to Climate Hazards

Based on the total population count for each vulnerable population and considering the risks each demographic is most sensitive to, as determined in the City’s Climate Vulnerability Assessment, the population vulnerabilities can be considered from highest sensitivity (more vulnerable individuals) to lowest (fewer vulnerable individuals) sensitivity for the City of Maplewood.



Populations More Vulnerable to Impacts in This Sector

The following populations tend to be more vulnerable to the potential climate change impacts in this sector:




Addressing This Sector

This Climate Adaptation Plan is organized around a unifying framework organized by sector. Each sector has over-arching Strategies and detailed Actions. Strategies are specific strategic goal statements providing direction and guidance for decisions about future public policy, community investment, and planning. Detailed Actions are specific tasks to be implemented in order to achieve the strategic goals.



Adaptation Actions

Below are the Strategies and detailed Actions addressing the needs of the **Health and Safety** section.

Strategy #	Action #	Sector Strategy / Action	Priority Level
 Health and Safety			
Strategy HS-1: Prepare the community for anticipated climate change impacts.			
HS-1-1		Partner with outside agencies on emergency response plans and explore opportunities to design and offer community resilience model training	1
HS-1-2		Review and effectively communicate emergency and evacuation plans on a regular basis to update for climate change forecasted data, paying particular attention to flooding, extended heat waves and tornadoes	2
HS-1-3		Conduct a health impact assessment for areas that may have unsafe levels of air pollution from vehicle traffic, and use data to modify zoning (see if any MPCA data indicates hot spots, related to at risk populations/ asthma) mobile source and point source manufacturing	2
HS-1-4		Explore partnerships to create programs to support families who cannot afford to purchase supplies for household emergency preparedness kits to adequately prepare their homes (e.g. solicit emergency supply donations). Identify possible strategies for the structure of the program through a review of donation programs in other communities and engagement with community partners and businesses	2
HS-1-5		Identify a sustainable funding source for increased utility assistance for low-income residents, including support for energy efficiency projects, such as weatherization	2

Adaptation Actions (continued)

Strategy #	Action #	Sector Strategy / Action	Priority Level
Strategy HS-2: Improve community health and well-being.			
HS-2-1		Ensure the community has robust resources to address increases in violence and crime, particularly domestic violence, during periods of stress including emergencies and heat waves (work with existing Police Department efforts related to mental health response and domestic abuse response and partnerships with agencies, look to examples from other metro cities	1
HS-2-2		Execute an assessment on completeness of sidewalks connecting all streets and prioritized implementation plan coordinated with County.	1
HS-2-3		Increase community participation in health and wellness, exercise and nutrition programs tie into Ramsey County MNSHIP initiatives	2
Strategy HS-3: Educate, engage, and empower the public on health and safety risks of climate change impacts.			
HS-3-1		Increase outreach to diverse populations about climate change and health, natural hazards, and emergency preparedness via broadcast, print, bus ads, social media, and other forms of communication in multiple languages and accessible to individuals with disabilities to ensure that emergency preparedness planning reaches all City residents	1
HS-3-2		Increase household education about water quality and food storage risks resulting from power outages associated with increased extreme weather events	2
2-7	Maplewood Climate Adaptation Plan		



Strategy #	Action #	Sector Strategy / Action	Priority Level
HS-3-3		Expand resident awareness and use of MPCA and MDH alert texts and emails of the City Air Quality Index including particulate matter and pollen counts so that the public is aware of bad air quality days. Include strategies for coping with poor air quality days	2
HS-3-4		Conduct education and outreach on the effects of nutrient loads and contaminants in stormwater on local water quality (Partner with RMWD)	2
HS-3-5		Provide information on what residents can do to reduce their carbon footprint and how their households can be more resilient.	2
HS-3-6		Partner with County Health Department to Identify list of resources for dealing with health impacts and to work with vulnerable populations to share information about climate risks to health and create specific adaptation strategies	2
Strategy HS-4: Implement City policies to address health and safety considerations of climate change.			
HS-4-1		Increase the number of City employees that participate in employee health and wellness, exercise, and nutrition programs	1.b
HS-4-2		Develop city-wide ordinances or policies to encourage, incentivize, or require the reduced use of water-related illness agents such as phosphorus and synthetic nitrogen fertilizers, herbicides and pesticides, that have potentially negative impacts on natural resources and human health	1
HS-4-3		Adopt/enforce codes/ordinances requiring window screens, especially for rental housing facilities.	2

Adaptation Actions (continued)

Strategy #	Action #	Sector Strategy / Action	Priority Level
HS-4-4		Encourage the preservation or establishment of native and natural vegetation near shorelands to protect wetlands, lakes, and rivers to reduce damage to water quality from severe storms and heavy rain events.	2
HS-4-5		Incentivize increased greenspace, pervious ground cover, and pervious pavement at existing and new developments to increase water infiltration, slow water table depletion, and reduce the impact of heavy rain events.	2
HS-4-6		Develop and identify/collect educational content and resources to provide to owners, developers, contractors, and designers of development, redevelopment projects, and commercial/multi-family properties to inform on strategies to reduce the urban heat island, improve landscape plans, increase effective tree cover, improve pavement reduction and parking requirement reduction, and solutions which may offer multiple benefits for property owners and users to share with residents and businesses. Targeted toward redevelopment and properties that have a lot of pavement.	2
HS-4-7		Review/create anti-idling policies and enforcement plans for city vehicles (especially on bad air days) coordinate with school district. Establish City wide anti-idling ordinance addressing all gasoline and diesel powered motors.	2





Section

03

Extreme Heat and Weather

 [Click here to return to TOC](#)

Extreme Heat and Weather

According to the EPA, major heat waves have been occurring more frequently across the Midwest for many decades. Extreme weather was happening before global warming began, however, there's general scientific agreement that global warming has contributed to a trend toward more intense extremes of heat and extreme weather events over the last decade and will continue to influence both in the future. Heat waves are longer and hotter than they used to be and some regions are suffering from catastrophic drought and wildfire impacts—even in areas which have not historically been effected by wildfire like Missouri. Heat stress is likely to increase in the future as a result of continued rises in temperatures and humidity in this region, resulting in more heat-related deaths and illnesses

Certain groups of people are more at risk of stress, health impacts, or death related to Extreme Weather events including heat stress, tornadoes, wind storms, lightning, wildfires, winter storms, hail storms, and cold waves. The risks related to extreme weather events include traumatic personal injury (tornadoes, storms), carbon monoxide poisoning (related to power outages), asthma exacerbations (wildfires, heat stress), hypothermia/ frostbite (cold waves, winter storms), and mental health impacts.

Equity Considerations:

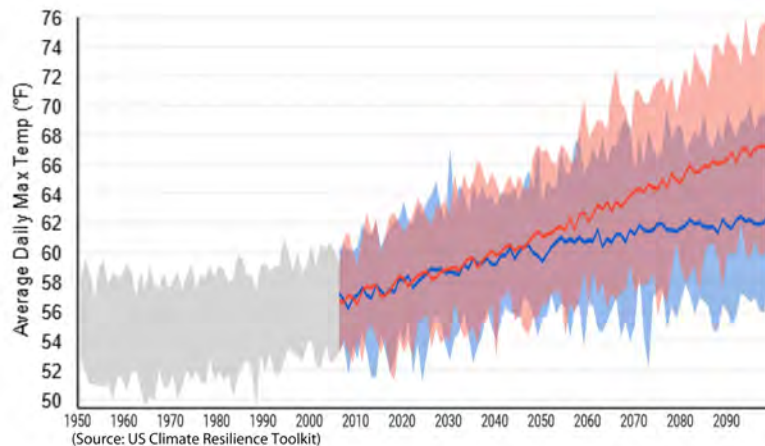
- According to the US DOE, low income families in Maplewood have an energy burden (percentage of income required to pay for energy needs) 3 to 5 times higher than average. Families with high housing or energy burden are required to spend higher portions of their income on their rent or energy needs, frequently leaving too little to cover other family expenses such as nutrition and appropriate medical care.
- Low income homeowners typically cannot afford needed investments to make their home resistant to extreme heat and weather while renters have little leverage to see to it that landlords make the needed weatherization improvements.



Extreme Heat and Weather

Increasing Temperatures

The chart above shows observed average daily maximum temperatures for Ramsey County from 1950-2010, the range of projections for the historical period, and the range of projections for two possible futures through 2100. Maximum temperature serves as one measure of comfort and safety for people and for the health of plants and animals. When maximum temperature exceeds particular thresholds, people can become ill and transportation and energy infrastructure may be stressed.



Increasing Extreme Weather

Below are the number of extreme weather events reported by NOAA for Ramsey County between 1999 and 2019. Extreme weather events increased 2% over that 20 year period.

Storm Weather Events

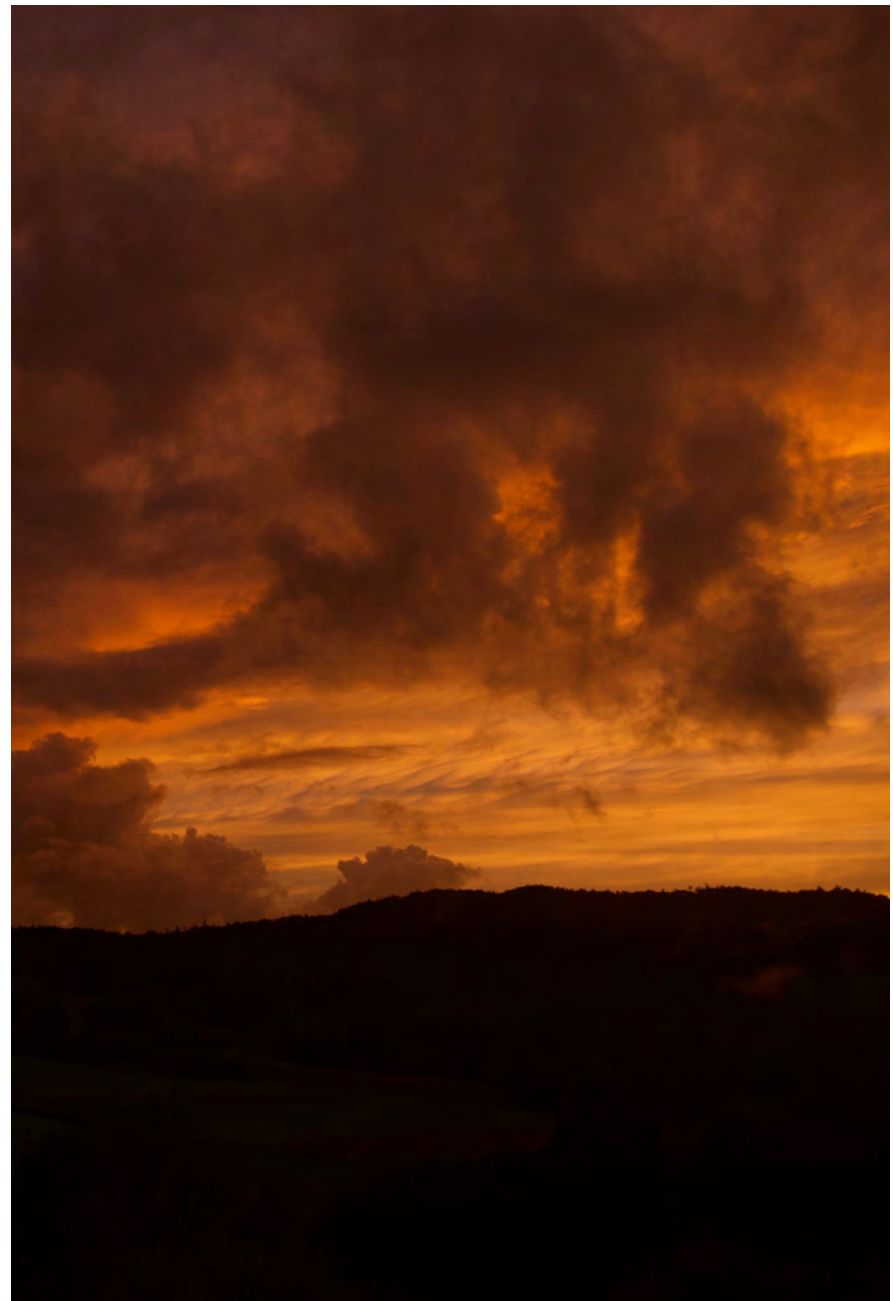
Number of Events Reported In Ramsey County:

From March 1999 to March 2009: **99** events

From March 2009 to March 2019: **101** events - an increase of **2%**

Average Annual Storm Weather Economic Damage 1999-2019: **\$1,550,000**

(source: NOAA National Centers for Environmental Information)



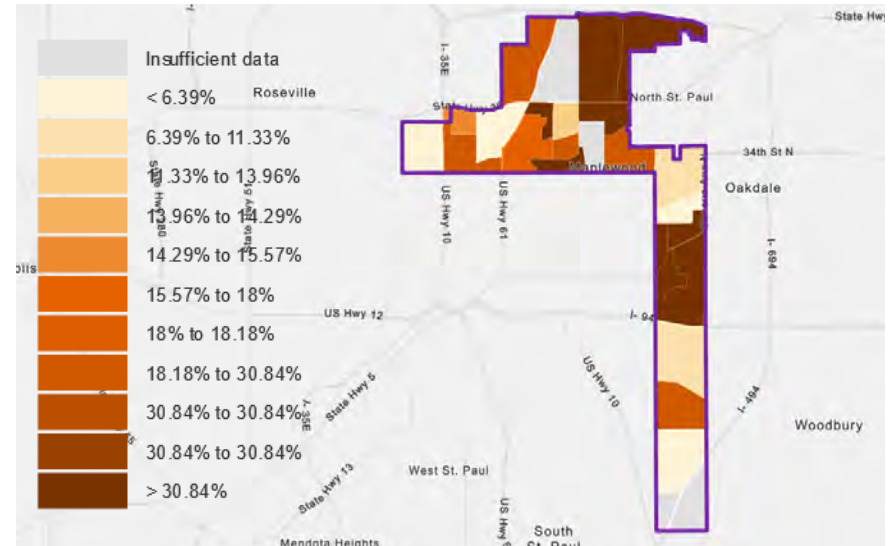
Extreme Heat and Weather

Housing Burden and Extreme Heat and Weather Resilience

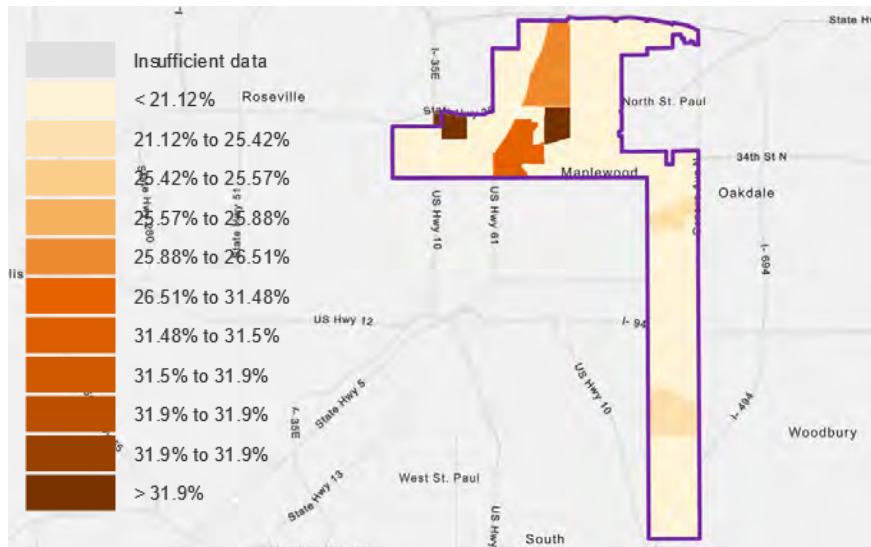
Households with cost housing burden (paying 30% or more of income for rent) can have a reduced capacity to respond to emergencies increasing that household's climate vulnerability. According to the US Census Bureau, Maplewood has 4,490 renter occupied housing units total. Over 54% are households living with a housing cost burden of over 30% and of those nearly 50% (26.8% of all renter occupied households) are living with a housing costs totaling 50% or more of their income.

Maplewood has a total of 10,545 owner occupied housing units. Of those households 24.2% are living with housing cost burden of over 30% with over 1/4th of those living with a housing costs totaling 50% or more of their income (6.1% of all homeowners). See maps below and to the right for the distribution of these households throughout the community.

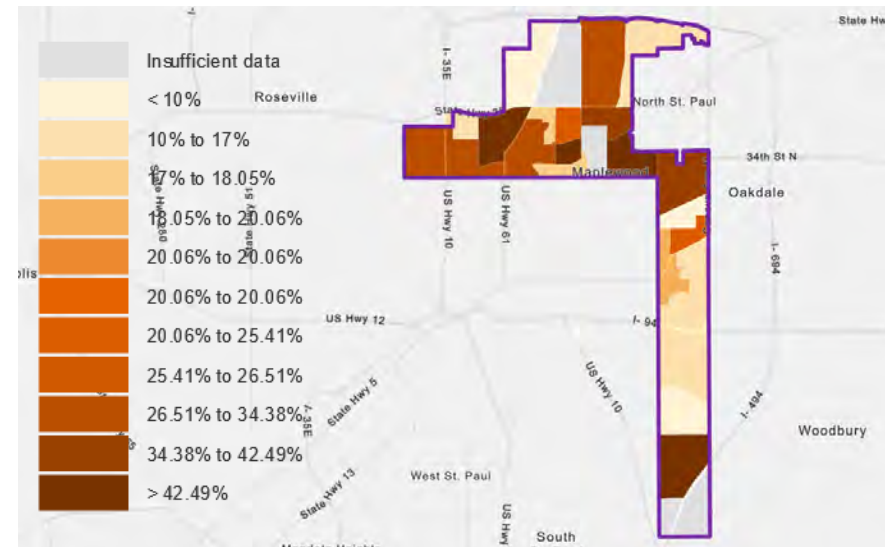
Maplewood Renters: Paying 30%-49% of Income for Housing



Maplewood Homeowners: Paying >30% of Income for Housing



Maplewood Renters: Paying >50% of Income for Housing

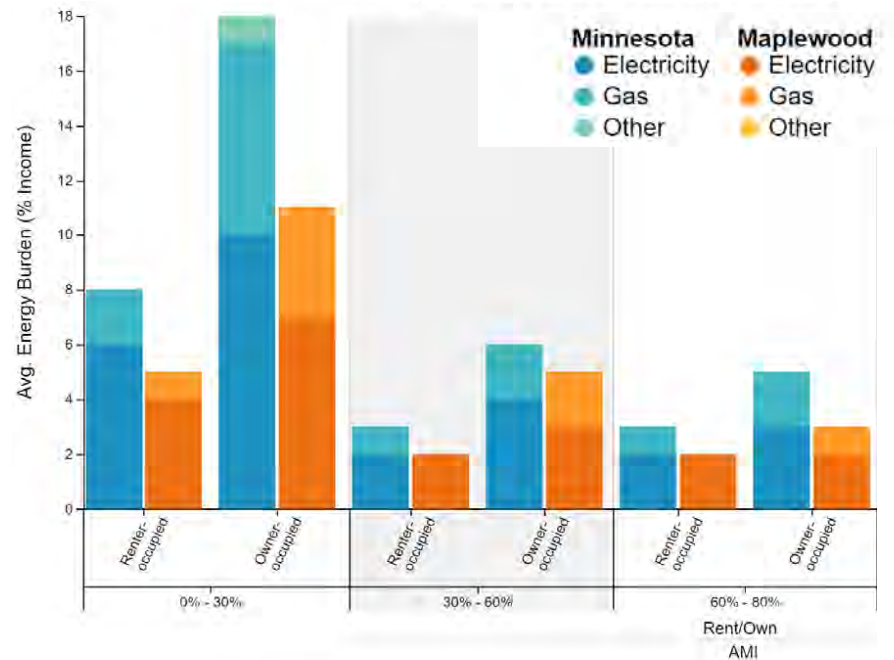




Extreme Heat and Weather

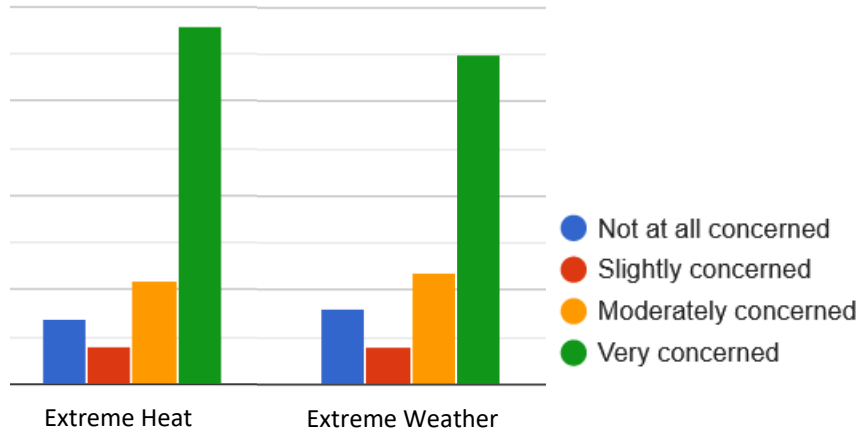
Energy Burden and Extreme Heat and Weather Resilience

“Energy Burden” is the percentage of household income that goes toward energy costs (electricity, home heating, and transportation). Individuals with lower incomes have a much higher likelihood of living under an energy burden—not only because the energy costs experienced by a lower income household must be paid for out of a smaller income, but also because lower income individuals frequently live in homes with higher energy costs due to older building age or lower levels of insulation and energy equipment efficiency. Those living under high energy burden and who are without ability to make the needed weatherization improvements (or leverage for landlords to do so) have an increased vulnerability to the effects of extreme heat and weather. See the chart below for the breakdown of energy burden levels by income level and rent vs owner occupied status in Maplewood.



Extreme Heat and Weather

Community Concern



Over **88%** of the individuals responding to the City of Maplewood’s 2020 Climate Adaptation Plan Community Input Survey reported being slightly (7%) moderately (18%), or very concerned (63%) about potential extreme heat impacts of climate change.

Over **86%** of the individuals responding to the survey reported being slightly (7%) moderately (20%), or very concerned (59%) about potential extreme weather event impacts of climate change.

Populations More Vulnerable to Impacts in This Sector

The following populations tend to be more vulnerable to the potential climate change impacts in this sector:




Addressing This Sector

This Climate Adaptation Plan is organized around a unifying framework organized by sector. Each sector has over-arching Strategies and detailed Actions. Strategies are specific strategic goal statements providing direction and guidance for decisions about future public policy, community investment, and planning. Detailed Actions are specific tasks to be implemented in order to achieve the strategic goals.



Adaptation Actions

Below are the Strategies and detailed Actions addressing the needs of the **Extreme Heat and Weather** section.

Strategy #	Action #	Sector Strategy / Action	Priority Level
 Extreme Heat and Weather			
Strategy EHW-1: Address health impacts of extreme heat.			
EHW-1-1		Identify and promote existing heat-warning systems for employees and the public	1
EHW-1-2		Plant shade trees to limit the need for indoor cooling and reduce temperatures at parks, playgrounds, and other outdoor spaces. Prioritize plantings based on city's Tree Canopy survey, identifying neighborhoods with higher heat island impacts, lower existing tree equity, and higher vulnerable population shares.	1
EHW-1-3		Strengthen emergency management capacity to prepare for and respond to the impacts of climate change. The City should prioritize capacity improvements such as training and equipment to address risks exacerbated by climate change. Emergency management should be equipped to address the possibility of multiple emergencies at the same time, such as the combination of wildfire smoke coupled with extreme heat and local brush fires	2
EHW-1-4		Identify and minimize potential urban heat impacts	2

Extreme Heat and Weather

Adaptation Actions (continued)

Strategy #	Action #	Sector Strategy / Action	Priority Level
EHW-1-5		Educate public and public health professionals about health risks posed by climate change, including potential changes in air quality and impacts on mental health. Explore partnerships for curricula and educational materials and joint communications efforts.	2
EHW-1-6		Explore modification of multi-family building licesure to include participation in the Xcel Energy and Centerpoint Energy Multi-Family building energy efficiency program as a requirement for re-licensure. https://www.centerpointenergy.com/en-us/SaveEnergyandMoney/Pages/Multi-Family-Building-Efficiency.aspx?sa=MN&au=bus	2
Strategy EHW-2: Educate, engage, and empower the public on Extreme Heat and Weather and linkage with health.			
EHW-2-1		Identify, review for appropriateness, and promote existing resource materials to emphasize steps individuals can take to improve emergency preparedness. Increase awareness of City and other alert systems. Resource: All hazard mitigation plan https://www.ramseycounty.us/your-government/departments/safety-and-justice/emergency-management-homeland-security	1
EHW-2-2		Continue to provide education around vegetation management of trees and how proper management can reduce storm-related power outages. Explore translating materials to support equity in communications.	1
EHW-2-3		Enhance community networks and connections for those who require special attention, such as the elderly, homebound, disabled, isolated, or those likely to be in need of financial assistance during or after extreme weather events (heat, cold and heavy precipitation)	2



Strategy #	Action #	Sector Strategy / Action	Priority Level
EHW-2-4		Identify funding sources to facilitate a financial aid arrangement to assist property owners in conducting preventive vegetation management and assist with costs related to post-storm, tree clean-up	2
EHW-2-5		Coordinate with the County on county-wide actions related to improved incentivization and financing mechanisms for multi-family energy efficiency and promote their use to multi-family building owners.	2
Strategy EHW-3: Implement effective systems and processes to manage and respond to extreme weather events.			
EHW-3-1		Continue to involve key community partners, such as hospitals, in emergency preparedness and management. Include the impacts of climate change as emerging threats in future response planning.	1
EHW-3-2		Review debris management plans to support response to severe storm events and flooding.	1

Extreme Heat and Weather

Adaptation Actions (continued)

Strategy #	Action #	Sector Strategy / Action	Priority Level
EHW-3-3		Ensure that facilities that serve vulnerable populations are resilient to climate hazards. Identify, promote, and share model procedures for ensuring both City and non-City facilities employ best practices in the event of an emergency such as flooding, power outages, extreme heat, etc.	2
EHW-3-4		Review and update the Emergency Management Plan in relation to projected climate change impacts to the community.	2
Strategy EHW-4: Improve the capacity of the City and community to provide support during extreme weather events.			
EHW-4-1		Identify existing resources on climate change, extreme heat and weather and use resources to train staff and inform the public.	1
EHW-4-2		Link low-income populations, communities of color, older adults and people with disabilities to services that help reduce safety, health and financial risks associated with climate change impacts.	2



Strategy #	Action #	Sector Strategy / Action	Priority Level
EHW-4-3		Make emergency communications available in multiple languages and platforms. The City’s top non-English languages should be addressed in the multiple-language communication plan. Platforms used should focus specifically on reaching the City’s top vulnerable populations identified in this report	2
EHW-4-4		Improve the safety and walkability of neighborhood sidewalks to increase foot traffic and opportunities for community interaction and easy access to neighborhood businesses and resources.	2
Strategy EHW-5: Decrease the urban heat island effect, especially in areas with populations most vulnerable to heat.			
EHW-5-1		Develop a policy that requires all housing development projects receiving City funding, PUD approval, and/or Conditional Use Permitting to implement residential scale heat island mitigation strategies which may include cool surfaces, solar-friendly landscape shading strategies, impervious surface reduction, and breeze capture.	1
EHW-5-2		Review existing development ordinances/ standards to look for opportunities to incentives or require tree planting within parking lots. Ordinance should establish a specific goal of percentage of pavement to be shaded by trees. Working with developers during variances and planned unit developments. Build upon the North End study and areas of heat islands. (Proactively work with developers to review their site plans and parking needs to reduce pavement and increase trees. Get RWMWD to invest in stormwater with new developments, use the examples from the Maplewood Mall and best practices for tree health. Solar shade canopy on parking lots.	2

Extreme Heat and Weather

Adaptation Actions (continued)

Strategy #	Action #	Sector Strategy / Action	Priority Level
EHW-5-3		Promote policies and programs which decrease impervious surfaces, especially in neighborhoods of increased vulnerable populations. Look at reflectivity/ cool pavement. (29)See the strategies above. Look at the pricing of the stormwater utility fee and credits for reduction of pavement, etc.	2
EHW-5-4		Review current building and development standards/policies/ordinances (applicable to public buildings, to PUDs, and to private-sector buildings which receive public funding/ resources) to increase vegetative cover and increase the solar reflective quality of surfaces (mid-cost)	2
EHW-5-5		Review voluntary sustainable building guidelines to reduce generation of waste heat from buildings by promoting and incentivizing building energy efficiency measures (low-cost) Increase energy audits, using Energy Smart/Waste Wise outreach staff funded by the county. Encourage building control methods to prevent taking in too much air on hot or cold days i.e. 75F building control tools.	2
EHW-5-6		Explore reduction of parking requirement ratios in zoning ordinances and encourage use of “proof of parking” strategies to minimize initial parking construction. Proactively work with developers to review their site plans and parking needs to reduce pavement, run off and urban heat island. Encouraging integration of trees. Tie into overall multi modal transportation planning and telecommuting. Trees, lighting and EV Charging spots,	2
EHW-5-7		Explore the development of a "Cool Roof", "Cool Building" and "Cool Pavement" pilot project to test and exhibit heat island mitigation strategies. North end large commercial properties, incentivize installation of reflective roofing materials, with federal tax incentives and St. Paul Port Authority and PACE loans. Black roofs are good to melt winter snow. Tie into U of MN experts and pilot projects https://twin-cities.umn.edu/new-urban-heat-island-study-shows-surprising-variation-air-temperatures-across-twin-cities	2






Section

04

Air Quality

 [Click here to return to TOC](#)

Air Quality

Changes in the climate affect the air we breathe both indoors and outdoors. The impacts to air quality are effected by pollution as well as allergens. Climate change effects temperatures, cloudiness, humidity, the frequency and intensity of precipitation, and wind patterns. Each of these, in turn, can impact air quality. Fine particle pollution can be elevated in weather conditions with high humidity, high pressure, strong overnight temperature inversions, or low wind speeds—all of which are impacted by climate change. In addition, climate change impacts can also lead to changes in naturally occurring emissions that effect air quality (for example, wildfires, wind-blown dust, and emissions from vegetation).

The atmospheric warming associated with climate change can also increase the formation of ground-level ozone—a pollutant that can trigger a variety of health problems, particularly for children, the elderly, and people of all ages who have lung diseases such as asthma. Ground level ozone forms when heat and sunlight trigger the reaction of nitrogen oxides and volatile organic compounds. These chemicals come from industrial plants, electric utilities, vehicle exhaust, and wildfire. Increasing temperatures, and increasing extreme heat days, accelerate the process of ground-level ozone formation.

Equity Considerations:

- The burden of air pollution is not evenly shared. Poorer people and some racial and ethnic groups are among those who often face higher exposure to pollutants and who may experience greater responses to such pollution.
- According to the Asthma and Allergy Foundation of America, studies indicate that poverty can play a major role in developing asthma and the ability to manage it, making low-income populations particularly susceptible to air quality impacts..



Air Quality Alerts in Minnesota

There have been more than two dozen air quality alerts issued by the Minnesota Pollution Control Agency since 2015. More than half of the alerts were due to smoke caused by wildfires in the Western United States and Canada. This represents an increase of nearly 200% over the previous seven year period. In a 2015 report, the Minnesota Department of Health indicated that fine particulate air pollution like that from wildfires contributed to more than 2,000 deaths and 600 emergency room visits in 2008 alone.

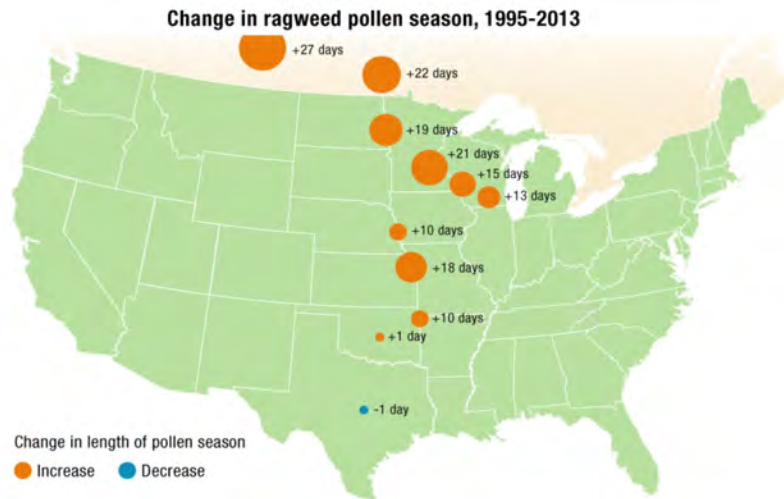


Flooding, 2019 (Graphic: Brian Peterson MPRnews.org)

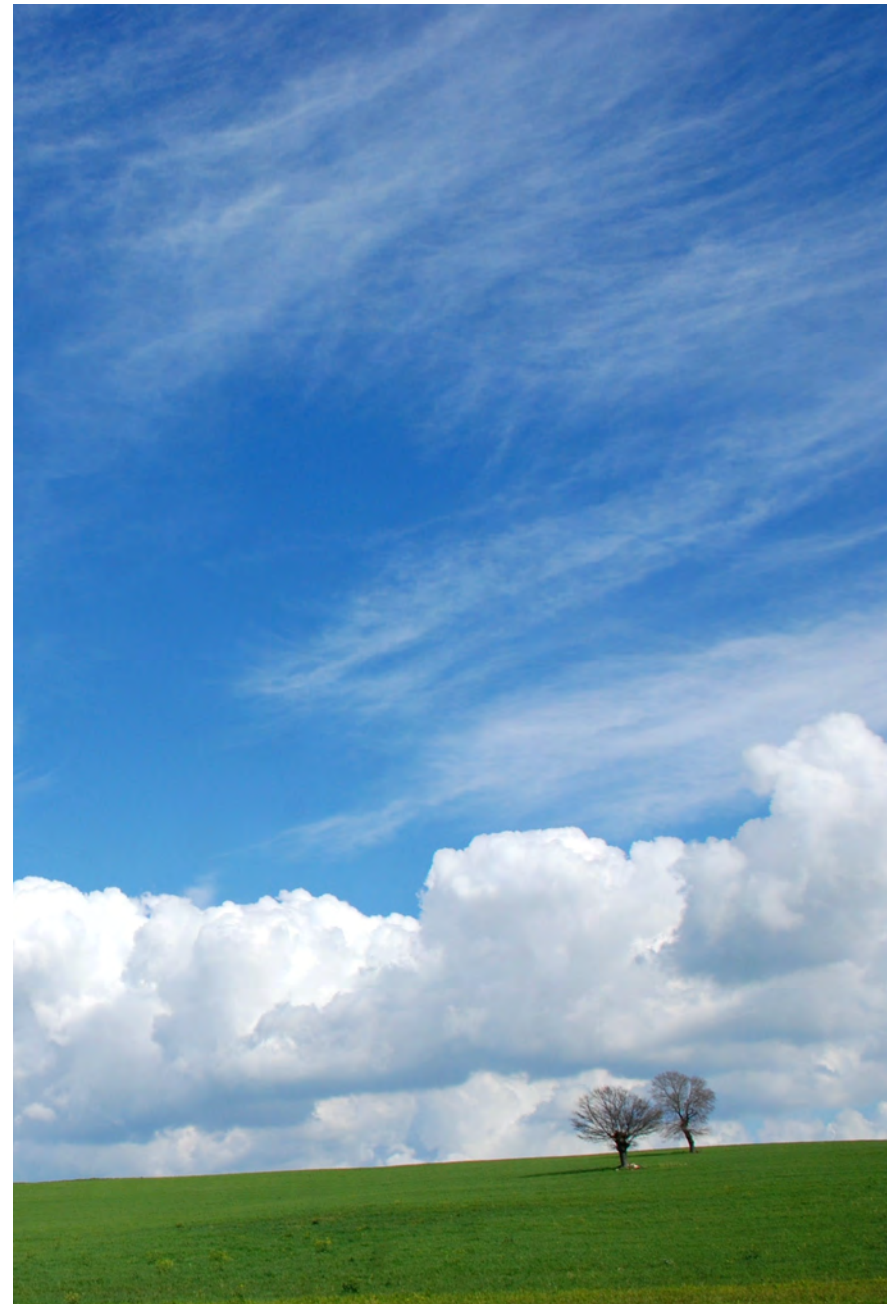
Air Quality

Allergies

Climate change in Minnesota is causing shifts in seasonal weather patterns, increasing annual temperatures, decreasing snow cover, and an increasing growing season. These changes are affecting an increase in pollen quantity and duration of allergy impacts for individuals that is projected to continue and increase. Beyond inflammation and irritation associated with allergic reactions, some studies indicate pollen can affect the cardiovascular and pulmonary system.



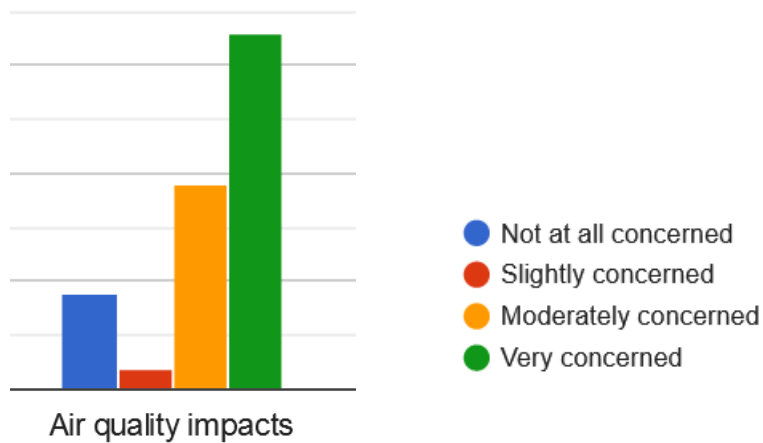
(Graphic: Jaime Chrismar MPRnews.org)



Community Concern

Over **49%** of the individuals responding to the City of Maplewood’s 2020 Climate Adaptation Plan Community Input Survey reported having been effected by increases in asthma attacks, longer allergy seasons, or other health impacts due to air quality changes.

Over **86%** of the individuals responding reported being slightly (4%), moderately (30%), or very concerned (52%) about potential air quality impacts of climate change.



Populations More Vulnerable to Impacts in This Sector

The following populations tend to be more vulnerable to the potential climate change impacts in this sector:



Addressing This Sector


This Climate Adaptation Plan is organized around a unifying framework organized by sector. Each sector has over-arching Strategies and detailed Actions. Strategies are specific strategic goal statements providing direction and guidance for decisions about future public policy, community investment, and planning. Detailed Actions are specific tasks to be implemented in order to achieve the strategic goals.



Air Quality

Adaptation Actions

Below are the Strategies and detailed Actions addressing the needs of the **Air Quality** section.

Strategy #	Action #	Sector Strategy / Action	Priority Level
 <h2 style="margin: 0;">Air Quality</h2>			
Strategy AQ-1: Increase and maintain air quality for residents and businesses.			
AQ-1-1		Work with the Air Quality Management District, MPCA Air Quality Alerts, and County Public Health Department to establish a process (and expand the number of platforms e.g., social media) to notify schools, community organizations, residents, and businesses	1
AQ-1-2		Inventory, identify, and maintain adequate community-safe spaces for poor air quality. Popular community gathering spaces must be made safe during air quality emergencies (smog or wildfire smoke). Options for improving safety include retrofits, upgrades, or other measures to ensure that these spaces are accessible and adequate for sensitive populations	2
AQ-1-3		Conduct education and outreach on the health impacts of air pollution, longer allergy seasons, and extreme heat events	2
AQ-1-4		Enhance street scape plantings and tree canopies, especially in areas of high traffic volumes	2



Adaptation Actions (continued)

Strategy #	Action #	Sector Strategy / Action	Priority Level
Strategy AQ-2: Reduce auto-generated particulate matter, tailpipe pollutants, waste heat, and ozone formation.			
AQ-2-1	Reduce generation of waste heat from mobile sources by promoting and incentivizing public transit, biking and walking.		1
AQ-2-2	Install roadside vegetation that creates effective barriers to prevent drifting of air pollutants to adjacent schools and residences. Coordinate with upcoming planned MNDOT and County upgrade projects. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6060415/		2
AQ-2-3	Measure and maintain review for progress City transportation connectivity using Center for Neighborhood Technology’s AllTransit index. Other indices also exist for walkable neighborhoods, commuting by bicycle, and commuting by walking.		2
Strategy AQ-3: Educate, engage, and empower the public on Air Quality and linkage with health.			
AQ-3-1	Educate public and public health professionals about health risks posed by climate change, including potential changes in air quality and impacts on mental health.		1
AQ-3-2	Develop and distribute educational content (brochures, k-12 curricula content, infographics, media announcements, etc.) which outline and actively promotes the clean air and health benefits of strategies included in this CAP plan such as: use of renewable energy, conservation of energy, use of electric vehicles, public transit, ride share, and walking and biking for transportation.		2

Section

05

Flooding and Water Quality



[Click here to
return to TOC](#)





Flooding and Water Quality

As the IPCC (Intergovernmental Panel on Climate Change) noted in its special report on extremes, it is increasingly clear that climate change “has detectably influenced” several of the water-related variables that contribute to floods, such as rainfall and snowmelt. In the Midwest, climate change exacerbates many of the factors that create significant flood conditions. For Minnesota, climate change has, and is projected to continue to bring heavier precipitation events as well as longer periods of time between rainfall events, creating dryer surfaces for those heavier rains to fall upon.

These climate change impacts significantly increase the threat of flooding in our communities. Flood danger includes over-bank flooding of rivers, ponds, and lakes that are over burdened with heavy precipitation or snowmelt runoff. In addition, the potential for heavier rainfalls on dryer surfaces also increases the risk of flash flooding which is caused by heavy rain events over a short period of time.

Flooding in Minnesota can be expected to increase in both regularity and severity. In 2015, researchers at the University of Iowa studied flooding since 1962 and determined that the number of floods has been trending upward significantly. According to a scientific study issued in 2019 by the University of Notre Dame, the severity of extreme hydrologic events, so-called 100-year floods, hitting watersheds in Minnesota and the Midwest will increase by as much as 30 percent by the end of the century.

Equity Considerations:

- According to the Iowa Flood Center report “Addressing Community Vulnerability and Building Flood Resilience”, members of communities most impacted by recurring flooding are more likely to live below the poverty level, experience unemployment, have a lower level of education, have a disability, speak English as a second language, lack vehicle access, have children, be elderly, identify as African American or Latino, or be the female head of a household.

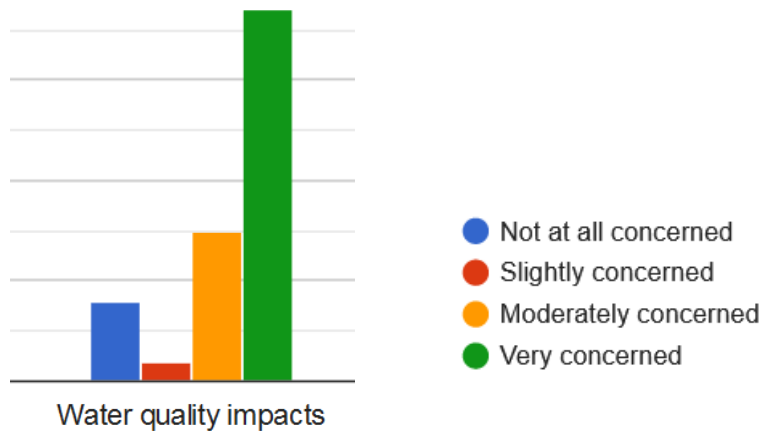
Flooding, 2019 (Graphic: Brian Peterson MPRnews.org)

Flooding and Water Quality

Community Concern

Over **20%** of the individuals responding to the City of Maplewood’s 2020 Climate Adaptation Plan Community Input Survey reported having been personally effected by recent flooding impacts.

Over **87%** of the individuals responding reported being slightly (4%), moderately (24%), or very concerned (59%) about potential impacts on clean drinking water.



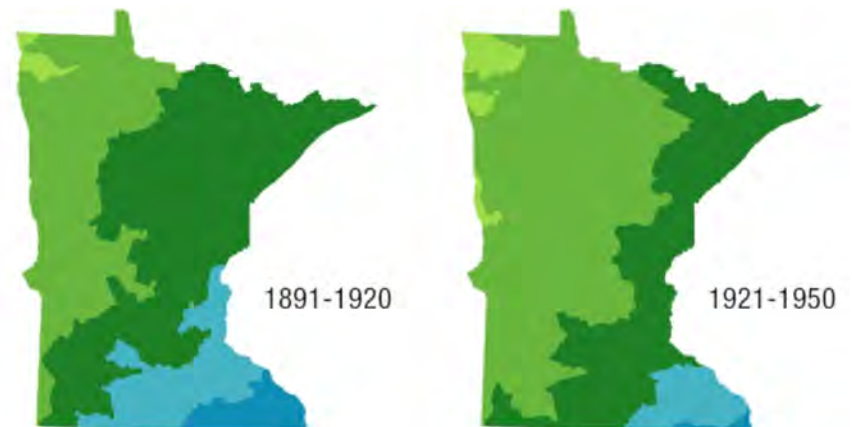
Annual Rainfall in Minnesota

According to the State of Minnesota Climatology office, DNR and the National Climate Assessment, the majority of the State receives 5-15% more annual rainfall than a century ago, with annual totals increasing at an average rate of just over a quarter inch per decade statewide since 1895. See maps to the right.

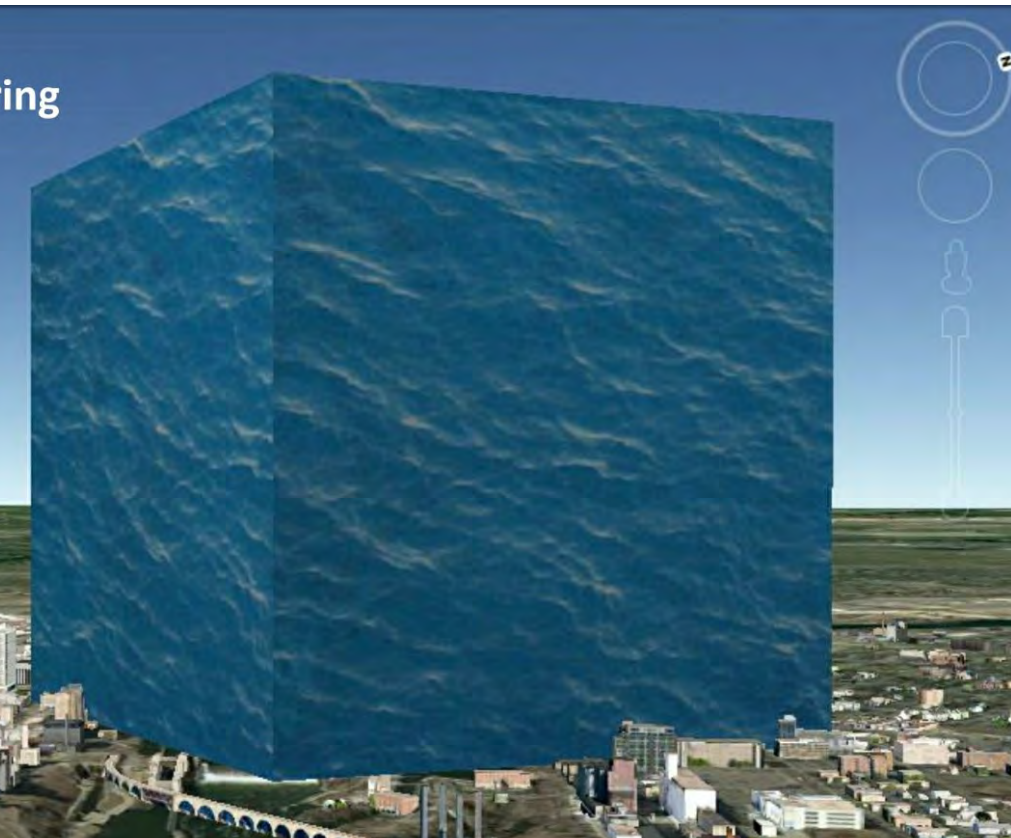
(Graphic Source: MPRnews.org)



Mega-Rain:
6+ inches of rain over 1,000+ square miles deliver over 13,900,000,000 cubic feet of water, equal to this ½ mile cube shown in Downtown Minneapolis:



ing



Flooding and Water Quality

Mega-Rain Events in Minnesota

Since 1860 Minnesota has had 15 “Mega-rain” events which deliver a minimum of 13.9 billion cubic feet of rainwater over a very short time. Seven of those storms have occurred since 2000. See graphic to the left.

Populations More Vulnerable to Impacts in This Sector

The following populations tend to be more vulnerable to the potential climate change impacts in this sector:



Children Under 5



Older Adults



Individuals With Disabilities



Those in Economic Stress



People of Color



Individuals W/ out Vehicle Access



Addressing This Sector


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Flooding and Water Quality

Adaptation Actions

Below are the Strategies and detailed Actions addressing the needs of the **Flooding and Water Quality** section.

Strategy #	Action #	Sector Strategy / Action	Priority Level
 <h2 style="margin: 0;">Flooding and Water Quality</h2>			
<h3 style="margin: 0;">Strategy FW-1: Improve community stormwater preparedness and water conservation.</h3>			
FW-1-1		Continue to update stormwater management plans to include best available data on projected rainfall and climate change impacts to reduce flooding and promote better water quality.	1
FW-1-2		Provide education to residents on what actions they can take to reduce their risk to extreme precipitation events and flash flooding. Develop an information HUB with tools and resources (e.g. https://www.cnt.org/tools/my-rainready-home-assessment-tool)	1
FW-1-3		Continue consistent implementation of the City's Living Streets policy to address priority areas of localized flooding and to expand green infrastructure and decentralized stormwater infiltration capacity.	1
FW-1-4		Develop and implement water conservation education and outreach programs in residential and commercial sectors. Coordinate with potential partners like Ramsey County and watershed districts.	2
FW-1-5		Coordinate and leverage city stormwater management infrastructure investments for streets, parks, and open space with watershed districts and county infrastructure investments.	2
FW-1-6		Expand public education about the value of watersheds, rain gardens, and low-impact development to address stormwater run-off. Implementation should focus on increasing equity in the community.	2
FW-1-7		Support the watershed district in helping to communicate and prepare owners of properties vulnerable to flooding.	3



Adaptation Actions (continued)

Strategy #	Action #	Sector Strategy / Action	Priority Level
Strategy FW-2: Promote and expand green infrastructure.			
FW-2-1		Promote the development of rain gardens and bioswales among residents and businesses and continue to partner with the Watershed District for grants and program support. Prioritization should be given to locations with greatest impact potential: neighborhoods with high heat island coefficient, high impervious surface shares, and high vulnerable populations.	1
FW-2-2		Establish a policy to prioritize open space preservation as an important strategy for stormwater infiltration, heat island mitigation, and species diversity protection. Actively seek partnerships and opportunities to increase preservation of green space, including review of Maplewood development and redevelopment projects against their negative impacts or positive contributions towards increasing green space preservation.	1
FW-2-3		Create a pre-development and/or permit checklist or pre-meeting requirement to ensure developers meet all of the City and watershed districts’ on-site stormwater capture and infiltration requirements. The checklist or pre-meeting should include education or review of stormwater best practices for site design and engineering.	1
FW-2-4		Promote native landscaping, “landscaping for absorption” , restore and conserve habitat; encourage rain gardens on private property, avoid turf grass, and convert City-owned space to include stormwater absorption features. Tree selection should consider those on the “Adaptive Planting List” which will thrive in our future local climate (refer to Maplewood Citywide Tree Survey and Carbon Sequestration Study). Prioritization should be given to locations with greatest impact potential: neighborhoods with high heat island coefficient, high impervious surface shares, and high vulnerable populations.	2



Flooding and Water Quality


Adaptation Actions (continued)

Strategy #	Action #	Sector Strategy / Action	Priority Level
Strategy FW-3: Strengthen emergency management capacity to respond to flood-related emergencies.			
FW-3-1		Update, test, and train emergency response plans to address hazards likely to become more frequent or intense as the climate changes, including flash flooding and unseasonal riverine flooding	1
FW-3-2		Prepare a Blue Spot flash flood risk map to identify areas within city that are particularly vulnerable to flash flood impacts. Create an implement a mitigation and response plan. Share and promote the information developed by the flash flood risk map, particularly among vulnerable populations and neighborhoods. (https://climate-adapt.eea.europa.eu/metadata/tools/the-blue-spot-model-a-key-tool-in-assessing-flood-risks-for-the-climate-adaptation-of-national-roads-and-highway-systems)	1
Strategy FW-4: Increase the resilience of the natural and built environment to impacts of climate change.			
FW-4-1		Identify and address vulnerabilities in local infrastructure as a result of increased frequency and severity of storms and rainfall. Prioritization should be given to locations with greatest impact potential: neighborhoods with high heat island coefficient, high impervious surface shares, and high vulnerable populations. Explore additional funding sources such as grants	1
FW-4-2		Identify, promote, and provide education and resources about climate risks to the public, especially those most vulnerable to potential impacts of flooding	1
FW-4-3		Change design and management methods to minimize water use and waste in publicly owned or managed properties while still maintaining thriving vegetation. Replace potable water lawn irrigation systems with grey/recycled water systems at city-owned facilities where practicable. Explore the development of a demonstration project to pilot the technology. Explore partnerships with county, watershed district, and non-profit entities.	2





Section 06 Greenspace and Ecosystem Health

 [Click here to
return to TOC](#)



Greenspace and Ecosystem Health

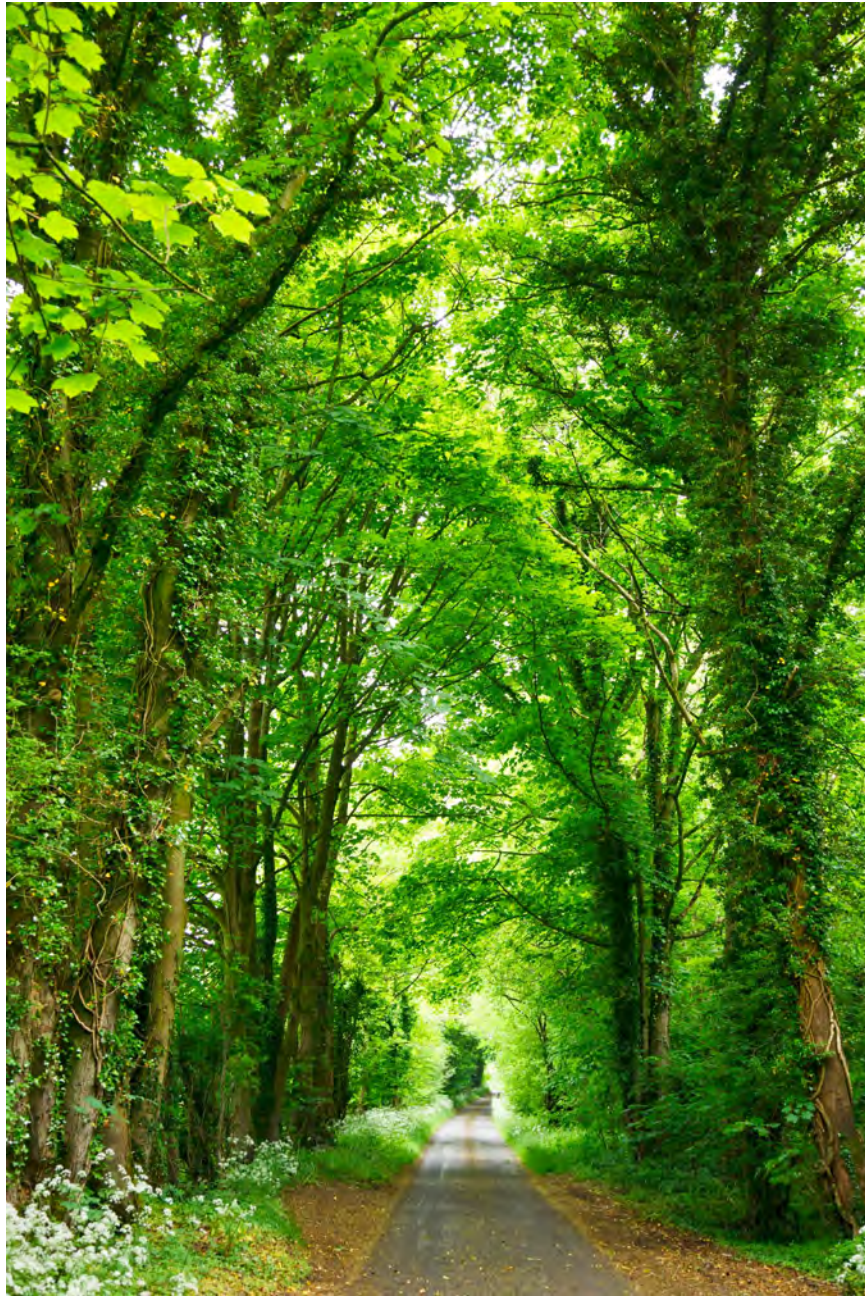
Natural ecosystems in the Midwest are being altered by the effects of climate change. Ecosystems are typically most at risk when climate stressors, such as temperature increases, are combined with habitat loss, pollution, changes in nutrient inputs, and impacts of nonnative invasive species. Forests are threatened by more frequent droughts, wildfires, and insect outbreaks. Many tree species are expected to gradually shift their ranges northward. Invasive species are having increasing impacts as growing season length and average temperatures increase.

Studies have found that climate change impacts could result in a change to the composition of Minnesota's forest and urban tree canopy cover. Climate change impacts may also result in an overall decrease tree cover as native species struggle to adapt to new climate conditions. In particular, species that are found in Minnesota near the southern edge of their native range are likely to struggle under warming conditions.

Equity Considerations:

- As noted by the nonprofit American Forests "a map of tree cover in America's cities is too often a map of income and race." Low income and communities of color frequently live within neighborhoods with the lowest tree canopy coverage, resulting in the economic, heat island mitigation, and environmental benefits of our tree canopy being inequitably distributed.
- Low income communities and communities of color are frequently underserved by access to public greenspaces and parks when compared to more affluent neighborhoods.

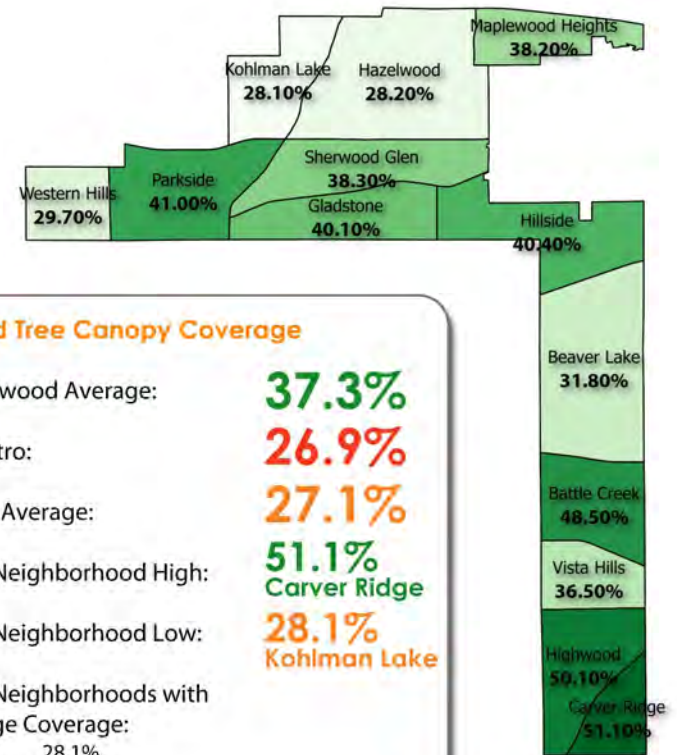




Greenspace and Ecosystem Health

Maplewood Tree Canopy Coverage

paleBLUEdot conducted a citywide tree canopy and ground cover study in 2017. That study determined the citywide average tree canopy coverage to be 37.3% and recommended increasing the tree canopy coverage to 44.4% by 2040. See below for existing tree canopy coverage by neighborhood.




Maplewood Tree Canopy Coverage

- City of Maplewood Average: **37.3%**
- Twin City Metro: **26.9%**
- National City Average: **27.1%**
- Maplewood Neighborhood High: **51.1%**
Carver Ridge
- Maplewood Neighborhood Low: **28.1%**
Kohlman Lake

Maplewood Neighborhoods with Below Average Coverage:

Kohlman Lake	28.1%
Hazelwood	28.2%
Western Hills	29.7%
Beaver Lake	31.8%
Vista Hills	36.5%

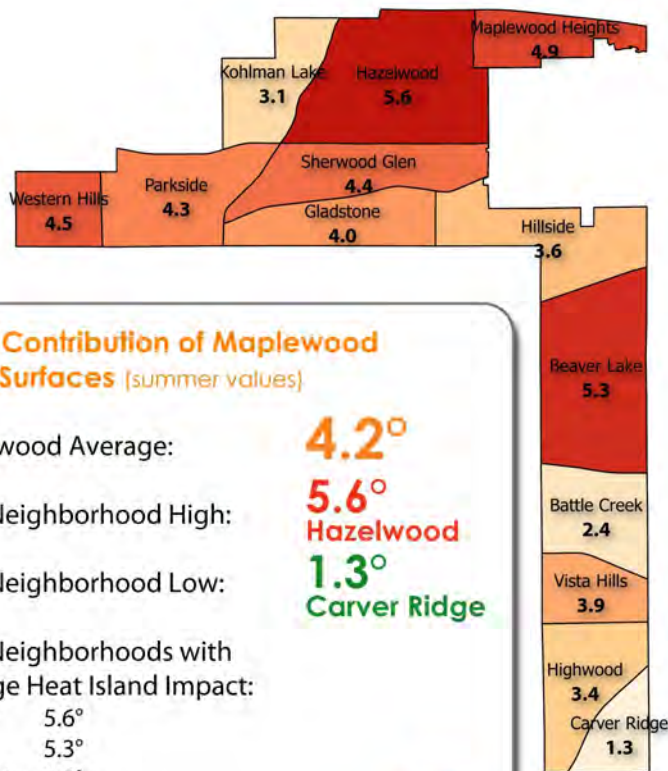




Greenspace and Ecosystem Health

Maplewood Tree Canopy Coverage

According to a 2006 study done by Minnesota State University and the University of Minnesota, the relationship between impervious surface percentage of a City and the corresponding degree of heat island temperature increase can be understood as a ratio. Below are the summer time heat island increase calculations for the City of Maplewood, by neighborhood, based on the calculated impervious surface coverage.



Heat Island Contribution of Maplewood Impervious Surfaces (summer values)

City of Maplewood Average: 4.2°

Maplewood Neighborhood High: 5.6°
Hazelwood

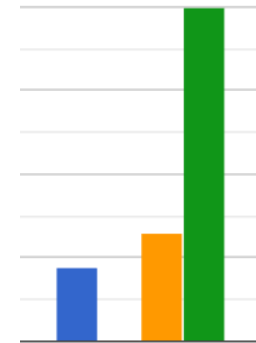
Maplewood Neighborhood Low: 1.3°
Carver Ridge

Maplewood Neighborhoods with Above Average Heat Island Impact:

Hazelwood	5.6°
Beaver Lake	5.3°
Maplewood Hgts	4.9°
Western Hills	4.5°
Sherwood Glen	4.4°
Parkside	4.3°

Community Concern

Over **25%** of the individuals responding to the City of Maplewood's 2020 Climate Adaptation Plan Community Input Survey reported being personally impacted by tree loss due to flooding, drought, or an extreme weather event.



Ecosystem loss

- Not at all concerned
- Slightly concerned
- Moderately concerned
- Very concerned

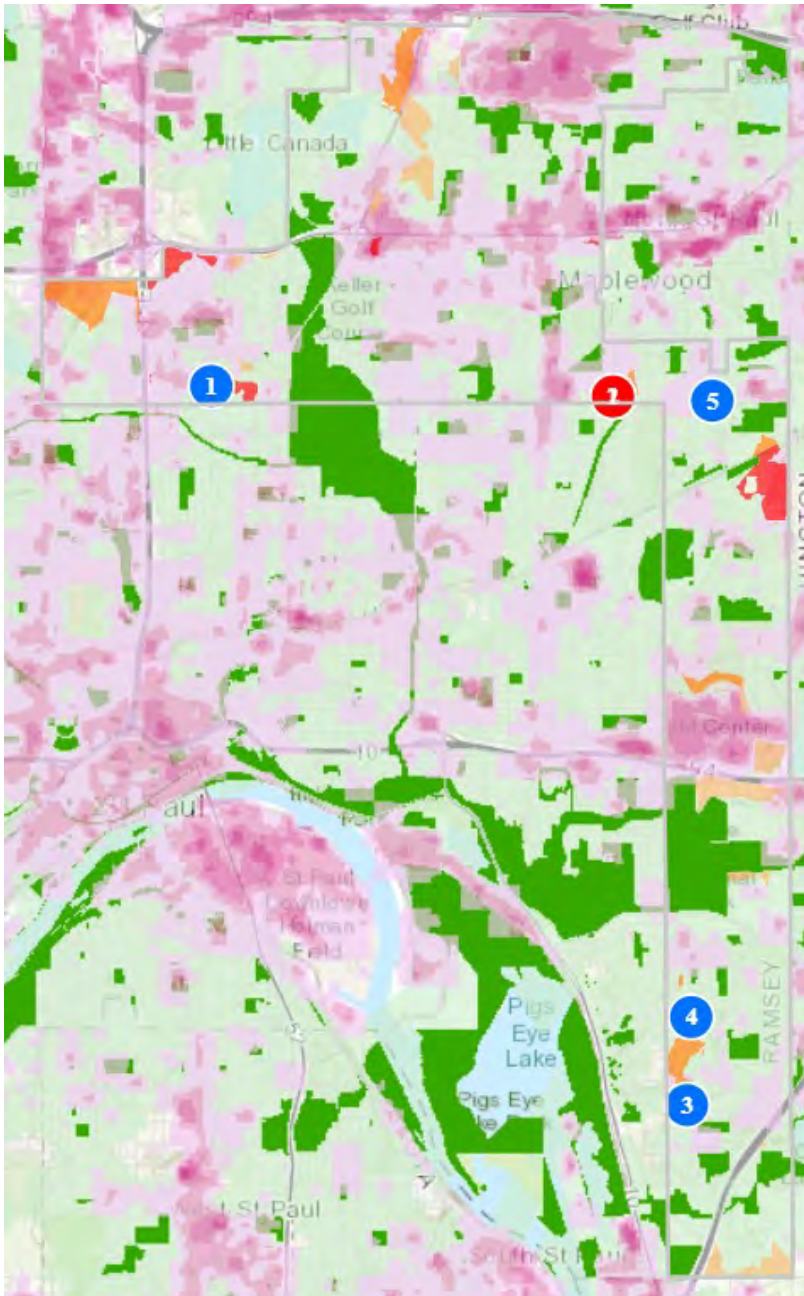
Over **87%** of the individuals responding reported being moderately (21%), or very concerned (66%) about potential ecosystem and tree loss impacts of climate change.

Recommended Focus Areas for Additional Maplewood Park Space, Weighted for Heat Island Impacts

Studies show that high-quality parks provide a wide range of benefits to cities and their residents. Park space, and ready access to them, provide physical and mental health benefits by providing opportunities to be physically active and to interact with nature. The environmental benefits of park space includes removal of air pollution, cooling the air and combating heat island effects, improved water quality, and flood resilience.

The map on the next page is generated by The Trust for Public Land and identifies recommended focus areas for improved Maplewood park accessibility. The numbered circles represent recommended locations for additional park space to serve individuals not currently within a 10 minute walk of park space. The numbered red circles represent recommended park locations that should be prioritized for mitigation of heat island impacts.





Greenspace and Ecosystem Health

Populations More Vulnerable to Impacts in This Sector

The following populations tend to be more vulnerable to the potential climate change impacts in this sector:



Children Under 5



Older Adults



Individuals With Disabilities



Those in Economic Stress



People of Color



Individuals W/ out Vehicle Access

Addressing This Sector

This Climate Adaptation Plan is organized around a unifying framework organized by sector. Each sector has over-arching Strategies and detailed Actions. Strategies are specific strategic goal statements providing direction and guidance for decisions about future public policy, community investment, and planning. Detailed Actions are specific tasks to be implemented in order to achieve the strategic goals.



Greenspace and Ecosystem Health

Adaptation Actions

Below are the Strategies and detailed Actions addressing the needs of the **Greenspace and Ecosystem Health** section.

Strategy #	Action #	Sector Strategy / Action	Priority Level
Greenspace and Ecosystem Health			
Strategy G-1: Increase the accessibility and quality of habitat for native plants and animals.			
G-1-1		Manage publicly-owned natural areas to enhance and maintain diverse native landscape communities. Implementation should prioritize areas of high impact and vulnerability.	1
G-1-2		Establish and effectively manage native-habitat corridors along trails and utility easement areas to restore and maintain landscape connectivity. Implementation should prioritize areas of high impact and vulnerability.	1
G-1-3		Create a Urban Forest Master Plan to establish objectives and best management practices for Maplewood's urban forest and to identify appropriate canopy cover and species diversity goals for the City and identify programs and suitable locations to maintain and expand Maplewood's urban tree canopy. Use Maplewood's Tree Canopy Study in forming the masterplan. Master plan should prioritize areas of high impact vulnerability, and equity	1
G-1-4		Require the use of native plants in landscaping at City-owned properties	1
G-1-5		Identify underutilized paved areas and incentivize conversion to sustainable green space. Implementation should prioritize areas of high impact and vulnerability.	1
G-1-6		Update the City's Living Streets policy to include requirements for planting more native, pollinator friendly, and climate change resistant trees and plants.	1
G-1-7		Update the City's landscaping requirements to require native, pollinator friendly, and climate change resistant plants and trees.	1



Adaptation Actions (continued)

Strategy #	Action #	Sector Strategy / Action	Priority Level
Strategy G-2: Improve the resilience of the urban forest and watersheds to climate change.			
G-2-1		Preserve existing forested areas through practices that re-purpose already developed areas, such as establishing codes that retain minimum canopy cover on new developments and minimize removal of native soil, ground cover, and shrubs	1
G-2-2		Promote and expand weed pulls, tree plantings, invasive species identification and management, wildfire mitigation, and other educational activities that promote stewardship among the public, businesses, and homeowners	2
G-2-3		Develop a watch list of potentially invasive species that could establish residency in the City due to climate change and distinguish this from species that might naturally expand their range. Programs provided by the Maplewood Nature Center support this action	2
G-2-4		Document and monitor the spread of invasive species. Establish agency management practices that reduce the spread of invasive species	2
Strategy G-3: Expand and sustain urban tree canopy and forests.			
G-3-1		Adopt a City tree plan based on the Maplewood Citywide Tree Survey and Carbon Sequestration Study. The tree plan to include a list of preferred climate change resistant trees, management and funding strategies for trees in right-of-ways and public spaces.	1



Greenspace and Ecosystem Health

Adaptation Actions (continued)

Strategy #	Action #	Sector Strategy / Action	Priority Level
G-3-2		Review and revise parking lot shading guidelines and enforcement of increased canopy cover. Policy should be informed by the Tree Master Plan	1
G-3-3		Review and refine park and natural space plans to minimize damage from the impacts of increased use and climate change impacts. Implementation should prioritize areas of high impact and vulnerability.	1
G-3-4		Develop neighborhood tree goals based on the City's 2017 Tree Survey and Carbon Sequestration Study and increase opportunities for residents to learn about and take care of tree.	1
G-3-5		Review and improve strategies for responding to pest and disease invasions	2
G-3-6		Update the City's approved street tree guide and landscape design standards for new development for tree species appropriate for a future local climate	2
Strategy G-4: Manage ecosystems and landscapes to minimize heat island impacts.			
G-4-1		Continue to promote the expansion of tree canopy in urban heat islands or areas that need air conditioning such as schools and apartment buildings (use the Maplewood Citywide Tree Survey and Carbon Sequestration Study as well as the Met Council heat island/tree map to review areas of need) Look for ways to expand the city budget capacity, look to pass state bonding money for trees, coordinate capital investments with county and watershed district. Potential to get lower cost trees (bare root) with gravel bed with Ramsey County	1
G-4-2		Create an ordinance for new and redeveloped commercial and mutli-family property that preserves a certain percentage of land as green space.	1



Adaptation Actions (continued)

Strategy #	Action #	Sector Strategy / Action	Priority Level
G-4-3	Evaluate opportunities to plant additional trees near city facilities and city, county and State road improvement projects to reduce heat island. Coordinate with Solar Goals. Use tree boxes and soil practices to improve tree survivability, tie into the Living Streets policy and tree health strategies.		2



Section

07

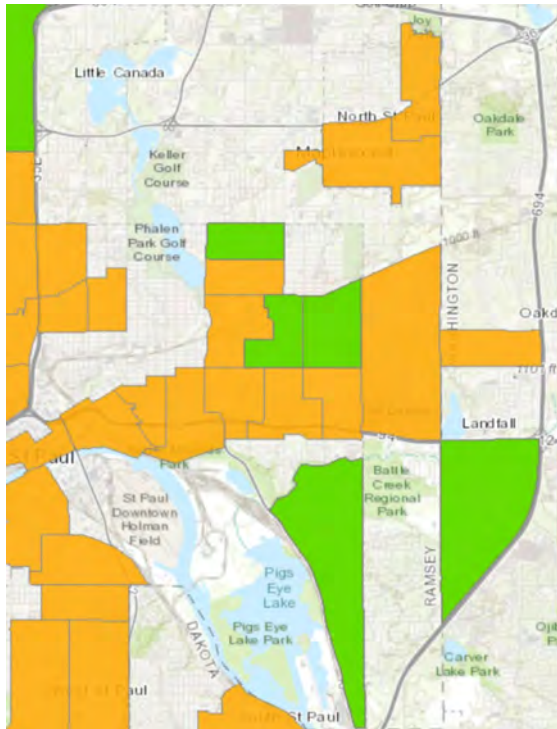
Local Food
and Agriculture

 [Click here to
return to TOC](#)



Food Access in Maplewood

On the map below, highlighted sections represent low-income census tracts (tracts where 20% or more of the population is at or below poverty, or where family median incomes are 80% or less of State median) where a significant number (at least 500 people) or share (at least 33 percent) of residents are distant from the nearest supermarket. In sections which are green, residents are more than 1 mile (urban) or 10 miles (rural), while in orange sections residents are more than ½ mile (urban) or 10 miles (rural) from nearest supermarket.



Climate change is expected to have many impacts on agriculture, forests, and other ecosystems in the Midwest. Midwestern agricultural lands make up two-thirds of the region's land area and produce 65% of the nation's corn and soybeans. Some climate-related impacts may provide short-term benefits for agriculture, but negative effects are also expected in this time frame. In the long-term, climate impacts are likely to have increasingly detrimental effects that increase variability in crop and agricultural production.

Warmer temperatures, especially extreme heat, stress livestock animals and cause declines in meat, milk, and egg production. Diseases may increase as temperature and moisture conditions become more favorable for disease spread and range expansion. Additional expenses may also be incurred as the need to cool animal buildings increases. Climate change can disrupt food availability, reduce access to food, and affect food quality. Projected increases in temperatures, changes in precipitation patterns, changes in extreme weather events, and reductions in water availability may all result in reduced agricultural productivity. Food prices are directly related to agricultural productivity, meaning that the ultimate impact of climate change on food systems will likely be to increase food prices, or introduce a higher variability in food costs.

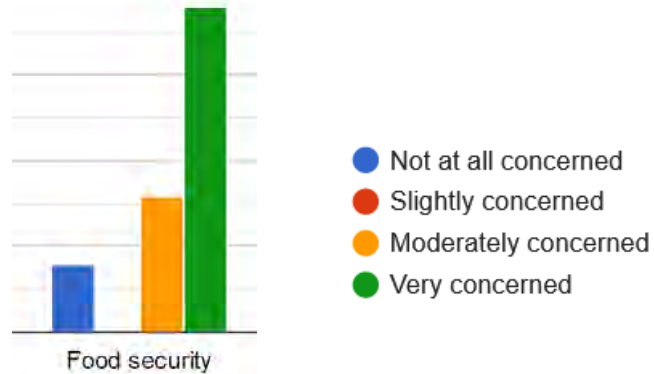
Equity Considerations:

- According to a study by Policy Link, food insecurity disproportionately impacts communities of color. Nationally, only 8% of African Americans have a grocery store in their census tract.
- Food insecurity and a lack of access to healthy food and balanced nutrition affects the health and wellbeing of vulnerable low-income communities.

Local Food and Agriculture

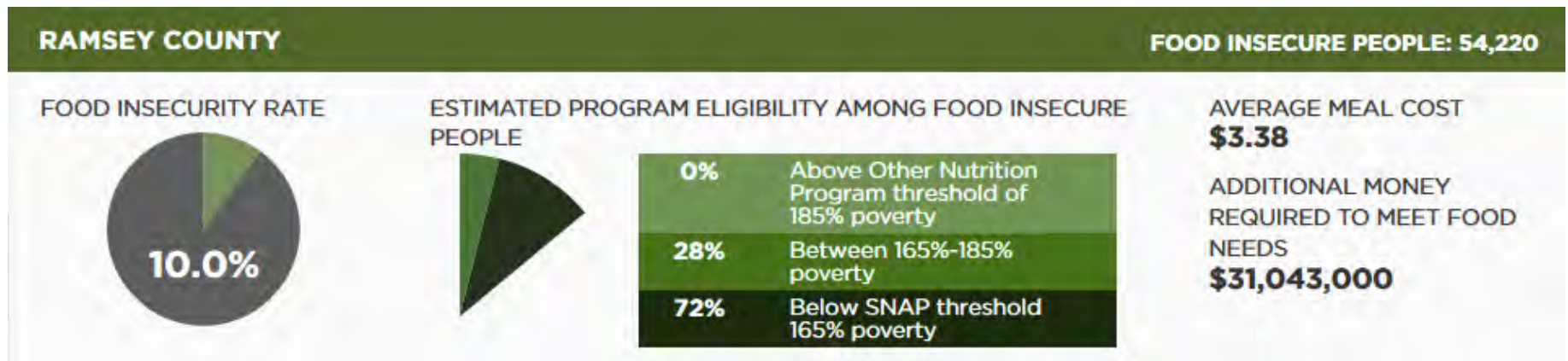
Community Concern

Over **87%** of the individuals responding to the City of Maplewood’s 2020 Climate Adaptation Plan Community Input Survey reported being moderately (26%), or very concerned (61%) about potential food insecurity impacts of climate change.



Food Insecurity in Ramsey County

According to Feeding America’s *Map the Meal Gap* project, Ramsey County has more than 54,220 food insecure individuals, over 19,400 are children. This represents a food insecurity rate of 10%.



Graphic source: Feeding America



Local Food and Agriculture

Populations More Vulnerable to Impacts in This Sector

The following populations tend to be more vulnerable to the potential climate change impacts in this sector:



Children Under 5



Older Adults



Those in Economic Stress



People of Color



Food Insecure Individuals



Individuals W/ out Vehicle Access

Addressing This Sector

This Climate Adaptation Plan is organized around a unifying framework organized by sector. Each sector has over-arching Strategies and detailed Actions. Strategies are specific strategic goal statements providing direction and guidance for decisions about future public policy, community investment, and planning. Detailed Actions are specific tasks to be implemented in order to achieve the strategic goals.






Local Food and Agriculture

Adaptation Actions

Below are the Strategies and detailed Actions addressing the needs of the **Local Food and Agriculture** section.

Strategy #	Action #	Sector Strategy / Action	Priority Level
 Local Food and Agriculture			
Strategy F-1: Educate, engage, and empower the public on food linkage with climate and health.			
F-1-1		Create collaborative partnerships with community-based organizations and affinity groups, including low-income populations and communities of color, to: a) Promote healthier, low-carbon diets. b) Encourage local food production. c) Support affordability and access to healthier foods through neighborhood food buying clubs and co-ops. d) Reduce food waste.	1
F-1-2		Identify funding options and partner organizations to promote public awareness of a climate-friendly diet through public education campaigns	1
F-1-3		Encourage and incentivize personal and neighborhood backyard fruit and vegetable gardens - Ramsey County Master Gardeners can give presentations, possibility of helping people build raised bed gardens	2
Strategy F-2: Integration of Local Food Considerations in City Plans.			
F-2-1		Develop an emergency food plan that includes a food needs assessment, plan for stockpiling the necessary food supplies, and a distribution and public communication plan that takes into account those most at risk for food insecurity. Work with local retailers, producers, and warehouses to obtain and store the necessary food stocks	2



Adaptation Actions (continued)

Strategy #	Action #	Sector Strategy / Action	Priority Level
F-2-2		Develop policy and equitability provide programmatic resources to: a) Increase the production and consumption of home-grown and locally sourced food by supporting farmers markets and community supported agriculture. b) Create policies and practices to encourage the purchase of healthy, low-carbon and minimally processed foods for public meetings, events and facilities. c) Expand opportunities for food production and neighborhood-scale distribution including community gardens, especially for low-income populations and communities of color. d) Increase the use of public and private land and roof-tops for growing food. e) Increase the planting of fruit and nut trees in appropriate locations. f) Leverage the purchasing power of public and private institutions to source low-carbon and local foods including County jails.	2
F-2-3		Integrate sustainable food system issues that affect climate into land use planning processes and, where practical, incorporate quantitative goals and metrics.	2
Strategy F-3: Increase production of local food.			
F-3-1		Expand community gardening and urban agriculture opportunities including those at schools, parks, and on rooftops.	1
F-3-2		Identify and prioritize locations to create community gardens throughout Maplewood	1
F-3-3		Continue to keep the city’s directory of community gardens up to date, including which gardens have openings for new gardeners. Establish a webpage with community garden information, a virtual community garden tour video, and links to garden websites for all community gardens in Maplewood including those operated by non-city entities.	1



Local Food and Agriculture

Adaptation Actions (continued)

Strategy #	Action #	Sector Strategy / Action	Priority Level
F-3-4		As land where existing community gardens is being re-developed work with the developer to find ways to incorporate community garden space. Connect Community Gardens with resources from the U of MN Horticultural Society	1
F-3-5		Update code to provide incentives or require developers to preserve topsoil and provide space for backyard or community gardens	2
F-3-6		Allow city facilities to be used as Community Supported Agriculture drop off sites	2
Strategy F-4: Strengthen demand for local foods.			
F-4-1		Pass city policy to procure locally grown foods for events and other organized food catering at city-managed facilities. Coordinate with School District, County, and local hospitals to establish similar locally sourced foods procurement policies. Explore development of group purchasing and logistics agreements to increase efficiency of local farm-to-agency process. https://goodfoodpurchasing.org/	1
F-4-2		Promote year-round farmers markets and/or CSA drop off spots - Talk with the St. Paul Farmers Market, Hmong American Farmers Assoc. and the St. Paul Ramsey County Food and Nutrition Council to see if there is a need to add one or more regular or small farmers markets in Maplewood (i.e. Church parking lot, etc.)	2
F-4-3		Encourage CSAs, markets, urban gardens, etc. and provide support incentives for these projects	2
F-4-4		Increase opportunities for local food producers to sell and distribute food locally	2



Adaptation Actions (continued)

Strategy #	Action #	Sector Strategy / Action	Priority Level
Strategy F-5: Increase food security for residents, especially those most vulnerable to food environment.			
F-5-1	Support existing school and community gardens and provide opportunities to expand community growing spaces with a focus on youth, immigrant, and low-income residents		1
F-5-2	Develop pollinator friendly policies including promotion of pollinator habitats on public and private land as well as policies which restrict and eliminate neonicotinoid pesticides		2
F-5-3	Develop edible landscaping initiatives to educate residents about these local food resources and to showcase the variety of plants that can grow in the City		2
F-5-4	Develop policies and ordinances which promote, encourage, or require permaculture landscaping in lieu of “traditional” lawn oriented landscaping.		2
F-5-5	Explore potential of collaborating with low cost produce providers to establish local food markets serving low income, vulnerable, and food insecure communities while addressing retail and commercial food waste. Potential partner: Daily Table https://dailytable.org/		2
F-5-6	Support the school districts serving Maplewood to shift toward healthier lunches and to use produce from local farmers. (Encourage their nutritionists to contact the St. Paul Schools for info)		2

Local Food and Agriculture

Adaptation Actions (continued)

Strategy #	Action #	Sector Strategy / Action	Priority Level
Strategy F-6: Reduce and repurpose food waste and food-related waste.			
F-6-1		Work regionally to support and facilitate food donation programs. Food donation programs reduce the amount of healthy, safe food that goes to waste and redirects it to those in need.	1
F-6-2		Reduce food waste through partnership with Ramsey County to advance existing Ramsey County initiatives and explore the development of joint initiatives.	1
F-6-3		Conduct an organics waste collection pilot project with a sample of City businesses to test the interest, methodology, and amount of commercial food waste that would need to be accommodated by a commercial organics collection program. Explore possible incentives for food retailers, restaurants, and institutions to participate in food waste reuse and recycling programs	2





Section

08

Climate Economy

 [Click here to return to TOC](#)

Climate Economy

All told, the Midwest is one of the most economically productive regions of America. But climate change puts that productivity at risk. While this is an area accustomed to dramatic weather events, the extremes that are likely to come with climate change are on an entirely different scale for the region’s businesses, communities, and overall economic health.

Climate change is anticipated to impact the Midwest through higher heat-related mortality, increased electricity demand and energy costs, and declines in labor productivity. Meanwhile, without significant adaptation on the part of Midwest farmers, the region’s thriving agricultural sector is likely to suffer yield losses and economic damages as temperatures rise. In addition, potential changes in the intensity, form, and timing of precipitation in the region—including snowfall, rain, and evaporation off the Great Lakes and Mississippi River—will pose challenges for regional infrastructure managers, farmers, and businesses.

Addressing the climate mitigation and adaptation needs brought about by climate change represents a significant economic development potential. According to the United Nations International Labour Organization, most studies show that a transition to a low-carbon economy will lead to a net increase in employment. Jobs will be created in new emerging green sectors, such as renewable energies where the demand for goods and services is expanding. In addition, addressing energy efficiency and climate adaptation needs will increase demand on construction and renovation jobs – such as those required for residential and commercial building weatherization programs.

Equity Considerations:

- Low income workers and workers of color are frequently disproportionately effected by economic downturns that can be triggered by environmental or public health disasters.
- New job potentials of the “green economy” represent a great potential to improve overall employment and income equity.



Climate Economy

Total Projected Economic Impacts Through 2100

According to research completed for “Estimating economic damage from climate change in the United States”, a 2017 study completed by Solomon Hsiang and others from the University of California at Berkeley the total annual economic impact for Ramsey County Minnesota by 2100 will be:

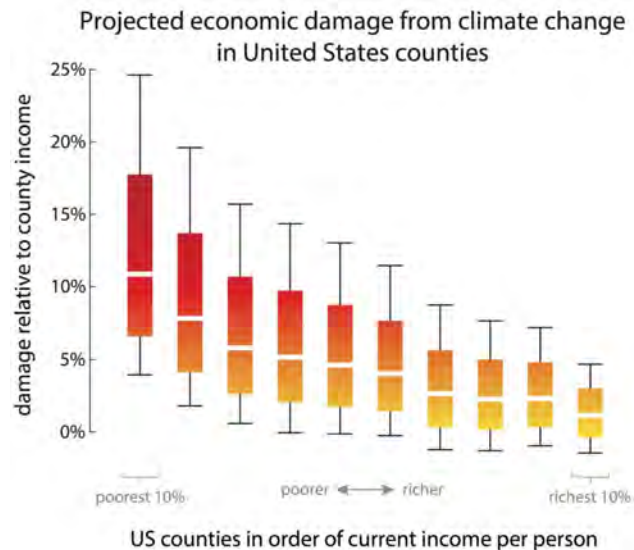
\$474,910,256 annually (2018 dollars)

Estimating the total annual economic impact for the City of Maplewood on a Pro Rata share results in:

\$35,618,269 annually (2018 dollars)

Inequity of Economic Impacts Through 2100

According to the study “Estimating economic damage from climate change in the United States”, climate change economic impacts will increase the unpredictability and inequity of future economic outcomes. The projected economic effects are unequally borne. As the graphic to the left illustrates, the poorest 10% are likely to receive 5 to 10 times the negative economic impacts of the wealthiest 10% in the community.



Hsiang, Knopp, Jina, Rising, et al. (2017)

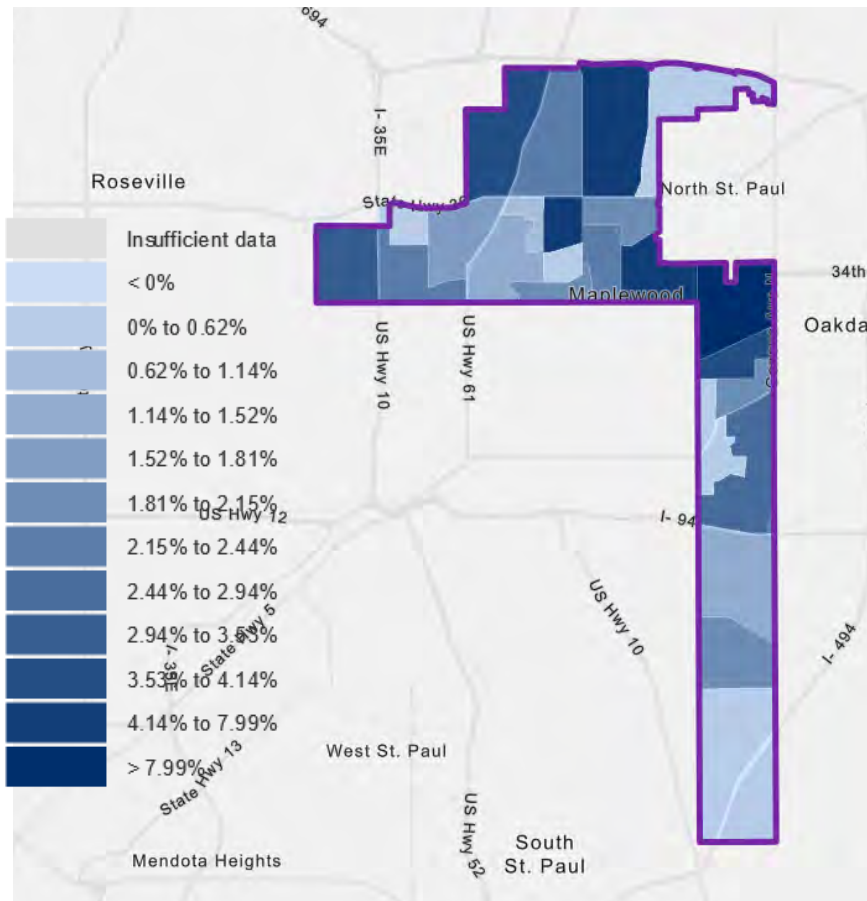




Climate Economy

Unemployment in Maplewood

According to the US Census, over the last 10 years, the population of Maplewood has averaged 7-8% of the total Ramsey County population. Over that same timeframe, unemployed workers in Maplewood have averaged 10.5-12.8% of the total unemployment in the county. With unemployment trending 1.5 to 2 times the county average, leveraging the economic and employment potential of the climate economy is an important opportunity for Maplewood.



Climate Adaptation and Economic Development

Rather than weakening the economy, climate adaptation can support economic development. Transitioning away from fossil fuel use, weatherization and weather preparedness of our built environment, and growth of local food industries are all, in part, a transition to local energy and labor sources. These transitions represent opportunities for communities to reduce the community wealth that is being exported and increase the percentage of community wealth that remains in the community in the form of local jobs.



Energy Efficiency Jobs

Increases in City-wide energy resilience requires energy retrofits and renovations within existing building stock. For the City of Maplewood, a program increasing residential energy efficiency targeting households constructed before 1980 (similar to potential outlined in the Buildings and Energy section of this report) and achieving upgrades for 160 households annually could result in up to 8 jobs. Similarly, a program increasing commercial building energy efficiency combined with a program focusing on commercial building retrocommissioning and achieving a coverage of 1-2% of the commercial building stock annually could result in up to 12 jobs.



Public Transit Jobs

Transit is key to both creating jobs and increasing access to existing jobs. A study by Smart Growth America found that investments in public transit created almost twice the number of jobs than the same level of spending in auto-centric transportation systems. Cities with better public transportation systems also have lower levels of unemployment, and greater reductions in unemployment, among young people - likely because public transit links areas with entry-level jobs to neighborhoods where people live. According to the APTA, for every \$1 invested in public transportation, \$4 in economic returns are generated. Investing in more buses and drivers both creates jobs directly and makes a more resilient community.





Renewable Energy Jobs

Renewable energy jobs have increased dramatically since 1980. Solar alone has increased employment by over 160% in the last ten years. Investments in renewable energy have significant local return - not only is the energy generated less expensive, for every dollar spent on renewable energy twice the number of people are employed over fossil fuels. What is more, expenditures on renewable energy promote the local economy - 40% of every dollar spent on solar can be kept in the local community rather than nearly 100% being spent out of state to import fossil fuel energy.



Economic Savings

Investments in energy efficiency, public transportation, renewable energy, and many other climate action strategies ultimately result in cost savings for community businesses and residents. These savings contribute to an increase in the quality of life for residents and will largely be spent within the community on goods and services, providing indirect and induced economic development potential for the City.

Populations More Vulnerable to Impacts in This Sector

The following populations tend to be more vulnerable to the potential climate change impacts in this sector:



People of Color



At Risk Workers



Individuals With Disabilities



Those in Economic Stress



Individuals W/ out Vehicle Access


Addressing This Sector

This Climate Adaptation Plan is organized around a unifying framework organized by sector. Each sector has over-arching Strategies and detailed Actions. Strategies are specific strategic goal statements providing direction and guidance for decisions about future public policy, community investment, and planning. Detailed Actions are specific tasks to be implemented in order to achieve the strategic goals.

Climate Economy

Adaptation Actions

Below are the Strategies and detailed Actions addressing the needs of the **Climate Economy** section.

Strategy #	Action #	Sector Strategy / Action	Priority Level
		 Climate Economy	
Strategy CE-1: Leverage the economic development opportunities of the Green Economy.			
CE-1-1		Conduct a Community-Wide Renewable Energy Potentials Study for the City including exploration of district energy systems. Study should identify potential incentives, economic development opportunities as well as economic savings/impacts of expansion of renewable energy infrastructure within the City.	1
CE-1-2		Explore and prepare for the potential of leveraging Federal COVID relief, infrastructure, and/or climate action funding for use in Maplewood. Create a list of priorities that need funding, explore funding potentials with county, state, and federal sources/grants, etc	1
CE-1-3		Leverage Community Development Block Grants from the Department of Housing and Urban Development, or HUD, to invest in resilient and equitable communities	2
CE-1-4		Conduct a Climate Economy Economic Development Assessment to identify economic development potential of climate adaptation, climate mitigation, and energy action planning.	2
CE-1-5		Develop job training programs focused on building resiliency- solar construction, weatherization, etc.	2



Adaptation Actions (continued)

Strategy #	Action #	Sector Strategy / Action	Priority Level
Strategy CE-2: Enhance community resilience through economic resilience.			
CE-2-1	Conduct a planning effort focused on identifying economic vulnerabilities and opportunities, especially those affecting the city’s vulnerable populations. Identify economic resilience strategies and strengthen public-private economic communications, especially with targeted group businesses (minority-owned, veteran owned, economically disadvantaged, etc.). Possible example process: https://www.eda.gov/ceds/	1	
CE-2-2	Work with community businesses to explore the creation of an incentivized “buy local” campaign to enhance resilience of small local businesses.	1	
CE-2-3	Explore development of one or more Green Zones, a place-based policy initiative aimed at improving health and supporting economic development using environmentally conscious efforts in communities that face the cumulative effects of environmental pollution, as well as social, political and economic vulnerability. http://www.ci.minneapolis.mn.us/sustainability/policies/green-zones	2	
CE-2-4	Establish a policy to prioritize local purchasing where feasible for City Operations and a "Buy Local" campaign to promote local businesses to community members and businesses - particularly those with services supporting climate action such as energy efficiency or renewable energy, or those who exhibit strong sustainability practices.	2	

Climate Economy

Adaptation Actions (continued)

Strategy #	Action #	Sector Strategy / Action	Priority Level
Strategy CE-3: Include Economic Resilience in Emergency Response Planning.			
CE-3-1		Make sure key business infrastructure is recognized in the City and County’s general hazard mitigation plan and emergency response plan	1
CE-3-2		Analyze how risks and hazards identified in this report and the City / County’s emergency response plan may impact the economic community. Conduct outreach to industry groups and public-private partnerships to promote private sector investment addressing them	1
CE-3-3		Ensure redundancy in telecommunications and broadband networks to protect commerce and public safety in the event of natural or manmade disasters	2
CE-3-4		Facilitate in-person discussions with community businesses to build relationships and prepare City’s business community for risks and hazards identified in this report and the City / County’s emergency response plan, and identify the businesses and infrastructure that are most vulnerable to disaster	2
Strategy CE-4: Accelerate the transformation to a low-carbon economy.			
CE-4-1		Re-connect with the homes and businesses that received solar feasibility assessment information from the City in 2018/2019. The extension of the ITC is a great opportunity to reach back out to these groups to let them know that the tax incentive and benefit has been extended 2 years - and to let them know about the solar group purchase campaign that Maplewood is participating in this year that could save them money as well.	1



Adaptation Actions (continued)

Strategy #	Action #	Sector Strategy / Action	Priority Level
CE-4-2		Prepare water, road, and other public infrastructure for increased demands from growth and tourism	1
CE-4-3		Focus the City's business development efforts on businesses that have lower impacts on natural resources, that are non-polluting, offer or support environmentally sustainable goods or services, and/or actively promote telecommuting, alternative work schedules, and alternative transportation modes.	1
CE-4-4		Establish a Clean Energy business incubator to support the establishment of innovative energy efficiency and renewable energy business models within the community. Explore incentives which can be coupled with the incubator to bring businesses supporting clean energy into the community.	1
CE-4-5		With community stakeholders and partners, conduct a study and host a community conversation to identify threats to current industries, opportunities for new businesses and industries, and areas that need support.	2
CE-4-6		Work with businesses to assess their climate change vulnerability and plan for the future.	2
CE-4-7		Identify and promote locations for green businesses	2

Section

09

Adaptation Capacity



[Click here to
return to TOC](#)

Adaptation Capacity

Implementing a Climate Adaptation Plan requires capacity both internal to City government as well as external within the public. External capacity includes the social and technical skills of individuals, organizations and groups within the community to respond to and engage the environmental and socio-economic changes at the core of a Climate Action Plan. External capacity is often established through education and engagement as well as support in establishing social networks supporting resilience. Internal capacity includes the staff support necessary for tracking and reporting progress, creating and executing an annual work plan, and establishing and growing collaborative relationships to support this important work.

Implementation of a Climate Action Plan should be supported by a variety of funding mechanisms and sources to be successful. Funds should be directed internally to support the city operations goals as well as toward the community in the form of communications, educational outreach, partnership development, and incentivization to spur action and change. Outside funds may also be identified to complement efforts of the city.


Equity Considerations:

- Climate action capacity is determined by a number of determinants including an individual or organization's assets, flexibility, and agency – or ability to impact change. Climate vulnerable populations are frequently vulnerable specifically due to one or more of these key determinants being missing.
- Individuals, organizations, and communities with a higher degree of adaptive capacity will suffer less harm from exposure to climate impacts and will recover more quickly than those with a lower degree of adaptive capacity.



Adaptation Actions

Below are the Strategies and detailed Actions addressing the needs of the **Adaptation Capacity** section.

Strategy #	Action #	Sector Strategy / Action	Priority Level
 Adaptation Capacity			
Strategy AC-1: Improve City staff capacity and knowledge of their role in meeting climate goals.			
AC-1-1		Conduct annual GHG emissions inventories, including identification of improved processes for quantifying net carbon sequestration and solid waste emissions. Create and distribute an annual municipal adaptation and GHG emissions report to staff to be used in assessment of current and proposed activities.	1
AC-1-2		Create a data management and reporting system for key performance indicators of activities related to CAP goals. Continue to align performance measurements of CAP actions with existing planning metrics.	2
AC-1-3		Provide training and other capacity building opportunities to staff to facilitate creative, climate positive innovations in operations, project design and implementation.	2
AC-1-4		Incorporate climate projections (e.g. precipitation, temperature, flooding) in transportation, hazard mitigation, and development planning	2
Strategy AC-2: Support equitable climate action.			
AC-2-1		Develop and incorporate equity metrics in the evaluation of CAP activities. This evaluation will be used as a criterion for the Environmental and Natural Resources Commission, MORE team, and budget team during review of implementation.	1

Adaptation Capacity

Adaptation Actions (continued)

Strategy #	Action #	Sector Strategy / Action	Priority Level
AC-2-2		Align existing City communication, educational and engagement programs with CAP goals and programs. Provide additional support to education and outreach to under served and vulnerable populations for the CAP and its individual actions.	2
AC-2-3		Host a community event regularly (every two years or less) to celebrate the annual progress report on the implementation of the CAP	2
AC-2-4		Develop a communication campaign to reach those without access to internet or technology, limited English speakers, and individuals in hard to reach vulnerable populations. Establish a variety of communication avenues such as through art, mail, public forums, digital surveys, social media, web and phone apps, door-to-door outreach, and others	2
AC-2-5		Establish a Climate Action webpage with accessible materials including how-to guides and information about climate adaptation and mitigation actions, educational resources, workshops, and climate economy job opportunities.	2
AC-2-6		Engage with community partners such as Century College, Ramsey County, State of Minnesota, non-profits, and others to identify unmet community needs, barriers and opportunities to improve access to the green job economy for all community members.	2
AC-2-7		Ensure the availability of translators and interpreter services for all outreach events and materials.	2



Adaptation Actions (continued)

Strategy #	Action #	Sector Strategy / Action	Priority Level
		Strategy AC-3: Establish a climate impacts mutual aid program.	
AC-3-1		Coordinate with County, State, surrounding communities, Red Cross, and utilities to establish a Mutual Aid and Response program. Program to focus on range of current and projected risks and hazards including flooding, extreme weather, storms, power outage, and emergency debris management. Agreement can be modeled on, or expand existing fire and public safety mutual aid agreements.	1
AC-3-2		Develop strategies to check on individuals at greatest risk during extreme weather and extreme temperature events. Explore partnerships for provision of options for cooling/warming centers for vulnerable populations.	1
AC-3-3		Organize a transportation-assistance program for individuals without access to vehicles. Explore partners such as Metro Transit, Ramsey County Library, non-profit groups, hospitals, and retail centers.	2
		Strategy AC-4: Establish financing to support the City's Climate Action efforts.	
AC-4-1		Generate Local Revenue through tiered stormwater fees. The City should develop a tiered schedule for stormwater fees for all development, commercial and residential, existing and proposed. These fees should be based on actual impact.	1

Adaptation Capacity

Adaptation Actions (continued)

Strategy #	Action #	Sector Strategy / Action	Priority Level
AC-4-2		Conduct a study to establish an Urban Forestry Product program to sell wood products, and dedicate funds to climate action plan strategy implementation. Revenue sources could include: sale of Ash tree logs removed as a part of the City's EAB management plan (example marketplace: Wisconsin Urban Wood, City of Eau Claire model: http://wisconsinurbanwood.org/sample-municipal-models/), selling tree storm debris and tree trimming waste to waste-to-energy plant or pelletizer, selling sugar tapping rights and nut harvesting rights to Maple, Birch, and Walnut trees located on City property and right of way responsibility.	1
AC-4-3		Adopt a "resilience penny" property tax increase of \$0.01 per \$100 of assessed value and dedicate additional funds for climate mitigation and climate adaptation strategies. Funds may be used directly, or may be used as a repayment source for a bond issue.	2
AC-4-4		Capturing savings from City Facility energy efficiency and renewable energy projects from all city departments. Performance-based rebate checks and operational savings are to be directed to a special Carbon Fund, with the funds being used to implement carbon-reducing projects that align with the Climate Action Plan.	2
AC-4-5		Dedicate all, or a portion, of the City's Utility Franchise Fee to a climate action and adaptation fund to fund projects which align with the City's Climate Action Plan. Alternatively, City could increase the Utility Franchise Fee and dedicate the increased value to the Climate Fund	2





Section

10

Implementation

 [Click here to return to TOC](#)

Implementation

The first few years after plan adoption are critical to its success. Establishing roles, both internal and external, and identifying funding will help establish the implementation phase of the plan and ensure the community is on track to achieve its goals. This plan includes robust goals for community sustainability and addressing climate resilience. This vision will require commitment and integration of the Climate Adaptation Plan into City operations, functions, and services.

Implementation is for Everyone

This Climate Adaptation Plan includes actions that require leadership and engagement from City Council, City departments and staff as well as the business community, households and individuals. While some actions will require City Council to amend policy there will be opportunities for businesses, organizations, households, and individuals to support the City Council policy changes and provide input on and feedback for those policies. Ultimately, achieving the visionary climate resilience goals outlined in this plan will require engagement and a sense of responsibility not only by the City of Maplewood leadership and government, but by the community itself as well. It is critical for all to remain engaged and active, advancing and advocating for actions you feel are important.

General Implementation Recommendations

The following are foundational recommendations to support the long-range implementation of the Climate Adaptation Plan:

Building Internal Capacity

Continuing to build internal capacity will be important to help establish the Climate Adaptation Plan as a priority integral to internal operations as well as fostering connections to community partners, businesses, and individuals through outreach, education, special projects, and service delivery.



Implementation

We recommend careful consideration of appropriate staffing to support the implementation of this plan.

1. Establish clear guidance and direction for the participation in and support of the Climate Adaptation Plan implementation actions by all City of Maplewood departments.
2. Incorporate Climate Adaptation Action implementation updates in Department staff reports provided to City Council.
3. Fund and support Sustainability and Climate Adaptation staffing required to:
 - Facilitate discussion on adaptation actions within community.
 - Participate in technical resource programs as they are available through County, State, Federal, and provider partners.
 - Support City of Maplewood department managers and staff as they implement Climate Adaptation Plan actions within their service area or area of expertise.
 - Maintain the internal City Green Team and empower the team to meet regularly and provide updates on progress and success of the Climate Adaptation Plan.
 - Ensure the maintenance of City of Maplewood Environment/Sustainability webpage supporting Climate Adaptation Plan resources for the community.
 - Engage city boards and commissions (e.g., Environmental and Natural Resources Commission, etc.) to ensure the Climate Adaptation Plan is integrated into their work plans.
4. Consider executing a community wide GHG inventory on a regular basis (1-2 year cycle) to support monitoring of GHG emissions reduction progress.
5. Consider implementing a Greenhouse Gas Mitigation Planning effort to map climate mitigation strategies as a companion to this Climate Adaptation Plan.
6. Review Climate Adaptation Plan implementation progress and impacts on a regular basis (1-2 year cycle); adjust, add, and remove detailed Climate Adaptation Plan actions as appropriate based on implementation progress review.



Implementation

Building and Maintaining External Support

City staff and elected officials will not be able to implement this plan without robust support from community members and coordination with jurisdictional, institutional, and organizational partners.

1. Establish the Environmental and Natural Resources Commission as the main citizen-body to support the implementation of the Climate Adaptation Plan:
 - Form subcommittees that focus on particular areas of the Climate Adaptation Plan
 - Coordinate with City staff in all relevant departments to receive updates on City projects and progress.
 - Support communication of the Climate Adaptation Plan and its progress to the public
2. Establish jurisdictional partnerships that advance Climate Adaptation Plan strategies to advance and accelerate action. This can include government entities like Ramsey County, the State of Minnesota, the Cannon Ramsey-Washington Metro Watershed District, and Ramsey County Soil & Water Conservation District; utilities like Xcel Energy; institutions like Century College; community groups; and neighboring communities.
3. Provide periodic updates of the Climate Adaptation Plan and its progress to the public in the City's Newsletter.

Funding

Funding the implementation of the Climate Adaptation Plan may require reallocation/reconsideration of existing City funds, raising new City funds, or identifying outside resources and funding opportunities. Some funds will need to be dedicated toward long-term support like staffing, while other funding will be on a project-by-project basis.

1. Maintain a budget and identify funding sources for staff dedicated to the implementation of the Climate Adaptation Plan.
2. Identify a budget necessary to support projects on an annual basis as per the detailed actions outlined in the Climate Economy and Adaptation Capacity sections of the plan and climate actions.
3. Utilize no-cost technical assistance offerings as available.





Implementation

Example Policies and Ordinances

The paleBLUEdot team has assembled example policies and ordinances supporting some of the strategies and actions included in the Maplewood Climate Adaptation Plan. The examples can be found on the following webpage:



<https://palebluedot.llc/maplewood-cap-policies>



Prepared by:



2515 White Bear Ave, A8
Suite 177
Maplewood, MN 55109

Contact:

Ted Redmond
tredmond@paleBLUEDot.llc