

# Rochester Climate Vulnerability Assessment

## Infrastructure | Transportation

### In 50 years, Rochester may experience...



- Warmer winters and even hotter summers.
- More than 30 days with temperature at or above 90°F annually.



- Increase in short-duration drought during summer season.



- More and longer heatwave occurrence.
- About 10% increase in average annual rainfall volume.
- 2-3 times more frequent extreme weather events (microbursts, extreme thunderstorms, ice storms, wind storms, etc.)

### Potential implications to transportation infrastructure:

- Loss of pavement integrity due to prolonged heat exposure.
- More freeze-thaw conditions, causing frost heaves and potholes on road and bridge surfaces.
- Increased cooling demand for public transportation facilities (stations, bus depots, maintenance facilities, etc.)
- More frequent or severe flooding of roads and the potential for road washout.
- Reduced navigability at port and airport.
- Debris and foreign object damages to rail tracks, rail signals, communication equipment, etc.

### DID YOU KNOW?



8.8%

Took Public Transportation



10.9%

Carpooled



6.6%

Walked to Work



1.2%

Bike to Work



The City offers approx. 64 lane miles of on-street bicycle facilities and an addition 140 miles are planned for. Pace Bike Share City Program was also launched in July 2017, with 340 bikes spread across 46 stations throughout the.



Rochester Harbor and Carousel Festival (Harborfest) takes place every June to celebrate the city's port and harbor area "where the mighty Genesee meets Lake Ontario."



A robust network of roadways, highways, and bridges, help connect neighborhoods across the City of Rochester.

### Strengths & Potential Opportunities

- Available technical ability & know-how expertise to harden/strengthen roadway infrastructure.
- Majority of bike and pedestrian network is new and in good conditions.
- State of repair is good for many bridges – high & sufficient redundancies in place.
- Decreased use of salt and chemicals on roadways and bridges (i.e., snow and ice removal, etc.).
- Bike/pedestrian network might be used more; biking season maybe increased/prolonged with less extreme cold days.
- Redundancy in place for detours - minimize disruption for all modes (car, transit, freight, bike, etc.) in emergency/evacuation events.

### Vulnerabilities

- Increased localized flooding.
- Inadequate ventilation of bus/public transit stations/shelters to help cool passenger down while waiting.
- Increased risk of heat exposure and heat-related illness for public transportation passengers.
- Uncertainty about resources needed for winter storm response (More ice? More snow?).
- Increased risk and damage to highways, roadways, bridges, and bike/pedestrian paths as a result of more frequent extreme storm events (microburst, extreme t-storms, ice storms, etc.) – making certain areas impassible or inaccessible.

# Rochester Climate Vulnerability Assessment

## Infrastructure | Energy/Utilities

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### Potential implications to energy/utilities infrastructure:

- Increased stress on power grid due to higher cooling demand.
- Increased risk for more brownouts and blackouts due to increasing electric demand.
- Stress on transmission line (instability) due to more freeze-thaw conditions.
- Disruption of fuel transportation due to damage infrastructure (flooding, damaged pipelines, etc.).
- Damage to communication system due to electrical voltage spikes during extreme weather events.



Solarize the Flower City 2016 offered discounted solar installations for the duration of the campaign, which launched in March 2016 and concludes in September 2016. The goals for the campaign are to have 250 new installations under contract by the end of the program with 2,450 kW of solar power installed.



With a grant from the New York State Energy Research and Development Authority (NYSERDA), the City of Rochester has installed 24 electric vehicle charging stations at public parking lots and garages throughout the City.



Eastman Business Park is a 1,200-acre research & development (R&D) and manufacturing campus - one of the major economic resources in Rochester. The Park has private utilities, and onsite water and wastewater management system.



Rochester Gas and Electric (RG&E)'s hydroelectric power plant on the banks of Lower Falls – one of the three power plants on the Genesee River in Rochester.

### Strengths & Potential Opportunities

- Telecommunication and energy systems have adaptive capacity already built-in.
- Demand-response program is available for larger customers to reduce energy consumption.
- Piloting battery storage.
- Residential energy programs (smart thermostats, etc.) available – utility can control and adjust to prevent overload, brownouts, and blackouts.
- Reduced demand for heating, less stress on generation capacity with less extreme cold days.

### Vulnerabilities

- Increased stress and risk of brownouts or blackouts, especially when power transformers are close to capacity and compounded by increased temperatures.
- Increased stress on transmission line (instability) due to more freeze-thaw conditions (potentially more ice than snow).
- Increased risk of power outages, delay or service disruption with more frequent extreme weather events.
- Safety risk for maintenance workers.

# Rochester Climate Vulnerability Assessment

## Infrastructure | Water

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### Potential implications to water infrastructure:

- Increased algal blooms due to warmer temperatures, affecting water supply quality.
- Increased water demand for irrigation, especially with more frequent drought.
- Potential sanitary sewers and stormwater management systems overflow, pollutant run-offs – risk for water quality and recreational activities at risk
- Increased risk of mold growth in buildings and structures due to more frequent rain and/or flooding events.
- Increased risk of overcapacity of flood-protection infrastructure due to potential increase in flood flow.



The Genesee River is an economic and ecological lifeline for the City of Rochester. It also offers recreational opportunities such as biking, hiking, and paddling, which are well enjoyed by residents and visitors.



The City of Rochester's primary water supply is from Canadice Lake and Hemlock Lake, located approximately 28 miles south of Rochester in Livingston and Ontario Counties. Water from these lakes is treated at the Hemlock Water Filtration Plant and then transmitted to the City using a system of tunnels, conduits, and reservoirs.

### Strengths & Potential Opportunities

- Good systems in place for dams during emergency overflow.
- Great redundancy system in place for water supplies.
- Available technology to modify wastewater treatment process.
- With existing water conservation measures, only permitted to take so much water from nearby lakes.
- Reduced spring runoff volumes due to decreased snow pack & spring melt - reduced contamination of water bodies

### Vulnerabilities

- Several dams in Monroe County (including Court Street Dam, Cobb Hill Reservoir Dam, and Highland Park Reservoir Dam in Rochester) are classified as "high hazard."
- Flooding already experienced at water treatment plant during heavy rains.
- Increased winter rainfall and snowmelt due to warmer winter temperatures, causing peak flows to occur earlier in the season.

# Rochester Climate Vulnerability Assessment

## Infrastructure | Buildings & Facilities

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### Potential implications to buildings and facilities:

- Increased internal temperatures in buildings and homes without adequate ventilation, causing heat stress and other heat-related illness.
- Seepage and flooding due to intense rainfall and extreme storm events, causing physical damages to building materials and equipment, especially if critical systems and equipment are located in the lower levels or basement of buildings and homes.
- Accelerated deterioration of building exteriors due to weathering, erosion, and/or inundation.
- Increased risk of treefall and debris during extreme storm events - impacts to gardens and lawns.



### Strengths & Potential Opportunities

- Zoning Code – on-site infiltration requirements, limited impervious coverage.
- Reduced maintenance needs and cost for snow-related issues.

### Vulnerabilities

- Buildings or homes without adequate ventilation - heat stress and other heat-related illness, especially for vulnerable populations (elderly, young children, pregnant women, etc.).
- Increased risk of ice damming due to more freeze-thaw cycles.
- Increased risk of mold growth with more frequent rain and/or flooding.
- Increased safety risks for employees to commute, service disruption, and product delivery delay due to more frequent extreme weather events.

# Rochester Climate Vulnerability Assessment

## Natural Resources

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Through the Cool Sweep program, the City helps residents who have limited opportunities to find relief from summer heat.



The changing climate and its potential implications may shift migration and habitat of certain species, causing cascading impacts on other species.

### Potential implications to environmental resources, natural habitat, and recreational and open space:

- Increased risk of wildfire due to more extreme temperature days combined with periods of drought.
- Shift in migration/ranges of certain species, resulting cascading impacts on other species.
- Increased risk of pests, invasive and/or pathogens species, potentially stress and/or outcompete native species over time.
- Increased turbidity to waterbodies and reservoirs due to runoff from more frequent heavy rainfalls.
- Increased risk of flooding and water damage to park facilities.



More than 500,000 visitors come to Highland Park every year to enjoy more than 200 varieties of lilacs and other flowers, trees and shrubs.



Temporary closure of Ellison Park (part of Seneca Park) due to flooding after a significant rain event in April 2017.

### Strengths & Potential Opportunities

- Health of trees surrounding the water bodies and waterways is critical to determine sensitivity.
- Completed an Urban Forest Master Plan in 2012.
- Majority of parks are well-suited and have capacity for increased users.
- Increased visitation and use of park facilities, especially cooling facilities (i.e. spray parks) are available (and popular) during hot days.

### Vulnerabilities

- Candice and Hemlock Lakes have limits on how much water can be pumped.
- Due to topography, Hemlock Lake is more likely exposed to microbursts; increased risk of shoreline erosion along Lake Ontario and severe flash flooding events.
- Certain tree species (maple, beech, birch) may not be able to survive with increased days of extreme temperatures.
- Declined winter recreation/tourism and any snow-dependent activities.
- Potential sediment issues in canal/river with increased heavy rain events (affecting water quality).

# Rochester Climate Vulnerability Assessment

## Socioeconomic

### In 50 years, Rochester may experience...

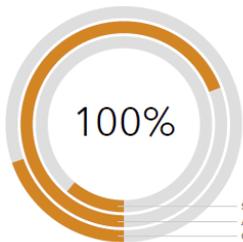


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### Potential implications to public health, economy, cultural resources, and social/human services:

- Health and safety concerns during extreme hot/cold and extreme storm events.
- Increased stress on emergency service provider's infrastructure and capacity to (efficiently) provide services.
- Low-income residents are more likely to experience poor air quality and lack of ventilation in older buildings due to lack of financial resources for remediation.
- Increased risk and exposure to harmful diseases (such as Lyme disease and West Nile Virus) due to longer breeding season and expands range of pests such as ticks and mosquitoes.
- Impact to winter tourism due to shorter winter season and/or warmer winters.

DID YOU KNOW?



The City of Rochester is economically, racially, and ethnically diverse. Community engagement is therefore critical for successful and effective implementation of the City's climate planning efforts.



Health and safety risks are major concerns for outdoor workers during extreme temperature days and storm events.



Rochester residents celebrate the holiday season at Lighting of the Liberty Pole event during winter 2017.

### Strengths & Potential Opportunities

- Existing healthcare facilities and services have high capacity for potential increase in service demands.
- Emergency plan in place for potential disease outbreaks (by County Public Health Department).
- Longer construction season and/or other outdoor work with warmer temperatures.
- Agricultural benefits with longer growing season - new job opportunities, increased revenue, and new farms.
- More workers and business opportunities from other region moving to Rochester due to more temperate weather conditions.
- Fewer homeless seek shelter services when not below freezing.

### Vulnerabilities

- Increased risk of heat exposure, heat-related illness, as well as respiratory-related illness.
- More frequent combined sewer overflow due to more frequent heavy rains, unsafe for swimming in lakes.
- Late harvest and reduced yields - shortage of fruit and vegetable supplies
- Increased risk of pollutant runoff, risk of pesticides entering the food chain - implications for the safety, distribution, and consumption.
- Individuals with disabilities or language barrier may be disproportionately affected - unable to access evacuation routes, understanding or receiving warnings of impending danger, limited ability to communicate their needs.