



# Climate Adaptation Framework Menu of Climate Adaptation Strategies

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## Introduction

This “Menu of Climate Adaptation Strategies” is an excerpt from a series of population vulnerability assessments developed by paleBLUEdot for 23 communities throughout the State of Minnesota in 2017 and 2018. This work has been made possible by a 2017 Environmental Assistance Grant provided by the Minnesota Pollution Control Agency.

These assessments sought to:

- Increase awareness of potential climate impacts and population vulnerabilities.
- Increase inclusion of climate adaptation dialogue within each City’s planning and decision making processes.
- Strengthen adaptive capacity based on the best available information on regional climate change projections and impacts.
- Outline priority risks, vulnerabilities, and possible near-term actions.
- Lay the foundation for the development of implementation plans that consider available resources and prioritize the most effective actions from a cost and benefit perspective.
- Prevent or reduce the risks to populations most vulnerable to the impacts of climate change.

These reports included Climate Adaptation Framework sections. These Framework sections recommended Adaptation Goals as well as a Menu of Adaptation Strategies. Each community can enact these climate resilience goals and strategies to reduce the impact of climate change, improve public health, and expand the local economy. Across all of these goals, there are four priority areas of action.

- 1) Assess vulnerabilities - especially among populations most vulnerable to climate change impacts.
- 2) Train and educate local officials, planners, and community organizations
- 3) Incorporate climate vulnerabilities into existing planning documents.
- 4) Develop partnerships to fund on-going research and implementation

Adaptation Goals and Strategies are organized by the population climate vulnerability they address. Many strategies may have co-benefits which address or support more than one climate vulnerability. The categories into which the Adaptation Goals and Strategies are grouped are:



## Climate Adaptation and Resilience Goals

The following are a menu of overall goals for increasing the climate resilience for Minnesota Communities. These goals are based on the anticipated climate impacts for the region as well as the vulnerable populations present in Minnesota Communities. Some of the goals and strategies identified in this report will require new City policies or program development. Many others have some existing City, County, and State policies already underway which relate to them. A detailed review of all existing policies against the goals and the strategies recommended in this report should be conducted and policy modifications integrated.

In prioritizing the implementation of the goals and strategies which follow, each community should:

- Consider available resources and opportunities to leverage new resources.
- When budget, staff, or schedule restrictions limit strategy implementation capacity, apply strategies with a priority towards vulnerable populations and tracts/areas with higher vulnerable populations
- Consider the associated carbon emission reduction opportunities and other co-benefits of strategies.
- Study the anticipated equity impacts of strategies.
- Consider the urgency and window of opportunity.
- Conduct appropriate outreach and engagement efforts with community residents and businesses for community feedback and buy-in.
- Identify departments / staff capable of taking the lead for strategy implementation. Integrate implementation plans into a routine working plan that is reviewed and revised regularly (every 2 to 5 years recommended).
- Whenever possible select strategies that provide everyday benefits in addition to climate risk reduction. These forms of strategies are known as “no regrets strategies” and they can be justified from economic, social, and environmental perspectives whether natural hazard events or climate change hazards take place or not.
- Explore possible use and effectiveness of existing City owned facilities and properties to meet emergency shelter and cooling center functions.

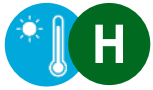
## Climate Adaptation and Resilience Goals

Goals are organized based on the primary anticipated climate change impacts they address. Detailed strategies for each goal are identified in the next section.



### Goals To **Build Capacity** For Preparing For And Responding To Population Risks Of Climate Change Impacts

- Goal C1 - Incorporate climate change preparedness activities into existing local government plans and programs as a means to increase resilience while minimizing costs.
- Goal C2 - Improve effectiveness of on-going adaptation measures.
- Goal C3 - Strengthen emergency management capacity to respond to weather-related emergencies.
- Goal C4 - Improve the capacity of the community, especially populations most vulnerable to climate change risks, to understand, prepare for and respond to climate impacts.
- Goal C5 - Enhance resilience of critical city operations.
- Goal C6 - Enhance city's capacity for adaptation implementation.
- Goal C7 - Secure funding to support City's adaptation efforts.



### Goals Responding to **Heat Stress And Extreme Weather**

- Goal H1 - Strengthen emergency management capacity to respond to heat stress and extreme weather.
- Goal H2 - Minimize health issues caused by extreme heat days, especially for populations most vulnerable to heat.
- Goal H3 - Improve the capacity of the community, especially populations most vulnerable to climate change risks, to understand, prepare for and respond to high heat and extreme weather.
- Goal H4 - Decrease the urban heat island effect, especially in areas with populations most vulnerable to heat.
- Goal H5 - Enhance resilience of community tree canopy and park/forest land
- Goal H6 - Enhance the resilience of buildings within the community to extreme heat, weather, and energy and fuel disruptions.
- Goal H7 - Improve the energy efficiency and weatherization of homes and businesses to reduce energy costs and carbon pollution.
- Goal H8 - Expand access to distributed solar energy in low-income communities in order to lower energy bills, increase access to air conditioning, and decrease carbon pollution levels.
- Goal H9 - Enhance resilience of local businesses to extreme weather.
- Goal H10 - Strengthen social cohesion and networks to increase support during extreme weather events.
- Goal H11 - Increase the resilience of natural and built systems to adapt to increased timeframes between precipitation and increased drought conditions.
- Goal H12 - Enhance the reliability of the grid during high heat events to minimize fires, brownouts and blackouts.

## Climate Adaptation and Resilience Goals



### Goals Responding to Air Quality Impacts

Goal A1 - Reduce auto-generated particulate matter, tailpipe pollutants, waste heat, and ozone formation.

Goal A2 - Increase and maintain air quality for residents and businesses.



### Goals Responding To Flood Vulnerability

Goal F1 - Strengthen emergency management capacity to respond to flood-related emergencies.

Goal F2 - Increase the resilience of the natural and built environment to more intense rain events and associated flooding.

Goal F3 - Enhance resilience to fuel disruptions in transportation and mobility.



### Goals Responding To Vector-Borne Disease Risks

Goal V1 - Manage the increased risk of disease due to changes in vector populations.



### Goals Responding To Food Insecurity And Food-borne Disease Risks

Goal FI-1 - Increase food security for residents, especially those most vulnerable to food environment.

(Rural communities) Goal A3 - Increase resilience of croplands, farms, and farmers within community.



### Goals Responding To Water Quality and Quantity Risks

Goal W1 - Increase the resilience of City's water supply in drier summers.



### Goals Responding To Waterborne Illness Risks

Goal WB1 - Enhance protection of surface water quality damage from severe storms

Goal WB2 - Enhance public protection from exposure to surface water pathogen contamination



### Goals Enhancing Economic Resilience In Support of Climate Resilience

Goal E1 - Leverage the economic development opportunities of the Green Economy

Goal E2 - Enhance community resilience through economic resilience

Goal E3 - Including Economic Resilience in Emergency Response Planning

## Menu of Adaptation and Resilience Strategies

Adaptive capacity can be broadly defined as the ability of a system to adjust, limit, and cope with potential hazards due to climate change. Potential measures of adaptive capacity include access to financial resources, health infrastructure, and technology. Adaptive capacity also refers to the ability of a system to reduce hazardous exposures, which can be measured by the implementation of government programs, initiatives, or policies.

To meet the recommended Adaptation goals outlined in the previous section, this section provides a range of potential adaptation strategies. This Menu of Adaptation and Resilience Strategies should form the basis for a Climate Adaptation Implementation planning effort. The planning effort should include a detailed review of the Community's existing policies and community resources. The Climate Adaptation Implementation planning effort should include appropriate community engagement to share information about population vulnerabilities to the changing climate and to solicit feedback on the final adaptation strategies. The final Climate Adaptation Implementation Plan should include a detailed implementation schedule and should identify responsible parties for each strategy to be implemented.





## Strategies To Build Capacity For Preparing For And Responding To Population Risks Of Climate Change Impacts

### Goal C1 - Incorporate climate change preparedness activities into existing local government plans and programs as a means to increase resilience while minimizing costs.

#### C1-1

Adopt climate change adaptation actions which fulfill other societal goals, such as sustainable development, disaster risk reduction, or improvements in quality of life, and can therefore be incorporated into existing decision-making processes. These are called “no regrets” actions.

#### C1-2

Address climate change adaptation and mitigation (to help reduce the need to adapt more and possibly beyond human capacity in the future) in locally meaningful ways in the local comprehensive plan.

#### C1-3

Consider populations most vulnerable to heat and living in urban heat islands when making decisions about tree planting, protection and maintenance, green infrastructure placement, and access to vegetated open spaces and natural areas of City owned land.

#### C1-4

Establish a multi-jurisdiction/multi-department adaptive management coordination team to: review emerging climate research, trends and regulations at least once a year.

#### C1-5

Utilize an equity framework or lens to ensure preparation actions are implemented in ways that deliver more equitable outcomes and prioritize populations most vulnerable to climate change impacts.

#### C1-6

As appropriate, coordinate with or require health and safety service providers to support recommendations of this Population Vulnerability Assessment (e.g., provide education and resources about climate risks to populations most vulnerable to climate change impacts and development of continuity of operations plans).

#### C1-7

Continue to pursue energy efficiency opportunities to minimize impacts from rising energy costs and increased cooling demands in City and County owned and operated facilities.

#### C1-8

Train public health officials, urban planners and emergency responders about the specific community risks from climate change (priority).

#### C1-9

Complete a Climate Adaptation and Action Plan identifying finalized climate adaptation strategies as well as climate mitigation (greenhouse gas emission and energy reduction) strategies. Include community engagement process and detailed implementation plan.

### Goal C2 - Improve effectiveness of on-going adaptation measures.

#### C2-1

Establish a community engagement effort to develop a detailed climate adaptation implementation plan.

#### C2-2

Involve all vulnerable populations in the community to develop relevant parts of the plan, specifically taking into account the need to engage trusted leaders, meet in locations perceived as safe and convenient and at available times for those demographics, and providing transportation, childcare, and wage support as needed.

### Goal C3 - Strengthen emergency management capacity to respond to weather-related emergencies.

#### C3-1

Train emergency responders on the risks from climate change and engage them in the process of adaptation planning and resiliency.



### C3-2

Coordinate with city, county, and state emergency managers by sharing this report and engage them for response and communication planning coordination.

### C3-3

Develop, test, train, and update emergency response plans that address hazards likely to become more frequent or intense as the climate changes, including flood and extreme heat. Plan for projected increases in weather-related emergencies, especially high-heat days, and the resulting potential for increased violence, mental illness, chemical dependency and addiction.

### C3-4

Promote equity in hazard mitigation, and emergency response and recovery activities, and consider populations most vulnerable to weather-related emergencies in all plans and exercises, including evacuation routes, transportation for vulnerable population groups, shelter in place locations, back-up power operations, extended access to fuel/power sources and drinking water, etc.

### C3-5

After weather-related emergency events, assess response to identify effectiveness, deficiencies and resources needed to build future resilience.

### C3-6

Through training, educational materials and other resources, strengthen capabilities of individuals and organizations that assist in disaster response as well as community/cultural groups to prepare for potential climate change impacts, including disproportionate impacts on populations most vulnerable to climate change risks.

### C3-7

Create map of key infrastructure vulnerabilities and level of risk.

### C3-8

During Hazard Mitigation Plan Update process include climate change risk assessment and incorporate climate adaptation strategies into planning process.

## **Goal C4 - Improve the capacity of the community, especially populations most vulnerable to climate change risks, to understand, prepare for and respond to climate impacts.**

### C4-1

Create and make available an Emergency Response Toolkit offering tips and suggestions for residents to increase their emergency preparedness.

### C4-2

Outreach to local community groups representing vulnerable populations outlined in this document (churches, minority representatives, senior center and supportive groups, etc.) and develop a coordinated communication plan to reach vulnerable populations.

### C4-3

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.

### C4-4

Build capacity and leadership within communities most vulnerable to climate change impacts by promoting, supporting and leveraging community-specific strategies, projects and events.

### C4-5

Invest in research projects that identify local vulnerabilities and the most appropriate region-specific strategies.

## **Goal C5 - Enhance resilience of critical city operations.**

### C5-1

Establish mutual aid agreements with neighboring law enforcement, fire, first responders and utilities.

### C5-2

Conduct climate change impacts and adaptation training for law enforcement, fire, first responders, and utilities.

### C5-3

Develop emergency response plans that include information on increased risks and vulnerabilities from climate change.

#### C5-4

Explore feasibility of establishing a solar micro-grid serving community facilities and supporting critical operations power backup.

#### C5-5

Decrease impervious areas and increase the total eco-roof acreage of public buildings (green roof, cool roof, etc.).

### Goal C6 - Enhance city's capacity for adaptation implementation.

#### C6-1

Engage in available support for local leaders to establish or enhance emergency shelters:  
<https://www.disasterassistance.gov/get-assistance/community-leaders?queryString=shelter%20housing>

#### C6-2

Participate in programs that evaluate and share city practices and provide technical support, such as the GreenStep Cities program ( <https://greenstep.pca.state.mn.us/> ) and the Regional Indicators Initiative.

#### C6-3

Identify funding and financing opportunities to pay for adaptation and resiliency planning and project implementation

#### C6-4

Create cross jurisdictional partnerships that pool resources to protect vulnerable assets and increase capacity to respond to emergencies.

#### C6-5

Identify staff responsible for City preparedness, emergency response, and recovery efforts for each type of event and risk identified in this report.

### Goal C7 - Secure funding to support City's adaptation efforts.

#### C7-1

Explore development of sustainability / carbon / or climate fund.

#### C7-2

Develop a list of projects and a list of potential grant or other funding opportunities.

#### C7-3

Examine how existing funding sources can be leveraged to enhance resilience and climate adaptation.

#### C7-4

Leverage Community Development Block Grants from the Department of Housing and Urban Development (HUD) to invest in resilient and equitable communities:

[https://www.hud.gov/program\\_offices/comm\\_planning/communitydevelopment](https://www.hud.gov/program_offices/comm_planning/communitydevelopment) ;

<https://www.hudexchange.info/programs/cdbg-state/state-cdbg-program-eligibility-requirements/>

<https://www.hudexchange.info/grantees/minnesota/?program=2>



## Strategies Responding to Heat Stress And Extreme Weather

### Goal H1 - Strengthen emergency management capacity to respond to heat stress and extreme weather.

#### H1-1

Plan and establish alternative or on-site power supply.

#### H1-2

Develop energy management plans for key facilities and cooling centers.

#### H1-3

Identify key risk areas and infrastructure that is at risk from high heat or extreme weather. Train and educate emergency responders about this risk.

#### H1-4

Develop, test, train, and update emergency response plans that address hazards likely to become more frequent or intense as the climate changes, including heat stress and extreme weather.

#### H1-5

Create map of key infrastructure vulnerabilities and level of risk.

#### H1-6

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.

#### H1-7

Develop communication plan, methods, and pathways for when community power and communication systems are non-functional.

### **Goal H2 - Minimize health issues caused by extreme heat days, especially for populations most vulnerable to heat.**

#### H2-1

Create a Heat Response Plan, in coordination with the County if appropriate, based on Minnesota Department of Health Extreme Heat Toolkit - mid-cost

<http://www.health.state.mn.us/divs/climatechange/extremeheat.html>

#### H2-2

Partner with community-based organizations and local service providers to seniors and people with disabilities to assess the need for and coordinate the operation of cooling environments, including extended hours of Senior Center Operations, which are culturally appropriate and readily accessible (low-mid cost).

#### H2-3

Improve the energy efficiency of homes, apartments and commercial buildings to keep interiors cool, improving the comfort and safety of occupants and reducing the need for summer air conditioning. Encourage the planting of trees and vegetation on the south and west sides of homes and buildings to reduce summer heat gain (mid-cost). Job creation opportunity.

#### H2-4

Ensure public safety staff is properly trained to recognize and respond to physical and behavioral signs of heat related illness (mid-low cost).

#### H2-5

Create a reverse 911 call system where public health officials call vulnerable individuals during extreme heat events (mid-low cost).

#### H2-6

Create an interactive and easy to use website that maps all area cooling centers and provides advice and information on how to stay safe during high heat events (mid-cost).

#### H2-7

Provide travel vouchers to vulnerable individuals to use during high heat emergencies since lack of transportation is highly correlated to heat vulnerability (mid cost).

#### H2-8

Provide indoor cooling centers and outdoor cooling stations (mid-cost).

#### H2-9

Implement a heat alert and response program to prevent heat-related illness and death (mid-cost).

#### H2-10

Increase in heat education at community centers, parks, pools, and City facilities (low-cost).

#### H2-11

Make air conditioned public facilities available during poor air quality days and high heat days

### **Goal H3 - Improve the capacity of the community, especially populations most vulnerable to climate change risks, to understand, prepare for and respond to high heat and extreme weather.**

#### H3-1

Expand the capacity to educate health care providers to recognize and report patterns of heat-related illnesses and injuries, and to inform the public about preventive actions.

#### H3-2

Provide education and resources about climate risks to the public, especially those most vulnerable to potential impacts of high-heat and extreme weather, via communication platforms typically relied upon for information by those populations.

### H3-3

Develop and distribute culturally appropriate and accessible materials about extreme heat and related respiratory-illness, especially to populations most vulnerable to those impacts, via communication platforms typically relied upon for information by those populations.

## Goal H4 - **Decrease the urban heat island effect, especially in areas with populations most vulnerable to heat.**

### H4-1

Develop an outreach campaign coordinated with local social non-profits and community groups to help build awareness of heat island risks and establish a foundation for action.

### H4-2

Identify vulnerable urban tree canopy and street tree sections and develop policies to incentivize, encourage, or require strategic tree planting for heat island mitigation (mid-cost).

### H4-3

Develop policies and programs which decrease impervious surfaces, especially in neighborhoods of increased vulnerable populations (high-cost).

### H4-4

Research, evaluate and pilot porous paving, de-paving, vegetation and/or more reflective surfaces in parking areas to reduce and cool impervious surfaces, particularly in urban heat island areas with populations most vulnerable to heat (high-cost).

### H4-5

Add or modify park plantings in under-served areas, and increase maintenance to sustain mature tree canopy, decrease tree hazards and delay tree replacement needs (mid-cost).

### H4-6

Reduce generation of waste heat from buildings by promoting and incentivizing building energy efficiency measures (low-cost).

### H4-7

Consider 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).

### H4-8

Explore creation of a Heat Island Reduction Incentive / Award program. Incentives and awards from governments, utilities, and other organizations can be an effective way to spur individual heat island reduction actions. Incentives might include below-market loans, tax breaks, product rebates, grants, and giveaways. (Determine the optimum balance for achieving climate adaptation goals of incentives vs. potential loss of tax base needed to accomplish those goals.) Awards can reward exemplary work, highlight innovation, and promote solutions across the public and private sectors.

### H4-9

Create incentive programs for cool roofs and green roofs. Develop policies/ordinances (for public buildings, PUDs, and private-sector buildings which receive public funding/resources) that require all new roofs meet cool roof standards if applicable. Utilize reach code if adopted as option for State Building Code. (See CA Title 24 Cool Roof Requirement as an example:

<http://www.energy.ca.gov/title24/coolroofs/documents/COOLROOF-REQUIREMENTS.PDF>) (mid-cost)

### H4-10

In areas where increased tree canopy is not feasible or appropriate, design and build shading structures (high-cost).

## Goal H5 - **Enhance resilience of community tree canopy and park/forest land**

### H5-1

Conduct a City Tree Canopy and Land Cover Survey to determine the extent, quality, and opportunities for the City's tree canopy (low-cost).

### H5-2

Evaluate the impact of the City's tree codes and modify to enhance protection of city's tree canopy (mid-cost).

### H5-3

Develop a tree planting incentive program for residents, include a maintenance plan as part of the program (low-mid).

### H5-4

Apply the latest climate and forestry science to develop a climate adaptive ready tree species list for use in City plantings/replacements as well as for communication to residents, building owners, and developers (low-cost). <https://www.extension.umn.edu/garden/yard-garden/trees-shrubs/recommended-trees-for-minnesota/index.html>

### H5-5

Apply the latest climate science in revision of urban tree canopy goals for the City and address tree canopy disparities in neighborhoods where populations most vulnerable to heat live (low-cost).

### H5-6

Participate in State and Federal urban forestry assistance programs as available (funding opportunity)

### H5-7

Build community gravel beds to raise bare root tree stock with more fibrous root systems that have greater resilience at lower cost for transplantation to parks and boulevards:

<http://www.mntreesource.com/gravel-beds.html>

### H5-8

Create a Citizen Pruner program that assists city staff focused on large tree removals and mature trees by having residents help young trees grow properly and not become public safety hazards:

<http://www.mntreesource.com/citizen-pruner.html>

## **Goal H6 - Enhance the resilience of buildings within the community to extreme heat, weather, and energy and fuel disruptions.**

### H6-1

Make a property-assessed clean energy (PACE) program available for conservation and renewable energy (low).

### H6-2

Promote businesses and residents exploring making their building sites solar resilient:

<http://solarresilient.org/>

### H6-3

Adopt policies to incentivize building owners to increase the resilience of existing and new buildings with resilience strategies such as elevated HVAC and electrical off basement floor, installation of backflow preventers, tree maintenance, permeable pavements, energy conservation and on-site renewable energy generation, and safe rooms.

## **Goal H7 - Improve the energy efficiency and weatherization of homes and businesses to reduce energy costs and carbon pollution.**

### H7 - 1

Explore development of a Living Buildings or Living Community district: <https://living-future.org/lcc/>

### H7-2

Create a building weatherization program that includes a job training component:

<https://risingsunenergy.org/>

### H7-3

Promote the Weatherization Assistance Program to lower income families and homeowners:

<https://mn.gov/commerce/consumers/consumer-assistance/weatherization/>

## **Goal H8 - Expand access to distributed solar energy in low-income communities in order to lower energy bills, increase access to air conditioning, and decrease carbon pollution levels.**

### H8 -1

Participate in federal, state, and local utility programs that incentivize the implementation of wind and solar power generation (low-cost).

#### H8 -2

Consider promoting the development or use of community solar gardens (CSGs) by public and private entities to enable fuller and more economic use of the community's solar resource, including participating as subscribers, assisting in marketing CSG opportunities for economic development, or providing sites for gardens (high-cost?).

#### H8 -3

Establish NET Metering and/or a Solar Feed-in-Tariff as part of the local utility to expand local rooftop solar (mid-cost).

#### H8 -4

Fight energy poverty by bringing no-cost solar energy systems to low-income families on public energy assistance: <https://www.rreal.org/solar-assistance>

#### H8 -5

Explore Solar+Storage for low- and moderate-income communities:  
<https://www.cesa.org/projects/energy-storage-technology-advancement-partnership/>

### **Goal H9 - Enhance resilience of local businesses to extreme weather.**

#### H9-1

Identify local measures to address impacts to local economies, local resources, and infrastructure systems as a result of more frequent or severe weather events.

#### H9-2

Identify local initiatives as cost-saving measures that may, as a result, lower energy consumption, reduce the generation of greenhouse gas emissions, preserve water supply, reduce municipal waste, or increase participation in recycling programs.

#### H9-3

Identify the unique challenges faced by local businesses during extreme weather events.

### **Goal H10 - Strengthen social cohesion and networks to increase support during extreme weather events.**

#### H10-1

Strengthen City's Heat Response Plan through collaboration with community stakeholders and populations most vulnerable to heat.

#### H10-2

Work with health care and social services providers to ensure their ability to provide appropriate services during extreme heat events.

#### H10-3

Work with community groups, churches, synagogues, and mosques that serve vulnerable populations to develop targeted support and outreach about the dangers of heat (mid-low cost)

#### H10-4

Set up call trees and block networks to check on neighbors during/after extreme weather events especially involving grid disruption.

#### H10-5

Improve the safety and walkability of neighborhood sidewalks to increase foot traffic and opportunities for community interaction and easy access to neighborhood businesses.

#### H10-6

Increase affordability and accessibility of transit options to improve ridership and strengthen facial recognition among residents in the neighborhood.

### **Goal H11 - Increase the resilience of natural and built systems to adapt to increased timeframes between precipitation and increased drought conditions.**

#### H11-1

Determine stormwater volume requirements meeting anticipated future storm levels and identify stormwater management systems and infrastructure not capable of meeting projected needs. Prioritize upgrades required and implement. (mid-cost) (should be top priority)

#### H11-2

Adopt innovative techniques such as vegetated streets to provide habitat diversity and connectivity co-benefits while improving stormwater management. (mid-high cost)

## **Goal H12 - Enhance the reliability of the grid during high heat events to minimize fires, brownouts and blackouts.**

### **H12-1**

Work with local electric utilities to conduct a grid capacity and conditions assessment. Assessment recommendations should also identify renewable energy capacities and potentials including renewable energy back up.



## **Strategies Responding to Air Quality Impacts**

## **Goal A1 - Reduce auto-generated particulate matter, tailpipe pollutants, waste heat, and ozone formation.**

### **A1-1**

Add bike racks around neighborhood businesses and community gathering places to reduce vehicle exhaust from driving and idling. (medium)

### **A1-2**

Install roadside vegetation that creates effective barriers to prevent drifting of air pollutants to adjacent schools and residences. (medium)

### **A1-3**

Conduct a Public Transit and bike infrastructure study and establish appropriate community wide bike infrastructure (low).

### **A1-4**

Measure 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 (low).

### **A1-5**

Develop and implement an Electric Vehicle "EV Ready" strategy plan (low).

### **A1-6**

Reduce generation of waste heat from mobile sources by promoting and incentivizing public transit, biking and walking. (low-mid cost)

### **A1-7**

Plan, design and maintain infrastructure to accommodate emerging autonomous vehicle technology and shared-ride economy strategies.

## **Goal A2 - Increase and maintain air quality for residents and businesses.**

### **A2-1**

Improve the weatherization and ventilation of homes, apartments and commercial buildings. Weatherization or retrofitting may include: installing storm windows, weather stripping, caulking, insulation. Methods of ventilating buildings and maintaining acceptable thermal conditions using resilient or passive design strategies should be a priority.

### **A2-2**

Promote public awareness of air quality considerations and improvement strategies.

### **A2-3**

Create a building weatherization program that includes a job training component (<https://risingsunenergy.org/>)

### **A2-4**

Promote the Weatherization Assistance Program to lower income families and homeowners: <https://mn.gov/commerce/consumers/consumer-assistance/weatherization/>

### **A2-5**

Establish a Green Roof policy to promote and advance the development of green roofs on existing buildings and new construction. Encourage rooftop garden / farm installations which advance food security. For a review of existing greenroof policies throughout the US review: [http://www.traversecitymi.gov/downloads/green\\_roof\\_policies\\_incentives\\_programs\\_case\\_studies\\_32014.pdf](http://www.traversecitymi.gov/downloads/green_roof_policies_incentives_programs_case_studies_32014.pdf)

#### A2-6

Enhance street scape plantings and tree canopies, especially in areas of high traffic volumes.

#### A2-7

Explore use of the EPA Midwest Clean Diesel Program resources to create enhanced City policies and ordinances. The Clean Diesel Program provides support for projects that protect human health and improve air quality by reducing harmful emissions from diesel engines. This program includes grants and rebates funded under the Diesel Emissions Reduction Act (DERA).

<https://www.epa.gov/cleandiesel/midwest-clean-diesel-initiative>

#### A2-8

Explore use of the EPA Midwest Clean Diesel Program Funding to create incentives and support for City Operations and community businesses in the transition of fleets to Clean Diesel fleets. The Clean Diesel Program provides support for projects that protect human health and improve air quality by reducing harmful emissions from diesel engines. This program includes grants and rebates funded under the Diesel Emissions Reduction Act (DERA). <https://www.epa.gov/cleandiesel/midwest-clean-diesel-initiative>

#### A2-9

Conduct education and outreach on the health impacts of air pollution, longer allergy seasons, and extreme heat events.



## Strategies Responding To Flood Vulnerability

### Goal F1 -

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

##### F1-1

Plan and establish alternative or on-site power supply, especially those from renewable resources such as Solar.

##### F1-2

Develop energy management plans for water supply and wastewater treatment facilities and infrastructure.

##### F1-3

Build flood barriers to protect infrastructure, especially water and waste water infrastructure.

##### F1-4

Identify key risk areas and the infrastructure that is at risk from flooding. Train and educate emergency responders about this risk.

##### F1-5

Develop, test, train, and update emergency response plans that address hazards likely to become more frequent or intense as the climate changes, including flash flooding and unseasonal riverine flooding.

##### F1-6

Create map of key infrastructure vulnerabilities and level of risk.

##### F1-7

Incorporate trees and vegetation into complete street design.

### Goal F2 -

#### Increase the resilience of the natural and built environment to more intense rain events and associated flooding.

##### F2-1

Identify and address vulnerabilities in local infrastructure as a result of increased frequency and severity of storms and rainfall. (Mid cost).

##### F2-2

Determine storm water volume requirements meeting anticipated future storm levels and identify storm water management systems and infrastructure not capable of meeting projected needs. Prioritize upgrades required and implement. Integrate upgrades into already scheduled maintenance programs and budgets. (Mid cost)

##### F2-3

Review city codes, drainage rules, and surface waterways to evaluate their ability to protect and improve stream flows, seeps, springs, wetland function, water quality including temperature, vegetation and habitat, and storm water management during periods of extreme heavy rain. Use the Natural Resource Inventory and other data to track gains and losses, and propose revisions as necessary.



**F2-4**

Explore new and support expansion of voluntary programs promoting increased on-site storm water management such as rain gardens and impervious surfaces (low-cost).

**F2-5**

Adopt a storm water credit system to incentivize on-site management.

**F2-6**

Provide education and resources about climate risks to the public, especially those most vulnerable to potential impacts of flooding.

**F2-7**

Provide education to residents on what actions they can take to reduce their risk to extreme precipitation events and flash flooding.

**Goal F3 - Enhance resilience to fuel disruptions in transportation and mobility.**

**F3-1**

Develop and implement an Electric Vehicle “EV Ready” strategy plan that includes solar powered EV charging and EVs for city fleets.



**Strategies Responding To Vector-Borne Disease Risks**

**Goal V1 - Manage the increased risk of disease due to changes in vector populations.**

**V1-1**

Identify and prioritize risks from current and projected extreme precipitation that threaten local infrastructure, environmental quality, health, ecosystems, public safety, and economic development (low-cost). (Part of first priorities)

**V1-2**

Develop and distribute culturally appropriate and accessible materials about vector-borne disease prevention.

**V1-3**

Expand the capacity to educate health care providers to recognize and report patterns of vector-borne disease illnesses and injuries, and to inform the public about preventive actions.

**V1-4**

Create and maintain a Response Plan for emerging vector-borne diseases, including increased capacity for health services that are triggered by certain case thresholds.

**V1-5**

Adopt/enforce codes/ordinances requiring window screens, especially for rental housing facilities.

**V1-6**

Strengthen insect-control efforts in areas of the city with more vulnerable populations and/or increased standing water, including water collected in abandoned refuse/tires/furnishings/etc

**V1-7**

Conduct education and outreach on the health impacts of vector-borne disease and strategies for avoidance.

**V1-8**

Strengthen insect-control efforts in areas of the city with more vulnerable populations and/or increased standing water, including water collected in abandoned refuse/tires/furnishings/etc.



**Strategies Responding To Food Insecurity And Food-borne Disease Risks**

**Goal FI-1 - Increase food security for residents, especially those most vulnerable to food environment.**

**FI1-1**

Conduct a detailed Food Security Assessment to determine food insecurity conditions within the City, target areas within the City for improvement, and identify detailed strategies to increase food security within City.

**FI1-2**

Expand the prevalence of community gardens and family gardens through the continued development, improvement, and communication of the City’s urban agriculture policies and ordinances (low-cost).

**FI1-3**

Promote local food production, sales, and consumption and review City Codes to remove barriers for urban farming including innovative solutions such as aquaponics, hydroponics, indoor agriculture, vertical farms, etc.

**FI1-4**

Develop policies and ordinances which promote, encourage, or require permaculture landscaping in lieu of “traditional” lawn oriented landscaping.

**FI1-5**

Develop edible landscape zones for city-controlled properties and street boulevard zones where practicable (low-mid cost). (Could be similar or lower cost than existing landscaping)

**FI1-6**

Continue to support, collaborate on, and implement invasive species control programs (low-cost).

**FI1-7**

Develop pollinator friendly policies including promotion of pollinator habitats on public and private land as well as policies which restrict and eliminate neonicotinoid pesticides (low-cost).

**FI1-8**

Attract and promote grocery store and food market investment in food desert sections of the City. Collaborate with neighboring communities to maximize coverage. (Major priority)

**FI1-9**

Identify, map and prioritize food insecure areas and populations.



## Strategies Responding To Water Quality and Quantity Risks

### Goal W1 - Increase the resilience of City’s water supply in drier summers.

**W1-1**

Create a priority list of local measures that would result in reductions in water use (low-cost) (first task)

**W1-2**

Develop and implement water conservation education and outreach programs in residential and commercial sectors (low-cost).

**W1-3**

Support incentivized (such as providing rebates for water efficient appliances), encouraged, and regulatory water efficiency programs (low-cost).

**W1-4**

Support incentivized encouraged, and regulatory grey water and water recycling systems for lawn irrigation systems consistent with Minnesota’s building/plumbing codes (mid-cost).

**W1-5**

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 (mid-cost).

**W1-6**

Consider rate design structures that incentive reductions in water consumption (See Boulder Colorado’s water budget (<https://bouldercolorado.gov/water/know-your-water-budget> )

**W1-7**

Establish time of sale ordinance that requires installation of low-flow toilets and low-flow shower heads whenever a house is sold (if not prohibited by building code in Minnesota?).

**W1-8**

Implement a biochar soil amendment for all building and earth working construction sites – improves soil sequestration and builds carbon content of topsoil, and improves water retention and permeability characteristics.

**W1-9 (Rural Communities)**

Reduce erosion, promote infiltration, manage water retention and runoff, and improve resilience to drought through crop selection and management, and soil and water management of cropland.

**W1-10**

Require soil profile rebuilding at all building project sites or compacted soil conditions to reduce erosion and runoff contaminated with fertilizers, increase soil carbon stores and support long-term soil building (low cost)

**W1-11**

Review and update lawn maintenance ordinance to encourage native, low water use plantings. Provide information and assistance to residents on natural landscaping techniques, including rain garden installation and creation of pollinator habitats.

**W1-12**

Provide information to community members about water use and conservation



**Strategies Responding To Waterborne Illness Risks**

**Goal WB1 - Enhance protection of surface water quality damage from severe storms**

**WB1-1**

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

**WB1-2**

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.

**WB1-3**

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

**WB1-4**

Conduct education and outreach on the effects of nutrient loads and contaminants in stormwater on local water quality

**Goal WB2 - Enhance public protection from exposure to surface water pathogen contamination**

**WB2-1**

Establish a communication campaign to educate public on surface water pathogens and Algal toxin contamination issues, particularly those exacerbated by extreme precipitation events, increased water temperatures, and flooding.

**WB2-2**

Establish a communication campaign to educate public on risks of water pathogens related to fishing and fish consumption from local waterways and strategies to avoid exposure.



**Strategies Enhancing Economic Resilience In Support of Climate Resilience**

**Goal E1 - Leverage the economic development opportunities of the Green Economy**

**E1-1**

Leverage Community Development Block Grants from the Department of Housing and Urban Development, or HUD, to invest in resilient and equitable communities.

**E1-2**

Conduct a Climate Economy Economic Development Assessment to identify economic development potential of climate adaptation, climate mitigation, and energy action planning.

**E1-3**

Develop job training programs focused on building resiliency- solar construction, weatherization, etc.

#### E1-4

Conduct a Community-Wide Renewable Energy Potentials Study for the City. Study should identify economic development opportunities as well as economic savings/impacts of expansion of renewable energy infrastructure within the City.

#### E1-5

Foster small business and green business development, particularly those which increase renewable energy, climate mitigation and adaptation resources within the community.

### Goal E2 - Enhance community resilience through economic resilience

#### E2-1

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/>

#### E2-2

Explore opportunities to broaden the City's economic base with diversification initiatives, such as targeting the development of emerging clusters or industries that (a) build on the region's unique assets and competitive strengths; and (b) provide stability during downturns that disproportionately impact any single cluster or industry

#### E2-3

Work with community businesses to explore the creation of an incentivized "buy local" campaign to enhance resilience of small local businesses.

#### E2-4

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>

### Goal E3 - Including Economic Resilience in Emergency Response Planning

#### E3-1

Make sure key business infrastructure is recognized in the City and County's general hazard mitigation plan and emergency response plan.

#### E3-2

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.

#### E3-3

Explore use of geographic information systems (GIS) to link with municipal business licenses, tax information, and other business establishment data bases to track local and regional "churn" and available development sites as well as integrated hazard information to make rapid post-incident impact assessments.

#### E3-4

Ensure redundancy in telecommunications and broadband networks to protect commerce and public safety in the event of natural or man-made disasters.

#### E3-5

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.





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