



## MEMORANDUM

**To: Twin Cities Metro Area Healthy Communities Planning Project Team**

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**Re: Indicator Analysis: Extreme Heat for Metropolitan Communities  
Metro Area Healthy Communities Planning Project**

**Date: October 1, 2021**



This project is supported by the Statewide Health Improvement Partnership,  
Minnesota Department of Health



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## **Indicator: Extreme Heat Events**

The following discussion includes key findings and analysis of the reviewed comprehensive plans regarding the extreme heat events health indicator which assessed how communities addressed extreme heat events in their comprehensive plans. While the exact definition of extreme heat events varies based on geography, humidity, temperature, and time of year, the Center for Disease Control and Prevention (CDC) defines extreme heat events as “a series of unusually hot days.”<sup>1</sup> Extreme heat is directly connected to the urban heat island effect. The Project Team defines the urban heat island as “built up areas that are hotter than nearby rural area. The annual mean air temperature of a city with 1 million people or more can be 1.8-5.4 degrees warmer than its surroundings. In the evening, the difference can be as high as 22 degrees.”<sup>2</sup>

## **Overall Takeaways**

In total, 31 of the studied communities address extreme heat as part of their comprehensive plans. When taken as a whole, these communities generally approach mitigating extreme heat events through increasing the amount of urban greenspace through trees and vegetation and reducing impervious, non-reflective surfaces. Below are some common examples of approaches communities use to reduce the occurrence and impacts of extreme heat, along with the number of communities who mentioned each approach.

### *Equity*

Overall, the plans of urban communities incorporate equity into their discussions of addressing extreme heat. Rural and suburban communities have few equity quotes and no unifying themes. The urban community designation section of this memo describes in further detail the two main equity themes identified - environmental justice and how heat impacts low-income communities.

### *Urban Heat Island Effect*

Many communities approach extreme heat reduction by acknowledging and reducing factors that contribute to the urban heat island effect. **Rogers** points out that, “[a]ir temperatures are increasing and are compounded in the metropolitan area by the urban heat island effect” (Rogers, 147). **Golden Valley** plans to “[r]educe impervious surface area where possible, and use lighter colored pavements and building materials to mitigate urban heat island effect” (Golden Valley, 7-24). Similarly, **St. Francis** recognizes the importance of ecological areas that “add an element of resilience to the community [...] and mitigat[e] urban heat island effects” (St. Francis, 3-20).

### *Planting Trees*

Because of the cooling benefits of trees, one of the most common approaches for mitigation of extreme heat and the heat island effect in plans is discussing tree plantings to increase overall tree coverage as well as addressing specific threats to the community's tree canopy. **Mahtomedi** intends to “[p]rotect and enhance trees, shrubs, and other landscaping within City right-of-ways” (Mahtomedi, 118). **Coon Rapids** states that, “[t]he corridor should have a ‘green’ appearance” and “[e]xisting landscaping should be



preserved and supplemented with new landscaping, including street trees and shrubs both in the public right-of-way and on private property” (Coon Rapids, 7-23). **Nowthen** plans to “promote native grasses, shrubs, and trees on redevelopment sites and require adding trees to new development sites” (Nowthen, 22). Several communities, like **Roseville**, highlight their status as “Tree City USA communities” and the technical assistance with urban forestry programs they receive from that (Roseville, 9-4).

### *Protecting the Tree Canopy*

Recognizing the critical role tree coverage plays in reducing extreme heat and the urban heat island effect, many communities, including **New Brighton**, discuss the concern of further canopy loss from “threats such as emerald ash borer and oak wilt” (New Brighton, 7-119). **West St. Paul** plans to “[t]ake a proactive approach to mitigating the spread of Emerald Ash Borer and other threats to the urban forest as described in the City's Emerald Ash Borer Management Plan [... and] update the plan as necessary” (West St. Paul, 9-13). **Columbia Heights** has also “completed a Tree Inventory, and has adopted an Emerald Ash Borer Plan to manage trees, especially ash, and encourage a diverse tree canopy on public and private lands” (Columbia Heights, 7-157).

### *Parking Standards*

Many communities discuss enforcing or adding restrictions to their parking standards as a key strategy for reducing impervious and non-reflective, black surfaces which contribute to the urban heat island effect and more extreme heat events. **St. Louis Park** wants to “[c]ontinue to enforce parking lot standards that address surfacing, light standards, tree canopy, and heat island reduction” (St. Louis Park, 5-137). **Eden Prairie** discusses parking maximums that would provide several environmental benefits such as “[preventing] the overbuilding of parking, [... providing] more green space,” and “[reducing] the heat island affect [sic]” (Eden Prairie, 53). Additionally, **Minneapolis** plans to “[e]ncourage the design of parking areas in ways that minimize their contribution to the urban heat island” (Minneapolis, 120) and **Plymouth** will “[p]lant shade trees in parking areas” (Plymouth, Appendix 3D-5).

Communities that discuss creating additional plans, policies, and programs for managing and improving the urban forest and heat resilience tended to earn higher scores for reducing extreme heat events. Additionally, communities that address all four of the overall themes discussed above in their plans also scored higher.

## **Interesting and Innovative Approaches**

Some of the most interesting approaches taken by communities in addressing extreme heat include cool roofs, building social networks to increase community resilience to extreme heat, and balancing solar photovoltaic (PV) potential with tree canopy cover. **Golden Valley** also includes a couple of unique approaches to its understanding of the risks of and potential actions to protect from extreme heat.

### *Cool Roofs*

A few communities referenced using cool roofs, where changing the color of a roof to be light or reflective keeps buildings cooler inside with less energy required. **Eden Prairie**, for example, wants to



replace “dark roofs with light ones to reduce heat absorption from the sun” (Eden Prairie, 167). Resilience is a major theme of **Falcon Heights**’ plan, which refers to a separate resilience analysis that recommends the use of “reflective roofing material (cool roofs)” (Falcon Heights, Appendix F, 7).

### ***Building Social Resilience to Extreme Heat***

A couple of other communities recognize the importance of social relationships and networks in creating the capacity to be resilient to extreme heat events. **St. Louis Park** created *Ready & Resilient: A Guide to Extreme Weather* with the purpose of “educating residents about climate conditions already being experienced in the region, resources the city offers, and actions individuals can take to mitigate the impacts of extreme weather and be better prepared for extreme weather. This guide is provided in every new resident welcome packet” (St. Louis Park, 4-34). **Falcon Heights**, in its resilience analysis, describes resiliency strategies for prolonged heatwaves, including “[providing] access to air conditioned space,” “[communicating] dangers to residents,” and “[encouraging] residents to check on vulnerable neighbors” (Falcon Heights, Appendix F, 7).

### ***Balancing Solar Power Access with Tree Canopy Coverage***

A couple urban communities consider how their tree canopies might conflict with goals to increase solar electricity generation capacity by shading roofs that could otherwise support solar panels. **Osseo** “will consider opportunities to increase access to solar energy resources and other alternative energies. These opportunities should balance the value of retaining urban tree canopy and maintain the character of the community” (Osseo, 47). **New Hope** decides on a specific way to balance the conflicting goals stating, “[r]ecommended ordinance changes will promote the preservation of New Hope’s tree canopy over the installation and promotion of solar arrays. Solar policy will focus predominantly in industrial areas where tree canopy is already sparse” (New Hope, 204).

### ***Other Interesting Approaches***

- Neighborhood-specific engagement process: **Golden Valley**’s approaches to extreme heat management are worth further focus, as it includes consideration of impacts and policy not seen in other plans. For example, the city recognizes that, “economic impacts that could burden residents are high heating and cooling costs due to prolonged heatwaves and cold spells” (Golden Valley, 7-16). Golden Valley also plans to “[c]omplete a neighborhood-specific engagement process [and] [i]nvolve residents and businesses located in areas identified as a concern for stormwater management, urban heat island effect, or invasive species in a process that allows them to influence how the City plans for and manages these areas in the face of climate variation” (Golden Valley, 7-29).

## **Ranking Analysis**

Each community received a score of 1 to 4 on the extreme heat indicator, which ranks it on how much it incorporated the protection of public health during extreme heat events in its comprehensive plan. If a community scored a 1, that means there was no mention of protecting public health during extreme heat



events. A score of 2 would demonstrate that the community mentions heat event protections for public health in the body of the plan but does not include goals and policies to this end. Level 3 plans include goals and/or policies for extreme heat events protection. Communities with the highest score of 4 must include goals and policies in their plans AND dedicate resources to implementation. The number of communities to receive each score was:

<b>Level 1</b>	18 communities
<b>Level 2</b>	15 communities
<b>Level 3</b>	11 communities
<b>Level 4</b>	5 communities

Most communities that scored a 2 or above mention protecting and preserving their tree canopy, but the higher scoring cities include impervious surfaces and other vulnerabilities that impact the urban heat island effect.

***Level 1***

Of the 18 communities that have a score of 1, a few mention their tree canopies in passing or for aesthetic purposes, but not to mitigate the heat.

***Level 2***

Communities that received a score of 2 on this indicator mention heat event protections for public health in the body of the plan, but do not include goals and policies to this end. Communities at this level mainly focus on planting new trees and protecting old ones with ordinances to keep communities shaded.

Tree Planting

Many level 2 communities want to encourage tree planting to provide benefits to the city that can help residents get through extreme heat events. **Belle Plaine** wants to “[e]ncourage tree planting to reduce energy use” (Belle Plaine, 1-21). Meanwhile, **Columbia Heights** has a “City Forester [who] actively works to achieve and maintain a resilient urban forest which provides numerous benefits to community” (Columbia Heights, 7-157).

Tree Preservation Ordinance

Many communities are also interested in, or already have, tree preservation ordinances to keep older trees in the ground. **Coon Rapids** is “[considering] adopting a tree preservation ordinance to ensure that valuable mature trees are preserved as new development occurs” (Coon Rapids, 2-15). **Inver Grove Heights** already has such an ordinance and intends to “[c]ontinue to enforce [the existing] tree preservation ordinance with new subdivisions” (Inver Grove Heights, 3-72). **Plymouth** outlines the consequences for removing too many trees in its “tree preservation ordinance that sets maximum tree removal thresholds for new development and requires reforestation and/or monetary restitution if removal exceeds the thresholds” (Plymouth, Appendix 3A, 1).



### *Level 3*

A ranking of 3 on this indicator means that the plan includes goals and/or policies to protect against extreme heat events. Communities at this level extend their interest in the urban tree canopy onto private properties.

#### Incentivizing Trees on Private Property and Rights of Way

Level 3 communities recognize that the urban tree canopy extends onto private lots. Both **Falcon Heights** and **St. Anthony Village** want to “[c]reate incentives and programming to increase tree plantings on private lots and in public right of way” (Falcon Heights, 46; St. Anthony Village, 180). **Shakopee** also wants to “[e]ncourage and promote tree planting on private property by supporting tree sales” in an effort to “[i]mprove the community's overall tree canopy to improve health, safety and wellbeing” (Shakopee, 349).

### *Level 4*

To score a 4 for this indicator, communities must include goals and policies in their plans for heat event protection AND dedicate resources to implement these goals and policies. In general, level 4 communities create in-depth, extra plans for managing their tree canopies for heat resilience as well as connecting these heat events to climate change.

#### In-Depth Planning with Tree Canopy Focus

The communities that scored a 4 take their tree canopy very seriously, often referencing an additional specific plan or program for managing the urban heat island effect that includes tree canopies. **Minneapolis** sets out to “[e]stablish an urban tree canopy goal and adopt a plan to manage the urban heat island effect across all communities” (Minneapolis, 209). **Roseville**'s plan discusses its goals to “preserve wooded areas and implement an aggressive reforestation and forestry management program to ensure that Roseville has a substantial aesthetically pleasing and environmentally critical tree population in its parks, open spaces, boulevards, and other City property” (Roseville, 8-16). **Chanhassen** will “[a]dopt a public improvement landscaping policy which states that trees and landscaping will be incorporated in all public improvement projects and boulevard trees will be included in all street improvement projects, where appropriate” (Chanhassen, 10). It will also “[i]mplement a tree cover analysis for the city to define tree cover needs and strengths” (Chanhassen, 10).

#### Mentioning Changing Climate

Level 4 communities are also more likely to connect the need for heat resilience to rising global temperatures. **Golden Valley** frames its goals around “how the City plans for and manages these areas in the face of climate variation” (Golden Valley, 7-29). **Minneapolis** wants to “prepare for the consequences of climate change by investing in [...] urban heat island reduction” (Minneapolis, 42). **North St. Paul** lists “threats to food and water supplies,” “temperature fluctuations,” and “heat island effects” as “Possible Climate Change Implications” (North St. Paul, 207).



## Community Designation Analysis

All 49 plans, representing 51 communities, reviewed in the project were sorted into one of three main designations: urban, suburban, or rural. The project researchers analyzed these types of communities separately to see if they address extreme heat in different ways that are more specific to their community type. These larger categories are combinations of the more narrowly defined categories the Metropolitan Council uses to distinguish communities. The urban category is made up of urban center and urban communities, while the suburban category is made up of towns the Met Council defines as suburban, suburban edge, and emerging suburban edge communities. The rural category is a combination of rural center, diversified rural, rural residential, and agricultural communities.

### *Urban*

Urban communities are more likely to discuss equity in the parts of their plans that address extreme heat, specifically connecting extreme heat to environmental justice concerns and its disproportionate impact on low-income communities. Several urban communities also discuss air conditioning as a strategy to combat the effects of extreme heat.

#### Equity — Environmental Justice

A common approach among urban communities is the incorporation of environmental justice into their discussion of extreme heat. **St. Louis Park** wants to “[i]ncrease environmental justice by planting more trees in areas of low income, which are often the same areas with the most impervious surfaces” (St. Louis Park, 4-70). **Falcon Heights** “will keep environmental justice a part of its goal making and policy development processes” which includes addressing extreme heat and the urban heat island effect (Falcon Heights, 7).

#### Equity — How Heat Impacts Low Income Communities

Another way urban communities approach equity as it relates to extreme heat is recognizing the additional impacts it has on low-income populations. **Falcon Heights** says that, “[t]he urban heat island effect [...] often affect marginalized and low-income individuals the hardest” (Falcon Heights, 7), and discusses this issue further in its *Resilience Analysis* (Appendix F). Additionally, **Golden Valley** wants to “[p]romote low-income weatherization and heating assistance programs through City communication mediums” (Golden Valley, 7-25). **St. Louis Park** will “[plant] more trees in areas of low income, which are often the same areas with the most impervious surfaces” (St. Louis Park, 4-70).

#### Air Conditioning

Several urban communities discuss air conditioning and its economic impacts in their plans to address extreme heat. **Bloomington**<sup>1</sup>’s plan states that “[e]xtreme heat increases demand for air conditioning, which requires more electricity” (Bloomington, 6.16). In response to the heat issues **Falcon Heights** identified, the city spells out goals to respond to heatwaves in its *Resilience Analysis*, including “Provide

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access to air conditioned space” (Falcon Heights, Appendix F, 7). **Golden Valley** wants to “[m]ake air conditioned public facilities available during poor air quality days and high heat days” (Golden Valley, 7-25). **North St. Paul** also mentions an “Air Conditioner/Air Source Heat Pump Rebate” in its plan (North St. Paul, 207).

### *Suburban*

The Metro’s suburban communities that address extreme heat did so by connecting their heat mitigation approaches to trees and specifically highlighting the air quality benefits of trees and planning to expand greenspaces and reforest their communities.

#### Air Quality Co-Benefits of Trees

Several suburban communities discuss the additional benefits that more urban trees provide beyond reducing extreme heat. For instance, **Chanhassen’s** plan states that, “[t]rees increase home values, decrease energy costs, reduce stormwater runoff, provide clean air, sequester carbon, keep people healthy, provide wildlife habitat and enhance community aesthetics” (Chanhassen, 70). **Eden Prairie** also points out “improved air quality” as one of the “positive health impacts associated with increased tree canopy in developed areas (Eden Prairie, 170). **Minnetonka Beach** wants to “[m]aintain, protect, and enhance trees and wooded areas which provide numerous public and private benefits to the community. These benefits include [...improvement] of air quality” (Minnetonka Beach, 25). **Shakopee** plans to “[e]stablish an urban forest policy and program to improve air quality and mitigate the urban heat island effect” (Shakopee, 362).

#### Reforestation and Expanding Greenspace

Another theme among suburban communities is a focus on reforesting and adding more greenspace to reduce extreme heat and provide other benefits. **Oakdale** “will continue to support reforestation, tree preservation, park dedication, open space preservation and acquisition, and water quality improvements to protect these natural resources and maintain property values” (Oakdale, 12). **Minnetonka Beach** plans to “[m]aintain, protect, and enhance trees and wooded areas which provide numerous public and private benefits to the community” (Minnetonka Beach, 25).

### *Rural*

Many of the rural communities focus on adding tree preservation plans as a requirement in rural cluster developments to reduce the heat island effect as well as the function of trees in providing shade more broadly.

#### Tree Preservation Plans Requirement in Rural Cluster Development

Those rural communities that incorporate heat reduction in their plans tend to do so by discussing new or existing requirements to ensure trees are not lost to development. **Marine on St. Croix’s** plan states that “[t]he City requires a tree preservation plan as part of residential subdivisions and business or industrial developments to help protect trees before, during, and after construction” (Marine on St. Croix, 28).



Similarly, **Nowthen**'s plan includes guidelines that "would require developers and builders to incorporate a tree preservation plan with the required grading plan submission. Tree preservation may also be considered as part of a rural cluster development requirement intended to preserve massings [sic] of mature trees as a development amenity" (Nowthen, 56).

### Shade

Increasing shade to provide environmental and health benefits including reducing extreme temperatures is another common approach of rural communities. **Belle Plaine** wants to "[a]dopt a 'Living Street' policy that provides for multiple modes of transportation and street design that reduces environmental impacts by [...] providing shade" (Belle Plaine, 3-25). **Inver Grove Heights** wants "[p]arks improvements [to] focus on providing places to rest with benches and shade that are spaced to serve all users" (Inver Grove Heights, 6-171) while **Lake Elmo** focuses on "greenery and canopies that provide shade and comfort" (Lake Elmo, 6-28). **Rogers** highlights shade among several other tree canopy benefits, stating that it wants to "[i]ncrease the urban tree canopy coverage to provide shade, dissipate heat, mitigate the health effects of airborne particulates, and reduce the City's overall carbon footprint" (Rogers, 162).

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<sup>1</sup> "Climate Change and Extreme Heat: What You Can Do To Prepare," Centers for Disease Control and the Environmental Protection Agency, 3, (2016), available at: <https://www.cdc.gov/climateandhealth/pubs/extreme-heat-guidebook.pdf>.

<sup>2</sup> "Key Definitions," Twin Cities Metro Area Healthy Communities Planning Project Team - MN DEPT OF HEALTH (2020), internal project document available upon request.