FALCON HEIGHTS

RESILIENCE ANALYSIS

ABSTRACT

Resilience planning is emerging as a critical tool for communities to understand and prepare for climate related changes that have local impacts. This analysis assesses vulnerabilities and strengths in Falcon Heights and offers recommendations for planning-based solutions.

The Great Plains Institute

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INTRODUCTION

Climate change is altering the way communities think about their infrastructure, operations, and natural resources. Understanding the limitations of existing systems in future scenarios will help communities prepare for, respond to, and recover from abrupt changes.

Resilience planning is emerging as a critical tool for communities to understand and prepare for climate-related events. The concept of resilience is closely related to that of sustainability, but the two are not the same. Sustainability is a broader field that emphasizes planning for today without negatively impacting the future. Resiliency is understanding the way we have planned in the past will be inadequate for future events that are exacerbated by a changing climate. Resilience planning includes strategically incorporating both mitigation and adaptation into city functions and operations with consideration of social, economic, and environmental impacts.

There is a growing need for local governments to incorporate resilience into their planning efforts in order to minimize impact from increasingly extreme and frequent weather events that put additional stress on public facilities and increase costs of services. By identifying the risks, understanding vulnerabilities, and enhancing strengths, Falcon Heights will be better situated to handle extreme events. Proactive preparation can lessen the impact on residents' lives and reduce the costs associated with unexpected events.

Image: City Hall, Photo Credit: Great Plains Institute

This citywide resilience analysis was conducted for the City of Falcon Heights as part of the Environmental Assistance grant program funded by the Minnesota Pollution Control Agency. The priority of the program is to increase the resilience of communities in the face of a changing climate. The City of Falcon Heights was interested in identifying opportunities to include resilience in its comprehensive plan. Through research, stakeholder engagement, and analysis a number of recommendations have been made to increase resilience in city operations and functions by integrating best practice actions and strategies into its comprehensive plan. Additionally, this analysis will be used to inform larger metro and state efforts to enhance resilience in communities across the region.

The analysis is loosely based off the Rockefeller Foundation's Resilient Cities Framework, focusing on resiliency through four lenses: Leadership and Strategy; Economy and Society; Healthy Communities; and Infrastructure and Environment. Using this framework, vulnerabilities and strengths in city operations have been identified to build the foundation for best practices appropriate for Falcon Heights.

The focus of this analysis is on impacts related to a changing climate. While there may be other emergencies or crisis situations the city must to respond to, some aspects of hazard mitigation are outside the scope of this analysis. This review specifically takes into consideration events that may occur from a changing environment, including: extreme heat and cold, diminished air quality, extreme weather events, and increased ecological changes and how they impact city functions and the health and well-being of residents.

PROCESS

This resilience analysis took place from spring 2015 through the end of summer 2015. It involved gathering background information to identify strengths and vulnerabilities in the community, engaging stakeholders to elicit feedback on the findings, and providing recommendations to the city for how to proceed with integrating resilience best practices and strategies into comprehensive planning efforts. Further, the results of this analysis will be used to inform the GreenStep Cities program and the Metropolitan Council's Local Government Planning Handbook.

BACKGROUND INFORMATION

A firm understanding of current city operations, in what ways Falcon Heights has responded to past events, and how well it is prepared for future events is crucial to the analysis. The current comprehensive plan, zoning regulations, and interviews with city staff, contractors, and volunteers provided valuable input for the compilation of background material. The information collected was used to build the foundation to identify the strengths and vulnerabilities in city operations and functions for anticipated climate-related events.

The size and location of Falcon Heights requires collaboration with a number of other entities including Ramsey County, the Metropolitan Council, the Capitol Watershed District, and the Saint Paul Regional Water Services. Each of these entities was also considered for their roles in shaping a more resilient Falcon Heights. Finally, background material was also gathered from State Agencies, the Metropolitan Council, and Ramsey County, among others were reviewed to assess the impact climate change may have on functions of the city.

VULNERABILITIES ANALYSIS

After gathering background information on city operations and services, an analysis was conducted to identify which changes can be expected in Falcon Heights and how well the city is prepared to handle future events. To be a resilient community, it is crucial to acknowledge vulnerabilities well as understand strengths. External stresses may push systems to their limits and with adequate preparation, a city can know when its functions will reach capacity and be able to better respond and adapt to additional pressure.

This analysis explored a number climate-related stresses and how they might impact the city. Below is a summary of the major climate events that are anticipated to affect Falcon Heights:

Prolonged Heatwaves

Prolonged Cold Spell

Diminished Air Quality

More Extreme Weather

Increased Ecological Changes

STAKEHOLDER ENGAGEMENT

Throughout the process various stakeholders were engaged to provide input for specific components of the analysis, including city staff, volunteers, and contracted workers. Upon completing the vulnerability analysis, stakeholders were further engaged to provide feedback for the recommendations made to the city. Stakeholders were presented the information during a two-hour session where they provided feedback on what they thought was missing, inaccurate, and what they would like to see as part of the final recommendations. Attendees of the meeting included:

- **Falcon Heights Mayor**
- **City Administrator**
- **Community Development Coordinator**
- **Representative of the Community Emergency Response Team**

The input gathered was used to inform the final recommendations, which were presented to the City Council in early October. The City Council then had an opportunity to suggest changes to the analysis including the recommendations. These recommendations may be used to incorporate resiliency into the comprehensive plan, which will be updated in the near future in alignment with the metropolitan comprehensive plan schedule. Further the recommendations will be provided to the GreenStep Cities program to determine new best practices around resiliency that can be replicated by other communities throughout the state. The analysis may also be used to inform the Metropolitan Council's *Local Planning Handbook*.

RECOMMENDATIONS

Recommendations to incorporate resiliency into the city's upcoming comprehensive plan were developed based on the analysis within this document. The recommendations focus on the city assessing what it has done (Existing Conditions), what it would like to do (Desired Conditions), and how it will get there (Strategies and Actions). The city already has a number of policies that relate to resiliency, though not explicitly. However, many of the policies have not resulted in action as there are no clear strategies for how to achieve them. The recommendations lay out a path for how the city may wish to include resilience best practices when updating its next comprehensive plan.

Community Park, Falcon Heights. Photo Credit: GPI.

COMMUNITY PROFILE

The City of Falcon Heights is approximately 2.24 square miles and is located in the west-central portion of Ramsey County. It is bordered by Lauderdale to the west, Roseville to the north, and St. Paul on the east and south ends.

Falcon Heights officially became a city in 1973. The government structure includes a Mayor and four City Council members, each of whom are elected to four-year terms. The City has three commissions which serve as advisory groups to the City Council. Commissioners are appointed by the mayor and approved by the Council, serving three-year terms. The commissions include: Environment; Parks and Recreation; Community Engagement; and Planning. The City has eight full-time employees housed in its City hall. City departments include: Administration, Public Works, and Parks.

As of the most recent comprehensive plan, there are 2,249 households in Falcon Heights: 1,145 are single-family detached; 71 are single-family attached; 702 are multi-family; and 331 are University student housing. More than half of the households are owner occupied. According the 2010 U.S. Census, 5,321 people live within the city. The median age of Falcon Heights is 32.6 with 12.3% over the age of 65. Just over 20% of the population speak a language other than English at home. Nearly 9% of the population lives below the poverty level and the median household income $64,866, which is higher relative to the State's ($59,836).

Residential street Falcon Heights. Photo Credit: Great Plains Institute.

Within the city boundaries include two major institutions: The University of Minnesota, and the Minnesota State Fair. The city has little to no jurisdiction over these entities, greatly reducing its geographic area. Of Falcon Heights' 1,400 acres, nearly two-thirds is owned by either the University of Minnesota or the Minnesota State Fair. In addition to the University campus itself, the University also owns Les Bolstad Golf Course which is located on the western edge of the city, as well as substantial agricultural land (267 acres) within the city limits. Further, much of the available private land has been developed and little is available for future development.

The city is responsible for maintaining infrastructure within its boundaries including: streets, sewers, water lines, storm water, trees, and approximately 100 streetlights (Xcel Energy owns and maintains the rest). The city has its own volunteer fire department, receives water from the St. Paul Regional Water Services, police assistance from the City of St. Anthony, electric service from Xcel Energy, gas service from CenterPoint Energy, and Ramsey County is responsible for emergency management operations.

VULNERABILITIES ASSESSMENT

Climate change will have varying impacts across the globe. In Minnesota we can expect to see temperatures rise; growing seasons lengthen; habitats change; heavier downpours; droughts; longer durations of hot and cold spells; more extreme weather; and loss of species[1]. Each of these consequences of climate change will have associated impacts on the health, environment, and economies in communities throughout the state. While Falcon Heights is generally well-positioned to avoid the worst of the impact, there are actions it can take to mitigate its effect on climate change, while at the same time enhancing community resiliency to prepare for and respond to climate-related events. This section focuses on anticipated changes facing Falcon Heights, descriptions of these events, and the impact they may have on the health, environment, and economy of the city. It further describes resilience strategies, associated considerations, and opportunities for additional benefits of taking action.

The table below summarizes climate-related changes Falcon Heights should consider when designing a resilient future. Each challenge is listed in the table with brief descriptions, and possible associated impacts.

Change	Description	Impact
Prolonged Heatwaves	Increased and prolonged heatwaves, may be exacerbated by urban heat island effect	Health, energy costs, energy reliability, economic, road other infrastructure
Prolonged Cold Spells	Longer periods of extreme cold due to stalled weather patterns	Higher energy costs, increased natural gas consumption, school closures, decreased economic activity
Diminished Air Quality	Increased particulate matter from wildfires, (fossil fuel) energy production, more vehicle traffic, increased ozone levels, more pollen	Health of residents, health economic
More Extreme Weather	More droughts, more intense precipitation (snow and rain), more severe weather (tornadoes, hail)	Water shortage, floods, poor water quality, erosion, health impacts, property damage
Increased Ecological Changes	Invasive species, ecological succession, drought	Loss of urban forest, habitat loss, species die-off, increased urban heat island effect

Table 1 Climate related changes affecting Falcon Heights

Prolonged Heatwaves

Minnesota can expect to see the temperature continue to rise on average across the entire state. From 1895 to 1970, the temperature increased one tenth of one degree every decade; since then the temperature has increased by half a degree every decade.[2] Extreme heat can cause roads to buckle and damage other infrastructure such as bridges and railroads, increase energy costs and decrease grid reliability, as well as adversely impact the health of residents.

Heat is the number one weather-related cause of death, disproportionately affecting vulnerable populations: elderly, low-income, and people with respiratory illnesses. In 2003, more than 60,000 people died from heat-related illness in Europe; in 2010, nearly 5,000 people died from excess heat in Moscow, Russia and more than

[1] Adapting to Climate Change in Minnesota, 2013 Report of the Interagency Climate Adaptation Team
[2] Adapting to Climate Change in Minnesota, 2013 Report of the Interagency Climate Adaptation Team

56,000 died country-wide. The Chicago heat wave of 1995 took the lives of 700 residents; and from 1999-2003 nearly 3,500 deaths were the result of exposure to extreme heat in the U.S[3]. There is typically no physical damage associated with heatwaves, and they therefore often go relatively unnoticed, or leave the public's consciousness more quickly than more destructive events like tornadoes.

As a consequence of climate change, it is highly likely we will see an increase in prolonged heat waves. This will be further exacerbated in developed regions because of the urban heat island effect. The built environment of metropolitan areas typically causes temperatures to be higher in the urban core than surrounding rural communities. The asphalt and concrete of rooftops, roads, parking lots, and sidewalks absorb the sun's heat causing surface temperatures to be warmer during the day. Additionally, these materials release heat more slowly than vegetative areas, keeping temperatures higher through the night. Because of a city's limited ability to cool off during the summer heat, residents in urban areas are more at risk to heat-related illnesses and deaths than their rural counterparts.

In Falcon Heights, much of the land cover is vegetation, with the agricultural fields of the University of Minnesota, the golf course, and campus grounds. The map below shows the impervious surfaces (white areas) in Falcon Heights, demonstrating that the city generally has a low percentage of hard surface coverage. The portions of the city that are within the jurisdiction of Falcon Heights tend to be built out, with significant impervious surface. Further, surrounding areas (Roseville, Lauderdale) have substantially more impervious surface, which may impact the local heat within Falcon Heights.

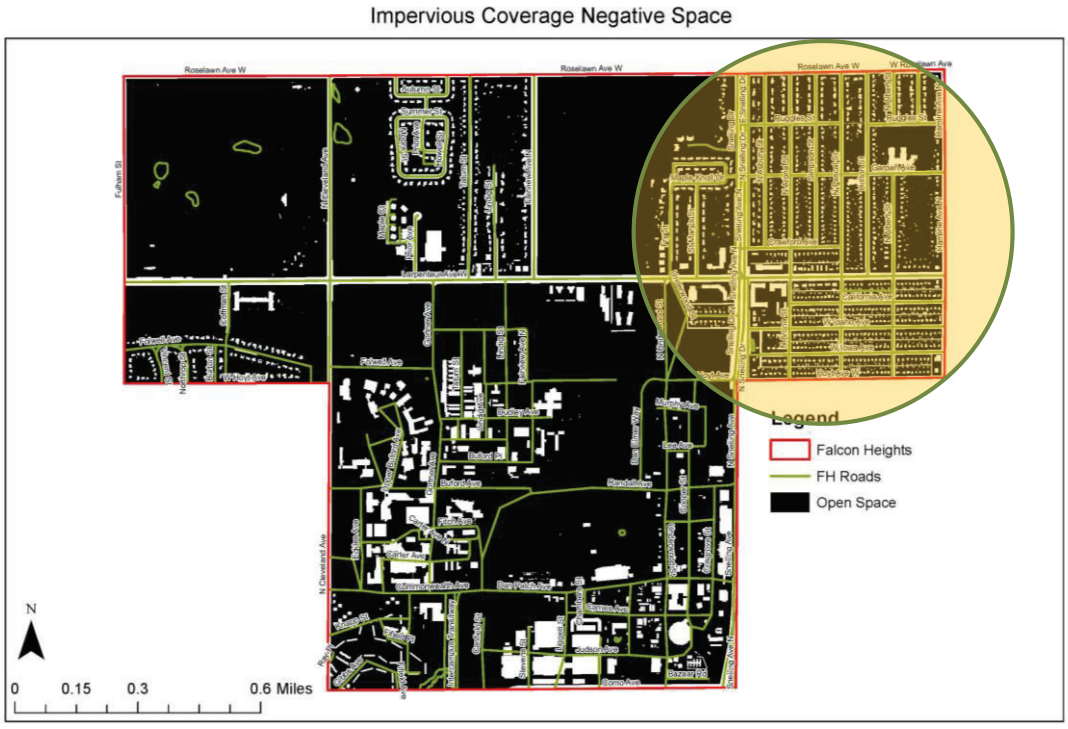


Figure 1 Map produced by: City of Falcon Heights

[3] http://www.health.state.mn.us/divs/climatechange/docs/mnextremeheattoolkit.pdf

Heat-related deaths are preventable. It's only going to get hotter, taking steps to reduce heat-related illness will save lives. The following table provides a snapshot of considerations for the community regarding prolonged heat events.

Prolonged Heatwaves			
Impact	**Resilience Strategy**	**Considerations**	**Co-benefits**

– Disproportionately affects health vulnerable populations:
  ○ Elderly
  ○ Young
  ○ Respiratory illness
  ○ Low-income
– Increased energy costs, unduly affecting low-income residents
	– Provide access to air conditioned space
	– Communicate dangers to residents
	– Encourage residents to check on vulnerable neighbors
	– Plant more trees and vegetation for shade
	– Use reflective roofing material (cool roofs)
	– Install green roofs
		– Air conditioning can increase carbon emission from power plants
		– Air conditioning units give off heat from system exhaust, increasing atmospheric temperatures
		– Air conditioning comes with higher energy costs
			– Better social cohesion
			– Trees and vegetation have been shown to increase mental well-being
			– Trees have been shown to increase property values
			– Trees store carbon and other pollutants

Stressed infrastructure (roads, bridges, etc.)	– Reduce the amount impervious surface – Plant more trees and vegetation for shade – Construct resilient roads	– Trees may be negatively impacted by invasive species, drought, and extreme weather – proper care and strategic species selection is important for a healthy urban forest	– Less impervious surface reduces stormwater runoff and increases the amount of rain water that can be captured and allowed to infiltrate

Prolonged Cold Spells

Similar to heatwaves, the weather can shift to a stall pattern where a particular event can stay over a given area for a longer period of time. As we've seen in more recent winters, arctic air has hovered over the state for several days, causing a deep freeze. Unlike air-conditioning during a heatwave, however, everyone has access to heat during a cold spell. That said, there are people who find it difficult to pay high heating bills during extremely cold periods. In Minnesota, Statute 216B.096 Cold Weather Rule makes it so utilities cannot disconnect any customer from October 15 to April 15. Although the heat will not be shut off, for low-income households a high-heating bill is often a hardship that is mitigated with potentially harmful practices. Under such circumstances, people take different measures to try to keep their bills low and stay warm, resorting to space heaters (fire hazards), lowering the thermostat (hypothermia), to more dangerous measure like building an indoor fire (fire and Carbon Monoxide hazards). These actions are most likely to occur in older homes that are poorly insulated and air sealed.

Cold spells also take a toll on public infrastructure. Freeze-thaw cycles can stress roads and bridges causing pot holes, which in turn can damage vehicles or create dangerous conditions for those traveling on bike.

The table below looks at the impact prolonged cold spells have on the community, strategies to mitigate the risk, considerations, and co-benefits that can be gained by taking action.

Prolonged Cold Spells			
Impact	**Resilience Strategy**	**Considerations**	**Co-benefits**

– Disproportionately affects health vulnerable populations:
  ○ Elderly
  ○ Immigrant populations
  ○ Low-income
– Increased energy costs, unduly affecting low-income residents
	– Educate residents on weatherization programs
	– Communicate dangers to residents
	– Encourage residents to check on vulnerable neighbors
	– Certain coniferous trees can provide wind blocks
		– Increased natural gas or electricity consumption increases greenhouse gas emissions	– Weatherization saves money and increases comfort
			– Encourages better social cohesion

Stressed infrastructure (roads, bridges, etc.)	– Reduce the amount impervious surface – Plant more trees for wind breaks – Construct resilient roads	–	– Less impervious surface reduces stormwater runoff and increases the amount of rain water that can be captured and allowed to infiltrate

Diminished Air Quality

Falcon Heights' residents can expect an increase in poor air quality days with more pollen, smoke from distant wildfires, and an increase in ozone. In the summer of 2015, the Twin Cities saw one of its worst air quality days that was caused by wildfires in Saskatchewan, Canada. On July 6th, 2015 the Minnesota Pollution Control agency expanded an unhealthy air alert to much of the state, with the air quality index well over 100 in most areas.[4] When this type of alert is issued, it is recommended for people to limit outdoor activity, remain indoors, and use air conditioning. Inhaling particulate matter, especially for sensitive groups (the elderly, children, those with allergies, asthma, or other respiratory illnesses) can have adverse impacts on their health.

With climate change, we can expect more wildfires to impact Minnesota air quality. In fact, 2015 has already exceed the 10-year average for acres burned. The Washington Post explains:

> *So wildfires are getting worse, and more expensive to fight. The practical consequences of course include greater risks to individuals and communities in harm's way, and also to the wildland firefighters.* ***They also include downwind air quality risks from smoke to people who do not necessarily live anywhere near the raging fires*** *[author's emphasis].*[5]

In addition to wildfires, climate change is lengthening the growing season for many plants, including allergenic plants, increasing the production and potency of the pollen. This will impact allergy sufferers and may result in

[4] http://www.mprnews.org/story/2015/07/06/air-quality
[5] http://www.washingtonpost.com/news/energy-environment/wp/2015/08/05/california-is-now-experiencing-its-scariest-wildfire-in-2015-so-far/

more people having allergic reactions. According to the Minnesota Department of Health, the current cost in the U.S. for hay fever treatment is more than 11 billion dollars each year.

As mentioned above, the temperature is expected to rise along with prolonged heatwaves. During high heat days with slow-moving weather patterns, air quality will deteriorate due to an increase in the formation of ozone. Ozone is caused by a chemical reaction between volatile organic compounds and nitrogen oxide with heat and sunlight. Exposure to ozone can deteriorate existing health conditions like allergies and asthma, result in new onset asthma or allergies, and may lead to serious illness or death.

Taking measures to improve air quality is an important step to mitigate its impact. However, there will be times when the city needs to be prepared for poor air quality days. Ensuring air conditioning is available, alerting residents to remain indoors as much as possible, and encouraging them to take precaution should they go outside. The graphic below summarizes impacts of air quality and considerations for reducing negative effects while capturing additional benefits and not worsening the problem.

Diminished Air Quality			
Impact	**Resilience Strategy**	**Considerations**	**Co-benefits**
– Disproportionately affects health of vulnerable populations: ○ Elderly ○ Young ○ Respiratory illness ○ Low-income ○ Outdoor workers	– Reduce emissions from stationary and mobile sources – Provide access to air conditioned buildings – Plant more trees – Educate residents on indoor and outdoor air quality – Increase use of renewable energy	– Increased use of air conditioners increases carbon emission from power plants – Trees may be negatively impacted by invasive species, drought, and extreme weather	– More trees and vegetation capture carbon dioxide and other pollutants – Solar energy can be installed to offset an increase in air conditioning
– Increased healthcare costs			

More Extreme Weather

There will be an increase in extreme weather events that will have different impacts depending on the variety of the event. Heavy rains can lead to flash flooding, downstream flooding, and basement flooding. Drought may impact water tables and tree health. Storms may cause damage to structures, infrastructure, trees, and other property. Heavy snow may cause property damage (e.g., ice dams), traffic delays, and automobile accidents. Weather patterns are increasingly slowing down, leaving weather stagnant for long periods of time. For example, extreme cold weather may stay for several days before moving out (discussed above). This also has an impact on rain and snow systems that move slowly over the region, dropping more precipitation.

Heavy Rain

The Midwest has seen an increase in the amount of rainfall since 1900, with larger increases in more recent year. Figure 2, below, illustrates the average precipitation differences by decade for 1901-1912 (relative to the 1901-1961 average) for the Midwest.

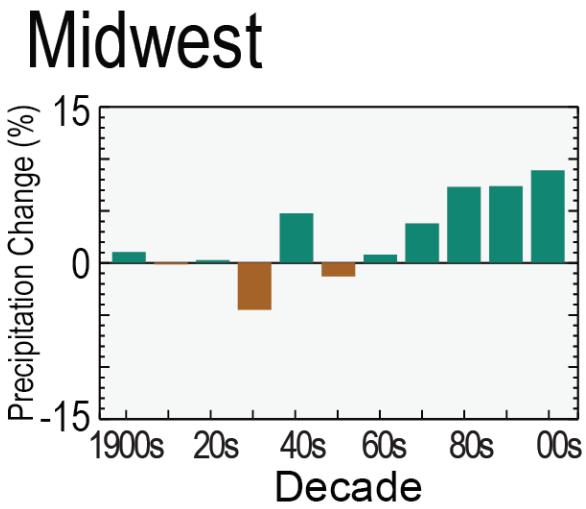


Figure 2 Observed Precipitation Change Decadal Bar Graph - Midwest (Source: Laura Stevens, Cooperative Institute for Climate Satellites, NC)

Not only is there an increase in precipitation, but there is also a change in the character of precipitation: it comes less frequently, but in higher volumes, i.e., heavier downpours. A consequence of heavier downpours is an increased risk of flooding. Falcon Heights does not contain any major bodies of water and is generally uphill, which means it is unlikely to see major flooding. However, there are several low-lying areas that are vulnerable to flash flooding, and basement flooding, causing water damage to vehicles and structures.

Further, all water must go somewhere. The runoff from pervious surfaces in Falcon Heights is conveyed through underground infrastructure. It leaves Falcon Heights and is directed towards Roseville where it ends up in Gottfried's Pit. Gottfried's Pit is a holding tank that keeps storm water for a time allowing sediments to fall before the water is redirected to Como Lake in St. Paul; water from Como Lake discharges into the Trout Brook storm-sewer, then into the Mississippi River.

In 2002, Como Lake was placed on the impaired waters list for aquatic recreation due to excessive nutrients, such as phosphorous, which causes algal blooms. In order to meet water quality standards, Como Lake needs a 60% reduction in watershed load and 97% reduction in internal load (existing lake sediments). Sources of pollution include organic materials like leaves and grass clippings, fertilizers (lawns and golf course), and sediments.

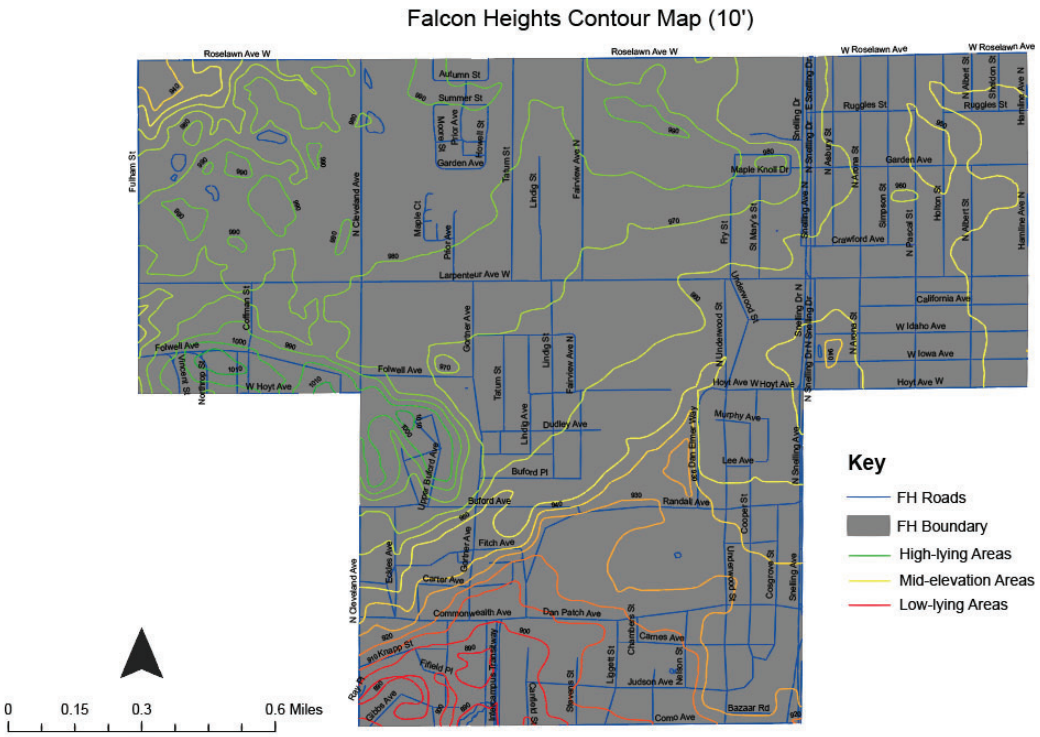


Figure 1 Falcon Heights Contour Map (Source: City of Falcon Heights)

The map above illustrates the low-lying areas in the community, these are the most likely to see flash flooding, and basement flooding where there are structures.

Heavy Snow

The heavier precipitation that is predicted for Minnesota includes snowfall as well as rainfall. Heavy snow fall can have many of the same impacts as rain, but there are also consequences unique to a snowstorm. The immediate impact can halt travel, which has an impact on businesses, and cause accidents as people try to drive in dangerous conditions. Under very heavy snowfall, there can be damage to structures that are unable to bear the weight. As the winter wears on, there is an increase in the chance of ice dams forming, causing damage to residential and commercial roofing and building structures. Rapid snow melt can lead to flooding in some areas and poor water quality when sediments are carried with the melt.

Drought

The future occurrence of drought in Minnesota is less certain than changing precipitation patterns, though it is anticipated that drought and prolonged dry periods will continue to occur regularly in the state. Drought impacts the availability of water, the quality of soil, increases the demand for irrigation (stressing the supply), water quality, and ecological systems. Drought also increases the risk of wildfire, which in itself is not a local issue, but can be when smoke from the wildfire impacts local air quality, as mentioned previously.

In Falcon Heights, concern with drought and extended dry periods include the impact vegetation, soils, and drinking water availability. The St. Paul Regional Water Services supplies Falcon Heights with drinking water. Much

of the water that serves the Saint Paul region comes from the Mississippi River (75%), it is supplemented with well reserves from the Prairie du Chien – Jordon aquifer. The St. Paul Water Management Plan acknowledges the impact of drought stating:

> *"Climatologists predict that Minnesota will have heavier rains and longer droughts due to global climate change. This will affect our water supply, our water usage, erosion, and surges into storm sewers[6]."*

The plan goes on to say that under normal conditions, there is an adequate water supply, and "when extreme drought conditions occur, the sources of the system is adequate to meet the foreseeable demand if demand is properly managed. This would entail a conservation strategy […] and additional groundwater or river water pumping[7]."

Generally, drought is not a concern for the availability of drinking water at this time and there are strategies in place to mitigate impact of severe drought in the future. Falcon Heights, should however, be prepared to water city trees and encourage residents to water theirs, in order to maintain a healthy urban forest and prevent soil erosion and other associated problems.

Storms

Extreme weather events are predicted to increase in frequency in Minnesota. As with the events mentioned previously, there will be physical, economic, and emotional stress that result from these events. Storms can cause heavy damage to homes, businesses, and other buildings; take down trees; disrupt power; and may cause injury or death. Falcon Heights will need to be prepared to respond to first aid needs and have the capacity to clean-up any debris caused by storms.

More Extreme Weather Events			
Impact	**Resilience Strategy**	**Considerations**	**Co-benefits**
Heavy Rain: – Flooding – Structural damage – Traffic delays – Poor water quality from runoff	– Stormwater management with green infrastructure – Increase Street sweeping – Resident education for fertilizer application	– Green infrastructure requires special attention and maintenance – More street sweeping increases costs	– Prairie restoration and habitat – Rain gardens improve aesthetics and water quality – Restored aquifers through infiltration
Heavy Snow: – Traffic delays – Ice dams – Roof collapse – Slower economy	– Improve snow removal – Communicate with residents to stay home – Identify alternatives to chemical and salt snow melt products – Increase alternative options to driving – Educate residents	– Snow melting strategies impact water quality – Residents should be educated on proper ice dam prevention, as they could make it worse with bad practices (ice-melt cables, chipping, etc.)	– Cleaner snow melt products reduces runoff impact – Properly weatherized homes are more affordable and comfortable – Driving alternatives reduce congestion and emissions

[6] http://www.stpaul.gov/DocumentCenter/Home/View/11886
[7] Ibid.

	regarding proper weatherization		
Drought: – Health of urban forest and vegetation – Reduces water table	– Plant drought resistant vegetation – Increase infiltration practices (rain gardens, porous surface)	– Porous surfaces require more maintenance – Rain gardens and similar features need attention and maintenance	– Drought resistant vegetation and/or rain gardens provide habitat for pollinators
Storms (Strong wind, hail, lightning, tornadoes): – Property damage – Injury or death – Fire (lightning, gas leaks) – Infrastructure damage – Power outages – Damaged urban forest	– Be familiar with Ramsey County Emergency Management plan – First aid training among residents – Education materials about proper insurance – Resilient electric grid – Emergency funds for repair or replacement of city infrastructure and trees – Utilize back-up generators (solar-powered battery when possible	– Traditional diesel generators can be loud and cause poor local air quality.	– Maximized preparation for unexpected events – Increased social cohesion – Smarter, cleaner grid that reduces emissions

Increased Ecological Changes

Warmer temperatures and longer growing seasons will mean a change for ecological systems. According to the Interagency Climate Adaptation Team's *Adapting to Climate Change in Minnesota* report, it is likely that there will be an increase in invasive species like emerald ash borers and gypsy moths that kill and defoliate trees, respectively. Longer growing season for weeds, means more pollen that impacts allergy sufferers, addressed previously. Species of trees may move north as it gets harder for them to survive in the new climate. The survival of blacklegged ticks, which carry Lyme disease among others, is strengthened during winters with heavy snowfall and warmer, wetter springs. There may be an increase in other invasive species that carry diseases that are not normally observed in the state.

Ecological changes in Falcon Heights will disrupt habitat for animals and insects living in affected trees, have negative impact on human and animal health, and reduce the urban tree canopy. The national assessment for Minnesota finds that:

> *The composition of the regions' forests is expected to change as rising temperatures drive habitats for many tree species northward. The role of the region's forests as a net absorber of carbon is at risk from disruptions to forest ecosystems, in part due to climate change.*[8]

[8] https://www.whitehouse.gov/sites/default/files/docs/state-reports/MINNESOTA_NCA_2014.pdf

A healthy urban forest is essential for a variety of reasons: trees absorb carbon dioxide from the atmosphere, converting it into oxygen which is released, and carbon which is stored in the wood. They improve soil quality, provide habitat for a variety of species, and help mitigate urban heat island effect through shading and transpiration. Trees can reduce energy in homes and business by shading in the summer and blocking cold wind in the winter.

Ecological changes that are not local may still impact Falcon Heights. Drought, disease, colony collapse, or other events will affect agricultural production in regions that supply food to the Midwest. This could result in food scarcity for one or many different types of food.

Ecological Changes			
Impact	**Resilience Strategy**	**Considerations**	**Co-benefits**
Invasive species can replace, disease, or kill native species (e.g. emerald ash borer, gypsy moth).	– Plant diverse species of native trees – Consider options for eliminating pests – Educate residents on prevention methods – Early detection/rapid response	– Some methods to eliminate invasive species have unintended consequences	– A greater variety of species provides great habitat for
Disease carrying insects may increase in numbers (e.g. ticks and mosquitoes)	– Educate residents of dangers of diseases and prevention strategies – Minimize standing water – Landscape management to reduce population	– Even with management practices, disease carrying insects will not eliminated and may still pose a threat.	– Landscape management strategies that work for one pest may also work for others
Ecological succession may change the make-up of the urban forest.	– Forest management practices to keep specific species – Continued forest management	- Forest management efforts may be impacted by invasive species	- Forest management efforts may reduce the impact of some invasive species

Community Park, Falcon Heights. Photo Credit: GPI

RESILIENCE ANALYSIS

The resilience analysis used a modified version of the Rockefeller Foundation's City Resilience Framework. Under this framework, resilience to climate change is analyzed through the lenses of Leadership and Strategy, Economy & Society, Healthy Communities, and Infrastructure and Environment. The analysis looked into each of these areas to identify strengths and vulnerabilities in Falcon Heights' current city operations, functions, and services. This analysis will be used to inform the recommendations for the city's comprehensive plan.

Each of these areas are discussed in more detail below. They include an examination of how city functions and operations fit within each category. At the end of each section, lists of strengths, vulnerabilities, and operations have been identified for the city's consideration.

LEADERSHIP AND STRATEGY

Resilient communities have strong leadership to guide them through an integrated planning processes. Decision-making is inclusive and involves a broad range of stakeholders to ensure everyone is informed and involved in the planning of their city. Effective management and thoughtful strategies foster community goals that address climate-related vulnerabilities with opportunities to enhance resilience across city operations and services.

ELECTED OFFICIALS & COMMISSIONS

Falcon Heights has 5 elected officials, four council members and a mayor, all acting on behalf of residents to make community-wide decisions that will impact the future of the city. The leadership in Falcon Heights has taken a number of actions to improve the sustainability and resilience of the city to date. Falcon Heights is a Step 3 GreenStep City, completing a number of actions aimed at sustainability. These actions are rooted in 5 best practice categories, including: transportation, land use, environmental management, buildings and lighting, and economic and community development. Leadership in sustainable practices has been the foundation for the implementation of numerous sustainable actions, including those in the illustration below.

Figure 3 Sustainable actions taken within the City of Falcon Heights

The Environmental Commission is another important leadership body that has been instrumental in initiating a number of efforts, including participation in the Regional Indicators program, which allows the city to measure its carbon footprint city-wide. Regional Indicators measure: transportation; trash; water; and other inputs to identify

a baseline of carbon emissions. This information can be used by the city to target where it wants to work to reduce carbon emissions in city operation, functions, and actions by businesses and residents.

Other Commissions include:

- **Parks and Recreation Commission**
- **Community Engagement Commission**
- **Planning Commission**

CITY DEPARTMENTS

The following table summarizes the city departments and their functions:

Public Works	Public Works is responsible for snow removal, parks, maintenance of the streets, and other city property and infrastructure.
Permits & Inspection	Responsible for building permits and inspection of new construction or alteration or repair of existing structures.
Zoning, Planning & Community Development	Enforce zoning code, modify and update city codes and plans, provide residents, businesses, and contractors with information regarding city regulation, inform council members of city activities.
Forester	Manages the trees and vegetation in the city. This position is contracted.
Fire Department	Volunteer first responders for Falcon Heights and neighboring communities.

SHARED SERVICES

Falcon Heights is a small city both in terms of population and geography. It is however, located within a major metropolitan area and surrounded by several larger communities that have greater resources. Sharing services with these communities is a more efficient use of resources than Falcon Heights taking them on itself. The table below summarizes the interaction between Falcon Heights and each government entity.

Ramsey County:	Falcon Heights is located within Ramsey County. The County coordinates emergency management and response and maintains county roads.
Metropolitan Council:	The Metropolitan Council is the regional planning authority and is responsible for the operation and maintenance of: Metro Transit, sewer lines
St. Anthony:	Falcon Heights is served by the police services of St. Anthony.
St. Paul Regional Water:	St. Paul Regional Water Service provides the city water from the Mississippi River.

COMMUNITY EMERGENCY RESPONSE TEAMS

The Community Emergency Response Team (CERT) is a national program organized by the Federal Emergency Management Agency (FEMA). The CERT program trains civilians across the country to prepare for and respond to emergency situations in their communities. The Falcon Heights' CERT program was started in 2004 and has since trained 140 residents (4 community members have completed 'train the trainer' programs). The goal of the program is to have as many residents trained in the appropriate actions to take under a given circumstance. In doing so, residents can better respond to assist neighbors immediately after an event and before emergency crews arrive.

The program has been less active in recent years due to de-emphasis on emergency preparedness and few resources to support the program. However, CERT has maintained enough structure to appropriately respond to events and help community members when needed. In June 2013, a severe storm blew through the Twin Cities with heavy rain and sustained wind gusts over 70 miles per hour. The storm left behind flooding in streets and basements, property damage, hundreds of uprooted trees, and downed power lines. Members of CERT responded, fliering the city with information regarding the situation and the city's response. Important information, including household maps and a list of residents' numbers assisted in the effort to reach out to people and offer assistance.

Having an on-the-ground network to support communication and assistance efforts, not only strengthens a community's social cohesion, but can save lives.

Strengths:

- Falcon Heights has demonstrated strong leadership, guiding sustainable and resilient best practices.
- The city has integrated a number of sustainable practices into its city operations.
- Shared services with other communities and government entities allows the city to increase efficiencies and decreases expenditures for services.

Vulnerabilities:

- There are several policies with good intentions that lack strategies for implementation.
- Waning interest in programs like CERT reduce its ability to respond when needed.

Opportunities:

- Identify and adopt strategies to implement actions related to resilient policies.
- Establish a clear set of goals and strategies to support programs that increase resident resilience, such as CERT.

Solar Panels atop City Hall. Photo Credit: City of Falcon Heights.

ECONOMY AND SOCIETY

Resilient communities provide stability for their residents in terms of economic and social prosperity, and in the services delivered by the city. Maintaining a diverse local economy while strategically using city resources is less likely to be affected by economic volatility, regional recession, or changing politics. In times of crisis, the city needs to be able to meet the basic needs of its residents through emergency preparedness operations.

CITY BUDGET

The Falcon Heights City budget was most recently tested during the great recession, where the economy was depressed and local government aid was cut. This required the city draw from reserves and make strategic cuts in order to keep staff and continue to provide quality services to residents.

City budgets tend to be volatile, subject to the health of the economy and the whim of politicians. Emergency events can further put stress on budgets that do not have enough reserves in place to cover the costs of repairing and rebuilding. Maintaining and balanced budget and high quality services ensures better value for residents.

LOCAL ECONOMY

Economically, Falcon Heights does well when compared to the state. The Median household income in 2013 was $67,840 while Minnesota's was $60,702. Further the estimate median house value was $260,970; Minnesota was $180,100. However, the percentage of residents living in below poverty is nearly 9%.

The local population is also well-educated with 99.1% of adults over 25 years having completed high school; 69.6% have at least a bachelor's degree; and nearly 40% have a graduate level degree. The unemployment rate is in line with the state's at under 5%.

EMERGENCY OPERATIONS

Ramsey County is the lead entity for the Multi-jurisdictional Hazard Mitigation Plan that includes Falcon Heights. In its plan, the County has identified hazards and associated risks as well as the critical facilities that will be impacted and any economic disruption. The Plan also identifies responsibilities for each community under certain circumstances. Understanding the plan and the role of the city is important in the successful execution of the Plan in the event of an emergency.

Strengths

- The city has demonstrated maintaining a strong budget in times of economic volatility.
- Shared services with other entities help to keep expenditures low.
- The County has a detailed Hazard Mitigation Plan to respond to major emergencies in the region.
- The city has a high percentage of well-educated residents.
- Major employment centers are located in and around the boundaries of the Falcon Heights.

Vulnerabilities:

- Fluctuation in Local Government Aid Funds can lead to uncertainty.
- Costs for the maintenance of city infrastructure is likely to increase due to climate impacts (e.g., more frequent road repairs, damage costs, urban forest restoration, more frequent street sweeping, etc.)
- Future economic crises will lead to instability for city budget and operations.
- Nearly 500 residents live below poverty within the city.
- Emergency situations may hinder communications protocol.

Opportunities:

- Emergency funds for unexpected expenses due to damage or over-capacitated infrastructure.
- Lower cost alternatives for city services/operations:
    - Increase use of renewable energy
    - Identify additional energy efficiency opportunities
    - Utilize natural systems to the extent possible in order to lower capital costs associated with traditional infrastructure.
    - Reduce the amount of hard surfaces within the city to minimize maintenance and repair.
- Identify vulnerable populations and strategies to support and increase their resilience.
- Have a strong understanding of the County's Hazard Mitigation operations and institutionalize practices and protocols among city staff.
- Consider a franchise agreement with utilities to generate funds dedicated toward infrastructure improvements.

HEALTHY COMMUNITIES

Healthy communities tend to be more resilient in the face of a changing climate. Fostering healthy communities through better food choices, installing complete streets, and sustaining the health of a population reduces the impact of climate related events that are especially detrimental to vulnerable residents.

In times of crisis, the city must be prepared to meet the most basic needs of its residents, including ensuring everyone has access to food, water, sanitation, energy, and shelter. Understanding the demographics of a community (i.e., who is most at risk) and what may impact them is critical to saving lives, reducing impact of hazards (heat, air pollutions, etc.), and rebounding from a major event. Encouraging healthy lifestyles leads to a more resilient population who are better able to withstand climate-related impacts, especially those that affect vulnerable residents.

POPULATION

Falcon Heights is home to 5,321 residents with more than 2,196 households. Growth has been slow and steady since 1960. Many of the residents live in single-family suburban style housing, with 19 multi-family properties that have 703 units. The geographic area of the city is relatively small and covers 1,400 acres, though much of this area is outside the City's jurisdiction and falls under University of Minnesota or the Minnesota State Fair's authority.

The median age for residents is 31.8, which is lower than both the county (34.6) and the state (37.6). This number may be slightly skewed toward a younger age given the proximity to the University of Minnesota. Just over 12% of residents are over the age of 65; 20.1% speak a language other than English at home; and nearly 9% live below poverty.[9]

Strengths:

- The city has four parks that offer recreation opportunities for residents that encourage healthy and active lifestyles, reducing the number of people with illnesses that can be impacted by changes in the climate.
- The city promotes alternative transportation modes including biking and walking, which both support active living.
- A community garden is located at Roselawn and Cleveland.

[9] American Fact Finder, 2013 data for Falcon Heights, 2010 U.S. Census

- The City has a policy for active living in its Comprehensive Plan:

  > **General Land Use Policies: #5**. On transit routes, where appropriate, allow the redevelopment of multi-family and commercial properties for mixed use or higher density housing, incorporating best practices for conserving green space and promoting active living.

- Falcon Heights is geographically small and relatively dense, allowing emergency responders and others to more easily reach out and assist residents in need during dangerous events like extreme heat, poor air quality, or destructive storms.

Vulnerabilities:

- Vulnerable populations include:
  - The elderly (12% of residents)
  - Physically disabled residents
  - Low-income residents, particularly those with limited or no access to air conditioning
  - Those with illnesses that depend on medical equipment (power outages)
  - People who are sensitive to air quality or extreme heat (respiratory illnesses, allergies, etc.)
  - Residents whose first language is something other than English may not understand alerts that are sent out in one language and therefore may be at risk.
- Food Security
  - The nearest grocery store is nearly 10 miles away

Opportunities:

- Identify populations that are at risk for various climate related events.
- Implement prevention strategies to maintain a healthy population (e.g. participate in the Statewide Health Improvement Program).
- Continue to expand network of non-motorized transit, developing walking and bicycling paths to encourage active living.
- Consider opportunities to encourage the reduction of emissions through education, incentives, events, land use planning
- Develop a strategy to implement Complete Streets policy
  - Increase healthy food options (e.g. The Good Acre food hub will open in October 2015)

Garden in Falcon Heights. Photo Credit: Abby Finis

INFRASTRUCTURE AND ENVIRONMENT

Enhancing operations to ensure continuity of service will be a challenge for communities. Knowing a system's capacity and limitations can help a city prepare for a major event. Understanding natural systems (e.g., stormwater infiltration and renewable energy) and putting them to work can ease the burden of city infrastructure, saving costs and mitigating associated emissions. There are many opportunities for Falcon Heights to improve resilience in its infrastructure and services including: storm water, waste water, street infrastructure, vegetation, electric and natural gas utilities, and other services.

STORM WATER

Storm water in Falcon Heights is conveyed through a variety of sewer line sizes. Generally, there is little risk of flooding in the city given its topography, however there have been incidences of basement flooding and flash flooding at several intersections. Further, conveying large volumes of water impacts the quality of downstream water bodies. In this instance the water quality of Como Lake is greatly impacted by storm water conveyance in Falcon Heights and surrounding communities.

Strengths:

The City has taken several steps to reduce the amount of water that is conveyed to Como Lake:

- In that past 2 years, 6 underground containment structures have been constructed to hold water and allow it to percolate down into the ground.
- At City Hall, the parking lot is paved with porous asphalt, and has two rain gardens to capture runoff before it reaches the storm water system.
- As street projects are completed, the City looks to add rain gardens or bio-swales where there is room.

Vulnerabilities:

- Flash flooding can occur during heavy downpours in low-lying areas.
- Basement flooding can occur during heavy downpours in low-lying areas.
- Diminished water quality of Como Lake from excessive stormwater runoff.
- The storm water system was originally constructed in 1957. However, as the city makes road repairs, it simultaneously assesses whether or not storm water structures are in need of repair or replacement.

Opportunities:

- Storm water best management practices identified by the Minnesota Pollution Control Agency[10] include:
    - Increase ponding
    - Install infiltration trenches
    - Install rain gardens
    - Restore native plants
    - Retrofit detention ponds
    - Educate property owners about proper fertilizer uses and low-impact lawn care products
- Como Lake Strategic Implementation Plan adds increased street sweeping.

[10] http://www.pca.state.mn.us/index.php/view-document.html?gid=13083

SEWER

The Falcon Heights sewer system was constructed in 1957. The system is regularly maintained and is in the process of being updated. Eight years ago there were 2 major back-ups that caused the city to alter its maintenance schedule. Since then, every other year, half the city lines are cleaned out and a camera is used to find any obstructions or leaks, including root balls from trees or foreign objects. There have been no issues since the current procedure has been in place.

The Metropolitan Council maintains regional interceptor sewers that collect the flow from Falcon Heights. If there were a disruption down the line, residents would be notified of the issue and warned not to use the sewage system until the problem is resolved.

Strengths:

- The Met Council has a goal of reducing its fossil-fuel energy 50% by 2020 below a 2006 baseline.
- Met Council Environmental Services consistently achieves near-perfect compliance with federal and state clean water discharge standards.
- Falcon Heights has instituted a procedure to minimize inflow and infiltration.
- The sewer lines are currently being updated to improve function.

Vulnerabilities:

- Major rain events can lead to inflow and infiltration, causing basement backups and taking up capacity in sewers and wastewater treatment plants
- Factors that contribute to susceptibility include:
    - Age
    - Condition
    - Pipe material
    - Construction
    - Soils
    - Water table elevation

Opportunities:

- Continue to monitor city sanitary sewer pipes for open joints, broken or cracked pipe and replace, as needed.
- Mitigate stormwater runoff to minimize the risk of inflow and infiltration.
- Educate residents about what not to put down the drain (e.g., ‘flushable’ wipes).

STREETS

The City of Falcon Heights is responsible for maintaining 47 miles of road. Most of the streets were redone from 1997 to 1999 and have held up well, thought the chip seal is peeling off. The last road project maintained good longevity and it is expected to be the case with the next round of street updates.

Extended heatwaves can have an impact on roads, causing them to buckle or crack, leading to increased maintenance costs. Further, more frequent freeze thaw cycles in the winter also lead to more potholes and more maintenance. As the climate warms, there is the potential for the roads to face different conditions of warming as well as an increase in the fluctuations of temperatures in the winter months potentially causing an increase in stress on the roads.

Another impact associated with roads is the amount of vehicle traffic that flows through the city. The Regional Indicators analysis reported in 2013 that there were 34,387,015 vehicle miles traveled in Falcon Heights. According to MNDOT calculations, for every mile traveled by an automobile, there is a $.03 climate and health related emission cost[11], therefore, VMT in Falcon Heights incurs $10.3 million in climate and health related costs.

Finally, the city may see an increase in average annual snowfall and more frequent heavy snowfall events. Additional snowplowing will increase city costs for removal, as well as costs associated with greater stress on the roads due to increased snowplow traffic.

Strengths:

- The conditions of roads have held up well since they were last resurfaced.
- The city has implemented a complete streets policy to encourage all modes of transportation as well as green infrastructure practices.
- Most city streets have a low volume of traffic, reducing impact and tailpipe emissions.

Larpenteur Avenue, Falcon Heights. Photo Credit: GPI

Vulnerabilities:

- Heat can cause roads to buckle, increasing maintenance costs.
- Freeze thaw cycles can cause pot holes, increasing maintenance costs.
- Heavy snowfall can cause traffic delays, and greater use of the road by heavy equipment (i.e. snowplows)
- Unshaded roads contributes urban heat island effect, which can exacerbate the impact of heatwaves.
- The complete streets policy has not resulted in construction of complete streets within the community.
- Any increase in VMT also increases the associated health and climate costs.

Opportunities:

- Work with MNDOT for to determine best material for re-pavement for durability and longevity.
- Maintain boulevard trees to maximize street shading.
- Identify strategies to implement complete streets policy.

[11] http://www.dot.state.mn.us/planning/program/appendix_a.html

UTILITIES

Electricity and gas are critical services that are necessary for the everyday functions of city government, businesses, residences, lights, and traffic signals. Power outages or natural gas disruptions can have severe impacts on populations including: economic disruptions, loss of heat during cold spells, loss of power during heatwaves, and loss of power at critical facilities such as hospitals. It is critical to maintain a resilient grid and ensure natural gas is available during the coldest days of the year.

Strengths:

- The city has adopted a solar ordinance making it easier for residents and businesses to install solar energy systems
- The city leads by example with a large solar installation on top of city hall
- Falcon Heights is part of a community solar project to receive 100% of its electric generation from solar
- The city has replaced all of its street lights with LED technology

Vulnerabilities:

- Severe weather can cause prolonged power outages that may last several days or longer.
- Heatwaves can cause power outages by excessive energy consumption.
- The electric infrastructure is aging and is susceptible during severe weather events.
- High gas and electric bills are disproportionately impact low-income households

Opportunities:

- Conduct solar resource analysis to determine prime solar sites
- Work with utilities to develop a plan to reduce energy consumption, increase grid resilience, and advance renewable energy penetration.
- Encourage businesses to participate in PACE
- Provide educational materials to residents for energy improvements and solar energy installations.

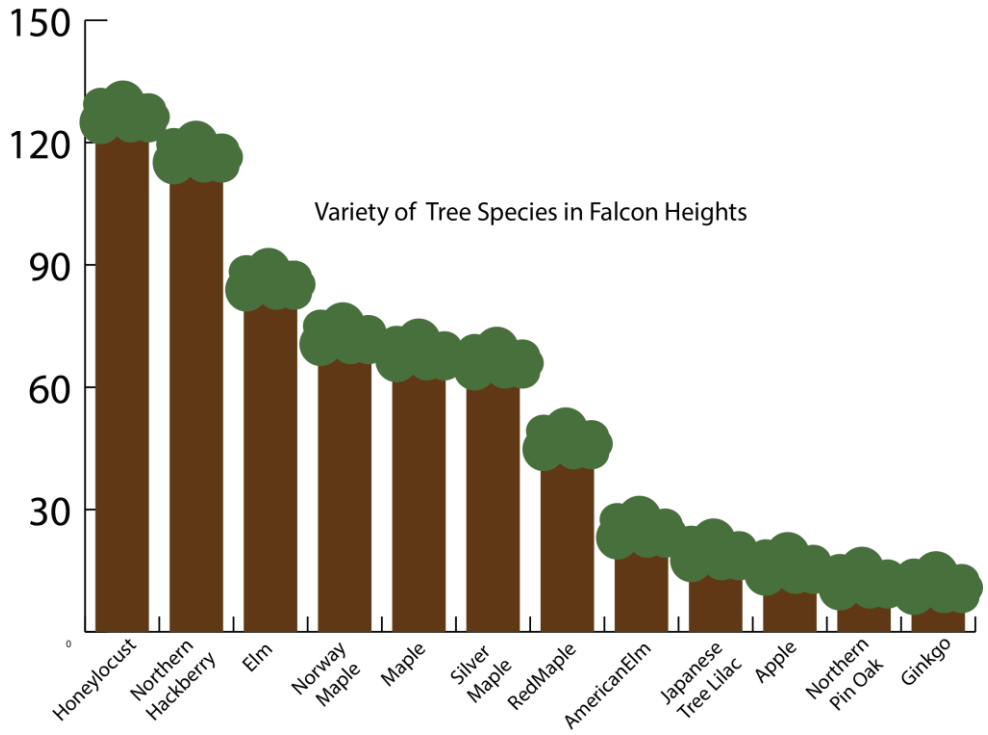
TREES

Trees are one of the most important assets a community can invest in to enhance its resilience. Trees absorb pollutants (including carbon dioxide), break wind, provide shade, prevent soil erosion, and improve mental health, among other benefits. Maintaining an urban forest and prioritizing management in consideration of climate change will help the community retain its canopy and realize the many benefits.

Residential areas of Falcon Heights have good tree canopy coverage, providing shade to homes, as well as pleasant scenery along the streets. Recently, the city received a grant from the Department of Natural Resources to remove all Ash trees in an effort to stop Emerald Ash Borer from spreading. The trees are generally being replaced 1:1, though not always in the same locations. It will take time for the new trees to mature before the city can regain the canopy it had previously.

Generally, urban forests should be maintained so that they include a mix of different species. This allows foresters to better manage invasive species that target specific trees such as Ash (Emerald Ash Borer). The graph below shows the distribution of trees species within the city for tree types with 10 or more trees in Falcon Heights. The

forest is dominated by Honey Locust and Northern Hackberry; there are a number of remaining Elm; and several varieties of Maple trees.



Tree distribution in Falcon Heights. Source: City of Falcon Heights Tree Survey 2015.

Strengths:

- The city contracts and urban forester to manage boulevard trees.
- The city tries to replace trees 1:1 with greater diversity of new trees.
- The city has recently surveyed its existing tree inventory.

Vulnerabilities:

- Storms with high winds can break limbs and uproot trees.
- Storms with heavy precipitation can increase the risk of trees being uprooted by strong winds.
- Invasive species can defoliate or kill certain trees.
- The future climate may not be suitable for certain tree species.
- Trees may be susceptible to disease.

Opportunities:

- Identify areas where trees can be planted (e.g. increase shade over paved areas).
- Develop a map with location, type, and age of trees for a better visual inventory of existing trees.
- Examine opportunities to save remaining Elm trees.
- Determine appropriate allocation of funding to improve urban forest management.
- Educate residents on importance of planting and maintaining trees.

RECOMMENDATIONS & CONCLUSION

Resilient communities have the capacity to respond, adapt, and thrive under changing conditions. Extreme and unforeseen events, both weather and economic, have long lasting environmental, social, and economic consequences. Creating a comprehensive plan in today's uncertain and rapidly evolving world requires considering a new climate and weather reality, an increasingly global marketplace, and evolving social structures.

The City has already taken a number of steps to improve resiliency. Elements of resiliency are already incorporated into the City's existing comprehensive plan, though not explicitly as resilience actions. City practices have addressed resilience including storm water management, encouraging active living, and managing the city's budget through uncertainty. Continued participation in the GreenStep Cities program has allowed the city to track and identify sustainable practices that enhance its resiliency.

Falcon Heights has identified the importance of building on its previous efforts to become more resilient. The existing comprehensive plan includes a number of policies related to resiliency, but without clear strategies for action, many policies don't become reality. Resiliency issues should be incorporated into all three phases of the city's next comprehensive plan including: **Existing Conditions**, **Desired Conditions**, and **Strategies and Actions**. Examples of what the city may include in its comprehensive plan are included below.

The new comprehensive plan should consider the following elements within the **Existing Conditions** section:

- **Leadership and Management**
  - Identify resilience policies and actions that within city documents and past action.
  - Inventory and describe existing standards, codes, guidelines, and tools that can be modified to enhance resilience.
- **Economy and Society**
  - Analyze how the city budget has been used in the past to implement city goals.
  - Assess diversity of local economic base and its ability to withstand volatility.
- **Healthy Communities**
  - Conduct a health assessment of residents including available opportunities to improve well-being through active living, air quality, and availability of healthy food options.
  - Identify vulnerable populations within the city that may be disproportionately impacted by various extreme events.
- **Environment and Infrastructure**
  - Identify the availability of redundant systems that allow for rapid response to unforeseen or extreme events in city operations.
  - Assess limitations of and opportunities to transform infrastructure, buildings, and natural systems to be able to resume functionality after extreme events.

The new comprehensive plan should engage community members to identify **Desired Conditions**:

- **Leadership and Management**
  - Establish Falcon Heights as a leader in resilience planning.
  - Set goals for city departments to implement a set number of resilience actions each year.
- **Economy and Society**
  - Reduce the number of low income residents each year through supportive programs
  - Maintain a healthy reserve budget to respond to and pay for unexpected events.
- **Healthy Communities**
  - Provide better access to healthy food choices and increase food security.

    - Reduce vehicle miles traveled and become a more walkable and bikeable community.
- **Environment and Infrastructure**
    - Reduce the amount of storm water runoff that is conveyed through the sewer system.
    - Increase species diversity and maximize tree canopy coverage over hard surfaces.

The new comprehensive plan should identify **Strategies and Actions** that:

- **Leadership and Management**
    - Modify standards, codes, guidelines, and tools to enhance resilience.
    - Develop new processes for city departments to incorporate resilience actions into every day operations.
- **Economy and Society**
    - Track implementation of resilience goals that support the city functions and societal needs.
    - Prioritize budget goals to be in line with resilience goals.
- **Healthy Communities**
    - Develop programs and educational efforts that encourage resilient habits and practices among residents.
    - Develop assistance and outreach programs to support vulnerable populations in the community.
- **Environment and Infrastructure**
    - Develop a resilience checklist that ensures all city projects consider resilience elements before they begin.
    - Identify opportunities to strengthen the city's ability to update infrastructure

In updating its plan, Falcon Heights should consider prioritizing opportunities for making public infrastructure investment practices and designs more resilient. A number of resources identify best practices that can be tailored to Falcon Heights, such as the Envision infrastructure rating system, RELi resiliency action list, the GreenStep Cities resiliency best practices (in progress), EPRI's "Integrated Grid" concepts, and other infrastructure-specific standards and best practices that are evolving to address resiliency. Moreover the city should consider incorporating social and economic resiliency tools and measures, such as Health Impact Assessment tools from the Minnesota Department of Health and FEMA's guidance on building resiliency into its comprehensive plans to both mitigate risk and enhance emergency response.