REGIONAL CLIMATE VULNERABILITY ASSESSMENT

Part 1: Localized Flood Risk
Chapter 2: Regional Parks System

METROPOLITAN COUNCIL

January 2019

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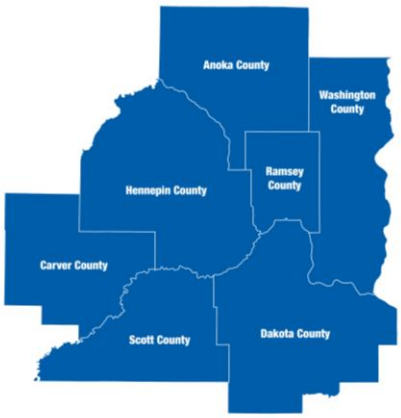

The Metropolitan Council is the regional planning organization for the seven-county Twin Cities area. The Council operates the regional bus and rail system, collects and treats wastewater, coordinates regional water resources, plans and helps fund regional parks, and administers federal funds that provide housing opportunities for low- and moderate-income individuals and families. The 17-member Council board is appointed by and serves at the pleasure of the governor.

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Chapter 2: Regional Parks System

The seven-county Twin Cities metropolitan area is home to a system of regional parks and trails that are nationally renowned for their beauty, size, and variety of features. The Regional Parks System was established in 1974 to provide regional recreation open space for public use in the metro area. Since its inception, the Metropolitan Council has invested state and regional funds to help local park agencies develop the first designated regional parks, as well as to acquire and develop new parks and trails for the growing metropolitan population. The Regional Parks System is operated by ten partner agencies that work with the Council to implement the *2040 Regional Parks Policy Plan* and provide outdoor recreation space for public enjoyment. These partners are known as regional park implementing agencies and consist of the following cities, counties and special park districts:

- Anoka County
- Carver County
- Minneapolis Park and Recreation Board
- City of Saint Paul
- Three Rivers Park District
- City of Bloomington
- Dakota County
- Ramsey County
- Scott County
- Washington County

The Regional Parks System comprises four main components: regional parks, park reserves, regional trails, and special recreation features.

Regional Parks: Regional parks most notably contain a diversity of nature-based resources, either naturally occurring or human-built, and are typically 200-500 acres in size. Regional parks accommodate a variety of outdoor recreation activities.

Park Reserves: Like regional parks, park reserves provide a diversity of outdoor recreation activities, but are larger in size. The minimum size for a park reserve is 1,000 acres. Park reserves are also required to manage at least 80% of the park reserve as natural lands that protect the ecological functions of the native landscape.

Regional Trails: The Metropolitan Council defines two major types of trails to serve the seven-county metropolitan region: 1) destination or greenway trails and 2) linking trails. Destination or greenway trails typically follow routes with high-quality natural resources that make the trail itself a destination. Linking trails are predominately intended to provide connections between various Regional Parks System units, most notably regional parks and park reserves.

Special Recreation Features: special recreation features are defined as Regional Parks System opportunities not generally found in the regional parks, park reserves, or trail corridors. Special recreation features often require a unique managing or programming effort.

Today, the Regional Parks System consists of 54 regional parks and park reserves, 43 regional trails totaling nearly 400 miles, and eight special recreation features, with an estimated 58.3 million visits in 2017. For purposes of this analysis, regional parks, park reserves, and special recreation features are collectively referred to as “regional parks.”

Localized Versus Riverine Flooding

View of the Mississippi River from Pine Bend Bluffs Scientific and Natural Area in Dakota County. Source: Metropolitan Council Digital Image Library

Riverine flooding areas are generally known and regulated by relevant stakeholders, be they local floodplain managers or state agency staff. Riverine flooding should be considered with the latest modelling data and Atlas 14 precipitation estimates to ensure that all floodplain mapping is up to date and as accurate as possible.

Considering localized flooding helps expand understanding of flooding dangers, which has traditionally relied upon rigorously studied and closely managed 100- and 500-year floodplains. Much of the built environment, including park structures and trails, has intentionally been located outside the floodplain, or has been built to withstand flooding, whether as a matter of best practice or regulation.

When examining potential impact of flooding events on infrastructure, the floodplain should be considered alongside localized flooding hazards. Considering localized flooding together with riverine flooding will inform analysis of built assets, existing emergency management, and potential compounding of hazards where both types of flood impact could occur.

The localized flooding data layer does not replace FEMA floodplain information. It allows for a localized screening of areas that could be prone to surface water flooding that can occur outside the influence of streams and rivers. In recent years, stakeholders have seen much more surface or localized flooding from short, intense rain events. Though implementing agencies plan for such occurrences, sometimes stormwater infrastructure can become overwhelmed or blocked. The localized flooding data shows potential flood risks in the regional parks system in the event of stormwater infrastructure failure. The FEMA floodplain is not depicted in this analysis because the implementing agencies currently plan for and mitigate riverine flooding through asset management and emergency preparedness. Localized flooding is a much less understood and often underacknowledged flood risk. Therefore, this analysis focuses solely on surface water or localized flooding.

This analysis considers localized flooding exposure based on the aggregate holdings of each regional park implementing agency, rather than each individual park or asset. Hazard mitigation can vary considerably between parks, agencies, and degree of flood exposure. Regional park implementing agencies, as landowners and asset managers, are encouraged to use the localized flooding data to assess their parks on an individual basis using criteria and priorities defined by their unique needs and objectives.

To learn the methods employed in creating the localized flooding data layer, please refer to the document titled *Localized Flood Risk – Introduction*.

Localized Flood Hazard Categorization

Figure 1. Map view of a Bluespot and a Bluespot Cross-section using Council Categorization

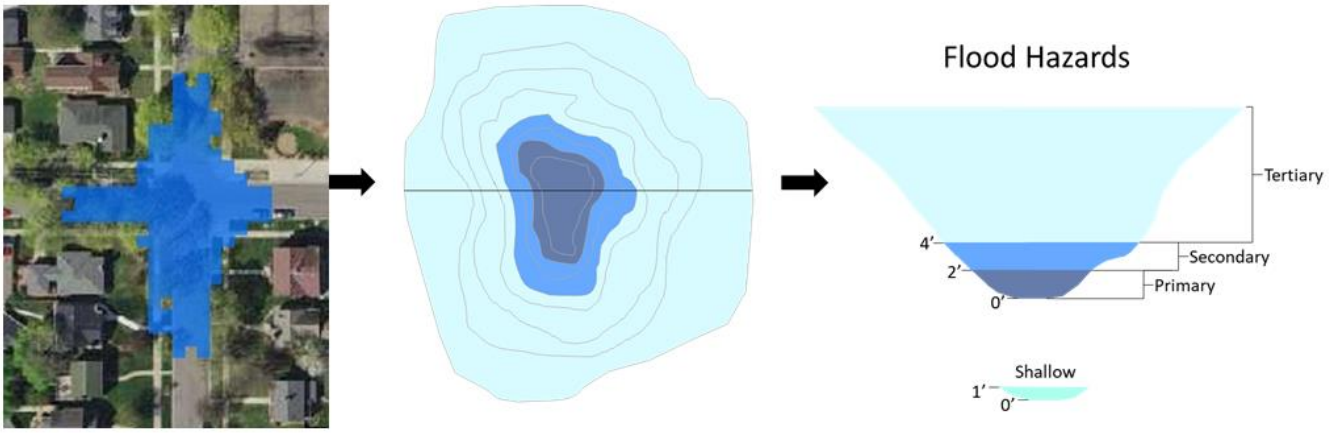


Figure 1 below shows an aerial map view and a cross-section of a generalized localized flooding area, otherwise known as a "Bluespot." This visualization can help stakeholders understand that the first areas to fill with water tend to carry the highest risk, and therefore assets in those areas tend to have the highest vulnerability to impacts associated with localized flooding.

The third image in Figure 1 shows the Council categorization of localized flood risk. Primary, Secondary, and Tertiary categorizations make up the contiguous Flood Impact Zone (FIZ), while Shallow areas are isolated localized flooding areas of 3in to 1ft in depth. The vulnerability of specific assets depends on each asset's sensitivity and exposure to different levels of flooding. This is discussed more thoroughly in each section of this chapter. Typically, areas that are first to fill with water during a localized flooding event carry the highest risk; therefore, most assets located within a Primary Flood Impact Zone will likely carry the highest potential vulnerability due to a higher probability and risk of flooding.

Stakeholder Use of the Data

The *Localized Flood Map for Climate Vulnerability Screening* is publicly available at high resolution. Local communities and other stakeholders may conduct similar analyses to assess conditions and vulnerabilities that may inform adaptive strategies for local system assets. *The Localized Flood Map Screening Tool* is also available for stakeholders that do not have access to GIS software.

People walking on a trail at Lake Phalen Regional Park in Saint Paul. Source: Metropolitan Council Digital Image Library

Assessment Overview of Regional Parks

Table 1 provides information on overall localized flooding potential for each regional park implementing agency. There is some variation among agencies in percentage of total localized

flooding exposure. There is also variation among agencies in proportion of parks within the Primary Flood Impact Zone (FIZ). As shown in Figure 1 above, the first areas to fill with flood water, the Primary FIZ, tend to carry the highest risk. Overall, total localized flooding exposure of regional parks, and regional park exposure specifically to Primary FIZ, is comparable to the averages for the region as a whole.

Table 1. Potential Localized Flooding in Regional Parks, by Implementing Agency, with Surface Water area removed

Regional Park Implementing Agency	Total Area* (mi^2)	Localized Flood Exposure (mi^2)	% Exposure	Total Primary Area (mi^2)	Primary % of All Exposed
Anoka County	11.13	3.64	33%	1.35	37%
City of Bloomington	2.31	0.77	33%	0.32	42%
Carver County	1.11	0.29	26%	0.18	62%
Dakota County	8.19	1.6	20%	0.68	43%
Minneapolis Park & Recreation Board	2.74	1.68	61%	1.39	83%
Ramsey County	6.46	2.51	39%	1.65	66%
City of Saint Paul	2.53	1.18	47%	0.75	64%
Scott County	0.88	0.19	22%	0.12	63%
Three Rivers Park District	33.07	8.34	25%	5.06	61%
Washington County	5.6	1.31	23%	0.66	50%
Total	**74.02**	**21.51**	**29%**	**12.16**	**57%**

**Total Area represents an approximation of total land area administered by each Implementing Agency.*

The Minneapolis Park and Recreation Board carries the highest percentage of exposure with 61% of the park areas within a potential Flood Impact Zone, followed by the City of St. Paul, with 47% exposure. The Regional Park Implementing Agency with the lowest potential exposure to localized flooding is Dakota County, with 20% exposure. Three Rivers Park District, on the other hand, has the largest area of localized flood exposure.

The overview in Table 1 is very broad and includes area calculations. More asset-related analysis is included in the Park Structures and Regional Trails sections of this chapter.

Regional Park Structures

Rationale

Natural areas, like regional parks, are equipped to handle flooding. However, flooding can be detrimental to built structures in regional parks and put public safety at risk. Structures are focal points with an array of potential functions, serving recreational park users, special programming, maintenance & storage, or other (and often multiple) purposes.

Methodology

To assess the localized flood impacts to the Regional Parks System, regional parks and existing structures within the parks were examined based on exposure to Flood Impact Zones and potential access obstruction due to flood risk.

Using GIS, intersect operations were performed to identify Flood Impact Zones affecting regional park structures. The Vulnerability Matrix for park structures is shown in Table 2 below, and this analysis is based entirely on FIZ because we do not have information on usage or other valuation metrics of each structure. While annual visitor estimates are available for parks in the system, there is no single metric or other systemwide characteristic suitable for applying a more rigorous Flood Hazard classification. The Flood Impact Zone is therefore the best and most consistent measure of exposure, providing a rank of surface flooding likelihood and severity independent of any other feature characteristics.

Table 2. Vulnerability Matrix for Regional Parks and Structures

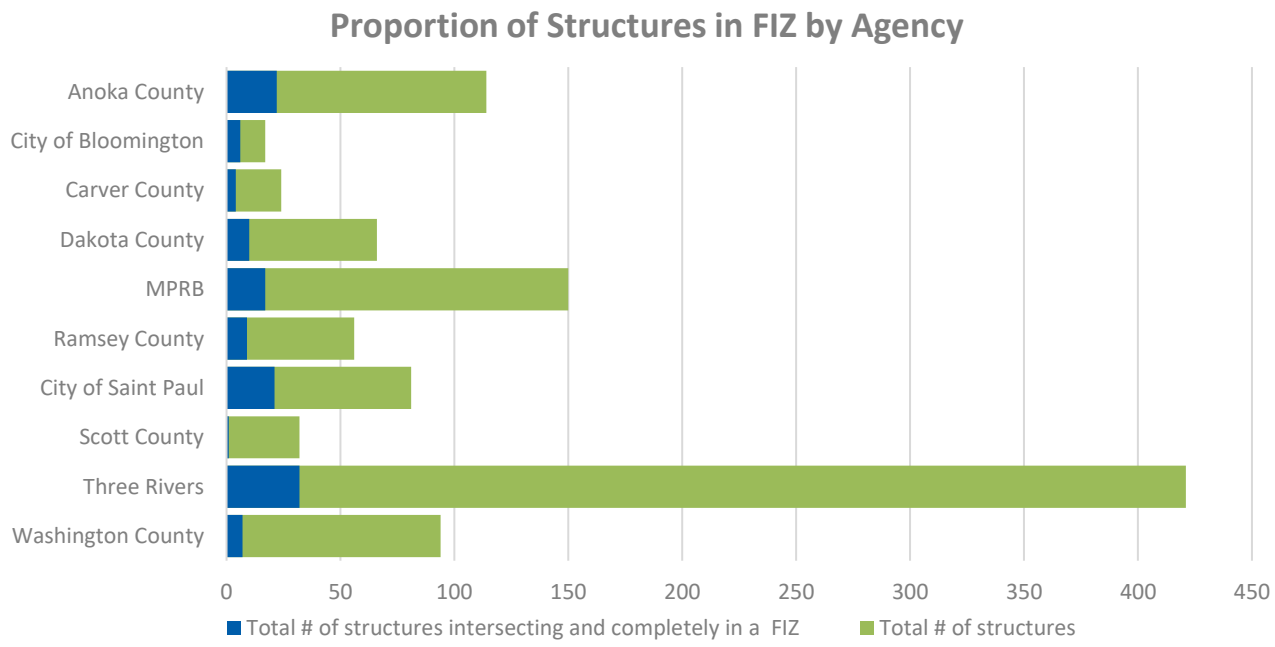
Flood Hazard		Vulnerability
Flood Impact Zone	Shallow	*Low*
	Primary	*High*
	Secondary	*Medium*
	Tertiary	*Low*

For analysis of emergency access to park structures, all park structures that intersect a Flood Impact Zone are evaluated. Emergency access for these structures is then analyzed by manually tracing access from the affected structure to the nearest arterial road. If the local road and arterial linkages to the structure are impeded by either Primary or Secondary FIZ, then the structure is determined to have no emergency access (see the *Transportation and Transit chapter* for a more specific analysis of the regional highway network).

Analysis: Regional Park Structures

Figure 2 details information derived from the park structures analysis. All agencies possess buildings at potential risk of exposure to localized flooding, from one building managed by Scott County to more than 30 under Three Rivers Park District's jurisdiction. The measure of vulnerability for access to structures represents a public safety concern.

Figure 2. Vulnerable Structures by Implementing Agency



As shown in Table 3, some implementing agencies have a high percentage of structures potentially at risk for localized flooding. However, other implementing agencies with a lower percentage of structures potentially at risk for localized flooding have a higher number of structures vulnerable to potential flooding. For example, 35.3% of Bloomington's structures are potentially vulnerable to localized flooding, but this only equates to 6 total structures. Meanwhile, 7.6% of Three Rivers Park District's structures are potentially vulnerable to localized flooding, which equates to 32 total structures.

Table 3. Vulnerable Structures by Implementing Agency

Regional Park Implementing Agency	Total # of structures	# of structures in a FIZ	% of structures in a FIZ
Anoka County	114	22	19.3%
Bloomington	17	6	35.3%
Carver County	24	4	16.7%
Dakota County	66	10	15.2%
Minneapolis Park & Rec	150	17	11.3%
Ramsey County	56	9	16.1%
Saint Paul	81	21	25.9%
Scott County	32	1	3.1%
Three Rivers	421	32	7.6%
Washington County	94	7	7.4%

Analysis: Regional Park Structure Emergency Access

As shown in Table 4, of the structures potentially affected by localized flooding, in general, few structures are made inaccessible by localized flooding. Eight of the ten implementing agencies have under 10% of their structures potentially inaccessible due to localized flooding.

Table 4. Vulnerable Park Structure Emergency Access by Implementing Agency

Regional Park Implementing Agency	# structures in a FIZ without access	% of structures without access
Anoka County	3	2.6%
Bloomington	4	23.5%
Carver County	0	0.0%
Dakota County	7	10.6%
Minneapolis Park & Rec	0	0.0%
Ramsey County	5	8.9%
Saint Paul	7	8.6%
Scott County	0	0.0%
Three Rivers	13	3.1%
Washington County	1	1.1%

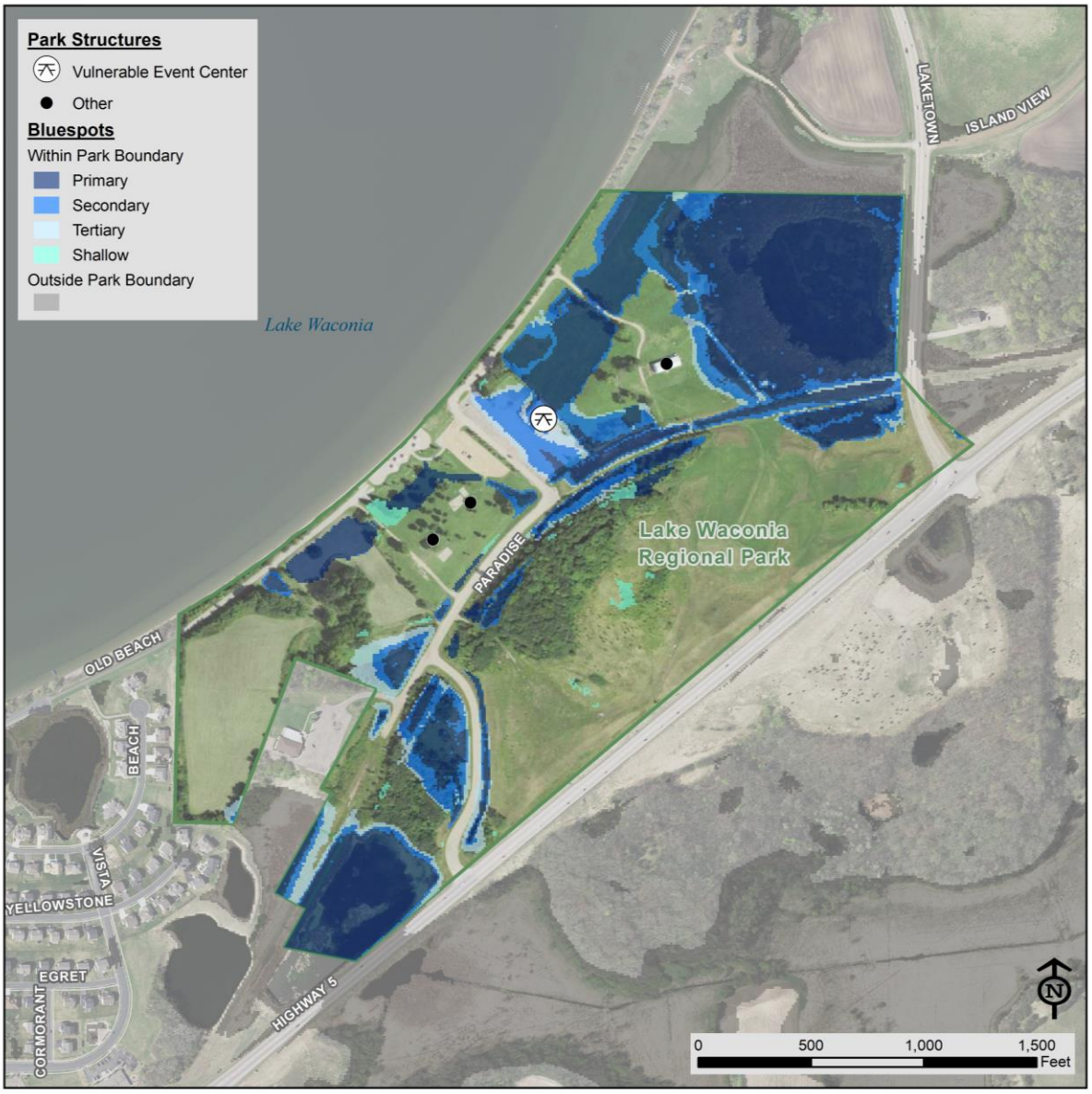
Local Examples

The figures on the next three pages show local examples of park structures potentially at risk of localized flooding. These examples illustrate how an implementing agency may use this analysis to screen their facilities for potential risk and potential mitigation measures. We provide 5 examples from around the region: Lake Waconia Regional Park, Coon Rapids Dam Regional Park, Lake Elmo Park Reserve, Como Regional Park, and Elm Creek Park Reserve.

Lake Waconia Regional Park

In Lake Waconia Regional Park, potential localized flooding encroaches into the most developed portion of the park. The park's event center – a locally significant facility used for weddings, dances, and other large events – is potentially at risk of being inundated on all sides in during severe rainfall events. It is worth bearing in mind that the event center and surrounding area has received recent funding for upgrades, including site grading.

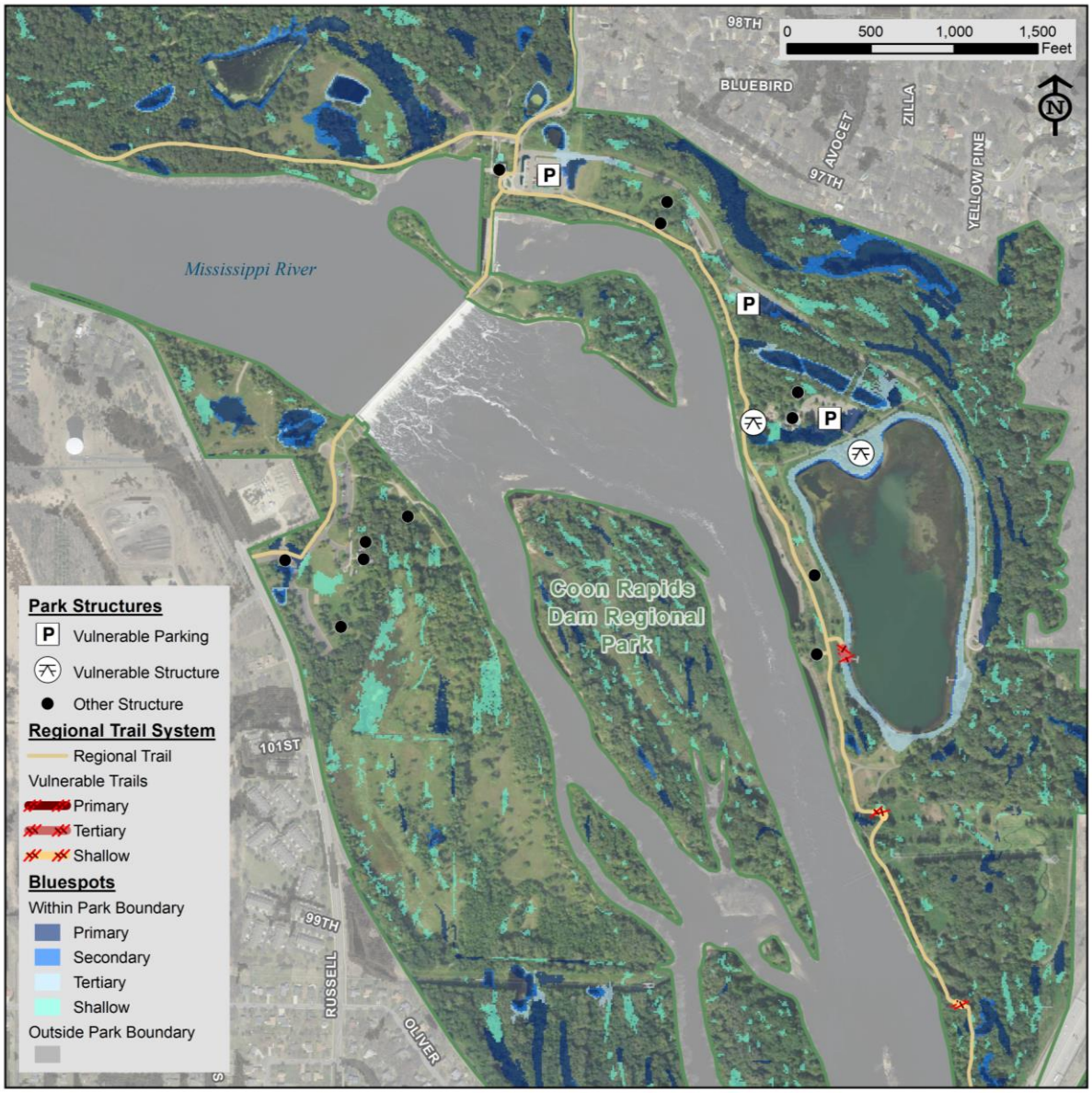
Figure 3. Example of an Inundated Structure in Lake Waconia Regional Park in Carver County



Coon Rapids Dam Regional Park

Coon Rapids Dam Regional Park's proximity to the Mississippi River may make its facilities more vulnerable to larger, more intense rain events. The visitor center, parking areas, and some picnic structures are potentially at risk of localized flooding.

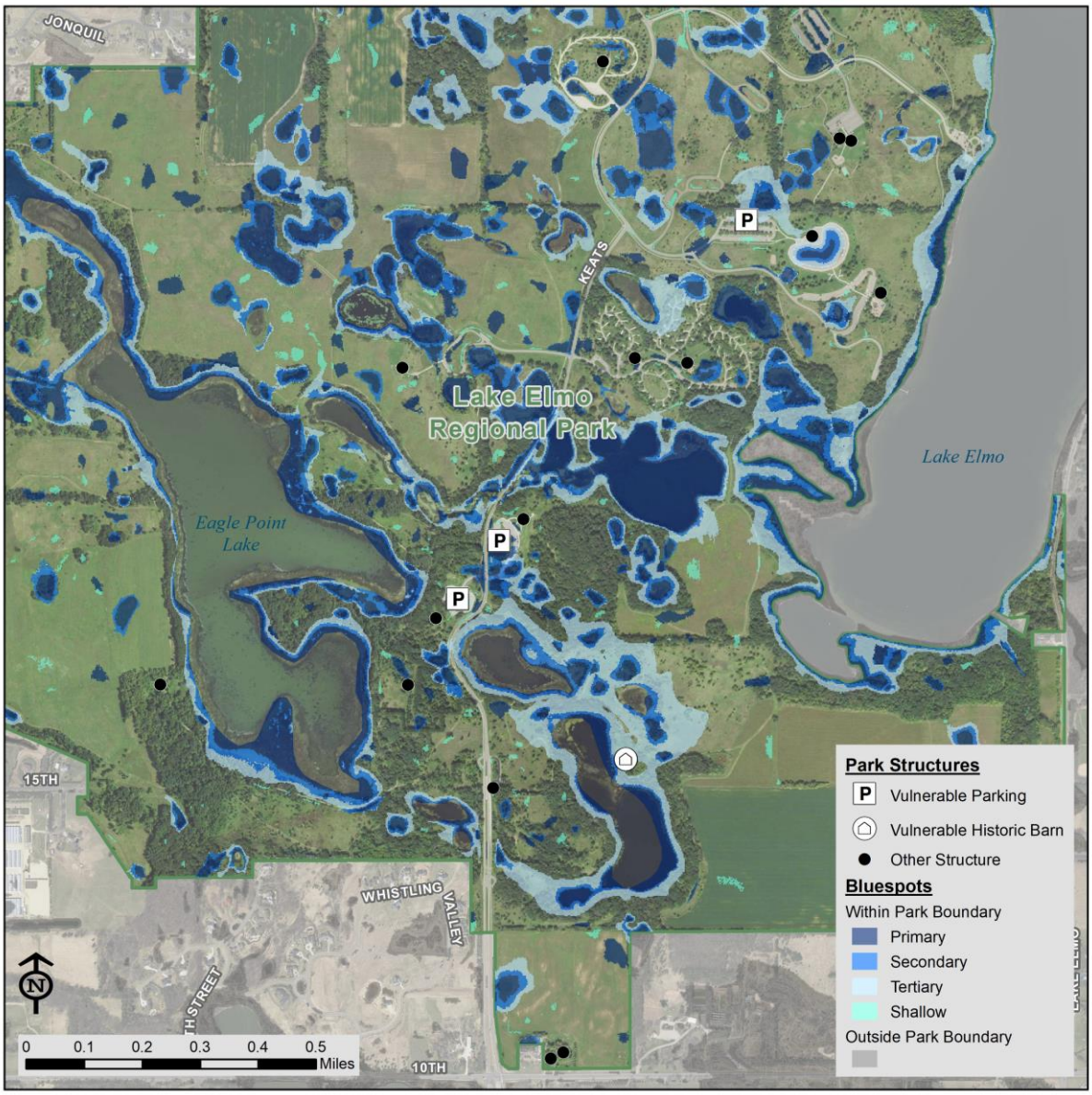
Figure 4. Example of an Inundated Structure at the Coon Rapids Dam Regional Park in Anoka County



Lake Elmo Park Reserve

At Lake Elmo Park Reserve in Washington County there are not many structures, but one – the historic barn on the east side of Brown Pond – may be negatively impacted by flooding if a major event were to occur. Large areas east of the lakes could potentially be inundated, limiting accessibility to the site as well.

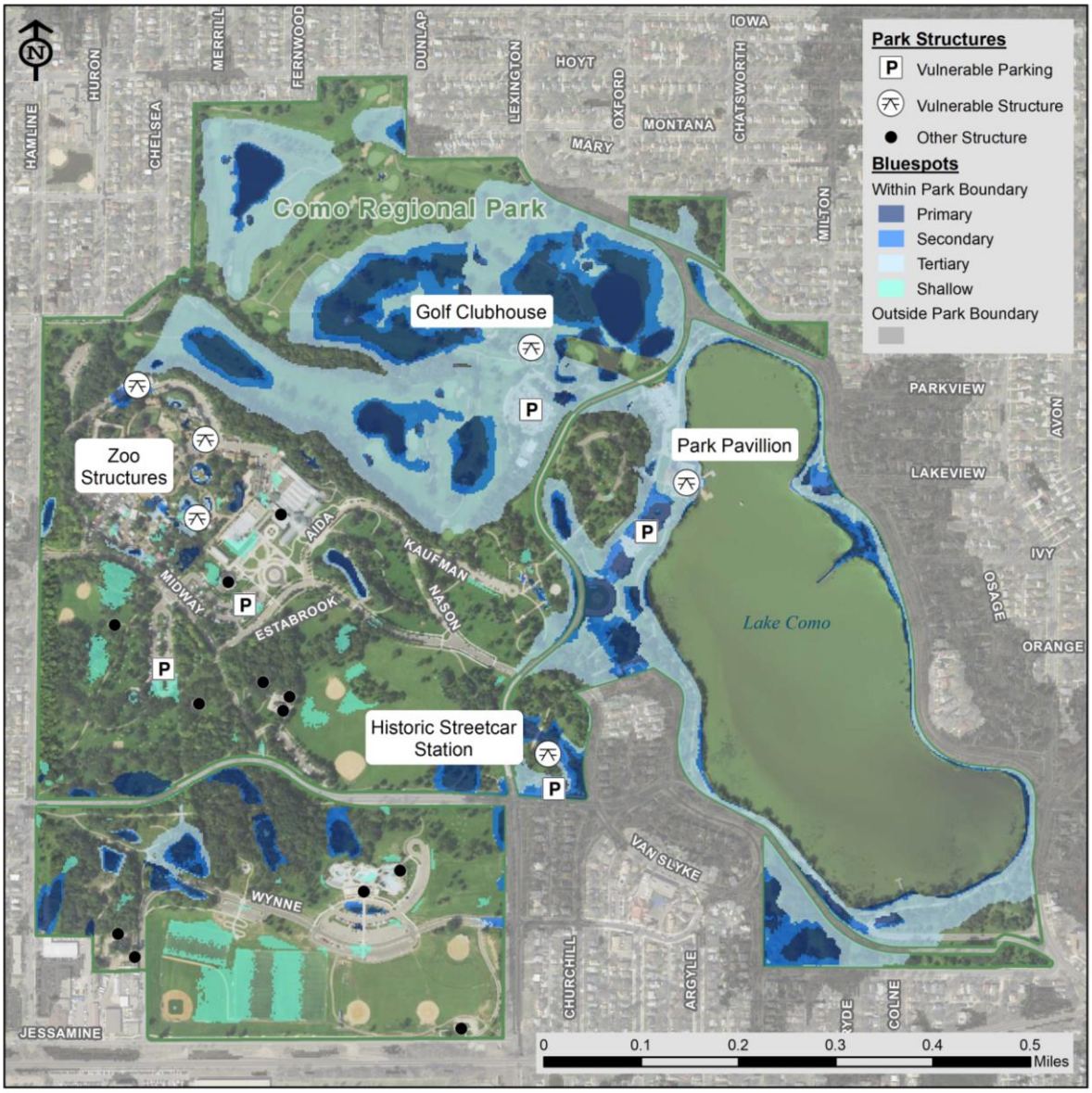
Figure 5. Example of an Inundated Structure at the Lake Elmo Park Reserve in Washington County



Como Regional Park

Como Regional Park's Lakeside Pavilion may be at potential risk for localized flooding. Inundation around this structure could limit opportunities to dine at the park and access recreation equipment and recreation space.

Figure 6. Example of an Inundated Structure in Como Regional Park in Saint Paul



Considerations

This assessment represents a high level, general analysis of regional parks and their structures throughout the region. Each regional park and its structures have unique characteristics that influence their vulnerability to localized flooding. The specifics of these characteristics, such as building use, were not considered in the analysis. The implementing agencies may prefer to perform a more detailed analysis which weighs exposure and sensitivity in terms of number of affected users or relevance of each structure's use or historical value.

It is important to consider how localized flooding impacts users of the regional park system. Bikers and pedestrians may be impacted by relatively shallow flooding, especially if conditions create fast flowing water. Deeper flooding generally poses more risk to the regional parks and their structures, although the structure use or surface materials can increase a site's vulnerability to flooding.

Existing Strategies

Picnic shelter at Big Marine Regional Park Reserve. Source: Metropolitan Council Digital Image Library

Implementing agencies have various strategies to mitigate localized flooding. For instance, agencies specifically design some areas to flood during extreme, high intensity rain events. Also, implementing agencies have hazard mitigation plans to ensure public safety and preparedness during extreme weather events

Proposed Strategies

Metropolitan Council may consider the following:

- ☐ Convene a regionwide stakeholder planning group to assess the potential impacts of localized flooding on the regional park assets and structures to inform current maintenance and future planning
- ☐ Establish a best management practices document for mitigating localized flooding impacts on regional parks assets and structures
- ☐ Consider potential localized flooding during park acquisition process

Local stakeholders may consider the following:

- ☐ Assess viability and impact of access management (temporary closures) versus other solutions
- ☐ Assess and repair local drainage and infiltration where necessary
- ☐ Develop or update public safety plans for localized flooding events
- ☐ Conduct asset-specific analysis of potential localized flooding vulnerability and investigate implementing resilience improvements accordingly
- ☐ Integrate localized flooding mitigation into capital improvement planning

Regional park users, advocates, and park agency representatives discuss how to make parks more accessible to a more diverse population. Source: Metropolitan Council Digital Image Library

Regional Trails

Rationale

The regional trail network, including all linking trails as well as the longer destination routes, is subject to frequent, short intersections with Flood Impact Zones (FIZ), each of which could represent a potential obstruction. Regional trails are a recreational and transportation asset connecting regional parks with local (and distant) communities, providing enhanced accessibility, and generating increased park visits.

Methodology

To assess localized flood impacts to the Regional Trail System, trails were examined based on exposure to Flood Impact Zones and potential restriction of access by flood waters. Using GIS, intersect operations were performed on regional trails with Flood Impact Zones to identify and provide flooding attributes for all vulnerable trail segments.

In Table 5, exposure is defined solely by flood hazard, with no further weighting of vulnerability. While annual visitor estimates are available for parks in the system, there is no single metric or other system-wide characteristic suitable for applying a more rigorous vulnerability classification. Flood hazard is thus the best and most consistent measure of exposure, providing a rank of flood likelihood and severity independent of any other feature characteristics.

Table 5. Vulnerability Matrix for Regional Trails

Flood Hazard		Vulnerability
	Shallow	*Low*
Flood Impact Zone	Primary	*High*
	Secondary	*Medium*
	Tertiary	*Low*

Analysis

Table 6 details the variation in Flood Impact Zone exposure across the regional trail network of the implementing agencies. Table 6 also details total exposure percentages for trails under the jurisdiction of each regional park implementing agency, including the longest continuous trail segment subject to potential flooding for each agency. The trail with the highest potential risk of localized flooding is Anoka County's Bunker Hills/Chain of Lakes Regional Trail with 7,914 feet (42.93%) of this trail intersecting the Primary FIZ.

Overall, 11.3% of all regional trail mileage is potentially at risk of localized flooding. This percentage is significantly lower than the 15.5% exposure of the complete *Regional Bicycle Trail Network (RBTN)*, which includes on-road lanes, co-use routes, local trails, and other components. Some regional trails are aligned with former rail corridors and retain many of the same structural characteristics (notably, an elevated bed). We can look at Northstar Commuter Rail for one point of comparison, which exhibits a total localized flooding exposure of only 5%. In this light, implementing agencies may wish to include a focus on built characteristics when further assessing their existing and planned trail networks and exposure to potential localized flooding.

Table 6. Regional Trails Localized Flood Exposure, by Implementing Agency

Regional Park Implementing Agency	Trail Miles Analyzed	Localized Flood exposure (mi.)	Primary Miles	% exposed	% of exposed in Primary	Longest Impacted Trail Segment (feet)	Trail Name
Anoka County	87.62	13.65	5.86	15.58 %	42.93%	7,914	Bunker Hills/Chain of Lakes
Carver County	29.79	1.36	0.38	4.57%	27.94%	780	Southwest Regional Trail
Dakota County	34.00	3.01	0.95	9.17%	31.56%	1,885	Mississippi River
Minneapolis Park & Recreation Board	24.84	2.41	0.95	11.86%	39.42%	3,797	St. Anthony Parkway
Ramsey County	23.05	3.22	1.35	13.97%	41.93%	2,224	Highway 96
City of Saint Paul	24.20	1.86	0.42	7.41%	22.58%	3,748	Bruce Vento
Scott County	12.11	0.94	0.19	7.76%	20.21%	876	Scott County West
Three Rivers Park District	141.16	15.8	4.79	11.19%	30.32%	2,384	Lake Independence
Washington County	12.76	1.26	0.4	9.87%	31.75%	1,661	Hardwood Creek

Local Examples

The figures on the next page show local examples of regional trails potentially at risk of localized flooding. We include two example: Mississippi River Regional Trail in Dakota County and Trout Brook Regional Trail in St. Paul. Like the park structures examples, these examples illustrate how the localized flooding data can be used to screen trail facilities for further evaluation and mitigation assessment.

Mississippi River Regional Trail

The Mississippi River Regional Trail in Dakota County is potentially vulnerable to localized flood events, including large rain events. With the increase in significant rainfall due to changes in weather patterns already observed and expected to continue, 100-year flood events have led to increased flooding all along the Mississippi River in the last five to 10 years. Figure 7 shows that inland segments of the regional trail may still be at risk of localized flooding with significant portions crossing a Primary FIZ.

Figure 7. Example of Potential Localized Flood Risk, Mississippi River Regional Trail in Dakota County

Considerations

The Regional Bicycle Transportation Network (RBTN) is included in the 2040 Transportation Policy Plan. As a transportation network, the *RBTN is analyzed in the Transit and Transportation chapter* of this report.

Pavement and other surface types on trails and walkways can have widely varying resilience to and functionality during a rain event. This variability is important to consider, but is not included within this analysis. Additionally, localized flooding poses slightly different hazard levels to pedestrians, bicyclists, and other visitors.

Existing Strategies

Implementing agencies have various strategies to mitigate localized flooding. For instance, agencies specifically design some areas to flood during extreme, high intensity rain events. Also, implementing agencies have hazard mitigation plans to ensure public safety and preparedness during extreme weather events

Proposed Strategies

Metropolitan Council may consider the following:

- ☐ Convene a regionwide stakeholder planning group to assess the potential impacts of localized flooding on regional trails to inform current maintenance and future planning
- ☐ Establish a best management practices document for mitigating localized flooding impacts on regional trails
- ☐ Consider potential localized flooding in future regional trail locations

Local stakeholders may consider the following:

- ☐ Assess viability and impact of access management (temporary closures) versus other solutions
- ☐ Assess and repair local drainage & infiltration where necessary
- ☐ Conduct a detailed analysis of potential impacts to regional trails which considers important characteristics (trail type, use, seasonality) and investigate implementing resilience improvements accordingly
- ☐ Integrate localized flooding mitigation into capital improvement planning

Next Steps

This assessment is regionwide and high level; its intention is to elicit a conversation about how best to embed use of the localized flood data into Council practice across department divisions. The assessment presents systemwide data and localized examples for Regional Park structures and Regional Trails. To get the most out of the data, staff propose a more in-depth analysis of specific park units, implementing agencies' infrastructure, and implementing agencies' experience with or capacity to manage flood-related issues. A rigorous analysis, coupled with other, complementary data sources, will help the Council and relevant stakeholders prepare for the impacts of localized flooding within our region.

Metropolitan Council Desired Outcomes

The following desired outcomes can provide a foundation for the strategy development for each system asset. These high-level outcomes apply to all system assets for regional parks and trails.

Prioritize operations and asset management through verification of localized flooding vulnerability. The auditing and verification of vulnerable areas within the Regional Park and Trail System will assist Council operations and asset management. Ground-truthing areas of highest vulnerability will facilitate operational and asset management prioritization across each respective system.

Manage stormwater locally, on site, as much as possible. This outcome can be achieved through deployment of low-tech strategies that absorb rainwater locally, with special attention given to High and Very High vulnerability areas. These strategies require collaboration with local and agency stakeholders to, for instance, reduce the percentage of impermeable surfaces in High and Very High vulnerability areas through installation of permeable paving, green stormwater infrastructure, and maintenance of existing stormwater conveyance through volunteer adopt-a-drain programs available in many jurisdictions.

Ensure that flooding takes place only where it does the least damage. System planning should consider that flooding will occur and will affect the Regional Park and Trail system. System assets should be planned to ensure that flooding does not impact large numbers of users and that redundancy plans are made that consider High and Very High vulnerability areas. When new impervious surfaces and structures are planned, the localized flooding data can assist in showing where to incorporate surface water features based on existing topography that provides infiltration and diverts water from high priority assets to allow flooding of areas that are less critical to operations and public safety.

Regional Trail user bicycles through floodwaters along Minnehaha Creek during the late June floods of 2014. Source: Metropolitan Council Digital Image Library

Ensure that public safety information is available for riders. When the Council performs a more rigorous asset by asset analysis of localized flooding, it should prioritize conveying potential public safety matters related to localized flooding in higher priority areas and on higher risk routes in a variety of media formats and languages.

Convene a regional stakeholder group and continue collaboration. In considering climate-related hazards and subsequent strategies for the regional transportation and transit networks, the Council should convene a regional collaborative stakeholder group representing multiple jurisdictions. One of the greatest challenges to strategy implementation to reduce the impact of localized flooding on regional systems is the multijurisdictional nature of the work. Often there are layers of responsibility to consider when implementing adaptation strategies at the ground level. Through convening a regional stakeholder forum on system impacts from climate hazards, the Council can increase regional and local climate resiliency through collaboration.

Going Beyond Hazard Mitigation

It is recommended that, when and where possible, regional park implementing agencies perform a focused assessment of potential localized flooding impacts.

Hazard mitigation is key in ensuring that procedures are in place to effectively react in a crisis situation, but it cannot always account for the more incremental, chronic climate stresses to assets. An additional and more focused consideration of climate hazards and subsequent impacts can allow for a more proactive approach to identifying potential vulnerabilities in our regional park and trail systems.

The Council should work with partners to go beyond the hazard mitigation approach, which tends to focus on how best to prevent and react to disasters or emergencies. To further the work, the localized flooding analysis could be incorporated into the Council's transportation and transit planning efforts as well as in its ongoing assessment of system assets, be they access to and from a regional park, often on a regional trail, or within parks, or through coordination of implementing agencies and Metro Transit to ensure the continued success of our growing regional bicycle transportation network.

Building Equity into Policies and Strategies

Equity is a desired outcome identified in *Thrive MSP 2040*, but planners do not often consider the disparate impacts of climate change on underserved or vulnerable populations. Human vulnerability to climate change should be considered in the planning and maintenance of the regional park and trail system in areas with populations that are more vulnerable to climate change impacts. Often, human vulnerability to climate change impacts is more difficult to measure than infrastructure vulnerability, due to the many variables that may contribute to a person, family, or community's vulnerability.

Youth by garden outside of Como Regional Park Conservatory in Saint Paul. Source: Metropolitan Council Digital Image Library

It is important that the Council and implementing agencies consider system vulnerability to climate change with equitable outcomes in mind. For instance, some parts of the region may rely more heavily on the parks and trail system for recreation, family outings, and various leisure activities. It is vital to consider system and asset vulnerability with such factors in mind so that the Council and its partners can work to reduce human vulnerability to climate change through sound asset management.

Summary of Proposed Council Strategies

Table 7. Parks and Park Structures, Proposed Strategies

Potential Strategy	Authority	Collaboration Required	Existing Practice	Priority	Cost/Time
Convene a regionwide stakeholder planning group to assess the potential impacts of localized flooding on the regional park assets and structures to inform current maintenance and future planning	METC; Implementing Agencies; Road Authority; LGU	Yes	No	High	Low/Med
Establish a best management practices document for mitigating localized flooding impacts on regional trails	METC; Implementing Agencies; Road Authority; LGU	Yes	No	Med	Med/Med
Consider potential localized flooding during park acquisition process	METC; Implementing Agencies; LGU	Yes		Med	Low/Low
Assess viability and impact of access management (temporary closures) versus other solutions	Implementing Agencies; Road Authority; LGU	Yes	SOPs	Med	Low/Low
Assess and repair local drainage & infiltration where necessary	Implementing Agencies; Road Authority; LGU	Yes	SOPs	Med	Med/Med
Develop or update public safety plans for localized flooding events	Implementing Agencies; Road Authority; LGU	Yes	SOPs	High	Med/Med
Conduct asset-specific analysis of potential localized flooding vulnerability and investigate implementing resilience improvements accordingly	Implementing Agencies; Road Authority; LGU	Yes	SOPs	Med	Med/Med
Integrate localized flooding mitigation into capital improvement planning	Implementing Agencies; LGU	Yes	SOPs	Low	Low/Med

Table 8. Regional Trails, Proposed Strategies

Potential Strategy	Authority	Collaboration Required	Existing Practice	Priority	Cost/Time
Convene a regionwide stakeholder planning group to assess the potential impacts of localized flooding on regional trails to inform current maintenance and future planning	METC; Implementing Agencies; Road Authority; LGU	Yes	No	High	Low/Med
Establish a best management practices document for mitigating localized flooding impacts on regional trails	METC; Implementing Agencies; Road Authority; LGU	Yes	No	Med	Med/Med
Consider potential localized flooding in future regional trail locations	METC; Implementing Agencies; Road Authority; LGU	Yes	SOPs	Med	Low/Low
Assess and repair local drainage & infiltration where necessary	Implementing Agencies; Road Authority; LGU	Yes	SOPs	Med	Med/Med
Conduct a detailed analysis of potential impacts to regional trails which considers important characteristics (trail type, use, seasonality) and investigate implementing resilience improvements accordingly	Implementing Agencies; Road Authority; LGU	Yes	SOPs	Med	Med/Med
Integrate localized flooding mitigation into capital improvement planning	Implementing Agencies; LGU	Yes	SOPs	Low	Low/Med

Acronyms

CVA – Climate Vulnerability Assessment
GIS – Geographic Information Systems
FEMA – Federal Emergency Management Administration
FIZ – Flood Impact Zone
LGU – Local Governmental Unit
METC – Metropolitan Council
RBTN – Regional Bicycle Transportation Network
SOP – Standard Operative Procedure
TPP – 2040 Transportation Policy Plan

References

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