MINNEHAHA CREEK
WATERSHED DISTRICT
QUALITY OF WATER, QUALITY OF LIFE

Meeting: Citizens Advisory Committee
Meeting date: 6/16/2020
Agenda Item #: 4.1
Item type: Discussion

Title: MCWD Climate Conversations – Climate Adaptation Governance Scan

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Purpose:
To provide background information on the climate change governance scan. This governance scan will provide a grounding on climate change planning throughout the state, region, and local levels, and will provide the basis for the Citizens Advisory Committee's (CAC) second climate conversation discussion.

Background:
In 2017 the Minnehaha Creek Watershed District (MCWD or District) Board of Managers adopted a Strategic Alignment Plan which outlines the directions and shifts necessary to align MCWD's programs to focus on:

1. Implementing high impact capital projects, meaningfully integrated into the urban landscape, through collaboration with the public and private land use community.

2. Shaping local, regional, and state policy to improve the integration of land use and water planning.

Since adoption of the Strategic Alignment Plan, progress has been made on specific initiatives which have advanced the organization's ability to align workflows, enhance organizational effectiveness, and lay a solid foundation for the District to move successfully into the future.

As the environment around MCWD is ever-changing, future issues and opportunities will be presented to the District. As these issue and opportunities arise, the District recognizes that they will require us to thoughtfully and strategically evaluate our current programming and policies to ensure they are evolving with needs across MCWD.

Over the past several years climate change has presented itself as an issue across MCWD. As a watershed, the District currently implements programming that stewards water management in a variety of ways. However, the District recognizes that climate change will require us to explore how our programming and policies may need to adjust and align to address the impacts of a changing climate to ensure the District is best positioned to proactively address the issues and opportunities it will face in the future.

Governance Scan Purpose:
The purpose of the climate adaptation governance scan is to build a common foundational knowledge on Minnesota's climate adaptation policy landscape among MCWD's staff, Citizen Advisory Committee and Board of Managers. This outside scan of climate adaptation planning at a state, regional and local level, coupled with an assessment of future issues, will provide a basis for the District to contemplate at it considers its potential role in climate adaptation planning and the steps the organization may need to take to align the District's programs and policies to support that role.

Summary:
At the June 16, 2020 meeting, staff will highlight the main themes and takeaways from the governance scan. Staff will then facilitate a discussion with the CAC on the District's potential role in addressing climate adaptation in partnership with local, regional, and state agencies. This June 16 discussion will provide the foundation for the July 7, 2020 CAC climate conversation which will examine MCWD's existing programming and work as it relates to climate adaptation and what the future role of MCWD might be in addressing shifts in watershed hydrology due to climate change.

Questions to Consider for the June 16, 2020 CAC Meeting:

- What was your expectation on the level of climate change planning being done before reading this governance scan?
- What gaps exist with climate change planning at the different levels?
- Should we look beyond Minnesota or beyond government for planning examples?
- Where might MCWD lead versus other entities?
- Where could MCWD add the most value?
- What additional information do you need to consider what the role of MCWD might be?

Supporting Documents:

- MCWD Climate Adaption Governance Scan
  - Appendix A: Contains a detailed overview of each level of government that was reviewed in the scan and if their plans has climate change content.
  - Appendix B: MN State Level Plans Climate Change Content
  - Appendix C: MN Watershed District Plans Climate Change Content
  - Appendix D: MN County Water Plans Climate Change Content
  - Appendix E: MCWD Local Entities & Agency Plans Climate Change Content

MINNEHAHA CREEK WATERSHED DISTRICT

QUALITY OF WATER QUALITY OF LIFE

MCWD Climate Adaptation Governance Scan

June 12, 2020

Purpose:

The purpose of conducting the environmental scan of climate change planning and implementation taking place throughout Minnesota is to:

1. Assemble data regarding climate adaptation planning efforts and policies, and who is leading this work across the layers of state, regional and local government; and

2. Create a clear picture of the governance framework to highlight the niche MCWD may best be able to fill in the future.

This information will provide a common foundational knowledge and will inform upcoming discussions regarding the District's current and potential future role in climate adaptation.

Introduction:

Climate change brings with it more uncertain weather, from frequent rain events with higher intensities than previously experienced, to longer periods of drought. The Minnesota DNR State Climatology Office reports that the 2010s were the wettest decade on record in the Twin Cities since record-keeping began in 1871. Eight of the decade's 10 years were wetter than recent climatological averages, and no six-year period on record is even close to as wet as 2014 through 2019. 2014 brought the largest flood in recent history. 2016 was the second wettest year on record, and 2019 was the wettest year ever on record. During the last decade, the annual precipitation average at the Minneapolis airport was nearly 37 inches—more than six inches above average.

MCWD recognizes that precipitation and temperature patterns within the District, the region, and the state are changing based on the District's review of state and federal reports on precipitation patterns and its own data collection.

In 2014, the District experienced its flood of record since the District was established in 1967. The 2014 flooding was catalyzed by the wettest first half of the year on record, and the month of June was the wettest month ever on record with over 11 inches of rain. Coupled with a long winter and late snowmelt, this extreme precipitation resulted in record stream flows or lake elevations on 26 of the District's stream and lakes, including Minnehaha Creek and Lake Minnetonka. The water resource impacts and the organizational impacts to each program from the 2014 flooding were synthesized into the District's *2014 MCWD Flood Report*. MCWD also captured video to highlight the 2014 flooding which can be viewed on YouTube here: https://youtu.be/A0eXVqXYQfo

Preparing to manage the risks of extreme rain events requires that our communities understand their vulnerabilities and capacities to adapt, both from a technical and social standpoint. To demonstrate this process, in 2012 the District partnered on a study with Syntectic International, Antioch University New England, the University of Minnesota, and two communities in the watershed – Minneapolis and Victoria. Funded by a grant from the National Oceanic and Atmospheric Administration's Climate Program Office, the study had two overarching goals: assess vulnerability to both land use and rainfall changes, and build capacity to support community adaptation. The results of this study showed that flood risk increased in all extreme rain event scenarios, requiring adaptive action, however a one-size-fits-all approach does not work when it comes to adapting communities to manage increasingly frequent extreme rainfall events.

As a watershed agency, MCWD is for managing and protecting the water resources across 178 square miles of rural to urban landscapes. In order to manage and protect these water resources for current and future generations, MCWD is actively considering its role in climate adaptation planning in order to achieve its vision of a landscape of vibrant communities where the natural and built environments in balance create value and enjoyment.

At the June 20, 2019 MCWD Board Retreat, the Board of Managers began discussions on the District's potential future role in the area of climate adaptation. To facilitate this Board Retreat discussion, an environmental scan was completed to review climate adaptation and implementation at various levels, including:

- State: agencies and working groups
- Regional: counties and watershed districts
- Local: government entities and agencies within MCWD's jurisdiction

Other levels of government, the public sector, and the private sector are also involved to varying degrees with climate change adaptation planning, however, this environmental scan chose to focus on agencies that have responsibility in water resource management.

Water Governance in Minnesota:

In Minnesota, water resources are protected through utilizing a range of national, state, regional, and local entities to collectively manage and protect water resources. Each entity has its unique authority and range of powers, capabilities, and responsibility to protect and manage water resources. The 2013 Water Governance Evaluation Report to the Legislature included an appendix (Attachment 1) which broke down the water program by state agency and their areas of concentration.

Additionally, MCWD has a ranges of authorities to address a variety of water resource issues across municipal boundaries within the watershed's legal boundary. Attachment 2 shows how MCWD along with other agencies/entities work together to protect, manage, and restore water resources across MCWD. Lastly, Attachment 3 was prepared by Louis Smith in 1997 and provides a brief description of the key governing bodies that regulate water resources within our watershed. As Louis Smith noted, *this complex regulatory system can create a dizzying array of water-regulating government agencies, boards, councils, and departments for the unwary.* The complex nature of water resource protection and

management in Minnesota is important to keep in mind when considering the varying roles of state, regional, and local government in climate adaptation planning.

Climate Change Governance Scan Methodology:

The scan was completed at the state, regional, and local levels to understand the varying degrees to which climate change planning was occurring:

- State: This scan included an overview of each agency engaged in water management to determine the extent of climate change adaptation policies and planning at a state agency level.

- Regional: This scan included a review of each watershed district plan and each county water management plan was conducted to determine the extent to which regional entities incorporated climate change planning into their 10-year planning efforts.

- Local: This scan included a review of communities and entities within MCWD's jurisdiction to understand the local landscape of climate change adaptation planning.

For ease of tracking all of the plans that were reviewed, Appendices A-E summarize the plans and details that we examined by this scan. Appendix A breaks down in table form the state, regional, and local plans that were reviewed. The items indicated in the "Content Analysis" column in Appendix A, Tables 1-4, are highlighted and summarized in more detail in Appendices B-E:

- Appendix A, Tables 1-4: contain a detailed overview of each level of government that was reviewed in the scan and if their plans has climate change content.
    - Table 1: Contains state-level plans
    - Table 2: Contains information about regional watershed district management plans
    - Table 3: Contains information about regional county water plans
    - Table 4: Contains information about communities and entities with MCWD's jurisdiction
- Appendix B: MN State Level Plans Climate Change Content
- Appendix C: MN Watershed District Plans Climate Change Content
- Appendix D: MN County Water Plans Climate Change Content
- Appendix E: MCWD Local Entities & Agency Plans Climate Change Content

Each table in Appendix A includes a "Content Analysis" column that reviews whether the reviewed plans and documents contain some, or all, of the following elements in their discussion of climate change adaptation and resilience:

- **Regulation/new standards**: Does the plan introduce new regulations or standards that are directly responsive to climate change?

- **Monitoring/research**: Does the plan call for some increased, new, or continued monitoring of climate change data, either conducted by the entity itself or by other entities?

- **Capital projects**: Does the plan identify specific projects to be constructed to increase a system's adaptability or resilience to climate change?

- **Modeling/forecasting**: Does the plan require modeling or forecasting of future changes or trends based on changing climate patterns?

- **Education and outreach**: Does the plan include education and outreach activities related to residents and other communities and groups?

- **Coordination with other government entities**: Does the plan involve an entity working in collaboration with other entities to address climate change and adaptability and resilience?

- **Budget item?** Does the plan list any funds specifically for climate change adaptation or resilience projects or activities?

Those items with a checkmark (✓) next to them in the "Content Analysis" column match the detailed selections from each local, regional, and state level plan that contain some level of climate change adaptation or resilience planning (Appendices B-E).

Climate Change Governance Scan Findings:

The following summaries provide a high-level overview of thematic findings from each level of government plans reviewed in the scan.

The table below provides a breakdown on the state, regional and county plans that were reviewed and if their respective plans contained any of the "Content Analysis" elements in their discussion of climate change adaptation.

			Climate Change Plan Contents						
Entity	Total Reviewed	Plans with Relevant Content	New Standards	Monitoring	Projects	Modeling	Outreach	Coordination	Budget
Watershed Districts	45	8							
Counties	83	14	1	8	2	11	8	9	4
State Level Groups	12	12		8		9	2	12	1
Total	140	34	1	16	2	20	10	21	5

*Excluded groups which only referenced climate change

State Level Analysis

State level agencies and planning entities are engaged in climate change adaptation and resilience conversations, and all of those reviewed for this scan took part in the 2017 Interagency Climate Adaptation Team report outlining the roles of different government entities and priorities related to climate change

adaptation and resilience. The survey of state plans reflects many priorities and goals around climate change adaptation and resilience, corresponding to monitoring, modeling, coordination, and education/outreach. However, agencies have not yet introduced changes to the existing regulatory framework or new standards to require or implement specific practices in response to climate change challenges. Identified in the state level survey materials (*see Appendix B*) is a 2016 survey by the Minnesota Management & Budget Office which identified a need on the part of government entities and agencies for climate adaptation best practices and other state-supported tools. In December 2019 Governor Walz's Executive Order 19-37 established a Climate Change Subcabinet and Advisory Council to identify policies and strategies across state agencies to meet Minnesota's greenhouse gas reduction and resilience goals.

Minnesota Water Law directs the Minnesota Environmental Quality Board (EQB) to coordinate water planning and regulation activities among the state agencies that manage water resources. The EQB implements this responsibility through a water resource planning report every 10 years. The EQB is currently drafting the 2020 State Water Plan which focuses on the intersection of climate change and water. On June 17, 2020, the EQB will be presenting the framework for the 2020 Plan as well as the Plan's goals and draft strategies. The EQB's 2020 State Water Plan will be an important one to track in the coming months as it relates to state level planning and regulations around climate change.

Regional/Watershed Level Analysis

Generally watershed district's acknowledged that water levels are rising and that they are analyzing those patterns throughout their watershed. However, despite observing water level increases, a minority of watershed districts have plans that identify climate adaptation as a goal. Several watershed district plans (*see Appendix C*) state clear goals, priorities, and implementation activities related to adapting resource protection strategies using a variety of tools in an effort to be responsive to climate change. Primarily watershed district plan activities have identified the need for additional monitoring, modeling/forecasting, identifying stormwater BMPs that need increased capacity, stricter permitting requirements, conducting education and outreach, and coordinating with other units of government. Several watershed districts state a goal of showing leadership in responding to climate change challenges, however, none modified rules or standards to reflect climate change adaptation strategies.

One example of a watershed identifying climate change adaptation as a goal is the Brown's Creek Watershed District. Brown's Creek Watershed District (located on the east side of the Twin Cities) identified Climate Change Adaptation as an issue in its 2017-2026 Watershed Management Plan and identified the following Climate Adaption Policies, Goals, and Implementation Activities shown on the next page.

SUB-ISSUE:	Climate Change		
POLICY:	**The BCWD recognizes the impacts of a changing climate and is committed to integrating adaptation best practices to create a more resilient community.**		
Goal		**Implementation Item**	
A	Develop a better understanding of climate change, its impact to the District's land and water resources, and adaptive strategies to address this emerging issue.	1	Encourage cities and developers to integrate Green Infrastructure and LID to increase the capacity and resiliency of the stormwater management system
		2	Maintain awareness of USGS, National Weather Service – new resources available
		3	Complete modeling and analysis of the likely impacts of climate change on hydrologic conditions within the BCWD from both a water quantity and quality perspective to identify areas of concern
		4	Evaluate the BCWD's roles in addressing and responding to potential impacts

Source: Table from Brown's Creek Watershed District's (BWCD) 2017-2026 WMP (credit: BWCD)

Nine Mile Creek Watershed District and South Washington Conservation District's plans both identified using modeling to understand the surface water and ground water interactions and predicted changes in hydrological conditions. Additionally, South Washington Conservation District plan identified that, "No later than 2022, the District will complete a Climate Adaptation Plan to guide the District's efforts to increase resiliency of District resources and infrastructure. This planning effort will include scenario modeling to identify impacts from predicted increases in extreme temperature and precipitation events". These modeling efforts would be similar to MCWD's recent proposal to develop a 2-dimensional model and a machine learning model.

County Level Analysis

For the County level scan, all county plans across Minnesota were evaluated, with the exception of Carver and Hennepin County whose plans are examined in the next section, MCWD Local Analysis. County engagement on climate change (*see Appendix D*) includes a focus on regional efforts to respond to changing climate patterns and to effectively educate parties living and working within these jurisdictions on climate change challenges and resiliency strategies. Similar to watershed districts, counties have focused climate adaptation and resilience efforts on monitoring, modeling/forecasting, education and outreach, and coordination with other units of government. More counties are engaging in the One Watershed, One Plan process, resulting in several counties sharing the same water plan. Those One Watershed, One Plan plans reviewed for this governance scan did not reflect deeply on climate change adaptation and resilience aside from noting that the issue is one that the planning groups are aware of and will continue to monitor, incorporating updated data into their projects and planning efforts as it becomes available.

MCWD Local Analysis

The MCWD local analysis scan included reviewing the plans from all 29 communities within MCWD, Carver and Hennepin County, Three Rivers Park District, Minneapolis Park & Recreation Board, and the Met Council. These entities within MCWD's boundary vary in their engagement on climate change adaptation

and resilience (see Appendix E). Generally, the plans of the larger and more developed cities within the lower watershed (Minneapolis, Richfield, Edina, St. Louis Park, Hopkins, Minnetonka and Golden Valley) include climate change policies and action steps, while those in the upper watershed do not address the topic.

			Climate Change Plan Contents						
Entity	Total Reviewed	Plans with Relevant Content	New Standards	Monitoring	Projects	Modeling	Outreach	Coordination	Budget
Cities	29	4		4		2	3	2	
Counties	2	1		1		1		1	
Regional	3	2		2		1	2	2	
Total	34	7		7		4	5	5	

In 2015, the Metropolitan Council adopted Thrive MSP as its new regional development plan, which identifies seven policies to guide regional land use and development. One of those policies is *Building in Resilience: Promote sensitive land use and development patterns to contribute toward achieving Minnesota's adopted greenhouse gas emission goals at the regional scale, and to develop local resiliency to the impacts of climate change.* Although the Metropolitan Council encourages this climate change policy it does not require cities to discuss climate adaptation planning in city plans.

Neither Carver County's Comprehensive Plan or the Carver County Watershed Management Organization plan reference anything about climate change. Hennepin County is currently developing a climate action plan that *will include initiatives to reduce greenhouse gas emissions and strategies to adapt to the change climate in ways that reduce vulnerabilities and ensure a more equitable and resilient Hennepin County. A climate action plan serves as the foundation for a coordinated approach to planning, policy development, and responses to climate change.* Recently Hennepin County asked entities across the county to complete a survey on how their organizations were preparing for climate change. Hennepin County then followed up this survey with a meeting to discuss opportunities to collaborate to address climate change in the areas of transportation, infrastructure, and water.

Local entities leading in the area of climate change adaptation and resilience are engaged in monitoring climate change indicators, setting greenhouse gas reduction goals and reporting on outcomes, and community education on climate change resilience. Several plans highlight the connection between land use and transportation, and the impact these patterns can have on climate change. Plans with a detailed discussion of climate change also cited improved tree canopies, efficient buildings, waste reduction, reduced single-occupancy vehicle use, renewable energy, and environmental justice as mitigation strategies.

In April 2020, the City of Edina published its *Flood Risk Reduction Strategy*, which identified that *flooding in Edina is not only common, it's increasing. The City of Edina's strategy is to comprehensively reduce risk*

throughout the community. MCWD staff and Edina staff have coordinated recently on this strategy and this strategy will be a critical local example to track.

Climate Change Governance Scan Conclusions:

At a state level there is general consensus that climate change adaptation planning should be a priority and goals to do so have been outline. The state has also lead the way in summarizing the impacts of climate change and is working to produce downscaled climate models to help communities plan for climate change. However, state agencies have yet to use this climate science and future climate projects to introduce changes to the regulatory framework, or new standards to require the implementation of specific practices in response to climate change. MCWD will continue to track the EQB's 2020 State Water Plan as it progresses throughout the rest of 2020.

At a regional scale, watershed districts across the state recognize firsthand that water levels are rising due to climate change and therefore recognize the need bring leadership to the issue. However, currently no watershed has defined what that leadership role might look like and how to carry it out. Similar to watershed districts, at a regional level, counties across Minnesota have focused climate adaptation efforts on gathering data (monitoring and modeling), providing education and outreach, and coordinating with other government entities.

At a local level across MCWD, communities east of Lake Minnetonka are discussing climate change policies and action steps. As discussed above, the City of Edina's recently published *Flood Risk Reduction Strategy* is a leading example on climate adaptation planning efforts and policies. The Hennepin County climate action plan will also be an important plan for MCWD to track as it is developed over 2020.

Attachments:

- Attachment 1: 2013 Water Governance Evaluation Report to the Legislature – Water Programs by Agency
- Attachment 2: MCWD Agencies Involved in Water Protection
- Attachment 3: Water Management and Regulation in the Twin Cities Metro Area by Louis Smith

Appendix:

- Appendix A, Tables 1-4: contain a detailed overview of each level of government that was reviewed in the scan and if their plans has climate change content.
    - Table 1: Contains state-level plans
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Attachment A

Appendix A: Water Programs by Agency

The following water-related programs were identified by each of the participating agencies and institutions, and are organized based on their primary areas of focus, such as education, planning, financial assistance or regulation. The scope of this study does not permit a detailed description of each program, nor can it indicate the relative size or scope of each one. Many programs also involve collaborative efforts among the participating agencies, which are not described here. However, the chart does provide a general overview of state agency roles and areas of concentration.

	Education, Outreach	Planning	Financial Assistance	Technical, Training	Oversight	Acquisition, Dev. & Maint.	Monitoring, Standards, Assessment	Regulation, Enforcement
Board of Water and Soil Resources (BWSR)								
Wetland Conservation Act			■	■	■			
Watershed District and Soil and Water Conservation District Creation, Dissolution, and Oversight			■	■	■			
Comprehensive Local Water Planning (Metro, Metro groundwater, WD, SWCD, County, WMO, and Comprehensive Watershed)			■	■	■			
Soil Conservation			■	■			■	
Erosion Control and Water Quality Cost-Share			■		■		■	
Education (NEMO, Envirothon, Conservation Corps Apprentices)	■		■	■				
Conservation Easements			■	■		■		
Nonpoint Engineering Assistance			■	■				
Area II Minnesota River Basin Projects, Inc.			■					
Performance Review and Assistance			■	■	■		■	
Department of Natural Resources (DNR)								
Water Use Permit Program (includes Supply Planning)	■	■		■	■		■	■
Public Waters Work Permit Program (includes Inventory)	■						■	■
Water-related Land Use Programs (Floodplain, Shoreland, Wild & Scenic River, other special River-related)	■	■		■	■		■	■
Aquatic Plant Management Program	■		■	■			■	■
Invasive Species Program	■	■	■	■			■	■
Dam Safety Program (includes permitting, inspections, grants)	■	■	■		■	■	■	■
Flood Hazard Mitigation Program (matching grants to LGUs)			■		■	■		
Lake Improvement District Oversight				■	■			
Surface Water Hydrology Programs (technical analysis, stream flows, lake levels, OHW levels, etc.)	■			■		■	■	
Groundwater Hydrology Programs (monitoring, ob. wells, technical analysis, mapping, etc.)	■	■	■	■	■		■	
Climate Monitoring Programs (State Climatology Office)	■	■		■			■	
Lake Superior Coastal Program (fed-state-local partnership)				■	■			
Mississippi River Management (long-term monitoring, UMRBA, navigation issues, etc.)				■		■	■	

Continued

	Education, Outreach	Planning	Financial Assistance	Technical, Training	Oversight	Acquisition, Dev. & Maint.	Monitoring, Standards , Assessment	Regulation , Enforcement
Fish Contaminant Monitoring Program (data to MDH & MPCA)							■	
Project WET (water education for teachers)	■			■				
Various Water Recreation-related Programs (fish mgmt., waterfowl mgmt., shallow Lakes, trout streams, water trails)	■	■	■	■		■		■
Aquatic Habitat Restoration Grant Program	■		■	■				
Environmental Quality Board (EQB)								
State Water Policy Coordination - includes:		■			■			
State Water Plan		■						
Groundwater Policy and Water Priority Reports		■						
MN Department of Agriculture (MDA								
Regulation of Fertilizers, Soil and Plant Amendments	■			■			■	■
MN Pesticide Control Act	■							
Agriculture BMP Loan Program			■	■				
MN Department of Health (MDH)								
MN Well Construction Code and Program					■			■
Public Water Supply Program						■	■	■
Wellhead / Source Water Protection Program		■		■				■
Contaminants of Emerging Concern		■		■				
Health Based Standard Setting				■			■	
MN Pollution Control Agency (MPCA)								
Surface Water Ambient Program – includes:								
Intensive Watershed Monitoring and Assessment				■			■	
Major Watershed Load Monitoring							■	
National and State Probabilistic Monitoring							■	
Fish Tissue Monitoring							■	
Project-Specific Monitoring							■	
Citizen Lake and Streams Monitoring	■			■			■	
Comprehensive Wetlands Monitoring							■	
Water Quality Standards Establishment							■	
Stormwater Program				■				■
Water Restoration and Protection Strategies (including TMDLs)			■	■	■			■
Feedlot Program				■	■			■
Subsurface Sewage Treatment Systems (SSTS, fka ISTS)				■	■			■
Wastewater Program (fka NPDES and SCS Permit Programs)				■				
Nonpoint Source Program (CWP and CWA §319 assistance)			■	■				
Groundwater Program				■			■	

Continued

	Education, Outreach	Planning	Financial Assistance	Technical, Training	Oversight	Acquisition, Dev. & Maint.	Monitoring, Standards , Assessment	Regulation , Enforcement
Public Facilities Authority (PFA) – DEED / MPCA								
Clean Water Revolving Fund			■					
Wastewater Infrastructure Fund			■					
Small Communities Wastewater Treatment Program			■					
TMDL Funds			■					
Phosphorus Reduction Grants			■					
Drinking Water Revolving Fund (PFA / MDH)			■			■		
MN Geological Survey								
County Geologic Atlas and Regional Hydrogeologic Assessments (DNR)				■				
County Well Index Database				■				
Borehole Geophysical Logging Program				■				
Hydrostratigraphic Framework Studies				■				
Geologic Mapping and Database Devel. Supporting Wellhead Protection (MDH)				■				
Karst Database Development				■				
Geologic Mapping to Support Lake Management				■				
Quantitative Mapping of Recharge, Metro and other areas				■				
University of MN Water Resources Center and Extension								
Manure Management and Utilization Education	■			■				
Environmental Quality Incentives Program Education	■			■				
On-Site Sewage Treatment Education Program	■			■				
Shoreland and Water Quality Education	■			■				
Volunteer Stream Monitoring Program	■			■			■	
University of MN Extension								
Water Resources Education (with BSWR)	■			■				
MinnAqua Program (with DNR)	■			■				
Metropolitan Council								
Lake Quality Assessment, Monitoring and Sampling							■	
Drainage Practices in the Minn. River Basin				■			■	
River and Stream Water Quality Monitoring Program				■			■	
Laboratory Analysis (wastewater, ambient & nonpoint sources)					■		■	
Water Supply Planning		■		■				
Technical Assistance (to communities, watershed orgs., etc.)				■				
River Corridor Planning (MNRRA and Critical Area plan review)		■			■			
Thrive MSP 2040 and Water Resources Management Policy Planning Program (regional plans, review of local water plans)		■			■			
Industrial Waste and Pollution Prevention (pretreatment)				■				■

Attachment B

Agencies involved in

WATER PROTECTION

The work of the Minnehaha Creek Watershed District to protect, manage, and restore water resources does not take place in isolation. There are federal, state, regional, and local agencies that work together for water protection.

FEDERAL

ARMY CORP OF ENGINEERS

includes water resource development activities including flood control, navigation, recreation, and infrastructure, environmental stewardship and emergency response.

FEDERAL EMERGENCY MANAGEMENT AGENCY

identifies flood hazards, assesses flood risks and partners with states and communities to provide accurate flood hazard and risk data to guide them to mitigation actions; runs the National Flood Insurance Program (NFIP).

REGIONAL

METROPOLITAN COUNCIL

is a regional planning authority for the seven-county metropolitan area; conducts water quality monitoring including citizen science.

CARVER & HENNEPIN COUNTIES

Minnehaha Creek Watershed District lies within two counties: Carver and Hennepin. Counties are involved in a variety of different activities that affect water resources.

CARVER COUNTY SOIL & WATER CONSERVATION DISTRICT

provides assistance to the land managers and citizens of Carver County for the protection of land and water resources.

MINNEHAHA CREEK WATERSHED DISTRICT

is an independent local government unit tasked with protecting, managing, and restoring the water resources within the 178 square miles that drain into Lake Minnetonka and Minnehaha Creek; regulates impacts to water resources through a permitting program.

STATE

POLLUTION CONTROL AGENCY

monitors environmental quality, offers technical and financial assistance, and enforces environmental regulations; finds and cleans up spills or leaks; develops statewide policy; supports environmental education.

DEPARTMENT OF HEALTH

works on many environmental issues, including water quality; handle drinking water regulation, microbial and other contamination.

DEPT OF NATURAL RESOURCES

works with citizens, cities, and other governmental units to conserve and manage the state's natural resources, to provide outdoor recreation opportunities, and to provide for commercial use of natural resources in a way that creates a sustainable quality of life.

DEPT OF AGRICULTURE

is responsible for or involved in many water quality programs including: the Agricultural Best Management Practices Loan Program, and the Comprehensive Groundwater Protection Act of 1989 - the department regulates most matters relating to pesticides and fertilizers.

DEPT OF TRANSPORTATION

works with design, construction and maintenance project managers to develop plans and procedures that promote cleaner project sites, and to protect the waters of the state during construction and maintenance activities.

BOARD OF WATER & SOIL RESOURCES

administers programs that prevent sediment and nutrients from entering our lakes, rivers, and streams; enhance fish and wildlife habitat; and protect wetlands.

The watershed district is overseen by BWSR

LOCAL

CITIES 27 cities and two townships in the Minnehaha Creek Watershed District

can regulate impacts to water resources, or leave that authority to the local watershed district or management organization

Design by Riley Purgatory Bluff Creek Watershed District

Attachment C

Water Management and Regulation In The Twin Cities Metro Area

By Louis N. Smith

Presented at Restoring Our Urban Waters Conference, sponsored by Citizens for a Better Environment, March 1997

Available online at: http://www.waterlaws.com/commentary/bulletins/twincities_mgt_bulletin.html

Urbanization presents a wide array of threats and demands on our water resources. We use our water for recreation, waste disposal, drinking, agriculture, and, here in the Land of 10,000 Lakes, as the centerpiece of our identity and pride in our "quality of life." But the strains put on our water by the demands of these often incompatible uses, combined with the strain of a heavily developed, industrialized urban area, constantly threaten the resource on which so much of our quality of life depends.

Minnesotans appreciate the stress that our modern way of living causes to our water resources. We act to protect our water resource by effectively using national, state, and local institutions, utilizing the powers and capabilities of each to create a comprehensive approach to water resource protection and management. Broad federal programs attack large, national issues; state programs augment them within Minnesota; and special local government units and municipalities work to solve water problems that affect a specific area, municipality, or watershed.

Still, this complex regulatory system can create a dizzying array of water-regulating government agencies, boards, councils, and departments for the unwary. Federal and state agencies often delegate their authority to other agencies, so that permit applications required by federal law are often filed with state agencies, and local government units are often responsible for enforcing state law. In addition, Minnesota recognizes that water resources are often best protected through special units of government with authority to protect entire natural ecosystems, such as watersheds.

The following is a brief description of the various government bodies that regulate water resources in the Twin Cities metropolitan area.

FEDERAL AGENCIES

Environmental Protection Agency

The EPA is responsible for carrying out most of the Clean Water Act, including the National Pollutant Discharge Elimination System (NPDES), which regulates the discharge of pollutants into waters of the United States. The EPA also promulgates the substantive criteria for issuing permits for the dredging and filling of wetlands, although the Corps actually implements the program. Though the EPA retains oversight authority and promulgates regulations for enforcement, it delegates a large portion of its responsibilities to other federal and state agencies.

U.S. Army Corps of Engineers

The U.S. Army Corps of Engineers oversees all dredging and filling activities in waters of the United States, including wetlands, under § 404 of the Clean Water Act (33 U.S.C. § 1344) and §10 of the Rivers and Harbors Act (33 U.S.C. § 403). In addition to complying with the requirements of the Corps (found at 33 CFR §323.1 et seq. and 40 C.F.R. part 230), permit applications under §404 are also subject to comment by the U.S. Fish and Wildlife Service and the State Historic Preservation Officer.

U.S. Fish and Wildlife Service
The USFWS enforces both the Endangered Species Act and the National Scenic Waterways Act. Under these laws, the USFWS has strong powers when a proposed project impacts any plant or animal species or waterway protected under federal law. All §404 permits submitted to the Corps of Engineers are also forwarded to the USFWS for comment.

U.S. Department of Agriculture
The USDA is a major protector of wetlands in agricultural areas under the Swampbuster Act, 16 USC §§3821-3824. Under the Swampbuster Act, any farmer who produces an agricultural commodity on a converted wetland or converts a wetland is ineligible for USDA benefits, including price supports, loans, disaster payments, and crop insurance.

STATE AGENCIES

Minnesota Pollution Control Agency
The MPCA is the largest single regulator of water in Minnesota, enforcing both federal and state law. EPA delegates much of its authority for federal water programs to the MPCA, including administration of the federal Clean Water Act's National Pollutant Discharge Elimination System (NPDES). Under NPDES, the MPCA regulates (1) direct discharges into surface waters; (2) sewage and waste discharges from treatment facilities into surface waters; (3) stormwater runoff entering surface waters; and (4) discharge of fill into wetlands. Discharges authorized under NPDES discharge permits include sampling, monitoring and reporting requirements.

The MPCA is also responsible for issuing water quality certifications under §401 of the Clean Water Act. Minn. R. 7001.1400 - 7001.1470; 7050.0186. A §401 water quality certification is required in order to obtain at §404 permit from the Corps to discharge dredged or fill materials into a wetland.

Minnesota Department of Natural Resources
The DNR administers water quantity and other water-related resource programs effecting fish and wildlife habitat, recreation, and shoreline management. Certain types of designated wetlands are regulated by the DNR under Minnesota Statutes Chapter 103G. The DNR's management responsibilities extend to lakes, rivers, and floodplains, as well.

Minnesota Board of Water and Soil Resources
The BWSR promulgates rules for the implementation of the Minnesota Wetland Conservation Act. The BWSR oversees local governments' implementation and interpretation of those rules and provides financial, technical and administrative assistance to counties, soil and water conservation districts, watershed districts, watershed management organizations, and other local governments units. BWSR's Dispute Resolution Committee adjudicates disputes over local government units' interpretations of some rules and regulations relating to water resources.

Minnesota Department of Health
In its role to protect, maintain and improve the health of Minnesotans, the MDH regulates sewage, groundwater and drinking water and establishes specific health limits for substances or chemicals determined to cause health risks. The MDH also sets standards for boring and operation of wells and infectious waste disposal.

Environmental Quality Board
Through its Water Resources Committee, the Environmental Quality Board (EQB) is responsible for anticipating and responding to key environmental issues and for coordinating local, state, and federal agency oversight. The EQB also promulgates and oversees regulations regarding the preparation of Environmental Impact Statements and Environmental Assessment Worksheets.

Minnesota Department of Agriculture
The MDA implements state-specific laws governing pesticides and fertilizers and administers sustainable agriculture and integrated pest management programs. The MDA also implements the federal Insecticide, Fungicide, and Rodenticide Program in Minnesota.

SPECIAL DISTRICTS AND LOCAL GOVERNMENTS

Watershed Districts
Watershed Districts have broad authority to address a wide variety of threats to water quality without respect for municipal boundaries. Holding independent authority for ensuring water quality and resource integrity, watershed districts develop and implement comprehensive watershed plans under the authority of Minn.Stat.§103D et seq. Watershed management may include regulations geared to control floodwaters; navigation or drainage improvements; reclamation or filling of wet and overflowed land; providing or conserving public water supply; providing for sanitation and public health; repairing or improving drainage systems; controlling soil erosion and regulating private projects by property owners affecting the beds, banks, and shores of lakes, streams and wetlands; protecting and enhancing water quality and groundwater quality.

Watershed Management Organizations
Unlike Watershed Districts, which function independently of other local government units (LGU's), WMO's are products of joint powers agreements, where two or more LGU's cooperate in dealing with local water issues by augmenting their existing zoning, regulatory, and permitting powers. Minn.Stat. §103B.201 et seq. WMO's are managed by a joint board representing all of the participating LGU's and employ some of the powers enjoyed by a watershed district. WMO's exist only in the seven county metro area. Minn.Stat. §103B.205, subd. 13.

Lake Improvement Districts
Organized under Minn.Stat. §103B.501 et seq., Lake Improvement Districts hold regulatory power over the use of a particular lake, with authority to act to preserve the natural character of the lake and its shoreline. Lake Improvement Districts also act to improve water quality, to ensure reasonable water quantity, and to assure protection of the lakes from the detrimental effects of some human and certain natural processes. Included in these regulations are often limits on the types of boats and motors used, and times, places, and maximum speeds for their use.

Sanitary Districts and Sanitary Sewer Districts
Established under Minn.Stat. §§115.18 et seq. and 115.61 et seq. respectively, sanitary and sanitary sewer districts provide statutory authorization for inter-municipal districts for collection, transportation, treatment, and disposal of domestic and industrial sewage, garbage, and waste. Any two or more municipalities may form such districts.

Soil and Water Conservation Districts
Under Minn.Stat. §103C.01 et seq., Soil and Water Conservation Districts aid in the maintenance of soil and water resources. The districts are administered by local boards and may conduct surveys, investigate and research potential threats to water resources, and assume conservation projects, publishing and implementing comprehensive plans towards their completion.

St. Paul Water Utility
The City of St. Paul owns and operates its own water utility under the authority of Minn.Stat. §452.08. The Water Utility provides clean water to St. Paul and some of its outlying suburban communities. The Utility operates intake, treatment, and distribution systems, and cooperates with local community groups to improve water quality and provide wildlife benefits in the Vadnais Lake Area Water Management Organization.

Counties, Cities and Towns
Local Government Units (LGU's) use their zoning, ordinance, permitting, and general police powers to affect water resources. Counties outside the seven county metro area have authority to develop and implement county comprehensive water plans. LGU's are often responsible for non-DNR regulated wetlands, but these regulatory powers are often shared with Watershed Districts and Watershed Management Organizations. LGU's may oversee local activities under delegated authority from state agencies as well, such as bridge and culvert work through the DNR's general permitting program.

Metropolitan Council
In the seven county metro area, the Metropolitan Council functions as a planning agency, overseeing and controlling many land use and transportation decisions affecting water resources. The Council also controls the area's solid waste program, and the Metropolitan Council Environmental Services (MCES) oversees surface water and water pollution abatement planning, non-point pollution abatement, industrial wastewater management, water quality monitoring, and it also directs the operation of the metro area's nine wastewater treatment plants.

APPENDIX A: **Table 1. MN State Level Plans Climate Change Content Review**

State level government entity or group	Relevant content	Level of engagement	Content Analysis	Plan/page title and link
Board of Water and Soil Resources	Y	Policies + implementation steps	*Regulation/new standards* √ Monitoring *Capital projects* √ Modeling/forecasting *Education and Outreach* √ Coordination with other government entities *Budget item?*	Landscape Resiliency - water planning, https://bwsr.state.mn.us/practices/climate_change/Water_Planning.pdf Draft Climate Change Trends and Action Report, January 15, 2019, https://bwsr.state.mn.us/sites/default/files/2019-09/ClimateChangeTrends%2BActionPlan_Sept2019.pdf
Environmental Quality Board (EQB)	Y	Policies + implementation steps	*Regulation/new standards* *Monitoring* *Capital projects* *Modeling/forecasting* *Education and Outreach* √ Coordination with other government entities *Budget item?*	Climate Solutions and Economic Opportunities: A Foundation for Minnesota's state climate action planning, https://www.eqb.state.mn.us/sites/default/files/documents/CSEO_EQB.pdf EQB is currently drafting the 2020 State Water Plan, a draft outline of the plan can be viewed here, https://www.eqb.state.mn.us/sites/default/files/June%2017%202020%20EQB%20Packet.pdf?utm_medium=email&utm_source=govdelivery
Interagency Climate Adaptation Team (ICAT)	Y	Policies + implementation steps	*Regulation/new standards* √ Monitoring *Capital projects* √ Modeling/forecasting *Education and Outreach* √ Coordination with other government entities *Budget item?*	Adapting to Climate Change in Minnesota: 2017 Report of the Interagency Climate Adaptation Team, https://www.pca.state.mn.us/sites/default/files/p-gen4-07c.pdf; Building Resiliency to Extreme Precipitation in Minnesota: ICAT Workgroup #1 White Paper, 2018, https://bwsr.state.mn.us/sites/default/files/2018-12/Building_Resiliency_to_Extreme_Precipitation_in_Minnesota-ICAT_White_Paper%20%282%29.pdf

State level government entity or group	Relevant content	Level of engagement	Content Analysis	Plan/page title and link
Minnesota Department of Agriculture	Y	Policies + implementation steps	*Regulation/new standards* √ Monitoring *Capital projects* √ Modeling/forecasting *Education and Outreach* √ Coordination with other government entities √ Budget item?	**Participated in development of 2017 ICAT report;* 2017 Forever Green Initiative, https://www.mda.state.mn.us/protecting/cleanwaterfund/forevergreen
Minnesota Department of Health	Y	Policies + implementation steps	*Regulation/new standards* √ Monitoring *Capital projects* √ Modeling/forecasting *Education and Outreach* √ Coordination with other government entities *Budget item?*	Climate and Health, https://www.health.state.mn.us/communities/environment/climate/; Climate Change and Water Quality, https://www.health.state.mn.us/communities/environment/climate/water.html; Minnesota Department of Health Climate & Strategic Health Plan, August 2016-August 2021, updated April 2019, https://www.health.state.mn.us/communities/environment/climate/docs/strategicplan.pdf; Minnesota Climate Change Vulnerability Assessment Summary: https://www.health.state.mn.us/communities/environment/climate/docs/mnclimvulnsummary.pdf; MN Climate & Health Impacts in Metro Minnesota, 2018, https://www.health.state.mn.us/communities/environment/climate/docs/hsem_region6.pdf

State level government entity or group	Relevant content	Level of engagement	Content Analysis	Plan/page title and link
Minnesota Department of Natural Resources	Y	Policies + implementation steps	*Regulation/new standards* √ Monitoring *Capital projects* √ Modeling/forecasting *Education and Outreach* √ Coordination with other government entities *Budget item?*	Climate Change and Minnesota: What DNR is doing, https://www.dnr.state.mn.us/climate/climate_change_info/what-dnr-doing.html Minnesota Department of Natural Resources State Climatology Office, https://www.dnr.state.mn.us/climate/about_us.html
Minnesota Department of Public Safety	Y	Policies + implementation steps	*Regulation/new standards* *Monitoring* *Capital projects* √ Modeling/forecasting *Education and Outreach* √ Coordination with other government entities *Budget item?*	Minnesota State Hazard Mitigation Plan Including Recommended Actions for Climate Change Adaptation, 2019, https://dps.mn.gov/divisions/hsem/hazard-mitigation/Documents/2019-mn-hmp-only.pdf
Minnesota Department of Transportation	Y	Policies + implementation steps	*Regulation/new standards* √ Monitoring *Capital projects* √ Modeling/forecasting *Education and Outreach* √ Coordination with other government entities *Budget item?*	MN Department of Transportation: Climate Change: Adaptation, http://www.dot.state.mn.us/climate/adaptation.html; Climate Resilience, http://www.dot.state.mn.us/sustainability/climate-resilience.html; MNDOT Sustainability Report (2016-2018), http://www.dot.state.mn.us/sustainability/ghg-reduction.html

State level government entity or group	Relevant content	Level of engagement	Content Analysis	Plan/page title and link
Minnesota Management & Budget	Y	Policies + implementation steps	*Regulation/new standards* *Monitoring* *Capital projects* *Modeling/forecasting* √ Education and Outreach √ Coordination with other government entities *Budget item?*	Management Analysis & Development: Minnesota Pollution Control Agency for the Interagency Climate Adaptation Team, Climate Adaptation Planning Survey, August 2016, https://www.pca.state.mn.us/sites/default/files/p-gen4-12.pdf
Minnesota Pollution Control Agency	Y	Policies + implementation steps	*Regulation/new standards* √ Monitoring *Capital projects* √ Modeling/forecasting √ Education and Outreach √ Coordination with other government entities *Budget item?*	Adapting to a changing climate, https://www.pca.state.mn.us/air/adapting-changing-climate; Pale Blue Dot: Climate Resilience for Vulnerable Populations, http://palebluedot.llc/mpca-vulnerable-population-assessments
Department of Administration	Y	Policies + implementation steps	*Regulation/new standards* ✓ Monitoring *Capital projects* *Modeling/forecasting* *Education and Outreach* *Coordination with other government entities* *Budget item?*	Enterprise Sustainability, https://sustainability.mn.gov/Home/FocusArea/G

State level government entity or group	Relevant content	Level of engagement	Content Analysis	Plan/page title and link
Climate Change Subcabinet and the Governor's Advisory Council on Climate Change	Y	Policies + implementation steps	✓ Regulation/new standards *Monitoring* *Capital projects* *Modeling/forecasting* ✓ Education and Outreach ✓ Coordination with other government entities *Budget item?*	Executive Order 19-37, 2019, https://mn.gov/governor/assets/2019_12_2_EO_19-37_Climate_tcm1055-412094.pdf
Natural Resources Defense Council - *MN review*	Y	Policies + implementation steps	*Regulation/new standards* *Monitoring* *Capital projects* *Modeling/forecasting* *Education and Outreach* √ Coordination with other government entities *Budget item?*	Ready or Not: An Evaluation of State Climate and Water Preparedness Planning, April 2012, https://www.nrdc.org/sites/default/files/Water-Readiness-full-report.pdf
Region 9	Y	Policies + implementation steps	*Regulation/new standards* √ Monitoring *Capital projects* √ Modeling/forecasting *Education and Outreach* √ Coordination with other government entities *Budget item?*	Region 9 Climate Change Vulnerability Assessment & Adaptation Plan, 2017, https://www.rndc.org/download/community_economic_development/climate-change-plan-final-for-web.pdf

APPENDIX A: Table 2. Watershed District Management Plan Climate Change Content Review

Watershed District	Relevant content	Level of engagement	Content Analysis	Plan title and link
Bear Valley	N	None		2012 Overall Plan, https://docs.wixstatic.com/ugd/526941_5a486d66537249f4aea47211e3d066dc.pdf
Belle Creek	N	None		2011 Watershed Management Plan Revision, https://docs.wixstatic.com/ugd/526941_0357f768997fd9a1f27e92c3be9a6307.pdf
Bois de Sioux	N	None		2003 Overall Plan, http://www.bdswd.com/PDF/Overall%20Plan/Final%20Overall%20Plan%205-23-03.pdf
Brown's Creek	Y	Policies + implementation steps	*Regulation/new standards* √ Monitoring/research *Capital projects* √ Modeling/forecasting √ Education and Outreach √ Coordination with other government entities √ Budget item?	2017-2026 Watershed Management Plan, https://bcwd.org/vertical/sites/%7B64FB1BEC-A43C-4118-B98E-92A5C0551F17%7D/uploads/BCWD_Plan_amendment_October_2019-_with_appendix_and_title_pages.pdf
Buffalo Creek	N	None		Overall Plan 2014-2023, http://bcwatershed.org/pdf/BCWD%20Overall%20Plan%202014-2023%20%5Bwith%20%20Appendix%20D%20Amendment%208-5-2015%5D.pdf
Buffalo-Red River	N	None		Revised Watershed Management Plan, 2010, http://www.brrwd.org/revised-watershed-management-plan-update/

Watershed District	Relevant content	Level of engagement	Content Analysis	Plan title and link
Capitol Region	Y	Policies + implementation steps	*Regulation/new standards* √ Monitoring/research *Capital projects* √ Modeling/forecasting √ Education and Outreach √ Coordination with other government entities √ Budget item?	2010 Watershed Management Plan, https://www.capitolregionwd.org/wp-content/uploads/2018/12/2010-Watershed-Management-Plan.pdf Draft 2021-2013 Watershed Management Plan, https://www.capitolregionwd.org/wp-content/uploads/2020/05/CRWD-WatershedManagementPlan-MainDocument-draftMay2020.pdf
Carnelian-Marine-St. Croix	N	None		2010 Watershed Management Plan Amended 2013, http://www.cmscwd.org/about-us/management-plan Carnelian-Marine-St. Croix is currently preparing to update its plan. Information here: http://www.cmscwd.org/about-us/management-plan/cmscwd-watershed-management-plan-update
Cedar River	Y	1W1P - acknowledgement		1W1P Plan for Cedar-Wapsipinicon Comprehensive Watershed Management Plan, December 2019, https://issuu.com/mowerswcd/docs/cedar_wapsipinicon_cwmp_final_12022019_complete-1
Clearwater River	N	None		2010 Watershed Management Plan, https://www.crwd.org/uploads/1/3/0/2/130247478/crwd_comprehensive_plan.pdf
Comfort Lake Forest Lake	Y	Acknowledgement		2012-2021 Watershed Management Plan, Vol 1-2, Vol. 1: https://www.clflwd.org/documents/CLFLWDWMPVolI_AmendedApr2018.pdf Vol. 2: https://www.clflwd.org/documents/CLFLWDWMPVolumeIIResourceInventory_000.pdf
Coon Creek	N	None		2013-2023 Comprehensive Plan, https://www.cooncreekwd.org/index.asp?SEC=570580B9-330E-49F8-8E9E-C21773F72F8E&Type=B_BASIC

Watershed District	Relevant content	Level of engagement	Content Analysis	Plan title and link
Crooked Creek	N	None		Part of Root River Watershed 1W1P https://www.co.houston.mn.us/?mdocs-file=3308
Heron Lake	N	None		10 Year Watershed Management Plan 2012-2021, http://www.hlwdonline.org/php/images/pdf/AboutUs/~HLWD%20Management%20Plan%20-%202012%20-%202021.pdf
High Island Creek	~	~		NO WEBSITE AVAILABLE
Joe River	~	~		RRWMB webpage for Joe River did not contain plan;
Kanaranzi-Little Rock	Y	1W1P - acknowledgement		*Engaged in Missouri River 1W1P, https://www.houstoneng.com/missouririverwatershedonewatershedoneplan/*
Lac qui Parle-Yellow Bank	N	None		Watershed Management Plan, 2009-2019, http://nebula.wsimg.com/8fd8322485b71597ca9d8214760350aa?AccessKeyId=E6D10C2F8BFB5B49D88D&dispositio n=0&alloworigin=1 Part of Yellow Medicine 1W1P: https://www.yellowmedicineswcd.org/watersheds-in-ymc
Lower Minnesota River	N	None		Watershed Management Plan, 2018-2027, http://www.lowermnriverwd.org/application/files/6615/4212/6020/1._LMRWD_Complete_Plan_2018-2027.pdf
Middle Fork Crow River	Y	Acknowledgement		*part of North Fork Crow River Water Planning Partnership* 1W1P 2018*, http://www.crowriver.org/NorthFork1W1P.html*
Middle - Snake-Tamarac Rivers	N	None		Watershed Management Plan 2011, https://mstrwd.org/wp-content/uploads/MSTRWD-FINAL-PLAN-MAY_2011.pdf
Minnehaha Creek	N	None		Watershed Management Plan 2018, https://www.minnehahacreek.org/sites/minnehahacreek.org/files/CompPlan/MCWDCompPlan/3%20-%20MCWD%20Watershed%20Management%20Plan%201-11-17.pdf

Watershed District	Relevant content	Level of engagement	Content Analysis	Plan title and link
Nine Mile Creek	Y	Policies + implementation steps	*Regulation/new standards* √ Monitoring *Capital projects* √ Modeling/forecasting √ Education and Outreach √ Coordination with other government entities √ Budget item?	Water Management Plan, 2017-2027, http://www.ninemilecreek.org/wp-content/uploads/2017_Oct_Final_9-Mile_WMP_Amended_April_2019.pdf
North Fork Crow River	Y	Acknowledgement		*part of North Fork Crow River Water Planning Partnership* 1W1P 2018, https://www.nfcrwd.org/vertical/sites/%7B14D03102-88C8-485B-81E2-631AD7572BCC%7D/uploads/NFCR_Watershed_1W1P_05012018-Final(1).pdf
Okabena-Ocheda	N	None		The district adopted the Missouri River Watershed Comprehensive Watershed Management Plan as its management plan in December 2019: http://www.okabenaochedawd.org/missouri%20river%20watershed%20plan.pdf
Pelican River	N	None		Revised Management Plan 2020, http://www.prwd.org/about-prwd/revised-mgt-plan/
Prior Lake-Spring Lake	N	None		Draft Water Resources Management Plan, 2020-2029; https://www.plslwd.org/wp-content/uploads/2020/05/FINAL-DRAFT-WRMP-Plan_2020-05-07.pdf

Watershed District	Relevant content	Level of engagement	Content Analysis	Plan title and link
Ramsey-Washington Metro	Y	Acknowledgement	*Regulation/new standards* √ Monitoring *Capital projects* *Modeling/forecasting* √ Education and Outreach *Coordination with other government entities* *Budget item?*	2017-2026 Watershed Management Plan, https://www.rwmwd.org/wp-content/uploads/RWMWD-Management-Plan.pdf
Red Lake	N	None		10-year Comprehensive Plan, 2006, http://www.redlakewatershed.org/planupdate/Final%20Draft/RLWD%2010-yr%20Plan-Atts_5.19.06_mk.pdf
Rice Creek	Y	Policies + implementation steps	√ Regulation/new standards *Monitoring* *Capital projects* *Modeling/forecasting* √ Education and Outreach √ Coordination with other government entities *Budget item?*	2020 Watershed Management Plan, https://www.ricecreek.org/vertical/sites/%7BF68A5205-A996-4208-96B5-2C7263C03AA9%7D/uploads/RCWD_2020_Watershed_Management_Plan_20191210_FINAL.pdf
Riley Purgatory Bluff Creek	Y	Policies + implementation steps	*Regulation/new standards* √ Monitoring *Capital projects* √ Modeling/forecasting √ Education and Outreach *Coordination with other government entities* *Budget item?*	10-Year Watershed management Plan, 2018-2028, http://rpbcwd.org/library/watershed-management-plans

Watershed District	Relevant content	Level of engagement	Content Analysis	Plan title and link
Roseau River	N	None		Overall Plan, 2004, http://www.roseauriverwd.com/pdf/RRWD%20Overall%20Plan.pdf
San Hill River	N	None		Watershed Management Plan, 2012, http://www.sandhillwatershed.org/Overall_Plan.html
Sauk River	N	None		Comprehensive Watershed Management Plan, 2014-2023, http://www.srwdmn.org/pdfs/SRWD-Comprehensive-Plan-March2014.pdf
Shell Rock River	N	None		2014 Second Generation Water Management Plan, https://www.shellrock.org/vertical/sites/%7B9804AD9D-40CA-46B1-8F91-CC0257E7304A%7D/uploads/12-31-15_FINAL_Shell_Rock_River_Watershed_Water_Management_(1-11-16).pdf
South Washington	Y	Policies + implementation steps	*Regulation/new standards* √ Monitoring *Capital projects* √ Modeling/forecasting √ Education and Outreach √ Coordination with other government entities √ Budget item?	Watershed Management Plan, 2016, https://www.swwdmn.org/wp-content/uploads/2016/08/SWWD-WMP-October-2016-1.pdf Climate Resiliency Plan, 2018, https://www.swwdmn.org/wp-content/uploads/2017/10/FINAL_SWWD-Climate-Resiliency-Plan_3.7.pdf
Stockton-Rollingstone MN City	N	None		Watershed Management Plan, 2019, https://www.co.winona.mn.us/sites/co.winona.mn.us/files/files/Private_User/plaes/Water%20Plan/12-1-2019%20FINAL%20SRMCWD%20Chapter.pdf
Turtle Creek	N	None		Watershed Management Plan, 2003, https://turtlecreekwd.org/wp-content/uploads/2019/01/Turtle-Creek-Watershed-Plan.pdf
Two Rivers	N	None		Overall Plan, 2004, http://www.tworiverswd.com/overall_plan.html

Watershed District	Relevant content	Level of engagement	Content Analysis	Plan title and link
Upper Minnesota River	N	None		10 Year Plan Update, 2013, http://www.umrwd.org/Main_Document.pdf
Valley Branch	Y	Acknowledgement		2015-2025 Watershed Management Plan, http://www.vbwd.org/watershed_management_plan_2015-2025/index.php
Warroad	N	None		The Warroad River Watershed District has adopted the Lake of the Woods Comprehensive Watershed Management Plan or the new One Watershed One Plan (1W1P) as of October 22, 2019. 1W1P, 2019 https://drive.google.com/file/d/1R2ETXjHBb-RNvkMflJrbS-Tx01UURSzg/view
Wild Rice	N	None		1W1P http://www.wildricewatershed.org/onewatershedoneplan/approved-documents/
Yellow Medicine River	Y	1W1P: Policies + implementation steps	*Regulation/new standards* √ Monitoring *Capital projects* *Modeling/forecasting* *Education and Outreach* √ Coordination with other government entities *Budget item?*	Yellow Medicine One Watershed One Plan 2017-2026, https://ymrwd.org/Yellow%20Medicine%201W1P%2010_06_2016.pdf

APPENDIX A: Table 3. County Water Plan Climate Change Content Review

County	Relevant content	Level of engagement	Content Analysis	Plan title and link
Aitkin	Y	Policies + implementation steps	*Regulation/new standards* √ Monitoring √ Capital projects √ Modeling/forecasting √ Education and Outreach √ Coordination with other government entities *Budget item?*	*Comprehensive Land Use Plan, adopted April 2010, https://www.co.aitkin.mn.us/departments/enviro-svcs/comprehensive-land-use-plan.html*
Anoka	Y*	*climate variations are normal; not necessarily "climate change"		Anoka County Water Resources Management Report, 2014, https://www.anokacounty.us/DocumentCenter/View/5631/Water-Resources-Report-2014-PDF
Becker	Y	Acknowledgement		Local Water Management Plan, January 1, 2017 – December 31, 2026, https://www.co.becker.mn.us/dept/soil_water/PDFs/2017%20Becker%20County%20Local%20Water%20Management%20Plan.pdf
Beltrami	Y	Acknowledgement		Local Water Management Plan, September 27, 2017 – September 27, 2027, http://www.co.beltrami.mn.us/Departments/SWCD/Resources/Local%20Water%20Plan.pdf
Benton	Y	Acknowledgement		Comprehensive Local Water Management Plan, 2018-2028, https://static1.squarespace.com/static/5991a4db4c0dbfafe10384f8/t/5bc0a64c0d9297c32f05b5d3/1539352193151/Benton_WP.pdf
Big Stone	Y	Acknowledgement		County Water Plan, 2014-2023, http://www.bigstonecounty.org/Government/Environmental/docs/BigStoneCountyWaterPlan%20with%20updates.pdf

County	Relevant content	Level of engagement	Content Analysis	Plan title and link
Blue Earth	Y	Acknowledgement		County Water Management Plan, 2017-2026, https://www.blueearthcountymn.gov/DocumentCenter/View/3317/Water-Plan-2017---Final-Draft?bidId=
Brown	N	None		Comprehensive Local Water Management Plan, 2008-2018 (Amended August 2013), https://www.co.brown.mn.us/images/Department/Planning_and_Zoning/water/FINAL_DRAFT_WATER_PLAN_Aug_20131.pdf
Carlton	Y	Action		Comprehensive Local Water Management Plan, 2010-2020, amended 2014, https://www.co.carlton.mn.us/ArchiveCenter/ViewFile/Item/58
Carver	N	None		Carver County Watershed Management Organization 2020-2029 Watershed Management Plan, February 2020, https://www.co.carver.mn.us/home/showdocument?id=19759
Cass	N	None		Local Water Management Plan, 2017-2027, http://cms4.revize.com/revize/casscounty/document_center/esd/2017-2027%20Water%20Plan.pdf
Chippewa	Y	Acknowledgement		The 2019-2023 Chippewa County Water Plan, https://www.co.chippewa.wi.us/home/showdocument?id=24952
Chisago	N	None		Local Water Management Plan, September 2013-September 2023, https://www.chisagocounty.us/DocumentCenter/View/4266/Chisago-County-Local-Water-Management-Plan-2013-2023?bidId=
Clay	N	None		Local Water Management Plan, 2017-2026, https://claycountymn.gov/DocumentCenter/View/5492/Clay-County-LWMP-2017-2026-?bidId=

County	Relevant content	Level of engagement	Content Analysis	Plan title and link
Clearwater	N	None		Comprehensive Local Water Management Plan, 2010-2020, https://www.clearwaterswcd.org/2010.final.plan.official.pdf
Cook	Y	Policies + implementation steps	*Regulation/new standards* √ Monitoring *Capital projects* √ Modeling/forecasting √ Education and Outreach *Coordination with other government entities* √ Budget item?	Comprehensive Local Water Management Plan, 2014-2024, https://www.co.cook.mn.us/index.php/soil-and-water-documents?task=document.viewdoc&id=280
Cottonwood	N	None		Comprehensive Local Water Management Plan, 2017-2027, https://www.co.cottonwood.mn.us/files/1614/9805/4565/CCCLWP_-__FINAL_APPROVED.pdf
Crow Wing	N	None		Local Comprehensive Water Plan, 2013-2023, https://crowwing.us/241/Water-Quality-and-Water-Plan
Dakota	N	None		Comprehensive Plan, DC2040, February 2015, https://www.co.dakota.mn.us/Government/Planning/CompPlan/Documents/DC2040ComprehensivePlanDraft.pdf
Dodge	N	None		Comprehensive Water Management Plan, 2006-2016, including 2017-2021 Amendment, https://www.co.dodge.mn.us/EnvironmentalServices/Final%20Dodge%20County%20Amended%20Comprehensive%20Water%20Plan.pdf
Douglas	Y	Acknowledgement		Comprehensive Local Water Management Plan, 2009-2019, http://www.douglasswcd.com/wp-content/uploads/2017/04/Water_Plan2016.pdf

County	Relevant content	Level of engagement	Content Analysis	Plan title and link
Faribault	Y	Policies + implementation steps	*Regulation/new standards* √ Monitoring *Capital projects* √ Modeling/forecasting √ Education and Outreach *Coordination with other government entities* √ Budget item?	Local Water Management Plan, 2018-2027, http://www.co.faribault.mn.us/sites/faribaultcountymn/files/uploads/water_plan_2018-2027.pdf
Fillmore	N	None		Comprehensive Local Water Management Plan 2006-2015, http://www.fillmoreswcd.org/documents/FillmoreCoLWMplan_final.pdf
Freeborn	N	None		Comprehensive Water Plan Amendment to Implementation 2016-2021, https://www.co.freeborn.mn.us/DocumentCenter/View/2177/Freeborn-County-Comprehensive-Water-Plan-2016-2021-PDF
Goodhue	N	None		Comprehensive Local Water Management Plan, 2010-2020, https://12decf39-832d-d999-99ec-c48ce06e0742.filesusr.com/ugd/526941_f6b5fcc18ac7120c6b38c1095a802884.pdf
Grant	N	None		Local Water Management Plan, Amendment 2010-2015, https://www.grantswcd.org/docs/WaterPlan2010-15Amendment.pdf
Hennepin	Y	M, acknowledgement	*Regulation/new standards* √ Monitoring *Capital projects* √ Modeling/forecasting *Education and Outreach* √ Coordination with other government entities	Hennepin County 2040 Comprehensive Plan, https://www.hennepin.us/your-government/projects-initiatives/comprehensive-plan Hennepin County Natural Resources Strategic Plan, 2015-2020, https://www.hennepin.us/-/media/hennepinus/residents/environment/natural-resource-management/natural-resources-strategic-plan.pdf?la=en

County	Relevant content	Level of engagement	Content Analysis	Plan title and link
Houston	Y	Acknowledgement		Comprehensive Water Plan for the Upper Mississippi – La Crescent Watershed, 2007-2022, Amendment October 2017, http://co.houston.mn.us/Documents/SoilWater/ComprehensiveWaterPlanDraft.pdf
Hubbard	Y	Acknowledgement		Local Water Management Plan, January 2016-January 2026, http://www.hubbardswcd.org/wp-content/uploads/2016/12/2016-Hubbard-County-LWMP.pdf
Isanti	Y	Policies + implementation steps	*Regulation/new standards* √ Monitoring *Capital projects* √ Modeling/forecasting √ Education and Outreach *Coordination with other government entities* *Budget item?*	Local Water Management Plan, 2018-2028, https://www.isantiswcd.org/images/Isanti/Studies_and_Plans/Water_Plan_FINAL_2018.pdf
Itasca	N	None		Local Water Management Plan, 1-29-2019 to 3-31-2022 effective Amendment, to the Executive Summary, Goals, Objectives, and Action Items, https://www.itascaswcd.org/images/Water_Resources/Final_Jan29_2019_effective_h2o_plan_amendment.pdf
Jackson	N	None		Local Water Management Plan, 2008-2018, https://www.co.jackson.mn.us/vertical/Sites/%7B47B68709-5081-4D2D-A79C-49891B025171%7D/uploads/Water_Management_Plan_2013_Amendment.PDF

County	Relevant content	Level of engagement	Content Analysis	Plan title and link
Kanabec	N	None		Kanabec County Water Plan 2006-2016 (still used as current document in 2020). https://www.kanabeccounty.org/departments/environmental_services/water_plan_administration.php
Kandiyohi	N	1W1P		Kandiyohi County Water Plan (2013-2023), with a 5-year implementation plan (2013 – 2018). In 2018, implementation plan was intended to be updated. North Fork Crow River One Watershed, One Plan submitted in 2018 for review (link to draft plan is broken)
Kittson	N	None		Comprehensive Local Water Management Plan (CLWP) 2010-2019 and resolution to extend to 2022. https://co.kittson.mn.us/2263/Kittson-County-SWCD
Koochiching	N	None		Local Water Management Plan, 2018-2028, https://koochichingswcd.org/wp-content/uploads/2018/03/2018-2028-kcclwmp.pdf Hazard mitigation plan, 2008, https://www.co.koochiching.mn.us/DocumentCenter/View/146/Draft-Hazard-Mitigation-Plan---Part-1-PDF
Lac qui Parle	N	None		Local Water Management Plan, 2014-2023, http://www.lqpco.com/environment/LQP%20WATER%20PLAN%202014-23.pdf
Lake	Yes	Strategy, Action Steps	*Regulation/new standards* Monitoring *Capital projects* Modeling/forecasting Education and Outreach √ Coordination with other government entities Budget item?	Hazard Mitigation Plan, 2008, https://www.co.koochiching.mn.us/DocumentCenter/View/146/Draft-Hazard-Mitigation-Plan---Part-1-PDF Lake Superior North One Watershed, One Plan, 2017, https://www.co.lake.mn.us/waterplan/swcd_20200428%20FINAL_Full%20Report_dated%20May%2023-2017%20-%20Revised%204-28-2020%20legacy%20logo.pdf

County	Relevant content	Level of engagement	Content Analysis	Plan title and link
Lake Superior North	Y	1W1P: Policies + implementation steps	*Regulation/new standards* √ Monitoring *Capital projects* √ Modeling/forecasting √ Education and Outreach √ Coordination with other government entities √ Budget item?	Lake Superior North, One Watershed, One Plan, May 23, 2017, http://www.co.lake.mn.us/document_center/SWCD_Doc_Center/One%20Watershed%20One%20Plan%20Lake%20Superior%20North%201.pdf
Lake of the Woods	Y	Acknowledgement		Local Water Management Plan, 2010-2020 Update, http://lakeofthewoodsswcd.org/district%20operations/2010CLWMP.pdf
Le Sueur	N	None		Local Water Management Plan, 2016-2021, https://www.co.le-sueur.mn.us/DocumentCenter/View/424/Le-Sueur-County-Local-Water-Management-Plan-PDF
Lincoln	Y	1W1P: Policies + implementation steps	*Regulation/new standards* *Monitoring* *Capital projects* √ Modeling/forecasting *Education and Outreach* √ Coordination with other government entities *Budget item?*	Yellow Medicine One Watershed One Plan, 2017-2026, https://area2.org/images/1W1P/Yellow%20Medicine%201W1P%2010_06_2016.pdf

County	Relevant content	Level of engagement	Content Analysis	Plan title and link
Lyon	Y	1W1P: goals, implementation actions	*Regulation/new standards* *Monitoring* *Capital projects* √ Modeling/forecasting *Education and Outreach* √ Coordination with other government entities *Budget item?*	Local Comprehensive Water Management Plan, 2011 Amendment covers 2012-2015, extended, 2018, and 1W1P (Yellow Medicine) is substituting for the current County Local Water Management Plan, https://www.lyonco.org/departments/lyon-county-soil-water-conservation-district/reports-and-plans/-folder-1112#docan2403_3404_2333
Mahnomen	~	~		
Marshall	N	None		Local Water Management Plan, 2007-2015, http://www.co.marshall.mn.us/document_center/WaterLand/Local%20Water%20Management%20Plan%20(LWMP)%202007-2012.pdf
Martin	Y	Acknowledgement		Local Water Plan 2017-2026, http://martinswcd.net/wp-content/uploads/2013/11/MartinCountyLocalWaterPlan2016-2.pdf
McLeod	N	None		Comprehensive Local Water Plan 2013-2023, https://www.co.mcleod.mn.us/Environmental%20Services/McLeod%20County%20Water%20Plan%202013-2023%20[6-18-13].pdf
Meeker	N	None		2013-2023 Comprehensive Local Water Plan, https://www.co.meeker.mn.us/DocumentCenter/View/238/Meeker-County-Comprehensive-Water-Plan-PDF?bidId=

County	Relevant content	Level of engagement	Content Analysis	Plan title and link
Mille Lacs	Y	Policies + implementation steps	*Regulation/new standards* *Monitoring* *Capital projects* √ Modeling/forecasting √ Education and Outreach *Coordination with other government entities* √ Budget item?	Comprehensive Local Water Management Plan, November 2018-October 2027, https://www.millelacsswcd.org/wp-content/uploads/2018/11/FINAL-Water-Plan_09.04.2018.pdf
Morrison	Y	Acknowledgement (groundwater)		Comprehensive Water Plan 2010-2020, https://www.co.morrison.mn.us/vertical/sites/%7BC8FCCAFF-AECD-45DC-91B1-016A998EB4A8%7D/uploads/%7B8DBC752F-EFA2-4EB6-ACDD-F6204EDD487C%7D.PDF
Mower	N	None		Local Water Management Plan, 2006-2015, http://www.co.mower.mn.us/files/public-works/planning/water-plan/2010%20Final%20Updated%20Water%20Plan.pdf https://issuu.com/mowerswcd/docs/cedar_wapsipinicon_cwmp_final_12022019_complete-1
Murray	Y	Regulation	√ Regulation/new standards *Monitoring* *Capital projects* *Modeling/forecasting* Education and Outreach Coordination with other government entities	Local Water Management Plan, 2017-2027, https://murraycountymn.com/wp-content/uploads/2017/03/Murray-County-LWMP-2017.pdf Hazard Mitigation Plan, 2019, https://murraycountymn.com/wp-content/uploads/2019-Murray-County-Hazard-Mitigation-Plan-Update-DRAFT.pdf Comprehensive Plan, 2016, https://murraycountymn.com/wp-content/uploads/2016/10/2016-Murray-County-Plan-10-25-2016.pdf?highlight=comprehensive%20plan

County	Relevant content	Level of engagement	Content Analysis	Plan title and link
Nicollet	N	None		Local Water Management Plan, 2018-2023 Extension, https://www.co.nicollet.mn.us/DocumentCenter/View/3628/Final-Draft-LWM-Plan-Amendment-2018
Nobles	N	None		Local Water Management Plan, 2009-2018, http://www.okabenaochedawd.org/waterplan2008.pdf
Norman	N	None		Local Water Management Plan 2017-2026, http://www.normancountyswcd.org/uploads/3/4/8/3/34830110/norman_county_water_plan.pdf
Olmstead	N	None		County Water Management Plan 2013-2023, https://www.co.olmsted.mn.us/pw/waterresourcemanagement/Documents/County%20Water%20Management%20Plan.pdf
Otter Tail	N	None		Local Water management Plan, August 31, 2009-August 31, 2019, http://www.wotswcd.org/uploads/files/Otter%20Tail%20County%20Local%20Water%20Management%20Plan.pdf
Pennington	~	~		*Appears to be part of under development Thief River Falls 1W1P*
Pine	N	None		Local Water Management Plan 2015-2020, https://www.co.pine.mn.us/document_center/Departments/planning%20and%20zoning/Pine%20County%20Water%20Management%20Plan.pdf
Pipestone	N	None		Comprehensive Plan including the County's Water Plan, 2004, http://www.swrdc.org/wp-content/uploads/2014/07/Pipestone-County-Comp-Plan.pdf
Polk	N	None		Local Water Plan, 5 Year Update 2017, http://www.co.polk.mn.us/DocumentCenter/View/536/2012-to-2022-Approved-Polk-County-Water-Plan-Amendment-PDF

County	Relevant content	Level of engagement	Content Analysis	Plan title and link
Pope	N	None		2013-2023 Water Plan, http://popeswcd.org/wp-content/uploads/2016/01/WaterPlan13_June.pdf
Ramsey	Y	Acknowledgement		2040 Water Resources, https://www.ramseycounty.us/sites/default/files/Projects%20and%20Initiatives/RamseyCounty2040_Wastewater_SurfaceWater_7.17.pdf
Red Lake	N	None		Comprehensive Local Water management Plan, March 24, 2010-March 24, 2020, http://redlakecountyswcd.org/uploads/3/4/8/3/34832033/rlc_clwmp.pdf
Redwood	N	None		Comprehensive Plan, 2007, https://redwoodcounty-mn.us/wp-content/uploads/2017/03/Redwood-County-Comprehensive-Plan.pdf
Renville	N	None		Comprehensive Local Water Management Plan, 2013-2023, http://www.renvillecountymn.com/document_center/1_Renville_County_Water_Plan_2013_2023_Final_Adopted_Plan_8_13_13.pdf
Rice	N	None		Local Water Management Plan 2014-2019, http://www.riceswcd.org/wp-content/uploads/2014/01/Rice-County-Water-PlanA-2015-2019-With-SWCD-Section.pdf
Rock	N	None		County Water Plan, 2006, updated 2011, http://www.rockswcd.org/uploads/2/6/2/4/26246555/2011_rock_water_plan.pdf
Roseau	N	None		Local Water Management Plan, 2010-2019, https://docs.wixstatic.com/ugd/d82f3b_5ecfba83a59d402eafe7585466d34d27.pdf
Scott	Y	Acknowledgement		Comprehensive Water Resources Management Plan, https://www.scottcountymn.gov/DocumentCenter/View/11775/WMO-Water-Resources-Plan-FINAL

County	Relevant content	Level of engagement	Content Analysis	Plan title and link
Sherburne	Y	Acknowledgement		Local Water Management Plan, 2018-2028, https://www.co.sherburne.mn.us/DocumentCenter/View/2798/Local-Water-Management-Plan- Comprehensive Land Use Plan, 2010-2030, https://www.co.sherburne.mn.us/DocumentCenter/View/353/Comprehensive-Land-Use-Plan-PDF
Sibley	~	~		https://www.co.sibley.mn.us/Water%20Plan%20(current%20as%20of%202019).pdf
St. Louis	N	None		Comprehensive Water Management Plan, Update 2010-2020, https://files.dnr.state.mn.us/lands_minerals/northmet/water-approp/references/mn-comprehensive-water-mgmt-plan-2010-2020.pdf
Stearns	N	None		Comprehensive Water Management Plan, 2008-2017, https://co.stearns.mn.us/Portals/0/docs/Department%20Files/EnvironmentalSvs/CLWP2008-2017_1.pdf?ver=2020-02-26-192257-770
Steele	N	None		Water Plan Amendment, December 2017 – December 2021, http://www.co.steele.mn.us/DRAFT_Steele%20WP%20Amendment_070416.pdf
Stevens	N	None		Local Water Management Plan Amendment, 2010-2015, https://www.stevensswcd.org/wp-content/uploads/2015/12/2010CLWMPAmendment.pdf
Swift	N	None		2014-2023 Local Water Plan, http://www.swiftswcd.org/uploads/9/8/2/9/98296824/swift_county_water_plan_2014-23.pdf
Todd	N	None		Comprehensive Local Water Management Plan, 2016, https://www.co.todd.mn.us/sites/default/files/soil_water/publications/misc/2010%20water%20plan.pdf
Traverse	N	None		(old plan) 2005-2014, https://www.traverseswcd.org/vertical/Sites/%7BF4B1E92B-F13F-43D8-BEE1-A4ABE27D3FC9%7D/uploads/LWM_Plan_2017.pdf

County	Relevant content	Level of engagement	Content Analysis	Plan title and link
Wabasha	N	None		Comprehensive Local Water Plan, 2015-2025 with 2020 Update, http://www.whitewaterwatershed.org/wp-content/uploads/2016/09/wabasha_2015_water_plan.pdf
Wadena	Y	Policies + implementation steps	*Regulation/new standards* √ Monitoring *Capital projects* √ Modeling/forecasting √ Education and Outreach √ Coordination with other government entities *Budget item?*	Local Water Management Plan Amendment 20-16-2026, https://www.wadenaswcd.org/2016_2026WadenaCountyWaterPlan_smallersize-1.pdf
Waseca	N	None		Local Water Management Plan Amendment 2015-2018, https://www.co.waseca.mn.us/DocumentCenter/View/3924/Waseca-County-Local-Water-Management-Plan-Amendment?bidId=
Washington	Y	Policies + implementation steps	*Regulation/new standards* √ Monitoring *Capital projects* √ Modeling/forecasting √ Education and Outreach √ Coordination with other government entities *Budget item?*	County Groundwater Plan 2014-2024, https://www.co.washington.mn.us/DocumentCenter/View/794/Groundwater-Plan-2014-2024?bidId=
Watonwan	N	None		Local Water Management Plan, 2014 Amendment, 2008-2018, https://www.co.watonwan.mn.us/DocumentCenter/View/913
Wilkin	N	None		Local Water Management Plan, 2008-2017, https://www.co.wilkin.mn.us/vertical/sites/%7B6E7AB7CB-4769-4357-B6C8-90E546FFE488%7D/uploads/Wilkin_County_water_plan.pdf

County	Relevant content	Level of engagement	Content Analysis	Plan title and link
Winona	N	None		Comprehensive Local Water Management Plan 2011-2015, https://winonaswcd.org/2011-2015%20Water%20Plan.pdf
Wright	N	None		(majority of the county will be included in N Fork of the Crow River 1W1P); Local Water Management Plan 2006-2015, http://www.wrightswcd.org/docs/WaterPlan.pdf
Yellow Medicine	Y	1W1P: Policies + implementation steps	*Regulation/new standards* *Monitoring* *Capital projects* √ Modeling/forecasting *Education and Outreach* √ Coordination with other government entities *Budget item?*	Yellow Medicine One Watershed One Plan, 2017-2026, https://area2.org/images/1W1P/Yellow%20Medicine%201W1P%2010_06_2016.pdf

APPENDIX A: Table 4. MCWD Local Government & Agency Plan Climate Change Content Review

City/Agency	Relevant content	Level of engagement (H/M/L)	Content Analysis	Plan title and link
City of Minneapolis	Y	H; policies + implementation steps	*Regulation/new standards* √ Monitoring *Capital projects* *Modeling/forecasting* √ Education and Outreach √ Coordination with other government entities *Budget item?*	Minneapolis 2040 Comprehensive Plan, 2019, https://minneapolis2040.com/ Minneapolis Climate Action Plan, 2013, http://www.ci.minneapolis.mn.us/www/groups/public/@citycoordinator/documents/webcontent/wcms1p-113598.pdf DRAFT City of Minneapolis Transportation Action Plan, 2020, http://go.minneapolismn.gov/ Minneapolis Water Resources Plan, http://www.minneapolismn.gov/www/groups/public/@publicworks/documents/webcontent/wcmsp-220578.pdf
City of Edina	Y	H; policies + implementation steps	*Regulation/new standards* √ Monitoring *Capital projects* √ Modeling/forecasting √ Education and Outreach √ Coordination with other government entities *Budget item?*	City of Edina Comprehensive Plan, https://www.edinamn.gov/647/Comprehensive-Plan, Electricity Action Plan, 2016, https://www.edinamn.gov/DocumentCenter/View/1047/Electricity-Action-Plan-PDF?bidId= / Flood Risk Reduction Strategy, 2020, https://www.edinamn.gov/DocumentCenter/View/9367/Flood-Risk-Reduction-Strategy_final?bidId=
City of St. Louis Park	Y	H; policies + implementation steps	*Regulation/new standards* √ Monitoring *Capital projects* √ Modeling/forecasting √ Education and Outreach *Coordination with other government entities* *Budget item?*	Comprehensive Plan 2040, 2019, https://www.stlouispark.org/government/departments-divisions/community-development/comprehensive-plan-2040-4799, Energy Action Plan, 2016, https://www.stlouispark.org/home/showdocument?id=1954, Climate Action Plan, 2018, https://www.stlouispark.org/our-city/climate-action-plan

City/Agency	Relevant content	Level of engagement (H/M/L)	Content Analysis	Plan title and link
City of Hopkins	Y	H; policies + implementation steps	*Regulation/new standards* √ Monitoring *Capital projects* *Modeling/forecasting* *Education and Outreach* *Coordination with other government entities* *Budget item?*	Comprehensive Plan, https://www.hopkinsmn.com/222/Comprehensive-Plan
City of Victoria	N	L; none		Our Victoria Tomorrow, 2019, https://www.ci.victoria.mn.us/DocumentCenter/View/4398/Our-Victoria-Tomorrow-2040-Comprehensive-Plan--PDF; *Note: Participated in MCWD's NOAA study*
City of Plymouth	N	L; acknowledgement (Surface Water Management Plan)		Plymouth Comprehensive Plan 2030, 2019, https://www.plymouthmn.gov/home/showdocument?id=20110
City of Wayzata	N	L; none		2040 Comprehensive Plan Update, https://www.wayzata.org/566/2040-Comprehensive-Plan-Update
City of Orono	N	L; none		2040 Comprehensive Plan, 2019, https://www.ci.orono.mn.us/371/2040-Comprehensive-Plan
City of Minnetrista	Y	L; acknowledgement		2040 Comprehensive Plan, 2019, https://www.cityofminnetrista.com/comprehensive-planning *Note: mentioned as a factor that could affect water supply.*
City of Deephaven	N	L; none		2040 Comprehensive Plan, https://www.cityofdeephaven.org/vertical/Sites/%7BA1F4EA29-FEA2-477B-97C1-913C7955ACF4%7D/uploads/City_of_Deephaven_2040_Comprehensive_Plan.pdf

City/Agency	Relevant content	Level of engagement (H/M/L)	Content Analysis	Plan title and link
City of Excelsior	N	L; none		2040 Comprehensive Plan, 2018, http://www.ci.excelsior.mn.us/DocumentCenter/View/1303/2040-Comprehensive-Plan-
Golden Valley	Y	M; implementation steps	*Regulation/new standards* √ Monitoring *Capital projects* √ Modeling/forecasting *Education and Outreach* √ Coordination with other government entities *Budget item?*	2040 Comprehensive Plan, http://www.goldenvalleymn.gov/planning/comprehensiveplanupdate/index.php
City of Greenwood	N	L; none		2040 Comprehensive Plan, 208, https://www.greenwoodmn.com/index.asp?SEC=EC7D78ED-9B90-469C-87DA-F45E8296634D&Type=B_BASIC
City of Independence	Y	L; acknowledgement		2040 Comprehensive Plan, 2018, https://www.ci.independence.mn.us/files/388/6/266/IND-2040-Draft-Comprehensive-Plan-12.2018-red.pdf
City of Long Lake	N	L; none		2040 Comprehensive Plan, 2018, https://www.longlakemn.gov/vertical/sites/%7BB1A99DAC-7328-47A4-8480-36B234C436B1%7D/uploads/2040_Comprehensive_Plan_FINAL_PACKAGE.pdf
Laketown Township	N	L; none		
City of Maple Plain	N	L; none		2030 Comprehensive Plan, 2010, https://evogov.s3.amazonaws.com/168/media/118523.pdf
City of Medina	Y	L; acknowledgement		2040 Comprehensive Plan, 2018, https://medinamn.us/regulations-fees/comprehensive-plan/
City of the Village of Minnetonka Beach	Y	L; acknowledgement		2040 Comprehensive Plan, 2019, https://www.ci.minnetonka-beach.mn.us/vertical/sites/%7B220E6946-C606-408C-96EE-ABCCE24AC6ED%7D/uploads/Minnetonka_Beach_Comp_Plan_-_10152019.pdf

City/Agency	Relevant content	Level of engagement (H/M/L)	Content Analysis	Plan title and link
City of Minnetonka		H; implementation steps	*Regulation/new standards* *Monitoring* *Capital projects* *Modeling/forecasting* √ Education and Outreach *Coordination with other government entities* *Budget item?*	DRAFT 2040 Comprehensive Plan, https://www.minnetonkamn.gov/government/departments/community-development/planning-zoning/comprehensive-guide-plan/2040-comprehensive-guide-plan
City of Mound	N	L; acknowledgement		
City of Richfield	Y	M; implementation steps		2040 Comprehensive Plan, 2018, https://www.richfieldmn.gov/departments/community-development/planning-and-zoning-division/comprehensive-plan
City of Shorewood	Y	L; acknowledgement		2040 Comprehensive Plan, 2019, http://weblink.ci.shorewood.mn.us/weblink8/0/doc/205671/Electronic.aspx
City of Spring Park	Y	L; acknowledgement		DRAFT 2040 Comprehensive Plan, https://www.ci.spring-park.mn.us/2040plan
City of St. Bonifacius	N	L; none		DRAFT 2040 Comprehensive Plan, https://ci.st-bonifacius.mn.us/index.asp?SEC=789C9C89-FED7-4DAD-81E3-42D333875583&DE=87295E0C-4820-4EB9-9E6B-4D7BFF2B548A&Type=B_BASIC
City of Tonka Bay	Y	L; acknowledgement		2018-2040 Comprehensive Plan, https://www.cityoftonkabay.net/vertical/Sites/%7B4A0B5943-C4EE-4132-80D2-7FD9E610BCBF%7D/uploads/City_of_Tonka_Bay_Comprehensive_Plan_FINAL_Reduced_Size.pdf
City of Woodland	N	L; none		DRAFT 2040 Comprehensive Plan, https://woodlandmn.org/comprehensive-plan/
Watertown Township	N	L; none		

City/Agency	Relevant content	Level of engagement (H/M/L)	Content Analysis	Plan title and link
Hennepin County	Y	M; implementation steps	*Regulation/new standards* √ Monitoring *Capital projects* √ Modeling/forecasting *Education and Outreach* √ Coordination with other government entities *Budget item?*	Hennepin County 2040 Comprehensive Plan, https://www.hennepin.us/your-government/projects-initiatives/comprehensive-plan Hennepin County Natural Resources Strategic Plan, 2015-2020, https://www.hennepin.us/-/media/hennepinus/residents/environment/natural-resource-management/natural-resources-strategic-plan.pdf?la=en Taking Action on Climate Change, https://www.hennepin.us/your-government/projects-initiatives/reducing-greenhouse-gas-emissions
Carver County	N	L; none		2040 Comprehensive Plan, 2020, https://www.co.carver.mn.us/home/showdocument?id=19425 Carver County Watershed Management Organization 2019-2028 Watershed Management Plan, January 2019 (Draft), https://www.co.carver.mn.us/home/showdocument?id=17613
Minneapolis Park and Recreation Board	Y	M; policies	*Regulation/new standards* √ Monitoring *Capital projects* *Modeling/forecasting* √ Education and Outreach √ Coordination with other government entities *Budget item?*	DRAFT Ecological System Plan, 2020, https://www.minneapolisparks.org/project_updates/revised-minneapolis-parks-ecological-system-plan-shared-online-for-public-review/

City/Agency	Relevant content	Level of engagement (H/M/L)	Content Analysis	Plan title and link
Three Rivers Park District	Y	L; acknowledgement	*Regulation/new standards* *Monitoring* *Capital projects* *Modeling/forecasting* √ Education and Outreach *Coordination with other government entities* *Budget item?*	*Note: In process of developing 2040 Systems Plan.* Climate Conversation Series, https://www.climategen.org/our-core-programs/community-convenings/climate-conversations-series/
Met Council	Y	M; policies	*Regulation/new standards* √ Monitoring *Capital projects* √ Modeling/forecasting √ Education and Outreach √ Coordination with other government entities *Budget item?*	Climate Vulnerability Assessment, https://metrocouncil.org/Communities/Planning/Local-Planning-Assistance/CVA.aspx?source=child ,Thrive MSP 2040, https://metrocouncil.org/Planning/Publications-And-Resources/Thrive-MSP-2040-Plan-(1)/ThriveMSP2040.aspx, Met Council Local Planning Handbook, https://metrocouncil.org/Handbook/Plan-Elements/Resilience.aspx, Twin Cities Greenhouse Gas Inventory, https://metrocouncil.org/tcghginventory.aspx, 2040 Transportation Policy Plan, https://metrocouncil.org/Transportation/Publications-And-Resources/Transportation-Planning/2040-Transportation-Policy-Plan-(2018-version)-(1)/2018-Transportation-Policy-Plan-Update/2040-Transportation-Policy-Plan-2018-Update-Overvi.aspx, Local Resilience Plans, https://metrocouncil.org/Handbook/Plan-Elements/Resilience.aspx

Appendix B

MN State Level Plans Climate Change Content

June 12, 2020

Highlighted sections correspond to Appendix A, Table 4 "Content and analysis" column and indicate rational for indicating what content each plan contains.

Government Entity or Group

Board of Water and Soil Resources

Environmental Quality Board (EQB)

Interagency Climate Adaptation Team (ICAT)

Minnesota Department of Agriculture

Minnesota Department of Health

Minnesota Department of Natural Resources

Minnesota Department of Public Safety

Minnesota Department of Transportation

Minnesota Management & Budget

Minnesota Pollution Control Agency

Natural Resources Defense Council – *MN review*

Region 9

Executive Order 19-37 - Climate Change Subcabinet and Governor's Advisory Council on Climate Change

BOARD OF WATER AND SOIL RESOURCES

Landscape Resiliency - Water Planning

15) Adapting to Climate Change. A major climate trend in Minnesota has been an increase in intense rainfall events that stress aquatic systems, cause erosion, and transport sediment and nutrients. Partners that are working on water plans should consider the potential for more extreme weather events and the implication for water and land resources. BWSR's Climate Change Trends and Action Report (pdf) provides details about climate change adaptation for conservation and protection of natural resources. All of the strategies summarized in this Toolbox play a role in climate adaptation efforts. In addition to the strategies already summarized related to water planning it is also important that NOAA Atlas 14 rainfall frequency data and good BMP/landscape planning and design practices are used to address larger storm events. It is also important to identify landscape and populations at risk from climate change trends.

Draft Climate Change Trends and Action Report, Jan. 15 2019

… BWSR is working to integrate climate change considerations in programs and practices for conservation on private lands that make up approximately 75% of Minnesota's land area through wetland protection, conservation easements (retirement of marginal agricultural lands), and providing soil and water conservation grants.

The following information is a summary of primary program areas and their role in climate mitigation and adaptation.

- Wetland Protection (Administration of the Minnesota Wetland Conservation Act): … With wetlands holding large amounts of carbon and methane, these actions help protect against climate change. It is estimated that one acre of peatland contains, on average, 750 metric tons of carbon. Total emission of the carbon contained in just 1,000 acres of peatland would increase Minnesota carbon dioxide emissions by almost two percent.

- Conservation Easements (Reinvest in Minnesota Reserve): BWSR's RIM program is focused on the acquisition and enhancement of critical habitat in the predominantly agricultural areas of the state by converting marginal crop lands to permanent native vegetative cover. This includes a wide range of activities that increase resiliency to climate change, such as restoring wetlands, establishing riparian buffers, protecting sensitive ground water areas, planting critical winter cover for wildlife, preserving habitat for rare plant and animal species, protecting and restoring native prairie and grasslands, increasing pollinator habitat, and preserving spawning and reproduction areas for fish. This program also plays an important role in sequestering larger amounts of carbon. The retirement of marginal agricultural lands also decreases emissions from machinery and nitrous oxide emissions from fertilizers.

- Soil and Water Conservation Grants: … . A wide variety of conservation practices sequester carbon and decrease nitrous oxide emissions from fertilizer, including: tree planting, grass planting, prairie and wetland restoration, windbreaks/shelterbelts, grassed waterways, contour

buffer strips, filter strips, riparian buffers, critical area planting, and cover crops. These practices also increase landscape resiliency and often help protect agricultural fields (protecting productivity) from extreme weather events. Grants also fund nutrient management plans and anaerobic manure digesters that decrease nitrous oxide and methane emissions.

What is BWSR doing now to adapt to climate change?

- Local Water Management Planning: BWSR supports and promotes integrated water resources management that uses a watershed approach to solve soil and water resource issues and considers the potential for more extreme weather events and their implications for the water and land resources. This includes the use of design standards for stormwater and conservation projects that address larger precipitation events. A new white paper on "Adaptation to Extreme Precipitation in Minnesota" has been developed.

- Wetland Protection and Restoration: Wetland and upland buffer restoration and protection conducted through the Reinvest in Minnesota (RIM) Reserve Program and federal partnerships, Wetlands Conservation Act implementation, and Clean Water Fund projects, help to restore and maintain water retention, runoff reduction, wildlife habitat, and water quality in Minnesota. This, in turn, enhances adaptation to climate change. The ecosystem services provided by wetlands also protect against intense storm events and periods of drought. Associated upland buffers protect wetland ecosystems, and provide landscape connectivity and other functions that promote landscape resiliency. Restoration projects also increase carbon sequestration that can increase infiltration rates and store water on the landscape.

- Agricultural Conservation Practices: BWSR promotes a variety of conservation practices in agricultural areas that promote soil health and the ability of soils to capture and store rainfall, store carbon and decrease heat absorption from tilled ground. Examples of conservation practices that minimize impacts from larger storms include cover crops, field terraces, no-till farming, buffer strips, retention areas, and constructed wetlands.

- Multipurpose Drainage Management: BWSR promotes and supports implementation of traditional and new conservation practices for multiple purposes, including conservation drainage and drainage water management practices. These practices help reduce runoff and nutrient loss, avoid runoff concentration, protect areas where runoff concentrates, reduce peak flows to reduce erosion, maintain agricultural productivity, improve water quality and habitat, and reduce flooding. Multipurpose drainage practices help make working lands as well as artificial and natural drainage systems more resilient to high intensity rainfall.

- Increasing Landscape Resiliency: A variety of restoration and land management strategies are promoted for conservation projects to increase resiliency to extreme storms and other landscape stressors.

- Adaptive Landscape Management: Disturbances associated with climate change can give invasive species a competitive advantage over native species. BWSR's Cooperative Weed Management Area (CWMA) program is focused on forming local organizations that share invasive species management expertise and resources across ownership boundaries. CWMAs are also focusing on controlling emerging weed threats that benefit from warming climate such as woody invasive species that are invading northern forests. By promoting adaptive landscape

management practices such as forest management and prescribed burning, BWSR is also working to increase the landscape's ability to sequester carbon and withstand large rain events.

BWSR action steps to guide future direction

1) Further guide the implementation of plan content requirements for One Watershed, One Plan with a focus on climate mitigation and adaptation.
2) Use the Minnesota Prairie Conservation Plan, the Nature Conservancy's Resilient Landscapes Tool, and other key landscape ecology planning documents when selecting conservation and restoration practices in habitat complexes and corridors to promote resiliency to landscape stressors and to provide refuge for wildlife species. These documents will help guide the development of planting plans for RIM easements and other conservation lands.
3) Update tracking of carbon sequestration and emission reductions of BWSR-funded conservation projects using eLINK and other tools. Partner with other agencies on carbon tracking-related efforts, as well as with advisors from the National Climate Alliance Natural and Working Lands Initiative.
4) Continue updating information in BWSR's Native Vegetation Establishment and Enhancement Guidelines about plant selection, establishment and management considerations to maximize climate adaptation and mitigation.
5) Provide information to local governments about practices, policies and programs they can promote to address climate mitigation and adaptation, including design standards and approaches to assessing sites and updating water plans.
6) Further promote practices that provide year-round cover on agricultural fields such as no-till and strip-till farming, cover crops and perennial vegetation to promote soil health and the ability of soils to capture and store rainfall, reduce runoff and erosion, store carbon, and decrease heat absorption from tilled ground.
7) Increase focus on tree planting in urban areas and previously forested areas to sequester carbon, improve air quality, reduce stormwater runoff, decrease the heat island effect in urban areas, control erosion, promote biodiversity and stabilize watersheds
8) Promote and support implementation of conservation drainage and drainage water management practices, as well as water storage at various scales, that help reduce runoff and nutrient loss, avoid runoff concentration, protect concentrated flow areas, reduce peak flows to reduce erosion, maintain agricultural productivity, improve water quality and habitat, and reduce flooding.
9) Increase focus on the restoration of high quality pollinator habitat to support declining pollinator populations. Pollinators play a key role in supporting landscape resiliency by pollinating about 30% of crops and 70% of native plants that in turn provide many landscape functions.
10) Investigate and implement methods to restore wetlands and lakes that are more resilient to landscape stressors, with improved site assessment, installation and maintenance techniques.
11) Use adaptive management strategies to maintain landscapes in a way that will increase landscape resiliency and increase climate mitigation.

ENVIRONMENTAL QUALITY BOARD (EQB)

Climate Solutions and Economic Opportunities: A foundation for Minnesota's state climate action planning

Climate action policies: immediate impact:

- Decrease fossil fuel use in electricity
- Retire and repower coal plants
- Increase energy efficiency in homes, buildings, and industrial processes
- Expand the conservation improvement program
- Combined heat and power
- SB2030 building guidelines
- Wastewater facilities energy efficiency

Climate action policies: long-term strategies

- Urban and community development: transit and multimodal travel, electric vehicles, community and urban forests
- Land management: forest health, conservation and working lands, agricultural soil development

Climate Action Policies – Pilot Programs – Pilot Programs to Develop:

Transportation:

• Advanced biofuels

• Pay-as-you-go car insurance

• Fuel or carbon based tax

Energy:

• Renewable thermal energy

Agriculture:

• Fertilizer efficiency

• Market development for cover crops and perennials

Draft 2020 State Water Plan

Minnesota Water Law (Minnesota Statutes 103B.151) directs the Environmental Quality Board to coordinate water planning and regulation activities among the state agencies that manage water resources. The EQB carries out the responsibility to produce a water resources planning report every ten years.

The 2020 State Water Plan will focus on the intersection of climate change and water. Staff will present draft materials that are under development for the Water Plan. They will review the overall structure, approach, main messages, public engagement, and goals and strategies.

The June 17, 2020 presentation will include preliminary findings from a public engagement process that included small group meetings with over 250 people spanning 44 public and private organizations, as well as an on-line survey. During these focus groups, staff inquired about the effects of climate change on water issues in their communities, planning efforts implemented to address these effects, and ideas for state action.

In addition, staff will review the five goals areas that have been identified to combat the effects of climate change on Minnesota's waters in the coming decade:

Goal 1: Ensure drinking water is safe and sufficient

Goal 2: Manage our landscapes to protect and improve water quality

Goal 3: Manage our built environment and infrastructure for greater resilience: stormwater and waste water

Goal 4: Manage our landscapes to hold water on the land and reduce runoff (water quantity)

Goal 5: Protect and support the recreational, economic and cultural benefits provided by Minnesota's water resources

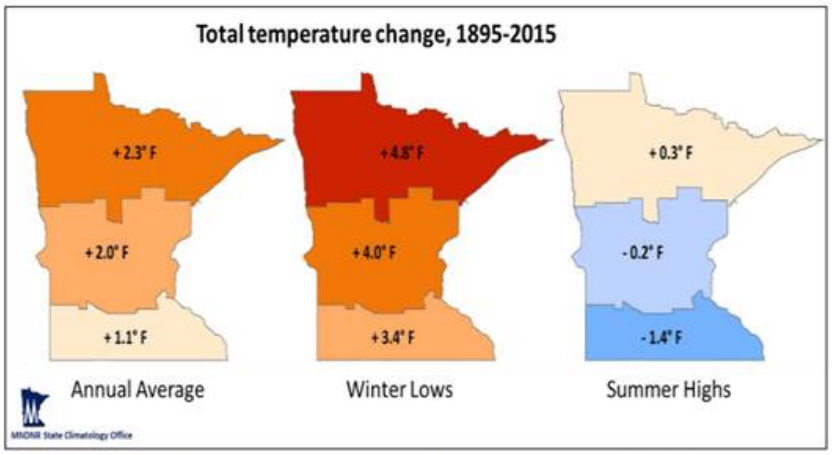
EQB staff are preparing the 2020 State Water Plan with staff support from the Board of Water and Soil Resources, the Minnesota Department of Agriculture, Commerce, Department of Health, Department of Natural Resources, Department of Public Safety, Department of Transportation, the Metropolitan Council, the Pollution Control Agency, and the University of Minnesota. Members of the interagency effort will provide an overview of the plan and each of its goals. Additional agency water experts involved in the collaboration will be available for questions.

INTERAGENCY CLIMATE ADAPTATION TEAM (ICAT)

Adapting to Climate Change in Minnesota: 2017 Report of the Interagency Climate Adaptation Team

a. Temperature change from 1895-2015:

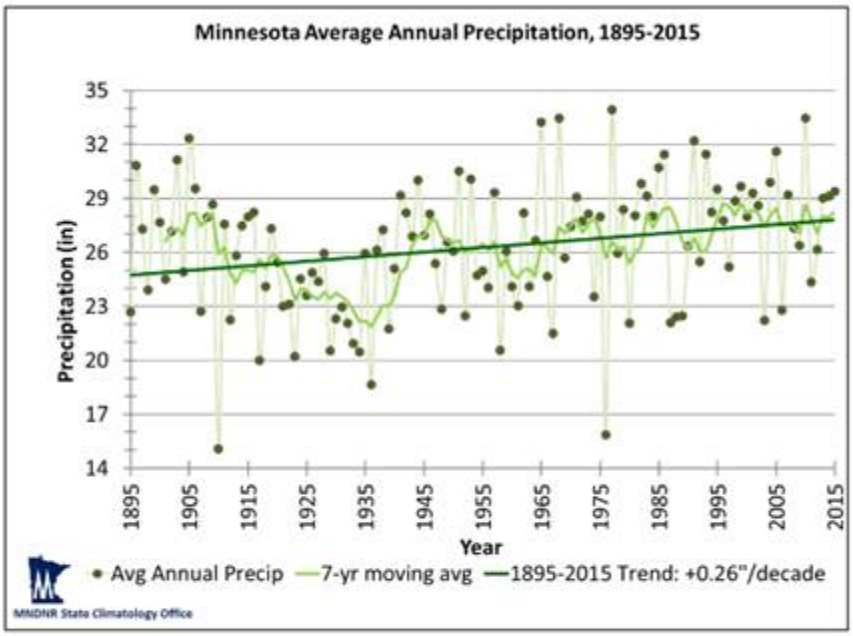
Figure 3



Comparisons of total change between 1895 and 2015 using 30-year averaging periods, for annual average temperature, winter low temperature, and summer high temperatures over the northern, central, and southern portions of the state. Values were obtained by subtracting the average of the first 30 years of record (1895-1924) from the average of the last 30 years of record (1986-2015). Each region is a blend of three climatic divisions, as defined by the National Centers for Environmental Information (https://www.ncdc.noaa.gov/monitoring-references/maps/us-climate-divisions.php), which is also the source for the divisional climate data used (http://www.ncdc.noaa.gov/cag/time-series). Maps prepared by Minnesota State Climatology Office.

b. Due to higher temperatures, precipitation has increased:

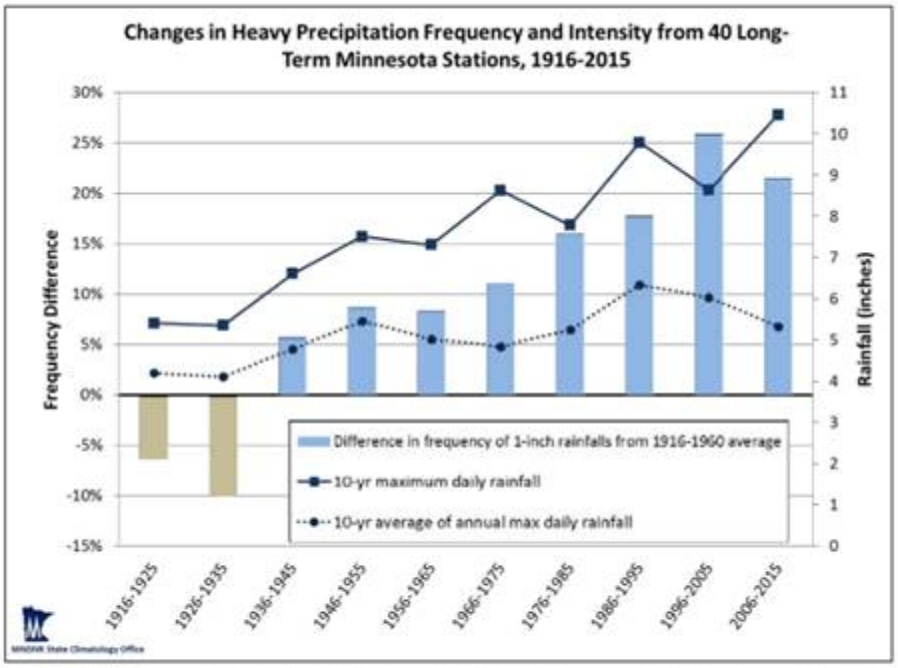
Figure 4



Statewide average annual precipitation, 1895-2015. The 1895-2015 trend (solid dark green line) is based on linear statistical techniques and does not imply an exact decade-by-decade precipitation increase. Source: National Oceanic and Atmospheric Administration (NOAA) Climate at a Glance (http://www.ncdc.noaa.gov/cag/)

c. They show the change in extreme precipitation over time:

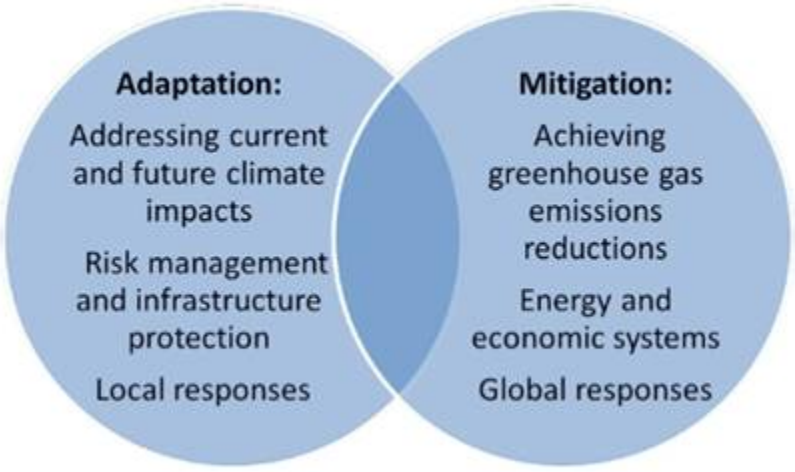
Figure 5



Changes in the frequency of one-inch rainfalls relative to the 1916-1960 average (vertical bars), from 40 long-term stations in Minnesota. Also shown are the 10-year average (lower dotted line, right axis) and 10-year maximum values (upper solid line, right axis) of the heaviest single rainfall amount recorded each year at any of the 40 stations. Note that the 10-year maximum value has doubled from just over five inches at the beginning of the record, to just over 10 inches at the end of the record. Courtesy of Minnesota State Climatology Office.

d. The report addresses the difference and overlap between adaptation and mitigation.

Figure 11



e. The report addresses the response of state agencies and outlines the existing governance puzzle. For example:
    i. DNR.
        1. The Water Monitoring and Surveys Unit has expanded its groundwater level observation well network by 200 wells for a total of 1,030 wells that track groundwater – surface water interaction.
        2. The same group added 11 "real time" weather stations to its network of 40.
    ii. FEMA
        1. FEMA hazard mitigation grant program allows for purchase of flood damaged homes when risk of a repeat event is considered to be significant.
    iii. BWSR.
        1. Supports and promotes integrated watershed planning. No clear programs, but a focus on resilient landscapes and pollinators.
    iv. Metropolitan Council
        1. Focused on inflow and infiltration
f. Recommendations for action:
    i. Priority #1. Build resilience to extreme precipitation
        1. Develop state action plans
            a. BWSR, Homeland Security, MPCA, MDOA, MDOT, MDEED, MEQB, MPCA, etc.
    ii. Other priority actions:
        1. Increase focus on managing climate impact in cities, towns and other population centers
        2. Increase focus on preserving natural and restored terrestrial and aquatic ecosystems and habitat to increase resilience of wildlife and plants.
        3. Strengthen climate information infrastructure to support climate adaptation practices
            a. DNR is listed as the key agency to enhance abilities to collect analyze, share and communicate measured and projected climate data at all scales to help ensure that the people and communities in all regions can better plan for, respond to, and withstand the impacts of ongoing and anticipated climatic trends.
        4. Strengthen Ag resilience
        5. Identify opportunities to strengthen climate resilience and health of vulnerable populations of Minnesotans across state agency programs through cooperation with local government.

MINNESOTA DEPARTMENT OF AGRICULTURE

**Participated in development of 2017 ICAT report*

Forever Green Initiative

The Forever Green Initiative brings together researchers from multiple departments including plant breeding, agronomy, food science and economics. The goal is to develop new high value commodity crops for conservation purposes.

Many of these new crops could fit into a corn and soybean rotation by providing ground cover after harvest and before next spring's emergence. Winter annuals and cover crops grow between the time when annual crops are harvested in the fall and a new planting is established in the spring. This is the time when fields are bare, and most vulnerable to erosion and nutrient loss.

The MDA receives Clean Water Funds to support the Forever Green Agricultural Initiative at the University of Minnesota. Research projects are selected through a request for proposal process administered by the University of Minnesota. The MDA oversees the distribution of funds and coordinates reporting on progress results and outcomes.

MINNESOTA DEPARTMENT OF HEALTH

**Participated in development of 2017 ICAT report*

Minnesota Department of Health Climate & Strategic Health Plan, August 2016-Augsut 2021, updated April 2019

- Outlines MDH research and outreach efforts to address climate change as it impacts health
- Planning for drinking water includes incorporating information about climate change into GRAPS (Groundwater Restoration and Protection Strategies).
- Work group meets quarterly to complete activities in the Plan

The Minnesota Climate & Health Program at the Minnesota Department of Health (MDH) improves our state's and partners' ability to protect the public's health and prevent further harms from climate change through implementing the following strategies to further climate change adaptation and mitigation:

• Educate: Resonate with the hearts and minds of the public and decision-makers to build a culture of health and climate action. The Program provides webinars, trainings and communication materials to the public and stakeholders on the health impacts of climate change. The program publishes a monthly newsletter on climate and health with the latest research, events, and tools related to climate adaptation.

• Research: Conduct credible, rigorous and innovative research to facilitate implementation of evidence-based adaptation strategies. The program has researched the most likely health impacts of climate change now and into the future, sharing this information publicly through the MN Climate and Health

Profile Report. The program developed a methodology to determine risk of contamination to drinking water due to possible future increased precipitation. Additionally, the program has been a leader in promoting the use of climate projection data to better understand the risks and vulnerabilities to climate change.

• Build Capacity: Provide technical assistance, tools and products to expand and accelerate health and climate solutions. The program has developed a significant number of tools to help planners and emergency management and preparedness professionals adapt to and mitigate climate change, including the Minnesota Extreme Heat Toolkit, the MN Climate Change Vulnerability Assessment, and a series of six HSEM profile reports for Planning for Climate & Health Impacts in Minnesota. MDH has a climate and health strategic plan that coordinates climate-related work across multiple programs and areas of disciplines within the department to protect the public's health from climate change impacts.

MN Climate & Health Impacts in Metro Minnesota, 2018

- Next steps: Minimize risk & build resilience: bring everyone to the table, incorporate climate into planning, champion climate and health.

MINNESOTA DEPARTMENT OF NATURAL RESOURCES

**Participated in development of 2017 ICAT report*

Climate Change and Minnesota: What DNR is doing

We have a responsibility to adapt to climate change. We manage the impacts of climate change and protect Minnesota's natural resources, ensuring outdoor recreation opportunities for future generations.

We take seriously our contributions to carbon dioxide and other greenhouse gas emissions. We are investing in renewable energy, continuing our good stewardship of public lands, and limiting or offsetting greenhouse gas emissions.

DNR is using these strategies to both prepare for climate change and reduce our carbon footprint. Here are some examples of our strategies in action:

- Ecosystems and water: climate and Lake Superior, natural heritage sites, terrestrial invasive species, MN ecological monitoring network
- Forestry, fish, and wildlife: species protection, forest diversity, protection, reforestation
- Operations and infrastructure: fleet efficiency, resilient watercourse infrastructure, net zero construction, renewable energy
- Parks and recreation: invasive plants, restore Mound Creek

MINNESOTA DEPARTMENT OF PUBLIC SAFETY

Minnesota State Hazard Mitigation Plan, Including Recommended Actions for Climate Change Adaptation

State's 20 major hazards are identified, including ground and surface water supply contamination as they relate to geographic and demographic characteristics, development trends, and climate change. Local governments can use the county by county assessment of mitigation goals, strategies, actions, and initiatives to develop and update their plans. The plan provides information and resources on ranking and criteria for hazard identification, and determining steps to declare an emergency. Resources include a listing of agencies and organizations that may assist with mitigation efforts, and an inventory and brief descriptions of funding programs including the Hazard Mitigation Grant Program. Several successful mitigation plans and tools are listed, including a Flood Forecast Display Tool for the Red River of the North via the Red River Basin Decision Information Network and the Zumbro Falls Acquisition Project (pdf).

Section Five: Goals, Objectives, Strategies and Actions: This section was updated to include climate change adaptation into two broad goals and objectives. Strategy types from FEMA's "Mitigation Ideas" handbook have been utilized locally since 2016. The updated strategy types are: Local Planning and Regulations, Structure and Infrastructure Projects, Natural Systems Protection and Education and Awareness Programs. A fifth type, Mitigation Preparedness and Response Support for local emergency management professionals has been utilized since 2016, and a sixth strategy type has been included for this state plan update: Data for climate adaptation. The mitigation actions listed for each natural hazard are broad enough for any jurisdiction to utilize them in the development of local mitigation plans. An assessment of state and local mitigation capabilities, pre- and post-disaster funding programs and the severe and repetitive loss strategy requirement are addressed.

MINNESOTA DEPARTMENT OF TRANSPORTATION

**Participated in development of 2017 ICAT report*

MN Department of Transportation: Climate Change: Adaptation

- The impacts of climate change on the Department of Transportation (MnDOT) are significant. MnDOT is committed to addressing climate change adaptation in our statewide vision: that Minnesota's multimodal transportation system, "is flexible and nimble enough to adapt to changes in society, technology, the environment and the economy." Climate issues will affect many functional groups within MnDOT, including Bridge Hydraulics, Water Resources, Maintenance, Design, Construction, Materials, and Freight, Rail and Waterways.

- Climate change is already having major impacts in Minnesota and change is likely to occur in a number of key areas. These changes can have negative effects on the state's

transportation system. However, changes in certain areas are more likely to occur than in others. For example, Minnesota has already seen increased heavy precipitation / flooding in recent years. It is very likely that this trend will continue into the future.

Table with climate impacts, confidence for change in MN, and impacts to transportation system

MnDOT is responding to climate change impacts in a number of areas:

- Climate vulnerability Assessment Pilot Project: Secured funding in 2013 from the Federal Highway Administration and internally to conduct a climate vulnerability assessment pilot project in two of MnDOT's flood prone areas to better understand extreme weather impacts to the transportation assets and identify cost-effective options to make the transportation system more resilient to extreme weather-related flooding.
- Bond-Funded Projects: $50 million of Chapter 152 bonds were dedicated to fund projects that mitigate and ensure long-term sustainability for flood prone highways. All projects must be constructed by fiscal year 2016.
- Bridge Scour Related Efforts: Scour may leave bridges vulnerable to damage and failure during flooding by undermining bridge foundations or removing the protection from the abutment slopes. MnDOT is addressing bridge scour through efforts including: managing a webpage that provides bridge scour monitoring information. A Bridge Scour Plan of Action for all 30 bridges that are scour critical or need to be monitored for scour was developed in addition to a Bridge Office Flood Response Plan. Finally, a cooperative agreement was set up with the U.S. Geological Survey (USGS) that allows MnDOT to hire them to monitor bridges during floods.
- Support up-to-date Hydrology: While this is not predictive for future changes, MnDOT is participating in keeping precipitation frequency estimates and discharge regression equations up to date. This included developing a cooperative agreement with the USGS where MnDOT provides funding to maintain crest gages to collect data that is used to develop stream regression equations, develop new regression equations every 10 years, develop and maintain Streamstats, and perform hydrologic studies. MnDOT also works to update precipitation frequency data, and provided funding to NOAA to help develop Atlas 14, as well as created an outreach webpage on the implementation of Atlas 14. NOAA Atlas 14 is an important new data source that fully documents the changing frequency of extreme precipitation in Minnesota, updating previous precipitation frequencies which in some cases are decades old.
- Funding for Research Projects: Provide funding for research projects, including ditch or swale infiltration to reduce runoff, roadway overtopping protection, scour monitoring implementation, drought tolerant sod, and natural flocculants to reduce total suspended solids and phosphorous discharge during extreme weather events that occur during project construction.

MNDOT 2016 Sustainability Report

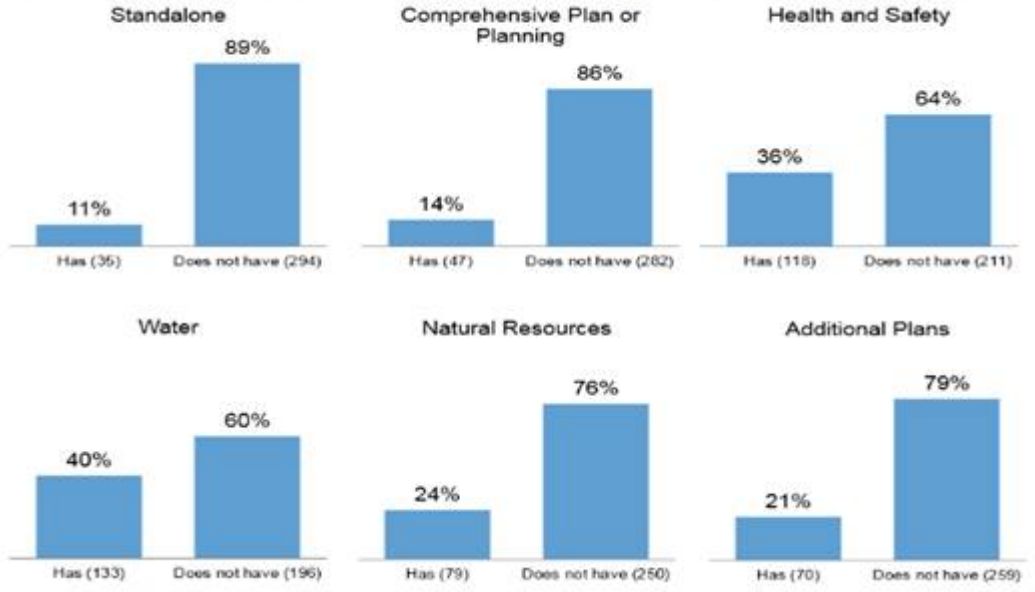
MnDOT's 2016 Sustainability Report outlines the agency's current sustainability efforts and performance targets. It will be used to support decision-making, agency sustainability goals, performance measures, and reporting. The report will be updated annually by the MnDOT Sustainable Transportation Steering Committee.

MINNESOTA MANAGEMENT & BUDGET

Management Analysis & Development: Minnesota Pollution Control Agency for the Interagency Climate Adaptation Team, Climate Adaptation Planning Survey, August 2016

1. The department of Management Analysis and Development (a MN government in-house fee-for-service management consulting group that exists to help public managers increase organizational effectiveness and efficiency) produced a 2016 Climate Adaptation Planning Survey that provides a summary of what's happening across the state. Below are some key takeaways:
    a. 17.5% of organizations in the surveyed organizations report that they have at least one type of plan or planning effort with content addressing climate adaptation or resilience
    b. 40% of responding organizations are engaged in water plans or planning efforts with climate adaptation or resilience content
    c. 25% of responding organizations have natural resource plans or planning efforts with climate adaptation or resilience content.
    d. Less than 25% of responding organizations are engaged in other types of planning that address climate adaptation and resilience.

Figure 2. Climate adaptation or resilience content in planning efforts by type of plan[1]



    e. Relatively few responding organizations are engaged in standalone climate adaptation planning efforts or comprehensive planning that addresses climate adaptation or resilience.
    f. Regarding resources needed.
        i. Close to two-thirds of responding organizations identified needing best practices for climate adaptation.
        ii. Over half of responding organizations identified needing planning toolkit and guides, financial assistance, model climate adaptation and resilience plans, and model policies or ordinances to help their organizations.

MINNESOTA POLLUTION CONTROL AGENCY

**Participated in development of 2017 ICAT report*

Adapting to a changing climate

Climate change is already occurring in Minnesota and is affecting our state's environmental, economic, and social systems.

Adaptation is a complement to mitigation.

- **Climate adaptation** is developing and implementing strategies, initiatives and measures to help human and natural systems cope with and become more resilient to climate change impacts.
- **Climate change mitigation** emphasizes reducing greenhouse gas emissions with the goal of limiting the magnitude or progression of climate change. While it is important to continue to mitigate climate change by reducing emissions to avoid calamitous change, we also need to adapt to changes that are already occurring.

Climate change will affect ecosystems, infrastructure, and sectors of our economy. The impacts on these systems will depend on their sensitivity to climate change and their ability to adapt. The goal of adaptation is to increase natural and societal resilience to climate change.

Listed reports:

2017 ICAT report, Adapting to Climate Change in Minnesota 2017 Report of the Interagency Climate Adaptation Team https://www.pca.state.mn.us/sites/default/files/p-gen4-07c.pdf

Pale Blue Dot: Climate Resilience for Vulnerable Populations

MPCA-sponsored surveys identified more than 40 Minnesota cities interested in assistance with climate resilience planning for vulnerable populations. In response to that need, the MPCA selected paleBLUEdot to provide these assessment services under a 2017 Environmental Assistance Grant.

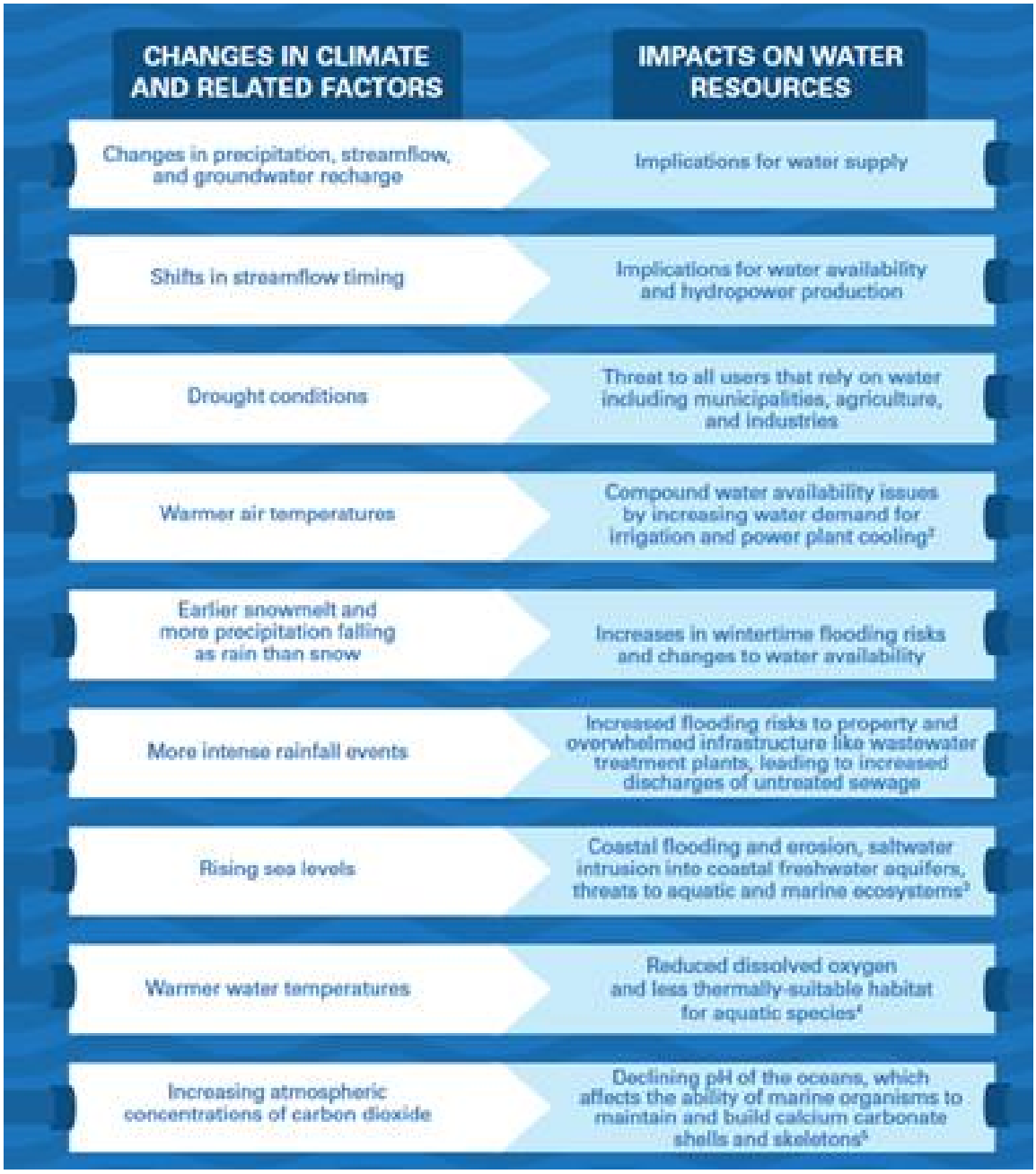
NATURAL RESOURCES DEFENSE COUNCIL – *MN Review*

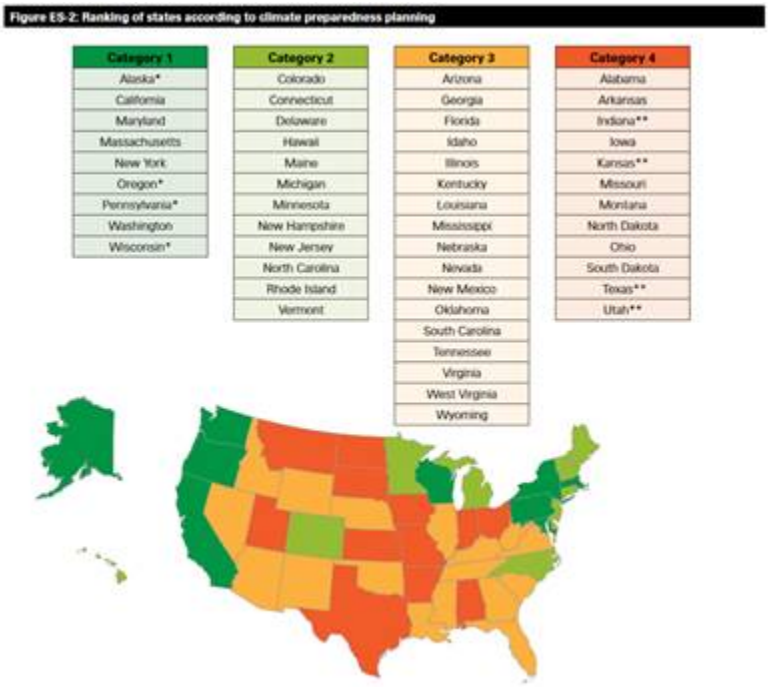
Ready or Not: An Evaluation of State Climate and Water Preparedness Planning, 2012

For MN:

a. In 2009 a state level Interagency Climate Adaptation Team (ICAT) was formed.
b. In 2010 a report on existing adaptation planning was released
c. *NRDC found* "while this was a good start for the state's adaptation efforts, the report lacks an overarching and cohesive strategy to guide state agencies, and a more robust, specific and goal-driven plan for adaptation in MN needs to be developed."

d. *Since the release of the 2010 report, cross agency collaboration through ICAT has* "slowed substantially as a result of political and economic changes". "In the meantime, many agencies, such as the DNR are focusing their adaptation efforts internally".
e. Issue Brief outlines impacts on water and MN's preparedness relative to the rest of the U.S.





REGION 9

Region 9 Climate Change Vulnerability Assessment & Adaptation Plan

Objective 1: Maximize Soil and Water Conservation; list of action items; Action items: increase conservation best management practices, retain topsoil and agriculture productivity during extreme rain, drought, and freezing events, manage impact of flooding, promote water conservation, decrease impacts from extreme storms, manage the floodplain.

Objective 2: Expand Alternative Genetics and Crop Choices; Action items: Increase cover crops and invest in diversified cropping, investment and development strategies.

Objective 3: Infrastructure Management; Action items: limit power outages, maintain transportation and traffic flow, support regional transportation initiatives.

Objective 4: Increase Adaptive Capacity for Livestock and Human Health; Action items: increase immunization, keep livestock cool in extreme heat.

Objective 5: Expand risk management and management planning across planning platforms; action items: utilize airports for disaster planning, add extreme weather into emergency planning, include climate change in local, regional, statewide, and national plans.

Objective 6: Special focus on resilience sector strategies; action items: implement urban resiliency strategies, focus on renewable energy programs and initiatives by diversifying electricity generation, implement conservation of energy practices.

Objective 7: Strengthen local food production; action item: strengthen local food production.

Executive Order 19-37 - Climate Change Subcabinet and Governor's Advisory Council on Climate Change

Governor Walz's Executive Order 19-37 established the Climate Change Subcabinet to coordinate climate change mitigation and resilience activities across state agencies. These agencies include: Pollution Control Agency, Department of Commerce, Department of Labor and Industry (DLI), Department of Management and Budget (MMB), Department of Employment and Economic, Development (DEED), Department of Agriculture (MDA), Department of Public Safety (DPS), Department of Natural Resources (DNR), Department of Health (MDH), Department of Transportation (MnDOT), Board of Water and Soil Resources (BWSR), Department of Administration, Metropolitan Council, Environmental Quality Board (EQB), Minnesota Housing. The Subcabinet will be advised by a 15-member Advisory Council.

Appendix C

MN Watershed District Plans Climate Change Content

June 12, 2020

Only content from those watershed district plans containing more than an acknowledgment of climate change is provided. Highlighted sections correspond to Appendix A, Table 2 "Content and analysis" column and indicate rational for indicating what content each plan contains.

Watershed District

Browns Creek

Capitol Region

Nine Mile Creek

Ramsey-Washington Metro

Rice Creek

Riley Purgatory Bluff Creek

South Washington

Yellow Medicine River*

*Same plan as Lincoln, Lyon, and Yellow Medicine Counties

BROWNS CREEK

Primary Issues addressed in the Plan:

11. Climate Change Adaptation (Section 3.1.11) - NEW to 2017-2026 WMP Rising global temperatures have been accompanied by changes in weather and climate. As a result, many areas are seeing changes in precipitation patterns including more floods, droughts and/or intense rainfall events. A trend analysis of local climate data indicates that the Brown's Creek watershed is experiencing changes in precipitation and temperature which presents challenges to watershed management decision-making.

…

Main Goals in the Plan:

11. Climate Change Adaptation - Develop a better understanding of climate change, its impact to the District's land and water resources, and adaptive management strategies to address this emerging issue.

…

A smaller portion of the annual expenditures are allocated to Land Conservation, Education and Outreach, Funding, Groundwater Management, Wetland Management, Ecological Health, Erosion Prevention and Sediment Control, Climate Change Adaptation, Recreation and Floodplain Management.

…

1.2.2 Climate and Precipitation *analysis of patterns in BCWD and measurements to assess trends related to climate change*

1.2.2.3 Climate Change

In the foreseeable future, the approach to watershed management could shift as a result of climate change. As the local monitoring data indicates, the BCWD is already experiencing shifts in temperature and precipitation. According to the Mississippi Watershed Management Organization (MWMO) Watershed Management Plan(6) , the predicted changes statewide are reported as follows:

… *more content in this section…*

1.7 Summary of Issues, Goals and Strategies

…Finally, a recent trend analysis of local climate and precipitation data and feedback received from residents of the watershed district highlighted the need to consider climate change and climate adaptation strategies as the BCWD moves forward with management decisions over the course of the next ten years. As a result, Climate Change Adaptation has been included as a new priority concern for the BCWD as well.

…

2.4 Prioritization of Restoration/Protection Needs

During this series of special meetings the Board discussed how they would like to address newer issues such as groundwater conservation and climate change impacts as well as on-going issues related to streamlining stormwater management rules and priorities for lake management. The key findings of these discussions are summarized below:

• The BCWD developed policies and goals addressing the management of groundwater recharge and supply as well as climate change. The special meetings addressing these topics (and subsequent meetings with the Citizens Advisory Committee and Technical Advisory Committee) highlighted the high priority the BCWD places on groundwater resource management and the need to incorporate climate-adaptation strategies into District-funded activities.

…

2.5 Adaptive Management Strategy

…

Over time, the District may learn that improvements to monitoring programs, existing regulations, and/or changes in climate may shift the resource restoration and protection goals. As this information becomes available, the BCWD Board of Managers will reassess the goals and strategies identified in this Plan and change its course of action as appropriate.

…

As the BCWD implements management strategies to address the restoration and protection needs of its lake systems, it will find that improvements to monitoring programs, changes in climate and/or changes in attitudes and behaviors may shift the resource and protection goals. Again, as this information becomes available, the BCWD Board of Managers will reassess the goals and strategies identified for its lake systems and change its course of action as appropriate.

…

3.7.3 Sub-Issue Areas

Management of Groundwater Recharge and Supply

The BCWD intends to proactively manage groundwater resources in the watershed rather than reactively responding to a crisis. Groundwater elevations and flow are controlled by longterm trends in climate, recharge, and groundwater withdrawal. By the time low groundwater elevations or discharges become a problem, it may be too late to implement a timely solution. The BCWD will not only monitor trends in groundwater elevations and water use, but also try to recognize and predict when and where issues could arise in the future and implement policies to avoid adverse effects on natural resources and water supplies.

…

Sub-Issue: management of Groundwater Recharge and Supply

Implementation Item:

10. Develop a water budget for the district that includes surface water and groundwater interaction, an assessment of the geologic conditions, land use and groundwater contamination and climate change trends and impacts.

3.11 Climate Change Adaptation

3.11.1 General Issue Statement

Rising global temperatures have been accompanied by changes in weather and climate. As a result, many areas are seeing changes in precipitation patterns including more floods, droughts and/or intense rainfall events. A trend analysis of local climate data indicates that the Brown's Creek watershed is experiencing changes in precipitation and temperature which presents challenges to watershed management decision-making.

3.11.2 Relevance to the District

A statistical analysis of local climate data indicates that changes in weather and climate are being seen in the Brown's Creek Watershed District: annual average air temperature is increasing, air temperature in winter months in particular is on the rise, rainfall depths are observed to be increasing, annual rainfall depths are increasing an average of 0.16 inches/year and there is an increasing trend in the mean rainfall depth during wet periods.

3.11.3 Sub-Issue Areas

Climate Change: Future watershed management activities need to be responsive to emerging issues resulting from changes in weather and climate

3.11.4 Policies, Goals and Implementation

The policies, goals, and implementation items related to these sub-issue areas are summarized in the following tables. The sub-issue area is identified in a heading, followed by a related policy. The goals addressing that policy are lettered and stated, followed by the implementation items for that goal. This format is intended to clearly display how each policy and goal will be addressed.

Policy: The BCWD recognizes the impacts of a changing climate and is committed to integrating adaptation best practices to create a more resilient community.

Goal: Develop a better understanding of climate change, its impact to the District's land and water resources, and adaptive strategies to address this emerging issue

Implementation Items:

- Encourage cities and developers to integrate Green Infrastructure and LID to increase the capacity and resiliency of the stormwater management system

-Maintain awareness of USGS, National Weather Service – new resources available

-Complete modeling and analysis of the likely impacts of climate change on hydrologic conditions within the BCWD from both a water quantity and quality perspective to identify areas of concern

- Evaluate the BCWD's roles in addressing and responding to potential impacts

(Table 41 Climate Change Adaptation Policies, Goals, and Implementation Activities)

- Table 42 Projected Expenditures (in 1,000s) for Climate Change Adaptation

4.1 BCWD Responsibilities

Assisting local units of government with planning and design related to resource protection needs and promoting resiliency of infrastructure to withstand changes in climate such as rainfall events of increasing intensity and volatility

Some references to climate change work in Implementation Plan (budget items) – Higher Priority (Table 60) and Implementation Plan – Lower Priority (Table 63)

CAPITOL REGION

Future Trends Changes in watershed management and emerging issues such as climate change impact the District's management decisions. The District recognizes the importance of staying up to date on new and innovative stormwater management approaches given the highly developed nature of the watershed and the limits of traditional practices. In addition, the District will need to have a role in addressing changes in watershed management due to climate change.

Innovation and Emerging Trends As new technologies develop and the water resources management and engineering fields continue to evolve, the District is responsible for staying aware of trends in science, design, and climate, and to interpret those trends for practical application. It is a priority of the District that programs and projects in the Plan be innovative and that the District anticipate emerging technological trends.

Issue 5 The quantity of runoff from a highly urbanized area increases the risk of flooding and puts added strain on the infrastructure within the District

Goal 5.1 Minimize existing and potential flooding problems

5.1.c Evaluate the impact of climate change on infrastructure capacity in the future and identify potential flooding issues

Future Trends, Issues and Goals … During the issues identification process, a number of future trends were identified for inclusion in the plan. All of the groups in the public involvement process identified climate change as an issue that needs to be addressed in the next ten years. While it is unclear what the District's role should be in addressing climate change, it is necessary for the organization to evaluate and coordinate mitigation efforts.

Future Trends Issues and Goals Issue 9 Future watershed management strategies need to be responsive to emerging issues resulting from climate change and technological advances

Goal 9.1 Develop a better understanding of climate change, its impacts to District natural and water resources and adaptive management strategies to address this emerging issue

9.1.a Participate in climate change working groups/forums

9.1.b Determine the District's strategies in addressing climate change impacts on watershed management

228 – Future Trends - Research & Positioning, Description and Purpose of Activity

While the future is uncertain with regard to climate, technology, and policy, it is important to have a strategy for incorporating new information as it becomes available. To maintain a leadership role with regard to how key water resources concerns are addressed in an urban setting, a deliberate effort is needed to stay aware of trends in science, design, and climate, and to interpret those trends for practical application.

Projected 10-year Expenditures for 228-Future Trends – Research & Positioning: $1,818,000

Objectives Looking forward to the next 10 years, key issues for the District are climate change, innovations in green infrastructure, and consideration of additional pollutants beyond those that have typically been the focus of water resources management. These issues are relatively unfamiliar to the District. The strategy will be to investigate the issue during years 1-3 of the plan, perform analysis and scoping of applicable projects during years 4-6 of the plan, and implement the projects during years 7-10 of the plan. As new ideas are explored, the District will seek to involve citizens and partners in projects, programs, and areas of interest.

Program Initiatives: Explanation of Planned Initiatives

A. Climate Change Impacts: Research & Analysis: Research the potential impacts of climate change as they apply to the resources of the District during years one through three of the plan. Complete modeling and analysis of the likely impact(s) of climate change on hydrologic conditions within the District from both a water quantity and quality perspective to identify areas of concern. Analyze the District's role in addressing and responding to the potential impacts. This will take place during years four through six of the plan.
B. Climate Change Impacts: Action: Formalize a District effort to address the identified local and watershed impacts from climate change, if any, during years seven through ten of the plan.

NINE MILE CREEK

Climate Change Adaptation (Table 5-8)

• Promoting climate change adaptation to minimize property damage and impacts to natural and water resources within the Nine Mile Creek watershed through:

o Evaluating impacts and developing a District climate change adaptation strategy to identify natural and water resource vulnerabilities to climate change and potential adaptation strategies (Objective 1, Policy 1, Action A).

o Working with local governments and stakeholders to educate and assist in development and implementation of city-specific climate change adaptation strategies (Objective 1, Policy 1, Actions B and C).

2.1.2 Climate Trends *reviews climate change trends including precipitation increases*

4.1.3 Priority Issues/Opportunities: … Developing a climate change adaptation strategy to understand and address potential flood risks.

4.9 Climate Change Adaptation

Climate change occurring in the upper Midwest poses a challenge for water resources management. Changes in precipitation trends include increased precipitation amounts and more frequent higher intensity storms leading to increased stormwater runoff (see Section 2.1). Increased stormwater runoff places additional strain on existing stormwater systems and can increase flood risk. Capital improvement projects implemented by the District, cities, and developers have long design lives that must consider current as well as possible future climate scenarios. Implementing projects and programs capable of performing under a range of possible conditions is strategy referred to as "adaptive management." In addition to responding to climate change, measures are required to limit or prevent further climate change. Two key tools to preventing further climate change that are relevant to water resources management include conservation and education.

4.9.1 Priority Issues/Opportunities

During the development of this Plan, the Board of Managers, local cities, and other stakeholders identified climate change adaptation as an important issue, including the following specific priority issues/opportunities:

• Studying the impact of climate change on flooding and identifying the areas of greatest flood risk.

• Reviewing District policies with consideration for climate change.

• Developing an adaptation strategy for climate change.

• Incorporating climate change adaptation into planning and land management.

• Evaluating the impacts of climate change on groundwater, surface water, and the interaction between groundwater and surface water.

• Assessing the impact of climate change on wetlands and changes in the species they support.

5.7 Flood Management, Object 2: Reduce the risk to public safety and permanent structures due to flooding, policies…3. Understand and address the potential for increased flood risk due to predicted changes in climate: A. Assess increased flood risk due to predicted climate changes; B. Work with cities and stakeholders to understand the increased flood risks and identify potential adaptation strategies; C. Review District rules and policies for adequacy under climate change scenario(s).

5.8 Climate Change Adaptation

Goal: Adverse impacts of climate change on the watershed and its water resources will be minimized.

Objective 1: Minimize the adverse impacts of climate change on the watershed and its water resources.

Policies: Promote climate change adaptation to minimize property damage and impacts to District natural and water resources: A. Evaluate impacts and develop a District climate change adaptation strategy to identify natural and water resource vulnerabilities to climate change and potential adaptation strategies; B. Work with other local governments and other stakeholders to educate regarding the impacts of climate change and assist in developing city-specific climate change adaptation strategies; C. Work with other local governments to implement climate change adaptation strategies; D. Collaborate with other natural resource management agencies to utilize current data and develop shared strategies.

The District has established goals, objectives, policies, and actions to address climate change adaptation issues described in Section 4.9. The goals, objectives, policies and actions related to climate change adaptation are summarized in Table 5-8.

Operations and Administration Implementation Items: OA-3: Assist cities in implementing climate change adaptation strategies, $50,000 over 10 years

Studies Implementation Items:

S-1: Evaluate impacts and develop a District climate change adaptation strategy to identify natural and water resource vulnerabilities to climate change and potential adaptation strategies; $15,000 over 10 years

S-2: Assess increased flood risk due to predicted climate changes; $160,000 over 10 years

RAMSEY-WASHINGTON METRO

3. Managing risk of flooding: …The risk of flooding may be further increased by future climate trends…

Infrastructure improvements to increase stormwater management capacity—Recent updates in regional precipitation data (see Section 1 of the Plan) project significant increases in the 100-year and other "design storm" events (events used to size infrastructure). The new data suggests that some existing infrastructure may be undersized for current or future estimated conditions. Increasing the capacity of existing stormwater management devices and planning for new infrastructure to accommodate future climate conditions poses a challenge for the District and its cities.

4.1.4.3 Engaging the Public and Communities in Water and Natural Resource Management: Key roles in the PIE program are to educate and support the engagement of citizens, institutions, cities, and communities in the implementation of BMPs that support improved water quality, enhance natural resources, reduce non-point pollution, limit chloride use, manage invasive species, and respond to emerging issues related to groundwater use and climate change. The District's approach to education needs to be adaptive and responsive to keep up with evolving environmental concerns, communication approaches, and strategies for community organizing and dissemination of information.

… • Development of education outreach opportunities and materials on climate change as it relates to water and natural resources

RICE CREEK

3.2.5 Climate Change … It is important to understand these changes in regional climactic trends because they impact water resources and their management. As noted by the SWCS, increased storm intensities result in increased soil erosion and increased runoff. Also, the MPCA warns that these more frequent, intense precipitation events may increase flooding (http://www.pca.state.mn.us/hot/globalwarming.html).

The District anticipates that it will respond to this emerging issue by supporting a regional effort to revise technical publications that define rainfall frequency and intensity. This potentially would amend the specified flood control design events. The District also anticipates that it will recognize the inherent uncertainty defining the 100-year floodplain.

RILEY PURGATORY BLUFF CREEK

2.3.4 Planning: Similarly, projects must be designed to function under future climate conditions (e.g., changes in precipitation, groundwater levels)… In addition, the District conducted community resilience workshops focusing on our changing climate in early 2017. Through the workshops, the following

climate hazards were identified as top concerns: · Extreme precipitation · Drought · Extreme heat · Warmer Winters

Moving Forward Riley Purgatory Bluff Creek Watershed District is in the planning process to adapt to Minnesota's changing climate and the multiple impacts that the community will experience. Proactive planning is the economically efficient route to climate adaptation, rather than reacting to the impacts of heat, storms, ice, and warm winters as they occur. The purpose of the workshops was to build relationships across the community, create a shared knowledge base, and harvest potential strategies. They were intended to be the first of many community conversations to make RPBCWD resilient in the face of climate change. This planning effort is being used to inform Riley Purgatory Bluff Creek Watershed District's Ten Year Plan, which is in the works.

3.2 Goals and Strategies…5. Include sustainability and the impacts of climate change in District projects, programs, and planning. (Plan 2)

3.2.2.2 Data Collection strategies:

DC S2. The District will develop and implement a Monitoring Plan. Collected data may include, but is not limited to: water chemistry, fisheries, macroinvertebrates, water levels, vegetation, planktons, shoreline and streambank inventories, flow data, and climatic data.

DC S4. The District will collect data to assess the potential impacts of climate change on District projects, programs, and resources.

3.2.4 Planning

3.2.4.1 Planning goals: Plan 2. Consider sustainability and the impacts of climate change in District projects, programs, and planning.

3.2.4.2. Plan S2: The District will consider the potential impact of climate change when developing and implementing District projects and programs.

3.2.6.6 Water Quantity Strategies:

WQuan S5. The District will use models and other available tools to design projects resilient to predicted climate change impacts.

4.1.2 Sustainability Metric A project is assigned a sustainability score of 1, 3, 5, or 7 based on a sustainability index calculated using a modified Envision™ sustainability rating system.

These credits are divided into the following five categories: · Quality of life · Leadership · Resource allocation · Natural world · Climate and risk

5.1.2 Climate Trends and Future Precipitation: Even with wide variations in climate conditions, climatologists have found four significant recent climate trends in the Upper Midwest (Seeley, 2006):

• Warmer winters—decline in severity and frequency of severe cold

• Higher minimum temperatures

• Higher dew points

• Changes in precipitation trends – more rainfall is coming from heavy thunderstorm events and increased snowfall

…Increasing precipitation amounts place greater stress on natural resources and stormwater infrastructure, and increase flood risk. The District has and will continue to consider potential climate changes in its evaluation and management of flood risk (see Section 5.9.2).

9.11.1 Value of Wetlands … · Climate Change Resiliency - As we see more intense storms resulting from our warming planet, flooding increases, resulting in loss of property and infrastructure damage. Wetlands mitigate some of the damage that would otherwise result from these intense storms

SOUTH WASHINGTON

Part II: Issues and Goals: Climate Change:

Issue: Minnesota's climate is changing (Fig 10)—precipitation patterns are increasingly variable with extremes (i.e. Drought and flooding) more common, growing seasons are expanding, winters are warmer and thereby increasing stress on infrastructure due to increasing freeze/thaw patterns and fostering increased survival of damaging pests. These changes are also reflected in risks to District resources. More frequent precipitation extremes will increase fluctuations in lake levels and increase rates of runoff and flow in streams. Those changes are reflected in increasing field and streambank erosion and increased demand on regional water supply provided by already stressed aquifers. Depressed water levels in lakes, streams, and wetlands during prolonged droughts will result in changing surface water/groundwater interactions. And, increasing growing seasons will result in prolonged nuisance algae conditions in already impaired waters.

Goal: Facilitate increased resilience of District resources and public infrastructure through development of information and strategies and implementation of accepted climate adaptation practices.

Implementation Indicators:

• Consider adaptive capacity—ability of a system to adjust to climate change to mitigate potential damages, take advantage of opportunities, or cope with consequences— of District systems and resources in developing projects and management plans;

• Require use of up to date hydrologic data for meeting District development and redevelopment standards;

• Utilize District surface water modeling and County Groundwater model to explore changes in surface water/groundwater interactions as a result of predicted changes in hydrologic conditions and water demand;

• Utilize District CCIP or similar program framework to assist Cities in adapting their infrastructure systems to increase resiliency—capability to anticipate, prepare for, respond to, and recover from significant threats with minimum damage to social well-being, the economy, and the environment;

• Promote use of alternative landscapes which require less water;

• Promote water re-use where feasible to reduce demand on aquifers;

• Work with local partners to improve delivery of soil conservation programs to prevent increased field erosion from changing precipitation patterns.

Implementation Tool: Planning, Education, Implementation and Maintenance

Part III: Implementation, Program: Planning:

Climate Adaptation Plan: Impacts of climate change on District resources and infrastructure was identified as a priority issue during development of this Plan. While extensive work continues at scales much larger than the District to predict how climate will continue to change and identify potential impacts, work remains to downscale that work to develop actionable strategies for the District. No later than 2022, the District will complete a Climate Adaptation Plan to guide District efforts to increase resiliency of District resources and infrastructure. This planning effort will include scenario modeling to identify impacts from predicted increases in extreme temperature and precipitation events.

Performance Measures: …

• Develop a Climate Adaptation Plan within 6 years

Part III: Implementation, Program: Implementation and Maintenance: Monitoring:

PURPOSE: TO PROVIDE THE MECHANISM AND RESOURCES TO REVERSE OR ADAPT TO THE IMPACTS OF LAND ALTERATION AND CLIMATE CHANGE. All implementation under this program will be guided by existing or future guidance documents. Existing guidance documents include the District's Greenway Corridor Plan, Resource Management Plans, and County Groundwater Plan. Future documents will focus on flood damage reduction and mitigation, climate adaptation and resiliency, Agriculture BMP Pilot Program, and natural resources.

Part III: Implementation, Program: Implementation and Maintenance:

WATERSHED RESTORATION, RECONSTRUCTION, AND RESILIENCY:

• Implementation of yet to be identified practices to increase resiliency of natural and man-made systems against land use and climate change (Climate Adaptation Plan)

Long Range Workplan: Climate Adaptation Plan; $45,000 over 10 years

Long Range Workplan: Climate Resiliency, $1,000,000 over 10 years

Appendix contains references to climate change implementation activities

YELLOW MEDICINE RIVER

2.3 Priority Values, Concerns, and Goals: … Remember to think about climate change when designing projects.

2.6.1 Climate Change

Data indicate temperatures and precipitation patterns are increasingly changing, including intensity, frequency, and duration of precipitation events as well as increased length between precipitation events. These precipitation patterns will influence the way agriculture, the major industry, and land use of the watershed require and use surface water and groundwater in the future. Historically, engineers have used the Weather Bureau Technical Paper No. 40 (TP-40) standards from 1961 for estimating precipitation/frequency and durations for the United States. In 2013, the National Oceanic and Atmospheric Administration updated TP-40 and published the Atlas 14 Volume 8 for Minnesota. Atlas 14 supersedes TP-40's precipitation-frequency atlas because of its higher gridded resolution (scale of 1 kilometer [km]), increase in weather station data, incorporation of geographic features, and roughly 50 years more of interpreted data. Rainfall depths for high-frequency, 24-hour storms remain relatively similar with some decrease in precipitation for Granite Falls, Minnesota (see Table 2-3). For recurrence intervals of 50 to 100 years, the Atlas 14 increases rainfall depth by 10–20 percent. Atlas 14 will be used to design BMPs mitigating the impact of the estimated increase in rainfall depth and runoff volume.

5.7 REGULATORY CONTROLS AND ENFORCEMENT Implementing the practices and projects outlined in Chapter 4.0 will achieve the goals of the plan if no additional, future impacts occurred in the watershed. However, future impacts will occur and, therefore, mitigating these impacts is critical. Additionally, uncertainty in climate factors, water availability, and economics require that appropriate planning take place to reduce the potential of harmful impacts that can currently be anticipated by these uncertainties. Because of these factors, regulatory controls are a critical tool for managing the Yellow Medicine Watershed. This plan calls for increasing local regulatory controls as well as increased coordination of regulatory activities to reduce impacts from altered drainage, increased groundwater demands, and harmful land management practices. A summary of these recommendations is provided in Table 5-7.

Appendices contain additional climate change-related information.

Appendix D

MN County Water Plans Climate Change Content

June 12, 2020

Only content from those county water plans containing more than an acknowledgment of climate change is provided. Highlighted sections correspond to Appendix A, Table 3 "Content and analysis" column and indicate rational for indicating what content each plan contains.

Carver and Hennepin Counties were examined as part of the MCWD Local Government & Agency Plans review.

County

Aitkin

Cook

Faribault

Isanti

Lake Superior North*

Lincoln**

Lyon**

Mille Lacs

Wadena

Washington

Yellow Medicine**

**Lincoln, Lyon, and Yellow Medicine use the Yellow Medicine One Watershed One Plan document

AITKIN

CLIMATE FLUCTUATION

Climate Fluctuation – Goal:

- The County should develop local management contingencies to handle periods of below and above average precipitation.

Climate Fluctuation – Economic Facts/Concerns

- The lake levels of many lakes in the County are higher than their average level since European settlement. Another dry period similar to the 1930's would significantly reduce lake water levels in many lakes. This will have large impacts on property values, lakeshore settlement and water based outdoor recreation activities.
- The Big Sandy Lake reservoir and associated development complex has almost one-fifth of the total assessed valuation in the County. If this reservoir is utilized for low flow augmentation in periods of below average rainfall this action will significantly impact property values and recreation use in the reservoir complex.
- In 1980 the 1-year-in-30 projected low flow of the Mississippi River at the Twin Cities water intakes was less than the daily requirement. Since 1980, major new water users of the Mississippi have been added downstream from Aitkin. This includes Sherco Two, growth of St. Cloud, and major agriculture irrigation growth on the outwash plains adjacent to the Mississippi between Brainerd and the Metropolitan Area. The need for supplementary water sources that do not destroy the recreational values of headwater reservoirs by drawdowns is critical.
- North central Aitkin County has the most viable reservoir site left in the headwaters area to store water for low flow augmentation in times of low precipitation. The site could store one year's water supply for the Twin Cities.

Climate Fluctuation – Economic Recommendations

- The historic low, average and high water levels of each lake in the County should be delineated and available to the public.
- The high water level maps supplied by the Federal Emergency Management Administration need to be made more accurate and be expanded to include all the lakes, wetlands and rivers. To make this possible, better criteria and an improved information gathering system is needed.
- The County should request yearly updates of the official State of Minnesota and Federal policies on management contingency plans to deal with major drought as it effects the Big Sandy reservoir. This yearly update should include (1) St. Cloud and Twin Cities Metropolitan Area plans for water supply and conservation in drought cycles; (2) Plans concerning the management of rural water users, primarily irrigation for both surface and ground water in the outwash plains adjacent to the Mississippi River from south of Brainerd to the Metropolitan Area; and (3) Flows needed for power production and sewage disposal.

- The County should plan for and encourage the development of a new reservoir to supply downstream water for the Mississippi in times of below average precipitation and in return receive guarantees of water level stability on Big Sandy reservoir.
- Dry periods result in temporary impacts and are part of the natural process and are necessary for the regeneration of bulrush and other emergent stands.

Climate Fluctuation – Environment Facts/Concerns

- Most public policy assumes that the climate of the County is an unchanging normal. In fact, the climate of the last 100 years is not typical of even the last 1000 years. Climate not only changes year to year, but also can change rapidly to a new multi-year average.
- In times of high fire weather danger (dry fuel, low humidity, high winds) a fire, even with modern fire control techniques employed, could destroy a significant share of the County.

Climate Fluctuation – Environment Recommendations

- A joint fire planning effort with the Department of Natural Resources to handle the contingency of a major fire should be undertaken. This study could serve as a pilot for the protection of dispersed rural development in other forested areas of Minnesota.
- Both County and State fire planning personnel should be consulted when major changes in zoning rules and zones or subdivision standards are considered.

COOK

Priority #4: Education

Goal: Support a healthy watershed and clean water through education

Actions: 6. Develop educational workshops and resources on local and regional topics to include but not limited to aquatic and terrestrial invasive species, land use changes, climate change, and watersheds.

Priority Concern #2: Land Use & Development Impact on Watersheds:

Action: Provide assistance to land owners with less than 20 acres for reforestation, re-vegetation, and land management plans.

Duration: 2014-2024

Cost: $5,000

Measurable Outcome: Reduction in natural habitat destruction; protection of habitats; minimized erosion; reduction of sedimentation and nutrient loading into water; planting based on succession and climate change.

Priority Concern #3: Surface and Groundwater Monitoring

Goal: Protect Surface and groundwater quality

Action: Secure funding to evaluate water usage of lakes and streams from water diversion or from us by volume of both commercial and private property.

Duration: 2014-2024

Cost: $40,000

Measurable Outcome: Enhanced protection of drinking water; enhanced protection of aquatic habitat; data for us in planning for climate change and land use.

FARIBAULT

2.7 Changes and Trends Pertaining to Climate

According to the State Climatology Office, Minnesota's climate is changing. Known facts include that the state has warmed one to three degrees (F) in the last century, floods are becoming more frequent, and ice cover on lakes is forming later and melting sooner. In the coming decades, these trends are likely to continue. Rising temperatures may interfere with winter recreation, extend the growing season, change the composition of trees in the North Woods, and increase water pollution problems in lakes and rivers. The state may have more extreme hot days, which not only harms public health, but alters the growing cycle of crops and impacts yields.

Our climate is changing because the earth is warming. People have increased the amount of carbon dioxide in the air by 40 percent since the late 1700s. Other heat-trapping greenhouse gases are also increasing. These gases have warmed the surface and lower atmosphere of our planet about one degree during the last 50 years. Evaporation increases as the atmosphere warms, which increases humidity, average rainfall, and the frequency of heavy rainstorms in many places, but contributes to drought in others.

In the big picture, greenhouse gases are also changing the world's oceans and ice cover. Carbon dioxide reacts with water to form carbonic acid, so the oceans are becoming more acidic. The surface of the ocean has also warmed about one degree during the last 80 years. Although warmer temperatures cause sea levels to rise, the impact on water levels in the Great Lakes is not yet known. Warmer air also melts ice and snow earlier in spring.

2.7.1 Lakes and Rivers

Higher temperatures and heavier storms could harm water quality in our lakes and rivers. Warmer water tends to cause more algal blooms, which can be unsightly, harm fish, and degrade water quality. Severe storms increase the amount of pollutants that run off from land to end up in our surface waters, so the risk of algal blooms will be greater if storms become more severe. Increasingly severe storms could also

cause wastewater sources to overflow into local lakes and/or rivers more often, threatening beach safety and drinking water supplies.

2.7.2 Ecosystems

The ranges of plants and animals are likely to shift as the climate changes. For example, warmer weather could change the composition of forests, rising water temperatures will increase the available habitat for warm water fish such as bass, while shrinking the available habitat for cold water fish such as trout. Declining ice cover and increasingly severe storms would harm both types of fish habitat through erosion and flooding.

Warming could also harm ecosystems by changing the timing of natural processes such as migration, reproduction, and flower blooming. Migratory birds are arriving in Minnesota earlier in spring today than 40 years ago. Along with range shifts, changes in timing can disrupt the intricate web of relationships between animals and their food sources and between plants and pollinators. Because not all species adjust to climate change in the same way, the food that one species eats may no longer be available when that species needs it (for example, when migrating birds arrive). Some types of animals may no longer be able to find enough food.

2.7.3 Agriculture

Changing climate is likely to have both positive and negative effects on agriculture in Minnesota. Warmer weather has extended the growing season by about 15 days since the beginning of the 20th century. Longer frost free growing seasons and higher concentrations of atmospheric carbon dioxide would increase yields of soybeans and wheat during an average year. But increasingly hot summers may reduce yields of corn. In seventy years, southern Minnesota is likely to have 5 to 15 more days per year with temperatures above 95°F than it has today. More severe droughts or floods would also hurt crop yields, making it important to identify potential cropping adjustments.

2.7.4 Air Pollution and Human Health

Changing climate can harm air quality and amplify existing threats to human health. Higher temperatures increase the formation of ground level ozone, a pollutant that causes lung and heart problems. Ozone also harms plants. In some rural parts of Minnesota, ozone levels are high enough to reduce yields of soybeans and winter wheat. The Environmental Protection Agency and Minnesota Pollution Control Agency have been working to reduce ozone concentrations. As the climate changes, continued progress toward clean air will become more difficult.

…

While much of Faribault County and Minnesota's land use activities depend on artificial drainage, it can have negative environmental and flooding impacts downstream. For example, recent studies estimate the Le Sueur River's flow has doubled over the past 60 years. Roughly half of this flow originates from tile drainage. The increase in the Le Sueur River's flow is due to hydrologic alterations made by both humans (including installing artificial drainage and changing crop types) and climate (increased

precipitation and temperatures). Several studies identify human changes as the primary cause and climatic changes as the secondary cause of this increased river flow. Furthermore, this watershed cannot improve without substantial mitigation of altered hydrology. In addition to high river flow, altered hydrology exhibited in excessively low river base flow is an identified stressor in the Le Sueur River watershed. Base flow is sustained by shallow groundwater and interflow. Simply put, low base flow is indicative of soils being too dry and water tables being too low, partly the result of draining excess water from the landscape. Therefore, these sources are unable to deliver ample water to rivers at dry times of year, when base flow is the only source of river flow.

…

Information Sharing, Education, and Outreach for all Priority Concerns:

Maintain precipitation observation network to continue understanding of climate and rainfall.

Resources: $2,000

Time Frame: 2018-2027

Measurable Results: Coordinate observation network of 25 volunteers.

ISANTI

XIV. Addressing Ecological Resilience within Isanti County

Ways to address the problems associated with a change in weather patterns:

- Land water retention (i.e. drainage management, soil health, etc.)
- Filter silt from runoff via buffers, wetlands, filtration, grasses, detention, and retention.
- Slow stream and inlet velocities via detention/retention, wetland protection/restoration, and grade control.
- Stabilize stream banks and beds
- Educate the public on climate issues
- Utilize the most up-to-date climate models (i.e. Atlas 14 by NOAA) Isanti County plans to address these climate fluctuations and the potential resiliency of sensitive ecosystems by proactively implementing this implementation plan and educating developers and land managers to focus efforts on plantings, soil health, and wetland restoration and protection strategies that will sequester carbon, filter runoff, and reduce impacts from human alterations and development.

LAKE SUPERIOR NORTH

Priority Concern: Impacts of Climate Change – Changes in climate and the frequency of severe storm events and droughts will have economic, ecological, and human health impacts in the LSNW.

3.1.10 Impacts of Climate Change:

PRIORITY AREA SUMMARY: The effects of climate change are being seen across the LSNW and region in changes in weather patterns and trends, spatial shifts in bird and plant populations, and dramatic shifts in the timing of natural events such as ice-over and ice-out events. Integration of tools, ordinances, and policies in the region's infrastructure and governance will be important in enhancing communities and resources to be resilient in the face of changing climate conditions and associated changes in weather.

ISSUE STATEMENT: Changes in climate and the frequency of severe storm events and droughts may have economic, ecological, and human health impacts in the LSNW area.

Goal 1: Continue to evaluate the impacts of climate change by partnering on regional efforts (U.S. EPA, July 2013/LaMP, 2008). Appendix A: 2 implementation activities address this goal. Elements of the Targeted Implementation Schedule and Secondary Plan action items, detailed within the LSNW Management Plan, support work completed by partnering entities towards completion of this work activity.

Goal 2: Increase the resiliency of the LSNW by adapting to climate change, including adopting the recent update of NOAA Atlas 14 and other climatic data to ensure that design standards are kept current with the most recent climate data. (MNDNR, 2015). CC 1.1 Integrate climate change scenarios and vulnerability assessments into land use plans and resource management plans, including but not limited to: economic development plans, nutrient management plans, municipal official plans, fisheries management plans, wildlife management plans, forest management plans, and Species at Risk Recovery plans (Draft Strategy from Lake Superior Lakewide Action and Management Plan, 2013 and MNDNR, 2015). CC 1.2 Consider and implement climate change adaptation strategies on all stormwater management projects implemented by or on behalf of Cook County and Lake County, including establishing additional staff and resources to accomplish this work (Source:1W1P Advisory Committee). Appendix A: 2 additional implementation activities address this goal. Elements of the Targeted Implementation Schedule and Secondary Plan action items, detailed within the LSNW Management Plan, support work completed by partnering entities towards completion of this work activity.

LSN Watershed Targeted Implementation Schedule: *various implementation activities related to climate change with associated schedules, project costs, project leads, and project partners, and activity outcome measurability*.

CC1.2: Consider and implement climate change adaptation strategies on all stormwater management projects implemented by or on behalf of Cook County and Lake County, including establishing additional

staff and resources to accomplish this work. Activity outcome measurability: SW ordinance changes; adaption to projects to accommodate climate change.

CC1.1: Integrate climate change scenarios and vulnerability assessments into land use plans and resource management plans, including but not limited to: economic development plans, nutrient management plans, municipal official plans, fisheries management plans, wildlife management plans, forest management plans, and Species at Risk Recovery plans. Activity outcome measurability: More resilient infrastructure and regional ecological areas in the face of climate change; decrease of infrastructure vulnerability.

Technical assistance incentive program aims: f. Support efforts to renew and implement adaptive forestry management practices that respond to climate change.

Extensive climate change content in the secondary implementation plan (T9)

LINCOLN

2.3 Priority Values, Concerns, and Goals: … Remember to think about climate change when designing projects.

2.6.1 Climate Change

Data indicate temperatures and precipitation patterns are increasingly changing, including intensity, frequency, and duration of precipitation events as well as increased length between precipitation events. These precipitation patterns will influence the way agriculture, the major industry, and land use of the watershed require and use surface water and groundwater in the future. Historically, engineers have used the Weather Bureau Technical Paper No. 40 (TP-40) standards from 1961 for estimating precipitation/frequency and durations for the United States. In 2013, the National Oceanic and Atmospheric Administration updated TP-40 and published the Atlas 14 Volume 8 for Minnesota. Atlas 14 supersedes TP-40's precipitation-frequency atlas because of its higher gridded resolution (scale of 1 kilometer [km]), increase in weather station data, incorporation of geographic features, and roughly 50 years more of interpreted data. Rainfall depths for high-frequency, 24-hour storms remain relatively similar with some decrease in precipitation for Granite Falls, Minnesota (see Table 2-3). For recurrence intervals of 50 to 100 years, the Atlas 14 increases rainfall depth by 10–20 percent. Atlas 14 will be used to design BMPs mitigating the impact of the estimated increase in rainfall depth and runoff volume.

5.7 REGULATORY CONTROLS AND ENFORCEMENT Implementing the practices and projects outlined in Chapter 4.0 will achieve the goals of the plan if no additional, future impacts occurred in the watershed. However, future impacts will occur and, therefore, mitigating these impacts is critical. Additionally, uncertainty in climate factors, water availability, and economics require that appropriate planning take place to reduce the potential of harmful impacts that can currently be anticipated by these uncertainties. Because of these factors, regulatory controls are a critical tool for managing the Yellow Medicine Watershed. This plan calls for increasing local regulatory controls as well as increased

coordination of regulatory activities to reduce impacts from altered drainage, increased groundwater demands, and harmful land management practices. A summary of these recommendations is provided in Table 5-7.

Appendices contain additional climate change-related information.

LYON** *See Lincoln*

MILLE LACS

Goal 6: Plan for local resiliency to withstand and respond to changing climate conditions. Cost: $3,026,000

Amplified Weather Events Minnesota's climate is changing rapidly and has been hypothesized to continue doing so in the foreseeable future. Temperatures are increasing, especially at night and in the winter, and larger, more frequent extreme precipitation events are occurring. As a result, Minnesota's wildlife, plants, waters, historic resources, infrastructure, and available outdoor recreation activities are being impacted by the resulting amplification of extreme weather events, and the increasing frequency thereof. The third (3) and fourth (4) priority concerns address a range of development and land management decisions that have a negative effect on the landscape's ability to mitigate and manage these amplified events. The fifth priority concern correlates with another type of amplified weather event (i.e drought), which has yet to be experienced locally, but is a weather event of concern with groundwater implications.

Goal 6. Plan for local resiliency to withstand and respond to changing conditions. Objective A: Determine the scope of change observed locally Objective B: Implement, and incentivize landowners to implement, practices to further adaptation to the changing conditions.

Implementation Program:

Category: Surface Water Quality

Objective B. Manage the impacts of forestland conversion on water quality.

v. Promote active forest management efforts to ensure the continuation of productive forest land into thefuture, addressing species diversity that provides multiple benefits for water, wildlife, and resiliency against the stressors of a changing climate. Budget: $100,000; 2024-2029

Objective D. Increase the protection and management of public and private forestland.

iv. Promote active forest management efforts to ensure the continuation of productive forest land into the future, addressing species diversity that provides multiple benefits for water, wildlife, and resiliency against the stressors of a changing climate. Budget: $500,000; ongoing

WADENA

Objective D: Maintain adequate groundwater resources for public water suppliers in Wadena County.

Cities also withdraw large volumes of water in a year for public drinking water. In order to maintain adequate water supplies for cities, proper actions and practices are needed to preserve aquifer volume. Individual cities manage their water supplies for everyone drinking public water. By referring to practices in wellhead protection (WHP) plans and encouraging water conservation, pursuing storm water updates and alternative practices like rain gardens and swales cities can ensure public water is available.

Action Items: Urban BMPs, Education and Outreach, Strategic Planning WHP plans often contain information about practices and actions that can be taken to reduce water use in towns. These water conservation practices can include maintenance of leaky pipes, increased water usage rates, and low flow appliances. Additional storm water updates can recharge aquifer volume and encourage water reuse. These practices include rain gardens, infiltration swales, permeable pavement, and development design standards for storm water. Education events, such as rain garden promotions and public input on city projects, can provide citizens opportunity to learn about water conservation opportunities and support or participate in city-wide activities. Workshops and task force meetings are ways to provide information to city planners and resource professionals. However, in order to enact all these changes in a single city, strategic planning is needed to determine priorities, importance, and interest for specific actions. The WHP plan covers a portion of the planning aspect, but city officials need to be cognizant of future practices, changes in climate, changes in population, and other relevant factors that can impact water conservation measures. With careful and deliberate implementation, planning, and education adequate water supplies should be available for public water use. Figure 26 shows the locations within the county that are already protected by WHP plans.

Objective E: Support sustainable development and management of groundwater supplies. The DNR issues all groundwater appropriation permits and monitors those permits to ensure there is a sustainable supply for the needs of all users. Water use permits are required for all users withdrawing more than 10,000 gallons of water per day or 1 million gallons per year. Prior to drilling a well, a preliminary well construction assessment is required. Those users with permits are also required to submit an annual report of their water usage. DNR also has the ability to suspend permits during dry conditions to safeguard water availability. An interagency team created a climate change report in 2013 to specify issues related to climate change. This report is used locally in county hazard mitigation plans. For example, increased drought periods could adversely impact groundwater supplies. Our county hazard mitigation plan has specific response actions for depleted groundwater supplies. The 2013 County Comprehensive Plan outlines the county's goals and practices to preserve natural resources in future years. Included in the plan is protecting and preserving wetlands in the county and preventing contamination and preserving supplies of groundwater and surface water for county residents.

Action Items: Partnering, Strategic Planning: In order to support sustainable water use development, Wadena County will need to partner with state agencies, especially DNR, to accurately forecast water supplies in the county. The relationships and expertise from these other agencies can help the county officials make changes in the case of water supply issues. In order to better foresee these changes and

prepare for future water use, Wadena County will need strategic planning. This includes determining what would happen to water supplies during potential droughts, monitoring increases in demand with changes in population, and climate changes. This could also involve the adoption of development standards for new developments, businesses, and irrigators to ensure aquifers are not depleted from increases in development or increases in irrigation.

GROUNDWATER Shallow, surficial aquifers are an important source of water for private wells in Wadena County as well as for surface water impacts. The interaction between surface water and ground water is highly influenced by precipitation. There have not been major issues in Wadena County with quantity of groundwater, but as irrigation increases, climate change worsens, and droughts become more likely, so does the risk for well interference. Without agricultural BMPs, there may be negative impacts to groundwater. Wellhead protection and source water assessments have been completed for cities in Wadena County and are actively being implemented. These are important when it comes to protecting public water supplies, determining water sources, and susceptibility to contamination.

WASHINGTON

Changing climate and unpredictable precipitation were identified as primary issues during the early stages of plan development. The climate change work group discussed where climate change issues should be addressed in the plan. It was decided that climate change should not be its own chapter, but needs to be addressed through numerous portions of the document and more specifically in the strategies for groundwater and surface water interaction and supply.

3.1 POLICY The county will partner in a coordinated effort to develop sustainable groundwater management that balances the discharge from the water supply with sufficient amounts of quality recharge, ensuring sufficient supplies of county groundwater are available.

3.2 STRATEGIES 1. Develop a county wide groundwater information database, informed by the work of the DNR and the Metropolitan Council, which the county and LGUs can use to determine:

a. A water budget that includes surface water and groundwater interaction, an assessment of the geologic conditions, land use, and groundwater contamination and climate change trends and impacts.

County 2040 Comprehensive Plan, Ch. 6, https://www.co.washington.mn.us/404/Comprehensive-Plan

Water Resources Policy: Collaborate with partners to build climate resilience through integrated surface and groundwater management. See Resilience chapter for more information.

Water Resources Strategy: Promote green infrastructure practices that support resiliency and adaptability to climate events

YELLOW MEDICINE** *see Lincoln*

Appendix E

MCWD Local Government & Agency Plans Climate Change Content

June 12, 2020

Only content from those local plans containing more than an acknowledgment of climate change is provided.

Local Governments & Agencies

City of Minneapolis

City of Edina

City of St. Louis Park

City of Minnetonka

City of Hopkins

City of Richfield

City of Golden Valley

Hennepin County

Minneapolis Park and Recreation Board

Met Council

CITY OF MINNEAPOLIS

Goals - Climate Change Resilience (Page 41)

- In 2040, Minneapolis will be resilient to the effects of climate change and diminishing natural resources, and will be on track to achieve an 80% reduction in greenhouse gas emissions by 2050.

21 Policies (and action steps) related to Climate Change Resilience (Page 44)

- Policies and Actions - Climate Resilient Communities (Page 210)
    - Ensure city infrastructure and residents are resilient to the shocks and stresses of climate change.

- Policies and Actions - Integration of Water Management into Development (Page 221)
    - Maximize use of public property for flood mitigation and WQ, use boulevard swales

- And others related to energy efficiency, renewable energy, stormwater management, etc.

Other notes: Participated in our NOAA study, in process of modeling all 150 flood areas and assessing risk/solutions, lining sanitary pipes may be exacerbating issue (see 8/23/18 notes).

CITY OF EDINA

Mentioned in Water Resources Chapter (Page 7-6)

- Describes the trends and anticipated impacts. Noted as future driver for flood protection.

Recommendations in Energy and Environment Chapter (Ch .8)

- The City of Edina will take actions to address climate change, including greenhouse gas reduction and solid waste reduction.

- History - Became a participant in the Regional Indicators Initiative (RII), Signed U.S. Mayor's Climate Protection Agreement, Became an ICLEI City for Climate Protection, Joined GreenStep Cities. Direct EEC to set new goals with community input to address climate change.

- Recommendations: The City will lead in sustainability both by example and by taking the lead role where possible. The City will plan for resilience regarding climate change. The City will meet or exceed its GHG reduction goals and solid waste reduction goals. Future EECs will continue to research and educate the community on environmental best practices.

- Have done modeling and have interactive map that shows flood risk. Currently doing assessment of solutions for Weber Park area - http://edinagis.maps.arcgis.com/apps/webappviewer/index.html?id=aeb57968722e476f9b6ef2b86d9326b8

City of Edina Flood Risk Reduction Strategy discusses in detail the City's strategy and framework for understanding flood risk and how the city has comprehensively reduce the risk.
https://www.edinamn.gov/DocumentCenter/View/9367/Flood-Risk-Reduction-Strategy_final?bidId

CITY OF ST. LOUIS PARK

Goals, policies, and action plan in Environmental Stewardship - Climate and Energy (Pages 4-28)

Adopted Energy Action Plan in 2016 and Climate Action Plan in 2018. Participant in MN GreenStep Cities, MN Regional Indicators Initiative, and MN LoGoPep Pilot Cities. Climate Action Plan focused on reducing emissions.

CITY OF HOPKINS

- Policies in Natural Environment chapter (fairly brief) (Page 84)

- Participated in GreenStep City, Regional Indicators Initiative, 2017 Climate Resilience Workshop Series (led by 2 local WDs). Also use STAR Community Rating System.

- 1 of 8 focus areas in the Introduction is to Identify and address increased risks to Hopkins due to climate change.

CITY OF RICHFIELD

Goals and Policies (Page 40)

- Goal: Encourage the use of alternative energy sources and sustainable building practices.
    - Establish long-range energy/greenhouse gas emission reduction goals and commit to conducting an energy Action Plan or Climate Action Plan.
    - Continue participating in the GreenStep Cities Programs to develop sustainable best practices.
    - Become an innovator in the use of alternative fuels, wind power, and other sustainable energy sources.
    - Install solar panels or similar energy sources on public buildings and encourage owners of businesses and private property owners to do the same.
    - Encourage sustainable building practices.

City of Golden Valley

Resilience and Sustainability (Chapter 7)

- Six goals are identified and presented and addressed under a Policy Plan and an Implementation Plan
- The six goals include: renewable energy, energy efficiency of the built environment, waste reduction, protection of the natural environment, resilient infrastructure, and community preparedness

HENNEPIN COUNTY

Discussion of impacts in Comp Plan

- Brief discussion of the changing climate and that there will be pressure on county to reduce its contribution via transportation system. (Pages 2-9)
- Discussion of emerging issues for surface waters and impacts climate change will have on ecosystems, habitat loss, invasive species. Pressure on stormwater management infrastructure and groundwater resources. (Page 4-3)

Mentioned in objectives on Natural Resources Strategic Plan

- Natural Resources Strategic Plan for 2015-2020 mentions climate change with regard to its objectives of implementing stormwater BMPs, increasing tree canopy, and collaborating on research.

MINNEAPOLIS PARK AND RECREATION BOARD

Recommendations in Ecological Systems Plan (Pages 9, 67)

- Adopted Ecological Systems Plan in Jan. 2019. Brief discussion of climate change and the resulting ecological changes they need to plan for. Recommends development of park resiliency plan. Notes attendance at Minnesota Climate Adaptation Partnership Annual Conference. Outlines current activities and recommendations for contributing to climate change mitigation in the areas of urban heat island effect, natural resource/energy consumption, and tree canopy fragmentation.

MET COUNCIL

- In 2015, the Metropolitan Council adopted Thrive MSP as its new regional development plan, which identifies seven policies to guide regional land use and development. One of those policies is *Building in Resilience: Promote sensitive land use and development patterns to contribute toward achieving Minnesota's adopted greenhouse gas emission goals at the regional scale, and to develop local resiliency to the impacts of climate change.*

- Met Council recommends, but doesn't require, discussion of climate adaptation in city plans

- *From Edina Plan*: Thrive MSP 2040 additionally encouraged communities within the region to plan for climate change, for example, and to develop climate mitigation strategies as part of their comprehensive plan updates. It was suggested that climate related strategies might: (1) promote land use and development patterns that will contribute toward achieving Minnesota's adopted greenhouse gas emissions goals or (2) recognize changing rainfall patterns that require additional storm water management capacity.

- *From St. Louis Park Plan*: Policy - Building in Resilience: Promote sensitive land use and development patterns to contribute toward achieving Minnesota's adopted greenhouse gas emission goals at the regional scale, and to develop local resiliency to the impacts of climate change. The plan also recommends communities' roles related to achieving this policy, which include: » Addressing climate change mitigation and adaptation; » Reducing water use, energy consumption, and greenhouse gas emissions; » Protect and enable the development of solar resources (cities are required to address as a goal, policy or strategy); » Consider the development or use of community solar gardens; » Address impacts to local economies, resources, and infrastructure systems; » Identify local cost-saving measures that could result in reducing waste, conserving water, and improving energy efficiency; » Participate in programs such as MN GreenStep Cities and the Regional Indicators Initiative.