MINNEHAHA CREEK WATERSHED DISTRICT
QUALITY OF WATER, QUALITY OF LIFE

Meeting: Citizens Advisory Committee
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Title:	Climate Adaptation Series Wrap-up
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Purpose:

The primary purpose of the March Citizens Advisory Committee (CAC) Meeting is to obtain CAC concurrence on the draft framework that has been developed for the District's Climate Adaptation Strategy as an outcome of the CAC's 2020 climate adaptation discussion series. This meeting will close out the discussion series as we transition into the first phase of work under the framework: Understand and Predict.

Background:

Over the course of 2020, the CAC has been engaged in a series of discussions to advise the District as it develops its strategy for responding to climate change. This process has included the following conversations:

1. Climate Science – a presentation on Hydroclimatic Conditions & Changes from a State Climatologist (March 3, 2020 CAC Meeting)
2. Governance Scan – review of existing plans and defined roles in climate adaptation across state, regional, and local governments (June 16, 2020 CAC Meeting)
3. Role Framing – discussion and stress-testing of a high-level framework for the District's climate adaptation strategy (October 14, 2020 CAC Meeting)
4. SWOT Analysis - conducting a Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis to inform the District's response to climate change (November 10, 2020 CAC Meeting)

Staff has used these discussions with the CAC to draw insights about the District's role in responding to climate change and develop a high-level framework for its Climate Adaptation Strategy. The framework serves to delineate the District's role in climate adaptation across three areas:

1. Understand and Predict – The District will utilize and expand its capabilities in data collection and analysis to understand and predict the impacts of climate change, establish goals, and evaluate potential solutions.
2. Communicate, Convene and Plan – The District will convene its partners to build consensus around the issues, align goals, and guide the development of a coordinated watershed-wide implementation plan.
3. Implement, Measure and Adapt – The District will implement projects, programming, and policy changes, in coordination with its partners, to achieve measurable progress toward the goals.

These three roles also represent three largely-sequential phases of work, with each informing the next. Staff will use this framework to build out a more detailed roadmap in 2021 that will guide the District as it works with its partners to develop a Climate Adaptation Implementation Plan in the coming years.

The findings and insights from the CAC discussions, and the resulting framework, were summarized in a CAC Climate Adaptation Series Report and distributed for the CAC's review on February 18. Staff is accepting CAC feedback on the report through February 26 and will summarize the feedback, and any proposed changes to the report, at the March 3 meeting.

From there, staff will take the following next steps to advance the District's climate adaptation efforts:

1. Brief the Board of Managers on the CAC Climate Adaptation Series Report (March 22 OPC meeting)
2. Proceed with work under Phase I (ongoing through 2021 and beyond)
3. Expand and enhance the framework into a public-facing Climate Adaptation Strategy for Board adoption and incorporation into the Watershed Management Plan (4th quarter 2021)

Summary:

At the March 3 CAC meeting, staff will:

1. Recap the work to date and next steps in the District's climate adaptation planning process
2. Review feedback received on the CAC Climate Adaptation Series Report and any proposed revisions
3. Provide an overview of the work currently planned for Phase I: Understand and Predict (described below)

<u>Overview of Phase I: Understand and Predict</u>

The MCWD recognizes that climate change is already impacting our state and its water resources, and the effects of climate change are expected to accelerate in the coming decades. To successfully adapt to the impact of increased flood risk, communities must optimize their infrastructure to maximize existing capacity, while more effectively implementing new climate adaptation strategies on the landscape by understanding what investments will yield the largest return. As a regional watershed entity, and with its technical expertise, MCWD is uniquely positioned to serve as an information broker and work with other regional partners (e.g. USGS, DNR, counties) to understand the water budget and the upstream-downstream cause and effect across communities.

MCWD's ability to help communities understand and adapt to these changes requires computer modeling tools to improve short term flood predictions and characterize impacts of increased precipitation on flooding locations, extent, and frequency. However, the ability to do so has been hampered by fragmented models built for each community or low resolution stormwater infrastructure data that makes it difficult to predict how specific areas will be impacted and quantitatively compare potential solutions.

Fortunately, advances in data science have made it affordable to collect exponentially more data and analyze it in more sophisticated ways. MCWD is developing a program to integrate and maximize the value of recent public investments in data collection to better predict the impacts of changing precipitation across the watershed, and to pinpoint, quantify and evaluate solutions.

This program would draw on existing investments made by MCWD, U.S. Geological Survey and Hennepin County in monitoring precipitation and watershed response across the District, which will collect more than 1 million real-time data points per year for precipitation, surface and shallow ground water levels, and pollutant loading. It will integrate this local understanding with state investments in producing detailed topography of Minnesota, along with local municipal investments in digitizing storm sewer information.

The tools currently being proposed for development include:

- *Real Time Sensor Network (RESNET):* High resolution water level, flow, and water quality data collection to provide real time water level information to the public and support future model development
- *Machine Learning:* Develop a machine learning model that can forecast future water levels based on the vast quantity of newly available remote sensing data, which will provide real time flood forecasting at 25 locations throughout MCWD
- *2-Dimensional (2D) Watershed Model:* Integrate state topographic and municipal infrastructure data to create a high resolution planning tool to pinpoint, quantitatively evaluate, and drive decisions on climate adaptation projects and policies

Real Time Sensor Network Implementation

In 2019, MCWD partnered with the USGS and Hennepin County Emergency Management to invest $150,000 in a remote sensing network that will collect more than 1 million real-time water level and flow data points per year at 25 sites throughout the District. District staff spent 2020 developing the water level data pipeline, testing equipment, and developing an interactive web dashboard to prepare the RESNET system for a soft rollout in 2021.

Next steps for the Real Time Sensor Network (RESNET):

- Spring 2021: Deploy interactive web dashboard that displays real time water levels and flow to a small beta testing group
- Spring 2022: Public rollout of interactive web dashboard

Short-Term Flood Forecasting with Machine Learning

In 2020, MCWD staff developed a machine learning model using weather data from Hennepin County Emergency Management and water level data from the USGS and MCWD water level stations. The first machine learning model demonstrated that water levels could be predicted with relatively high accuracy using a small subset of the data available.

Next steps for the Short-Term Flood Forecasting with Machine Learning:

- Summer 2021: MCWD will solicit academic review on the development of the District's predictive machine learning model to ensure that it is being built in a scientifically defensible manner
- Winter 2021/2022: The machine learning model will be incorporated into the MCWD RESNET dashboard to provide future forecasting
- Mid 2022: Assess potential options for dam optimization methodology using machine learning model developed in 2023

Long Term Quantitative Planning Models

Developing a long term climate change adaptation strategy requires a quantitative modeling framework that can inform how the District can leverage water resource policy, rules, and projects. However, the first step in developing modeling tools is identifying what questions need to be answered with modeling scenario output. In 2020 and 2021, MWCD staff met with internal work groups and the CAC to create a list of questions they deemed important to address climate concerns. The questions from the CAC and MCWD staff workgroups fell into two categories:

1. *Understand the Impacts of Climate Change:* characterize the location, frequency, and magnitude of issues under current and future conditions

2. *Evaluate Climate Adaptation Strategies:* Identify what climate strategies will be most effective based on our understanding of types of flooding, areas impacted, frequency of flooding, and strategy cost

MCWD has divided model development into an initial pilot model assessment as a proof of concept and to inform the full scale model development. The timeline of the process is as follows:

- Pilot Watershed Model Timeline
    - March 2021: R&M staff are developing a summary document that summarizes the modeling needs based on staff and CAC understanding of climate change threats. This document will be reviewed by a model consultant to comment on MCWD's staff assumptions, direction, and approach to model development.
    - May 2021: Release RFP for pilot model build
    - June 2021-April 2022: Development of the pilot model
    - April 2022-July 2022: Climate change scenario analysis
    - April 2022-July 2022: Model and scenario documentation
- Watershed Wide Model Partners, Timeline, and Funding Strategy
    - MCWD intends to submit an application to the Legislative-Citizen Commission on Minnesota Resources (LCCMR) request for proposals in April 2021. The LCCMR Environmental and Natural Resource Trust Fund (ENRTF) is large enough to support the entirety of MCWD's watershed model build.
    - MCWD has received letters of support from eight cities, the Minnesota DNR, USGS, Hennepin County Emergency Management, Hennepin County Environment and Energy, Metropolitan Council, Minnesota Cities Stormwater Coalition, and Minneapolis Park and Recreation Board.
    - The model build will begin in 2022 and end in 2024 if MCWD receives funding from the LCCMR ENRTF.
    - MCWD is also identifying other regional, state, and federal funding sources in the event that we are not selected for funding by the LCCMR.

Supporting documents (list attachments): N/A