Title: Remote Sensing and Water Level Management Update

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Purpose:
To provide an overview of the next steps for incorporating remote sensing data into the District’s daily workflow to guide water level management, policy and project planning, and improve public water level communication.

Background:
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. The past six years (2014-2019) were the wettest on record and resulted in nearly an average of 37 inches of annual precipitation at the Minneapolis airport, which is more than six inches above the historic annual average. The result of this additional precipitation is more frequent surface flooding along Minnehaha Creek, strained municipal stormwater infrastructure, and more interest in the operations of Grays Bay Dam for flood mitigation.

In response to this increased precipitation, District staff have formed partnerships with the National Weather Service (NWS), U.S. Geological Survey (USGS), and Hennepin County Emergency Management (HCEM) to utilize real-time data to predict, observe, proactively manage Gray’s Bay Dam, and communicate water levels across the watershed. To complement these multi-agency partnerships, the District has also invested in more real-time water level sensing equipment to increase the resolution of real-time (minute by minute) monitoring locations in partnership with HCEM (see attachment).

These recent investments in technology and partnership infrastructure have allowed the District to dramatically improve its ability to observe, manage, and communicate water level information. The volume and granularity of data gathered by this remote sensing network will provide the potential to further enhance the ability of MCWD, and its partners, to predict the impact incoming weather will have on the watershed and take proactive management steps. To ensure the data being collected has the strongest possible link to watershed management actions, staff have been working with the District’s partners to outline potential next level actions steps to maximize the utility of the remote sensing data.

Two primary methods have been identified to leverage the data being collected to make informed short-term decisions regarding water level management ahead of a storm and long range decisions on policies and projects that provide the greatest return on investment for flood hazard mitigation.

1) **Machine Learning:** A machine learning model that is able to predict future flow conditions across the watershed based on meteorological input data from our partners at the National Weather Service and existing watershed conditions (soil moisture, frost, water levels, flow, etc.). In parallel with existing processes, machine learning models are capable of quickly and accurately guiding how and when dam discharge can be adjusted to maximize storage within the system ahead of a storm, further improving the flood resilience of the watershed.

2) **Surface Water Hydrologic and Hydraulics (Physics) Model:** A hydrologic and hydraulic model is a mathematical representation of the physics of how water flows through the watershed. This model provides a granular level planning tool to evaluate the impacts and costs of physical changes within the landscape (e.g. flood storage creation, changing storm sewer networks, land use change, etc.) since it is a representation of the physical processes of water movement through a watershed based on existing infrastructure.
March 12, 2020 Operations and Programs Committee (OPC):
At the March 12, 2020 OPC meeting, staff will review the District’s progression in water level management, outline potential approaches for further enhancing MCWD’s data driven decision making, receive feedback from the committee members, and discuss potential next steps.

If there are questions in advance of the meeting, please contact Brian Beck at 952-471-8306 or bbeck@minnnehahacreek.org.

Supporting documents (list attachments):
- Map: MCWD Real-Time Sensor Network Phasing