

Memorandum

To: Bassett Creek Watershed Management Commission
From: Barr Engineering Company
Subject: Item 5C –Receive Update on XP-SWMM Phase 2 Project
BCWMC October 15, 2015 Meeting Agenda
Date: October 6, 2015
Project: 23/27-0051 2015

5C Receive Update on XP-SWMM Phase 2 Project

Recommendations

- Information only

Status Update on Work for the XP-SWMM Model (Phase 2)

The following items summarize the status of the work completed to date on the development of the BCWMC XP-SWMM Phase 2 model. The 2015 scope focuses on the development and calibration of the XP-SWMM models for the Medicine Lake and Plymouth Creek (including Parkers Lake) watersheds.

As noted in the third bullet below, we requested information from city staff to fill in data gaps for the model. City staff gathered and transmitted important data to us for use in the model's development. We acknowledge and thank city staff for the (sometimes significant) number of hours they spent on this task. Without this assistance from city staff, the BCWMC's project costs would have been higher.

- **Subdivision of watersheds: *Task complete.*** We subdivided the Medicine Lake and Plymouth Creek subwatersheds based on the existing BCWMC P8 model subwatersheds. We made minor revisions to subwatershed divides in a few locations within the XP-SWMM model to better address the needs of hydrologic and hydraulic modeling and to reflect any new data obtained during this process (e.g. storm sewer information, as-built drawings, topography). Based on the new XP-SWMM watershed divides, there are 171 subwatersheds in the Plymouth Creek model area and 242 subwatersheds in the Medicine Lake model area.
- **Developing revised watershed hydrology inputs: *Task nearly complete.*** We used the revised USDA SSURGO soils data to develop infiltration parameters based on the assigned hydrologic soil groups. For unclassified soil types, we will assume C soils, which is the predominant hydrologic soil classifications in the Twin Cities. Most of these unclassified soil types are present in largely impervious areas, where little rainfall infiltrates and the runoff is driven by impervious land cover. Average subwatershed slopes were developed based on the Minnesota Department of Natural Resources (MnDNR) 2011 LiDAR dataset. The initial

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subwatershed widths (an input parameter used for XP-SWMM) were developed based on the subwatershed areas and the longest flowpaths through the subwatershed. We are in the process of developing the subwatershed imperviousness, which will be based on the 2011 University of Minnesota Twin Cities metro area land cover/imperviousness data set and current land use information.

- **Modeling of storm sewer & outlet structures: *Task underway.*** We used storm sewer information obtained during BCWMC P8 model revisions, focusing on the data from the Cities of Plymouth, Minnetonka, Golden Valley, and New Hope in 2015, and compiled the storm sewer data that will be included in the Phase 2 XP-SWMM model. This primarily includes storm sewer that convey flows between each of the modeled ponds. Based on the original storm sewer data from the cities (in GIS format), we developed a list of “data gaps” where data required for modeling was not available. If possible, we made reasonable assumptions for missing storm sewer data based on available surrounding data. However, if this was not possible, we developed data requests specific to each city asking them to provide (or help provide) the additional required storm sewer or pond outlet data (e.g. record drawings, storm sewer data). The Cities of Plymouth, Minnetonka, Golden Valley, and New Hope provided information in response to our requests (as available); we reviewed the information and are in the process of following up. We also sent data requests to Hennepin County and the Minnesota Department of Transportation (MnDOT) for select locations adjacent to county or state roadways where the Cities did not have further information; we are in the process of receiving and reviewing this information.
- **Integrating detailed storage within the watershed: *Task nearly complete.*** Based on the final subwatershed divides, we are in the process of developing the storage curves using the MnDNR 2011 LiDAR data. However, for storage along the Bassett Creek channel, we will use the cross section information used in the current (Phase 1) XP-SWMM model; the Phase 1 cross-section information was developed using the 2011 MnDNR LiDAR data and the previous BCWMC HEC-2 model data.
- **Ensuring consistent vertical datums: *Task underway.*** The majority of the current XP-SWMM model (Phase 1) was developed in NAVD88; however, portions of the model are in NGVD29. The areas in NGVD29 will be converted to NAVD88, so the vertical datums will be consistent throughout the model. We contacted the Cities of Plymouth, Minnetonka, Golden Valley, and New Hope to verify the vertical datum of the available information from the Cities; the models for Medicine Lake and Plymouth Creek are being developed in NAVD88.
- **Incorporating Atlas 14 precipitation data: *Task underway.*** We are running preliminary XP-SWMM models using the Atlas 14 precipitation depths and the MN MSE3 storm distribution (replacement of “Type 2” storm distribution; developed by the Natural Resource

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Conservation Service (NRCS) and approved in early 2015) for the 100-year storm event. Through this process, we will capture any “lost water” associated with this event and ensure all water is routed appropriately in the model.

- **Flow monitoring & model calibration: *Task underway.*** The City of Plymouth provided the 2013 monitoring report for Plymouth Creek (completed by the Three Rivers Park District (TRPD)). We plan to request the actual flow monitoring data collected by the TRPD at the two locations along Plymouth Creek. We will use this data for calibration of the Plymouth Creek model (not yet started). We installed a flow monitoring station on the North Branch of Bassett Creek at Douglas Drive and have been collecting data from late-June 2015 to present. This data will be used to calibrate the North Branch model (to be developed in 2016).
- **Develop a modeling methodology report: *Task underway.*** Work completed includes documentation of modeling assumptions and general methodology.