



Bassett Creek Watershed Management Commission

MEMO

To: BCWMC Commissioners and Alternate Commissioners
 From: Laura Jester, Administrator
 Date: April 8, 2024

RE: Technical Advisory Committee Recommendations

The BWCWC Technical Advisory Committee (TAC) met on February 7, March 7 and April 3, 2024 to discuss a variety of topics. The TAC has recommendations on the next 5-year Capital Improvement Program and a project to convert and update the Commission’s hydrologic and hydraulic model. An overview of other items discussed at these meeting is also provided below.

Attendees at the TAC meetings included:

City/Partner	Attended February 7	Attended March 7	Attended April 3
Crystal	<i>Absent</i>	Ben Perkey	Ben Perkey
Golden Valley	Eric Eckman	Eric Eckman	Eric Eckman
Medicine Lake	Susan Wiese	<i>Absent</i>	<i>Absent</i>
Minneapolis	Liz Stout	Liz Stout & Nico Cantarero	Liz Stout & Nico Cantarero
Minnetonka	Sarah Schweiger	<i>Absent</i>	Sarah Schweiger
New Hope	Nick Macklem	Nick Macklem	<i>Absent</i>
Plymouth	Ben Scharenbroich	Ben Scharenbroich	Ben Scharenbroich
Robbinsdale	Jenna Wolf	Richard McCoy & Jenna Wolf	Jenna Wolf
St. Louis Park	Erick Francis	Erick Francis	Erick Francis
Others	Rachael Crabb and Mike Sorensen, Minneapolis Park and Rec Board; Administrator Laura Jester; Commission Engineers Karen Chandler, Stephanie Johnson, and Jen Koehler (virtual), Commissioner Pentel	Rachael Crabb and Mike Sorensen, Minneapolis Park and Rec Board; Administrator Laura Jester; Commission Engineers Karen Chandler, Stephanie Johnson and Jen Koehler; Alternate Commissioner Kennedy	Administrator Laura Jester; Commission Engineers Karen Chandler and Jen Koehler; Alternate Commissioner Polzin

1. 5-year Capital Improvement Program (CIP)

Each year, the TAC makes recommendations to the Commission regarding the potential projects for the Commission to include in the BCWMC 5-year CIP. The TAC discussed three potential projects at their February and March meetings (see fact sheets in Attachment A):

- a. Additional Dredging of Accumulated Sediment in Lagoons D, E and F of the Main Stem Bassett Creek, Theodore Wirth Park
- b. Dredging of Accumulated Sediment in Lagoon G of Main Stem Bassett Creek, Theodore Wirth Park
- c. Sweeney Lake Branch of Bassett Creek Culvert Repair/Replacement at Theodore Wirth Park west boundary

At the Commission meeting last October, commissioners agreed with a [TAC recommendation](#) to evaluate additional dredging of Lagoons D, E, and F or dredging of Lagoon G, while considering other potential CIP projects for the next 5-year CIP. There was acknowledgement that because the original Lagoon Dredging Project was not constructed to specifications, additional dredging may be warranted. [More information about the original project and the final report can be found here:

<https://www.bassettcreekwmo.org/projects/all-projects/bassett-creek-main-stem-lagoon-dredging-project.>]

For the next 5-year CIP, staff with the Minneapolis Park and Rec Board proposed that the Commission consider either (a) performing additional dredging in Lagoons D, E, and F, or (b) dredging accumulated sediment in Lagoon G further upstream in Theodore Wirth Park. The group discussed pros and cons of both options. They noted that it may be difficult for a contractor to remove additional sediment in Lagoons D, E, and F due to now steeper side slopes. They also discussed the more natural features of Lagoon G noting that although it was constructed as an open water lagoon in the 1930's, the stream seems to have reclaimed its channel through the area. The group wondered if the area should be left in its more natural state closer to conditions before the 1930's or if the presumably contaminated sediment should be removed to improve environmental conditions. Because of these complex questions, the TAC recommends that the Commission perform another feasibility study to fully assess the dredging options and their impacts.

Because the original Main Stem Lagoon Dredging Project was constructed under budget, there is approximately a \$1,175,000 budget balance. The proposed 5-year CIP budget of \$800,000 over years 2027 and 2028 (Attachment B) reflects a new feasibility study (\$75,000), plus the funds needed to design and construct the higher of the two options (\$1,900,000 for option (b)) minus the budget balance.

The TAC also discussed a proposed project (c) to repair or replace an aging culvert that carries the Sweeney Branch of Bassett Creek under a former roadbed just before its confluence with the Main Stem of Bassett Creek. It was noted that the owner of the culvert is unknown but inspections by the City of Golden Valley indicate that it is vulnerable to failure. While the TAC agrees this project is important, they do not believe it belongs in the BCWMC CIP, as it would be considered an infrastructure repair project and there are no comparable past BCWMC CIP projects. The TAC agreed there is likely a role for the Commission to study the issue and/or help repair or replace the structure but not through the CIP.

TAC Recommendations on 5-year CIP:

- The TAC recommends that the Commission add dredging of lagoons along the Main Stem of Bassett Creek in Theodore Wirth Park to the CIP in 2027 and 2028 (Attachment B).

2. Hydrologic & Hydraulic (H&H) Model Conversion and Update

At their meetings in February, March and April, the TAC discussed a project to convert the Commission’s H&H model from the XP-SWMM software platform to the PC-SWMM software platform and to incorporate the latest impervious cover data, LiDAR data (“light detection and ranging” that maps elevations across a landscape at 1-foot intervals), and precipitation estimates (Atlas 15). At the TAC’s request, the Commission Engineer developed a detailed scope and budget for this work (Attachment C).

The TAC discussed the necessity and urgency of performing the first task to convert the model from XP-SWMM to PC-SWMM due to changes in software pricing and technical support. They also discussed the advantages of incorporating the latest data into the model noting it would result in the most precise floodplain map, aid in identifying and assessing vulnerable infrastructure and communities, and provide an accurate basis for climate resiliency work.

Noting the significant cost of the whole project (see table below from the project scope), the TAC reviewed funding options. The last significant modeling project in 2017 was funded through a combination of the Commission’s Flood Control Project Long Term Maintenance Fund and a grant from the DNR. While the same DNR grant is no longer available, other grant programs are being reviewed. The Flood Control Project Long Term Maintenance Fund could be used for this project as well, but would result in a fund balance of only \$168,000 which may be too low to pay for future maintenance projects on flood control project infrastructure. The TAC also discussed the possibility of setting up a maintenance levy through Hennepin County, which is allowed under state law and already utilized by the Shingle Creek Watershed Management Commission. This would be similar to the current funding mechanism for CIP projects that includes levying watershed residents through Hennepin County, but for the purpose of maintaining existing projects.

Task	Estimated Cost FY2025	Estimated Cost FY2026	Estimated Cost FY2027	Total Estimated Cost
Task 1: Conversion of XPSWMM to PCSWMM	\$43,500			\$43,500
Task 2: Model Updates	\$60,000	\$45,000		\$105,000
Task 3: Recalibration & Atlas 14 Events		\$57,100		\$57,100
Task 4: Atlas 15/ Future Climate Events¹ & Meetings			\$39,700	\$39,700
Task 5: Reporting			\$32,800	\$32,800
Project Total	\$103,500	\$102,100	\$72,500	\$278,100

1 – Evaluation of Atlas 15 and Future Climate Events will provide information that can be used for planning for future flood mitigation projects within the watershed. There may be funding through other agencies to support this task.

TAC Recommendations on H&H Model Conversion and Update:

- The TAC recommends that the Commission direct the Commission Engineer to implement the hydrologic and hydraulic model conversion and update project as presented in Attachment C and to fund the project with Flood Control Project Long Term Maintenance Funds until or unless alternative funding is secured.
- The TAC recommends that the Commission direct Commission staff to continue exploring grant funding opportunities for the model conversion and update project.
- The TAC recommends that the Commission direct Commission staff to explore establishment of a maintenance levy through Hennepin County to help backfill the Flood Control Project Long Term Maintenance Fund for future maintenance projects.

3. Additional Topics Discussed (no recommendations)

- a. The TAC appointed Ben Scharenbroich and Liz Stout as delegated representatives to the Watershed Based Implementation Funding convene meeting.
- b. The TAC discussed the timeline for the Joint Powers Agreement (JPA) update and information needed to help educate city officials. Cities request at least 50 days to review the draft JPA and return comments to BCWMC (approximately April 19 – June 10) and that the final version of the JPA be distributed for city signatures no later than November 1st.
- c. The TAC discussed the 2025 operating budget and the potential city assessment increase of more than 10% over 2024 assessments due to a lower fund balance (which could change upon completion of the audit), and potential increase in staff capacity. Plymouth and Golden Valley staff noted that increases of 10% or more would need to be accompanied by specific and worthy spending needs.

Project Category: Water Quality

Project Title: **Additional Dredging of Accumulated Sediment in Lagoons D, E and F of the Main Stem Bassett Creek, Wirth Park**

Total Estimated Cost: \$1,200,000

BCWMC Project Number: [Staff will assign number]

Description:

This project in Theodore Wirth Park in the city of Golden Valley is a continuation of work that was completed as part of BCWMC Project BC-7 and includes additional dredging of sediment that has accumulated over decades within the Main Stem of Bassett Creek. Dredging will occur during the winter and the goal will be to achieve the 6 ft lagoon depths that were the initial goal of project BC-7. This project will improve stream hydrology, habitat, and water quality (240 lbs/year TP removal).

Source of Project Funding	2018	2019	2020	2021	2022
CIP Account – BCWMC ad valorem tax levy through Hennepin County	Staff will assign funding year.				

Justification:

This project will improve water quality in the Main Stem of Bassett Creek and downstream receiving waters by limiting pollutant loading, and removing sediment that accumulated over a short timeframe and is contaminated with PAHs, elevated lead, and petroleum associated with DRO. The project will also improve stream flow.

Scheduling and Project Status:

[Staff will provide this information.]

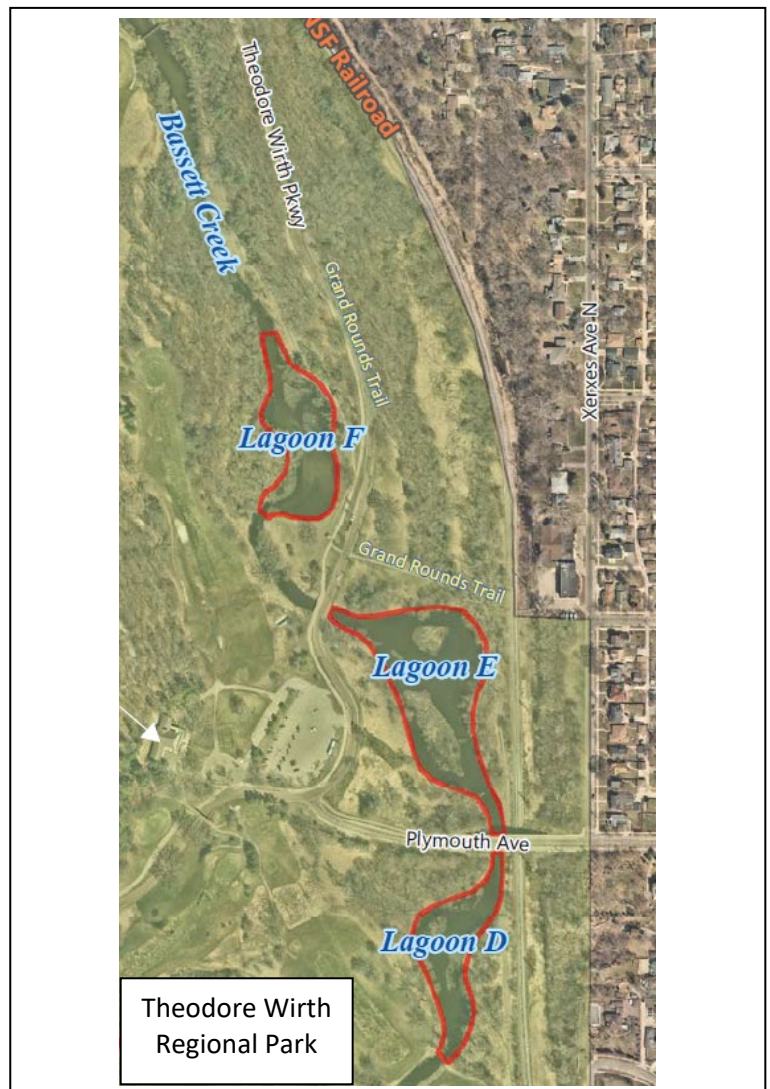
Relationship to BCWMC Plan and Other Projects:

Due to unforeseen circumstances, the contractor hired for BC-7 was only able to dredge to a depth of 3.7 feet in Lagoons D, E and F, and \$1.21M of project funds were left unspent. This project proposes to re-bid and retain a new contractor who will complete the dredging work and achieve the originally intended 6-foot lagoon depth resulting in an additional 240 lbs/year TP reduction at a cost of approximately \$260/lb/year.

This project is consistent with the goals and policies of the 2015 BCWMC Watershed Management Plan. Project BC-7, which occurred in the winter of 2022-2023, was an attempt to dredge Wirth Park lagoons D, E, and F to a depth of 6 feet.

Effect on Annual Operations Costs:

This project has no effect on BCWMC Annual Operations Costs.



Project Category: Water Quality

Project Title: **Dredging of Accumulated Sediment in Lagoon G of Main Stem Bassett Creek, Wirth Park**

Total Estimated Cost: \$1,900,000

BCWMC Project Number: [Staff will assign number]

Description:

This project in the city of Golden Valley is a continuation of work that was completed as part of BCWMC Project BC-7 and includes additional dredging of sediment that has accumulated over decades within the Main Stem of Bassett Creek. Dredging will occur during the winter in Lagoon G, a lagoon that was not dredged in the initial project. The goal of this project will be to achieve 6 ft lagoon depths in Lagoon G. This project will improve stream hydrology, habitat, and water quality.

Source of Project Funding	2018	2019	2020	2021	2022
CIP Account – BCWMC ad valorem tax levy through Hennepin County					
	Staff will assign funding year.				

Justification:

This project will improve water quality in the Main Stem of Bassett Creek and downstream receiving waters by limiting pollutant loading, and removing sediment that accumulated over a short timeframe and is likely contaminated with PAHs, elevated lead, and petroleum associated with DRO. The project will also improve stream flow.

Scheduling and Project Status:

[Staff will provide this information.]

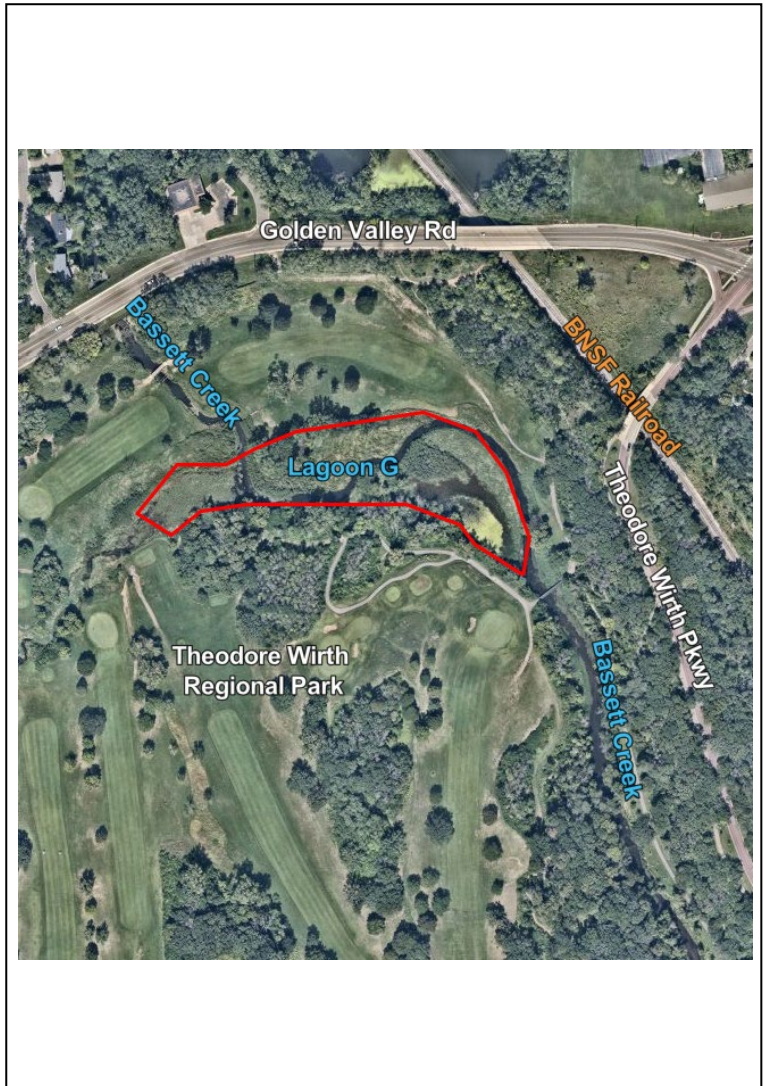
Relationship to BCWMC Plan and Other Projects:

Due to unforeseen circumstances, the contractor hired for BC-7 was only able to dredge to a depth of 4 feet in Lagoons D, E, and F, and \$1.21M of project funds were left unspent. This project proposes to re-bid and retain a new contractor who will perform dredging in Lagoon G, a nearby area that was not dredged in the original project.

This project is consistent with the goals and policies of the 2015 BCWMC Watershed Management Plan. Project BC-7, which occurred in the winter of 2022-2023, was an attempt to dredge Wirth Park lagoons D, E, and F to a depth of 6 feet.

Effect on Annual Operations Costs:

This project has no effect on BCWMC Annual Operations Costs.



Project Category: Water Quality/Water Capacity

Project Title: Sweeney Lake Branch of Bassett Creek Culvert Repair/Replacement at Theo Wirth Park west boundary

Total Estimated Cost: \$1,000,000
(split between partners)

BCWMC Project Number: [Staff will assign number]

Description:

This project in the city of Golden Valley will repair or replace aging infrastructure that facilitates the flow of the Sweeney Lake Branch of Bassett Creek, helps to protect critical regional watermain infrastructure, and prevents flooding of nearby buildings and property.

Source of Project Funding	2018	2019	2020	2021	2022
CIP Account – BCWMC ad valorem tax levy through Hennepin County	Staff will assign funding year.				

Justification:

This culvert is an aging corrugated metal pipe that carries the flow of the Sweeney Lake Branch of Bassett Creek. The age and ownership of the culvert is unknown and the City has no known records on file. There is a 24” PCCP watermain owned by the Joint Water Commission and a 48” steel watermain owned by Minneapolis that intersect the culvert (critical regional infrastructure), and may potentially be at risk as the culvert degrades. Nearby buildings (Courage Kenny) and property may be at risk of flooding as well.

Scheduling and Project Status:

[Staff will provide this information.]

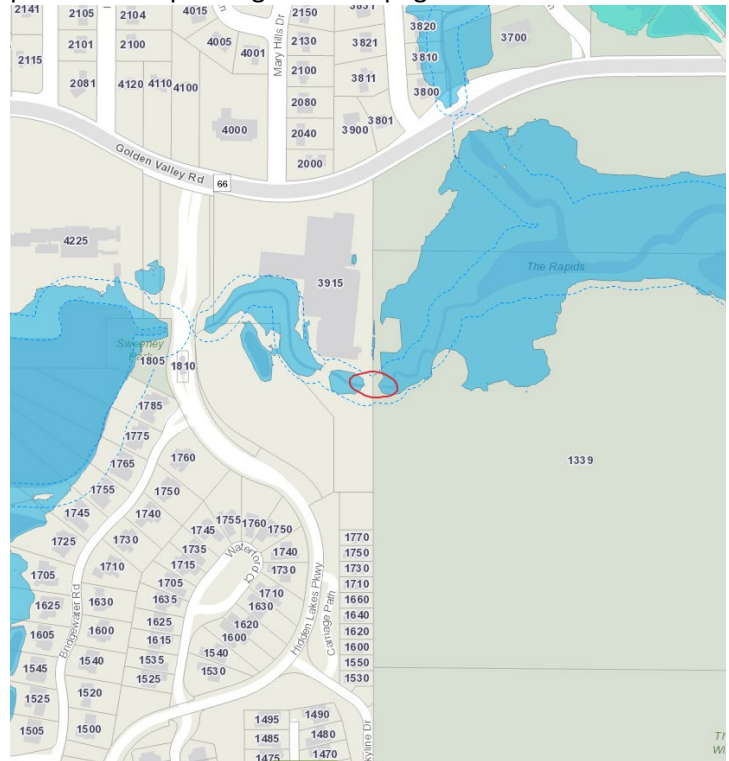
Relationship to BCWMC Plan and Other Projects:

Project is part of the BCWMC trunk system.
 Protect against flood risks along the Bassett Creek trunk system.
 Protect and enhance fish and wildlife habitat in the BCWMC.
 Project is upstream of the Wirth Park Stream Restoration Project and the Lagoon Dredging Project.

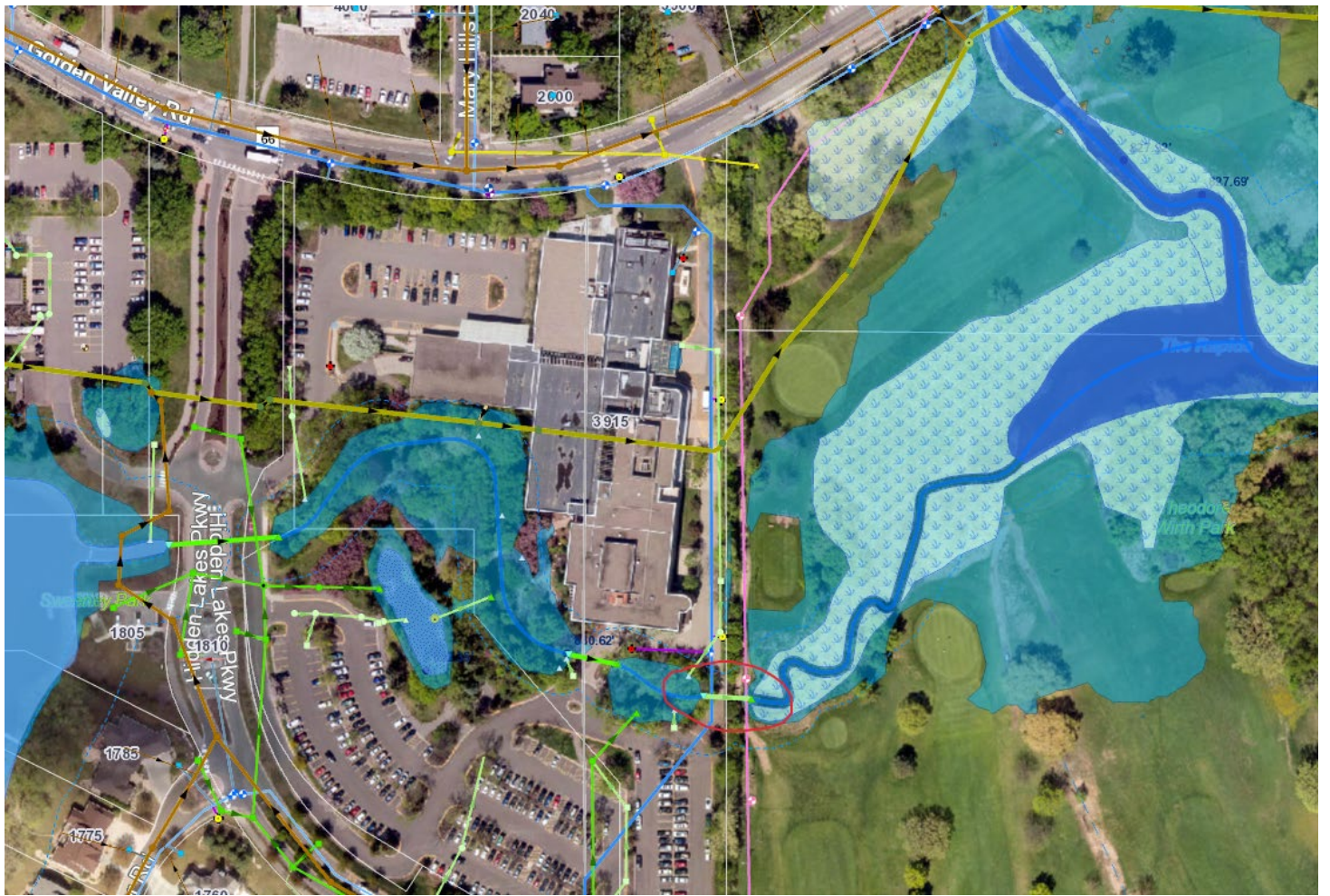
Effect on Annual Operations Costs:

This project has no effect on BCWMC Annual Operations Costs (depending on the ownership and maintenance responsibility).

Insert map, photo, and/or aerial view of site. Additional photos or maps can go on next page.



Aerial with approximate location of underground public utilities



West end of culvert (inlet)

2021 photos





Attachment B

BCWMC 5-year Capital Improvement Program: 2023 – 2028 CIP List (Approved March 2023; updated 2024 project costs approved June 2023; move 2026CR-P to 2025 and BC-2,3,8,10 to 2026 approved Oct 2023)

Project Name	City	#	2021	2022	2023	2024	2025	2026	2027	2028	Totals
Medicine Lake Rd & Winnetka Ave Long Term Flood Mitigation Plan Project (DeCola Ponds B&C Improvement Proj. + DeCola Pond F Flood Storage & Diversion Project + SEA School Flood Storage) ⁵	GV, Crystal, New Hope	BC-2,3,8,10		\$300,000	2,548,000 ⁵	\$252,000 (SEA School)		\$450,000	\$1,150,000		
WQ improvements in Bryn Mawr Meadows, Main Stem Watershed ²	MPLS	BC-5	\$812,000 ²		\$1,175,000						\$2,087,000
Medley Park Stormwater Treatment Facility ⁴	GV	ML-12		\$400,000	\$950,000 ⁴	\$800,000					\$2,150,000
Dredging accumulated sediment in Main Stem Bassett Creek Lagoons, Wirth Park ³	GV/MPLS	BC-7	\$600,000	\$1,425,000 ³	\$334,000				\$200,000	\$600,000	\$3,159,000
Parkers Lake Drainage Improvement Project	Plymouth	PL-7	\$485,000								\$485,000
Bassett Creek Main Stem Restoration - Regent Ave to Golden Valley Rd	Golden Valley	2024-CR-M				\$634,000	\$953,500 ⁷	\$653,500			\$1,227,000
Ponderosa Woods Stream Restoration	Plymouth	ML-22				\$352,000					\$352,000
Sweeney Lake Water Quality Improvement Project (alum + carp management) ¹	Golden Valley	SL-8	\$218,080								\$568,080
Cost share purchase of high efficiency street sweeper	Plymouth	ML-23	\$81,600								\$81,600
Crane Lk Chloride Reduction Demonstration Project at Ridgedale Mall	MTKA	CL-4						\$300,000			\$300,000
Plymouth Creek Restoration Project Dunkirk Lane to Plym Ice Center	Plymouth	2025CR-P					\$1,000,000	\$1,000,000			\$2,000,000
Cost share purchase of high efficiency street sweeper	Golden Valley	BC-12				\$100,000	\$50,000				\$150,000
Toledo Ave/Minnaqua Pond Stormwater Improvements & Flood Reduction	Golden Valley	BC-13							\$400,000	\$500,000	\$900,000
Flood Control Project Double Box Culvert Repairs	MPLS	FCP-1							\$250,000	\$950,000	\$1,200,000
Sochacki Water Quality Improvement Project	GV/Robbs	BC-14				\$2,000,000 ⁶	\$300,000				\$2,300,000
Estimated Total Project Cost			\$2,374,780	\$2,125,000	\$5,007,000	\$4,138,000	\$2,303,500	2,403,500	\$2,000,000	\$2,050,000	
Estimated Use of BCWMC Closed Project Account Funds			\$500,000	\$100,000	\$200,000	\$200,000	\$0	\$0	\$0	\$0	
City and Grant Funding			\$400,000 ²	\$325,000 ³	\$800,000 ⁴ \$1,800,000 ⁵	\$1,700,000 ⁶	\$300,000 ⁷				
Total Levy			\$1,474,780	\$1,700,000	\$2,207,000	\$2,238,000	\$2,053,500	2,403,500	\$2,000,000	\$2,050,000	

¹ Federal 319 grant

² Clean Water Fund grant (\$400,000)

³ Clean Water Funds (WBIF) (\$250,000) + Hennepin County Opportunity grant (\$75,000)

⁴ Clean Water Fund Grant (\$300,000) + Golden Valley funds (\$500,000)

⁵ MnDNR grant to city + city funds (\$1,800,000)

⁶ Funding partners = Robbinsdale, Golden Valley, TRPD, possible grants for BC-14

⁷ Golden Valley funding of \$300,000 for 2024CR-M



Technical Memorandum

To: BCWMC Technical Advisory Committee
From: Jen Koehler, Stephanie Johnson, and Karen Chandler
Subject: BCWMC XP-SWMM to PC-SWMM Model Conversion and Update
Date: February 29, 2024
Project: 23270051.62

At the February 7, 2024 Technical Advisory Committee (TAC) meeting, the Commission Engineer presented information regarding our recommendation and preliminary cost ranges to transition the current watershed-wide hydrologic and hydraulic (H&H) modeling (approved in August 2022) from XP-SWMM software to PC-SWMM software. The TAC directed the Commission Engineer to develop a detailed scope of work and budget for the transition from XP-SWMM software to PC-SWMM software, along with the Commission Engineer's other recommended model updates.

1 Background

The original hydrologic and hydraulic models of the Bassett Creek watershed were created in the 1970's. Although there have been significant changes in the watershed, there were only minor updates to these original HEC-1 and HEC-2 DOS-based models over the years. In late 2010 and early 2011, the TAC considered whether 1) the HEC models should be updated to the more current versions of the old software, or 2) the HEC models should be entirely converted to a new user-friendly software package. The TAC recommended that the BCWMC entirely convert the models to XP-SWMM (a commonly used H&H modeling software).

The BCWMC approved the TAC recommendation and, in 2012, completed the Phase 1 modeling effort that transitioned the HEC models into an XP-SWMM model of similar watershed resolution as the HEC models. The work included updates to the watershed divides based on more current topographic data, modifications to the hydrologic inputs, and enhanced detail along the creek based on updated channel, bridge, and culvert geometries.

In response to challenges calibrating the 2012 Phase 1 XP-SWMM model due to the coarse model resolution and limited storage, the BCWMC completed the Phase 2 modeling effort in 2015 through 2017. This effort included adding more detail to the model:

- increasing the number of subwatersheds from about 55 to about 1,160,
- incorporating additional municipal storm sewer systems between upstream modeled ponds,
- integrating detailed storage in modeled ponds upstream of the creek system (based on the 2011 LIDAR data), and

- incorporating National Oceanic and Atmospheric Administration (NOAA) Atlas 14 precipitation depths and updated USDA soils data

The Phase 2 effort also calibrated the XP-SWMM modeled flows to 5 sites throughout the watersheds and used observed lake level data during the calibration process. The model was used to evaluate the Atlas 14 design storm events and the BCWMC adopted the model in August 2017.

In 2018, the BCWMC worked with the Minnesota Department of Natural Resources (MnDNR) to update the Phase 2 XP-SWMM modeling, incorporating recent development projects (implemented from 2015 through 2018) and additional channel survey data collected by the MnDNR to ultimately develop updated Federal Emergency Management Agency (FEMA) floodplain mapping. The BCWMC completed its scope of work with the MnDNR in 2021, including the development of the:

- updated XP-SWMM model, which was reviewed by the Interagency Hydrology Review Committee and the MnDNR,
- preliminary floodway model (for use by the MnDNR to complete the floodway analysis), and
- preliminary floodplain and floodway mapping (for use by the MnDNR to complete the FEMA mapping)

To date, limited progress has been made by the MnDNR on finalizing the FEMA modeling and mapping for the BCWMC. It may be another year or two until the mapping is finalized and available for use.

Since then, the BCWMC completed updates to the draft FEMA modeling to incorporate additional significant projects and developments from 2018 through 2021. The BCWMC evaluated the Atlas 14 design events following the model updates and generated inundation mapping reflecting this updated modeling. The BCMWC approved the updated model in August 2022, and this is the most current version of the model.

Since the approval of the updated model in 2022, the BCWMC has been working with member communities on compiling information on significant projects and developments from 2022 to present to include in future model updates.

2 Transition from XP-SWMM to PC-SWMM

At the February 7, 2024 TAC meeting, the TAC agreed that the BCWMC should begin to move away from the XP-SWMM modeling platform due to upcoming changes by the software's parent company in licensing and software support, for the following reasons:

- upcoming changes to XP-SWMM licensing that will greatly increase its cost and a shift in how Autodesk/Innovyze (the owner of XP-SWMM) will continue to support the software, beginning in 2025. Autodesk/Innovyze is moving away from making upgrades to XP-SWMM; instead, they are moving to further develop and support ICM ("integrated catchment model"), another H&H model, which is also expensive – similar to the proposed XP-SWMM licensing costs.

- Currently, XPSWMM only sells subscription-based licenses (renting-to-use licenses which cannot be shared between users), rather than standalone licenses that can be shared. For Barr or any other entities (e.g., cities, other consultants) that have standalone XP-SWMM licenses (i.e., dongles or network licenses), these licenses can still be used through the beginning of 2025, but users will not be able to run the most current version of XP-SWMM. In addition, the software cost will jump significantly in 2025.

Barr and some of our other clients have started transitioning to PC-SWMM, which has comparable functionality to XP-SWMM, but at a lower cost.

3 Modeling Scope

3.1 Task 1: Conversion of XP-SWMM to PC-SWMM

In Task 1, we will convert the current version of the BCWMC model (approved in August 2022) from XP-SWMM to PC-SWMM. Barr has completed this transition from XP-SWMM to PC-SWMM models for other clients and will apply a streamlined procedure for the conversion of the BCWMC model, including modifications to model input parameters to better align results between the two software packages (e.g. modifying weirs lengths or converting to open channels to improve model stability).

Because XP-SWMM and PC-SWMM are different models using slightly different approaches for computing hydrologic and hydraulic processes, the simulation results will differ. Following the conversion to PC-SWMM, we will complete a technical review of the model to check that model elements were properly converted from XP-SWMM to PC-SWMM, will confirm that all water is captured within the model (up to the Atlas 14 500-year design event). We will also evaluate changes to global parameters such as model flow, head tolerances, and model timestep to improve results. No other model adjustments will be made in PC-SWMM or XP-SWMM within this task such that the simulation results are in closer agreement. This would include modifications to subwatersheds, storage, or conveyance within the models (these model adjustments are included in subsequent tasks).

Once water is fully captured and we complete the technical review, we will run the Atlas 14 2-yr, 10-yr, and 100-yr, 24-hour design storm events through the PC-SWMM model. We will compare the resulting peak elevations at nodes throughout the model for both the XP-SWMM and PC-SWMM models for these events and these will be visualized in a figure to show the difference in the 100-year peak elevations at model nodes throughout the model. We will also provide a summary of the BCWMC trunk system flood profile results (similar to Table 2-9 of the current Watershed Management Plan) for both the XP-SWMM and PC-SWMM models for the Atlas 14 2-yr, 10-yr, and 100-year, 24-hour events.

This task assumes one (1) meeting to present the results of the conversion of XP-SWMM to the PC-SWMM model to the BCWMC TAC, followed by one (1) meeting to present the results to the BCWMC.

Deliverables:

- BCWMC Watershed-Wide PC-SWMM Model
- Summary of Atlas 14 design events comparing XP-SWMM and PC-SWMM results for all nodes, including figure showing differences in 100-year peak elevations by nodes between XP-SWMM and PC-SWMM
- Summary of Atlas 14 design events comparing XP-SWMM and PC-SWMM results (similar to Table 2-9)
- One (1) meeting with BCWMC TAC
- One (1) Commission meeting to present results

3.2 Task 2: Model Updates

Once we convert the BCWMC watershed-wide model to PC-SWMM and verify and summarize the results, we will begin incorporating updated information into the PC-SWMM model.

We have already compiled information on significant projects from 2021 through 2022 based on BCMWC plat reviews and CIP projects, and information provided by member communities. At the beginning of Task 2, we will request and compile information from member communities regarding other significant projects implemented in the watershed from 2023 through 2025. Based on the number of projects compiled for 2021-2022, we assume there will be a total of 30 significant project updates from 2021 through 2025. With these significant projects, we will update as necessary the subwatershed divides, conveyance, and storage.

Draft new (2021) LiDAR data is available for the Metro area; however, an official date for when the MnDNR will post-process (hydro-correct) the data and officially finalize the data is unknown. However, we expect that the corrected data will be available for use by the time of model updates in 2025 and assume we will not need to process the data as part of this project.

Using this revised LiDAR data, we will autogenerate subwatershed divides and compare them to the existing subwatershed divides, looking for any major discrepancies in the subwatershed areas. However, we assume that the existing subwatersheds will be close and we can proceed with the existing subwatershed information.

The impervious data used in the development of the Phase 2 model inputs was from 2011. The University of Minnesota has a more recent impervious coverage dataset for the Twin Cities that was flown in 2015. However, these data were not available for use until a year or so later, so were not included in our development of the Phase 2 model. At a minimum, we will update the impervious assumptions for the PC-SWMM watershed divides based on the 2015 impervious dataset and the Phase 2 imperviousness calibration modifications (as applicable to the various model areas). If more current impervious coverage data for the Twin Cities becomes available before the model update begins, we will utilize the most current information available for the watershed at that time.

Additionally, the 2021 LiDAR data will be used to update the surface storage in the PC-SWMM model to better reflect the available storage within the watershed, especially with any changes to storage in the watershed occurring from 2011 through 2021. However, we will need to review the model prior to the update and flag any subsurface storage systems included in the model and any development storage that may have been constructed since the 2021 LiDAR was collected, as this storage should be based on construction plans/information. Also, using this 2021 LiDAR data, we will generate revised average watershed slope data for the subwatershed divides.

This task will include confirmation of water capture for events up to the Atlas 14 500-year event and will also include QAQC of the updated model to make sure the results make sense.

Deliverables:

- BCWMC Watershed-Wide PC-SWMM Model, with updated watershed inputs (slope, imperviousness), storage, and conveyance (as needed, based on recent significant projects)

3.3 Task 3: Recalibration & Evaluation of Atlas 14 Events

In Task 3, we will re-calibrate the PC-SWMM model to more current flow data. The Phase 2 XP-SWMM model was originally calibrated to 5 flow monitoring locations throughout the watershed. Over the past several years, the BCWMC began a flow monitoring program at several of these same locations.

For this recalibration effort, we expect to use flow data already collected at the following locations and will spend time performing checks of the flow data:

- Plymouth Creek (2022-2023) – BCWMC in partnership with Three Rivers Park District (TRPD)
- North Branch of Bassett Creek (2018-2019) – BCWMC
- Wisconsin Avenue Control Structure Elevation Data (2018-2023) - provided by the City of Golden Valley
- Sweeney Lake Branch (2020-2021) – BCWMC
- Bassett Creek Main Stem – Watershed Outlet Monitoring Program (WOMP) location (2018 - 2023) – BCWMC in partnership with the Metropolitan Council

As part of the calibration and validation effort, we will download and process precipitation data from gages around the watershed and will include the selection of a small storm event to calibrate primarily impervious runoff, a large storm event to calibrate runoff from pervious surfaces, and an intermediate storm event to serve as a validation event to confirm the overall performance of the calibrated model. The events will be selected based on the review of the available flow data for the corresponding locations. PC-SWMM will be used to process NEXRAD data that can be used to better capture the temporal and spatial variability of rainfall across the watershed for the calibration and validation events; this data will be checked against other local precipitation gages surrounding the watershed and scaled as needed. We will spend time performing additional checks of the flow data for the selected calibration and validation events.

We will summarize the calibration of the model at the 5 locations, including plots of the observed and predicted flow data, and calculate the appropriate statistics for the calibration.

Using the calibrated model developed in Task 3, we will evaluate the NOAA Atlas 14 2-yr, 10-yr, and 100-year, 24-hour events. These results will be used to evaluate potential flooding throughout the watershed and along the BCWMC trunk system.

We will develop a summary table of the results of the Atlas 14 2-yr, 10-yr, and 100-year, 24-hour events peak elevations/flows along the trunk system (similar to Table 2-9 of the current Watershed Management Plan). This will compare the current flood profile elevations (resulting from the current approved XP-SWMM model (August 2022)), and the revised Atlas 14 design event results from the updated PC-SWMM model.

This will also include the development of inundation mapping for the results of the Atlas 14 100-year, 24-hour using the results of the revised PC-SWMM model. This mapping will utilize level pool mapping in the upper subwatersheds and main water bodies and the FEMA inundation mapping methodology along the BCWMC creek system. Using this inundation mapping, we will identify the area of changes in flooding and estimate the number of potentially impacted structures within the watershed.

This task assumes one (1) meeting to present the results of the results of the calibration and validation of the model to the BCWMC TAC and presenting the results at one (1) Commission meeting.

Deliverables:

- Calibrated BCWMC Watershed-Wide PC-SWMM Model
- Summary of calibration (plots/statistics)
- Summary table of Atlas 14 design storm events
- Inundation mapping of the Atlas 14 100-year, 24-hour event as well as potentially impacted structures within the watershed.
- One (1) meeting with BCWMC TAC
- One (1) Commission meeting to present results

3.4 Task 4: Evaluation of Atlas 15 Events

Using the calibrated model developed in Task 3, we will utilize the NOAA Atlas 15 precipitation frequency estimates in the PC-SWMM model. Based on information from NOAA, we expect the [Atlas 15](#) draft precipitation estimates (update to Atlas 14) will be available in 2025, with the final estimates available in 2026. These estimates will include updates to the design storm events based on historical observations and will also include future climate model projections to generate adjustment factors to apply to the design events.

Similar to past efforts for the BCWMC, we will run the calibrated PC-SWMM model using the following:

- Atlas 15 2-yr, 10-yr, and 100-year, 24-hour events
- Atlas 15 future climate projection for the 100-year, 24-hour events

In this effort, we will evaluate potential flooding throughout the watershed and along the BCWMC trunk system.

We will develop a summary table comparing the results of the Atlas 14 (compiled in Task 3) and Atlas 15 2-yr, 10-yr, and 100-year, 24-hour events and the future climate projection 100-year event for elevations along the trunk system (similar to Table 2-9 of the current Watershed Management Plan). This will compare the current flood profile elevations (resulting from the current approved XP-SWMM model (August 2022)), and the revised Atlas 14 (see Task 3) and Atlas 15 and the future climate results from the updated PC-SWMM model.

This will also include the development of inundation mapping for the results of the Atlas 15 100-year, 24-hour and the future climate model projection using the revised PC-SWMM model. This mapping will utilize level pool mapping in the upper subwatersheds and main water bodies and the FEMA inundation mapping methodology along the BCWMC creek system. Using this inundation mapping, we will identify the area of changes in flooding and estimate the number of potentially impacted structures within the watershed.

This task assumes one (1) meeting to present the results of the results of the Atlas 15 and future climate events to the BCWMC TAC. Additionally, we assume we will hold up to eight (8) virtual meetings with member communities to review results within their individual communities.

Deliverables:

- Summary table of Atlas 14 (from Task 3) & Atlas 15 design storm and future climate events
- Inundation mapping of the Atlas 15 100-year, 24-hour event and future climate scenario event as well as potentially impacted structures within the watershed.
- One (1) meeting with BCWMC TAC
- Up to eight (8) virtual meetings with individual member communities

3.5 Task 5: Reporting and Meetings

Reporting will include development of a draft report documenting the transition from XP-SWMM to PC-SWMM, updates to and calibration of the PC-SWMM model, and the results of the Atlas 15 events. This will be delivered to the BCWMC Administrator and TAC for review and comment. We assume one (1) meeting to present and discuss draft report with the BCWMC TAC and assume we will make one round of revisions to finalize the report to share with the Commission. We will then present the final report at one (1) Commission meeting. We assume no major revisions will be required following presentation of the final report to the Commission.

Deliverables:

- Draft Report (delivered in PDF format)
- One (1) meeting with BCWMC TAC to present draft report
- Final Report (delivered in PDF format)
- One (1) Commission meeting to present final report.

4 Modeling Budget and Schedule

The modeling budget and schedule assumes that the modeling project will be completed over a 3-year period, beginning in 2025 and wrapping-up in 2027.

Task	Estimated Cost FY2025	Estimated Cost FY2026	Estimated Cost FY2027	Total Estimated Cost
Task 1: Conversion of XPSWMM to PCSWMM	\$43,500			\$43,500
Task 2: Model Updates	\$60,000	\$45,000		\$105,000
Task 3: Recalibration & Atlas 14 Events		\$57,100		\$57,100
Task 4: Atlas 15/ Future Climate Events¹ & Meetings			\$39,700	\$39,700
Task 5: Reporting			\$32,800	\$32,800
Project Total	\$103,500	\$102,100	\$72,500	\$278,100

1 – Evaluation of Atlas 15 and Future Climate Events will provide information that can be used for planning for future flood mitigation projects within the watershed. There may be funding through other agencies to support this task.

5 Potential Funding Opportunities

The BCWMC budget includes an annual line item for XP-SWMM model updates. In 2024, the BCWMC allocated a \$3,000 budget for this item in an ongoing effort to annually compile development and project information from the cities. Once we compile enough significant projects to warrant a full model update, then the BCWMC would allocate a larger budget (about \$15,000 every 3-5 years) to this line item to update the model. The BCWMC's 2024 budget does not include additional funding for this proposed scope of work to transition the watershed wide XP-SWMM model to PC-SWMM or the other proposed updates to the model.

The BCWMC funded the entire Phase II XP-SWMM project (about \$261,000), using the Flood Control Project Long-Term Maintenance Fund, although the Commission's costs were offset by the MDNR's \$93,000 Flood Damage Reduction Grant in 2016. The Commission did not "pay back" the Long-Term Maintenance Fund for the costs paid for the Phase 2 model.

Considering the precedence set for using the Long-Term Maintenance Fund for watershed modeling efforts, it would make sense for the BCWMC to again use the Long-Term Maintenance Fund for the current proposed model transition and update project. The current balance in the Long-Term Maintenance Fund is \$446,000. If the BCWMC uses the fund to pay for the entire model transition and update project, the fund balance would drop to about \$168,000. Although the BCWMC adds \$35,000/year to the Long-Term Maintenance Fund, that annual amount covers the Flood Control Project inspection costs, so there is very little, if any, net accumulation of funds in the account.

We believe that in the short-term, it is acceptable for the Long-Term Maintenance Fund to have a balance of \$168,000, especially considering there are currently no identified Flood Control Project maintenance projects slated to use these funds. However, we do recommend that the BCWMC commission pay back into the fund to recover the costs. The BCWMC could do this over the three years of the project (2025 – 2027) by increasing the annual payments into the fund by about \$90,000, from \$35,000 to about \$125,000 per year for each of those three years. However, these additional payments would be taken from the BCWMC's Operating Budget, so the cities would see this jump in their annual assessments they pay to the Commission. In this case, it would make sense to fund the entire project directly through the BCWMC's annual Operating Budget.

Alternatively, to lower the annual jump in the cities' assessment, we recommend the BCWMC use the Long-Term Maintenance Fund to pay for the model transition and update effort but pay back the funds more slowly. For example, if the BCWMC increased the annual payments into the Long-Term Maintenance Fund by \$55,000, from \$35,000 to \$90,000, it would take 5 years to replenish the account.

The BCWMC could also fund the model transition and update project using the BCWMC's Special Projects Fund (income from BCWMC's long term investments). Although similar to a subwatershed assessment, the modeling project is less directly tied to CIP projects (e.g., the model would likely be used in the subwatershed assessments). Considering the limited funds available in the Special Projects Fund (\$308,000), the high cost of this modeling effort, the use of the Special Projects Fund to pay for the

Medicine Lake TMDL Assessment project (\$85,400), and the need for future subwatershed assessments, we recommend not using this fund to pay for this modeling project. The BCWMC continues to accrue additional investment income for the Special Projects Fund, so the fund balance will fluctuate as the BCWMC spends and accrues funds from month to month.

To help ease the 2025 budget needs, the model transition effort could begin late in 2024 by using the XP-SWMM model updates budget (\$3,000) and the unallocated Surveys and Studies budget (\$15,000).

5.1 Potential Grant Opportunities

We also identified grant funding opportunities that could potentially be used to fund a portion of the proposed work including the following:

- MnDNR [Flood Hazard Mitigation grants](#) – We discussed this grant with MnDNR staff, and they indicated it seems unlikely that this MnDNR grant could be used for this project.
- MPCA climate resiliency planning grants – The implementation grant application period closes in April 2024; however, the MPCA indicated that the planning grant application window may open later in 2024. The planning grant funding is a better fit (more applicable) for this modeling effort than the implementation grant funding.
- FEMA Building Resilient Infrastructure and Communities (BRIC) grants – We reached out to agency contacts to further discuss the BRIC program but have not have the opportunity to discuss it with them yet.