

MEMORANDUM
Comfort Lake-Forest Lake Watershed District

To: Board of Managers

Date: November 30, 2021

From: Mike Kinney

Subject: Forest & Little Comfort H&H Model Update Scope of Work

Background/Discussion

The purpose of this agenda item is to consider approving a scope of work for District Engineer, Emmons & Olivier Resources (EOR), to complete the updates to the District's hydrologic & hydraulic (H&H) model. This topic was last discussed at the October 26th special board meeting, at which time EOR gave a comprehensive presentation on the H&H model and how it relates to other aspects of District work such as floodplain vulnerability assessment.

Link to October 26th meeting packet: https://www.cflwd.org/10-26-21_special_board_meeting.php

Recommended Action

Proposed Motion: Manager _____ moves to authorize the administrator, on advice of counsel, to enter into an agreement with Emmons and Olivier Resources, Inc. in accordance with the November 30, 2021 scope of work and in an amount not to exceed \$81,966. Seconded by Manager _____.

Attached: H&H Model Update Scope of Work

Project Name | 3006-C: H&H Model Update

Date | November 30, 2021

To / Contact info | CLFLWD Board of Managers

Cc / Contact info | Mike Kinney, District Administrator

From / Contact info | Cecilio Olivier PE, Mike Talbot EIT, Paul Nation EIT

Regarding | 2022 Proposed Scope of Work – Phase 3

This memo details a proposed scope for work in 2022 to upgrade/update the Forest Lake and Little Comfort Lake Management District portions of the District's Hydrologic & Hydraulic (H&H) model. An up-to-date H&H model is needed for watershed management to assess the feasibility and benefits of implementation practices, and the impacts of development on stormwater runoff for District's permitting. The upgrade/update of only the Forest Lake Management District is shown in the 2022 Budget as Item 3006-C: H&H Model Update – Phase 3, with a total cost of \$82,400.

Modeling Upgrade/Update Status

The District's original district-wide H&H model (constructed in 2005) uses XP-SWMM (Stormwater Management Model) software to represent hydrology and hydraulics. We will be using this model as the base for the upgrade/updates proposed in this scope.

In recent years, EOR has upgraded/updated various subwatersheds on a project-by-project basis. These upgrades/updates included: Modeling of the drainage areas of Shields Lake, 3rd Lake Pond, JD-6, and Hayward Avenue; and most recently the Comfort Lake Management District (2019-2020) and Bone Lake Management District (2020-2021). Environmental Protection Agency (EPA) SWMM5 was the platform used for these updates.

EPA SWMM5 has some improved features like user interface, data entry, and results display compared to XP-SWMM. EOR has consistently recommended to upgrade the district-wide H&H model to EPA SWMM5 to leverage the accuracy and additional functionalities it provides.

Purpose and Use

An upgraded, up-to-date H&H model will add more detail to the hydrology and hydraulics of the District and will use an updated, more reliable Geographical Information Systems (GIS) database. It would also include more recent precipitation records for a more accurate calibration/validation.

The upgraded/updated model will be used for a variety of purposes, including: subwatershed pollutant loading estimation, floodplain delineation, individual best management practice (BMP) design optimization, and lot-level permitting/drainage assessments. The software platform that EOR uses to build, run, and analyze results is PCSWMM, which is fully GIS-based modeling platform and provides additional tools for performing 2D floodplain delineation and linking model documentation while keeping the data in a non-proprietary format (unlike XPSWMM) that can be viewed, edited, and analyzed in the EPA's free modeling software.

2022 Proposed H&H Model Update: Forest Lake and Little Comfort Lake Management Districts

Updating the entire H&H model across the District is a multi-year effort. For Phase 3, EOR recommends updating the H&H model in the remaining portions of the Forest Lake and Little Comfort Lake Management Districts (see Figure 1). This work will build off the previous modeling work performed within the Forest Lake Management District for past feasibility and design efforts. We will also leverage monitoring data collected in 2016, 2018, and 2021 as shown on Figure 2. This set of monitoring data will be used for initial calibration and validation of the inflows into Forest Lake. Calibration and validation of Forest Lake's water levels and discharge will be performed after inflows are validated. Additional monitoring may be necessary in 2022 to fill in gaps from initial calibration. This monitoring and any additional calibration efforts are not included in this scope.

Forest Lake and Little Comfort Lake Management Districts H&H Model Update Proposed Scope

This scope includes upgrading the District's existing XP-SWMM model for the Forest Lake and Little Comfort Lake Management Districts to EPA SWMM5 (PC-SWMM platform). This scope also includes updates to the hydrologic and hydraulic parameters, incorporating existing EPA SWMM5 models for Shields Lake, 3rd Lake Pond, JD-6, and Hayward Avenue, and calibration/validation for the Forest Lake and Little Comfort Lake Management Districts. Note that EOR is proposing to add Little Comfort Lake H/H modeling within the 2022 budget (\$82,400) originally estimated for only the Forest Lake H/H modeling upgrade/update. We were able to do that by leveraging to the maximum extent existing modeling work and surveying from the City of Forest Lake, and by developing efficiencies in the input and management of H/H parameters.

Model calibration will be based on monitoring data from existing continuous stream and tributary flows, lake water levels, and nearby rain gages. Available survey data has been compiled for past modeling efforts and was used to identify data gaps where additional survey work will be necessary. Necessary survey data located within the City of Forest Lake will be collected in coordination with the City as they address data gaps in their Municipal Separate Storm Sewer System (MS4) mapping. Once the model is refined, it will be run with updated Atlas 14 storm events to determine the effects of these larger storms on flows and water levels.

Estimated Cost by Task & Category

Task	Units	Cost
1. Background Data Review and Data Processing	52 hrs	\$7,374
2. Survey	84 hrs	\$11,384
3. Synchronize Existing Models to Full Model	28 hrs	\$4,036
4. Remaining Model Construction	144 hrs	\$19,360
5. Model Calibration & Validation	142 hrs	\$20,056
6. Model Documentation & Quality Control	58 hrs	\$9,186

7. Project Management	42 hrs	\$7,230
Labor Subtotal	550 hrs	\$78,626
Mileage	480 miles @ \$0.56/mile	\$268
Survey Equipment	8 days @ \$384/day	\$3,072
Expenses Subtotal		\$3,340
Total		\$81,966

Deliverables

- Updated, calibrated, and validated PCSWMM models for the Forest Lake and Little Comfort Lake Management Districts
- Model documentation
- Memo outlining key findings and presentation to the Board

Schedule

January – August 2022

Recommended Motion

We recommend the Board approve the scope to upgrade/update the District H&H model in the Forest Lake and Little Comfort Lake Management at a total cost of \$81,966.

As mentioned above, EOR is proposing to include the H/H modeling for Little Comfort Lake within the allotted 2022 \$82,400 budget (Item 3006-C: H&H Model Update – Phase 3) that was originally estimated for only the Forest Lake H/H modeling upgrade/update.

H/H Modeling Status

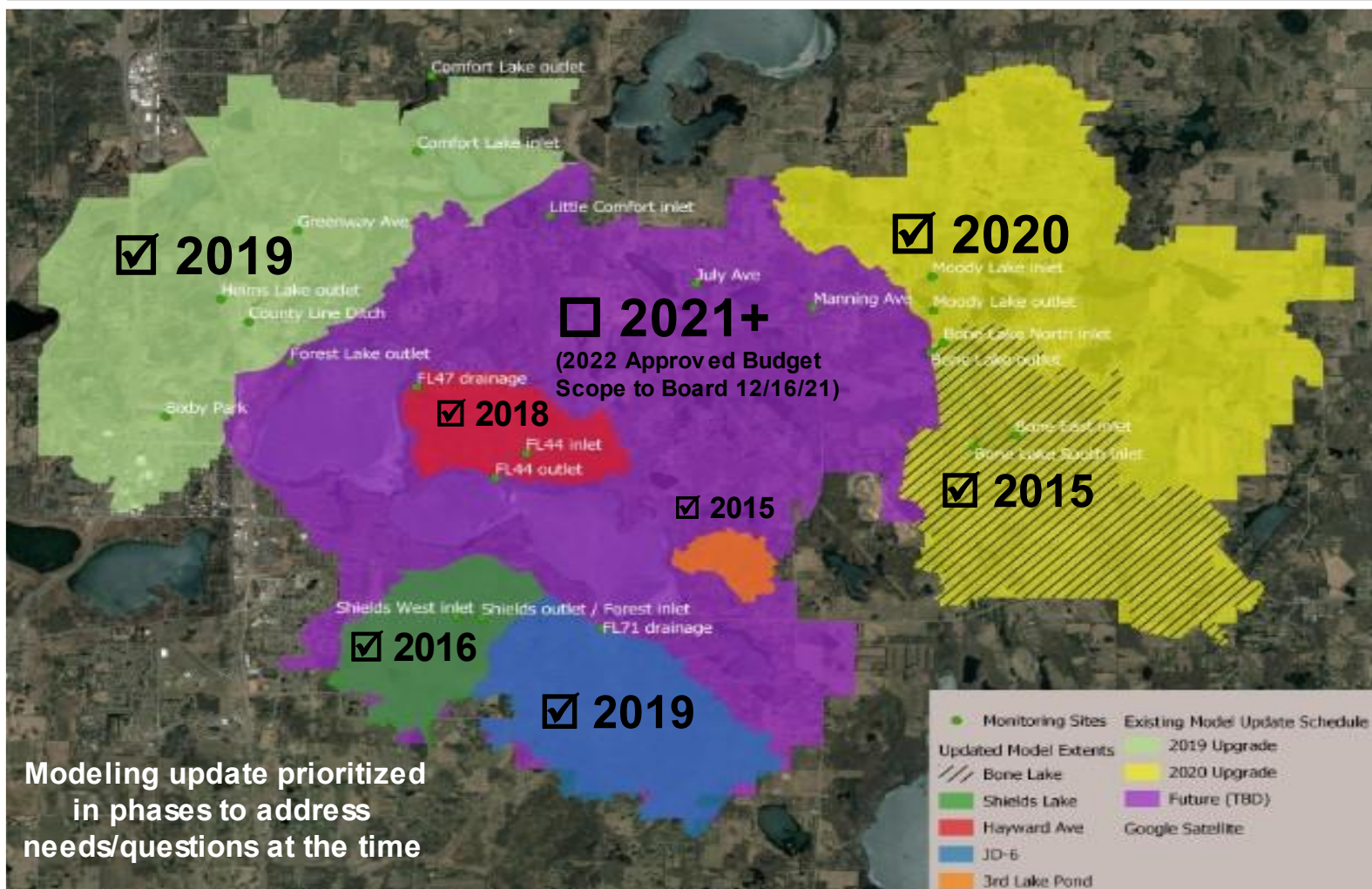


Figure 1. CLFLWD H&H Model Update Schedule

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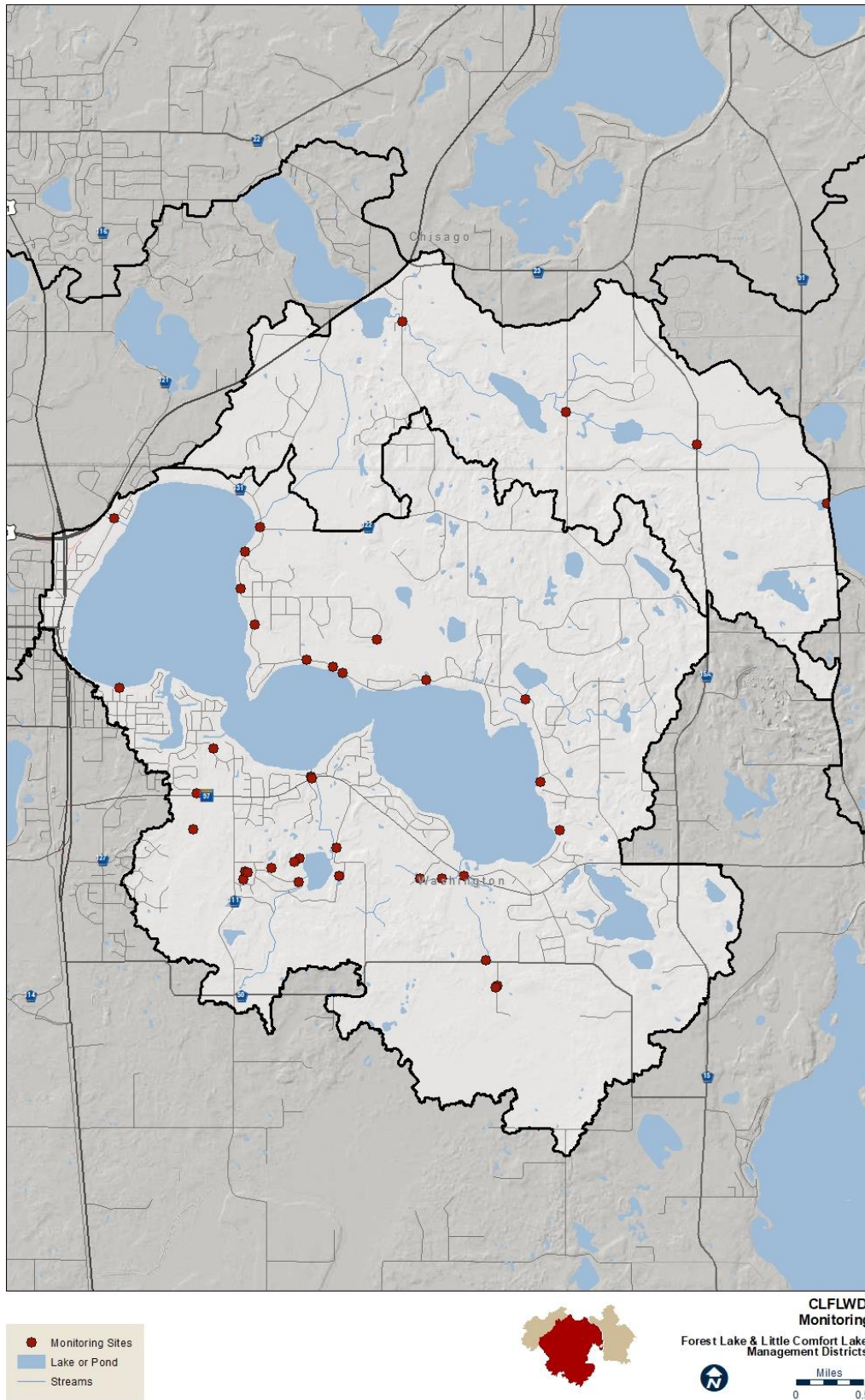


Figure 2. Monitoring Sites in the Forest Lake and Little Comfort Lake Management Districts

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