

Water Pro

Information for professionals working with water issues.

Featuring:

- ◆ MCWD's Hydraulic/Hydraulic and Pollutant Loading Model

Water Wise:

FREE TO CITIES, TOWNSHIPS AND PUBLIC AGENCIES

GROUND-BREAKING HYDROLOGIC / HYDRAULIC AND POLLUTANT LOADING STUDY HIGHLIGHTS WATERSHED RESEARCH, MODELING AND EDUCATION

After three-plus of intensive work, the Hydraulic/Hydraulic and Pollutant Loading Study (H & H) is completed and available gratis to all cities, townships and other public agencies with the Minnehaha Creek Watershed District. The landmark study provides cost-effective and cutting-edge data and insights into water resources, management, hydrology, pollutant loading, hydraulics and land use planning within the 12 subwatersheds for the next two decades.

The H & H study will help the MCWD and its partnering public bodies better understand and plan for human and natural effects on the wetlands, streams and lakes that make up the watershed, while also laying the framework for the District to implement performance-based rules. According to Eric Evenson, Administrator of the MCWD, the study is a ground-breaking research tool that is timely and extremely important.



The sheer scope of the H & H study makes it a leading strategic tool not only locally but nationally," Evenson notes. "The study will provide critical data and new knowledge about water resources and land use planning within all subwatersheds for cities and towns, other agencies, the MCWD board, staff and

consultants. Plus it is a wonderful tool to use for public education and communications programs.

The study developed an integrated model of the upper and lower watersheds and focused on 12 MCWD subwatersheds in order to understand the challenges facing the Minnehaha Creek watershed as a whole and within individual bioregions. "This is a dynamic approach to water quality and quantity management," Evenson says. "And it recommends project solutions and partnering opportunities in each subwatershed, which will prove to be a more cost-effective guideline for cities facing financial shortfalls in environmental areas."

The study contains hydraulic, hydrologic and pollutant-loading models that simulate non-point and point-source pollution loading and runoff, flood profiles and pollution loading. The pollutant-loading models provide new data that establishes limits on harmful discharges from the subwatersheds of the district into area lakes, streams and wetlands.

The project included two major components, "Technical Evaluation and Model Creation" and "Public Involvement."

TECHNICAL EVALUATION AND MODEL CREATION

The technical evaluation and model creation component of the project involved a Technical Advisory Committee (TAC) formed to develop modeling programs, data needs and to analyze model outputs. Representatives included individuals from MPCA, DNR, MPRB, MnDOT, Army Corp of

(continued on page two)

Engineers, Met Council, several municipal engineers from MCWD cities, plus Three Rivers Park, Hennepin and Carver Counties, Cities, townships and private consultants. Key elements of the technical evaluation and model creation component included:

- ◆ **Data collection:** The voluminous data collected during the process includes: monitoring data, survey data, creek cross-sections, infrastructure location and elevations, precipitation data, groundwater data, 2000 digital orthophotography, contour elevations for the entire District (2-foot on creeks and 5-foot elsewhere), and land cover classifications.
- ◆ **Customized GIS:** All the resulting data and modeling outputs have been integrated into a customized GIS. Based on existing conditions and projected 2020 land use conditions, the District will have a living resource for planning, data management, mapping, performance-based rule making, and many other uses. Continuing input from model users to MCWD staff will be downloaded into the models and re-routed back to cities for an always up-to-date model and for more cohesive and strategic water management and planning.
- ◆ **Water Quantity Modeling:** After consulting with the technical advisory committee (TAC) the XP-SWMM model, a public domain model developed by the EPA, was chosen to model water quantity in the various District creeks and waterway which could lead to recommendations for updating of floodplain elevations.
- ◆ **Water Quality Modeling:** Similar to water quantity, efforts in this phase focused on the common characteristics of the upper and lower watersheds, with a final analysis of the overall watershed. Models used were HSPF and PLOAD for out-of-lake modeling and WiLMS for in-lake modeling. The Painter Creek subwatershed was used as the pilot project area to test the models before moving into other areas of the district. It was chosen because it drains to Jennings Bay, a high-priority interest for the MCWD board, which has previously collected a substantial amount of data in the Painter Creek subwatershed through a review by national scientists and engineers over the past two years. That expert panel laid the groundwork for developing a method of predicting and limiting pollutant loads being transported to surface waters.
- ◆ **Groundwater Analysis:** Using existing data and new monitoring where necessary, the study's ground water analysis helped create a tool to understand the interaction between surface waters and groundwater. One of these tools is a map that demonstrates infiltration potential in each subwatershed.

PUBLIC INVOLVEMENT

The H & H study took more than three-years of development, research, execution and implementation, much of it involving the public and key advisory groups:

- Nine regional teams, each made up of 5-10 people, met 72 times with key stakeholders in the subwatersheds to analyze data and set goals.

(continued on page three)



Region Three: Citizens Lee Keeley, Andy Walstead work with Gary Oberts of EOR to designate problem areas within their subwatershed.

Nine Regions

Region One and Two: Minneapolis, Richfield, Golden Valley, St. Louis Park, Edina, Hopkins, Minnetonka
 Region Three: Plymouth, Wayzata, Woodland, Deephaven
 Region Four: Medina, Long Lake, Orono
 Region Five: Tonka Bay, Excelsior, Greenwood, Shorewood
 Region Six: Mound, Spring Park, Minnetonka Beach
 Region Seven: Victoria, Chanhassen, Laketown Township, Waconia Township
 Region Eight: Watertown Township, Minnetrista, St. Bonifacius

- A Public Advisory Committee (PAC) made up of municipal staff, elected officials and civic leaders was formed to act as a steering committee for overall public input. Over a period of a year-and-a-half and 90 meetings, close to a 100 people participated.

FINAL OUTCOMES OF THE H & H PROJECT

As previously stated, the H & H project was initially expected to provide three basic outcomes:

- ⇒ **Hydrologic and hydraulic analysis of the entire watershed**
- ⇒ **Provide current technical data resources for floodplain mapping**
- ⇒ **Provide the basis for developing a pollutant load limit approach to water quality**
- ⇒ **Planning tool for watersheds, cities, and other water resource professionals**

But, as the project progressed, it became clear that the potential uses of the resources being developed are greater than originally conceived. Some of the added benefits of the final study are:

Local Government Use:

1. Strategic planning tool for development within the city
2. Floodplain issues/flood control program
3. Water quality planning
4. Resource for city projects
5. COE project

Water Quality-Pollutant Loading Goals

1. Establish pollutant loading limits for each basin
2. Redefine water quality goals for MCWD
3. Identify BMP's for water quality

NPDES Phase II Permit:

1. Provides the modeling necessary to satisfy permit requirements
2. BMP selection

MCWD Third Generation Watershed Management Plan and City Water Resources Plans:

1. Identify and prioritize short/long-term projects
2. Resource for establishing district-wide goals
3. Better definition of hydrologic boundaries

Rules Revisions:

1. Scientific basis for rules revisions

Water Quantity—Flood Prevention:

1. Update flood elevations on Minnehaha and other major creeks
2. Identify problem flooding areas and potential solutions to the problems
3. Resource for development in flood prone areas
4. Technical basis to assist cities in flood map revision process

(continued on page four)

Permit/Regulatory Program:

- 1. Provide peak flow data and projected changes
- 2. Recommend BMP's based on site conditions
- 3. Identify areas to be avoided by development
- 4. Assist in wetland protection and restoration
- 5. Model creek impacts

Education:

- 1. Web site interactive mapping
- 2. Resource for secondary and higher education

Hydrodata Monitoring Program:

- 1. Identify gaps in existing data
- 2. Make monitoring data more meaningful

Quick Response to Public Inquiry:

- 1. "How high will the lake get?"

Time and Money Savings

- 1. First steps for feasibility studies completed by modeling
- 2. Preliminary work for District projects

HOW TO RECEIVE YOUR COPY OF THE MODEL

Contact John Erdelen, MCWD Modeler, at jerdelen@minnehahacreek.org or 952-471-0590.

The MCWD is ready to distribute the H & H Model to cities and townships and other public agencies in the district. Before release, a one-year license agreement needs to be completed (an extension may be granted for additional usage beyond the one-year period). If a city or township wants the model to be placed with their engineering consulting firm, a third-party agreement will need to be completed with the MCWD. An important aspect of all agreements is the request from cities for input and updating to the model when changes occur within the city. John Erdelen, the MCWD's modeler, will update the model at no cost and re-route it back to the municipality.

What does the MCWD provide?

- Set of the XP-SWMM Model files
- Set of WiLMS files
- PLOAD spreadsheets in Excel format
- HHPLS Report

What else will you need to run the model?

- XPSWMM—hydraulic modeling software
- WiLMS—available free from the Wisconsin DNR
- Microsoft Excel software

Note: To date, the H & H model has been distributed to MnDOT, HDR Engineering for the Army Corp of Engineers, Bonnestroo & Associates for the City of Orono



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