11333 N. Cedarburg Road
Mequon, WI 53092
Phone: 262-236-2913
Fax: 262-242-9655

www.cityofmequonwi.gov

MILWAUKEE RIVER ADVISORY COMMITTEE
Monday, October 6, 2025
5:30 PM
North Conference Room

Agenda

1) Call to Order, Roll Call

2) Approval of Meeting Minutes

   Action requested: review and approve

   a. April 24, 2025, Minutes

3) Committee Discussion

   a. Update on FEMA Floodplain Plan

   b. Report on Arbor Day celebration booth activity from Mike Gross

   c. Status of the "No Power Loading" sign for the Villa Grove boat ramp to be installed by the City DPW

   d. Discussion Recent River Flooding

   e. Dead Ash Trees and Shoreline Debris

   f. Updating High-water Markings at Villa Grove and Highland Road Bridge

   g. Invasive Purple Loosestrife Plant along the Milwaukee River and Tributaries

4) Informational Item

   a. Discussion Scheduling the First Quarter 2026 River Advisory Meeting

5) Adjourn

Dated: October 6, 2025 */s/ Michael Gross, Chair*

Notice is hereby given that a quorum of other governmental bodies may be present at this meeting to present, discuss and/or gather information about a subject over which they have decision-making responsibility, although they will not take formal action thereto at this meeting.
Any questions regarding this agenda may be directed to the Parks Dept. at 262-236-2913, Monday through Friday, 8:00 AM – 4:30 PM. Persons with disabilities requiring accommodations for attendance at this meeting should contact the City Clerk's Office at 262-236-2914, twenty-four (24) hours in advance of the meeting.

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MILWAUKEE RIVER ADVISORY COMMITTEE
Thursday, April 24, 2025
6:00 PM
North Conference Room

Minutes

1) Call to Order, Roll Call

The meeting was called to order at 6:01 pm.

Present:
Committee Member Ronald Dorszynski
Committee Member Wendy Porterfield
Committee Member Cynthia Raatz
Committee Member Perry Robinson
Committee Member Bill Spaulding
Committee Member Molly Ticcioni
Chair Michael Gross **-- Absent**
Vice Chair Kenneth Quant **-- Absent**

Also present were resident Nancy Tolocko (12644 N Shoreland Parkway), City Forester Herlache, and Admin Assistant Schlereth.

2) Nominate Chair

a. Motion to nominate Ron Dorszynski to Committee Chair
RESULT: **Approved by Voice Acclamation [Unanimous]**
MOVED BY: Board Member Porterfield

3) Approval of Meeting Minutes

a. October 22, 2024, Minutes
RESULT: **Approved by Voice Acclamation [Unanimous]**
MOVED BY: Board Member Porterfield

4) Information and Possible Discussion

a. Update on FEMA plan

Common Council passed RESOLUTION 4207 - A Resolution Approving Award of the

FEMA Floodplain Letter of Map Change Contract to M Squared Engineering, LLC, Cedarburg, Wisconsin, in the Amount of $75,300.

M Squared Engineering was able to increase the scope of the project to include that portion of the map without an additional charge in the contract.

The Village of Thiensville is providing funding ($5000) based on their portion of the river frontage that was included in the scope of this project.

The project itself should take between 18 to 24 months to complete, depending on the timeline from the DNR and FEMA.

b. Arbor Day Celebration 2025

Board Member Gross will have a table representing the River Advisory Board.

The City won the Gold Leaf Award.

c. Review City Ordinances Chapter 90 - Waterways

City Forester will investigate 'Red Zone' Sec. 90-7

Board Member Spaulding will check for state regulations of pier length Sec 90-8

d. River Advisory Meetings Schedule Review

The next meeting will be Thursday July 31, 2025, at 6:00 pm.

The board would like to discuss recommendations for future meeting topics at the July 31st meeting.

5) Adjourn

a. Motion to Adjourn at 7:13 PM

RESULT:	**Approved by Voice Acclamation [Unanimous]**
MOVED BY:	Committee Member Raatz
SECONDED BY:	Committee Member Robinson

AYES:	Dorszynski, Porterfield, Raatz, Robinson, Spaulding, Ticcioni
ABSENT:	Gross, Quant

Respectfully Submitted,

Ren Schlereth
Administrative Assistant

11333 N. Cedarburg Road
Mequon, WI 53092-1930
Phone: 262-236-2913
Fax: 262-242-9655
www.cityofmequonwi.gov
Office of Public Works

TO: **Milwaukee River Advisory Committee**
FROM: **Justin Bodoh, Building & Grounds Superintendent**
DATE: **October 6, 2025**
SUBJECT: **Update on FEMA Floodplain Plan**

Background

The purpose of this memo is to document the review and technical analysis of the recent change to the City of Mequon's FEMA mapped floodplains for the Milwaukee River. The Ozaukee County Flood Insurance Study (FIS) and Flood Insurance Rate Maps (FIRMs) were revised effective July 31, 2024. In the City's jurisdiction, the Milwaukee River floodplain and floodway were revised based on a hydraulic analysis that was performed by the Wisconsin Department of Natural Resources (DNR) in September 2016.

Analysis

The following discussion documents the items M Square discovered when conducting a review and technical analysis of the 2016 HEC-RAS model for the Milwaukee River. (SEE ATTACHMENT)

Attachments:
FEMA FLOODPLAIN (PDF)

M Squared Engineering, LLC
N19W6719 Commerce Ct.
Cedarburg, WI 53012
P. 262.376.4246

MEMORANDUM

City of Mequon FEMA Floodplain Mapping Review
M Squared Engineering
February 28, 2025

Introduction and Background

The purpose of this memo is to document the review and technical analysis of the recent change to the City of Mequon's FEMA mapped floodplains for the Milwaukee River. The Ozaukee County Flood Insurance Study (FIS) and Flood Insurance Rate Maps (FIRMs) were revised effective July 31, 2024. In the City's jurisdiction, the Milwaukee River floodplain and floodway were revised based on a hydraulic analysis that was performed by the Wisconsin Department of Natural Resources (DNR) in September 2016.

The City has concerns over the update to the FEMA mapped floodplains with specific issues including:

1. The hydrology for the Milwaukee River was not updated as part of the analysis even though the effective hydrology is based on a statistical analysis of USGS gage 4087000 from 1991. The City questions why incorporating the over 30 years of additional gage data and updating the hydrology was not done.
2. Base flood elevations (BFEs) increased throughout the City from a few tenths of a foot to a couple of feet. The City wants to know why these larger increases occurred with a primary focus on the area between Highland Road and Mequon Road.
3. The Floodway limits expanded between Donges Bay Road and County Line Road and the City wants to know if this widening of the floodway is accurate.
4. Trinity Creek base flood elevations and floodways were also questioned and requested to be evaluated.

To perform this review and technical analysis, M Squared obtained the 2016 hydraulic models for the Milwaukee River and Trinity Creek that were completed by the DNR and the 2007 Milwaukee River hydraulic model that the previous FEMA mapped floodplains were based on. A field visit was also conducted on December 6, 2024, to review the status of the floodplain, verify land use and vegetation, and better understand the nature of the Milwaukee River channel and bank conditions. Trinity Creek was evaluated using current aerial photography.

Previous Models

This memo documents the review of the 2016 hydraulic analysis and recommendations for revising the hydraulic model to produce more accurate results for the FEMA floodplain mapping. M Squared has completed review of the 2007 hydraulic model and compared it to the 2016 model. The primary findings between 2007 and 2016 were updated topographic data, but flood flow rates were identical between models.

After review, the 2007 model was determined to be obsolete and the 2016 model was used moving forward in the analysis.

For Trinity Creek a HEC-HMS file was finalized in 2015 and the effective HEC-RAS model was from 2016. The WDNR finalized the modeling and work in June of 2017. The Survey data was collected in 2015 and included significant bridges, culverts, and dams with channel bottoms in some locations to supplement the LiDAR data.

Hydrology

The effective hydrology for Milwaukee River was developed by regression analysis in 1991. Significant changes in available technology and data have occurred since then. Several USGS gages in the watershed have decades more data and the USGS has released StreamStats, a web-based tool which allows for quick regression estimates for hydrology within watersheds.

Using StreamStats, several locations were identified throughout the watershed that could be good locations to add flow changes to the HEC-RAS modeling. The 2016 HEC-RAS model has three flow change locations. Table 1 below shows these recommended flow change locations.

In addition to StreamStats, USGS gages 04086600 at Pioneer Road, 040869416 within the Lincoln Creek watershed, and 0408700 downstream of I-43 were evaluated.

Gage 04086600 was compared to the StreamStats results at Pioneer Road. The 100yr24hr peak flow from StreamStats (8,470 cfs) was higher than the estimated USGS gage 100yr24hr flow (6490cfs). The confidence of StreamStats was 57% compared to the USGS gage confidence of 85%. The gage flow falls within the 90% confidence interval range of the StreamStats flow rates. Assuming the gage is correct this results in a 33% reduction in flow rates for areas upstream of Pioneer Road. Flow rates computed by StreamStats were reduced accordingly and remained within the recommended 90% flow rate intervals.

Lincoln Creek is outside the study area but has an influence on the 0408700 gage of the Milwaukee River. Lincoln Creek has a watershed area of 20.9 square miles and a StreamStats flow of 2020 cfs for the 100yr24hr event. However, looking at the USGS 040869416 gage data on Lincoln Creek (13.2 square miles of tributary) more than four storms have significantly exceeded this flow rate with 9,700 cfs in 2010, 6,680 cfs in 2008, 5,640 cfs in 2009, and 5,460 cfs in 2018. The 90% upper confidence limit from StreamStats is only 3490 cfs, so there are obvious errors in the StreamStats analysis. Looking at Lincoln Creek, this area has been highly developed and urbanized. Looking at peak flow rates compared to tributary area, the 13.2 square mile watershed develops 1.15cfs/acre. This is not uncommon for highly urbanized areas. StreamStats regression equations are more typical of rural areas. Therefore, revising stream flows up for Lincoln Creek to account for the high urban density seems appropriate. Therefore, a reduction in flow upstream of the Lincoln Creek and Milwaukee River confluence seems appropriate. A very conservative

3,490 cfs was deducted from the flow rate established at USGS gage 0408700. The true 100yr-24hr flow rate of Lincoln Creek likely exceeds 5,000 cfs.

At USGS Gage 0408700, which was the dominant hydrologic data point used for the 1991 hydrology a 100yr-24hr peak flow value of 14,700 cfs was developed by USGS. Using Streamstats at this location a value of 9,000 cfs was estimated for the 100yr24hr event. This results in a gage flow rate 148% larger than the StreamStats calculation. However, with the confluence of Lincoln Creek just upstream of this gage, deducting the Lincoln Creek flows results in a Milwaukee River flow rate of 8,720 cfs. This is a conservative estimate of flow downstream of the Ozaukee county line but upstream of Lincoln Creek.

Table 1. Discharge Summary Table

HEC-RAS Flow Change Location	Effective Flow (1991 flow) (cfs)	Recommended Flow (cfs)	Description
162878	12560	5762	
159353	--	5938	DS of Falls Rd
148475	--	6490	DS of Hwy T
145727	14210	6490	Confluence with Cedar Creek
139240	--	6983	USGS Gage 04086600/Pioneer Rd
123026	--	7042	DS of Highland Rd
103524	--	7369	Thiensville Dam
103110	--	7413	Confluence with Pigeon Creek
100196	--	7577	DS of Mequon Rd
86951	14340	8720	US of Country Line

DS = Downstream, US = Upstream

Trinity Creek

For Trinity Creek an HEC-HMS model was developed as part of the effective FEMA mapping process. M Squared reviewed this HEC-HMS mode. The hydrologic model was competently prepared and meets engineering standards for hydrologic modeling. M Squared has no further comments on the HEC-HMS model and accepts the calculated flow rates.

Hydraulic Analysis Review

Milwaukee River

The following discussion documents the items M Square discovered when conducting a review and technical analysis of the 2016 HEC-RAS model for the Milwaukee River.

Ineffective flow areas are used in hydraulic modeling to indicate an area of inundation of flood waters, but not an area that is conveying active flow. For example, this could be used to delineate ponded water behind a roadway embankment where the water is not actively flowing. The ineffective flow locations in the HEC-RAS model seem somewhat random and do not have elevations associated with them. In the model, Pioneer Road, Highland Road, and Mequon Road all experience overtopping, but due to the way ineffective flow has been used in the model this

conveyance is not being recognized properly. Ineffective flow removes capacity from the floodplain and typically increases the height of the water surface elevations. If the overtopping was modeled more accurately, it is possible the water surface elevations could decrease at these crossings. Figure 1 shows the cross-section at Pioneer Road where overtopping is shown but is marked as ineffective flow.

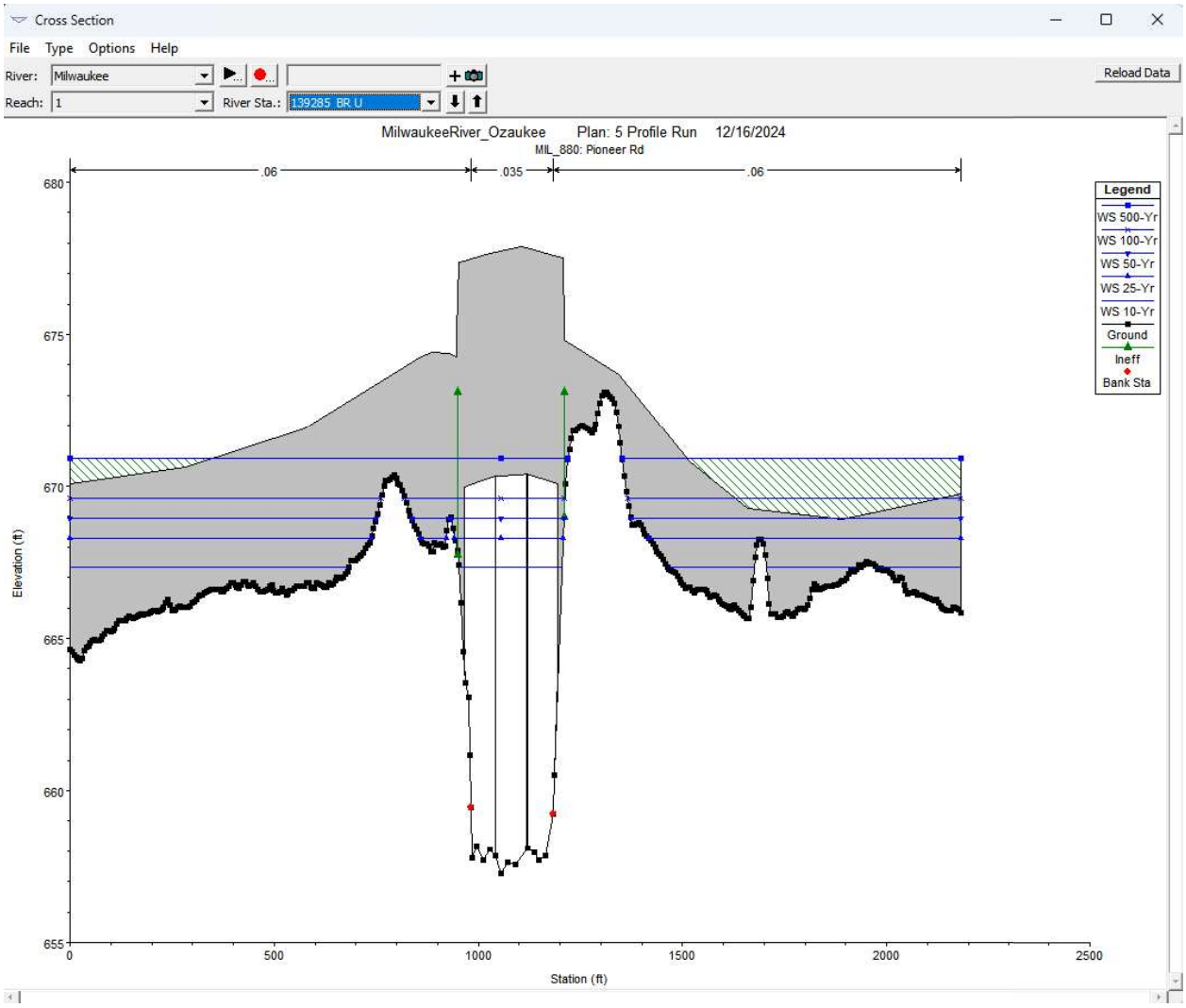

Figure 1. HEC-RAS Cross-Section of Pioneer Road over the Milwaukee River

The floodway for the Milwaukee River has also been delineated using ineffective flow areas throughout the model. FEMA recommends using an equal conveyance reduction method when determining the floodway for a floodplain. It is possible to set the HEC-RAS model to run an equal conveyance reduction floodway model and import those results to determine if they provide more favorable floodway limits when compared to the limits determined by the ineffective flow areas. If the floodway limits delineated by the ineffective flow areas are narrower than the proposed analysis, they can still be used as the effective floodway limits.

The State of Wisconsin floodway delineation policy is a zero rise or 0.00-ft increase in base flood elevations. The placement of ineffective flow is a common way that floodway encroachments are prepared. However, this is not the standard FEMA methodology and is difficult to defend on engineering merit. Using an equal conveyance encroachment method will produce more consistent, repeatable and technically defensible floodway limits.

Flow changes in HEC-RAS models are used to show where the hydrology changes either due to a tributary entering the river, or because a substantial amount of additional area is contributing flow to the river. In the 2016 HEC-RAS model, there are three flow change locations in the Milwaukee River in the City of Mequon and it is not obvious why the hydrology is changing at these locations. As indicated in the hydrology section above, additional flow change locations are recommended to improve the accuracy of the model. M Squared input additional flow locations into a working HEC-RAS model, which was used as the basis for comparison.

The Manning's n values are used to approximate the roughness of the channel and overbank areas due to vegetation and obstructions. There are several Manning's n values in the overbank areas that seem excessively high, in the 0.1 to 0.12 range. During the field visit, special attention was paid to the overbank areas to determine if these values seem reasonable. It was determined that it is likely more reasonable to use Manning's n values in the 0.06 to 0.08 range due to the overbank conditions. A smaller n value means the overbank areas would increase their conveyance capacity and decrease the water surface elevations. This reduction in n values will also allow for a narrower floodway. Figure 2 shows a picture from the field visit on December 6, 2024. This is representative of the type of vegetation in the overbank areas for the Milwaukee River.

Figure 2. Picture looking south at Milwaukee River, just downstream of the dam in Thiensville

There are several interpolated cross-sections in the HEC-RAS model. The use of interpolated cross sections in a steady state model is not recommended. Interpolated sections should only be used in unsteady models to create stability. If survey data is lacking at a critical location, either the necessary survey data should be collected to create the cross-section or a discrete cross section may be entered noting that it is an assumed section, a copy of another section, or manipulated or altered. In addition to the interpolated sections the n-values between these sections is also interpolated, which creates odd n-values that should be revised to align with the actual land use conditions at that location(s). The velocities at the interpolated cross sections have Froude numbers at or very near 1.0. This indicates that flow has entered a critical or supercritical state. This may or may not be accurate and warrants further investigation. This is occurring upstream of Falls Road and may not have much impact on downstream elevations. However, it shows the level of experience and knowledge of the modeler, that is they may not be experts using HEC-RAS and understand the nuances and limitations of the software.

Bank stations appear to be selected at the ordinary highwater level (OHWL). Bank full conditions would increase the width between bank stations. This can have a significant impact on conveyance as the n-value between bank stations is typically 0.035, which we agree with. However, with 0.1 or higher n-values in the overbank areas this is an effective conveyance reduction of 60% or more, which seems excessive. We recommend reevaluating the bank stations, perhaps with a sensitivity analysis, to determine the impact of widening the bank stations.

Cross section reach lengths for several of the bridges seem excessively long. HEC-RAS technical guidance has recommendations for distances between critical sections for bridges and inline structures. This guidance does not appear to be followed at some of the bridges. The results data suggests this might be a more minor issue and may not have a significant impact on the water surface elevations.

Several cross sections have computed water surface elevations above the far left and right stations. This results in “The cross-section end points had to be extended vertically for the computed water surface” errors. Either these cross sections need to be extended with additional survey data or computer water surface elevations should be below the cross-section end points. Figure 3 shows an example of a cross-section where the left overbank (LOB) does not extend far enough to contain the water surface elevations.

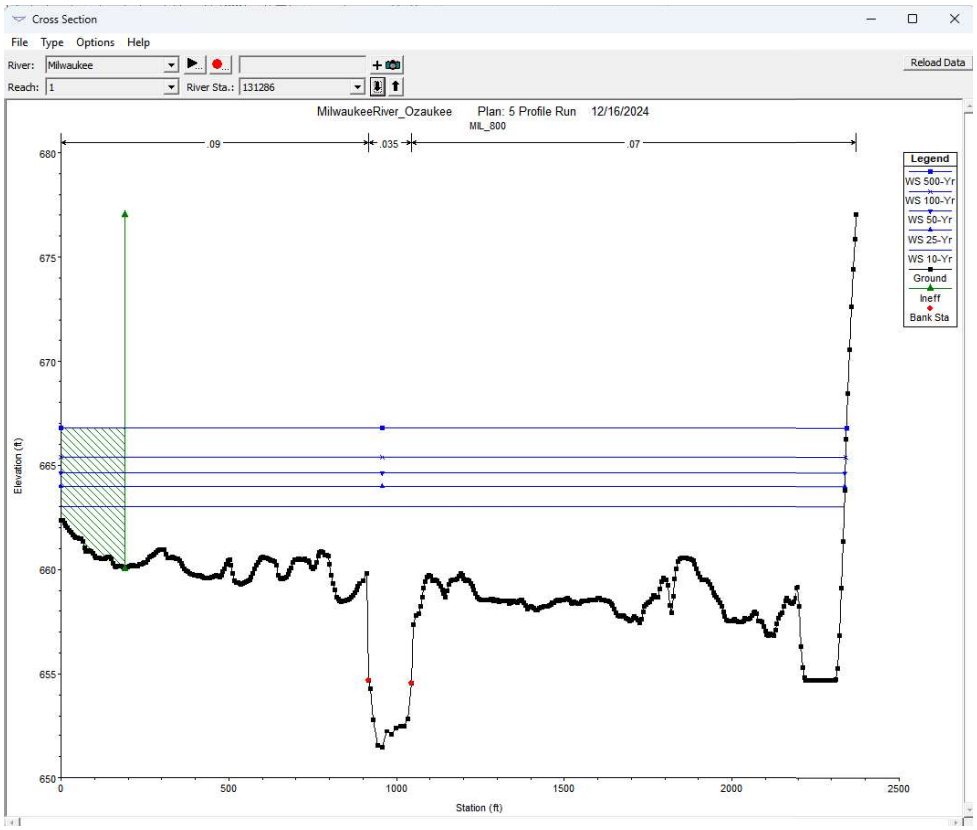

Figure 3. HEC-RAS Cross-section showing LOB not containing the water surface elevations

Trinity Creek

The Trinity Creek effective HEC-RAS modeling was reviewed for general compliance with engineering standards for floodplain modeling.

Several locations where identified that needed additional survey data. Prior modelers used HEC-RAS to interpolate cross sections between two cross sections to generate intermediate new cross sections at select locations. There appears to be a merging between the interpolated section and the extracted section, but it is unclear exactly how this was performed and what extracted data was used, it may have been extracted from the 5-ft LiDAR data set, but the report is not exactly clear.

Ineffective flow was set at bridges and culverts as mentioned in the engineer's report, but there appears to be some discrepancy between what elevations were used for ineffective flows at bridges and culverts and ineffective flows used for floodway encroachments. The report appears to specify ineffective flow was used correctly in the initial modeling, but the HEC-RAS model provided does not correlate with the report. The use of interpolated cross sections in steady state HEC-RAS modeling should not be used. There are areas within the model that need additional cross sections to be modeled accurately and correctly. However, discrete cross sections, even if they are interpolated or copied from adjacent sections or completely fictitious should be discrete. Interpolated cross sections are for use in modeling stability of unsteady HEC-RAS modeling only.

The discharge table used in the report does match the HEC-RAS flow rates. However, the selection of flow rates may not be correct in that the final Outlet in the HEC-HMS modeling is not used. This was investigated further and flow rates from HMS were modified for M Squared's working HEC-RAS model.

Table 2. Trinity Creek Flow Change Table

Flow Change locations (100-yr as example)			
RAS	Flow (cfs)	HMS	Flow (cfs)
15963	223	UserPoint3	708
9933	724	UserPoint5	487
6421	506	UserPoint13_x	754
3757	780	UserPoint9	1026
2727	1058	UserPoint11	1226
1732	1285	Outlet	1227

This indicates that the correct data may not have been used in the HEC-RAS model. The HMS model could have been changed at some point without coordination between the modelers (it happens). Also there appears to be discrepancies in selecting the appropriate HMS flow location that should correspond to the RAS flow location. Industry practice is to select the downstream accumulation of tributaries and apply that steady flow to the upstream cross section of the reach. This does not appear to have been done as only the Outlet flows appear to align well. The flows go up and down since there is reservoir and reach routing within the HMS model. Considering how well done the HMS model is, I would recommend using the HMS modeled values. We should recompute the HMS model to ensure that the tabulated pdf files correspond to the computed values in the model.

Amongst the engineering community there is some common practice for using the 10-year tailwater elevation of the downstream receiving water course, in this case the Milwaukee River, which was done by WDNR in the prior modeling. However, this does not follow FEMA policy recommendations. The correct FEMA modeling methodology is to use normal depth as starting water surface and then project the Milwaukee River backwater as a level pool upstream until it intersects the computed water surface. In the FIS profile report this area would be identified as "Backwater from Milwaukee River". The assumption that the Milwaukee River does not have a coincidental peak with Trinity Creek is valid and a sound engineering decision.

Manning's n-values generally agree with standard engineering practice but seemed a bit high in some locations. Any n-values in excess of 0.08 were modified down to 0.08.

Good engineering practice is to set minimum weir flow elevations for each crossing. This is especially useful when water surface elevations are at or near the overtopping point of a bridge or culvert. This will not significantly change the model, but is a good practice. There are two

concrete weirs upstream of the railroad in the Mequon Nature Preserve area. The modeling sets the weir coefficient at 2.6. A value of 3.0 is recommended by M Squared. This will result in an increase in flow capacity of 15% and will likely result in a lower water surface elevation through these areas. In relation to the weir at 3815 adjustments to the weir profile should be reviewed to address an opening on the left-hand side that might be erroneous.

Expansion and contraction coefficients are typically 0.1 / 0.3 unless there is a significant restriction to flow. Then coefficients of 0.3 / 0.5 or even 0.5 / 0.8 may be warranted. Values of 0.3 / 0.5 are typically used at bridges and culverts to indicate that a constriction has occurred. Bridges especially should be reviewed as very large span bridges may not have any impact on flow and should use 0.1 / 0.3 in those cases. Using coefficients of 0.3 / 0.5 away from bridge and culvert sections is unusual and typically indicates that adding additional cross sections into the model is warranted. These should be reserved for when the stream rapidly expands (gets wider) or contracts (gets narrower) in a very short distance that more cross sections will not effectively model. M Squared recommends validating the 0.3 / 0.5 coefficients in areas away from bridges and culverts and likely will recommend reducing these values to 0.1 / 0.3. This will have a minor impact on water surface elevations locally to those cross sections.

In several locations in the model there are not enough cross sections between adjacent culverts. Each culvert should have 4 unique cross sections. These culverts effectively share cross sections #1 and #4 (if you remove interpolated sections). Each culvert should have four discrete sections. This occurs at several locations. At the most upstream this is between culverts 15770 and 15156. There is plenty of distance between these to not have expansion/contraction of 0.3/0.5 for this whole length. These contraction / expansion coefficients will artificially raise WSEL somewhat. The correct way to model this would be to add a cross section to 15770 (perhaps a copy of 15757). Similar situations occur at culverts 13566 and 12930, 12647 and 12158, and bridges 3660 and 3610. Similar fixes are recommended (copy of 13547, 12625, and 3600 respectively). Culverts and bridges in close proximity should either be modeled as a singular structure (if they are close together) or modeled discreetly without sharing cross sections. The modeler got around HEC-RAS generated errors by adding internal bridge cross sections. This is not an appropriate fix for this error as this is effectively copying the upstream cross section 3625 downstream 8 feet to the face of the bridge. The same has been done for cross section 3600, which was effectively copied 4 feet upstream to the downstream bridge face. Internal bridge sections are for when the upstream cross section differs appreciably from the section internal the bridge that an additional internal section is warranted to better analyze the bridge hydraulics. Therefore, two additional discrete sections should be inserted between sections 3648 and 3625. An addition cross section should be added downstream of cross section 3600 as well.

Several warnings related to critical depth not being computed correctly and no valid solution for the energy equations. This strengthens the recommendation to run mixed flow regime and

to enable the more robust version of calculating critical depth (instead of the faster parabolic method).

Several bridges overtop within this reach, recommend setting the pressure flow bridge computations instead of the basic energy equation (pressure flow calcs are more accurate for this kind of flow).

In general, the WDNR engineering report for Trinity Creek is well done and documents the modeling efforts used for the FEMA flood mapping effort. The comments above do not create as dramatic a change in computed water surface elevations as the Milwaukee River modeling.

Results / Recommendations

Milwaukee River

After the evaluation of the Milwaukee River the following general results were found based on the recommended modeling changes.

Between Pioneer and Highland Road, the average base flood elevation reduction was just under three feet. Calculated water surface elevations for the 100-year surface were below the FEMA 10-year elevations in many locations. From Highland Road to Thiensville Dam base flood reductions were on the order of 2.8 feet. Reductions further improved downstream to Mequon Road with reductions of 3.3 feet. From Mequon Road to the county line reductions were less, predominantly due to tying into the known water surface elevation at the beginning of the model. Reductions varied from 2.9 feet just downstream of Mequon Road to matching the known water surface elevation (zero change) at the beginning of the model.

Table 3. BFE Reduction Summary Table

Reach on Milwaukee River	FEMA BFE	M2 calculated BFE	Average BFE Reduction (ft)
Pioneer to Highland Rd	669.4 – 664.6	666.4 – 661.3	2.92
Highland Rd to Thiensville Dam	664.3 – 661.8	661.2 – 659.6	2.81
Dam to Mequon Rd	661.5 – 659.0	657.9 – 656.0	3.34
Mequon Rd to county line	658.8 – 652.75	655.9 – 652.75	1.81 (2.9 – 0)

Floodway encroachments changed appropriately with the modeling effort. Ineffective flows were added where elevations were not inundated until overtopped. Permanent ineffective flows were also added as appropriate. The test for ineffective flow is, “Does it get wet?” and “Does it flow?” The answer should be YES, it does get wet, and NO it does not flow to meet permanent ineffective flow criteria. This modified the floodway limits from the FEMA maps and generally were narrower. A typical reduction is shown below. The heavy black line on the left shows the floodway encroachment just beyond the small green triangle that represents ineffective flow. In the cross section below the floodway limits are approximately half of the floodplain limits. However, it is

important to note that encroachment limits varied along the Milwaukee River and were highly dependent on channel geometry and resultant water surface elevations.

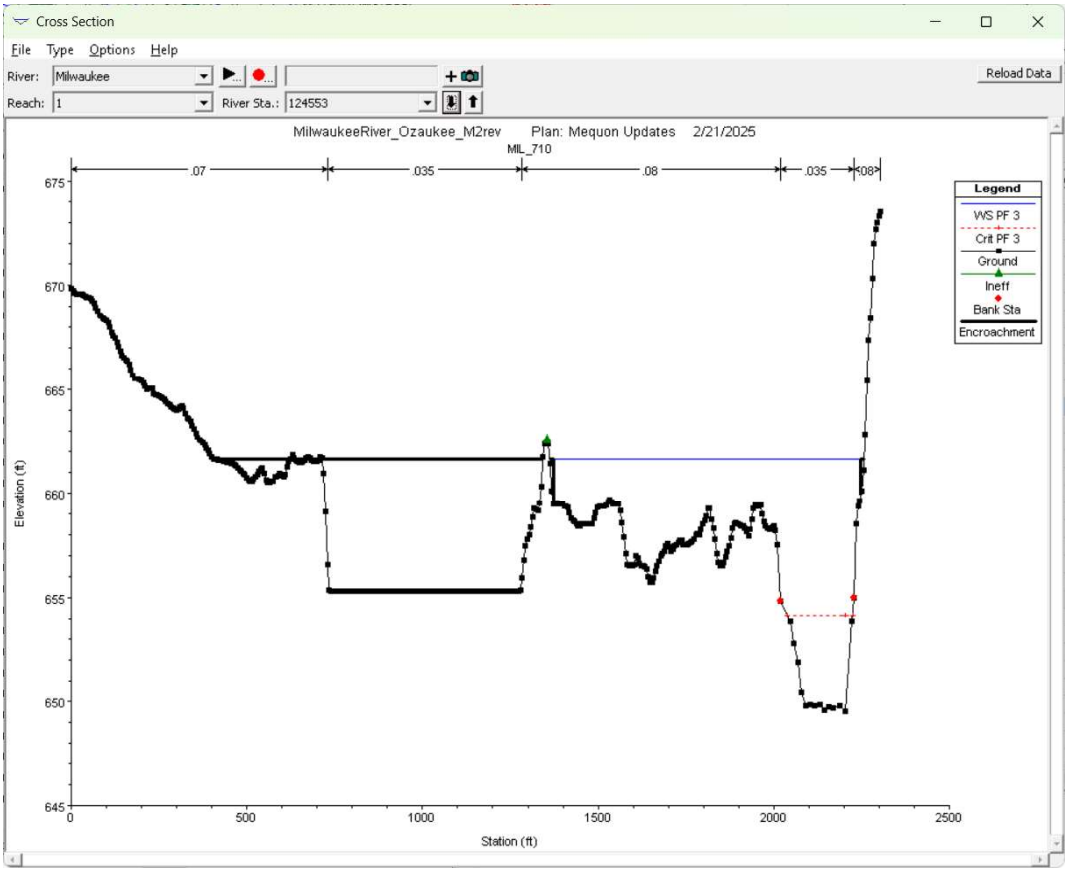

Figure 4. HEC-RAS Cross-section ineffective flow and floodway encroachments

Trinity Creek

Though the HEC-RAS model could have used technical refinements that align better with standard engineering practice, upon detailed review the results did not change much. Some water surface elevations slightly increased by aligning the model more closely with standard engineering practices and other locations had slight decreases. Neither of these is significant enough to expend the time and effort to remap or remodel Trinity Creek upstream of FEMA cross section G.

The Milwaukee River has a published backwater condition on Trinity Creek of 655.1. M Squared computed lower water surface elevations of 653.5, a little over 1.5-feet lower. Projecting the Milwaukee River elevation of 653.5 into Trinity Creek only impacts the section from State Highway 57 downstream to the confluence. Upstream of State Highway 57 to the Central Wisconsin Railroad water surface elevations reduced from the FEMA elevations of 655.6 to 655.8 about one to one and a half feet to 654 to 654.9.

Upstream of the Central Wisconsin Railroad computed water surfaces reduced about one foot compared to the FEMA published results to 656 from 657.1. The end of this area corresponds to

FEMA cross section F and results upstream were similar between the FEMA and M Squared models.

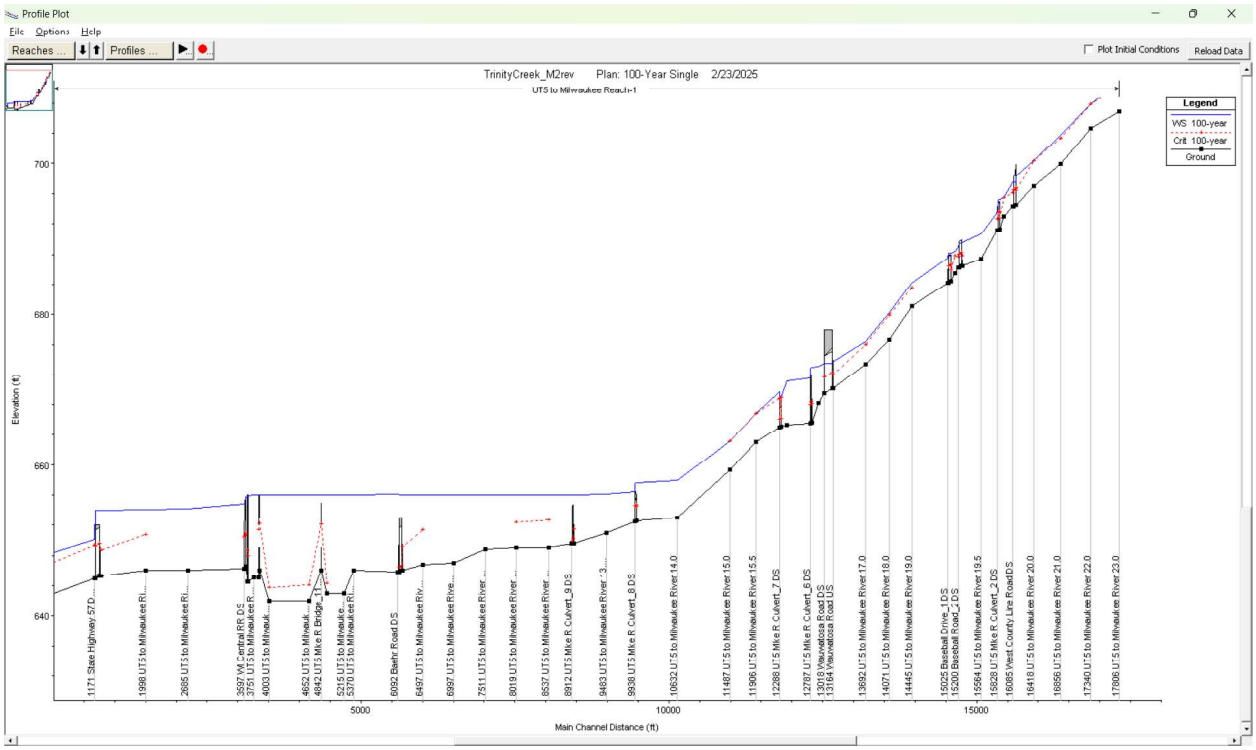

Figure 5. HEC-RAS Trinity Creek 100-year profile plot

Upon completion of the Trinity Creek modeling M Squared suggests the following recommended changes to the HEC-RAS modeling.

The Milwaukee River backwater condition will result in a lower computed water surface elevation for Trinity Creek from the confluence with the Milwaukee River to FEMA cross section F. This elevation reduction also corresponds with a narrower floodway encroachment. Due to the stringent floodway encroachments for the State of Wisconsin the floodway limits are very close to the floodplain limits. Therefore, there will not be a significant reduction in floodway limits beyond the water surface elevation reductions.

The need for additional cross sections in key areas adjacent to bridges and culverts in the modeling is warranted and necessary. However, M Squared does not recommend the use of interpolated cross sections. Each section in a steady state HEC-RAS model should be discrete. Using an interpolated or copied cross section is an acceptable method of adding needed cross sections for the model to run properly and M Squared recommends evaluating the areas using interpolated sections, selecting an appropriate section or generating a new or copied section, and inserting it as a discrete cross section in the HEC-RAS model.

Each bridge and culvert in HEC-RAS needs four cross sections to be modeled correctly by the program. At several locations the downstream cross sections are excessively far from the bridge

or culvert. M Squared recommends adding a cross section at an appropriate distance to better represent the hydraulics at individual bridges and culverts. Some of these areas attempt to use interpolated cross sections to fix this issue. A similar recommendation on how to correct this issue and the one described above is recommended. These changes would be recommended if the decision to pursue a Letter of Map Change was pursued in the future.

Implementing the above recommendations in the HEC-RAS model will result in a lower water surface elevation compared to the FEMA mapping as documented above. The floodway from the confluence with the Milwaukee River halfway up the watershed should narrow significantly. Water surface elevations will reduce a foot or more from the confluence through the Mequon Nature Preserve with the suggested changes above. Water surface elevations in the upper watershed, which is much steeper, will be less dramatic and minor reductions and increases were identified. Therefore, M Squared recommends focusing on areas downstream of FEMA cross section G.

Next Steps

If the City of Mequon desires to pursue a map revision based on M Squared's preliminary analysis a formal Letter of Map Change process will be necessary. Additional modeling effort will be required to meet FEMA mapping requirements and submission. This takes time and effort as this is a regulatory process, but with the results of the Milwaukee River changes this would be a benefit to landowners within the current limits of the floodplain. Reductions were significant throughout the City limits.

One important issue to consider is the WDNR and FEMA performed a countywide map update. This process has budgetary and scheduling constraints that force engineers and modelers to purposely avoid excessive levels of detail. They simply do not have the resources or time for a more detailed study. The benefit of Mequon performing a more detailed investigation allowed the M Squared team to investigate objectively with great scrutiny to determine what the Milwaukee River flood elevations are more likely to be. Any Letter of Map Change effort will undergo regulatory review and M Squared's results are only our professional opinion and should not be construed as what the FEMA regulatory maps will be changed to. Peer review and government agency involvement will still be required.

Trinity Creek could likely be lowered, especially downstream of the Central Wisconsin Railroad. Most of this change is due to lowering the Milwaukee River base flood elevations. M Squared recommends focusing on the Milwaukee River aspect of the project first with the resultant conversation on the reductions to Trintiy Creek near the confluence once the Milwaukee River effective flood heights are lowered. Attempting to reduce Trinity Creek without first lowering the Milwaukee River will be unsuccessful. However, the Letter of Map Change process should include modifications to Trinity Creek in conjunction with the Milwaukee River efforts.

Letter of Map Change are lengthy processes, and we would recommend Mequon budget twelve to eighteen months for the necessary engineering effort and government coordination. A formal

proposal has not been prepared, but based on the anticipated level of effort in consideration of the information investigated so far the City of Mequon should budget $75,000. As impacted landowners are frequently urgent to expedite this process to reduce flood insurance premiums, remove themselves from the floodplain/floodway, and generally remove encumbrances from their properties it is important to know that FEMA allows up to one year of flood insurance premium rebates from the new effective date of the maps.

11333 N. Cedarburg Road
Mequon, WI 53092-1930
Phone: 262-236-2913
Fax: 262-242-9655
www.cityofmequonwi.gov
Office of Public Works

TO: **Milwaukee River Advisory Committee**
FROM: **Justin Bodoh, Building & Grounds Superintendent**
DATE: **October 6, 2025**
SUBJECT: **Discussion Recent River Flooding**

1) Recent river flooding:
   a. Open discussion on impacts of higher water levels and significantly increased water flow rates, with the goal being to catalog the impacts of local flooding.
   b. The preliminary river elevation value for the 8/12/25 Milwaukee River flooding was 12.91' at the NOAA/National Weather Service gauge at Cedarburg Road. The 12.91" value would be number 5 on the list of historic crests. The record crest was 13.98' on 6/13/2008.
   c. Current flow at a more normal 6.0' of river elevation would be approximately 250 CFPS (Cubic Feet per Second). Current flow at 12.91' was approximately 4,850 CFPS.

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TO: **Milwaukee River Advisory Committee**
FROM: **Justin Bodoh, Building & Grounds Superintendent**
DATE: **October 6, 2025**
SUBJECT: **Dead Ash Trees and Shorline Debris**

1) Dead ash trees & shoreline debris:
    a. Fallen trees, along with some cut trees and brush debris, were observed flowing downstream during the recent flooding. Some tree-related property damage was reported.
    b. Some trees in or along the river edge can create hazards for powerboaters and paddlers, particularly during periods of high water.
    c. Fallen trees and bushes along the river edge can be advantageous to some fish populations.
    d. Removal of fallen trees from the river could be difficult and costly. Voluntary and/or mandatory steps river property owners can or must take to help alleviate the problem can be discussed. The text of the City of Glendale's ordinance is included below.

An informational mailing to river property owners containing suggestions and/or requirements for dealing with fallen trees and placement of brush or debris along the river during periods of high water can be discussed.

Glendales Ordinance:

6.2.17 - Obstructions placed in Milwaukee River; duties of riparian owners.

No person shall place or deposit any tree or part thereof or any foliage, leaves, grass clippings, dirt, earth, stone, sand, ground, broken concrete or any similar materials or substances in the Milwaukee River.

(b)

No person shall construct or erect any pier, retaining wall, wharf or any other structure, nor fill in any part of the Milwaukee River without first applying for and obtaining a permit from the City of Glendale. Such permit shall be issued by the building inspector upon application being duly made on a form provided by the city, which shall be signed by the owner of the premises and which shall be accompanied by plans of the proposed river filling, retaining wall or structure and a survey map prepared by a registered surveyor, containing on its face the certificate of such surveyor as to accuracy. No permit shall be issued until such application shall have been submitted to and approved by the common council. Provided that if the original permit is for a seasonal or temporary structure, the duration of the permit shall be for

one year. Permits for such seasonal structures shall be automatically renewed for successive periods of one year each, after the expiration thereof, and shall permit reconstruction and maintenance for such successive periods of one year, provided such structure is reconstructed in its identical form and location. At renewal time for such permit, the building inspector shall make an investigation of each such seasonal or temporary structure for the purpose of ascertaining if the same is so reconstructed and located. The common council shall not approve any permit if it shall appear to it that the river filling or any structure proposed to be constructed or erected will materially interfere with navigation on said river or be likely to cause or contribute to the flooding of lands adjacent to the river within the City of Glendale. Nothing herein contained shall be construed to in any way interfere with the jurisdiction of any other authority, whether state or federal, relating to navigable waters. Such permit, as is herein required, shall be in addition to any permit which any other authority has the jurisdiction to require.

(c)

If any tree, structure or other obstruction falls or has fallen from adjacent land into, or partially into, the Milwaukee River, the owner or occupant of such adjacent land shall immediately remove the same from said river.

(d)

In the event such tree, structure or obstruction shall not be so immediately removed, the director of public works shall give written notice to the owner of the lands involved, at his last known address, and to the person in possession of said lands, to remove said tree, structure or other obstruction from the river within ten days of the giving of such notice. If such tree, structure or other obstruction be not removed at the expiration of said ten days, the director of public works shall remove or cause to be removed such tree, structure or other obstruction, and for this purpose he is authorized to enter onto the land from which the tree, structure or other obstruction has fallen. An accurate record of the expense of removing such tree, structure or other obstruction shall be made and report thereof given to the city clerk, who shall enter the amount of the expense of such removal against the respective real estate on the next and subsequent tax roll as a special tax against such real estate and the same shall be ,collected in all respects like other city taxes on real estate.

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TO: **Milwaukee River Advisory Committee**
FROM: **Justin Bodoh, Building & Grounds Superintendent**
DATE: **October 6, 2025**
SUBJECT: **Updating High-water Markings aty Villa Grove and Highland Road Bridge**

1) Updating high-water markings at Villa Grove ramp and Highland Road bridge:
    a. The purpose for the markings was to provide an indication to boaters as to when boat wakes at a given elevated water level were capable of causing property damage along the river. Reported property damage included items being washed from piers and shorelines, and waves hitting sidewalls and/or wall openings on homes in low-lying areas.
    b. Over the years it was suspected that the upstream and downstream marks did not properly correlate with an established high-water level. With the recent flooding, some photos and measurements were taken roughly adjacent to the upstream and downstream markers. Hopefully this information can be used to synchronize new upstream and downstream marks for an established high-water elevation. Coordination with Mequon's DPW will be required.

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TO: **Milwaukee River Advisory Committee**
FROM: **Justin Bodoh, Building & Grounds Superintendent**
DATE: **October 6, 2025**
SUBJECT: **Invasive Purple Loosestrife Plant along the Milwaukee River and Tributaries**

1) Invasive Purple Loosestrife plant along the Milwaukee River and tributaries:

   a. Purple Loosestrife has returned to many areas around Mequon and Ozaukee County. Querry members as to their knowledge of its presence along the river or its tributaries.
   b. Discuss the possible inventorying of locations with significant plant presence, and the need and/or willingness of the committee to get involved with another control effort. Discuss the past purple loosestrife control efforts of the river advisory committee and local groups.

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TO: **Milwaukee River Advisory Committee**
FROM: **Justin Bodoh, Building & Grounds Superintendent**
DATE: **October 6, 2025**
SUBJECT: **Discussion Scheduling the First Quarter 2026 River Advisory Meeting**

Discuss scheduling the first quarter 2026 River Advisory Meetings.