

Tabla Brain

From: Hahn, Michael G.
Sent: Wednesday, August 13, 2014 11:07 AM
To: 'tabla_brain@att.net'
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Subject: FW: Elevations portrayed in Estabrook Dam EA hydraulic analysis and Memorandum Report 172

Dear Mr. Kreuziger:

Our responses to your July 19, 2014, questions are indicated in red below.

In response to a July 28, 2014, question regarding the elevation at RM 6.827 under the 6.3 foot high rock ramp alternative, this alternative is the only alternative which involves a modeled physical change downstream of the dam. The proposed rock ramp would replace the gated portion of the dam, extending 100 to 200 feet downstream of the location of the gated section. The increased velocity from the resulting "rapids" due to the rock ramp would cause a slight decrease in the flood stage at RM 6.827 as compared with the existing condition model and other alternatives.

Your July 28, 2014, email posed a question regarding differences in flood stages between this analysis and calculations performed in the 1930s for the original dam proposal. For a 14,700 cfs event, the 1930s calculations showed the then proposed dam (with gates open) would cause a stage increase of 2.7 feet as compared to the without dam condition. In our current analysis, for a 14,800 cfs event, our model shows the dam (also with gates open) causes a stage increase of 1.45 feet as compared to the without dam (Alternative 2: Dam Removal) condition. Computational methods and hydraulic modeling techniques have significantly evolved over the past 80 years. Through the use of ever-improving hydraulic modeling programs, which enable consideration of backwater effects along the River, we are now able to represent hydraulic structures and the flow of water through them with more complexity and accuracy than the techniques that were employed in the original calculations.

From: tabla_brain@att.net [tabla_brain@att.net]

Sent: Saturday, July 19, 2014 2:08 AM

To: Hahn, Michael G.

Subject: elevations portrayed in Estabrook Dam EA hydraulic analysis and Memorandum Report 172

Dear Mr. Hahn:

I do not understand the elevations stated in the hydraulic analysis provided for the Estabrook Dam EA.

According to USGS, the gauge at Estabrook Park, 0408700, has an elevation of 606.91, NAVD88.

According to a converter I found here:

<http://www.coj.net/departments/planning-and-development/development-services-division/convert->

the elevation 606.91, NAVD88 converts to 607.23, NGVD29.

SEWRPC used NGVD 29 in the hydraulic analysis for the Estabrook Dam EA and in SEWRPC Memorandum Report No. 172, A Watercourse System Plan for The Milwaukee River In Milwaukee County Upstream Of The Milwaukee Harbor Estuary.

According to Memorandum Report 172, a 1 % probability flood at the Estabrook Gauge has a flow of 14,800 CFS. According to USGS, NWS and FEMA data, on June 21, 1997 this gauge read 10 feet and the flow was 16,500 CFS. This flood is also documented in Memorandum Report 172. By adding 10 feet to the gauge height, this would indicate that this larger than a 100 yr flood had an elevation of 617.23, NGVD29.

Memorandum Report 172 states that the elevation for a 1 % flood at mile 6.829, just above Estabrook Dam, is 620.46. The analysis for the EA states that the elevation for a 1 % flood at the same point with a repaired dam is 620.68. Both studies state that the elevation for a 1% flood at mile 6.827, just below Estabrook Dam is 619.23. I am not sure of the exact location of the gauge, but according to USGS it is about 1200 feet downstream of the dam. This would put it at approximately mile 6.60. The EA analysis does not include elevations for anything downstream of 6.827, but the Memorandum Report 172 does. The 1 % elevation at mile 6.61 is 618.45 and at 6.567 it is 617.63.

So, how is it that your 1 % flood elevations are approximately one foot higher than the actual measured elevation of a flood that was larger than a 1 % flood?

We have field checked the location of USGS gage 04087000 and confirmed that the gage house and the published coordinates are located between Milwaukee River model cross-sections RM 6.567 and RM 6.610 downstream from Estabrook dam. Based on the USGS 04087000 stage-discharge rating curve, a flow of 14,800 cfs (100-year flow) would result in a stage of approximately 616.7 feet above NGVD29. At the location of the coordinates of USGS 04087000, the 100-year stage of the FEMA FIS effective model and the model reflected in SEWRPC MR No. 172 would be about 618.0 feet above NGVD29. This difference is a reasonable correlation and calibration between modeled and measured data. In addition, this difference between the modeled and measured stage downstream of the dam would not be realized in the reaches of interest upstream of the dam due to the hydraulic effects of the dam structures.

Also, how is it that the elevations in the EA analysis are almost all slightly higher than those reported in Memorandum Report 172, especially when Memorandum Report 172 claimed that there would be no change in the 1 % elevations until at least 2020?

The Milwaukee River flood flow and stage information presented in SEWRPC MR No. 172 is based on the effective model described in the September 26, 2008, FEMA FIS for Milwaukee County, which served as the starting point for the Estabrook dam EA analysis. The changes made to the effective model to establish the existing condition model in the analysis are documented on page 4 in the "Existing Condition" section of the SEWRPC Hydraulic Analysis. The change in stage at RM 6.829 can be attributed entirely to the refined representation of Estabrook dam described in the 3rd paragraph of the "Existing Condition" section. At other upstream locations, changes in stage relate to both this refined representation and other model refinements described on page 4.

The year 2020 reference in MR No. 172 refers to the year of the planned land use conditions within the Milwaukee River watershed for which flood flows were developed. The results of the same hydrologic (flow development) procedure were used in the Estabrook analysis. The changes to the existing conditions model mentioned in our April 25, 2014, memorandum refer to changes to the hydraulic (stage development) model.

Perhaps SEWRPC has now changed its idea of a 100 yr flood, after July 22, 2010?

As you correctly noted in your July 28, 2014 email, the 100-yr flood flow modeled in the hydraulic analysis is the same as that used in MR No. 172.

But if so, how is it that the elevations at mile 6.827, just below the dam, are the same for the 2 reports here compared, and yet all the others are different?

The revisions made to the existing conditions model described in the analysis were made either to the dam itself or upstream of the dam. The computational nature of the modeling program (computations proceeding from downstream to upstream) therefore dictate that any changes in stage would be limited to cross-sections upstream of the dam.

Finally, please state the flow rate of what you considered to be a 1 % flood for the EA analysis.

As you correctly noted in your July 28, 2014 email, the 100-yr flood flow for the Milwaukee River in the vicinity of the dam is 14,800 cfs.

Brian Kreuziger