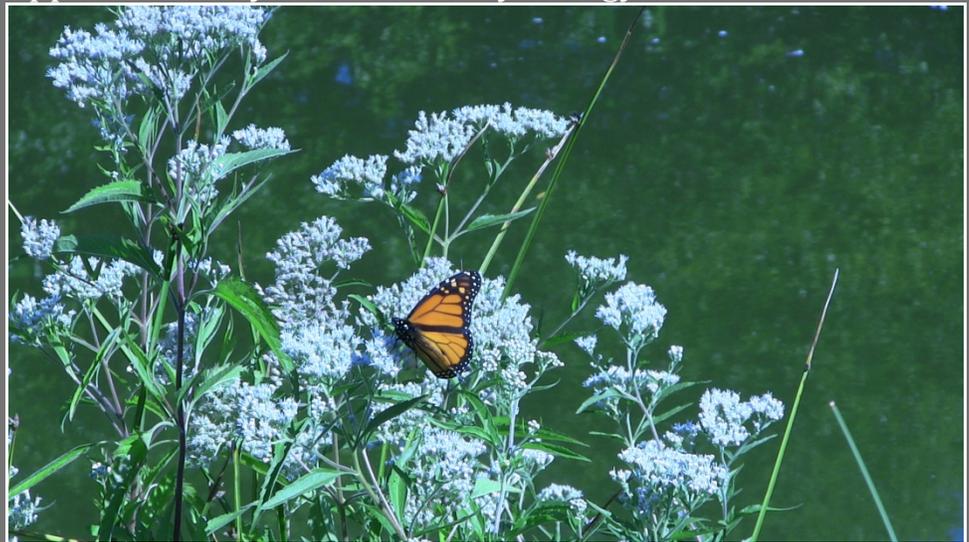


2015

# Saganashkee Slough - McMahon Woods Section 506 Great Lakes Fishery & Ecosystem Restoration Study

## Appendix A – Hydraulics and Hydrology



## **McMahon Woods – Hydraulics and Hydrology Appendix**

### *McMahon Woods*

The primary watercourse through McMahon Woods is Crooked Creek. Crooked Creek is located in southwestern Cook County, Illinois, north of the Calumet-Sag Channel and for the most part west of Willow Springs Road. The water shed of Crooked Creek has a tributary area of 3.5 square miles. Crooked Creek is a natural open channel stream that begins at the Belly Deep Slough, drains into and through Saganashkee Slough, and discharges into the Calumet-Sag Channel.

### *Crooked Creek overflow problem into McMahon Fen*

The environmentally delicate area of McMahon Fen has been plagued with severe erosion in conjunction with flood conditions on Crooked Creek. There is a low area (saddle area) along the south overbank of Crooked Creek, where during flood conditions, significant flows escape Crooked Creek and flow through McMahon Fen, causing problematic erosion to environmentally delicate areas of McMahon Fen.

To evaluate a solution to this overbank flooding problem, the HEC-HMS and HEC-RAS models of Crooked Creek from the Cal-Sag Area Detailed Watershed Plan (DWP) developed by the Metropolitan Water Reclamation District (MWRD) were utilized to analyze the overflow from Crooked Creek into McMahon Fen.

In the DWP HEC-RAS model of Crooked Creek the overflow area was not included in the model. All flood flows were assumed to stay in Crooked Creek. The critical 12 hour precipitation duration was used for the analysis. The model was modified for the Saganashkee Slough study to include a lateral weir to model the Crooked Creek overbank overflow condition in the low saddle area.

One proposed solution to the overflows into McMahon Fen, is to add a berm to fill in the low saddle area, to reduce the risk of overflows. This berm would be constructed at elevation 612 ft NAVD to connect to high ground on either side of the saddle area. It will contain the overflow at the saddle area with approximately one foot of freeboard.

Filling in the saddle area caused increased water surface profiles. These increased stages were confined to the channel and did not cause flooding to structures, with the exception of the 100 year flood event where filling the saddle area induced overtopping of 107<sup>th</sup> Street Bridge. To mitigate this induced flooding of 107<sup>th</sup> Street, a 72 inch diameter reinforced concrete culvert was added to the current box culvert. Figure 1 shows the proposed berm and culvert locations.

Figure 2 presents the 100 year maximum water surface profiles for 1) current condition with saddle overflow (blue line), 2) condition with berm in saddle area (red line) 3) condition with berm and 72 inch mitigation culvert at 107<sup>th</sup> Street Bridge (green line). Figure 3 presents the same three conditions at the face of the 107<sup>th</sup> Street Bridge. The 72 inch mitigation culvert in conjunction with the berm prevents overtopping of 107<sup>th</sup> Street Bridge.

Figure 1

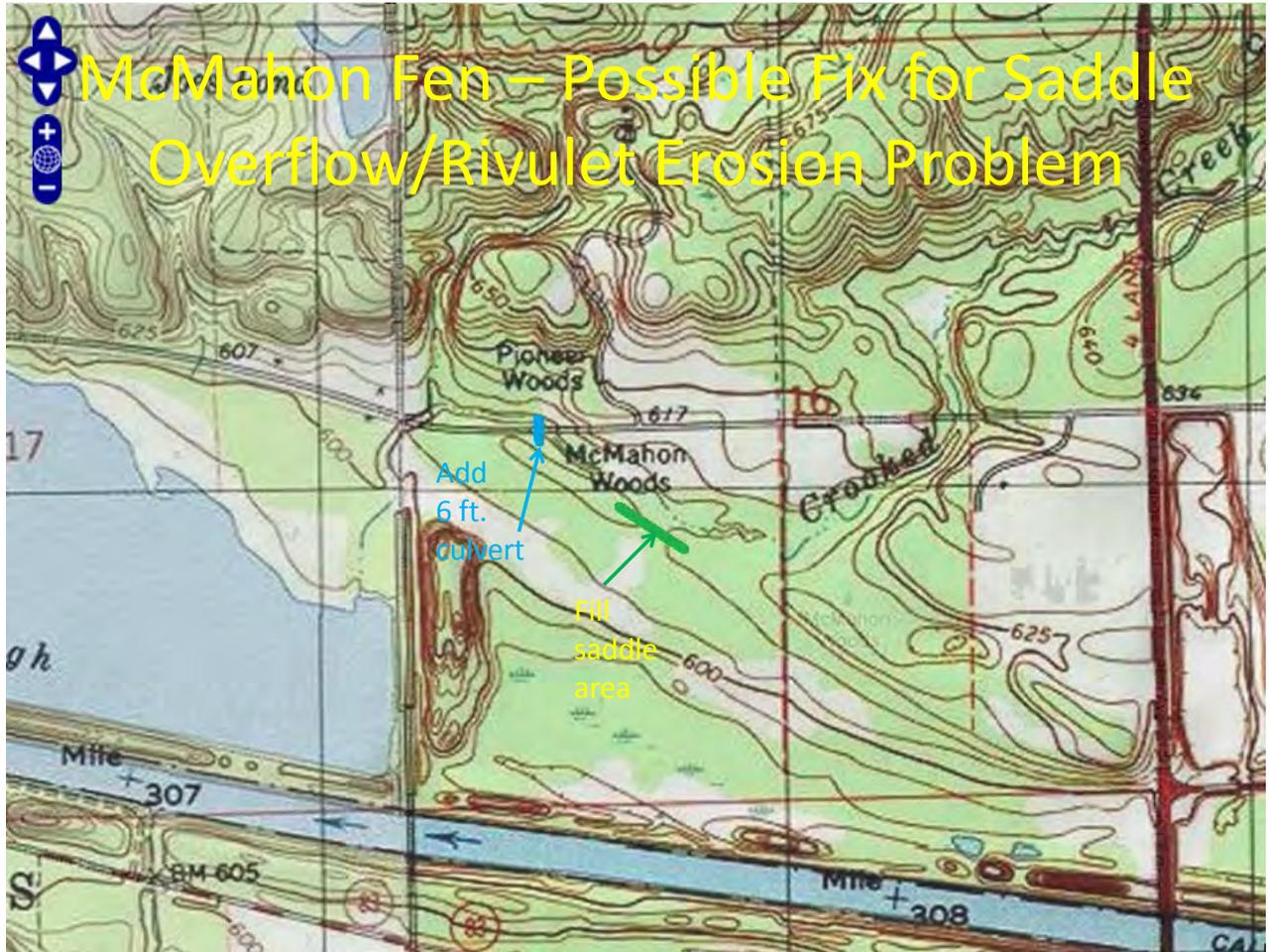


Figure 2

# Crooked Creek near McMahan Fen

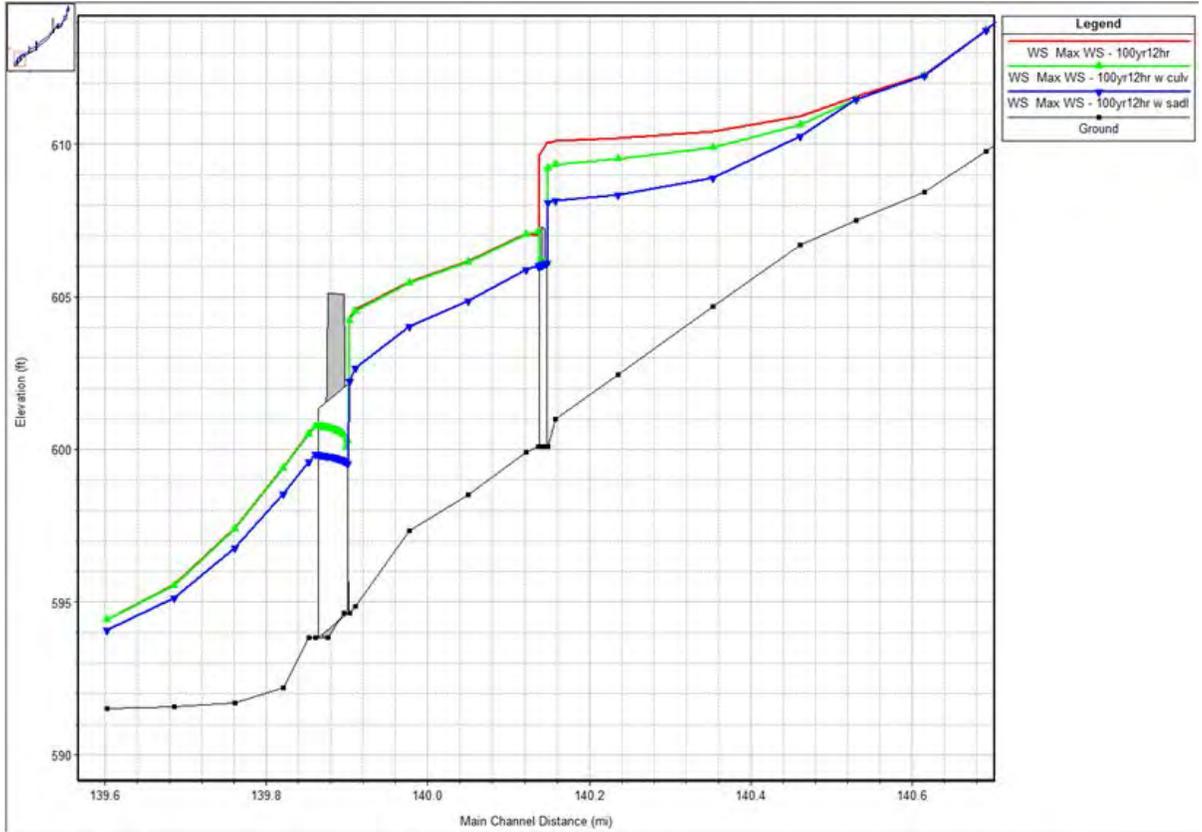
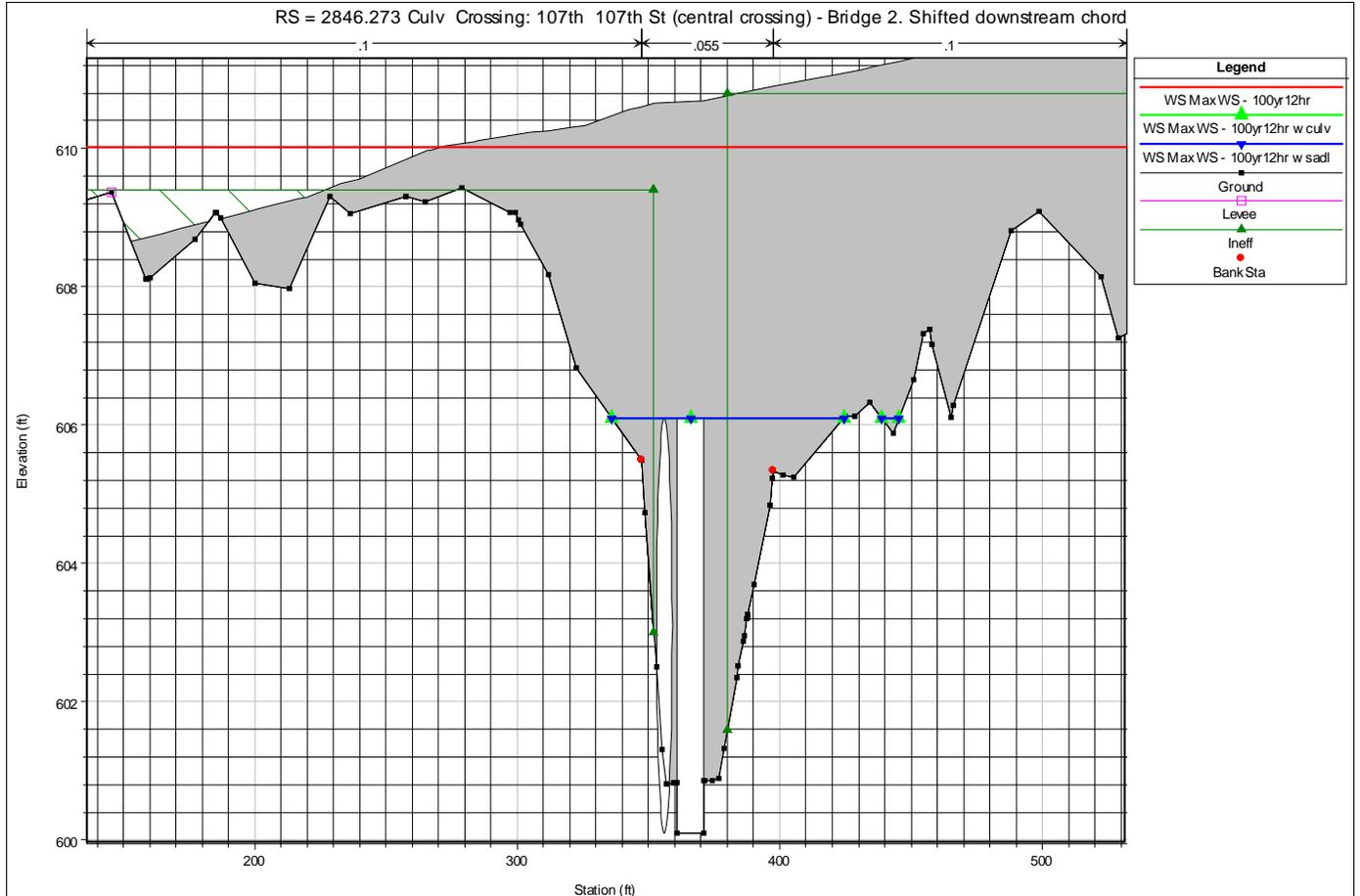


Figure 3

# 107<sup>th</sup> Street Bridge



## Hydrologic Data for Saganashkee Slough

Table x below presents some basic hydrologic data estimated from output from MWRD's Crooked Creek modeling from their DWP from the two, ten and one hundred year synthetic event 12 hour duration storms.

Table X – Hydrologic Information for Crooked Creek

Recurrence Interval (years)	12 hr duration Precip. (inches)	Crooked Creek Peak Flow (cfs)
2	2.6	190
10	3.9	362
100	6.6	917

*Additional Study Items for Design Phase*

Additional items will be studied during the design phase. These include:

- 1) Detailed H & H data section for the contractor in Specifications
- 2) IDOT permit for the McMahan Fen remediation work
- 3) IDNR floodway permit for the McMahan Fen remediation work
- 4) Erosion control design for McMahan Fen rivulets