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October 11, 2018

Village of Riverside
27 Riverside Road
Riverside, IL 60546

Attention: Jessica Frances
Village Manager

Subject: Proposed ACOE Groveland Levee Improvement
Response to Public Comments
(CBBEL Project No. 12-0544)

Dear Ms. Frances,

During the July 19, 2018 Village of Riverside Board meeting, a Maplewood Road resident presented information suggesting the U.S. Army Corps of Engineers (ACOE), Chicago District Groveland Avenue Levee modeling did not match the Federal Emergency Management Agency (FEMA) Flood Insurance Study (FIS) Des Plaines River modeling. He stated that since the 2009 Groveland Avenue Limited Strategic Study completed by the Illinois Department of Natural Resources – Office of Water Resources (IDNR-OWR) was more recent compare to the FEMA FIS its hydraulic model should have been used by the ACOE in their current Groveland Avenue Levee evaluation study.

The following is a list of the available Des Plaines River hydrologic and hydraulic models:

- The ACOE developed the Des Plaines River one-dimensional steady flow HEC-2 hydraulic model in September 1995. The ACOE 1999 Upper Des Plaines River Flood Damage Reduction Feasibility Study (Phase I Study) utilized the one-dimensional steady flow HEC-2 hydraulic model to establish Baseline Conditions and to evaluate potential flood mitigation projects. Within the vicinity of the Groveland Levee, the model included one (1) cross-section located 338 feet upstream of Forest Avenue. The August 19, 2008 FEMA Cook County FIS adopted the ACOE's Baseline Conditions one-dimensional steady flow HEC-2 hydraulic model.

- The October 2009 IDNR-OWR Groveland Avenue Limited Strategic Study used a hybrid approach since the study's focus was specifically on evaluating the Groveland Avenue flooding. They developed a Des Plaines River one-dimensional steady flow HEC-RAS hydraulic model between Hofmann Dam and 31st Street using new survey Des Plaines River channel cross-sections. The FIS Des Plaines River hydrology was adopted by IDNR-OWR. The downstream boundary condition for the Des Plaines River one-dimensional steady flow HEC-RAS hydraulic model was a rating curve representing the hydraulics of the Hofmann Dam. The Des Plaines River one-

dimensional steady flow HEC-RAS hydraulic model was not calibrated to historic flood events. IDNR-OWR evaluated several potential flood mitigation alternatives in the study including the following:

- Raise and extend the Groveland Avenue Levee to elevation 618';
- Extend Groveland Avenue Levee at elevation 616.1';
- Chicago Burlington & Quincy Railroad (CBQRR) pier realignment;
- CBQRR embankment culvert additions;
- Hofmann Dam removal;
- Salt Creek Diversion block; and
- CBQRR pier extensions.

The study's conclusion was the following:

"The railroad bridge modification alternative created the greatest reduction of water surfaces for the project area and reduces potential debris buildup. However, this alternative has little effect on increasing the level of protection to the Groveland Avenue floodprone area. Only the levee alternatives show a substantial reduction in flood risk to the study area which would provide the greatest benefit for the local residents"

**Since the IDNR-OWR hydraulic model did not include updated hydrology and was not calibrated, it should not be used as the "Best available Des Plaines River hydraulic model".**

- The Metropolitan Water Reclamation District (MWRD) completed the Detailed Watershed Plan for the Lower Des Plaines River Watershed (LDPR) on February 28, 2011. This study included the development of updated hydrologic and hydraulic models of the Des Plaines River watershed. MWRD adopted the HEC-HMS for the hydrologic model and a one-dimensional unsteady flow HEC-RAS for the hydraulic model. The one-dimensional unsteady flow HEC-RAS can model storage areas and hydraulic connections between storage areas and between reaches more accurately than the one-dimensional steady flow HEC-2 hydraulic model. The FEMA FIS Des Plaines River one-dimensional steady flow HEC-2 hydraulic model was converted to a one-dimensional unsteady flow HEC-RAS hydraulic model. Using new field survey information in conjunction with Cook County's LiDAR aerial topography the Des Plaines River one-dimensional unsteady flow HEC-RAS hydraulic model was updated with new cross-sections. In addition, various constructed flood control projects (i.e. Levee 37, Levee 50, Hofmann Dam removal, etc.) were incorporated into the model. The Des Plaines River HEC-HMS hydrologic and one-dimensional unsteady flow HEC-RAS hydraulic models were calibrated to the September 2008 historic flood event using the available United States Geological Survey (USGS) streamflow gages. The calibrated models were verified by simulating the October 2006 storm event. The calibrated HEC-HMS hydrologic model produce flow hydrographs for various design storm events including the 100-year. These hydrographs were input to the Des Plaines River one-dimensional unsteady flow HEC-RAS hydraulic model which then produced the design storm event flood profiles. The MWRD LDPR Des Plaines River HEC-HMS hydrologic and one-dimensional unsteady flow HEC-RAS hydraulic model produce the most current and best representation of the Des Plaines River hydrology and hydraulics. The LDPR unsteady flow HEC-RAS hydraulic model includes five (5)

Des Plaines River cross-sections north of Forest Avenue with the Area of the Groveland Avenue Levee. MWRD has submitted the MWRD LDPR HEC-HMS hydrologic and one-dimensional unsteady flow HEC-RAS hydraulic model to FEMA so they can be incorporated in the next Cook County FIS version.

**It is our opinion that the MWRD LDPR Des Plaines River one-dimensional unsteady flow HEC-RAS hydraulic model is the "Best available Des Plaines River hydraulic model".**

- For their Groveland Levee study, the ACOE adopted the MWRD LDPR Des Plaines River one-dimensional unsteady flow HEC-RAS hydraulic model. The ACOE enhanced the Des Plaines River one-dimensional unsteady flow HEC-RAS hydraulic model by simulating the Des Plaines River overflow entering the Groveland Avenue Levee study area from the north to be simulated using two-dimensional unsteady flow equations. This allows for a more defined way to determine the amount of Des Plaines River floodwaters that can enter the Groveland Avenue Levee study area and therefore more accurately determine if there are any hydraulic impacts from the proposed levee extension project.

Table 1 compares the Des Plaines River 100-year flood elevations from the various hydraulic models described above for the Groveland Avenue study area.

Table 1
Des Plaines River
100-year Flood Elevation Comparison
(NAVD88 datum)

| Cross-Section Designation | Cross-Section (Feet Upstream of Forest Avenue) | FEMA FIS | IDNR-OWR 2009 Study Model | MWRD 2011 Study Model | ACOE 2018 Groveland Levee Study Model |
|---|---|---|---|---|---|
| 101735.8 (1) | 0 | | | 615.1 | 615.0 |
| 101934.0 | 109 | | | 615.2 | 615.1 |
| FEMA W | 200 | 615.2 | | | |
| 102245.7 | 510 | | | 615.2 | 615.2 |
| 102535.6 | 800 | | | 615.3 | 615.2 |
| 102647.6 (2) | 912 | 615.3 | 616.4 (4) | 615.3 | 615.3 |
| 103020.7 (3) | 1,285 | 615.4 | | 615.4 | 615.3 |
| 103344.0 | 1,622 | 615.5 | | 615.5 | 615.5 |
| 103681.3 | 1,766 | 615.6 | | 615.6 | 615.6 |
| 103825.6 | 1,910 | 615.7 | | 615.7 | 615.6 |
| 10423.5 | 2,504 | 615.8 | | 615.8 | 615.8 |

(1) Upstream face of Forest Avenue Bridge
(2) Upstream of Park Lane
(3) 373 feet upstream of cross-section 102647.6
(4) Obtained from Table 1 of the IDNR-OWR October 2009 Groveland Avenue Limited Strategic Study report

As shown in Table 1, there are no significant differences in the 100-year flood elevations reported for the FEMA FIS, MWRD 2011 study or the ACOE 2018 Groveland Levee Study.

It is not clear why the IDNR-OWR's one reported 100-year flood elevation is different from the others.

If you have any questions, please feel free to contact me.

Sincerely,

Donald R. Dressel

Donald R. Dressel, PE, CFM
Vice President