Introduction

As part of the North Branch Chicago River (NBCR) DWP development, inundation mapping was produced based on hydrologic and hydraulic modeling. Tables 1 and 2 include a comparison of the inundation mapping created for this DWP to the effective FEMA floodplain mapping, revised August 19, 2008 as part of the FEMA Map Modernization program. Only detailed study Zone AE and limited detail Zone A special flood hazard areas (SPHA) are included in the comparison. FEMA Zone A SFHA exists in a portion of the Forest Preserve within the Mainstem of the NBCR, the Mainstem downstream of the dam, portions of the Skokie River, and the entire North Shore Channel. Additionally, the Lake Michigan Watershed does not contain any FEMA designated flood zones.

In some locations, other discrepancies exist between this DWP inundation area maps and the FEMA floodplain maps, which may be attributed to differences in hydrologic and hydraulic modeling, as described in more detail in the following paragraphs.

Hydrologic Modeling Methodology

Hydrologic modeling methodologies utilized for the District's DWP are fundamentally different than those performed for DFIRM mapping, thus estimated peak flow rates may be significantly different. DFIRM hydrology was primarily based on regression equations and older hydrologic models (HEC-1, TR-20, etc.) while this DWP utilized the current hydrologic model, HEC-HMS. Consequently, different approaches to channel and reservoir routing have been taken, which may result in magnitude and timing differences.

Parameters of each hydrologic model may be quite different. This DWP computed NRCS Curve Numbers based on the latest CMAP land use maps and NRCS soil maps. Contrarily, hydrologic methods utilized by the DFIRM mapping, likely referenced older land use and soil data. Additionally, different methodologies may have been used to calculate subbasin times of concentration.

This DWP utilized current ISWS Bulletin 71 rainfall data while previous hydrologic studies used for DFIRM mapping may have used older Technical Paper-40 rainfall data. Bulletin 71 rainfall data generally yields higher rainfall depths than Technical Paper-40. For example, Technical Paper-40 specifies a 100-year 24 hour duration rainfall depth of approximately 6.0 inches while Bulletin 71 specifies a corresponding rainfall depth of approximately 7.6 inches. Additionally, this DWP utilizes depth-area adjustments, which may not have been utilized in the DFIRM mapping.

Subbasin delineation is likely different between this DWP and the DFIRM mapping, as this DWP utilized the latest Cook County LiDAR data for topographic information to support subbasin delineation.

Difference in hydrologic modeling approaches may yield different flow rates, which will likely yield different flood surface profiles in the hydraulic model results.

Hydraulic Modeling Methodology

Hydraulic modeling methodologies utilized for this DWP are fundamentally different than those performed for DFIRM mapping, thus their associated flood surface profiles may be significantly different. Steady-state hydraulic modeling was generally performed in support of DFIRM mapping; this DWP utilized dynamic unsteady flow simulation. The difference in approaches between steady and unsteady hydraulic modeling may contribute to discrepancies between flood surface profiles.

Channel cross sections in the hydraulic models differ between this DWP and previous modeling. Cross sections developed under this DWP were generally obtained from field surveys and LiDAR data. Hydraulic models produced in support of DFIRM mapping may have used different cross section data, which may reflect outdated channel geometries. Likewise, bridge section geometries may also vary from previous modeling. Differences in model cross sections may contribute to discrepancies between flood surface profiles.

Hydraulic model calibration may also contribute to discrepancies in flood surface profiles between this DWP and DFIRM mapping. This DWP was calibrated to recent storm events that have occurred since the development of DFIRM modeling. The calibration may contribute to discrepancies between flood surface profiles.

DWP and FEMA Floodplain Area Comparison

Table 1 below lists for comparison the floodplain area within each subwatershed as determined by the NBCR DWP and DFIRM mapping (for both FEMA Zone AE, and FEMA Zone A).

TABLE 1

Comparison of DWP Inundation Area and FEMA Floodplain by Subwatershed

Subwatershed	DWP Floodplain Area (acres)	FEMA Zone AE Area (acres)	FEMA Zone A Area (acres)
West Fork	666.1	563.0	0
Middle Fork	444.1	386.8	0
Skokie River	2,303.2	1,498.3	447.2
Mainstem	951.5	487.7	404.1
North Shore Channel	129.7	0	149.4
Mainstem D/S of the Dam	241.2	0	223.5
TOTAL	**4,735.8**	**2,935.7**	**1,224.1**

*The Lake Michigan Watershed does not contain any designated FEMA Flood Zones

Table 2 below lists for comparison the floodplain area within each community within the NBCR watershed as determined by the NBCR DWP and the DFIRM mapping (for both FEMA Zone AE, and FEMA Zone A).

TABLE 2

Comparison of DWP Inundation Area and FEMA Floodplain by Community

Subwatershed	DWP Floodplain Area (acres)	FEMA Zone AE Area (acres)	FEMA Zone A Area (acres)
Chicago	713.7	86.2	657.5
Cook County Unincorporated Areas	957.3	920.2	58.5
Deerfield	21.5	33.2	0
Evanston	37.4	3.2	48.9
Glencoe	161.9	132.8	40.8
Glenview	473.6	336.4	0
Golf	45.5	32.1	0
Kenilworth	0	0.1	0
Lincolnwood	16.9	0	17.0
Morton Grove	214.5	177.1	0
Niles	101.2	100.5	0
Northbrook	412.3	366.1	3.4
Northfield	506.0	421.4	0
Skokie	39.0	0	41.2
Wilmette	328.7	83.5	13.0
Winnetka	710.0	298.2	344.8
TOTAL	**4,739.5**	**2,991.0**	**1,225.1**