Appendix A
DWP Inundation Area and FEMA Floodplain Comparison

Introduction

As part of the Little Calumet River DWP development, inundation mapping was produced based on hydrologic and hydraulic modeling. **Tables A1 and A2** below provide a comparison of the inundation area created for this DWP to that of 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 study Zone A special flood hazard areas (SFHA) are included in the comparison.

Caution should be exercised when evaluating the numbers in **Table A1** and **A2**, as differences in inundation area may result from differences in the extent of detailed hydraulic modeling performed between the District's DWP development process and the FEMA program. The relative impact of the differences is described below. The greatest reasons for any difference that will likely result in higher flood stages for DWP inundation areas are: the change to Bulletin 70 rainfall data; detailed critical duration analysis; including Tunnel and Reservoir Plan (TARP) areas; and using historic storm calibration versus calibrating to a discharge frequency curve. These detailed model development differences will tend to raise predicted stages throughout the watershed. Other modeling differences have resulted in more minor inundation area differences, more local in nature, resulting in higher or lower predicted stages.

Hydrologic Modeling Methodology

Hydrologic modeling methodologies utilized for the District's DWPs are 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 a more current hydrologic model (HEC-HMS). Consequently, different approaches to channel and reservoir routing may have been taken, which may result in peak magnitude and timing differences.

The parameters used for each hydrologic model may also be different. This DWP computed NRCS Curve Numbers based on the latest CMAP land use maps and NRCS soil maps. Hydrologic methods utilized by the FEMA DFIRM process 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 70 rainfall data while previous hydrologic studies used for DFIRM mapping may have used older Technical Paper-40 rainfall data. Bulletin 70 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 5.7 inches, while Bulletin 70 specifies a corresponding rainfall depth of approximately 7.6 inches. Additionally, this DWP utilizes depth-area adjustments, which may not have been utilized for DFIRM mapping. Also, detailed critical duration analysis was performed to identify the critical duration storms in each subwatershed.

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.

Tunnel and Reservoir Plan (TARP) subareas were incorporated into the DWP modeling, including the impact of diverting flow and filling the tunnels. Some of the earlier modeling of the Little Calumet River used for DFIRM mapping did not include the TARP areas as contributing runoff to the watershed. Within earlier modeling, the proposed TARP Thornton Reservoir was sized to contain the largest volume computed during continuous modeling performed for TARP. The currently proposed TARP Thornton Reservoir is much smaller than the original proposed volume, and the combined sewer area will contribute runoff to the Little Calumet River watershed during larger events.

Hydraulic Modeling Methodology

Hydraulic modeling methodologies utilized for this DWP are different than those performed for DFIRM mapping, thus their associated flood surface profiles may be 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. The differences may contribute to discrepancies between flood surface profiles. Cross sections developed under this DWP were generally obtained from rigorous field survey. In a few cases, recent hydraulic models were available and modified under this DWP. If recent hydraulic models were used, several cross sections were verified with field surveying. Hydraulic models produced in support of DFIRM mapping may have used different cross-sectional data, which may reflect outdated channel geometries. Likewise, bridge section geometries may also vary from previous modeling.

Hydraulic model calibration differences 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 differences may contribute to discrepancies between flood surface profiles.

DWP and FEMA Floodplain Area Comparison

Table A1 below depicts the floodplain area within each subwatershed as determined by the Little Calumet River DWP and DFIRM mapping (for both FEMA Zone AE, and FEMA Zone A).

Table A1: 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)
Butterfield Creek	1,267.5	1,556.0	135.1
Calumet Union Drainage Ditch	910.8	478.4	135.0
Deer Creek	1,305.0	1,267.1	1.2
Hart Ditch	13.4	7.8	
Little Calumet River	1,505.0	1,136.7	76.9
Midlothian Creek	762.9	833.6	151.7
North Creek	2,134.7	2,233.8	42.4
Plum Creek	239.3	238.4	
Thorn Creek	1,546.2	1,132.8	174.7
Totals	**9,683.9**	**8,884.6**	**717.0**

1. Subwatersheds with no DWP mapping were not included in the table. Some FEMA Zone A does exist in these locations.

2. The floodplain area comparisons are within the Cook County

Table A2 depicts the floodplain area within each community within the Little Calumet River watershed as determined by the Little Calumet River DWP and DFIRM mapping (for both FEMA Zone AE, and FEMA Zone A).

Table A2: Comparison of DWP Inundation Area and FEMA Floodplain by Community

Community	DWP Floodplain Area (acres)	FEMA Zone AE Area (acres)	FEMA Zone A Area (acres)
Blue Island	36.1	62.5	5.1
Calumet City	309.8	261.6	
Calumet Park	0.3	0.7	
Chicago Heights	337.4	193.8	82.1
Country Club Hills	32.8	88.8	60.1
Crestwood	0.1		
Crete			0.1
Dixmoor	80.3	15.6	7.4
Dolton	24.9	21.1	17.8
East Hazel Crest	0.6		14.4
Flossmoor	138.0	191.6	3.1
Ford Heights	284.4	261.4	
Glenwood	189.8	178.5	1.1

Table A2: Comparison of DWP Inundation Area and FEMA Floodplain by Community

Community	DWP Floodplain Area (acres)	FEMA Zone AE Area (acres)	FEMA Zone A Area (acres)
Harvey	548.7	193.3	
Hazel Crest	159.7	104.7	75.7
Homewood	135.2	115.5	0.0
Lansing	459.8	345.7	
Lynwood	862.7	1024.1	42.4
Markham	350.4	185.1	8.1
Matteson	476.6	559.7	55.6
Midlothian	136.8	116.0	
Oak Forest	236.5	234.2	15.8
Olympia Fields	91.5	92.2	28.5
Orland Hills	4.6		10.4
Orland Park	9.1	1.2	
Park Forest	162.8	9.0	
Phoenix	0.4	0.2	
Posen	12.4		91.8
Richton Park	83.7	125.3	9.8
Riverdale	23.0	23.2	
Robbins	39.9	99.5	
Sauk Village	137.8	173.9	
South Chicago Height	28.2	13.5	19.3
South Holland	527.1	492.3	
Steger	23.7		24.2
Thornton	31.6	29.0	5.9
Tinley Park	215.8	212.1	8.1
UNINCORP	3483.5	3454.3	130.2
University Park	7.9	4.9	
Totals	**9,683.9**	**8,884.6**	**717.0**