Final Report

Detailed Watershed Plan for the Lower Des Plaines River Watershed: Volume 1

Prepared for

Metropolitan Water Reclamation District of Greater Chicago

February 28, 2011

CBB

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Detailed Watershed Plan for the Lower Des Plaines River Watershed

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Executive Summary

Background

The Metropolitan Water Reclamation District of Greater Chicago (District) has authority for regional stormwater management within Cook County as granted by the Illinois General Assembly in Public Act 93-1049 (the Act). The Act requires the District to develop watershed plans for six Cook County watersheds, which include the North Branch of the Chicago River, Lower Des Plaines River, Calumet-Sag Channel, Little Calumet River, Poplar Creek, and Upper Salt Creek. The District published the *Cook County Stormwater Management Plan* (CCSMP) in February 2007 to identify stormwater management goals and to outline the District's approach to watershed planning. Chapter 6 of the CCSMP defines the District's approach to and standards for Detailed Watershed Plans (DWPs), which address regional stormwater problems in Cook County. The six major watersheds for which DWPs are being developed cover approximately 730 square miles in Cook County. The primary goals of the DWPs are as follows:

- Document stormwater problem areas.
- Evaluate existing watershed conditions using hydrologic and hydraulic models.
- Produce flow, stage, frequency, and duration information about flood events along regional waterways.
- Estimate damages associated with regional stormwater problems.
- Evaluate potential solutions to regional stormwater problems.

The Lower Des Plaines River DWP was developed to meet the goals for the Lower Des Plaines River Watershed as described in the CCSMP. The Act required the formation of Watershed Planning Councils (WPCs) to advise the District during development of its countywide stormwater management program; therefore, the DWPs were developed in coordination with the WPCs. Membership of the WPCs consists of the chief elected official of each municipality and township in each watershed, or their designees. Many municipalities and townships are represented by engineers, elected officials, or public works directors. WPC meetings are also open to the public. Frequent coordination with WPCs was performed to ensure that local knowledge is integrated into the DWP and the DWP reflects the communities' understanding of watershed issues as well as the practicability of proposed solutions.

Detailed Watershed Plan Scope

The scope of the Lower Des Plaines River DWP includes the development of stormwater improvement projects to address regional problem areas along open waterways. Regional problems are defined as problems associated with waterways whose watersheds encompass multiple jurisdictions and drain an area greater than 0.5 square miles. Problems arising from capacity issues on local systems, such as storm sewer systems and minor open channel ditches, even if they drain more than one municipality, were considered local and beyond the scope of this study. Erosion problems addressed in this plan were limited to active erosion along regional waterways that pose an imminent risk to structures or critical infrastructure. Interstate highways, U.S. highways, state routes, county roads with four or more lanes, and smaller roads providing critical access that are impacted by overbank flooding of regional waterways at depths exceeding 0.5 feet were also considered regional problems.

Watershed Overview

The Des Plaines River Watershed is located in portions of Racine and Kenosha Counties in Wisconsin and Lake, Cook, DuPage, and Will Counties in Illinois. The majority of the watershed is urban developed area within the Chicago metropolitan area with most remaining agricultural lands in Lake and Will Counties. Approximately 680 square miles of watershed area is tributary to the Des Plaines River at the Cook-Will County border.

For the purpose of this study, the Lower Des Plaines River DWP, the portion of the Des Plaines River Watershed located within Cook County north of the Chicago Sanitary and Ship Canal, excluding the Upper Salt Creek Watershed is the study area highlighted on Figure ES.1. Tributary subwatersheds included within the Lower Des Plaines River Watershed study area include: 67th Street Ditch, Addison Creek, Buffalo Creek, Chicago Sanitary and Ship Canal, Crystal Creek, Des Plaines River Mainstem, Des Plaines River Tributary A, East Avenue Ditch, Farmers-Prairie Creek, Feehanville Ditch, Flagg Creek, Golf Course Tributary, McDonald Creek, Lower Salt Creek, Silver Creek, Weller Creek, and Willow Creek. The tributary subwatersheds are generally located on the west side of the Lower Des Plaines River and flow east towards the Lower Des Plaines River Mainstem except for the Farmers-Prairie Creek and Golf Course Tributary Subwatersheds that are located on the east side of the Lower Des Plaines River Mainstem.

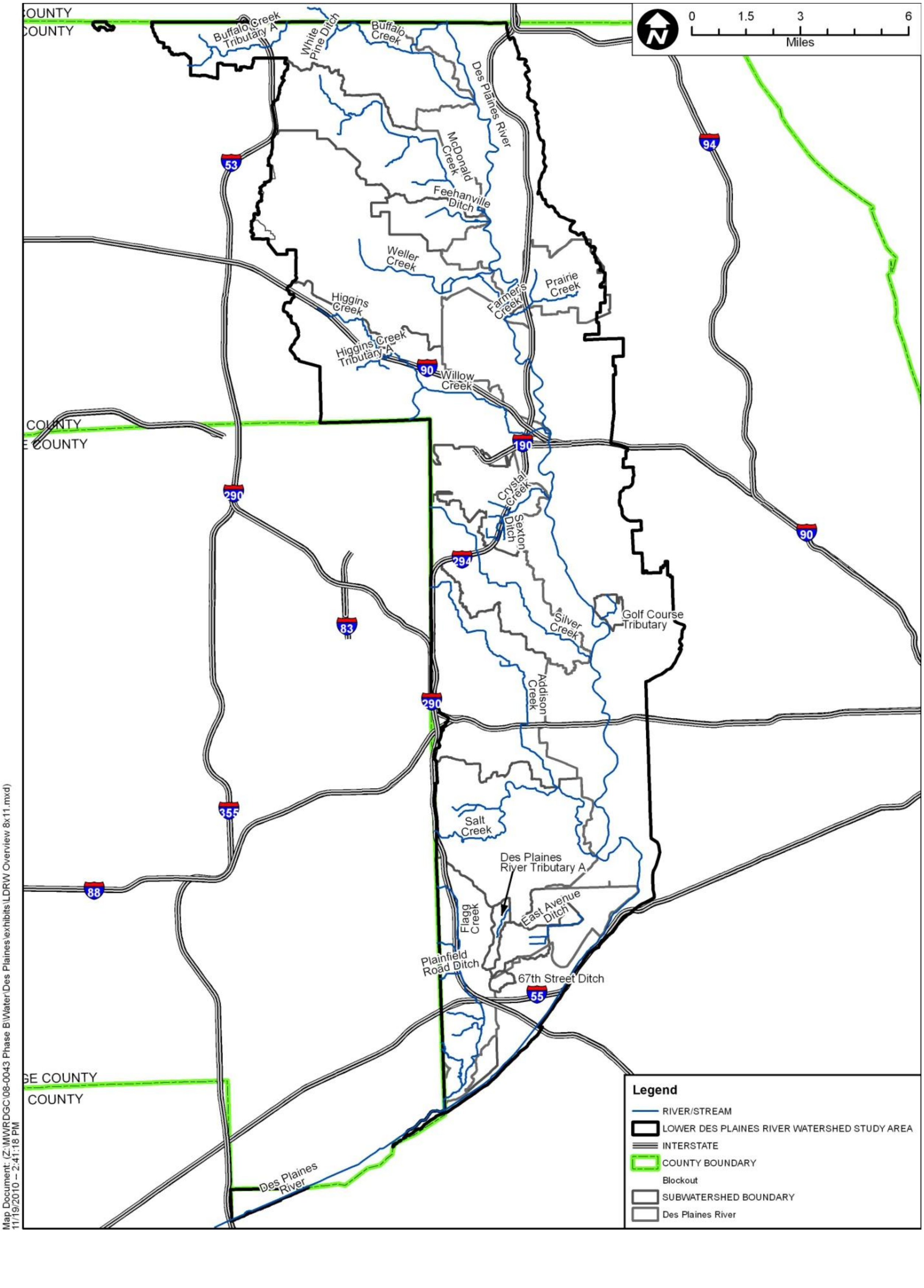
Existing Conditions Evaluation

Locations with historic flooding and streambank erosion problems on regional waterways exist throughout the watershed. Information on existing problem areas was solicited from WPC members as well as federal and state agencies and other stakeholders during the data collection and evaluation phase of the DWP development, which also included the collection of additional data regarding the watershed and evaluation of the data's acceptability for use. Responses from stakeholders were used to help identify locations of concern, and where field assessment or surveys were needed to support hydrologic and hydraulic modeling.

Hydrologic models were developed to represent runoff generated by rainfall throughout the Lower Des Plaines River Watershed. The runoff was then routed through hydraulic models, which were created for the major open channel waterways within the watershed. Design rainfall events were simulated for the 2-, 5-, 10-, 25-, 50-, 100-, and 500-year recurrence interval events based upon Bulletin 71 rainfall data (ISWS, 1992). The simulated water surface profiles were overlaid upon a ground elevation model of the study area to identify structures at risk of flooding.

Property damages due to flooding were estimated using a methodology consistent with the U.S. Army Corps of Engineers (USACE) Flood Damage Assessment program. Estimated flood damage resulting from a storm was considered in combination with the probability of the event occurring to estimate an expected annual damage. Erosion damages were assessed for structures or infrastructure at risk of loss due to actively eroding streambanks.

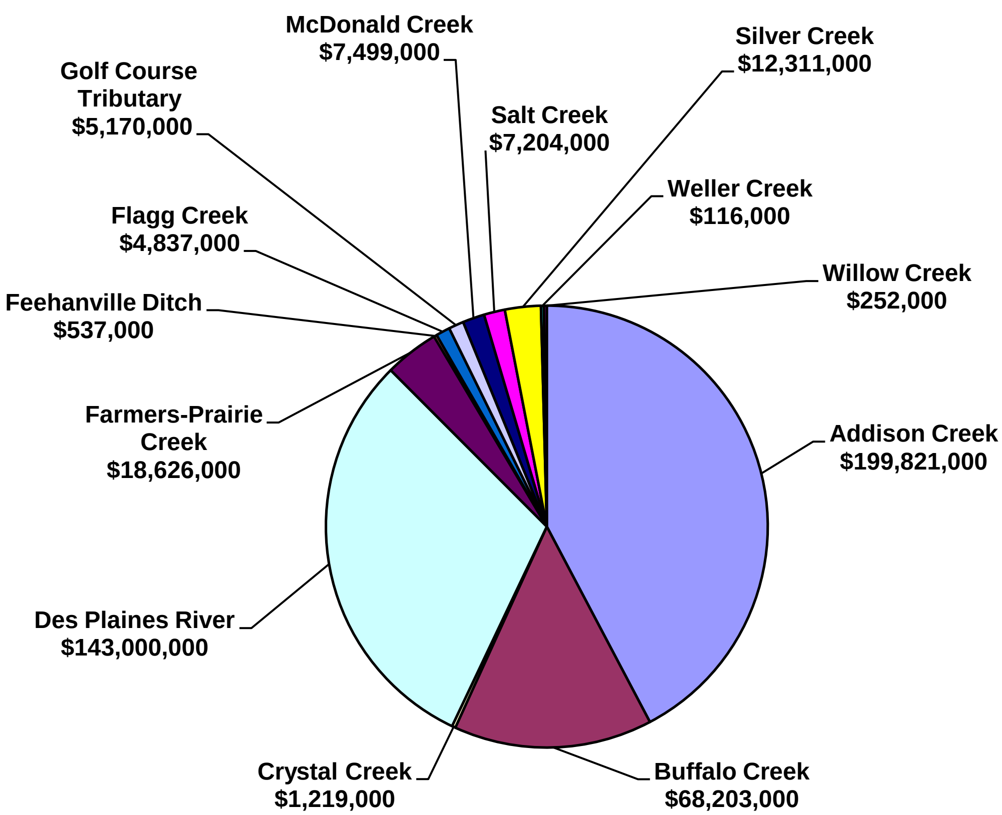
FIGURE ES.1
Lower Des Plaines River Watershed Overview



Damages reported within this document refer to economic damages estimated over a 50-year period of analysis that result from regional overbank flooding or erosion of a regional waterway. Additional damages throughout the watershed exist, including damages due to flooding from local waterways and storm sewer systems, and also damages not easily quantified in financial terms such as water quality, wetland, riparian, and habitat impact, loss of emergency access, and loss of business or operations due to limited transportation access.

Figure ES.2 summarizes the distribution of existing conditions damages within the Lower Des Plaines River Watershed over a planning period of analysis of 50 years. The Addison Creek Subwatershed is not the largest subwatershed; however, it has the greatest existing damages. The subwatershed has numerous flood control reservoirs; however, the risk of overbank flooding is significant as there are many communities where structures adjacent to the creek are at risk of flooding during more frequent storm events. The Mainstem Lower Des Plaines River (MLDPR) Subwatershed has the second highest amount of damages under existing conditions. While the MLDPR Subwatershed has the largest subwatershed area, much of the land along the MLDPR corridor is located within the Forest Preserve District of Cook County. There are several areas that are at risk of flooding during frequent storm events; however, numerous locations are only at risk of flooding during less frequent storm events. Approximately 40% of the existing damages within the MLDPR Subwatershed consist of transportation damages.

FIGURE ES.2
Summary of Existing Conditions Damages within the Lower Des Plaines River Watershed over 50-Year Period of Analysis



Note: East Avenue Ditch, Des Plaines River Tributary A, 67th Street Ditch and the Chicago Sanitary and Ship Canal Subwatersheds are not included in Figure ES.2 as they do not have existing conditions damages.

The estimated damages summarized in Figure ES.2 include calculated regional damages related to overbank flooding and erosion problems on regional waterways that threaten structures only and transportation damages. Localized problems, such as storm-sewer capacity related problems, are not included in this estimate. Reported problems classified as local are presented in Table 2.2.1 in Section 2.2.1. Also provided in Table 2.2.1 is the reasoning behind classifying the problems as local or regional.

Evaluation of Alternatives

Stormwater improvements, or alternatives, were developed to address regional stormwater problems along intercommunity waterways. WPC members participated in the alternative development process by providing input on possible solutions and candidate sites for new stormwater infrastructure. It should be noted that the alternatives presented in the DWP are developed at a conceptual level of feasibility.

Hydrologic and hydraulic models were used to determine the benefit of alternative stormwater improvement projects. Models were run and damages were calculated for the existing conditions evaluation. Benefits were calculated for each project as the difference between existing and alternative conditions damages. Only regional financial benefits (e.g., relief of flooding due to a regional problem as defined above) were considered. Local benefits (e.g., improved sewer drainage due to reduced outlet elevation) and non-economic benefits (e.g. improved emergency access, improved wetland, riparian, and habitat, and improved access to businesses) are not included in the benefits. The alternative stormwater improvement projects may have significant local and non-economic benefits. Local benefits are not reported in the DWP, which focuses on regional benefits.

Conceptual level cost estimates were produced to represent the estimated costs for design, construction, and maintenance of a specific alternative over a 50-year period of analysis. The cost estimates were developed using standard unit cost items located within a District database and used for all six watershed plans. In addition, standard markups on the estimated capital costs, such as utility relocation, design and engineering costs, contractors profit and contingency, and property acquisitions were included.

A benefit-to-cost (B/C) ratio was developed for each alternative, which represents the ratio of estimated benefits to costs. The B/C ratios calculated may be used to rank the alternatives in a relative manner as the District's Board of Commissioners prioritizes the implementation of recommended stormwater improvement projects. Only regional financial benefits were considered in determination of the B/C ratios. The B/C ratios do not include local and non-economic benefits and should not be interpreted to be the sole measure of justification of an alternative. In addition to the B/C ratio, noneconomic criteria such as water-quality impact, number of structures protected, and impact on wetland and riparian areas were noted for each alternative. These criteria may also be considered along with the calculated B/C ratios as the District's Board of Commissioners prioritizes the implementation of recommended stormwater improvement projects.

It should be noted that at the time of this report, the USACE is performing a study of the Des Plaines River and its tributaries in Illinois and Wisconsin, upstream of the confluence with Salt Creek at Riverside, Illinois, to determine the feasibility of improvements in the interests of flood damage reduction, environmental restoration and protection, water quality, recreation, and related purposes. Frequent coordination between the District and USACE resulted in a parallel approach to identifying potential solutions to problem areas within the limits of each of these studies.

Recommendations

Alternatives were recommended based upon consideration of the project's ability to reduce stormwater damages and to address regional problems reported by communities. Table ES.1 lists the recommended alternatives, their costs, and regional financial benefits. Note that additional benefits to the local drainage systems and non-economic benefits will result from the recommended alternative projects.

Figure ES.3 summarizes the extent to which recommended alternatives address existing regional financial damages within each tributary, ordered by increasing existing conditions damages. Figure ES.3 lists the Lower Des Plaines River subwatersheds in order of increasing existing conditions damages. The existing conditions damages and the benefits for each subwatershed are plotted as a line graph against each other to picture the amount of damages which are addressed by the alternatives within each subwatershed. This is also plotted as percent damage addressed for each subwatershed. This shows the amount of damage the alternatives address for each subwatershed. For example, the bar graph for McDonald Creek shows that just over 60% of the damages are addressed by the recommended alternatives in that subwatershed, while 100% of the damages in the Weller Creek, Feehanville Ditch, Golf Course Tributary, and Salt Creek subwatersheds are addressed by the recommended alternatives in these subwatersheds.

Each subwatershed shows a diamond representing the B/C ratio. This B/C ratio, plotted against the percent damages addressed bar graph, indicates that there are some subwatersheds that may address a high percentage of damages, but at a very low B/C ration. For example, Weller Creek has 100% of the damages addressed, but with a B/C ratio of 0.01. This indicates that the cost to address these damages is 100 times greater than the benefit itself.

TABLE ES.1
Recommended Alternatives Summary for the Lower Des Plaines River Watershed

Project	Category	Description	B/C Ratio	Total Benefits	Total Project Cost	Probable Construction Cost	Cumulative Structures Removed from 100-Year Inundation	Communities Involved
ADCR-6b[1]	Flood Control Storage/Conveyance	960 A-F reservoir on Addison Creek with pump station modification, new pump station, and channel improvements	1.5	$196,463,000	$133,921,000	$102,500,000	954	Northlake, Stone Park, Melrose Park, Bellwood, Westchester
ADCR-7	Streambank Stabilization	Stabilize eroded streambank between Whitehall and Wolf Road, and along Fullerton Avenue/King Arthur Drive	2.3	$1,896,000	$809,000	$438,000	0	Northlake
ADCR-9	Streambank Stabilization	Stabilize eroded streambank south of Cermak Road to stabilize east bank at 19th Avenue	1.2	$270,000	$219,000	$120,000	0	North Riverside
BUCR-1B	Conveyance/ Mitigation Storage	Increase conveyance on Buffalo Creek from Lake-Cook Road to Aptakisic Road, partial bulkhead Lake-Cook Road crossing to provide storage in Buffalo Grove Golf Course	1.3	$808,000	$613,000	$310,000	10	Buffalo Grove, Wheeling
BUCR-4	Conveyance/ Mitigation Storage	Increase conveyance on Buffalo Creek from Hicks road to Lynda Road and Laurel Drive to Baldwin Road, replace 4 culverts, 45 A-F reservoir for mitigation storage	0.7	$5,671,000	$8,544,000	$5,469,000	48	Palatine, Palatine Township
BUCR-5	Flood Control Storage/Floodwall	310 A-F reservoir on non developed property in Wheeling east of Buffalo Grove Road, 4,125 LF floodwall	0.03	$1,926,000	$61,687,000	$37,315,000	106	Wheeling
CYCR-4	Conveyance/ Mitigation Storage	Divert Crystal Creek Tributary under I-294, then under Irving Park Road to a 100 A-F reservoir. Pump station for internal drainage associated with Sexton Ditch	0.03	$1,199,000	$42,671,000	$21,523,000	94	Franklin Park, Schiller Park, Chicago
DPR-1	Floodwall	6,000 LF floodwall between Des Plaines River and Milwaukee Avenue	0.01	$259,000	$17,826,000	$10,416,000	6	Wheeling
DPR-2B	Conveyance	Raise Central Road and enlarge waterway opening, raise Rand Road, Algonquin Road and Oakton Street	0.4	$7,884,000	$18,967,000	$14,466,000	0	Des Plaines
DPR-3A	Floodwall/ Mitigation Storage	26,500 LF floodwall west side of Des Plaines River in Des Plaines, 3 USACE concept reservoirs	0.1	$52,566,000	$523,019,000	$284,075,000	300-500	Des Plaines
DPR-4	Road Raise	Raise Higgins Road, River Road, and Glenlake Avenue	0.2	$1,558,000	$9,305,000	$6,710,000	0	Rosemont
DPR-5	Floodwall/Road Raise	6,600 LF floodwall east side of River Road between Irving Park Road and Belmont Road, raise Irving Park Road, raise Lawrence Avenue	0.3	$9,936,000	$28,620,000	$17,528,000	13	Schiller Park, Franklin Park
DPR-6D	Floodwall/Road Raise	7,500 LF floodwall west of Des Plaines River, 3,000 LF floodwall east of Des Plaines River north of 1st Ave. Raise and enlarge waterway opening at Grand Avenue, raise 1st Avenue	0.4	$19,353,000	$45,892,000	$30,271,000	115	River Grove, Elmwood Park
DPR-8A	Road Raise	Raise Chicago Avenue over Des Plaines River	0.04	$407,000	$10,371,000	$8,652,000	0	River Forest
DPR-8B	Floodwall	2,150 LF floodwall north of Lake Street east side of Des Plaines River	0.2	$985,000	$6,098,000	$3,539,000	19	River Forest
DPR-9A	Road Raise	Raise Roosevelt Road and enlarge waterway opening over Des Plaines River	0.2	$822,000	$4,597,000	$3,996,000	0	Forest Park
DPR-10	Road Raise	Raise Cermak Road over Des Plaines River	0.2	$127,000	$538,000	$383,000	0	Proviso Township and Riverside Township

Project	Category	Description	B/C Ratio	Total Benefits	Total Project Cost	Probable Construction Cost	Cumulative Structures Removed from 100-Year Inundation	Communities Involved
DPR-11C	Floodwall/Road Raise	1,300 LF floodwall west of Des Plaines River, 3,500 LF floodwall east of Des Plaines River, raise Forest Avenue and 1st Avenue, straighten piers at railroad bridge south of Forest Avenue	0.4	$11,768,000	$28,267,000	$17,540,000	59	Riverside, North Riverside
DPR-12	Road Raise	Raise Ogden Avenue adjacent to Des Plaines River	0.05	$52,000	$1,029,000	$724,000	0	Lyons
DPR-13	Floodwall	2,400 LF floodwall west side of Des Plaines River	1.4	$14,100,000	$9,881,000	$5,918,000	39	Riverside
DPR-14A	Floodwall	1,200 LF floodwall west side of Des Plaines River north of 47th Street	0.08	$371,000	$4,595,000	$2,773,000	12	Lyons
DPR-14B	Conveyance	Raise 47th Street over Des Plaines River	0.01	$270,000	$18,201,000	$16,361,000	0	Lyons
DPR-14C	Levee Enhancement	McCook levee enhancement, 3,000 LF of sheet piling floodwall	0.2	$1,350,000	$8,266,000	$6,555,000	17	McCook, Summit, Lyons
DPR-14D	Levee Enhancement	3,000 LF floodwall east of Des Plaines River, north of 47th Street	0.03	$8,622,000	$260,991,000	$217,548,000	204	Stickney, Forest View
DPR-15	Floodwall	6,500 LF floodwall west of Des Plaines River	<0.01	$194,000	$25,786,000	$15,372,000	5	Hodgkins
DPR-26	Road Raise	Raise North Avenue over Des Plaines River	0.08	$322,000	$4,243,000	$2,515,000	0	Elmwood Park, River Forest, River Grove
FRCR-12	Mitigation Storage/Conveyance	FRCR 1, FRCR 4, FRCR 7, FRCR 8, FRCR 9	1.0	$18,877,000	$19,788,000	$12,695,000	128	Maine Township, Park Ridge, Des Plaines, Niles
FHDT-2	Floodwall	1,130 LF floodwall west of River Road at Feehanville Ditch	0.06	$537,000	$8,570,000	$5,648,000	9	Wheeling Township
FGCR-1	Flood Control Storage	Lower soccer fields in Spring Rock Park by 8 feet. Regrade west of soccer field	0.05	$290,000	$6,230,000	$3,615,000	23	Western Springs
FGCR-2	Floodwall/Conveyance	Floodwall along west side of Wolf Road, raise Roofers Lane entrance by 2 feet. Flagg Creek channel improvements	0.02	$184,000	$10,563,000	$6,788,000	3	Indian Head Park
FGCR-3	Floodwall	Floodwall on west side of Flagg Creek	0.06	$223,000	$3,689,000	$2,418,000	3	Lyons Township
FGCR-4	Conveyance	Remove and replace pedestrian entrance, remove and re-place auto entrance across Flagg Creek north of German Church Road	0.7	$489,700	$668,000	$608,000	4	Burr Ridge, Willow Springs, Lyons Township
FGCR-5	Conveyance	Raise roadway west of Flagg Creek crossing of 91st Street, provide 2 box culverts under 91st and Orchard	0.01	$27,000	$2,455,000	$1,461,000	0	Lyons Township
59DT-1	Levee Enhancement	Enhance earthen berm at east side of Legge Park	0.1	$127,000	$969,000	$53,000	5	Burr Ridge, Hinsdale
FGTB-1	Conveyance/Bridge Replacement	New outfall channel for Flagg Creek Tributary B, channel improvements, concrete weir, two 4 feet diameter culverts, new park district maintenance and pedestrian bridge	2.2	$1,832,000	$816,000	$328,000	1	Burr Ridge, Lyons Township
GCTR-1	Floodwall/Conveyance	1,940 LF floodwall, new storm sewer system on Courtland Drive and Country Club Lane to convey flow to new pump station	0.3	$5,170,000	$15,486,000	$9.884,000	50	Elmwood Park, River Grove
MCTA-1	Flood Control Storage/Conveyance	20 A-F reservoir on park in Prospect Heights, 20 A-F reser-voir in Wheeling, culvert improvements at Hillcrest Drive, road improvements at Hillcrest Drive/Owen Court	0.03	$314,000	$9,430,000	$6,195,000	0	Prospect Heights, Wheeling
MDCR-2	Levee/Conveyance/Flood Control Storage	4,100 LF floodwall, channel improvements south of Camp McDonald Road, 20 A-F reservoir in Mount Prospect.	0.1	$1,842,000	$15,625,000	$9,845,000	13	Prospect Heights, Mount Prospect
MDCR-3	Floodwall	2,200 LF floodwall west of Des Plaines River Road	0.2	$2,438,000	$10,368,000	$6,774,000	8	Wheeling Township
MDCR-5	Streambank Stabilization	Streambank stabilization	0.3	$204,000	$798,000	$423,000	0	Mount Prospect
STCR-5	Floodwall/ /Flood Control Storage/ Conveyance	3,335 LF floodwall, 2,000 LF floodwall, 2,465 LF floodwall, 160 A-F reservoir north of Brookfield Village Hall, channel improvements	0.2	$7,180,000	$39,964,000	$24,593,000	50	Brookfield, Lyons

Project	Category	Description	B/C Ratio	Total Benefits	Total Project Cost	Probable Construction Cost	Cumulative Structures Removed from 100-Year Inundation	Communities Involved
SLCR-2	Flood Control Storage	Expansion of Structure 102 by 250 A-F, 150 A-F reservoir south of Belmont Avenue, 80 A-F reservoir north of Grand Avenue	0.2	$10,416,000	$51,501,000	$36,718,000	269	Melrose Park, Franklin Park, Leyden Township
SLCR-5	Road Raise	Raise Irving Park Road on Silver Creek and replace existing culverts	0.06	$239,400	$3,945,000	$2,652,000	0	Chicago, Franklin Park
WECR-1	Floodwall/Conveyance	750 LF floodwall and additional box culvert on Weller Creek	0.01	$116,000	$10,660,000	$5,223,000	24	Des Plaines
HGCR-1	Streambank Stabilization	Rehabilitate existing weir and stabilize west streambank west of Elmhurst Road	0.3	$247,000	$763,000	$531,000	1	Des Plaines

[1]The project ADCR-6b could be constructed in phases with the reservoir and pump station modification in phase 1 and channel improvements in Phase 2.

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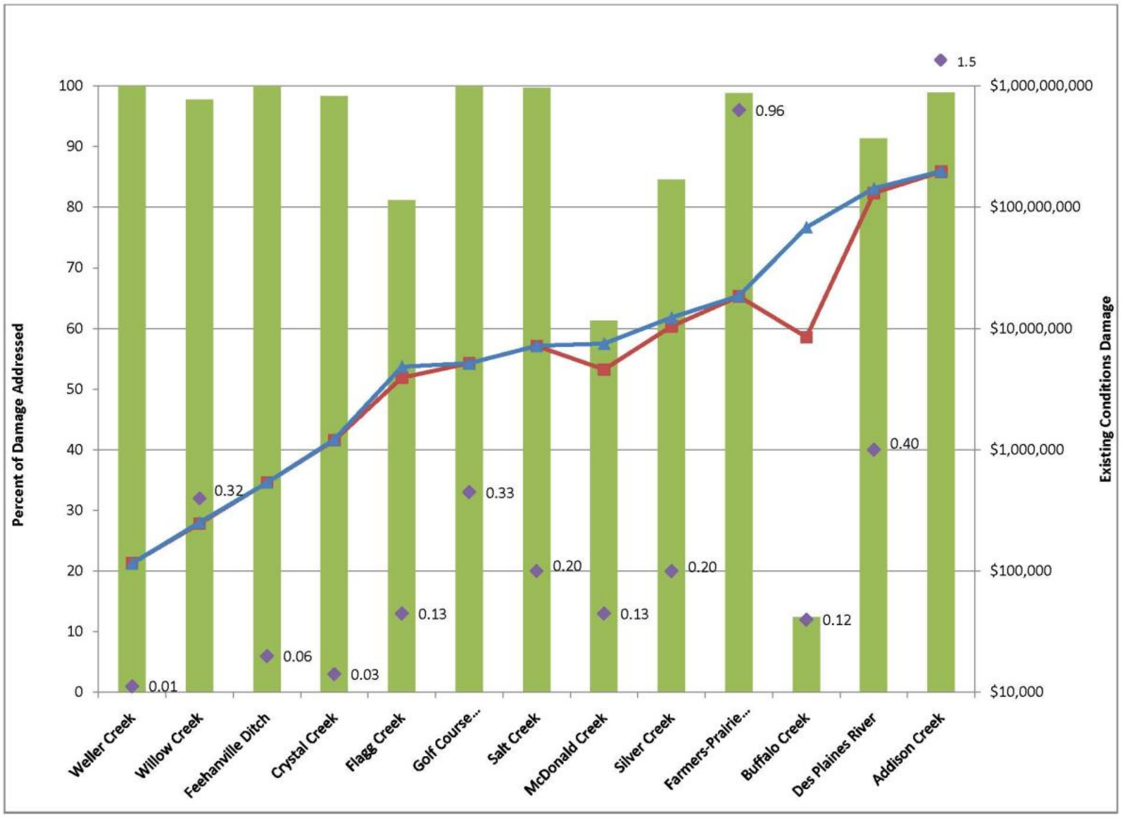
Stated simply, areas with lower existing regional financial damages show lower benefits from flood control projects.

FIGURE ES.3
Lower Des Plaines River Watershed Alternative Summary



The Lower Des Plaines River DWP integrated stormwater data from a large number of sources to identify and prioritize solutions to existing stormwater problems. An extensive data collection effort undertaken for the DWP development included surveying of streams, bridges, and culverts throughout much of the watershed. Field reconnaissance was performed throughout the watershed to understand conditions unique to the watershed. This compilation of current, accurate data was used by the District to document and identify existing stormwater problems throughout the study area.

A large number of alternatives were developed and evaluated for their effectiveness in reducing regional damages within the Lower Des Plaines River Watershed. The alternatives listed in Table ES.1 were identified as the most effective improvements for reducing expected damages due to flooding and erosion within the watershed. In some tributaries, greater opportunities to reduce regional flooding were identified than in others. Factors such as the lack of availability of land and location of structures relative to stream channels limited the practicality of some alternative projects to eliminate all flooding damages for the design storms evaluated.

The enabling legislation (70 ILCS 2605/7h (g)) for the District's stormwater management program states "the District shall not use Cook County Forest Preserve District land for stormwater or flood control projects without the consent of the Forest Preserve District (FPD)"; therefore proposed projects involving FPD property cannot be implemented without FPD's permission. The District will work collaboratively with FPD to develop multi- objective projects beneficial to both agencies along with our constituents and also consistent with our individual mission

The data provided in the Lower Des Plaines River DWP will be used by the District, along with consistently developed data in DWPs for the other five major Cook County Watersheds, to prioritize the implementation of stormwater improvement projects.

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Figures

Notes: Figures not embedded in the chapters are contained in Volume 2.
Tributary Overview, Proposed Alternative, and Recommended Alternative Figure titles begin with *Lower Des Plaines River Detailed Watershed Plan*

Figures (*continued*)

Figures (*continued*)

Figures (*continued*)

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Appendices

Acronyms and Abbreviations

A-F	Acre-feet
ACRC	Addison Creek Restoration Commission
AMC	Antecedent Moisture Condition
B/C	Benefit-to-cost
CAWS	Chicago Area Waterway System
CBBEL	Christopher B. Burke Engineering, Ltd.
CCHD	Cook County Highway Department
CCSMP	Cook County Stormwater Management Plan
CCTA	Cook County Tax Assessor
CDM	Camp Dresser and McKee Inc.
CFS	Cubic feet per second
CIP	Capital Improvement Program
CN	Curve Number
CMAP	Chicago Metropolitan Agency for Planning
CSSC	Chicago Sanitary and Ship Canal
CTE	Consoer, Townsend, Envirodyne Engineering Inc.
CUH	Clark's Unit Hydrograph
CWA	Clean Water Act
DEM	Digital elevation model
DFIRM	Digital Flood Insurance Rate Map
DSS	Data Storage System (DSS)
DWP	Detailed Watershed Plan
FEMA	Federal Emergency Management Agency
FFE	First floor elevations
FGCS	Federal Geodetic Control Subcommittee
FIA	Federal Insurance Administration
FIS	Flood Insurance Study
FPDCC	Forest Preserve District of Cook County
FT	Feet
GIS	Geographic information systems
GPS	Global Positioning System
HA	USGS Hydrologic Atlas
HARN	High Accuracy Reference Network
HEC-1	Flood Hydrograph Package (Hydrologic Engineering Center computer program)
HEC-HMS	Hydrologic Engineering Center-Hydrologic Modeling System
HEC-RAS	Hydrologic Engineering Center-River Analysis System
HSPF	Hydrological Simulation Program - FORTRAN
HWM	High water marks
IDNR-OWR	Illinois Department of Natural Resources – Office of Water Resources
IDOT	Illinois Department of Transportation
IEPA	Illinois Environmental Protection Agency

Acronyms and Abbreviations (*continued*)

ISWS	Illinois State Water Survey
LCSMC	Lake County Stormwater Management Commission
LiDAR	Light Detection and Ranging
LOMR	Letter of Map Revision
MLDPR	Mainstem Lower Des Plaines River
MWRD	Metropolitan Water Reclamation District of Greater Chicago
NAVD	North American Vertical Datum, 1988
NFIP	National Flood Insurance Program
NGS	National Geodetic Survey
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resource Conservation Service
NWL	Normal Water Level
O'Hare	O'Hare International Airport
OMP	O'Hare Modernization Program
PIN	Parcel Identification Number
R	Clark Unit Hydrograph storage coefficient
RCBC	Reinforce concrete box culvert
RCP	Reinforced concrete pipe
SCS	Soil Conservation Service
SSURGO	Soil Survey Geographic (Database)
TARP	Tunnel and Reservoir Plan
T_c	Time of Concentration
TIN	Triangulated Irregular Network
TMDL	Total maximum daily loads
TSS	Total suspended solids
NWI	National Wetlands Inventory
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
WPC	Watershed Planning Council
WMO	Cook County Watershed Management Ordinance
WSEL	Water surface elevation
WSP-2	Water Surface Profiles (SCS computer program)
Yr	Year

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1. Introduction

The headwaters of the Des Plaines River originate south of Union Grove in Racine County, Wisconsin where the River flows south through Kenosha County before entering Lake County, Illinois east of Interstate 94. The Des Plaines River then flows southerly through Cook County, Illinois where it turns to the southwest near Lyons to flow parallel to the Chicago Sanitary and Ship Canal until its confluence with the Kankakee River. The Des Plaines River Mainstem is approximately 150 miles in total length and flows through the Lake and Cook County Forest Preserve District corridors through much of Lake County and northern Cook County, respectively.

The Des Plaines River Watershed is located in portions of Racine and Kenosha Counties in Wisconsin and Lake, Cook, DuPage, and Will Counties in Illinois. The majority of the watershed is urban developed area within the Chicago Metropolitan area with most remaining agricultural lands in Lake and Will Counties. Approximately 680 square miles of watershed area is tributary to the Des Plaines River at the Cook-Will County border.

For the purpose of this study, the study area is the Lower Des Plaines River Watershed Detailed Watershed Plan (DWP), the portion of the Des Plaines River Watershed located within Cook County north of the Chicago Sanitary and Ship Canal, excluding the Upper Salt Creek Watershed. The study area is highlighted on Figure 1.1. Tributary subwatersheds included within the Lower Des Plaines River Watershed study area include: 67th Street Ditch, Addison Creek, Buffalo Creek, Chicago Sanitary and Ship Canal, Crystal Creek, Des Plaines River Mainstem, Des Plaines River Tributary A, East Avenue Ditch, Farmers-Prairie Creek, Feehanville Ditch, Flagg Creek, Golf Course Tributary, McDonald Creek, Lower Salt Creek, Silver Creek, Weller Creek, and Willow Creek. Locations with historic flooding and streambank erosion problems due to regional waterways exist throughout the watershed.

The Lower Des Plaines River DWP was developed by the District with the participation of the Lower Des Plaines River WPC which provided local input to the District throughout the development process. The DWP was developed to accomplish the following goals:

- Document stormwater problem areas.
- Evaluate existing watershed conditions using hydrologic and hydraulic models.
- Produce flow, stage, frequency, and duration information along regional waterways.
- Estimate damages associated with regional stormwater problems.
- Evaluate solutions to regional stormwater problems.

Regional problems are defined as problems associated with waterways whose watersheds encompass multiple jurisdictions and drain an area greater than 0.5 square miles. Problems arising from capacity issues on local systems, such as storm sewer systems and minor open channel ditches, even if they drain more than one municipality, were considered local and beyond the scope of a regional stormwater management program. Erosion problems addressed in this DWP were limited to active erosion along regional waterways that pose an imminent risk to structures or critical infrastructure. Damages to interstate highways, U.S. highways, state routes, county roads with four or more lanes, and smaller roads providing critical access that are impacted by overbank flooding of regional waterways at depths exceeding 0.5 feet were also considered regional problems.

1.1 Scope and Approach

The Lower Des Plaines River DWP scope included data collection and evaluation, hydrologic and hydraulic modeling, development and evaluation of alternatives, and recommendation of alternatives. The data collection and evaluation task included collection and evaluation of existing hydrologic and hydraulic models, geospatial data, previous studies, reported problem areas, and other data relevant to the watershed plan. Hydrologic and hydraulic models were developed to produce inundation mapping for existing conditions for the 100-year storm event and to evaluate stormwater improvement project alternatives. Stormwater improvement project alternatives were developed and evaluated to determine their effectiveness in addressing regional stormwater problems. Estimates of damage reduction, or benefits, associated with proposed projects were considered along with conceptual cost estimates and noneconomic criteria to develop a list of recommended improvement projects for the Lower Des Plaines River Watershed.

1.2 Data Collection and Evaluation

The data collection and evaluation phase (Phase A) of the DWP focused on obtaining data regarding the watershed and evaluation of the material's acceptability for use. The District contacted all WPC members as well as federal and state agencies and other stakeholders requesting relevant data. Coordination with WPC members to support the DWP took place throughout development of the DWP. Existing and newly developed data was evaluated according to use criteria defined in Chapter 6 of the *CCSMP,* included in Appendix B. Where data was unavailable or insufficient to complete the DWP, additional data was collected. This report includes information on all data collected and evaluated as a part of the preparation of the Lower Des Plaines River DWP. Table 1.3.1 lists key dates of coordination activities including meetings with WPC members prior to and throughout DWP development.

1.3 Hydrologic and Hydraulic Modeling

This section of the report provides a description of hydrologic and hydraulic modeling completed to support the DWP development. Hydrologic and hydraulic models were developed for all tributaries within the watershed containing open waterways. Models were developed based on data from previously developed models for some subwatersheds while other subwatershed modeling was new. Hydraulic model extent was defined based upon the extent of detailed study for effective FIRMs and upstream drainage area. Models were extended to cover additional stream reaches, where appropriate, to aid evaluation of damages associated with regional stormwater problems. Revised DFIRM data produced by the FEMA's Map Modernization Program was unavailable at the time of model definition. Appendix A includes a comparison of FEMA's revised DFIRM panels with inundation areas developed for DWP modeling purposes. Tables comparing DWP inundation area to FEMA floodplain mapping by community and subwatershed are also included in Appendix A.

Hydrologic and hydraulic models were developed to be consistent with the protocols defined in Chapter 6 of the CCSMP. In numerous instances, models included additional open channel or other drainage facilities not strictly required by Chapter 6, to aid the evaluation of community reported problem areas. Available monitoring data, including USGS stream gage data, District facility data, and HWM observed following storm events were used to perform model calibration and verification consistent with Chapter 6 guidelines. All hydrologic and hydraulic modeling data and documentation of the data development are included in the appendixes referenced in the report sections below.

TABLE 1.3.1
Lower Des Plaines River DWP WPC Coordination Activities

07-856-5C Lower Des Plaines River Detailed Watershed Plan - Phase A - Contract start date		January 15, 2008
08-864-5C Lower Des Plaines River Detailed Watershed Plan - Phase B - Contract start date		October 6, 2008
Information Gathering		
Data Request (Forms A and B) sent out as part of Phase A		November 24, 2006
Watershed field visit and meetings with various municipalities		January 23, 2007
Open meetings with Watershed representatives during Phase A to discuss Forms A and B		February 14, 2007
District phone calls to communities after the September 13th and 14th, 2008 storm event		September 15, 2008
Data provided by various communities following the July 23-24, 2010 storm event		July – August 2010
Lower Des Plaines River Watershed Planning Council Meetings (12)		
January 30, 2008	April 23, 2008	July 30, 2008
October 20, 2008	February 4, 2009	May 6, 2009
August 5, 2009	November 4, 2009	February 17, 2010
May 19, 2010	August 19, 2010	November 17, 2010

TABLE 1.3.1
Lower Des Plaines River DWP WPC Coordination Activities

Modeling Results and Alternatives Review Meetings			
Initial Model Review Workshop			December 2, 2009, January 20, January 27, February 10, February 18, and February 25, 2010
Preliminary Alternatives Review Workshop			April 22, April 29, May 6, May 13, May 20, and May 22, 2010
Final Alternatives Presentation Workshop			August 18, August 25, September 9, and September 30, 2010
MWRDGC Board of Commissioners' Study Sessions			
January 10, 2006	April 27, 2006	October 2, 2008	

1.3.1 Model Selection

Hydrologic and hydraulic models were developed with the USACE HEC-HMS Version 3.1.0 modeling application and HEC-RAS Version 4.0. These applications were identified as acceptable in Tables 6.10 and 6.11 of the CCSMP. The SCS CN loss module was used with the CUH methodology to enter subbasin parameters into HEC-HMS to model basin hydrology. The dynamic unsteady flow routing methodology was used within HEC-RAS. Both applications have an extensive toolkit to interface with GIS software to produce input data and display model results; however, the subbasin parameters for this study were not developed in HEC-HMS.

1.3.2 Model Setup and Unit Numbering

1.3.2.1 Hydrologic Model Setup

Hydrologic model data was primarily developed by hand and using GIS. The subbasin boundaries for each subwatershed were drawn by hand in GIS based on the 2-foot topographic data from the 2003 Cook County LiDAR and referencing the best available supporting data for each subwatershed. The route of the longest flow paths were also drawn by hand in GIS based on the 2-foot topographic data from the 2003 Cook County LiDAR. The associated parameters of length and channel slope were determined by hand with length measurements taken in GIS. An area-weighted average of the CN was generated for each subbasin based upon NRCS soil data and 2001 CMAP land use data. Input parameters for hydrologic elements such as storage reservoirs and reaches were calculated by hand based on the 2-foot topographic data from the 2003 Cook County LiDAR and/or referencing the best available supporting data for each element. HEC-HMS was used to create and route, when applicable, stormwater runoff hydrographs to be read in to the hydraulic models developed within HEC-RAS. Hydrologic model data was transferred between HEC-HMS and HEC-RAS through HEC-DSS files.

Subbasin Delineation. Each major tributary model (Addison Creek, Buffalo Creek, etc.) was subdivided into subbasins to form the basis of the hydrologic model and modeled assuming a unified response to rainfall based on land use characteristics and soil type. Elevation data provided by Cook County, described in Section 2.3.4, was the principal data source used for subbasin delineation. Drainage divides were established based upon consideration of the direction of steepest descent from local elevation maxima, and refined in some instances to reflect modifications to topographic drainage patterns caused by stormwater management infrastructure such as TARP, storm sewer systems, culverts, etc. Significant portions of the Lower Des Plaines River and tributary watersheds are drained by combined sewer systems. These areas were included in the hydrologic model with diversions created to simulate the approximate capacity of the interceptor sewers and the District's TARP system being constructed to address combined sewer overflows. Runoff diverted to TARP within the watershed models was discounted from the overall flows tributary to the individual waterways. Finally, boundaries were defined to most accurately represent the area tributary to specific modeled elements, such as constrictions caused by crossings, and reservoirs. GIS data was developed for all subbasins delineated and used for hydrologic model data development.

Runoff Volume Calculation. The SCS CN loss model uses the empirical CN parameter to calculate runoff volumes based on landscape characteristics such as soil type, land cover, imperviousness, and land use development. Areas characterized by saturated or poorly infiltrating soils, or impervious development, have higher CN values, converting a greater portion of rainfall volume into runoff. The SCS methodology uses Equation 1.1 to compute stormwater runoff volume for each time step:

$$Q = \frac{(P - I_a)^2}{(P - I_a) + S} \qquad (1.1)$$

Where:

Q	=	runoff volume (inches)
P	=	precipitation (inches)
S	=	storage coefficient (inches)
I_a	=	initial abstractions (inches)

Rainfall abstractions due to ponding and evapotranspiration can be simulated using an initial abstractions (I_a) parameter. In the Lower Des Plaines River DWP, the commonly used default value of I_a, estimated as $0.2 \times S$, where S is the storage coefficient for soil in the subbasin. S is related to CN through Equation 1.2:

$$S = \frac{1000}{CN} - 10 \qquad (1.2)$$

where:

CN	=	curve number (dimensionless)
S	=	storage coefficient (inches)

Table 1.3.2 describes the input data used to develop the CN values throughout the watershed.

TABLE 1.3.2
Description of Curve Number Input Data

Variable Used to Determine CN	Approach for Definition of Variable for Lower Des Plaines River Watershed Hydrologic Modeling
Ground cover	Chicago Metropolitan Agency for Planning (CMAP) land use inventory (v.2.1 2005) is used to define land use. A lookup table was developed to link CMAP categories to categories for which CN values have been estimated.
Soil type	The Natural Resources Conservation Service (NRCS) publishes county soil surveys that include a hydrologic classification of A, B, C, or D.
Antecedent moisture condition	Antecedent Moisture Conditions (AMC) reflect the initial soil storage capacity available for rainfall. For areas within Northeastern Illinois, it is typical to assume an AMC of II.

Specific combinations of land use and soil type were linked to CN values using a lookup table based on values recommended in Table 1.3.3 excerpted from *TR-55: Urban Hydrology for Small Watersheds* (U.S. Department of Agriculture [USDA], 1986). The CN matrix includes assumptions about the imperviousness of land use classes, and therefore, percent impervious does not need to be explicitly considered as the SCS runoff volume calculation. Since the CMAP land-use data does not correspond to the categories in Table 1.3.3, a mapping between TR-55 land use categories and CMAP land use categories was necessary. This process is detailed in Appendix C, which includes a technical memorandum detailing the process used to develop CN values for the Lower Des Plaines River Watershed.

GIS applications were used in conjunction with a lookup table to develop an area-weighted average CN for each subbasin.

TABLE 1.3.3
Runoff Curve Numbers for Urban Areas

Cover Type and Hydrologic Condition	Avg. % Impervious Area	Hydrologic Soil Group A	B	C	D
Fully developed urban areas (vegetation established)					
Open Space (lawns, parks, golf courses, cemeteries, etc.)					
Poor condition (grass cover < 50%)		68	79	86	89
Fair condition (grass cover 50 to 75%)		49	69	79	84
Good condition (grass cover > 75%)		39	61	74	80
Impervious Areas					
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)		98	98	98	98
Streets and roads		98	98	98	98
Paved; curbs and storm sewers (excluding right-of-way)		98	98	98	98
Paved; open ditches (including right-of-way)		83	89	92	93
Gravel (including right-of-way)		76	85	89	91
Dirt (including right-of-way)		72	82	87	89
Western Desert Urban Areas					

TABLE 1.3.3
Runoff Curve Numbers for Urban Areas

Cover Type and Hydrologic Condition	Avg. % Impervious Area	Hydrologic Soil Group A	B	C	D
Natural desert landscaping (pervious areas only)		63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin barriers		96	96	96	96
Urban Districts					
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential Districts by Average Lot Size					
1/8 acre or less	65	77	85	90	92
1/4 acre	38	61	75	83	87
1/3 acre	30	57	72	81	86
1/2 acre	25	54	70	80	85
1 acre	20	51	68	79	84
2 acres	12	46	65	77	82
Developing Urban Areas					
Newly Graded Areas (pervious areas only, no vegetation)		77	86	91	94

Notes: Average runoff condition, and $I_a = 0.2S$. Source of table is *TR-55: Urban Hydrology for Small Watersheds* (U.S. Department of Agriculture [USDA], 1986)

Runoff Hydrograph Production. The time of concentration is the time it takes for a drop of water to travel from the hydraulically furthest point in a watershed to the outlet. For the purposes of the study, the USGS Water-Resources Investigations 82-22 methodology for estimating time of concentration and storage coefficient values for Illinois streams was used.

This methodology determines values of the unit hydrograph parameters time of concentration and storage coefficient, R. The sum of T_c and R is related to stream length, L, and main channel slope, S, by the relation of the following Equation 1.3:

$$(T_c + R)_e = 35.2 L^{0.39} S^{-0.78} \qquad (1.3)$$

where:

T_c = Time of Concentration
R = Watershed Storage Coefficient
L = Longest flow path (miles)
S = Main channel slope (feet/mile)

Regional values of $R/(T_c+R)$ are multiplied with values of $(T_c+R)_e$ to compute estimated values of the storage coefficient R_e. The value for T_c is then calculated by subtracting R_e from $(T_c + R)_e$. The variable $R/(T_c+R)$ is not significantly correlated with drainage area, slope or length, but does exhibit a regional trend. The variable accounts for variations in unit hydrograph parameters caused by physiographic variables such as basin topography, floodplain development and basin storage characteristics.

The route of the longest flow paths were drawn by hand in GIS based on the 2-foot topographic data from the 2003 Cook County LiDAR. The associated parameters of length and channel slope were determined by hand with length measurements taken in GIS and entered into a spreadsheet to support calculation of T_c. This approach to calculating time of concentration was performed for each subbasin within each subwatershed generally south of Lake-Cook Road, as the values for north of Lake-Cook Road were taken from the USACE HEC-1 hydrologic model.

Rainfall Data. Observed and design event rainfall data was used to support modeling evaluations for the DWP. Monitored rainfall data is described in Section 2.3.1. Design event rainfall data was obtained from Bulletin 71, *Rainfall Frequency Atlas of the Midwest* (Huff, 1992). Design event rainfall depths obtained from Bulletin 71 were used to support design event modeling performed for existing and proposed conditions assessment. Additionally, the 500-year rainfall depths were based on the extrapolating the 24-hour values of Bulletin 71 summarized in an ISWS memorandum dated June 15, 1999.

1.3.3 Storm Duration

A critical storm duration analysis was performed to determine the storm event duration that would result in the maximum peak flowrates and water surface elevations for each individual subwatershed analysis. Using the 100-year rainfall depths published in ISWS Bulletin 71 for northeastern Illinois, the CUH was convoluted with the Huff rainfall distributions corresponding to the 1-, 2-, 3-, 6-, 12-, 18-, 24-, and 48-hour duration events. Additional duration events were run if necessary. The AMC used was AMC II. The storm event duration corresponding to the highest water surface elevations and flowrates was selected as the critical-duration storm. The critical-duration storm varied for the individual subwatershed analyses. Table 1.3.4 lists the critical durations by subwatershed.

The critical-duration storm for the Lower Des Plaines River Mainstem was the 10-day storm per the existing USACE modeling and was used as the critical-duration storm for this DWP. The direct tributary area to the Des Plaines River, and all of the subwatersheds tributary to the Lower Des Plaines River Mainstem, were run for the 10-day storm for purposes of consistency within the Lower Des Plaines River Mainstem modeling.

1.3.4 Areal Reduction Factor

The probability of uniform rainfall across a subwatershed decreases with increasing watershed size. Table 21 of Bulletin 71 relates areal mean rainfall depth to rainfall depth at a point (Huff, 1992). The subwatersheds in the Lower Des Plaines River Watershed used the areal reduction factor method based on their tributary area. Modeled rainfall depths were multiplied by the appropriate factor from Table 21 to account for the expected decrease in probability of uniform rainfall.

TABLE 1.3.4
Critical Durations

Subwatershed	Critical Duration
67th Street Ditch	2-hour
Addison Creek	24-hour
Buffalo Creek	24-hour
Chicago Sanitary and Ship Canal	N/A
Crystal Creek	12-hour
Des Plaines River	10-day
Des Plaines River Tributary A	2-hour
East Avenue Ditch	24-hour
Farmers Prairie Creek	12-hour
Feehanville Ditch	24-hour
Flagg Creek	24-hour
Golf Course Tributary	24-hour
McDonald Creek	24-hour
Salt Creek	72-hour
Silver Creek	48-hour
Weller Creek	48-hour
Willow Creek	24-hour

1.3.5 Hydrologic Routing

Subbasin runoff hydrographs were routed within HEC-HMS to reflect attenuation due to stormwater storage in channel and overbank areas, upstream of restrictive structures or control structures, and in reservoirs or depressional areas. Storage routing through reservoirs and depressional areas was evaluated using the Modified Puls level-pool routing methodology. Various routing methodologies were applied to different situations within the subwatershed hydrologic models such as Muskingum-Cunge, kinematic wave, and lag and were based on the best available data.

1.3.6 Hydraulic Model Setup

Hydraulic model data was developed through field surveys with some additional definition of channel overbank areas and roadway crests defined using Cook County topographic data. Cross section locations were developed in HEC GeoRAS, and surveyed channel geometry were inserted into topographically generated cross-sectional data. Cross sections were generally surveyed at intervals of 500 to 1,000 feet. Interpolated cross sections were added at many locations to the models to increase stability and reduce errors. Bridges, culverts, and other major hydraulic structures were surveyed within the hydraulic model extent. The locations of all surveyed and modeled cross sections, bridges, culverts, and other structures are shown in a figure within Appendix D.

The HEC-RAS hydraulic models for subwatersheds within the Lower Des Plaines River Watershed incorporate cross-section location, channel data, and structure data from previous studies, as-built plans, construction plans, and channel and structure surveys completed by D.B. Sterlin Inc. The channel and structure data was incorporated into the HEC-GeoRAS cross-sections extracted from the TIN created in GIS from the 2003 Cook County LiDAR topographic data. Cross sections were generally surveyed at intervals of 500 to 1,000 feet. Interpolated cross sections were added at many locations throughout the HEC-RAS hydraulic models to increase model stability. The locations of all surveyed cross sections, bridges, culverts, and other structures are shown provided in Appendix D. Specific details of the composition of the hydraulic model geometry for each subwatershed are provided in the detailed subwatershed narratives in Chapter 3.

1.3.6.1 Bridges, Culverts, and Hydraulic Structures

As necessary, bridges, culverts, and hydraulic structures were surveyed consistent with FEMA mapping protocol as identified in *Guidelines and Specifications for Flood Hazard Mapping Partners*, “Guidance for Aerial Mapping and Surveying” (FEMA 2003). A State of Illinois licensed professional land surveyor certified each location as FEMA compliant. Documentation of certifications is provided in Appendix D. Bridges, culverts, and hydraulic structures were surveyed consistent with the NAVD 1988 datum using 5-centimeter or better GPS procedures (as specified in NGS-58 for local network accuracy) or third-order (or better) differential leveling, or trigonometric leveling for short distances. When available, information from construction and as-built plans was used for recently constructed bridges in lieu of surveying. Additionally, bridge, culvert, and hydraulic structure information previously surveyed and incorporated into existing hydraulic models was also utilized. Ineffective flow areas were placed at cross sections upstream and downstream of crossings, generally assuming a contraction ratio of 1:1 and an expansion ratio of 2:1. Contraction and expansion coefficients generally were increased to 0.3 and 0.5, respectively, at cross sections adjacent to crossings.

1.3.6.2 Cross-Sectional Data

As necessary, channel cross-sectional data was surveyed consistent with FEMA mapping protocol as identified in *Guidelines and Specifications for Flood Hazard Mapping Partners*, “Guidance for Aerial Mapping and Surveying” (FEMA 2003).

All survey work, including survey of channel cross-sections, was certified as compliant to FEMA mapping protocol by a licensed professional land surveyor. Documentation of certifications is provided in Appendix D. Channel cross-sections were surveyed consistent with the North American Vertical Datum, 1988 (NAVD 1988) using 5-centimeter or better GPS procedures (as specified in NGS-58 for local network accuracy) or third-order (or better) differential leveling, or trigonometric leveling for short distances.

In addition to new channel cross-section survey, previously surveyed channel data from existing hydraulic models was also utilized to represent the existing channel section for several tributaries.

The overbank portion of the cross-sections utilized in the HEC-RAS hydraulic model geometry were extracted from the TIN created in GIS from the 2003 Cook County LiDAR topographic data using HEC-GeoRAS. The new and previously surveyed channel data was combined with the overbank data to create a full-valley cross-section.

Additional cross-sections were interpolated at many locations within the hydraulic models to aid model stability and reduce errors.

1.3.6.3 Boundary Conditions

The downstream boundary condition for the all of the subwatershed except for Addison Creek and the Lower Des Plaines River Mainstem was the 5-year water surface elevation for the Des Plaines River at their confluences with the Des Plaines River. Since Addison Creek is tributary to Salt Creek, the Addison Creek downstream boundary was based on the Salt Creek FIS. To reflect the timing of Addison Creek and Salt Creek, the Salt Creek 25-year WSEL of 618.4 feet was used as the 100-year starting water surface elevation. The downstream boundary condition for the Mainstem Lower Des Plaines River was the normal depth method associated with the channel slope of the downstream portion of the Des Plaines River.

1.3.7 Model Run Settings

All hydraulic model simulations were carried out using the fully dynamic, unsteady flow simulation settings within HEC-RAS. The Saint-Venant equations, or the continuity and momentum balance equations for open channel flow, were solved using implicit finite difference scheme. HEC-RAS has the ability to model storage areas and hydraulic connections between storage areas and between stream reaches. The computational time step for model runs was varied as necessary for model stability.

1.3.8 Model Calibration and Verification

Model calibration and verification was performed for tributaries where stream monitoring data was available to substantiate that the hydrologic and hydraulic model results are consistent with the observed stormwater runoff response for the subwatershed. Available monitoring data used for calibration is described in Section 2.3.1. The hydrologic and hydraulic models for gaged subwatersheds, including Addison Creek, Buffalo Creek, Lower Des Plaines River Mainstem, Flagg Creek, McDonald Creek, Salt Creek, and Weller Creek, were calibrated to the September 13-14, 2008 storm event. Each subwatershed HEC-HMS hydrologic model was run with the September 13-14, 2008 precipitation data and the resulting hydrographs were run in the HEC-RAS hydraulic model. Resulting stages (or peak water surface elevations) and associated peak flowrates from the HEC-RAS hydraulic model were compared to observed values at stream gages and available HWM. Initial calibration model results generally over-predicted stage, volume, and peak flow rates for the gaged subwatersheds.

The parameter utilized for calibration was the CUH storage coefficient, R. Subwatersheds within Lower Des Plaines River Watershed benefited from the attenuation incorporated by the use of the basin storage coefficient, R, in the CUH method. The basin storage coefficient, R, helps incorporate the natural storage characteristics associated with the varying terrain and watershed shapes within the Lower Des Plaines River Watershed.

A multiplier was applied to the R value uniformly across all subbasins within a subwatershed to meet the District calibration standards. The calibration standards established by the District in Chapter 6 of the CCSMP are that storage volume and peak flowrate should be within 30% of the observed values, and water surface elevation should be within 0.5 feet of observed values. The calibrated models for the gaged subwatersheds were also verified by running an additional historical event with available observed data. Detailed calibration and verification results for gaged watersheds are presented in subwatershed subsections, including flow and stage hydrographs comparisons.

All of the gaged subwatersheds utilized a R multiplier to achieve better calibration. As all of the ungaged watersheds were not calibrated, a relationship between the R value and the average watershed slope was plotted for the gaged subwatersheds to estimate R value multipliers to apply to the ungaged subwatersheds. An estimated R value was incorporated into each ungaged subwatershed based on average watershed slope. Several ungaged subwatersheds had observed HWM data or stream conditions for various storm events that was used to verify the R value application. Farmers-Prairie Creek and Silver Creek had IDNR-OWR HWM available for historical storms, while Willow Creek and East Avenue Ditch had observed conditions noted by community officials.

Stage was used as the primary calibration benchmark, since stage is the measured value, both for high-water marks and the USGS stream gages. USGS stream gages use a field-measured stage-flow relationship to calculate flow (which is generally not measured).

1.3.9 Flood Inundation Mapping

Flood inundation maps were produced to display the inundation areas associated with the 100-year event. The flood inundation maps were produced by overlaying the results of the hydraulic modeling on the ground elevation model of the watershed, which was derived from Cook County LiDAR data.

1.3.10 Discrepancies Between Inundation Mapping and Regulatory Flood Maps

Discrepancies may exist between inundation mapping produced under this DWP and regulatory flood maps. Discrepancies may be the result of updated rainfall data, more detailed topographic information, updated land use data, and differences in modeling methodology. A discussion of discrepancies is included in Appendix A.

1.3.11 Model Review

The hydrologic and hydraulic models developed under this DWP were independently reviewed by AECOM. AECOM's review of the hydrologic models included a general verification of drainage areas, subbasin divides, and hydrologic model parameters such as CN and CUH parameters. AECOM's review of the hydraulic models included a general verification of roughness values, bank stations, ineffective flow areas, hydraulic structures, boundary conditions and connectivity with the hydrologic model output files. Recommendations from the independent review have been addressed in the hydrologic and hydraulic models developed to support the Lower Des Plaines River DWP.

1.4 Development and Evaluation of Alternatives

1.4.1 Problem Area Identification

Problem area data for the Lower Des Plaines River Watershed was generated from two sources. The first was community, agency, and stakeholder response data that identified flooding, erosion, water quality, and maintenance problems recognized by the communities to be problems. In addition, problem areas were identified by overlaying the results of hydrologic and hydraulic modeling on the ground elevation model of the watershed to identify structures at risk of flooding along regional waterways. Modeled flood problems generally corroborated the communities' reported problems; however, in many instances, the model results also showed additional areas at risk of flooding for larger magnitude events. A secondary source of problem area identification was the existing FEMA FIRM panel maps. Areas shown within FEMA floodplain were carefully considered in hydrologic and hydraulic modeling and communication with communities in order to identify problem areas.

1.4.2 Economic Analysis

1.4.2.1 Flood Damages

Property damages due to flooding were assessed based upon the intersection of inundation areas for modeled recurrence intervals (2-, 5-, 10-, 25-, 50-, and 100-year) with the Cook County parcel data, considering ground elevation data, to calculate estimated flood depths. Damages were estimated using a methodology consistent with one developed by the USACE that estimates structure and contents damage as a fraction of structure value and based upon the estimated depth of flooding (USACE 2003). The general procedure estimating property damage due to flooding is outlined in Appendix F of the CCSMP. This method of damage calculation requires estimating a number of parameters for properties at risk of flooding which are detailed below.

The foundation for property damage values due to flooding is derived from the 2006 CCTA data multiplied by a standard factor derived from a statistical analysis comparing recent sales data to the CCTA property values. The CCTA data includes tax assessed value of land, improvements, total tax assessed value, structure class (residential single family, multi-family, industrial etc.), number of stories, basement information, land area (square footage), and other data fields not relevant to this study.

1.4.2.2 Identification of Parcels at Risk of Flooding

Parcel boundaries were converted to points within the GIS application, and then the points were moved to the low side of structures at risk of flooding. Intersection of inundation boundaries with parcel data was then performed for each modeled recurrence interval storm and used to identify parcels within the subwatershed that may, based upon their zero-damage elevations, be subject to property damage due to flooding for a particular recurrence interval.

1.4.2.3 Parcel Zero Damage Elevation

Structures do not incur damage due to flooding until the water surface exceeds the *zero-damage elevation,* at which water is assumed to begin flowing into the structure and cause damages. For most structures, the zero-damage elevation is the ground surface. Floodwaters exceeding the ground surface may enter the structure through doorways, window wells, and other openings within the structure. The zero-damage elevation was assumed to be the ground elevation for all parcels within the Des Plaines River Watershed. The ground elevation estimate was obtained at the point representing the parcel, generally on the lower, stream-side of the actual structure or from survey information. A summary of the watersheds with ground survey information is provided in Table 1.3.5.

TABLE 1.3.5
Subwatersheds with Ground Survey

Subwatershed	Source
Feehanville Ditch	D.B. Sterlin Inc.
Farmers-Prairie Creek[1]	IDNR-OWR
McDonald Creek	D.B. Sterlin Inc., District
Silver Creek	District
Weller Creek	District
Willow Creek	D.B. Sterlin Inc., District

[1]Survey from *Executive Summary - Des Plaines River, Rand Park Flood Control For Des Plaines and Park Ridge, Cook County, Illinois*, (IDNR-OWR, August, 1997)

1.4.2.4 Parcel First Floor Elevation

USACE depth-damage curves relate flooding depths to the first floor elevation of the structure, a value not provided within the CCTA data. FFE generally were not surveyed for the Lower Des Plaines River DWP, as that would require several thousand measurements; however, some subwatersheds utilized had survey data available that was incorporated. A summary of the watersheds with first floor survey information is provided in Table 1.3.6. A sample of available surveyed field measurements of the FFE offset from ground elevation were reviewed in the Lower Des Plaines River Watershed to document expected values and variability of this component of the damage analysis. Based upon review of the collected first floor elevations, it was not possible to identify a pattern to predict the first floor elevation based upon factors such as subwatershed, estimated age of structure, or structure type. Furthermore, it was noted that the average first floor elevation offset was roughly 12 inches from the ground elevation, or slightly lower for structures that did not have basements. Based upon the data collected, first floor elevation offsets from ground elevation were estimated throughout the watershed as 12 inches for structures with and without basements.

TABLE 1.3.6
Subwatersheds with First Floor Survey

Subwatershed	Source
Feehanville Ditch	D.B. Sterlin Inc.
Farmers-Prairie Creek[1]	IDNR-OWR
McDonald Creek	D.B. Sterlin Inc., District
Silver Creek	District
Weller Creek	District
Willow Creek	D.B. Sterlin Inc., District

[1]Survey from *Executive Summary - Des Plaines River, Rand Park Flood Control For Des Plaines and Park Ridge, Cook County, Illinois*, (IDNR-OWR, August, 1997)

1.4.2.5 Structure Estimated Value

The estimated value of flooded structures is an input to damage calculations. The CCTA data included data that identified values for the land value as well as the improvement value (i.e., building, garage, etc.). The values in the CCTA data are assessed valuations of the estimated property value, which require a factor to bring the value, depending on the structure's use, to the CCTA estimation of property value. For example, residential structures receive an assessed valuation factor of 16 percent, thus the value identified by CCTA is the CCTA estimated value divided by a standardized 0.16. The adjusted CCTA data (reported values divided by the assessed valuation factor) was then compared with recent sales data throughout the county to statistically derive a multiplier that brings the 2006 CCTA estimated value of the properties to 2008 market value of properties. This multiplier was calculated to be 1.66. Since this plan analyzes damage to the structure, the land component of the property value was removed from the analysis. The value of the structure was computed by applying the assessed valuation multiplier and the District calculated market value multiplier to the improvement value identified in the CCTA data. This method was used on all property types to generate information to be used in the damage calculations.

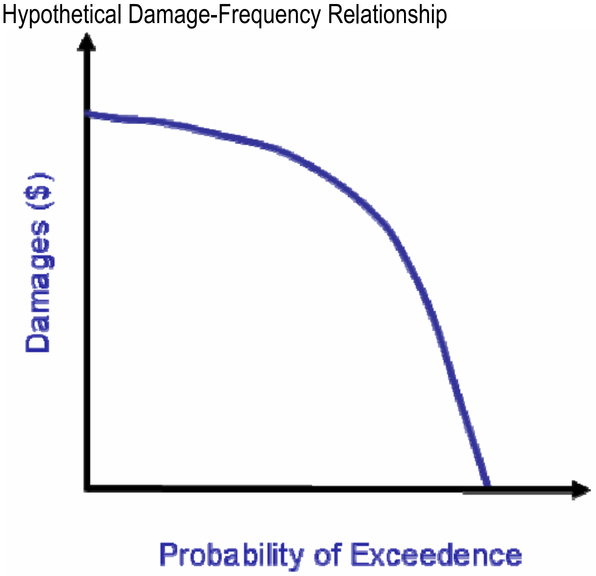
1.4.2.6 Depth-Damage Curves

Six residential depth-damage curves were obtained from the USACE technical guidance memorandum EGM 04-01 (USACE, 2003) to relate estimated structure and contents damage to structure replacement value as a function of flooding depth. These damage curves are one story, two-story, and split-level resident structures, either with or without basements. For nonresidential structures, a depth-damage curve representing the average of structure and contents depth damage curves for a variety of structure types, generated by the Galveston District of the USACE was selected for use. Appendix F contains the depth-damage curves used to calculate property damage due to flooding. CCTA data was analyzed to identify the number of stories on residential structures and the presence or absence of a basement.

1.4.2.7 Property Damage Calculation

The estimated structure value, flooding depth, and depth-damage curve information were used to estimate the property damage from flooding for a specific structure due to a storm of given recurrence interval. Higher magnitude events, such as the 100-year event, cause higher damages for flooded properties but also have a lower likelihood of occurring in a given year. Figure 1.4.1 shows the hypothetical relationship between expected damage and modeled recurrence interval. Estimated annual damages were calculated according to Appendix F of Chapter 6 of the CCSMP, essentially weighting the expected annual damages by their annual probability of occurrence. Damages were then capitalized over a 50-year period of analysis, consistent with the period of analysis over which maintenance and replacement costs were calculated, using the federal discount rate for 2008 of 4.875 percent.

FIGURE 1.4.1
Hypothetical Damage-Frequency Relationship



1.4.2.8 Erosion Damages

Locations of potential erosion risk were identified through community response data. The CCSMP contains direction that erosion damages be estimated as the full value of structures at "imminent risk" of damage due to streambank erosion, and that erosion damages not be assessed for loss of land. Field visits to areas identified as erosion problems were performed. Properties and infrastructure were judged to be at imminent risk if they were located within 30 feet of a site of *active erosion*, characterized by exposed earth, lack of vegetation, or collapsing banks. The estimated market value of the structure derived from CCTA data was used to estimate erosion damages for structures deemed at imminent risk. For infrastructure at risk other than property, such as roads and utilities, an estimate of the replacement value of these structures was used to assess erosion damages.

1.4.2.9 Transportation Damages

Transportation damage generally was estimated as 15 percent of property damage due to flooding. In some specific instances, significant transportation damages may occur in absence of attendant property damage due to flooding. For the Lower Des Plaines River Watershed, specific transportation damages were calculated when flooding fully blocked all access to a specific area in the watershed and these damages were not adequately captured as a fraction of property damages. In such instances, transportation damages were calculated according to FEMA guidance in the document "What Is a Benefit?" (FEMA, 2001). The duration of road closure was estimated for the modeled storms, and transportation damage was calculated according to a value of $39.82 (based on a FEMA recommended rate of $32.23 in 2000 and brought forward to 2008 using a 3.068% discount rate) per hour of delay per vehicle based on average traffic counts.

1.4.3 Alternative Development and Evaluation

Potential stormwater improvements, referred to within the DWP as alternatives, were developed using a systematic procedure to screen, develop, and evaluate technologies consistently throughout the Lower Des Plaines River Watershed. Tributary-specific technologies were screened and evaluated in consideration of the stormwater problems identified through community response data and modeling. An alternative is a combination of the technologies developed to address the identified stormwater problems. In many instances, communities had ideas or suggestions regarding potential resolution of their stormwater problems, and these ideas were solicited during workshops and subsequent comment periods and were considered during alternative development.

Alternatives were evaluated with respect to their ability to reduce flooding, erosion, and other damages under existing conditions. The reduction in expected damages for an alternative is called a *benefit*. Conceptual level costs were developed for each alternative using countywide unit cost data that considered expected expenses such as excavation, land-acquisition, pipe costs, channel lining, etc. Standard countywide markups were used to account for the cost of utility relocation, profit, design engineering and construction management costs, and contingency. Expected maintenance and replacement costs were considered over a 50-year design period. Detailed design studies are required to confirm details associated with the feasibility of construction and precise configuration of proposed facilities.

Additional non-economic factors, such as the number of structures protected, the expected water-quality benefit, and the impact on wetland or riparian areas were considered in alternative development and evaluation.

1.4.3.1 Flood Control

Flood control technologies were considered during the development of alternatives for addressing flooding problems, as summarized in Table 1.4.1. After selection of an appropriate technology or technologies for a problem area, and review of information provided by communities and obtained from other sources (such as aerial photography and parcel data) regarding potentially available land, conceptual alternatives were developed.

Hydrologic or hydraulic models for alternative conditions were created to analyze the effect of the conceptual alternatives. Initial model runs were performed to determine whether an alternative significantly affected WSEL near the target problem area, or had negative impacts in other parts of the tributary area. For models that resulted in significant reduction in WSEL, a full set of alternative conditions model runs was performed, and expected damages due to flooding were evaluated for the alternative conditions. Benefits were calculated based on damages reduced from existing to proposed conditions.

1.4.3.2 Floodproofing and Acquisition

Alternatives consisting of structural flood control measures may not feasibly provide a 100-year level of protection for all structures. The DWP identifies areas that will experience flooding at the 100-year event, even if recommended alternatives are implemented. Floodproofing and/or acquisition of such structures are nonstructural flood control measures that may reduce or eliminate damages during flood events, which is why these measures are listed in Table 1.4.1. However, due to the localized nature of implementing such solutions, the District may look to address structures that are candidates for nonstructural flood control measures under separate initiatives, outside of the CIP.

1.4.3.3 Erosion Control

Erosion control alternatives were developed to address problem areas where erosion problems on regional waterways were determined to threaten structures. Damages were calculated based on the value of the threatened structures. Erosion control alternatives considered a full range of alternative technologies as summarized in Table 1.4.2.

1.4.3.4 Water Quality

The potential effect of alternatives on water quality was considered qualitatively. Most detention basins built for flood control purposes have an ancillary water quality benefit because pollutants in sediment will settle out while water is detained. Sediments can be removed as a part of maintenance of the detention basin, preventing the pollutants from entering the waterway. Detention basins typically have a sediment forebay specifically designed for this purpose. Some detention basins could be designed as created wetland basins with wetland plants included which could naturally remove pollutants and excess nutrients from the basin. Erosion control alternatives can help address water quality problems through reduction of sedimentation.

TABLE 1.4.1
Flood Control Technologies

Flood Control Option	Description	Technology Requirements
Detention/Retention		
Detention facilities (Dry basins)	Impoundments to temporarily store stormwater in normally dry basins.	Open space, available land. Only an upstream option.

TABLE 1.4.1
Flood Control Technologies

Flood Control Option	Description	Technology Requirements
Retention facilities (Wet basins)	Impoundments that include a permanent pool which stores stormwater and removes it through infiltration and evaporation. Retention facilities generally have an outfall to the receiving waterway that is located at an elevation above the permanent pool.	Open space, available land. Only an upstream option.
Pumped detention	Similar to detention or retention facilities, but includes a portion of the impoundment which cannot be drained by gravity and must be pumped out.	Open space, available land. Only an upstream option. Best applied when significant area is available to allow for filling only during large storms.
Underground detention	A specialized form of storage where stormwater is detained in underground facilities such as vaults or tunnels. Underground detention may also be pumped.	Space without structures, available land. Only an upstream option. Significantly more expensive than above ground facilities. Surface disruption must be acceptable during construction.
Bioretention	Decentralized microbasins distributed throughout a site or watershed to control runoff close to where it is generated. Runoff is detained in the bioretention facilities and infiltrated into the soil and removed through evapotranspiration.	Open space, multiple available opportunities for various sizes of open space.
Conveyance Improvement		
Culvert/bridge replacement	Enhancement of the hydraulic capacity of culverts or bridges through size increase, roughness reduction, and removal of obstacles (for example, piers).	Applicable only if restricted flow and no negative impact upstream or downstream. May require compensatory storage to prevent negative downstream impact. Permitting requirements and available adjacent land.
Channel improvement	Enhancement of the hydraulic capacity of the channels by enlarging cross sections (for example, floodplain enhancement), reducing roughness (for example, lining), or channel realignment.	No negative upstream or downstream impact of increased conveyance capacity. Permitting requirements and available adjacent land. Permanent and/or construction easements.
Flood Barriers		
Levees	Earth embankments built along rivers and streams to keep flood waters within a channel.	Permitting requirements and available adjacent land. Wide floodplains will be analyzed. Requires 3 feet of freeboard to remove structures behind levees from regulatory floodplain. Often requires compensatory storage.
Floodwalls	Vertical walls typically made of concrete or other hard materials built along rivers and streams to keep flood waters within a channel.	Permitting requirements and available adjacent land. Permanent and/or construction easements.
Acquisition	Acquisition and demolition of properties in the floodplain to permanently eliminate flood damages. In some cases, acquired property can be used for installation of flood control facilities.	Severe flooding, repetitive losses, other alternatives are not feasible.
Floodproofing		
Elevation	Modification of a structure's foundation to elevate the building above a given flood level. Typically applied to houses.	Severe flooding, repetitive losses, other alternatives are not feasible

TABLE 1.4.1
Flood Control Technologies

Flood Control Option	Description	Technology Requirements
Dry Floodproofing	Installation of impermeable barriers and flood gates along the perimeter of a building to keep flood waters out. Typically deployed around commercial and industrial buildings that cannot be elevated or relocated.	Better suited for basement or shallow flooding. Need the ability to provide closure of openings in walls or levees. Plan for emergency access to permit evacuation.
Wet Floodproofing	Implementation of measures that do not prevent water from entering a building but minimize damages; for example, utility relocation and installation of resistant materials.	Most applicable for larger buildings where content damage due to flooding can be minimized. Waterproofing sealant applied to walls and floors, a floor drain and sump pump.

TABLE 1.4.2
Erosion Control Technologies

Erosion Control Option	Description	Technology Requirements
Natural (vegetated or bioengineered) stabilization	The stabilization and protection of eroding overland flow areas or streambanks with selected vegetation using bioengineering techniques. The practice applies to natural or excavated channels where the streambanks are susceptible to erosion from the action of water, ice, or debris and the problem can be solved using vegetation. Vegetative stabilization is generally applicable where bankfull flow velocity does not exceed 5 ft/sec and soils are more erosion resistant, such as clayey soils. Combinations of the stabilization methods listed below and others may be used.	Requires streambank slopes flat enough to prevent slope failure based upon underlying soils. Channels with steep banks with no room for expansion or high bank full velocities (> 5 ft/sec) should avoid these technologies.
Vegetating by sodding, seeding, or planting	Establishing permanent vegetative cover to stabilize disturbed or exposed areas. Required in open areas to prevent erosion and provide runoff control. This stabilization method often includes the use of geotextile materials to provide stability until the vegetation is established and able to resist scour and shear forces.	
Vegetated armoring (joint planting)	The insertion of live stakes, trees, shrubs, and other vegetation in the openings or joints between rocks in riprap or articulated block mat (ABM). The object is to reinforce riprap or ABM by establishing roots into the soil. Drainage may also be improved through extracting soil moisture.	
Vegetated cellular grid (erosion blanket)	Lattice-like network of structural material installed with planted vegetation to facilitate the establishment of the vegetation, but not strong enough to armor the slope. Typically involves the use of coconut or plastic mesh fiber (erosion blanket) that may disintegrate over time after the vegetation is established.	
Reinforced grass systems	Similar to the vegetated cellular grid, but the structural coverage is designed to be permanent. The technology can include the use of mats, meshes, interlocking concrete blocks, or the use of geocells containing fill material.	
Live cribwall	Installation of a regular framework of logs, timbers, rock, and woody cuttings to protect an eroding channel bank with structural components consisting of live wood.	

TABLE 1.4.2
Erosion Control Technologies

Erosion Control Option	Description	Technology Requirements
Structural stabilization	Stabilization of eroding streambanks or other areas by use of designed structural measures, such as those described below. Structural stabilization is generally applicable where flow velocities exceed 5 ft/sec or where vegetative streambank protection is inappropriate.	Applicable to areas with steep streambank slopes (> 3:1) and no room for channel expansion, or areas with high velocities (> 5 ft/sec) can benefit from this technology.
Interlocking concrete	Interlocking concrete may include A-Jacks®, ABM, or similar structural controls that form a grid or matrix to protect the channel from erosion. A-Jacks armor units may be assembled into a continuous, flexible matrix that provides channel toe protection against high velocity flow. The matrix of A-Jacks can be backfilled with topsoil and vegetated to increase system stability and to provide in-stream habitat. ABM can be used with or without joint planting with vegetation. ABM is available in several sizes and configurations from several manufacturers. The size and configuration of the ABM is determined by the shear forces and site conditions of the channel.	
Riprap	A section of rock placed in the channel or on the channel banks to prevent erosion. Riprap typically is underlain by a sand and geotextile base to provide a foundation for the rock, and to prevent scour behind the rock.	
Gabions	Gabions are wire mesh baskets filled with river stone of specific size to meet the shear forces in a channel. Gabions are used more often in urban areas where space is not available for other stabilization techniques. Gabions can provide stability when designed and installed correctly, but failure more often is sudden rather than gradual.	
Grade Control	A constructed concrete channel designed to convey flow at a high velocity (greater than 5 ft/sec) where other stabilization methods cannot be used. May be suitable in situations where downstream areas can handle the increase in peak flows and there is limited space available for conveyance.	
Concrete channels	Prevent streambank erosion from excessive discharge velocities where stormwater flows out of a pipe. Outlet stabilization may include any method discussed above.	

The enabling legislation (70 ILCS 2605/7h (g)) for the District's stormwater management program states "the District shall not use Cook County Forest Preserve District land for stormwater or flood control projects without the consent of the Forest Preserve District (FPD)"; therefore proposed projects involving FPD property cannot be implemented without FPD's permission. The District will work collaboratively with FPD to develop multi- objective projects beneficial to both agencies along with our constituents and also consistent with our individual missions.

2. Watershed Characteristics

2.1 General Watershed Description

The Des Plaines River Watershed is located in portions of Racine and Kenosha Counties in Wisconsin and Lake, Cook, DuPage, and Will Counties in Illinois. The majority of the watershed is urban developed area within the Chicago Metropolitan area with most remaining agricultural lands in Lake and Will Counties. Approximately 680 square miles of watershed area is tributary to the Des Plaines River at the Cook-Will County border. The largest tributary to the Lower Des Plaines River Watershed is the Salt Creek Subwatershed.

Figure 1.1 shows the major streams within the Lower Des Plaines River Watershed. Figure 1.1 also shows the subwatershed divides for the major streams within the Lower Des Plaines River Watershed. Table 2.1.1 lists the municipalities within the Lower Des Plaines River Watershed. Table 2.1.2 lists the major streams and tributaries to the Lower Des Plaines River and stream lengths. Each stream is briefly described with a narrative in the following subsection.

TABLE 2.1.1
Municipalities in the Lower Des Plaines River Watershed

Municipality[1]	% of Municipality Area within Lower Des Plaines River Watershed	% of Lower Des Plaines River Watershed Area by Municipality	Municipality	% of Municipality Area within Lower Des Plaines River Watershed	% of Lower Des Plaines River Watershed Area by Municipality
Arlington Heights	92	8.4	Lyons	97	1.2
Bedford Park	2	<1	Maywood	100	1.5
Bellwood	100	1.3	Mc Cook	16	<1
Bensenville	100	<1	Melrose Park	100	2.3
Berkeley	92	<1	Mount Prospect	100	5.6
Berwyn	1	<1	Niles	26	<1
Broadview	100	<1	Norridge	69	<1
Brookfield	100	1.6	North Riverside	99	<1
Buffalo Grove	100	1.2	Northbrook	14	<1
Burr Ridge	100	1.5	Northlake	100	1.7
Chicago	6	8.0	Oak Park	24	0.5
Countryside	90	1.3	Palatine	17	1.2
Deer Park	73	<1	Park Ridge	99	3.9
Des Plaines	100	7.9	Prospect Heights	100	2.3
Elk Grove Village	45	2.7	River Forest	100	1.3
Elmwood Park	100	1.1	River Grove	100	1.3
Forest Park	99	1.3	Riverside	100	1.1
Forest View	<1	<1	Rolling Meadows	12	<1
Franklin Park	100	2.5	Rosemont	100	<1
Glenview	15	1.2	Schiller Park	100	1.5

TABLE 2.1.1
Municipalities in the Lower Des Plaines River Watershed

Municipality[1]	% of Municipality Area within Lower Des Plaines River Watershed	% of Lower Des Plaines River Watershed Area by Municipality	Municipality	% of Municipality Area within Lower Des Plaines River Watershed	% of Lower Des Plaines River Watershed Area by Municipality
Harwood Heights	24	<1	Stickney	5	<1
Hillside	96	1.1	Stone Park	100	<1
Hinsdale	98	<1	Summit	15	<1
Hodgkins	85	1.2	Unincorporated Cook County	-	12.3
Indian Head Park	100	<1	Westchester	17	1.7
Justice	2	<1	Western Springs	100	1.3
La Grange	65	<1	Wheeling	86	4.8
La Grange Park	100	1.2	Willow Springs	50	1.1
Lemont	2	0.1			

TABLE 2.1.2
Lower Des Plaines River Watershed Open Channel Stream Lengths

Open Channel Name	Length (miles)	Open Channel Name	Length (miles)
57th Street Ditch	0.5	Higgins Creek Tributary A	1.1
59th Street Ditch	0.8	Higgins Creek Tributary B	0.4
63rd Street Ditch	0.6	Industrial Tributary	0.6
79th Street Ditch	0.3	McDonald Creek	6.4
Addison Creek	8.6	McDonald Creek North Branch	1.7
Addison Creek Lake and Mannheim Tributary	0.4	McDonald Creek South Branch	0.7
Buffalo Creek	6.4	McDonald Creek Tributary A	1.2
Buffalo Creek Tributary A	3.1	McDonald Creek Tributary B	1.1
Buffalo Creek Unnamed Tributary A	1.1	Motel Tributary	0.3
Buffalo Creek Unnamed Tributary B	0.6	Plainfield Road Ditch	0.7
Chicago Sanitary and Ship Canal	21.9	Prairie Creek	1.5
Crystal Creek	2.3	Salt Creek	9.4
Crystal Creek Tributary	1.6	Salt Creek Middle Fork	0.9
Mainstem Lower Des Plaines River	48.8	Salt Creek South Fork	1.4
Des Plaines River Tributary A	1	Sexton Ditch	0.3
East Avenue Ditch	2.2	Silver Creek	7.5
Farmer's Creek	2	Weller Creek	5.9
Feehanville Ditch	2.3	Weller Creek Diversion Channel	0.6
Flagg Creek	7.7	Weller Creek Old Channel	0.7
Flagg Creek Tributary A	1.2	White Pine Ditch	0.7
Flagg Creek Tributary B	1.2	William Rogers Memorial Diversion Channel	1.6
Flagg Creek Tributary C	2	Willow Creek	5.7
Golf Course Tributary	1.1	Higgins Creek Tributary A	1.1

TABLE 2.1.2
Lower Des Plaines River Watershed Open Channel Stream Lengths

Open Channel Name	Length (miles)	Open Channel Name	Length (miles)
Higgins Creek	4.9	Higgins Creek Tributary B	0.4
		Total	**173**

[a]Des Plaines River Tributary A, East Avenue Ditch, and a portion of the Mainstem Lower Des Plaines River drain to the Summit Conduit/Chicago Sanitary and Ship Canal

Table 2.1.3 lists the subwatersheds each municipality drains to, with subwatersheds listed in decreasing order based upon the area within the municipality. Although municipalities contribute stormwater to the listed subwatersheds, the actual stream may not be included within the municipality's boundaries.

TABLE 2.1.3
Municipality and Subwatersheds within the Municipality Boundary

Municipality	Subwatersheds within Municipality Boundary (square miles) [a, b, c]
Arlington Heights	Weller Creek(8.81), McDonald Creek(4.61), Buffalo Creek (1.47), Willow Creek[b],Feehanville Ditch[b]
Bedford Park	Des Plaines River (0.15)
Bellwood	Addison Creek(2.39), Des Plaines River[b]
Bensenville	Silver Creek[b], Addison Creek(0.17)
Berkeley	Addison Creek(1.27)
Berwyn	Des Plaines River[b]
Broadview	Addison Creek(1.04), Des Plaines River(0.69), Salt Creek[b]
Brookfield	Salt Creek(2.59), Des Plaines River(0.46)
Buffalo Grove	Buffalo Creek(1.97) McDonald Creek(0.16)
Burr Ridge	Flagg Creek(2.54), Des Plaines River[b]
Chicago	Des Plaines River (6.81), Willow Creek(4.21), Crystal Creek(3.15), Silver Creek(0.66)
Countryside	Des Plaines River(1.18), East Avenue Ditch(0.86), 67th Street Ditch(0.25), Flagg Creek(0.20), Des Plaines Tributary A[b]
Deer Park	Buffalo Creek[b]
Des Plaines	Des Plaines River(7.32), Weller Creek(3.70), Willow Creek(2.07) Farmer's Prairie Creek(0.80), Feehanville Ditch(0.56), McDonald Creek[b]
Elk Grove Village	Willow Creek(4.84)
Elmwood Park	Des Plaines River(1.56), Golf Course Tributary(0.35)
Forest Park	Des Plaines River(2.40)
Forest View	Des Plaines River[b]
Franklin Park	Silver Creek(2.93), Des Plaines River(1.26), Crystal Creek(0.52), Addison Creek[b]
Glenview	Des Plaines River(1.91), Farmer's Prairie Creek(0.16), Feehanville Ditch[b]
Harwood Heights	Des Plaines River(0.19)
Hillside	Addison Creek(1.97), Salt Creek[b]
Hodgkins	Des Plaines River(2.08), East Avenue Ditch[b], Flagg Creek[b]

TABLE 2.1.3
Municipality and Subwatersheds within the Municipality Boundary

Municipality	Subwatersheds within Municipality Boundary (square miles) [a, b, c]
Indian Head Park	Flagg Creek(0.91), Des Plaines Tributary A[b], East Avenue Ditch[b], 67th Street Ditch[b]
Justice	Des Plaines River
La Grange	Salt Creek(1.51), Des Plaines Tributary A, East Avenue Ditch, Des Plaines River, Flagg Creek
La Grange Park	Salt Creek(2.24)
Lemont	Des Plaines River(0.16)
Lyons	Des Plaines River(1.93), Salt Creek(0.19)
Maywood	Des Plaines River(2.63), Silver Creek[b], Addison Creek[b]
McCook	East Avenue Ditch(0.28), Des Plaines River(0.17)
Melrose Park	Silver Creek(2.06), Addison Creek(1.57), Des Plaines River(0.59)
Mount Prospect	Weller Creek(5.43), Feehanville Ditch(2.02), McDonald Creek(1.73), Des Plaines River, Willow Creek(0.58)
Niles	Farmer's Prairie Creek(1.29), Des Plaines River(0.26)
Norridge	Des Plaines River(1.29)
North Riverside	Des Plaines River(1.37) Salt Creek(0.21), Addison Creek[b]
Northbrook	Des Plaines River(1.79)
Northlake	Addison Creek(2.72), Salt Creek(0.47)
Oak Park	Des Plaines River(1.13)
Palatine	Buffalo Creek(2.26),Weller Creek[b], McDonald Creek[b]
Park Ridge	Des Plaines River(6.70), Farmer's Prairie Creek(0.41)
Prospect Heights	McDonald Creek(2.79),Des Plaines River(1.06), Buffalo Creek(0.32), Weller Creek(0.11)
River Forest	Des Plaines River(2.48)
River Grove	Des Plaines River(2.19), Golf CourseTributary(0.21)
Riverside	Des Plaines River(2.02)
Rolling Meadows	Weller Creek(0.68), Willow Creek[b]
Rosemont	Willow Creek(1.02), Des Plaines River(0.77), Crystal Creek[b]
Schiller Park	Crystal Creek(1.68), Des Plaines River(1.08) Silver Creek[b]
Stickney	Des Plaines River[b]
Stone Park	Addison Creek(0.33), Silver Creek[b]
Summit	Des Plaines River(0.33)
Unincorporated Cook County	Des Plaines River(10.23), Salt Creek(2.20), Silver Creek(1.90), Willow Creek(1.84), Farmer's Prairie Creek(1.77), Buffalo Creek(1.39), Flagg Creek(1.03), Addison Creek(0.94), Des Plaines Tributary A(0.40), Weller Creek(0.28), McDonald Creek(0.26), Feehanville Ditch[b], Crystal Creek[b], 67th Street Ditch[b]
Westchester	Salt Creek(1.96), Addison Creek(1.29)
Western Springs	Flagg Creek(1.8), Salt Creek(0.59), Des Plaines Tributary A[b]
Wheeling	Buffalo Creek(5.09), Des Plaines River(3.13), McDonald Creek(0.53)
Willow Springs	Des Plaines River(1.51), Flagg Creek(0.50)

[a]Subwatersheds are in alphabetical order
[b]Less than 0.1 square miles within municipality contributes to watershed, [c]Within Cook County

2.2 Stormwater Problem Data

To support DWP development, the District solicited input from stakeholders within the watershed. Municipalities, townships, and countywide, statewide, and national agencies such as CCHD, IDNR-OWR, IDOT, and the USACE, for example, were asked to fill out two forms with information to support DWP development. Organizations such as ecosystem partnerships were also contacted by the District as part of this information-gathering effort. Form A included questions on stormwater data and regulations, Form B included questions on known flooding, erosion, and stream maintenance problem areas. In addition to problem areas reported by municipalities, townships, public agencies and other stakeholders, results of hydrologic and hydraulic modeling performed as a part of DWP development identified stormwater problem areas. The hydrologic and hydraulic modeling process is described in general in Section 1.3 and specifically for each modeled tributary in Section 3.

Figure 2.2.1 and Table 2.2.1 summarize the responses to Form B questions about flooding, erosion, and stream maintenance problem areas. As noted, the scope of the DWP addresses regional problems along open channel waterways. The definition of regional problems was provided in Section 1.

TABLE 2.2.1
Summary of Responses to Form B Questionnaire

Problem ID	Municipality	Problem as Reported by Local Agency	Location	Problem Description	Local/ Regional	Reason for Classification
ADCR-BK-FL-01	Berkeley	Maintenance	IL RTE 56 at I-290	Reported by IDOT: Last incident 2/21/97	Local	6
ADCR-BW-FR-01	Bellwood	I-290 overtopping	I-290 at Addison Creek	Reported by IDOT	Regional	1, 3
ADCR-BW-FR-02	Bellwood	25th Avenue viaduct flooding at I-290	25th Avenue at Addison Creek (I-290 Underpass)	Reported by IDOT	Regional	1, 3
ADCR-HS-FL-01	Hillside	Bank Erosion, Sedimentation	I-290 at Wolf Road	Reported by IDOT: Last incident 5/1/03	Local	6
ADCR-HS-FL-02	Hillside	Pavement Flooding	US RTE 12/20/45 at I-290	Reported by IDOT: Last incident 8/26/87	Local	5
ADCR-HS-FL-03	Hillside	Storm Sewer Flow Restriction, Bank Erosion, Sedimentation	Mannheim and Roosevelt, 300 block of Oakridge Ave.	Street flooding and ponding to properties within subdivision.	Local	5, 6
ADCR-LE-FR-01	Leyden Township	Overbank flooding upstream of Northlake Structure 86	Leyden Township, north of Northlake Structure 86	Reported by IDOT: Last incident 5/28/03	Regional	1
ADCR-MR-FL-01	Melrose Park	Pavement Flooding	IL RTE 64 under Mannheim Road	Reported by IDOT	Local	5
ADCR-MR-FL-02	Melrose Park	Pavement Flooding	US RTE 20 at Wolf Road to US 12/20/45	Reported by IDOT: Last incident 2/21/97	Local	5
ADCR-NL-FL-01	Northlake	Pavement Flooding	Grand Avenue at I-294	Reported by IDOT: last incident 8/30/01	Local	5
ADCR-NL-FL-02	Northlake	Erosion and flooding	555 Northwest Avenue	Erosion and flooding problems	Local	6
ADCR-NL-SM-01	Northlake	Erosion and stream degradation between Northwest Avenue and Wolf Rd	Erosion and streambank degradation between Northwest Avenue and Wolf Road	Degradation along creek banks and sedimentation along creek	Regional	1
ADCR-NL-SM-02	Northlake	Storm sewer silting	North Ave. and Prater Avenue	48” storm sewer conveying majority of Rohde’s Creek is 80% silted in.	Local	6

TABLE 2.2.1
Summary of Responses to Form B Questionnaire

Problem ID	Municipality	Problem as Reported by Local Agency	Location	Problem Description	Local/ Regional	Reason for Classification
ADCR-PV-FL-01	Proviso Township	Pavement/ residential flooding	Wolf Rd. and Roosevelt Road	Flooding within the Westdale Gardens Subdivision along the roadways	Local	5
ADCR-SN-FR-01	Stone Park	Mannheim Road and overbank flooding in Stone Park	Village of Stone Park between Mannheim Road and Lake Street	Reported by IDOT: Last incident 8/24/04	Regional	1
ADCR-WC-FL-01	Westchester	Pavement Flooding	US RTE 12/20/45 at RTE 38	Reported by IDOT: Last incident 10/26/91	Local	5
BCTA-AH-FL-01	Arlington Heights	Pavement flooding	IL Route 68 at IL Route 53	Reported by IDOT: Last Incident 2/21/97	Local	5
BCTA-BG-FL-01	Village of Buffalo Grove	Streambank erosion along Buffalo Creek Tributary A	Lake-Cook Road and Ridge Avenue	Bank Erosion	Local	6
BCTA-CD-SM-01	CCHD	Sediment deposits and vegetative growth	Cook County Highway Department Structure 016-4011 at Buffalo Creek Tributary A	Sediment accumulation and vegetative growth	Local	6
BCTA-PL-FL-01	Palatine	Pavement flooding	IL Route 68 at US Route 12 to Baldwin Street	Reported by IDOT: Last incident 3/30/97	Local	5
BCTA-PL-FL-02	Palatine	Pavement flooding	IL Route 68 at US Route 12 to Hicks Road	Reported by IDOT: Last incident 7/15/03	Local	5
BUCR-CD-SM-01	CCHD, Deer Park	Maintenance	Cook County Highway Department Structure 016-3203, at Buffalo Creek, 0.5 Miles west of Buffalo Grove Road.	Sediment accumulation and vegetative growth	Local	6
BUCR-CD-SM-02	CCHD	Maintenance	Buffalo Grove Road from Hintz Road to Lake-Cook Road	Sediment accumulation in streambed	Local	6
BUCR-CD-SM-03	CCHD	Maintenance	Hintz Road from Arlington Heights Road to Milwaukee Avenue	Mild sedimentation accumulation downstream of CCHD Structure #016-3229	Local	4
BUCR-CD-SM-04	CCHD, Wheeling	Maintenance	Aptakisic Road from Buffalo Grove Road to McHenry Road	West barrel is heavily silted with significant vegetation	Local	4

TABLE 2.2.1
Summary of Responses to Form B Questionnaire

Problem ID	Municipality	Problem as Reported by Local Agency	Location	Problem Description	Local/ Regional	Reason for Classification
BUCR-PH-FL-01	Prospect Heights	Pavement flooding	IL Route 83 from Dundee Road to Hintz Road	Last incident 7/8/03	Local	5
BUCR-PL-FL-01	Palatine	Pavement flooding	US Route 12 from IL Route 68 to Winslowe Drive	Reported by IDOT: Last incident 3/28/04	Local	5
BUCR-PL-FL-02	Palatine	Erosion	1800 N Rand Road	Sinkhole forming in back parking lot behind building	Local	6
BUCR-WH-FL-01	Wheeling	Pavement flooding	Wolf Road at IL Route 68 to Manchester Drive	Reported by IDOT: Last incident 5/21/96	Local	5
BUCR-WH-FL-02	Wheeling	Pavement flooding	IL Route 68 at Wheeling Drainage Ditch	Reported by IDOT	Local	5
BUCR-WH-FL-03	Wheeling	Storm sewer/ residential flooding	Hintz Road and Schoenbeck Road	Undersized storm sewers back up into low lying, flood residential areas	Local	5
BUCR-WH-FL-04	Wheeling	Pavement flooding	Wheeling Road and Exchange Court	Wheeling Road closed due to flooding 1-2 times per year	Local	5
BUCR-WH-FL-05	Wheeling	Pavement flooding	Bridle Trail and Pleasant Run Drive	Undersized storm sewers flood Pleasant Run Drive and parts of Bridle Trail	Local	5
BUCR-WH-FL-06	Wheeling	Detention basin overflow	Lee Street Detention Basin (Dundee Road and Schoen-beck Road)	Ponding in local streets in Wheeling and Buffalo Grove	Local	5
BUCR-WH-FR-01	Wheeling	Overbank flooding	Dundee Road and Elmhurst Road	Dunhurst Subdivision flood-ing	Regional	1
BUCR-WH-FR-03	Wheeling	Overbank flooding	Wheeling Road and Mercan-tile Court	Wheeling Road closed due to flooding 1-2 times a year	Regional	1
BUCR-WH-FR-10	Wheeling	Overbank flooding	Wolf Road and Highland Avenue	Wolf Road floods at the in-tersection of Wolf Road and Highland Ave	Regional	1

TABLE 2.2.1
Summary of Responses to Form B Questionnaire

Problem ID	Municipality	Problem as Reported by Local Agency	Location	Problem Description	Local/ Regional	Reason for Classification
WPDT-BG-FL-01	Buffalo Grove	Storm sewer/ residential flooding	600-700 MacArthur Drive	Water ponds and enters residences	Local	5
WPDT-BG-FL-02	Buffalo Grove	Pavement flooding	IL Route 68 at Arlington Heights Road	Reported by IDOT: Last incident 10/13/01	Local	5
WPDT-BG-FL-03	Buffalo Grove	Residential flooding	Beechwood Road, Beechwood Court, and Weidner Road	Storm sewer under Weidner Road surcharges, homes with driveways flood	Local	5
WPDT-BG-FL-04	Buffalo Grove	Residential flooding	514 to 644 White Pine Road	Runoff accumulates in homes with at-grade driveways	Local	5
WPDT-BG-FL-05	Buffalo Grove	Pavement flooding	IL Route 68 at Old Arlington Heights Road	Reported by IDOT: Last incident 10/17/98	Local	2
WPDT-BG-FR-01	Buffalo Grove	Residential flooding	St. Mary's Parkway and adjacent areas	Culvert at St. Mary's Parkway undersized	Local	2
CYCR-SP-FL-01[1]	Schiller Park	Pavement Flooding	Lawrence Avenue at Soo Line Railroad	IDOT reported pavement flooding	Local	2, 5
CYCR-SP-FL-02[1]	Schiller Park	Pavement Flooding	Lawrence Avenue at 25th Avenue	IDOT reported pavement flooding	Local	2, 5
CYCR-SP-FL-03[1]	Schiller Park	Pavement Flooding	US Route 12/45 at Lawrence Avenue entrance	IDOT reported pavement flooding	Local	2, 5
CYTR-FP-FL-01[2]	Franklin Park	Pavement Flooding	US Route 12/45 at I-294 entrance	IDOT reported pavement flooding	Local	2, 5
DP-CH-FL-01	City of Chicago	Pavement flooding	Interstate Route 90 at Canfield Avenue to Oriole Avenue	Drainage Investigation completed not implemented	Local	2
DP-CH-FL-02	City of Chicago	Pavement flooding	Interstate Route 90 at Des Plaines River	Reported by IDOT	Local	5

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Summary of Responses to Form B Questionnaire

Problem ID	Municipality	Problem as Reported by Local Agency	Location	Problem Description	Local/ Regional	Reason for Classification
DP-CS-FL-01	City of Countryside	Pavement flooding	Bobolink Drive between LaGrange Road and 7th Avenue	City storm sewer discharges into IDOT storm sewer on 55th Street, which occasionally surcharges causing street ponding	Local	5
DP-CS-FL-02	City of Countryside	Pavement flooding	5400 block of Madison Avenue	IDOT 55th Street storm sewer surcharge	Local	5
DP-DP-FL-01	City of Des Plaines	Pavement flooding	Central Road at West of US Route 45	Reported by IDOT: Last incident 10/13/01	Local	5
DP-DP-FL-02	City of Des Plaines	Pavement flooding	Des Plaines River Road at between IL 72 & Devon Avenue	Reported by IDOT: Last incident 10/14/01	Local	5
DP-DP-FL-03	City of Des Plaines	Pavement flooding	Devon Avenue at I-294 West of River Road	Reported by IDOT: Last incident 8/14/87	Local	5
DP-DP-FL-04	City of Des Plaines	Pavement flooding	Touhy Avenue at east of Interstate Route 294	Reported by IDOT: Last incident 5/09/90	Local	5
DP-DP-FL-05	City of Des Plaines	Pavement flooding	Des Plaines River Road at Touhy Avenue To Dempster Street	Reported by IDOT: Last incident 8/24/07	Local	5
DP-DP-FL-06	City of Des Plaines	Pavement flooding	Illinois Route 58 at Des Plaines River	Reported by IDOT	Local	5
DP-DP-FL-07	City of Des Plaines	Pavement flooding	Illinois Route 58 at C&NW RR (Des Plaines River)	8/23/07 Des Plaines River cresting	Local	5
DP-DP-FR-03	City of Des Plaines	Pavement flooding	Des Plaines River Road at Gregory to Central Road	Reported by IDOT: Last incident 8/24/07 (Feehanville Ditch problem area DP-FHDT-WT-FR-02)	Regional	3
DP-DP-FR-04	City of Des Plaines	Pavement flooding	US Route 14 (Miner Street) at Des Plaines River	Reported by IDOT	Regional	3

TABLE 2.2.1
Summary of Responses to Form B Questionnaire

Problem ID	Municipality	Problem as Reported by Local Agency	Location	Problem Description	Local/ Regional	Reason for Classification
DP-DP-FR-06	City of Des Plaines	Structure flooding	Oakton Street (Locust and Maple Street)	09/13/08: Major flooding on Des Plaines River. Seventeen businesses had up to 24 inches of first floor flooding. 06/19/09: 4 inches in 1 hour. Des Plaines River did not over top but low area held water to foundation level.	Regional	1
DP-DP-FR-07	City of Des Plaines	Structure flooding	Fargo Avenue and River Road	09/13/08: Major flooding on Des Plaines River. Seventeen businesses' had up to 24 inches of first floor flooding. 06/19/09: 4 inches in 1 hour. Des Plaines River did not over top but low area held water to foundation level.	Regional	1
DP-DP-FR-08	City of Des Plaines	Structure flooding	River Road and Oakton Street	09/13/08: Major flooding on Des Plaines River. Seventeen businesses had up to 24 inches of first floor flooding.	Regional	1
DP-DP-FR-11	City of Des Plaines	Pavement flooding	Illinois Route 58 (Golf Road) at Oakton Community College	Reported by IDOT: Last incident 4/24/99	Regional	2
DP-PR-FR-01	City of Park Ridge	Pavement flooding	Illinois Route 72 at Des Plaines River	Reported by IDOT	Regional	5
DP-PR-FL-02	City of Park Ridge	Pavement flooding	Devon Avenue at Des Plaines River	Reported by IDOT	Local	5
DP-CD-FR-01	CCHD	Pavement flooding	Fullerton Avenue at Des Plaines River Road	Des Plaines River floods over bank	Regional	3

TABLE 2.2.1
Summary of Responses to Form B Questionnaire

Problem ID	Municipality	Problem as Reported by Local Agency	Location	Problem Description	Local/ Regional	Reason for Classification
DP-CD-SM-02	CCHD	Maintenance/Debris	Cook County Highway Department Structure 016-3258 at the Des Plaines River, 0.2 miles east of US 45	Debris collected at center pier.	Local	6
DP-CF-ER-01	FPDCC	Erosion	LaGrange Road and 63rd Street	Severe erosion within Theodore Stone Forest Preserve ravine needs to be restored to natural topography.	Local	6
DP-HH-FL-01	Harwood Heights	Combined sewers	Lawrence Avenue and Harlem Avenue	Separate combined sewer proposal	Local	5
DP-LT-FL-01	Lyons Township	Pavement flooding	Interstate Route 55 at Des Plaines River	Reported by IDOT: Last incident 5/28/00	Local	5
DP-MT-FR-01	Maine Township	Pavement flooding	Central Road at East River Road to River Road	Reported by IDOT: Last incident 3/1/07	Regional	2
DP-NT-FL-01	Northfield Township	Pavement flooding	Illinois Route 21 at Central Road	Reported by IDOT: Last incident 8/10/98	Local	5
DP-NT-FL-02	Northfield Township	Pavement flooding	Central Avenue, between Dearlove and Glenwood Road	Street and structural flooding due to undersized storm sewer along Central, IDOT has preliminary study that did not proceed due to lack of funding, pictures included in Form B	Local	5
DP-PT-FL-01	Proviso Township	Pavement flooding	Illinois Route 171 at 13th Street (Loyola Hospital)	Reported by IDOT: Last incident 5/28/96	Local	5

TABLE 2.2.1
Summary of Responses to Form B Questionnaire

Problem ID	Municipality	Problem as Reported by Local Agency	Location	Problem Description	Local/ Regional	Reason for Classification
DP-EP-FL-01	Village of Elmwood Park	Pavement flooding	Illinois Route 64 at Des Plaines River	Reported by IDOT	Local	5
DP-EP-FR-01	Village of Elmwood Park	Residential flooding	Flooding from Des Plaines River at Thatcher Road	Village sand bags now when River rises. Street and house flooding when overtopping occurs. Village would like to build berm but were told no by State.	Regional	1
DP-FO-EL-01	Village of Forest Park	Erosion	Roosevelt Road & Des Plaines Avenue	Significant bank erosion, sedimentation, and pollution present.	Local	6
DP-FO-FL-01	Village of Forest Park	Pavement flooding	Interstate Route 290 at Des Plaines	Reported by IDOT. Phase I studies complete.	Local	5
DP-FO-FL-02	Village of Forest Park	Pavement flooding	Illinois Route 171 at Roosevelt to Cermak	Reported by IDOT: Last incident 11/4/03	Local	5
DP-FP-FL-01	Village of Franklin Park	Pavement flooding	Des Plaines River Road at Belmont Avenue	Reported by IDOT: Last incident 4/23/99	Local	5
DP-FP-FR-01	Village of Franklin Park	Pavement flooding	Des Plaines River Road between King Avenue and Robinson Avenue	Reported by IDOT: Last incident 6/5/00	Regional	1
DP-FV-FR-01	Village of Forest View	Potential residential flooding	47^{th} Street Levee	Levee potentially not high enough	Regional	1
DP-GV-FL-01	Village of Glenview	Storm sewer	Central Road at Milwaukee Road	Storm sewer at Milwaukee and Central is undersized, causing flooding impacts in areas that drain to Central Road storm sewer, also impacts 600 Naples Court Condo	Local	5

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Problem ID	Municipality	Problem as Reported by Local Agency	Location	Problem Description	Local/ Regional	Reason for Classification
DP-GV-FL-02	Village of Glenview	Erosion	Forest Drive near Des Plaines River	Deteriorating of ditch on FPDCC property has caused flooding problems in the subdivision. The FPDCC is not allowing the Village to perform the required corrective work	Local	4
DP-GV-FL-03	Village of Glenview	Pavement flooding	Illinois Route 21 at Glenview Road	Reported by IDOT: Last incident 10/13/01	Local	5
DP-LG-FL-01	Village of LaGrange	Pavement flooding	47th Street at East Avenue	Reported by IDOT: Last incident 5/9/03	Local	5
DP-LY-FL-01	Village of Lyons	Pavement flooding	Illinois Route 171 at 45th Street	Reported by IDOT: Last incident 11/10/06	Local	5
DP-LY-FR-01	Village of Lyons	Pavement flooding	US Route 34 (Ogden Avenue) east of Plainfield Road	Reported by IDOT: Last incident 8/15/87	Regional	3
DP-LY-FR-02	Village of Lyons	Pavement flooding	47th Street at Des Plaines River	Reported by IDOT	Regional	3
DP-LY-FR-03	Village of Lyons	Residential flooding	Forest Avenue and 1st Avenue	High River levels cause property damage	Regional	1
DP-MW-FL-01	Village of Maywood	Combined sewers	Various Locations	Village experience extensive basement flooding. After heavy rainfall, combined sewers cannot handle runoff, therefore, causing basement flooding.	Local	5
DP-MW-FL-02	Village of Maywood	Pavement flooding	Illinois Route 171 at south of Lake Street	Reported by IDOT: Last incident 7/7/04	Local	5
DP-MW-FL-03	Village of Maywood	Pavement flooding	Illinois Route 171 at Madison Street (School Street)	Reported by IDOT: Last incident 6/7/93	Local	5

TABLE 2.2.1
Summary of Responses to Form B Questionnaire

Problem ID	Municipality	Problem as Reported by Local Agency	Location	Problem Description	Local/ Regional	Reason for Classification
DP-MC-FR-01	Village of McCook	Overbank flooding	McCook Levee at Des Plaines River	March 1979 Des Plaines River breach of MWRD levee caused catastrophic damage in McCook and Summit. Village wants assurance that MWRD/IDOT levee system is intact and to what elevation (BFE+2' or BFE+3')	Regional	1
DP-NR-FL-01	Village of North Riverside	Overbank flooding	General overbank flooding - no location specified	Flooding occurs as indicated on FIRM panels. (Structures not affected.)	Local	7
DP-NR-FL-02	Village of North Riverside	Pavement flooding	Illinois Route 171 at 31st Street to Ogden Avenue	Reported by IDOT: Last incident 8/17/97	Local	5
DP-NR-FL-03	Village of North Riverside	Pavement flooding	26th Street at Des Plaines River	Reported by IDOT	Local	5
DP-NB-EL-01	Village of Northbrook	Erosion	Portwine Road and Forest View Drive along ditch	Severe bank erosion along 0.5 miles of Portwine Ditch (pics with Form B)	Local	4
DP-RF-FL-01	Village of River Forest	Sewer	Lake Street and River Oaks Drive near 1st Avenue and Lake	Sewer Surcharging into basements and streets due to high River levels and overland flooding. River Forest completed study of problem area for levee project in 1988.	Local	5
DP-RF-FR-01	Village of River Forest	Restrictive structure	Lake Street crossing	Possible restrictive structure	Regional	3
DP-RF-FR-02	Village of River Forest	Restrictive structure	UPRR crossing	Possible restrictive structure	Regional	3

TABLE 2.2.1
Summary of Responses to Form B Questionnaire

Problem ID	Municipality	Problem as Reported by Local Agency	Location	Problem Description	Local/ Regional	Reason for Classification
DP-RF-FR-03	Village of River Forest	Sewer	Chicago Avenue and Thatcher Avenue	Sewer Surcharging into basements and streets due to high River levels and overland flooding. River Forest completed study of problem area for levee project in 1988.	Regional	1
DP-RG-EL-01	Village of River Grove	Erosion	Des Plaines River Road and Grand Avenue to Fullerton	Bank Erosion along road-way	Local	4
DP-RG-ER-01	Village of River Grove	Erosion	Des Plaines River Road and 1st Avenue. Drainage ditch along west side of Des Plaines River Road	Pile of crushed stone along west side of Des Plaines River Road began to erode. Stone eroded into drainage ditch and filled ditch enough to cause surface runoff to flood over banks onto Des Plaines River Road. IDOT planning to dredge and re-contour ditch.	Regional	1
DP-RG-FL-01	Village of River Grove	Storm and combined sewer	Basements throughout Village	Storm and combined sewer overflow into basements	Local	5
DP-RG-FL-02	Village of River Grove	Pavement flooding	Belmont Avenue at Des Plaines River	Reported by IDOT	Local	5
DP-RG-FL-03	Village of River Grove	Pavement flooding	Belmont Avenue at Forest Reserve	Reported by IDOT: Last incident 7/18/93	Local	5

TABLE 2.2.1
Summary of Responses to Form B Questionnaire

Problem ID	Municipality	Problem as Reported by Local Agency	Location	Problem Description	Local/ Regional	Reason for Classification
DP-RG-FR-01	Village of River Grove	Pavement flooding	Along Des Plaines River from Grand to Fullerton	After heavy rains, the Des Plaines River cannot handle the volume of stormwater and results in bank erosion and severe overbank flooding and often results in lane closures along Des Plaines River Road.	Regional	1
DP-RG-FR-02	Village of River Grove	Pavement flooding	Des Plaines River Road at Grand Avenue to 1st Avenue	Reported by IDOT: Last incident 5/27/04	Regional	1
DP-RS-FL-01	Village of Riverside	Pavement flooding	31st Street at Des Plaines River	Reported by IDOT	Local	5
DP-RS-FR-01	Village of Riverside	Residential flooding	Groveland north of Forest Avenue	Structure flooding	Regional	1
DP-RS-FR-02	Village of Riverside	Residential flooding	Forest Avenue and 1st Avenue	High River levels cause property damage	Regional	1, 3
DP-RM-FL-01	Village of Rosemont	Pavement flooding	US Route 12/45 at IL Route 72	Reported by IDOT: Last incident 2/21/97	Local	5
DP-RM-FL-02	Village of Rosemont	Pavement flooding	Touhy Avenue at US Route 12/45	Reported by IDOT: Last incident 8/30/01	Local	5
DP-RM-FL-03	Village of Rosemont	Sediment Deposition	West of intersection of Rosemont Avenue and Kirschoff Street	Sedimentation in Willow Creek channel creating an island	Local	6
DP-SM-FL-01	Village of Summit	Pavement flooding	Interstate Route 55 at Illinois Route 171	Reported by IDOT	Local	5
DP-WH-FL-03	Village of Wheeling	Pavement flooding	Illinois Route 68 west of Interstate Route 294	Reported by IDOT: Last incident 2/21/97	Local	5
DP-WH-FL-04	Village of Wheeling	Pavement flooding	Illinois Route 68 at Des Plaines River	Submitted by IDOT	Local	5

TABLE 2.2.1
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Problem ID	Municipality	Problem as Reported by Local Agency	Location	Problem Description	Local/ Regional	Reason for Classification
DP-WT-SM-01	Wheeling Township	Sediment deposition	Portwine Road and Forest View Road, Northbrook	Outlet to Des Plaines River has large sediment deposits causing restricted flow into Des Plaines River and causing basement flooding and ponding in residential area. Channel needs to be reconstructed	Local	6
DPTA-LT-FL-01	Lyons Township	Blockage	5441 Edgewood Avenue	Obstruction inhibits natural flow of water north into LaGrange Country Club	Local	6
DPTA-LT-FL-02	Lyons Township	Pavement Flooding	58^{th} and Peck Avenue	Ditch conveyance to culvert at 58th and Peck. Water is obstructed from west causing backup and flooding.	Local	5
EADT-CS-FL-01	Countryside	Pavement Flooding	Plainfield Road at Salem Square Shopping Center	Roadway drainage problems	Local	5
EADT-CS-FL-02	Countryside	Pavement Flooding	East Avenue at 56^{th} Street	Reported by IDOT: Last incident 01/22/09	Local	5
EADT-CS-FL-03	Countryside	Pavement Flooding	57^{th} Street and Madison Avenue	Area floods when 5500 block of Kensington Avenue floods	Local	5
EADT-CS-FL-04	Countryside	Pavement Flooding	Bobolink Drive between LaGrange Road and 7^{th} Avenue	Discharges to IDOT 55^{th} Street storm sewer which surcharges	Local	5
EADT-LT-FL-01	Lyons Township	Pavement Flooding	62^{nd} Street and Brainard Avenue	Nuisance flooding from Edgewood Avenue to Brainard Avenue	Local	5
EADT-LT-FL-02	Lyons Township	Pavement Flooding	Between 61^{st} Street and 62^{nd} Street	Creek between 61^{st} and 62^{nd} Streets acts as outlet for storm sewer drainage	Local	5

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Summary of Responses to Form B Questionnaire

Problem ID	Municipality	Problem as Reported by Local Agency	Location	Problem Description	Local/ Regional	Reason for Classification
FRCR-DP-FL-01	Des Plaines	Overbank Flooding	Ballard Road (Dawn Court & Lyman Avenue)	Severe cross sectional restrictions north of Ballard Road cause minor flooding.	Local	4
FRCR-DP-SM-01	Des Plaines	Erosion	Farmers Creek from Railroad to Des Plaines River	Channel deterioration at confluence with Des Plaines River.	Local	6
FRCR-PR-FR-03	Park Ridge	Residential Flooding	Lake Mary Ann	Level of Lake Mary Ann rises and floods surrounding homes.	Local	4
PRCR-DP-FL-01	Des Plaines	Pavement Flooding	IL Route 68 at I-294	Reported by IDOT: Last incident 5/26/04.	Local	5
PRCR-NI-FL-01	Niles	Pavement Flooding	IL Route 21 at Greenwood Road	Reported by IDOT: Last incident 10/13/01	Local	5
PRCR-NI-FL-02	Niles	Pavement Flooding	IL Route 21 at Maryland Drive	Reported by IDOT: Last incident 2/21/98	Local	5
PRCR-PR-FL-01	Park Ridge	Pavement Flooding	US Route 14 at Dee Road	Watershed study required.	Local	5
PRCR-PR-FL-02	Park Ridge	Overbank Flooding	Lutheran General Hospital detention basin	Flooding located at the detention basin.	Local	5
FHDT-DP-FL-01	Des Plaines	Pavement Flooding	Wolf Road at Central Road	Last incident 05/04/09, Submitted by IDOT	Local	2
FHDT-DP-SM-01	Des Plaines	Maintenance	River Road and Gregory Street	48-inch storm sewer carrying Feehanville Ditch needs to be televised, cleaned, repaired	Local	6
FHDT-MP-FL-01	Mount Prospect	Pavement Flooding	US Route 12 at Kensington Road	Last incident 06/17/96, submitted by IDOT	Local	5
FHDT-MP-FL-02	Mount Prospect	Pavement Flooding	IL Route 83 at Kensington Road	Last incident 06/26/93, submitted by	Local	5

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Summary of Responses to Form B Questionnaire

Problem ID	Municipality	Problem as Reported by Local Agency	Location	Problem Description	Local/ Regional	Reason for Classification
FHDT-WT-FR-01	Wheeling Township	Structure and Roadway Flooding	River Road and Gregory Street	Backwater from Des Plaines River causes flooding in unincorporated residential areas	Regional	1
FHDT-WT-FR-02	Wheeling Township	Roadway Flooding	River Road and Feehanville Ditch	Roadway inundation greater than 0.5 feet	Regional	1
FGCR-CS-FL-01	Countryside	Pavement Flooding	55th Street at Gilbert Avenue	Reported by IDOT: Last incident 5/23/04	Local	5
FGCR-CS-FL-02	Countryside	Pavement Flooding	Willow Springs Road at 55th Street	Reported by IDOT: Last incident 5/10/90	Local	5
FGCR-FD-FL-01	Flagg Creek Water Reclamation District	Facility Flooding	Joliet Road and I-55-west bank of Flagg Creek, 200 feet north of Joliet Road	Floodwaters impact hydraulics and contaminants from pond are discharged.	Local	5
FGCR-FD-FL-02	Flagg Creek Water Reclamation District	Storm Sewer Problem	Harvey Avenue	Drainage problem for east side of subdivision off of Harvey Avenue.	Local	5
FGCR-IH-FL-01	Indian Head Park	Pavement Flooding	I-55 and I-294	Reported by IDOT: Last incident no reported	Local	5
FGCR-LT-FL-01	Lyons Township	Drainage Problem	55th Street and Laurel Avenue	Debris and poor grading cause ponding and flooding problems.	Local	5
FGCR-LT-FL-02	Lyons Township	Drainage Problem	55th Street and Wolf Road	Problems with drainage flowpath.	Local	5
FGCR-LT-FL-03	Lyons Township	Storm Sewer Problem	55th Street and Willow Springs Road	Drainage problems at storm sewer.	Local	5
FGCR-LT-FL-04	Lyons Township	Drainage Problem	54th Street to 54th Place drainage easement	Obstructions impede flow and cause ponding and flooding.	Local	5

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Problem ID	Municipality	Problem as Reported by Local Agency	Location	Problem Description	Local/ Regional	Reason for Classification
FGCR-WL-FL-01	Willow Springs	Pavement Flooding and Residential Flooding	91st Street and Orchard Road	Corner floods in heavy rains; intersection impassable and threatens homes.	Local	5
FGCR-WS-FL-01	Village of Willow Springs	Sediment deposition	Southwest of German Church Road and Wolf Road	Sediment and sedge build up along north side of creek causing creek to re-channel itself.	Local	6
MCTA-AH-FL-01	Arlington Heights	Pavement flooding	US Route 12 at Camp McDonald Road	Reported by IDOT: Last Incident 9/08	Local	5
MCTA-CD-FL-01	CCHD	Pavement flooding	Willow Road west of Wheeling Road	Road flooding	Local	5
MDCR-AH-FL-01	Prospect Heights	Home/Pavement flooding	East of Wilke Road near Concord Drive	Residential and road flooding	Local	5
MDCR-AH-FL-02	Arlington Heights	Pavement flooding	US Route 12 at Kennicott Avenue	Reported by IDOT: Last Incident 2/21/97	Local	5
MDCR-CD-SM-01	CCHD	Sediment deposits	Camp McDonald Road bridge	Sediment accumulation	Local	6
MDCR-MP-FL-01	Mount Prospect	Bank erosion and sediment deposits	Downstream of Euclid Avenue	Sedimentation accumulation and bank erosion	Local	6
MDCR-PH-FL-01	Prospect Heights	Road flooding	Palatine Road at IL 83	Reported by IDOT: Last Incident 10/13/01	Local	5
MDCR-PH-FL-02	Prospect Heights	Road flooding	Palatine Road under Wolf Road	Reported by IDOT: Last Incident 9/23/06	Local	5
MDCR-PH-FL-03	Prospect Heights	Road flooding	Wolf Road at Palatine Road	Reported by IDOT: Last Incident 5/4/93	Local	5
MCTA-PH-FR-03	Prospect Heights	Road flooding	Hillcrest Drive and Owen Court	Flooding on critical access roads	Regional	1
MDCR-WH-FL-01	Wheeling	Road flooding	IL Route 68 at Des Plaines River	Reported by IDOT: Last Incident unknown	Local	5

TABLE 2.2.1
Summary of Responses to Form B Questionnaire

Problem ID	Municipality	Problem as Reported by Local Agency	Location	Problem Description	Local/ Regional	Reason for Classification
MDCR-WH-FL-02	Wheeling	Road flooding	IL Route 68 at I-294	Reported by IDOT: Last Incident 2/21/97	Local	5
MDCR-WH-FL-03	Wheeling	Road flooding	IL Route 21 at Hintz Road	Reported by IDOT: Last Incident 2/21/97	Local	5
MDCR-WH-FL-04	Wheeling	Road flooding	Palatine Road west of Wolf Road	Reported by IDOT: Last Incident 4/3/03	Local	5
MDCR-WT-FL-01	Wheeling Township	Bank erosion	Woodlawn Drive and Bonnie Brae Avenue	Bank erosion along yards of residences.	Local	6
MDCR-MP-FR-01	Mount Prospect	Erosion	North of Euclid Avenue, west of Wolf Road	Bank erosion at bridges	Regional	1
SLCR-LE-FL-01	Leyden Township	Street, Yard, and Basement Flooding	Throughout Township	Flooding during moderate to medium rains or snow melt	Local	5
SLCR-LE-FL-02	Leyden Township	Street, Yard, and Basement Flooding	Throughout Township	Flooding during moderate to medium rains or snow melt	Local	5
SLCR-LE-FL-03	Leyden Township	Street, Yard, and Basement Flooding	Throughout Township	Flooding during moderate to medium rains or snow melt	Local	5
SLCR-LE-FR-01	Leyden Township	Street, Yard, and Basement Flooding	Between Fullerton Avenue and Armitage Avenue	Flooding during moderate to medium rains or snow melt	Regional	1
SLCR-LE-FR-02	Leyden Township	Street, Yard, and Basement Flooding	Between Fullerton Avenue and Armitage Avenue	Flooding during moderate to medium rains or snow melt	Regional	1
SLCR-LE-FR-03	Leyden Township	Street, Yard, and Basement Flooding	Between Grand Avenue and Mannheim Avenue	Flooding during moderate to medium rains or snow melt	Regional	1

TABLE 2.2.1
Summary of Responses to Form B Questionnaire

Problem ID	Municipality	Problem as Reported by Local Agency	Location	Problem Description	Local/ Regional	Reason for Classification
SLCR-LE-FR-04	Leyden Township	Street, Yard, and Basement Flooding	Between Grand Avenue and Mannheim Avenue	Flooding during moderate to medium rains or snow melt	Regional	1
SLCR-LE-FR-05	Leyden Township	Street, Yard, and Basement Flooding	Between Belmont Avenue and Grand Ave	Flooding during moderate to medium rains or snow melt	Regional	1
SLCR-LE-FR-06	Leyden Township	Street, Yard, and Basement Flooding	Between Belmont Avenue and Grand Ave	Flooding during moderate to medium rains or snow melt	Regional	1
SLCR-FP-FL-01	Franklin Park	Street and Structure Flooding	Between I-294 and Franklin Avenue	Flooding occurs in events greater than 25-year	Local	5
SLCR-FP-FL-02	Franklin Park	Street and Structure Flooding	Between I-294 and Franklin Avenue	Flooding occurs in events greater than 25-year	Local	5
SLCR-FP-SM-01	Franklin Park	Street and Structure Flooding	Between I-294 and Franklin Avenue	Flooding occurs in events greater than 25-year	Local	5
SLCR-FP-FL-03	Franklin Park	Street Flooding	Mannheim Avenue from Belmont Avenue to Grand Avenue	Reported by IDOT, last incident 8/31/01	Local	5
SLCR-FP-FR-01	Franklin Park	Street, Yard, and Basement Flooding	Lee Street south of Belmont Avenue	Homes subject to frequent flooding due to insufficient capacity	Regional	1
SLCR-FP-FR-02	Franklin Park	Structural Failure and Flooding of Residents	Riverside Drive near Structure 106	Failing and Undersized Culvert	Regional	1, 2
SLCR-MW-FL-01	Maywood	Insufficient Capacity	1st Avenue	Backwater from Des Plaines River	Local	1
SLCR-MR-FL-01	Melrose Park	Erosion	From 14th Avenue to 1st Avenue	Eroding Streambank	Local	6
SLCR-MR-ER-01	Melrose Park	Pavement Flooding	North Avenue at IHB RR	Pavement Flooding, insufficient storm sewer capacity	Local	5

TABLE 2.2.1
Summary of Responses to Form B Questionnaire

Problem ID	Municipality	Problem as Reported by Local Agency	Location	Problem Description	Local/ Regional	Reason for Classification
STCR-LG-FL-01	LaGrange	General Village Flooding	Throughout Village	The Village is drained by combined sewers that flow west to east to the Districts interceptor sewer and TARP dropshafts. Street and home flooding occurs due to combined sewers	Local	5
STCR-PV-FL-01	Proviso Township	Pavement Flooding	US Route 12/20/45 at IL Route 38	Reported by IDOT: Last incident 8/8/91	Local	5
SCSF-WC-FL-01	Westchester	Pavement Flooding	31^{st} Street at Wolf Road	Reported by IDOT: Last incident 7/3/98	Local	5
STCR-BF-FL-01	Brookfield	Street and basement flooding	Throughout Village	After heavy rains, combined sewer cannot handle runoff which causes street and basement flooding	Local	5
STCR-BV-FL-01	Broadview	Local flooding due to undersized ditch	25^{th} Avenue south of Cermak to Salt Creek	Parking lot and industrial building dock flooding due to undersized ditch on east side of 25^{th} Avenue	Local	5
STCR-CF-SM-01	Forest Preserve District of Cook County	Odor	LaGrange Road and 31^{st} Street	Water within creek has odor of raw sewage, possible problem with sewer overflow	Local	6
STCR-LP-FL-01	LaGrange Park	Basement flooding due to undersized sewers	East of LaGrange Road and south of 31^{st} Street	After heavy rains, combined sewer cannot handle runoff which causes basement flooding	Local	5

TABLE 2.2.1
Summary of Responses to Form B Questionnaire

Problem ID	Municipality	Problem as Reported by Local Agency	Location	Problem Description	Local/ Regional	Reason for Classification
STCR-LY-FR-01	Lyons	Pavement flooding	Ogden Avenue and First Avenue	During the September 2008 storm, Salt Creek over-topped its banks and flooded the Czech Terrace subdivision in Lyons and a portion of Southview Ave. Arden Ave. and McCormick Ave. in Brookfield	Regional	1
STCR-WC-FL-01	Westchester	Pavement Flooding	22nd Street / Cermak Road at Boeger Street	Reported by IDOT: Last incident 8/26/87	Local	5
STCR-WS-FL-01	Western Springs	Storm Sewer Flow Restriction	Howard Avenue north of Ogden Avenue	Under permits for sewer extensions within service area for drop shaft 55, Village of is limited to 200 cfs plus available outfall capacity. This restriction required until proposed phase II TARP is in operation	Local	5
STCR-WS-FL-02	Western Springs	Pavement Flooding	US Route 34 at Wolf Road	Reported by IDOT: Last incident 11/4/03	Local	5
WECR-AH-FL-01	Arlington Heights	Pavement Flooding and/or Residential Flooding	Between Magnolia Street and Noyes	Home and/or road flooding during September 2008 event	Local	5
WECR-AH-FL-02	Arlington Heights	Pavement Flooding and/or Residential Flooding	North of Central Road between Dryden Place and Arthur Avenue	Home and/or road flooding during September 2008 event	Local	5
WECR-AH-FL-03	Arlington Heights	Pavement Flooding and/or Residential Flooding	South of Euclid Avenue and Rolling Lane	Home and/or road flooding during September 2008 event	Local	5
WECR-AH-FL-04	Arlington Heights	Pavement Flooding and/or Residential Flooding	Regency Drive West and Peachtree Lane north of Kensington Road	Home and/or road flooding during September 2008 event	Local	5

TABLE 2.2.1
Summary of Responses to Form B Questionnaire

Problem ID	Municipality	Problem as Reported by Local Agency	Location	Problem Description	Local/ Regional	Reason for Classification
WECR-AH-FL-05	Arlington Heights	Pavement Flooding and/or Residential Flooding	Regency Drive East, north of Kensington Road	Home and/or road flooding during September 2008 event	Local	5
WECR-AH-FL-06	Arlington Heights	Pavement Flooding	Vail Avenue and White Oak Street	Cypress Basin	Local	5
WECR-AH-FL-07	Arlington Heights	Pavement Flooding	US Route 14 at Euclid Avenue to Ridge Avenue	Reported by IDOT: Last incident 03/01/97	Local	5
WECR-CD-SM-01	CCHD	Bridge Debris	Structure #016-3051.	Single span bridge with debris and partially silted at north abutment	Local	6
WECR-DP-FL-01	Des Plaines	Pavement Flooding	US Route 12 at Miner Street to Ballard Road	Reported by IDOT: Last incident 05/30/06	Local	5
WECR-DP-FL-02	Des Plaines	Pavement Flooding	US Route 14 west of Graceland Avenue	Reported by IDOT: Last incident 08/28/08	Local	5
WECR-DP-FL-03	Des Plaines	Drainage Investigation	Illinois Route 58 at C&NW RR (Wolf Road)	Reported by IDOT: Drainage Investigation completed. Not implemented	Local	5
WECR-DP-FR-03	Des Plaines	Pavement Flooding	US Route 12 at River Road to Golf Road	Reported by IDOT: Last incident 10/17/06	Local	5
WECR-DP-SM-01	Des Plaines	Stream Maintenance	Near Seegers and Rand Road	Diversion structure/emergency overflow needs maintenance	Local	6
WECR-MP-EL-01	Mount Prospect	Erosion	Busse Road and Central Road to Lincoln Street	Bank erosion and water odor problem	Local	6
WECR-MP-FL-01	Mount Prospect	Future detention	Elmhurst Road and Council Trail	Possible location for future Park District detention	Local	4
WECR-MP-FL-02	Mount Prospect	Structure Flooding	Busse Road and Lincoln Street	Flooding in basements and rear yards due to undersized storm sewer	Local	5

TABLE 2.2.1
Summary of Responses to Form B Questionnaire

Problem ID	Municipality	Problem as Reported by Local Agency	Location	Problem Description	Local/ Regional	Reason for Classification
WECR-MP-FL-03	Mount Prospect	Pavement Flooding	IL Route 83 at IL Route 62 to Dempster Street	Reported by IDOT: Last incident 08/22/02	Local	5
HGTB-EG-FL-01	Elk Grove Village	Siltation, Roadway Flooding	Landmeier Road west of Elmhurst Road	Siltation in Tributary B and roadway flooding	Local	6
WICR-AH-FL-01	Arlington Heights	Pavement Flooding	Arlington Heights Road south of I-90	Submitted by IDOT: Last incident 10/24/01	Local	5
HGCR-DP-ER-01	Des Plaines	Weir Deterioration and Erosion	Elmhurst Road and Oakton Street	Deteriorating weir and streambank erosion	Regional	1
WICR-DP-FL-01	Des Plaines	Pavement Flooding	IL Route 72 at Wolf Road	Submitted by IDOT: Last incident 08/30/01	Local	5
WICR-DP-FL-02	Des Plaines	Pavement Flooding	IL Route 72 at Lee Street	Submitted by IDOT: Last incident 10/25/91	Local	5
WICR-DP-FL-03	Des Plaines	Pavement Flooding	Oakton Street between IL 72 and IL 83	Submitted by IDOT: Last incident 05/09/90	Local	5
WICR-DP-FL-04	Des Plaines	Pavement Flooding	Touhy Avenue at Higgins Creek	Submitted by IDOT	Local	5
WICR-EG-FL-01	Elk Grove Village	Pavement Flooding	Arlington Heights Road at IL 72	Submitted by IDOT: Last incident 09/12/91	Local	5
WICR-EG-FL-02	Elk Grove Village	Pavement Flooding	Devon Avenue at Busse Avenue to Elmhurst Road	Submitted by IDOT: Last incident 08/22/02	Local	5
WICR-EG-FL-03	Elk Grove Village	Pavement Flooding	IL Route 72 at Touhy Avenue	Submitted by IDOT: Last incident 02/21/97	Local	5
WICR-EG-FL-04	Elk Grove Village	Pavement Flooding	IL Route 72 at Elmhurst Road to Mount Prospect Road	Submitted by IDOT: 08/31/01	Local	5
WICR-EG-FL-05	Elk Grove Village	Pavement Flooding	IL Route 83 to Devon Avenue	Submitted by IDOT: Last incident 12/28/90	Local	5
WICR-RM-FL-01	Rosemont	Pavement Flooding	IL Route 72 at Soo Line Railroad east of Mannheim Road	Submitted by IDOT: Last incident 09/22/06	Local	5

TABLE 2.2.1
Summary of Responses to Form B Questionnaire

Problem ID	Municipality	Problem as Reported by Local Agency	Location	Problem Description	Local/ Regional	Reason for Classification
WICR-RM-SM-01	Rosemont	Sedimentation	Southeast of Higgins Road and Willow Creek Way	Sediment accumulation in channel	Local	6
WICR-RM-SM-02	Rosemont	Sedimentation	Southeast of Higgins Road and River Road	Sedimentation accumulation in channel	Local	6

Reasons for Regional / Local Classifications:
1. Located on an open channel waterway with greater than 0.5 square mile drainage area
2. Roadway culvert (two-lane road)
3. Roadway culvert (greater than two-lane road)
4. Located in headwater area (less than 0.5 square mile drainage area)
5. Located within storm sewer system (regardless of drainage area)
6. Routine maintenance activities that do not meet regional erosion criteria or directly cause regional problems
7. General overbank flooding that does not impact structures.

2.3 Watershed Analysis Data

2.3.1 Monitoring Data

2.3.1.1 USGS Gage Data

The USGS owns and maintains a nationwide network of stream gages used to record real-time measurements of the monitored stream's water surface elevations. Rating curves developed through periodic paired stage and flow measurements are used to relate estimated flow to measured stage. Within Cook County, a total of 9 stream gages were utilized along Addison Creek, Buffalo Creek, Des Plaines River, Flagg Creek, McDonald Creek, Salt Creek, and Weller Creek. Additionally, data from two gages along the Des Plaines River within Lake County were used for hydrologic modeling purposes. Table 2.3.1 summarizes the USGS gage data utilized for the Lower Des Plaines River Watershed.

TABLE2.3.1
USGS Stream Gage Data in the Lower Des Plaines River Watershed

Gage	Description	Discharge Begin Date	Discharge End Date	Stage Begin Date	Stage End Date
05528500	Buffalo Creek Near Wheeling	08/12/1952	ongoing	10/01/1993	ongoing
05529000	Des Plaines River Near Des Plaines	10/01/1940	ongoing	10/01/1993	ongoing
05529500	McDonald Creek Near Mount Prospect	08/13/1952	ongoing	10/01/1993	ongoing
05530000	Weller Creek at Des Plaines	10/01/1950	ongoing	10/01/1993	ongoing
05531500	Salt Creek at Western Springs	10/01/1945	ongoing	02/28/1994	ongoing
05532000	Addison Creek at Bellwood	08/16/1950	ongoing	10/01/1993	ongoing
05532300	Salt Creek at Brookfield	N/A	N/A	10/01/1989	10/01/2010
05532500	Des Plaines River at Riverside	10/01/1943	ongoing	10/06/1993	ongoing
05533000	Flagg Creek Near Willow Springs	07/26/1951	ongoing	10/01/1993	ongoing

Note: All stream gages noted are within Cook County.

2.3.1.2 Rainfall Data

Due to the size of the Des Plaines River Watershed tributary to the downstream limit of the study at the Des Plaines River at the Will County border, numerous sources for rainfall data were used. Rainfall data was obtained for the gages noted below for storms and dates from approximately 2000 to 2010 to support calibration and verification of the Lower Des Plaines River Mainstem model and gaged tributaries. Figure 2.3.1 shows locations where rainfall gage data was available to support the Lower Des Plaines River Watershed DWP.

The ISWS owns and maintains 25 rain gages in Cook County. Five ISWS rain gages—1, 3, 5, 8, and 11—are located within the Des Plaines River Watershed. Three ISWS rain gages – 4, 6, and 9 - are located adjacent to the Des Plaines River Watershed. Rainfall is recorded continuously at 10-minute intervals, processed by the ISWS to ensure quality, and available for purchase.

The District owns and maintains six rain gages near the Des Plaines River Watershed that record rainfall. These gages are located in Chicago at the North Branch Pump Station and at Springfield Avenue, at Shermer Road in Glenview, at Howard Street in Skokie, at Pershing Road in Cicero, and at Natchez Avenue in Burbank. The data from these gages was utilized to help complete the Thiessen Polygon analysis.

The USGS, IDNR, and local entities cooperate to own and maintain rain gages in or near the Des Plaines River Watershed that record rainfall at 5-minute intervals. The gages used in this study are located at Des Plaines River near Gurnee, Oak Brook Well at Oak Brook, Salt Creek at Elmhurst, Salt Creek at Rolling Meadows, Schaumburg Public Works in Schaumburg, O'Hare International Airport in Chicago, Wheaton Water Department at Wheaton, and Woodridge WWTF at Woodridge.

Lake County, Illinois owns and maintains 13 rain gages in or near the Des Plaines River Watershed that record rainfall at 5-minute intervals. These gages are located at Antioch, Buffalo Grove, Gages Lake, Lake Zurich, Libertyville, Lindenhurst, Old Mill Creek, Riverwood, Round Lake, Vernon Township, Wauconda, Waukegan, and Zion.

In Wisconsin, local entities record rain gage information commonly at less frequent intervals than those in Illinois. The rain gages utilized in Wisconsin include the Union Grove Wastewater Treatment Plant, Racine Wastewater Treatment Plant, Kenosha Regional Airport, Kenosha Wastewater Treatment Plant, Paddock Lake, and the Pleasant Prairie Wastewater Treatment Plant.

2.3.1.3 Stage Data

HWM made by the USGS following the September 2008 storm event were surveyed by D. B. Sterlin, Inc. and used for model calibration for the Addison Creek and Salt Creek Subwatersheds and for the Lower Des Plaines River Mainstem Watershed. IDNR-OWR crest stage data for limited storm events was available for Farmers-Prairie Creek and Silver Creek and used for verification purposes.

Figure 2.3.1 shows locations where monitoring data was available to support the Lower Des Plaines River Watershed DWP. Thiessen polygons, which divide the watershed into areas closest to each ISWS rain gage, are also shown.

2.3.2 Subwatershed Delineation

Each major tributary model (Addison Creek, Buffalo Creek, etc.) was subdivided into subbasins to form the basis of the hydrologic model and modeled assuming a unified response to rainfall based on land use characteristics and soil type. Elevation data provided by Cook County, described in Section 2.3.4, was the principal data source used for subbasin delineation. Drainage divides were established based upon consideration of the direction of steepest descent from local elevation maxima, and refined in some instances to reflect modifications to topographic drainage patterns caused by stormwater management infrastructure (TARP, storm sewer systems, culverts, etc.). Boundaries were defined to most accurately represent the area tributary to specific modeled elements, such as constrictions caused by crossings, and reservoirs. References to previous studies and consultation with community representatives were also valuable resources to assist in determination of boundaries. GIS data was developed for all subbasins delineated and used for hydrologic model data development.

Following the definition of tributary subwatersheds, each tributary was studied in detail and was divided into smaller subbasins. The size of subbasins varied based upon the natural topography, reservoirs, storm sewers, and specific modeled elements, such as restrictive stream crossings.

Figure 2.3.2 shows the subwatersheds and subbasins developed for the Lower Des Plaines River DWP.

2.3.3 Drainage Network

The principal waterways of the Lower Des Plaines River Watershed were generally defined during Phase A of the DWP and refined during Phase B of the DWP. Initial identification of the stream centerline was made using planimetry data obtained from Cook County. Stream centerlines were reviewed against aerial photography and Cook County 2-foot contour data, and modified to best represent existing conditions. These streamlines were included in the topographic model of the Lower Des Plaines River Watershed (see Section 2.3.4), and collect runoff from upland drainage areas. Secondary drainageways that were not modeled were identified based upon review of contour data. In flat, heavily sewered areas, consultation of sewer atlases and discussion with community representatives helped to identify significant drainage paths. Secondary drainageways were used to help define flow paths in the hydrologic models for individual tributaries. Figure 2.3.3 shows the major drainageways within the Lower Des Plaines River Watershed superimposed upon an elevation map of the watershed.

2.3.4 Topography and Benchmarks

The topographic landscape of the Lower Des Plaines basin was molded and formed during the Wisconsin Glacier period. During this time, ice covered areas to the north and the Des Plaines River Basin served as an outlet. As the glacier retreated, Lake Chicago, the ancestor of Lake Michigan formed. As new outlets formed, the levels of Lake Chicago dropped leaving behind Lake Michigan and the Des Plaines River Basin. The region includes geological features such as seeps, ponds, and hills formed by glaciers, and dolomite cliffs and canyons. The west portion of the Des Plaines River Basin has moraines while the eastern portion of the basin is flatter with the northern portion also being poorly drained.

Topographic data for the Lower Des Plaines River Watershed was developed from Cook County LiDAR data generated from a 2003 LiDAR mission (Cook County, 2003). The LiDAR data was obtained along with break lines from Cook County. A DEM was developed for the Lower Des Plaines River Watershed model based upon a subset of filtered elevation points. Figure 2.3.3 shows elevations within the watershed.

Stream channel cross–sections, structure (such as bridge and culvert), and high water marks were collected during field survey work conducted primarily between November 2008 and September 2009 to support the DWP. (Some additional field survey work, including building low entry and first floor topographic data, was performed between March 2010 and May 2010, and in July 2010 and September 2010.)

Rather than use an established network of benchmarks, the horizontal and vertical ground control was established by GPS technology that meets the specifications of the Federal Geodetic Control Subcommittee (FGCS) Second Order Class One and the accuracy standards specified in FEMA's *Guidelines and specifications for Flood Hazard Mapping*, "Guidance for Aerial Mapping: (FEMA 2003).

2.3.5 Soil Classifications

NRCS soil data representative of 2002 conditions was obtained for Cook County except for unmapped areas (which include the City of Chicago and some portions of nearby communities). The top three soil types by area within the study area reflect the urban landscape of the LPDR Watershed and consist of the following map unit categories: Urban land - Orthents complex, clayey; Urban land – Markham-Ashkum complex, and Urban land. These soil types have less than 75% urban land, 30-50% urban land, and more than 85% urban land, respectively.

The NRCS soil data includes hydrologic soil group, representing the minimum infiltration rate of the soil after wetting. Table 2.3.2 summarizes the hydrologic soil groups.

TABLE 2.3.2
Hydrologic Soil Groups

Hydrologic Soil Group	Description	Texture	Infiltration Rates (inches/hour)
A	Low runoff potential and high infiltration rates even when wetted	Sand, loamy sand, or sandy loam	> 0.30
B	Moderate infiltration rates when wetted	Silt loam or loam	0.15–0.30
C	Low infiltration rates when wetted	Sandy clay loam	0.05–0.15
D	High runoff potential and very low infiltration when wetted	Clay loam, silty clay loam, sandy clay, silty clay, or clay	0–0.05

All data from *Technical Release 55, Urban Hydrology for Small Watersheds*, NRCS, June 1986

Table 2.3.3 summarizes the distribution of hydrologic soil type throughout the Lower Des Plaines River Watershed. Figure 2.3.4 shows the distribution of soil types throughout the watershed.

TABLE 2.3.3
Hydrologic Soil Group Distribution

Hydrologic Soil Group	Percentage (%) of Lower Des Plaines River Watershed
Unmapped	59.9
A	0.1
B	6.7
C	31.4
D	1.9

Note: This list includes community areas tributary to Lower Des Plaines River Watershed in Cook County.

2.3.6 Land Use

Land use has a significant effect on basin hydrology, affecting the volume of runoff produced by a given area and the speed of runoff delivered to the receiving system. Impervious areas restrict infiltration and produce more runoff, which is often delivered to receiving systems more rapidly through storm sewer networks. Land use was one of two principal inputs into the calculation of CN for the Lower Des Plaines River Watershed, detailed more extensively in Section 1.3.2.

A land use inventory for the Chicago metropolitan area was received from CMAP in GIS format. The data was used to characterize existing conditions land use within the Lower Des Plaines River Watershed. The data include 15 land use classifications summarizing land use within the Lower Des Plaines River DWP. Table 2.3.4 summarizes the land use distribution within the Lower Des Plaines River Watershed. Figure 2.3.5 shows the distribution of general land use categories throughout the watershed.

Note: Chicago Sanitary and Ship Canal not included.

TABLE 2.3.4
Land Use Distribution within the Des Plaines River Watershed

Land Use Type	Area (mi^2)	Area (%)
Residential	118	48
Forest/Open Land	34	14
Commercial/Industrial	43	18
Water/Wetland	12	5
Agricultural	1	0
Transportation/Utility	21	9
Institutional	16	6

TABLE 2.3.5
Projected Population Increase by Subwatershed

Name	2000 Population	2030 Population	% Change	Population Change
67th Street Ditch	14469	15267	6	798
Addison Creek	212193	209258	-1	-2935
Buffalo Creek	355660	380942	7	25282
Crystal Creek	426164	468326	10	42162
Des Plaines River	1376345	1459480	6	83135
Des Plaines Tributary A	35358	37043	5	1685
East Avenue Ditch	31861	34387	8	2526
Farmer's Prairie Creek	220424	226602	3	6178
Feehanville Ditch	312473	328939	5	16466
Flagg Creek	72112	88719	23	16607
Golf Course Tributary	72146	69062	-4	-3084
McDonald Creek	654546	689458	5	34912
Salt Creek	129723	137849	6	8126
Silver Creek	540561	576134	7	35573
Weller Creek	373077	393589	5	20512
Willow Creek	814540	880596	8	66056
67th Street Ditch	14469	15267	6	798

2.3.7 Anticipated Development and Future Conditions

Anticipated development within the Lower Des Plaines River Watershed was analyzed using population projection data. Projected future conditions land use data for the Lower Des Plaines River Watershed are unavailable from CMAP or other regional agencies. Projected 2030 population data for Cook County was obtained from CMAP. Population data was overlaid upon subwatershed boundaries to identify the potential for increases in subwatershed populations. Table 2.3.5 shows subwatersheds with a projected population increase from the year 2000 population. Projected increases in population along with current subwatershed land use conditions make it likely that there will also be a corresponding increase in impervious surface area. This potential change in impervious surface area could contribute to higher flow rates and volumes of stormwater runoff drained by those tributaries.

Management of future development may be regulated through both local ordinances and the Cook County WMO as described below in Section 2.3.9. This regulation would be an effort to prevent an increase in peak flows, via the construction of site-specific stormwater controls. The impact of the modified hydrologic and hydraulic characteristics of the subwatersheds due to changing land use over time may require the recommended projects to be re-evaluated under the conditions at the time of implementation to refine the details of the final design. To accomplish this, it is recommended that at the time projects are implemented, if updated land use and topographic information is available, the hydrologic and hydraulic models be rerun incorporating this new data.

2.3.8 Wetland and Riparian Areas

Wetland areas within the Lower Des Plaines River Watershed were identified using NWI mapping. NWI data includes approximately 6 square miles of wetland areas in the Lower Des Plaines River Watershed. Riparian areas are defined as vegetated areas between aquatic and upland ecosystems adjacent to a waterway or body of water that provide flood management, habitat, and water quality enhancement. Identified riparian areas defined as part of the DWP offer potential opportunities for restoration. Figures 2.3.6 and 2.3.7 contain mapping of wetland and riparian areas in the Lower Des Plaines River Watershed.

2.3.9 Management of Future Conditions through the regulations of Site Stormwater Management

The District regulates the discharge of stormwater runoff from development projects located within separate sewer areas within the District's corporate boundaries through its Sewer Permit Ordinance. Currently, development projects meeting certain thresholds must provide stormwater detention in an effort to restrict the post-development flow rate to the predevelopment flow rate. A number of communities enforce standards beyond the District's currently required standards and thresholds. This DWP supports the continued regulation of future development through countywide stormwater management.

The WMO is under development and is proposed to provide uniform minimum countywide standards for site stormwater runoff for events up to and including the 100-year event that are appropriate for Cook County. This effort seeks to prevent post-development flows from exceeding pre-development conditions. The WMO is proposed to be a comprehensive ordinance addressing site runoff, floodplains, floodways, wetlands, soil erosion and sedimentation, water quality, and riparian environments.

3. Tributary Characteristics and Analysis

3.1 67th Street Ditch

The 67th Street Ditch Subwatershed area measures approximately 0.26 square miles and is roughly bounded by Joliet Road to the north, Willow Springs Road to the west, Brainard Avenue to the east, and Hillsdale Road to the south within the City of Countryside. The headwaters of the 67th Street Ditch originate west of Sunset Avenue then flow east through a residential subdivision in a 585-footlong culvert that outlets into the Arie Crown Forest Preserve. The 67th Street Ditch then flows through an industrial park prior to emptying into the Des Plaines River at 71st Street.

The 67th Street Ditch study terminates just east of Brainard Avenue within the Arie Crown Forest Preserve. No problem areas were reported downstream of Brainard Avenue and there is also no FEMA defined floodplain just downstream of Brainard Avenue. The studied area of the 67th Street Subwatershed primarily consists of residential landuse but also contains areas of forest preserve and commercial areas.

Table 3.1.1 lists the communities located in areas directly tributary to the 67th Street Ditch Subwatershed. Figure 3.1.1 shows an overview of the tributary area of the subwatershed. 67th Street Ditch flood inundation areas are shown and discussed in the following subsections. Table 3.1.2 lists the land use breakdown by area within the 67th Street Ditch Subwatershed.

TABLE 3.1.2
Land Use Distribution for 67th Street Ditch

Land Use Category	Area (acres)	%
Residential	106	64.3
Commercial/Industrial	30.1	18.3
Forest/Open Land	24.3	14.7
Institutional	0.6	0.3
Transportation/Utility	0.0	0.0
Water/Wetland	4.0	2.4
Agricultural	0.0	0.0

3.1.1 Sources of Data

3.1.1.1 Previous Studies

The Cook County FIS reports that Regional Equations were originally used to determine the flow rates. The WSP-2 hydraulic analysis was last revised in August, 2002 by CBBEL for a floodway construction permit for IDNR-OWR. The permit included modifying the channel upstream of Sunset Avenue by removing existing timber railroad ties, adding a modular reinforced concrete retaining wall, and extending the culvert underneath Sunset Avenue. The project analysis was updated in 2006; however, maintenance of the reach of 67th Street Ditch west of Sunset Avenue was the final product incorporated in this area. The original hydrologic information was not available for review. Portions of the WSP-2 hydraulic model information are incorporated into this study as this data is considered the best available data for the 67th Street Ditch. Data used from the FIS hydraulic model include existing culvert sizes and channel inverts.

3.1.1.2 Water Quality Data

No District or IEPA water quality monitoring stations are located within the 67th Street Ditch Subwatershed. The IEPA's 2010 *Integrated Water Quality Report*, which includes the CWA 303(d) and 305(b) lists, lists no impaired waterways within the subwatershed. The 67th Street Ditch Subwatershed area was not included in the *Des Plaines River/Higgins Creek Watershed TMDL Stage 1 Report*, March 2009. No TMDLs have been investigated for 67th Street Ditch.

According to the water permit discharge data provided by the USEPA, there are no NPDES permits issued by IEPA for discharges to 67th Street Ditch. Municipalities discharging to the 67th Street Ditch are regulated by IEPA's NPDES Phase II Stormwater Permit Program, which was instituted to improve water quality by requiring that municipalities develop six minimum measure controls for limiting runoff pollution to receiving systems.

3.1.1.3 Wetland and Riparian Areas

Figures 2.3.6 and 2.3.7 contains mapping of wetland and riparian areas in the Lower Des Plaines River Watershed. Wetland areas were identified using NWI mapping. NWI data did not identify any wetland areas in the 67th Street Ditch Subwatershed. Riparian areas are defined as vegetated areas between aquatic and upland ecosystems adjacent to a waterway or body of water that provides flood management, habitat, and water quality enhancement. Identified riparian environments offer potential opportunities for restoration.

3.1.1.4 Floodplain Mapping

Flood inundation areas supporting the NFIP were revised in 2008 as a part of FEMA's Map Modernization Program. As part of the new mapping, floodplain boundaries were revised based upon updated Cook County topographic information; however, hydrologic and hydraulic computer models, which are used to estimate flood levels, were not updated. LOMRs were incorporated into revised floodplain areas. 67th Street Ditch is mapped in detail in the DFIRM mapping update, with Zone AE floodplain shown across the length of the ditch. The original hydrologic and hydraulic analyses were performed in the early 1980's. Flow rates were determined using regional equations. Hydraulic routing performed was steady state and used the WSP-2 modeling application. Appendix A includes a comparison of FEMA's effective floodplain mapping from updated DFIRM panels with inundation areas developed for the DWP.

3.1.1.5 Stormwater Problem Data

Starting in the 3rd quarter of 2007, communities, agencies (e.g., IDOT, CCHD), and stakeholders submitted Form B questionnaire response data to the District summarizing known stormwater problems within their jurisdictions. The questionnaires were requested again by the District following the September 2008 storm event. There were no reported problem areas for 67th Street Ditch.

3.1.1.6 Near Term Planned Projects

No near-term planned major flood control projects to be constructed by others were identified for 67th Street Ditch.

3.1.2 Watershed Analysis

3.1.2.1 Hydrologic Model Development

Subbasin Delineation. The 67th Street Ditch tributary area was delineated based upon 2003 Cook County LiDAR topographic data developed by Cook County. There are 2 subbasins with a total drainage area of 0.26 square miles.

Hydrologic Parameter Calculations. CN values were estimated for each subbasin based upon NRCS soil data and CMAP land use data. This method is further described in Section 1.3.2, with lookup values for specific combinations of land use and soil data presented in Appendix C. An area-weighted average of the CN was generated for each subbasin.

Clark's unit hydrograph parameters were estimated using the method described in Section 1.3.2. Appendix G provides a summary of the hydrologic parameters used for subbasins in each subwatershed.

3.1.2.2 Hydraulic Model Development

Field Data, Investigation, and Existing Model Data.

The FEMA effective hydraulic model was developed by NRCS in 1982 using WSP-2. The model data was used as background information. The WSP-2 hydraulic analysis was last revised in August, 2002 by CBBEL for a floodway construction permit from IDNR-OWR. The permit included modifying the channel upstream of Sunset Avenue by removing existing timber railroad ties, adding a modular reinforced concrete retaining wall, and extending the culvert underneath Sunset Avenue. The project analysis was updated in 2006; however, maintenance of the reach of 67th Street Ditch west of Sunset Avenue was the final product incorporated in this area. The original hydrologic information was not available for review. Portions of the WSP-2 hydraulic model information are incorporated into this study as this data is considered the best available data for the 67th Street Ditch. Data used from the FIS hydraulic model include existing culvert sizes and channel inverts.

HEC-GeoRAS cross-sections extracted from the TIN created in GIS from the 2003 Cook County LiDAR topographic data were imported into HEC-RAS. The Manning's n-values were assessed based on information obtained from aerial photography.

Boundary Conditions. The normal slope method was used to determine the starting water surface elevation, as was done in the WSP-2 model.

3.1.2.3 Calibration and Verification

No stream gage or HWM was available within the 67th Street Ditch Subwatershed. Based on previous Lower Des Plaines River Tributary calibrations, the CUH storage coefficient, R, was multiplied by a factor of 2.62 for all subbasins in the 67th Street Ditch HEC-HMS hydrologic model. The R multiplier was determined for ungaged watersheds based on the results of calibrations performed for gaged subwatersheds. An equation was developed based on the average of the slopes calculated for use in determining the time of concentration. That equation was used to determine an R value for ungaged subwatersheds.

3.1.2.4 Existing Conditions Evaluation

Flood Inundation Areas. Figure 3.1.3 shows inundation areas in the 67th Street Ditch Subwatershed produced by the DWP's hydraulic model for the 100-year, 2-hour critical duration design storm.

Hydraulic Profiles. Appendix H contains existing conditions hydraulic profiles for 67th Street Ditch. Profiles are shown for the 2-, 5-, 10-, 25-, 50-, 100-, and 500-year recurrence interval design storms.

3.1.3 Development and Evaluation of Alternatives

3.1.3.1 Problem Definition

No regional stormwater problem areas were reported or identified through modeling; therefore, no proposed alternative projects were evaluated.

3.2 Addison Creek

The Addison Creek Watershed drains approximately 22 square miles and is tributary to Lower Salt Creek which is tributary to the Des Plaines River.

The headwaters of the Addison Creek subwatershed originate in northeastern DuPage County. Addison Creek flows southeast, east under Interstate 294 and continues through the City of Northlake, Village of Stone Park, and Village of Melrose Park where it turns south under the Chicago and Northwestern Railroad and continues through the Village of Bellwood. Addison Creek turns to the southeast around Roosevelt Road and continues through the Villages of Westchester, Broadview, and North Riverside before joining Salt Creek within the Forest Preserve District of Cook County property south of Cermak Avenue. The watershed contains five (5) flood control reservoirs within Cook County:

- Hillside Reservoir (Hillside, 120 A-F),
- Eugene Doyle Reservoir (Northlake, 70 A-F),
- Railroad Avenue Reservoir (Northlake, 40 A-F),
- Northlake Structure 86 Reservoir (Northlake, 420 A-F), and
- Lower Elmhurst Reservoir (Berkeley, 100 A-F).

Three (3) other flood control reservoirs are also located within the DuPage County portion of the watershed:

- William Redmond Reservoir (Bensenville, 970 A-F),
- York Road/I-290 Reservoir (Elmhurst, 20 A-F), and
- Arlington Cemetery Reservoir (Elmhurst, 70 A-F).

TABLE 3.2.1
Communities Draining to Addison Creek

Community	Tributary Area (mi^2)
Bellwood	2.36
Berkeley	1.27
Broadview	1.02
Hillside	1.95
Maywood	0.03
Melrose Park	1.58
Northlake	2.62
North Riverside	0.04
Stone Park	0.34
Westchester	1.32
Unincorporated Cook County	1.02

Note: This list includes community areas tributary to the Addison Creek within the 13.55 square mile study area in Cook County. It does not include upstream tributary areas in DuPage County.

TABLE 3.2.2
Land Use Distribution for Addison Creek within Cook County

Land Use Category	Area (acres)	%
Residential	3755.99	43.3
Commercial/Industrial	2527.60	29.1
Forest/Open Land	137.52	1.6
Institutional	996.53	11.5
Transportation/Utility	1083.32	12.5
Water/Wetland	171.55	2.0
Agricultural	0.00	0.0

At the headwaters, approximately 3.7 square miles are tributary to the William Redmond Reservoir in DuPage County, with flows entering through a west and a north spillway chute. The reservoir outflow drains south to join with a second Addison Creek tributary just upstream (west) of County Line Road. The York/Interstate-290 Reservoir is located within this second Addison Creek tributary subwatershed. The combined flows cross into Cook County and travel east and then south around the Northlake Structure 86 Reservoir. The Arlington Cemetery Reservoir in DuPage County outflows through a storm sewer system to the Railroad Avenue Reservoir in Cook County which outflows to Addison Creek in the City of Northlake downstream of Northlake Structure 86. Runoff from the City of Elmhurst flows east toward the Lower Elmhurst Reservoir. A portion of the flow is diverted north towards the Eugene Doyle Reservoir through a storm sewer equipped with an 8-inch flap gate while the remainder flows into the Lower Elmhurst Reservoir through twin 60-inch storm sewers. Additional tributary area from DuPage County drains into the Eugene Doyle Reservoir, and runoff enters Addison Creek through a storm sewer along Lake Street and into a concrete-lined channel (Lake and Mannheim Tributary) east of Mannheim Road that connects with Addison Creek south of the Lake Street culvert. From the Lower Elmhurst Reservoir, the stormwater flows through storm sewers and open channels through the Proviso Rail Yard to the Lake and Mannheim Tributary. The downstream-most reservoir is the Hillside Reservoir within Cook County which outflows through a storm sewer system to Addison Creek.

Figure 3.2.1 show the areas directly tributary to Addison Creek. Areas directly tributary to Addison Creek in general are heavily drained by storm sewer systems. Table 3.2.1 lists the communities located in areas directly tributary to the Addison Creek subwatershed and/or combined sewers. Reported stormwater problem areas, flood inundation areas, and proposed alternative projects are also shown and discussed in the following subsections. Table 3.2.2 lists the land use breakdown by area within the Addison Creek subwatershed.

3.2.1 Sources of Data

3.2.1.1 Previous Studies

The hydrologic and hydraulic modeling for the Addison Creek Subwatershed is based on the models that were prepared in support of a 2005 Addison Creek Physical Map Revision prepared by CDM and submitted on behalf of the IDNR-OWR. The HEC-1 hydrologic model and the HEC-2 hydraulic model from the study correspond with the effective FEMA FIS information.

The FEMA effective HEC-2 hydraulic model for Addison Creek begins at the confluence with Salt Creek and extends upstream to the upstream face of County Line Road. IDNR-OWR performed or contracted field crews to survey Addison Creek to develop the data in the HEC-2 hydraulic model for the channel geometry and bridges.

IDNR-OWR published a report titled “Strategic Planning Study for Flood Control, Addison Creek, Cook and DuPage Counties,” dated September 1993, documenting a flood control feasibility analysis and presenting a recommended plan based on the most advantageous benefit/cost ratio. At the time, local agreement could not be reached regarding land availability so the project did not move forward. The ACRC was formed in 2004 (Illinois Public Act 093-0948) with a primary goal of implementing a flood control project to reduce the size of the floodplain and the cost of flood insurance to homeowners. The ACRC existing HEC-2 hydraulic model was built from the FEMA effective HEC-2 model, and the proposed alternatives studied were based on those recommended in the IDNR-OWR 1993 study. The 1993 IDNR-OWR and 2004 ACRC studies were referenced to create the existing conditions and proposed alternatives for this study.

3.2.1.2 Water Quality Data

There are no District water quality monitoring stations in the Addison Creek Subwatershed. Water quality monitoring data for Addison Creek is available through IEPA monitoring stations. The IEPA monitors water quality data at one location within the DWP study area in the Addison Creek Subwatershed as part of the Ambient Water Quality Monitoring Network. Table 3.2.3 provides the location of the water quality monitoring station.

TABLE 3.2.3

IEPA Water Quality Monitoring Stations in the Addison Creek Subwatershed

Station ID	Waterbody	Location
GLA-02	Addison Creek	Bellwood

IEPA's 2010 *Integrated Water Quality Report*, which includes the CWA 303(d) and 305(b) lists, lists two segments within the Addison Creek Subwatershed as impaired. Table 3.2.4 lists the 303(d) listed impairments. TMDLs have been established for Addison Creek in the USEPA-approved *Total Maximum Daily Loads for Salt Creek, Illinois*, October 2004, report. The report calls for a 41 percent reduction in overall chloride application in the Addison Creek Subwatershed, and segment IL_GLA-04 was listed for copper violations.

TABLE 3.2.4
IEPA Use Support Categorization and 303(d) Impairments in the Addison Creek Subwatershed

Station ID	Waterbody	Impaired Designated Use	Potential Cause	Potential Source
IL_GLA-02	Addison Creek	Aquatic Life	Aldrin, Chromium (Total), DDT, Hexachlorobenzine, Nickel, Phosphorus (Total)	Urban Runoff/Storm Sewers, Combined Sewer Overflow, Contaminated Sediments, Municipal Point Source Discharge
		Primary Contact Recreation	Fecal Coliform	Urban Runoff/Storm Sewers, Combined Sewer Overflow, Municipal Point Source Discharge
IL_GLA-04	Addison Creek	Aquatic Life	alpha-BHC, Copper, Hexachlorobenzene, Polychlorinated biphenyls, Sedimentation/Siltation, Phosphorus (Total)	Urban Runoff/Storm Sewers, Combined Sewer Overflow, Contaminated Sediments, Private and Municipal Point Source Discharge

NPDES point source discharges within the Addison Creek subwatershed are listed in Table 3.2.5. In addition to the point source discharges listed, municipalities discharging to the Addison Creek subwatershed are regulated by IEPA's NPDES Phase II Stormwater Permit Program, which was created to improve the water quality of stormwater runoff from urban areas, and requires that municipalities obtain permits for discharging stormwater and implement the six minimum control measures for limiting runoff pollution to receiving systems.

TABLE 3.2.5
Point Source Discharges in the Addison Creek Subwatershed

Name	NPDES	Community	Receiving Waterway
Congress Dev Co-Hillside	IL0035831	Hillside	Addison Creek
Vanee Foods Company-Berkeley	IL0069124	Berkeley	Addison Creek
Vanee Foods Company	IL0075086	Broadview	Addison Creek

Note: NPDES facilities were identified from the IEPA website at http://www.epa.state.il.us/water/permits/waste-water/npdes-statewide.pdf.

3.2.1.3 Wetland and Riparian Areas

Figures 2.3.6 and 2.3.7 contain mapping of wetland and riparian areas in the Lower Des Plaines River Watershed. Wetland areas were identified using NWI mapping. NWI data includes roughly 30.1 acres of wetland areas in the Addison Creek subwatershed within Cook County. Riparian areas are defined as vegetated areas between aquatic and upland ecosystems adjacent to a waterway or body of water that provides flood management, habitat, and water quality enhancement. Identified riparian environments offer potential opportunities for restoration.

3.2.1.4 Floodplain Mapping

Flood inundation areas supporting the NFIP were revised in 2008 as a part of FEMA's Map Modernization Program. Floodplain boundaries were revised based upon updated Cook County topographic information; however, the effective models, which are used to estimate flood levels, were generally not updated. LOMRs were incorporated into revised floodplain areas. Addison Creek is mapped as a studied Zone AE. The FEMA effective models for the Addison Creek Watershed were prepared in support of a 2005 Addison Creek Physical Map Revision prepared by CDM and submitted on behalf of the IDNR-OWR. The HEC-1 hydrologic model and the HEC-2 hydraulic model from the study correspond with the effective FEMA FIS information. The FEMA effective HEC-2 hydraulic model for Addison Creek begins at the confluence with Salt Creek and extends upstream to the upstream face of County Line Road. Appendix A includes a comparison of FEMA's effective floodplain mapping from updated DFIRM panels with inundation areas developed for the DWP.

3.2.1.5 Stormwater Problem Data

Starting in the 3rd quarter of 2007, communities, agencies (e.g., IDOT, CCHD), and stakeholders submitted Form B questionnaire response data to the District summarizing known stormwater problems within their jurisdictions. The questionnaires were requested again by the District following the September 2008 storm event. Table 3.2.6 summarizes reported problem areas reviewed as a part of the DWP development. Problems are classified in Table 3.2.6 as regional or local. This classification is based on a process described in Section 1 of this report. The Problem Area ID naming convention was found in Technical Memorandum entitled, "Proposed Naming Conventions for Database Elements" dated August 3, 2007.

TABLE 3.2.6
Community Response Data for Addison Creek

Problem Area ID	Municipality	Problems as Reported by Local Agency	Location	Problem Description	Local/ Regional/Modeled	Resolution in DWP
ADCR-BK-FL-01	Berkeley	Maintenance	IL RTE 56 at I-290	Reported by IDOT: Last incident 2/21/97	Local	This is a local problem[2].
ADCR-BW-FR-01	Bellwood	I-290 overtopping	I-290 at Addison Creek	Reported by IDOT	Regional	Alternatives ADCR-1 through ADCR-6
ADCR-BW-FR-02	Bellwood	25th Avenue viaduct flooding at I-290	25th Avenue at Addison Creek (I-290 Underpass)	Reported by IDOT	Regional	Alternatives ADCR-1 through ADCR-6

TABLE 3.2.6
Community Response Data for Addison Creek

Problem Area ID	Municipality	Problems as Reported by Local Agency	Location	Problem Description	Local/ Regional/Modeled	Resolution in DWP
ADCR-HS-FL-01	Hillside	Bank Erosion, Sedimentation	I-290 at Wolf Road	Reported by IDOT: Last incident 5/1/03	Local	This is a local problem[2].
ADCR-HS-FL-02	Hillside	Pavement Flooding	US RTE 12/20/45 at I-290	Reported by IDOT: Last incident 8/26/87	Local	This is a local problem[2].
ADCR-HS-FL-03	Hillside	Storm Sewer Flow Restriction, Bank Erosion, Sedimentation	Mannheim and Roosevelt, 300 block of Oakridge Ave.	Street flooding and ponding to properties within subdivision.	Local	This is a local problem[2].
ADCR-LE-FR-01	Leyden Township	Overbank flooding upstream of Northlake Structure 86	Leyden Township, north of Northlake Structure 86	Reported by IDOT: Last incident 5/28/03	Regional	Alternatives ADCR-8
ADCR-MR-FL-01	Melrose Park	Pavement Flooding	IL RTE 64 under Mannheim Road	Reported by IDOT	Local	This is a local problem[2].
ADCR-MR-FL-02	Melrose Park	Pavement Flooding	US RTE 20 at Wolf Rd. to US 12/20/45	Reported by IDOT: Last incident 2/21/97	Local	This is a local problem[2].
ADCR-NL-FL-01	Northlake	Pavement Flooding	Grand Ave. at I-294	Reported by IDOT: last incident 8/30/01	Local	This is a local problem[2].
ADCR-NL-FL-02	Northlake	Erosion and flooding	555 Northwest Ave.	Erosion and flooding problems	Local	This is a local problem[2].
ADCR-NL-SM-01	Northlake	Erosion and stream degradation between Northwest Ave and Wolf Rd	Erosion and streambank degradation between Northwest Ave and Wolf Road	Degradation along creek banks and sedimentation along creek	Regional	Alternative ADCR-7

TABLE 3.2.6
Community Response Data for Addison Creek

Problem Area ID	Municipality	Problems as Reported by Local Agency	Location	Problem Description	Local/ Regional/Modeled	Resolution in DWP
ADCR-NL-SM-02	Northlake	Storm sewer silting	North Ave. and Prater Ave.	48” storm sewer conveying majority of Rohde’s Creek is 80% silted in.	Local	This is a local problem[2].
ADCR-PV-FL-01	Proviso Township	Pavement/ residential flooding	Wolf Rd. and Roosevelt Rd.	Flooding within the Westdale Gardens Subdivision along the roadways	Local	This is a local problem[2].
ADCR-SN-FR-01	Stone Park	Mannheim Road and overbank flooding in Stone Park	Village of Stone Park between Mannheim Road and Lake Street	Reported by IDOT: Last incident 8/24/04	Regional	Alternatives ADCR-1 through ADCR-6
ADCR-WC-FL-01	Westchester	Pavement Flooding	US RTE 12/20/45 at RTE 38	Reported by IDOT: Last incident 10/26/91	Local	This is a local problem[2].

[1] All Problem Area IDs begin with DP- as they are in the Des Plaines River Watershed.
[2] Problem does not meet regional definition (refer to chapter 1). Solutions for the local problems are not addressed in the DWP.

3.2.1.6 Near Term Planned Projects

IDOT is in the planning phase to replace the culvert at Mannheim Road, and in the design phase to replace the culvert at Lake Street. IDOT has preliminary plans to enlarge the Lake Street culvert openings as agreed with ACRC, and has agreed to collaborate with the District on any modifications to the road crossings.

The ACRC Flood Control Study is in the concept phase and is under IDNR-OWR review. The project is not proposed to be built in the near term.

3.2.2 Watershed Analysis

3.2.2.1 Hydrologic Model Development

Subbasin Delineation. The Addison Creek tributary area was delineated based upon 2003 Cook County LiDAR topographic data developed by Cook County using the 2005 CDM HEC-1 subbasins as the starting point. There are 31 subbasins ranging in size from 0.07 to 2.87 square miles with a total drainage area of 21.8 square miles. Two subbasins are also included in the model directly tributary to the Interstate 290 underpasses and ultimately tributary to the Des Plaines River through a storm sewer and pump station at the River. The total drainage area including the two Interstate 290 basins is 22.1 square miles.

Hydrologic Parameter Calculations. CN values were estimated for each subbasin based upon NRCS soil data and CMAP land use data. This method is further described in Section 1.2.2, with lookup values for specific combinations of land use and soil data presented in Appendix C. An area-weighted average of the CN was generated for each subbasin.

Clark's unit hydrograph parameters were estimated using the method described in Section 1.2.2. Appendix G provides a summary of the hydrologic parameters used for subbasins in each subwatershed.

3.2.2.2 Hydraulic Model Development

Field Data, Investigation, and Existing Model Data. The Addison Creek subwatershed unsteady HEC-RAS hydraulic model incorporates the cross-section location, channel data, and structure data from the FEMA effective HEC-2 hydraulic model, as-built plans, field survey in the City of Northlake, and IDOT survey of the Lake Street bridge.

Supplemental field survey was performed by D.B. Sterlin Inc. in early 2009 under the protocol of FEMA's *Guidelines and Specifications for Flood Hazard Mapping partners, Appendix A: Guidance for Aerial Mapping and Surveying.* Channel cross-sections were surveyed along sections of the creek and tributaries in addition to the survey of 8 hydraulic structures. In areas where the supplemental field survey was deemed necessary, the actual spacing and location was determined based on the variability of the channel geometry, shape, roughness, and slope.

HEC-GeoRAS cross-sections extracted from the TIN created in GIS from the 2003 Cook County LiDAR topographic data were imported into HEC-RAS. The field survey and bridge geometry from the HEC-2 hydraulic model were incorporated into these GIS created cross sections.

Field visits were performed to assess channel and overbank roughness characteristics at several locations along Addison Creek. The information gathered in the field was compared to photographs and aerial photography to review and determine Manning's n roughness coefficients for the unsteady HEC-RAS hydraulic model.

Boundary Conditions. The starting water surface conditions for the various storm frequencies are based on the Salt Creek FIS. To reflect the timing of Addison Creek and Salt Creek, the Salt Creek 25-year WSEL of 618.4 feet was used as the 100-year starting water surface elevation for Addison Creek. The Salt Creek 25-year water surface elevation of 618.4 feet matches closely to the original Addison Creek 1993 IDNR-OWR 100-year output elevation of 618.5 feet, which the 2005 FIS FEMA effective model intended to match.

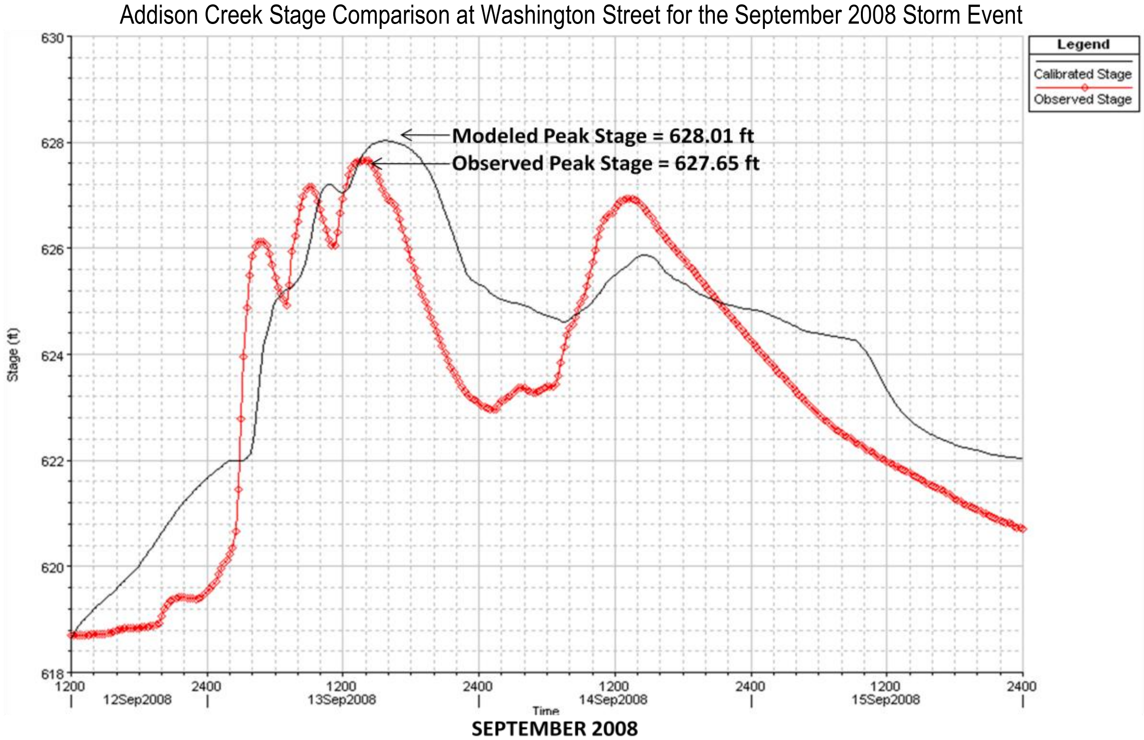
3.2.2.3 Calibration and Verification.

Observed Data. Addison Creek has a USGS stream gage at Bellwood (USGS 05532000) just downstream of Washington Boulevard that measures gage height and stream flow. The watershed drainage area to the gage is approximately 15.5 square miles according to the CBBEL hydrologic analysis.

Fourteen (14) HWMs made by the USGS following the September 2008 storm event were surveyed by D.B. Sterlin Inc. and used for model calibration.

Calibration Results. The Addison Creek Watershed HEC-HMS hydrologic model and unsteady HEC-RAS hydraulic models were calibrated to the September 13-14, 2008 storm event conditions observed at the USGS stream gage and at HWMs surveyed along Addison Creek. The unsteady HEC-RAS water surface profile was within one foot of the observed HWMs between County Line Road and Lake Street. A calibration was achieved for the downstream section of Addison Creek by multiplying the CUH storage coefficient, R, by a factor of 1.75 for subbasins downstream of the Proviso Railroad Yard in the HEC-HMS hydrologic model. The storage coefficient was modified for the downstream portion alone because all but one reservoir are in the upstream portion of the watershed, and more storage is contained in the downstream tributary land area. The calibration with the CUH storage coefficient of 1.75 yielded a water surface profile more consistent with that of the gage than a coefficient of 1.0. In addition, field observation during the September 2008 storm event noted that the creek was approximately contained within the channel downstream of Lake Street. The William Redmond Reservoir was observed overtopping George Street and the Northlake Structure 86 Reservoir was observed filling to capacity, and all of these conditions were reflected in the models. Figure 3.2.2 shows the resulting peak water surface elevation at HEC-RAS cross-section 16751.22 is within 0.5 feet of peak gage water surface elevation.

FIGURE 3.2.2
Addison Creek Stage Comparison at Washington Street for the September 2008 Storm Event



The peak flowrate of the unsteady HEC-RAS model is within 15% of the peak gaged flowrate as shown in Figure 3.2.3. The volume of the calibrated runoff hydrograph at the gage is within approximately 10% of the volume of the observed hydrograph for the September 13-14, 2008 storm event.

FIGURE 3.2.3
Addison Creek Flow Comparison at Washington Street for the September 2008 Storm Event

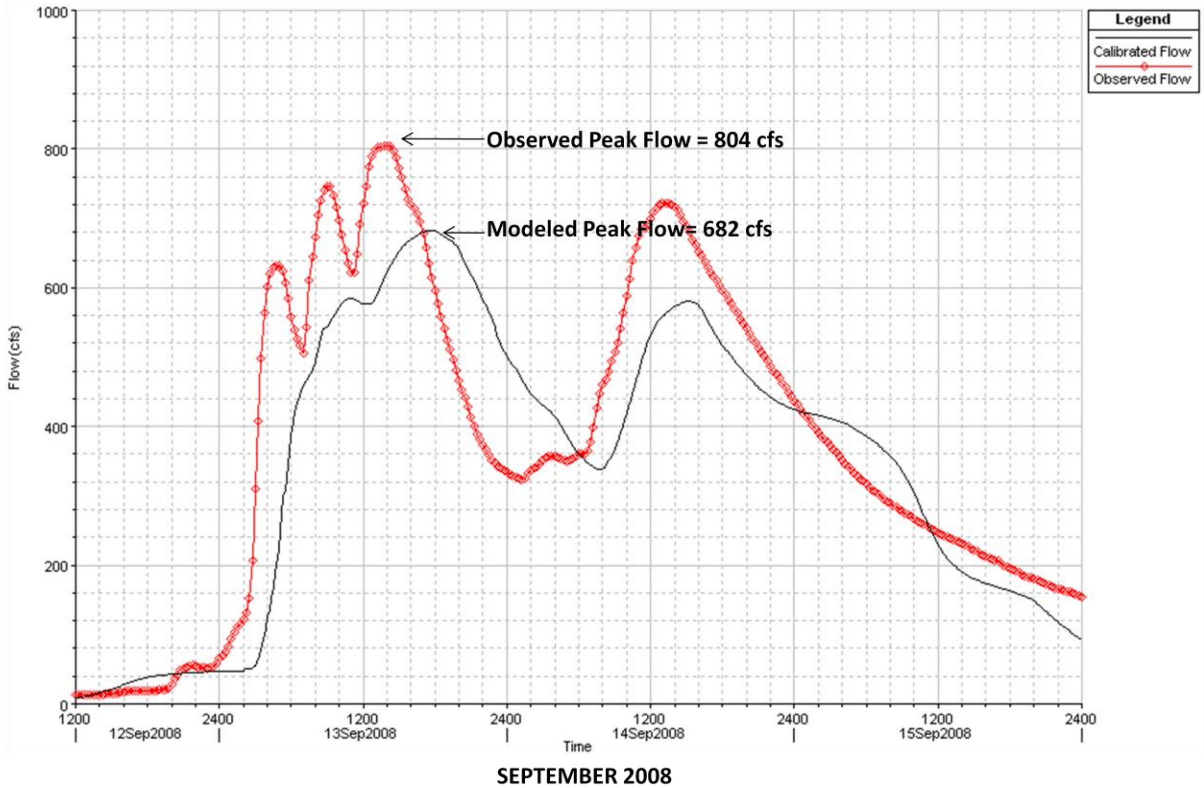


Table 3.2.7 shows the comparison of observed HWMs to the resulting Addison Creek profile. As shown in the table and Figure 3.2.4, the resulting September 2008 profile demonstrates that the water surface elevation matches the observed high water marks within 1.0 foot.

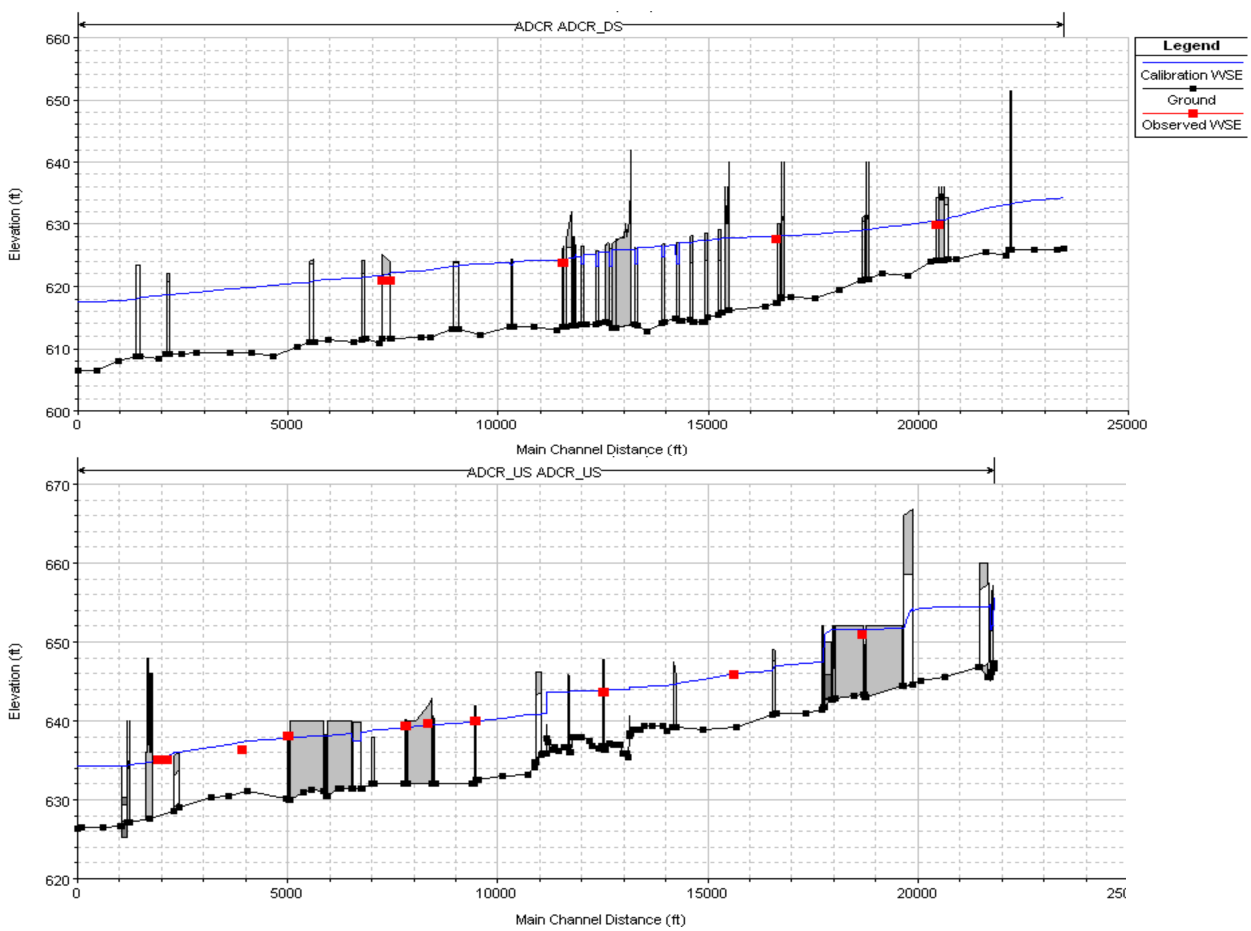
TABLE 3.2.7
Observed High Water Marks vs. Modeled Results for September 2008 Storm Event

Cross Section River Station	Closest Road Crossing	Observed HWM (NAVD 1988) (ft)	Modeled Water Surface Elevation (NAVD 1988) (ft)	Difference (ft)
7353.189	Gardner	620.95	621.77	0.82
11644.72	Wedgewood	623.72	624.32	0.60
16751.22	Washington	627.65	628.01	0.36
20546.02	Downstream CH&NW Railroad	629.86	630.54	0.68
25504.14	Downstream Mannheim	635.11	635.16	0.05
25741.14	Mannheim	635.05	635.85	0.80
27521.7	$45^{th}/46^{th}$	636.35	637.28	0.93

TABLE 3.2.7
Observed High Water Marks vs. Modeled Results for September 2008 Storm Event

Cross Section River Station	Closest Road Crossing	Observed HWM (NAVD 1988) (ft)	Modeled Water Surface Elevation (NAVD 1988) (ft)	Difference (ft)
28552.67	Hirsch	638.09	637.83	-0.26
31368.37	North Roberta	639.33	639.06	-0.27
32033	North Roy	639.62	639.50	-0.12
32990.05	Prater	640.04	639.89	-0.15
36080	Armitage	643.73	643.79	0.06
39269.5	Fullerton/Palmer	645.95	645.98	0.03
42316.54	Martin	650.88	651.60	0.72

FIGURE 3.2.4
Addison Creek Profile Comparison to the
Observed High Water Marks for the September 2008 Storm Event



The August 23rd to 25th, 2007 and October 12th to 16th, 2001 storm events were run as verification storms. As shown in Figure 3.2.5, the August 2007 storm event peak flowrate downstream of Washington is within 10% and the volume is within 23%. As shown in Figure 3.2.6, the October 2001 storm event peak flowrate is within 9% and the volume is within 5%.

FIGURE 3.2.5
Addison Creek Flow Comparison at Washington Street for the August 2007 Storm Event

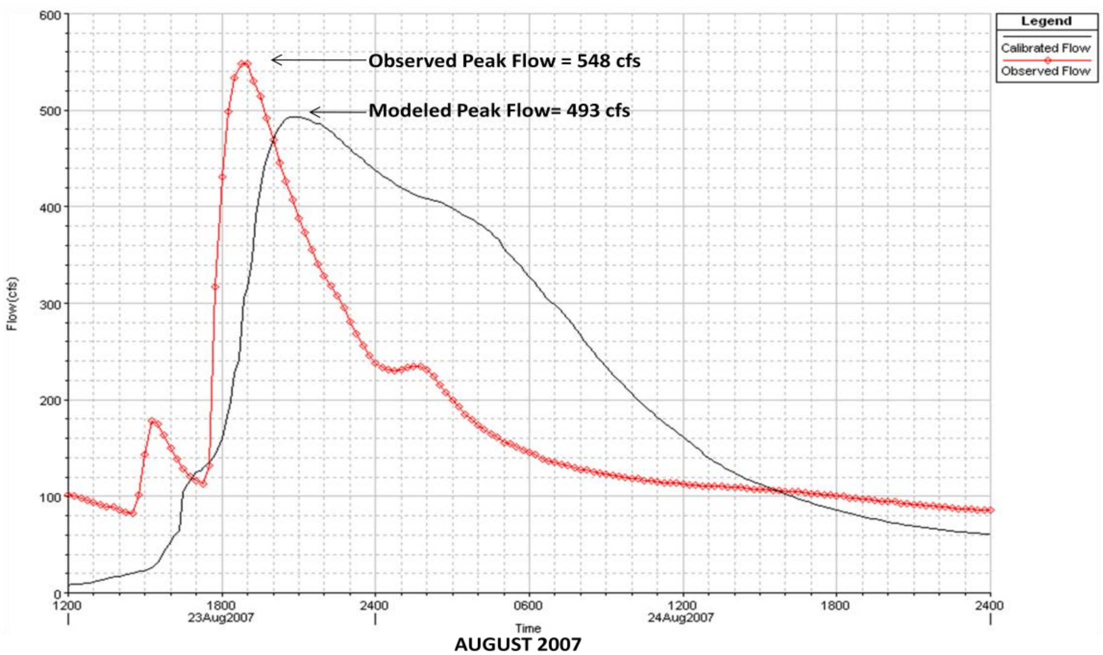
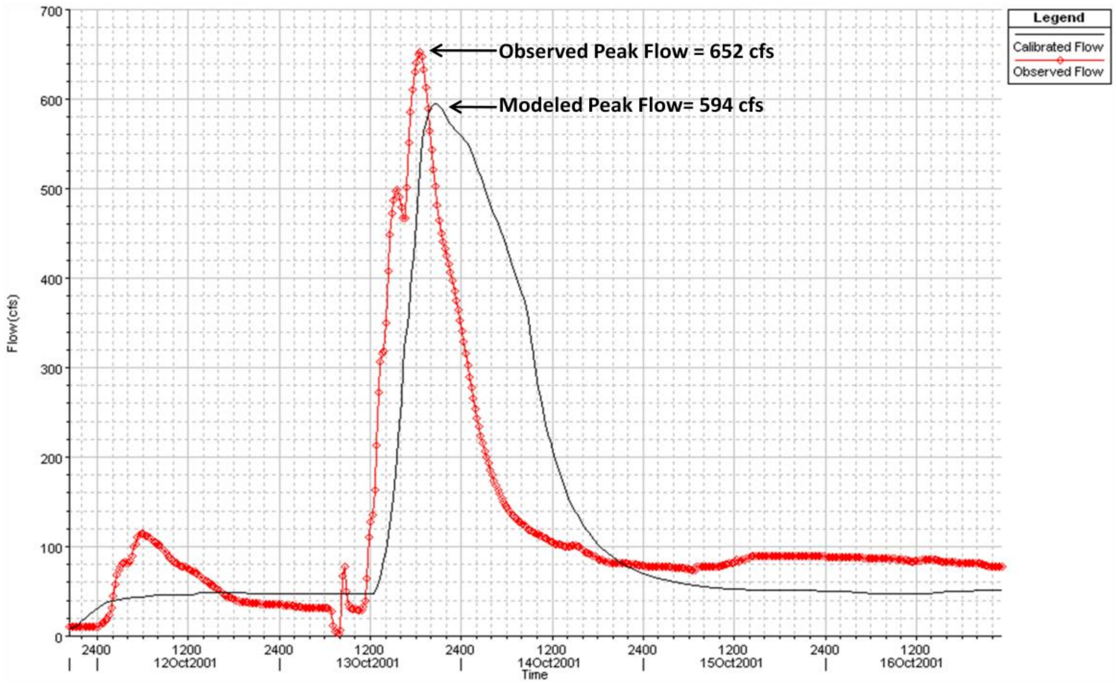


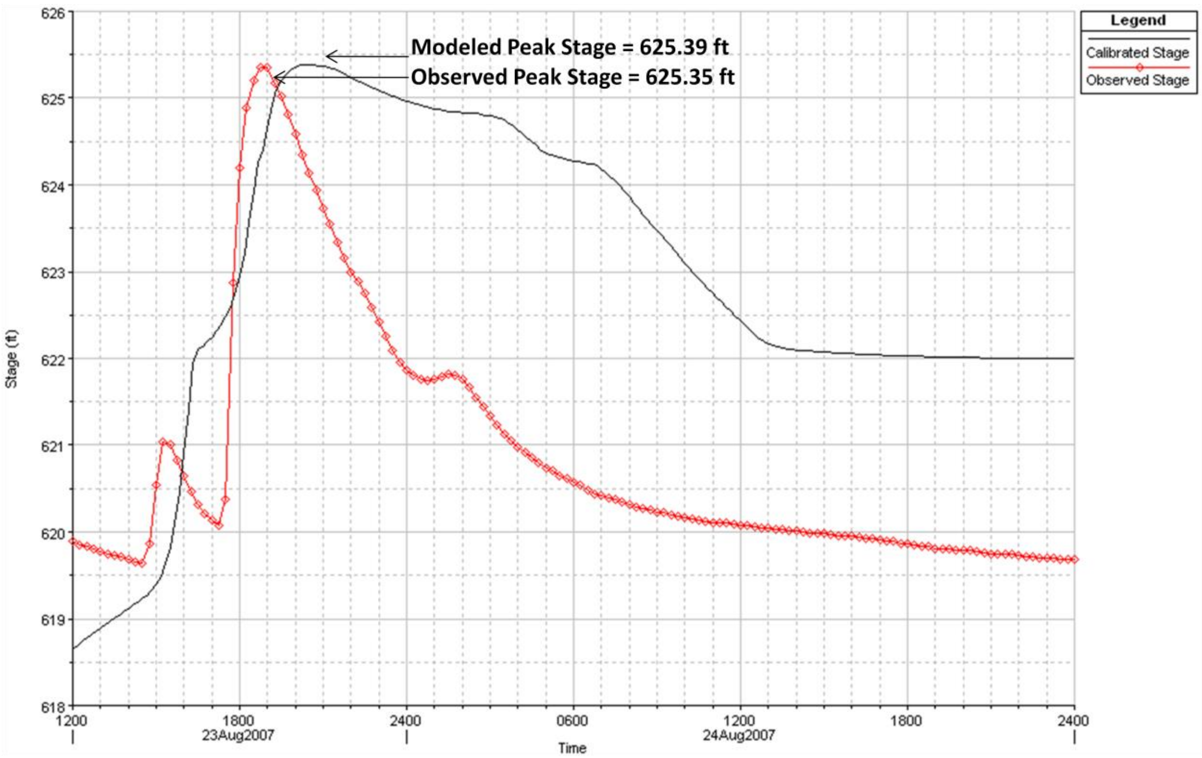
FIGURE 3.2.6
Addison Creek Flow Comparison at Washington Street for the October 2001 Storm Event



OCTOBER 2001

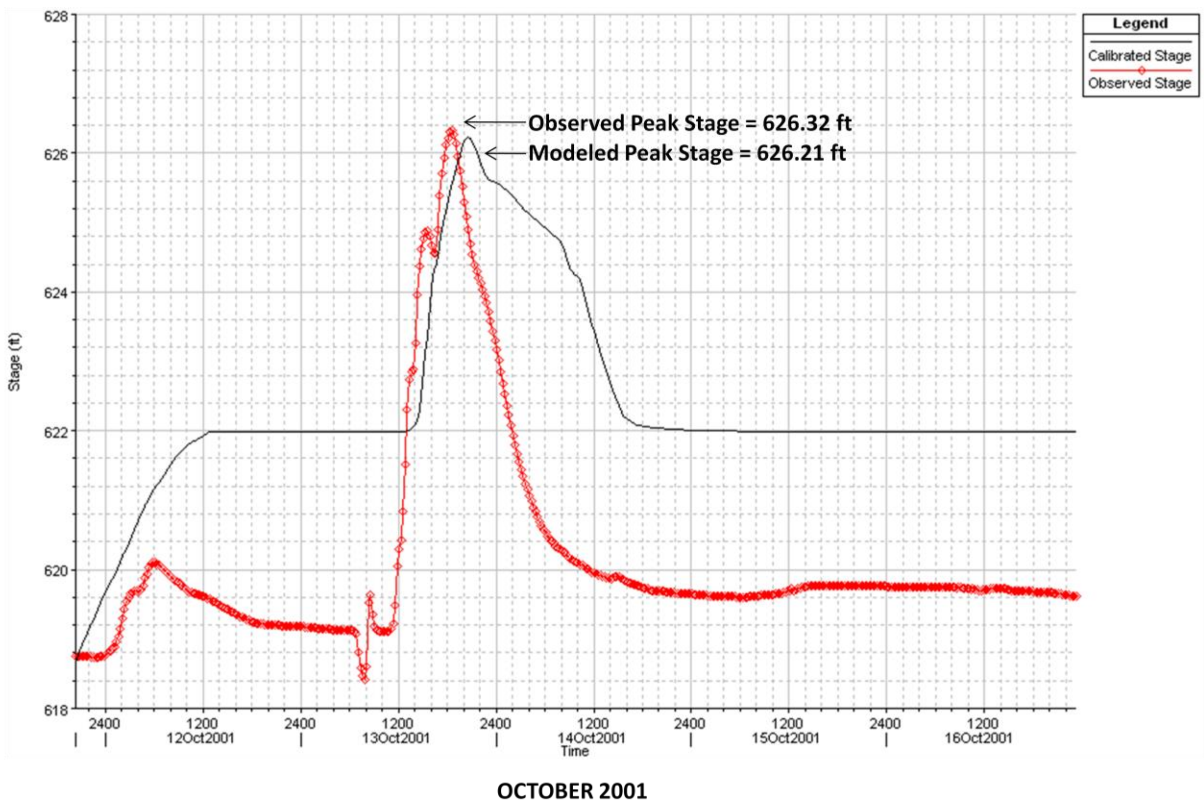
The resulting peak water surface elevation at HEC-RAS cross-section 16751.22 was within 0.5 feet of the peak gage water surface elevation for both storm events as shown in Figures 3.2.7 and 3.2.8.

FIGURE 3.2.7
Addison Creek Stage Comparison at Washington Street for the August 2007 Storm Event



AUGUST 2007

FIGURE 3.2.8
Addison Creek Stage Comparison at Washington Street for the October 2001 Storm Event



After the existing calibration and verification was completed, the July 2010 storm event flooded communities along Addison Creek. The July 2010 storm event was run as an additional verification storm. The gage became stuck during the storm event, so there is not a complete hydrograph for verification. Two high water marks were collected during the storm event, and peak flowrates were interpolated from the high water marks collected. The resulting peak water surface elevation at HEC-RAS cross-section 16751.22 was within 0.5 feet of the peak gage water surface elevation as shown in Figure 3.2.9. As shown in Figure 3.2.10, the July 2010 storm event peak flowrate downstream of Washington is within 17% and the volume is within 3%.

FIGURE 3.2.9
Addison Creek Stage Comparison at Washington Street for the July 2010 Storm Event

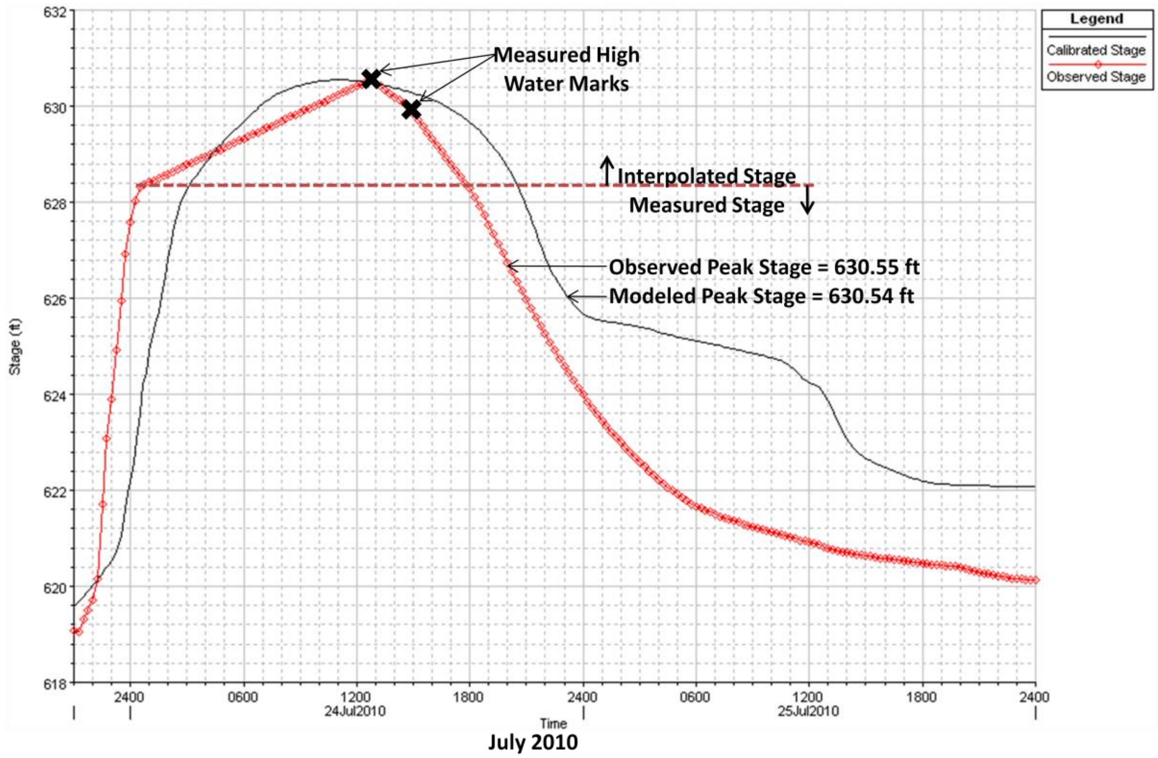
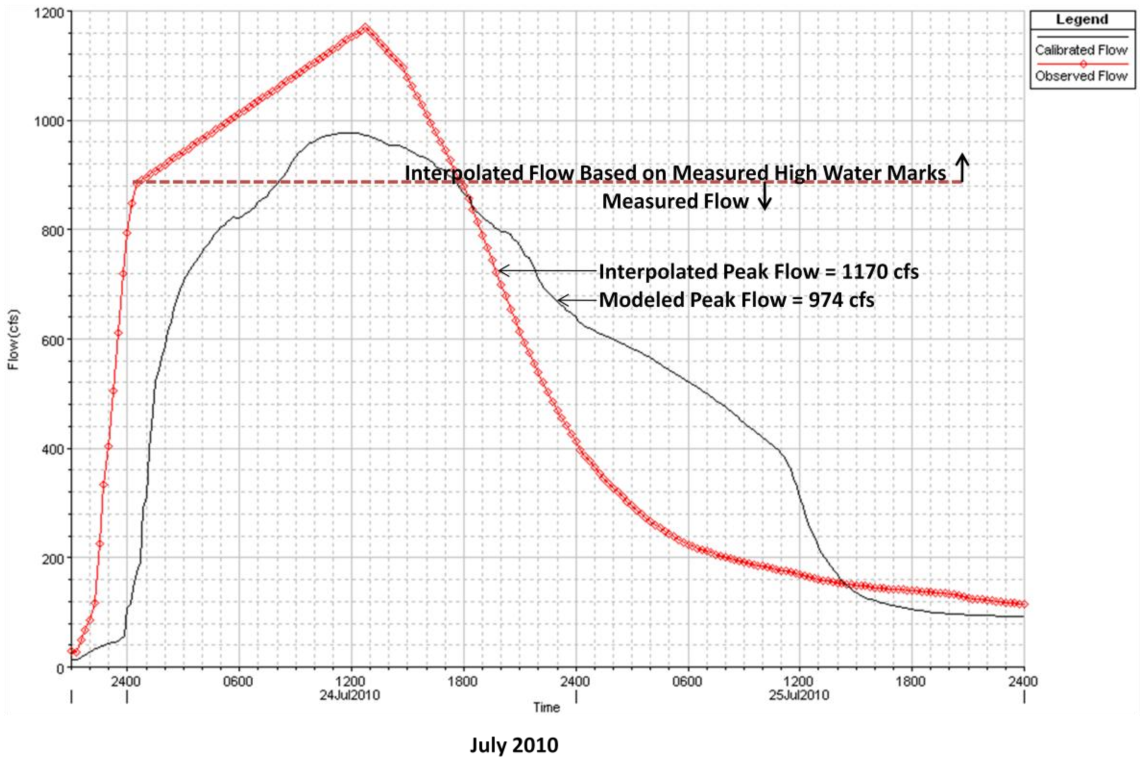


FIGURE 3.2.10
Addison Creek Flow Comparison at Washington Street for the July 2010 Storm Event



3.2.2.4 Existing Conditions Evaluation

Flood Inundation Areas. Figure 3.2.1 shows inundation areas in the Addison Creek Watershed produced by the DWP's hydraulic model for the 100-year, 24-hour duration design storm.

Hydraulic Profiles. Appendix H contains existing conditions hydraulic profiles for Addison Creek. Profiles are shown for the 2-, 5-, 10-, 25-, 50-, 100-, and 500-year recurrence interval design storms.

3.2.3 Development and Evaluation of Alternatives

3.2.3.1 Problem Definition

Hydraulic model results were reviewed with inundation mapping to identify locations where property damage due to flooding is predicted. Table 3.2.8 summarizes problem areas identified through hydraulic modeling of Addison Creek.

TABLE 3.2.8
Modeled Problem Definition for Addison Creek

Problem Area ID[1]	Location	Recurrence Interval (yr) of Flooding	Associated Form B	Resolution in DWP
ADCR-MR-FR-02	Village of Melrose Park between Mannheim Road and Lake Street	2, 5, 10, 25, 50, 100, 500	N[2]	Same as above
ADCR-BW-FR-03	Village of Bellwood, between the Chicago and Northwest Railroad and Madison Street	25, 50, 100, 500	N[2]	Same as above
ADCR-BW-FR-04	Village of Bellwood, between Madison Street and I-290	25, 50, 100, 500	N[2]	Same as above
ADCR-BW-FR-05	Village of Bellwood, St. Charles Road overbank flooding east through the railroad underpass	50, 100, 500	N	Same as above
ADCR-BW-FR-06	Village of Bellwood, Washington Boulevard overbank flooding east through the railroad underpass	50, 100, 500	N	Same as above
ADCR-WC-FR-01	Village of Westchester between I-290 and Gardner Road	25, 50, 100, 500	N[2]	Same as above
ADCR-NL-FR-01	City of Northlake, north of Northlake Structure 86	10, 25, 50, 100, 500	N	Project ADCR-8
ADCR-NL-FR-02	City of Northlake between Wolf Road and North Avenue	5, 10, 25, 50, 100, 500	N	Project ADCR-3A, -3B, -6A, -6B, -7, and ADCR-8
ADCR-NL-FR-03	City of Northlake between North Avenue and Mannheim Road	2, 5, 10, 25, 50, 100, 500	N[2]	Same as above
ADCR-NR-ER-01	Village of North Riverside, Erosion along east bank, south of Cermak Rd to Salt Creek	2, 5, 10, 25, 50, 100, 500	N[2]	ADCR-9

[1] All Problem Area IDs begin with DP-ADCR- as they are in the Des Plaines River – Addison Creek Watershed.
[2] Verified by Stakeholders

3.2.3.2 Damage Assessment

Economic damages were defined following the protocol defined in Chapter 6.6 of the CCSMP. Recreation damages due to flooding are not being identified as part of the DWP. Transportation damages were estimated as 15 percent of property damages plus additional site specific traffic damages computed for the Interstate 290 interchanges at Mannheim Road and 25th Avenue, and at Mannheim Road just north of Lake Street. Table 3.2.9 lists the damage assessment for existing conditions.

TABLE 3.2.9
Estimated Average Annual Damages for Addison Creek

Damage Category	Estimated Damage ($)	Description
Property	9,252,600	Includes residential and non-residential structure and contents damage
Erosion	4,839	Includes critical erosion at 19th Avenue in North Riverside
Transportation	1,419,627	Assumed as 15% of property damage plus regional transportation damages

3.2.3.3 Technology Screening

Flood control technologies were screened to identify those most appropriate for addressing the flooding problems in the subwatershed. Increased conveyance or storage was identified as the principal technologies applicable for addressing stormwater problems in Addison Creek. The feasibility of the technologies defined in Chapter 6.6 of the CCSMP is summarized for each alternative in Table 3.2.10.

TABLE 3.2.10
Technology Screening for Addison Creek

Technology	Feasibility for WC-FR-01 (Westchester from Gardner Road to I-290)
Storage Facility	Feasible – However, no large open space available, commercial property buy-out required, property under consideration located upstream
Conveyance Improvement – Culvert/Bridge Replacement	Not Feasible – Limited easements available for Gardner Road improvements. Other bridges not sources of flood problems
Conveyance Improvement – Channel Improvement	Feasible – Will require flood control reservoir for mitigation
Conveyance Improvement – Diversion	Not Feasible
Flood Barriers, Levees/Floodwalls	Feasible – West and east of Gladstone Ave., will require mitigation storage
Technology	**Feasibility for BW-FR-01, -02, and -04 (Bellwood from I-290 to Madison Street)**
Storage Facility	Feasible – However, no large open space available, commercial property buy-out required, property under consideration located upstream
Conveyance Improvement – Culvert/Bridge Replacement	Not Feasible – existing bridge and channel improvements from I-290 to Madison Street
Conveyance Improvement – Channel Improvement	Not Feasible – existing bridge and channel improvements from I-290 to Madison Street
Conveyance Improvement – Diversion	Not Feasible

Flood Barriers, Levees/Floodwalls	Not Feasible – space issues due to adjacent structures proximity to creek, property buy-outs required

Technology	**Feasibility for BW-FR-03, -05, and -06 (Bellwood from Madison Street to the CH&NW Railroad)**
Storage Facility	Feasible – However, no large open space available, commercial property buy-out required, property under consideration located just upstream
Conveyance Improvement – Culvert/Bridge Replacement	Not Feasible - culverts/bridges not a source of flood problem
Conveyance Improvement – Channel Improvement	Feasible – no prior channel improvements through the reach, channel excavation possible. Easements required
Conveyance Improvement – Diversion	Not Feasible
Flood Barriers, Levees/Floodwalls	Not Feasible – space issues due to adjacent structures proximity to creek, property buy-outs required

Technology	**Feasibility for MR-FR-02 and SN-FR-01 (Melrose Park and Stone Park from the CH&NW Railroad through Mannheim Road)**
Storage Facility	Feasible – However, no large open space available, commercial property buy-out required, property under consideration located at Lake Street and Mannheim Road
Conveyance Improvement – Culvert/Bridge Replacement	Feasible - Lake Street sediment removal and Mannheim Road enlargement with creek channel improvements
Conveyance Improvement – Channel Improvement	Feasible – no prior channel improvements through the reach, channel excavation possible. Easements required
Conveyance Improvement – Diversion	Feasible - flow diversion to the Lake and Mannheim Tributary
Flood Barriers, Levees/Floodwalls	Not Feasible – space issues due to adjacent structures proximity to creek, property buy-outs required

Technology	**Feasibility for NL-FR-02 and -03 (Northlake from Hirsch Street to Wolf Road)**
Storage Facility	Feasible – Open space available at Centerpoint Preserve, commercial property under consideration located downstream
Conveyance Improvement – Culvert/Bridge Replacement	Not Feasible – culverts/bridges not a source of flood problems
Conveyance Improvement – Channel Improvement	Feasible – Will require flood control reservoir for mitigation
Conveyance Improvement – Diversion	Not Feasible
Flood Barriers, Levees/Floodwalls	Not Feasible – space issues due to adjacent structures proximity to creek, property buy-outs required

Storage Facility	Feasible – Open space available at Centerpoint Preserve, located downstream
Conveyance Improvement – Culvert/Bridge Replacement	Feasible – dam removal in Centerpoint preserve to lower upstream elevations, Wolf Road culvert modification to use park storage
Conveyance Improvement – Channel Improvement	Feasible - channel expansion in conjunction with Wolf Road modification for flood storage
Conveyance Improvement – Diversion	Not Feasible
Flood Barriers, Levees/Floodwalls	Feasible – some space adjacent to creek because structures are set back further from creek than in other reaches

3.2.3.4 Alternative Development

Flood Control Alternatives. Alternatives solutions to regional flooding and streambank erosion were developed and evaluated consistent with the methodology described in the Introduction of Section 1 of this report. Table 3.2.11 summarizes flood control alternatives for the Addison Creek Watershed.

TABLE 3.2.11
Flood Control Alternatives for Addison Creek

Alternative	Addressed Problem Area IDs	Location	Description
ADCR-1	SN-FR-01 MR-FR-02 BW-FR-05 to 06 BW-FR-01 to 04 WC-FR-01	Stone Park Melrose Park Railroad underpasses to East Bellwood Bellwood Westchester	*480 or 960 A-F Reservoir:* Southeast of Lake Street and Mannheim Road. Upgrade IDOT Mannheim Road pump station to relocate the force main outlet from just D/S of Mannheim Road to the Lake and Mannheim tributary. New pump station south of Lake Street and 33rd Ave to pump depressional area within Melrose Park and Stone Park to Addison Creek
ADCR-2	BW-FR-01 to 06	Bellwood	**With ADCR-1**. *Downstream Channel Improvements:* Lake St. to Madison St.
ADCR-3	SN-FR-01 MR-FR-02 NL-FR-03	Stone Park, Melrose Park, and City of Northlake	**With ADCR-1**. *Upstream Channel Improvements:* Hirsch St. to the Chicago and Northwest Railroad
ADCR-4	SN-FR-01 MR-FR-02	Stone Park, Melrose Park	**With ADCR-1**. *Sediment Removal:* Lake St. through Reservoir
ADCR-6	All areas listed above	Increased benefit to upstream and downstream communities	**With ADCR-1.** *Downstream and Upstream Channel Improvements:* Hirsch St. to Madison St., plus Gladstone Ave. to Gardner Rd. for ADCR-6b (960 A-F reservoir)

Alternative	Addressed Problem Area IDs	Location	Description
ADCR-8	LE-FR-01 NL-FR-01 to 03	Leyden Township Northlake	*Reservoir:* At Centerpoint Preserve between Palmer Ave. and Wolf Rd.

Flood Control Storage and channel improvements alternatives were evaluated to address regional flooding problems along Addison Creek. For all alternatives, a storage element is required because channel improvements would increase conveyance and lower elevations at the area of interest, but increase flows and water surface elevations downstream. Addison Creek experiences overbank flooding along the entire reach in Cook County. Therefore, regulations and project goals stipulate that flood elevations and flowrates cannot increase on the waterway, and storage volume is required to mitigate for all alternatives.

The 1993 IDNR-OWR flood control study recommended several alternatives. Alternative ADCR-1 includes one of the IDNR-OWR recommended alternatives analyzed in the recent ACRC flood control study. ADCR-1 includes the construction of either a 480 A-F or a 960 A-F reservoir at an existing commercial site at the southeast corner of Mannheim Road and Lake Street. The reservoir site has approximately 20 acres of surface area and soil borings were used to determine the depth of bedrock. Side slopes of 3:1 are proposed within the soil layer and vertical walls are proposed within the bedrock layer. A 480 A-F reservoir would be approximately 40 feet deep with 20 feet of bedrock. A 960 A-F reservoir would be approximately 90 feet deep with 70 feet of bedrock. A diversion structure just downstream of the confluence of Addison Creek with the Lake and Mannheim Tributary would back-up water upstream of the confluence so that it would flow over a spillway into the reservoir. The diversion structure and reservoir would attenuate flow and reduce elevations in the downstream communities of Bellwood and Westchester. To reduce Addison Creek flows and elevations from Mannheim Road to Lake Street (in the communities of Stone Park and Melrose Park), the Mannheim Pump Station just downstream of Mannheim Road would be modified to pump to the Lake and Mannheim Tributary. The flood elevation reduction benefits would extend upstream of Mannheim Road in the City of Northlake.

ADCR-1 would reduce flood damages but would not eliminate them for any community. Alternative ADCR-2 through ADCR-6 would supplement ADCR-1 with variations of channel improvements and culvert modifications upstream and downstream of the reservoir to benefit adjacent communities. The channel improvements would involve work within the channel banks but narrower sections may require some overbank excavation. Side slopes of 3:1 are proposed in wider creek sections and 3:1 side slopes transitioning to vertical walls are proposed in narrower creek sections. Another project element studied for alternatives ADCR-1 through ADCR-6 was a new pump station to drain the depressional area north of Lake Street and east of Mannheim Road in the Village of Stone Park and Melrose Park. The concept pump discharge alignment would follow the existing storm sewer alignment crossing Lake Street at 33rd Avenue and discharge into Addison Creek upstream of the railroad crossing at the south bend behind the commercial sites. However, it may be feasible to align the storm sewer along Lake Street and discharge upstream of the proposed reservoir diversion in the design phase.

Alternative ADCR-2 would include variations of the IDNR-OWR recommended alternatives analyzed in the recent ACRC flood control study. ADCR-2 would add channel improvements from Madison Street in the Village of Bellwood to Lake Street in the Village of Melrose Park to the ADCR-1 improvements. ADCR-2 would increase the channel capacity and lower the water surface profile through the downstream communities of Melrose Park and Bellwood.

Alternative ADCR-3 would add channel improvements between the Chicago and Northwestern Railroad and Hirsch Street in Stone Park and Melrose Park to the ADCR-1 improvements. ADCR-3 would increase the channel capacity and lower the water surface profile through the upstream communities of Northlake, Stone Park, and Melrose Park.

Alternative ADCR-4 would address sedimentation at the Lake Street culvert. Approximately two feet of sediment would be removed from the center culvert, and one foot of sediment would be removed from the side culverts. The sediment within the downstream channel from Lake Street to the Chicago and Northwestern Railroad would be removed to match invert elevations and smooth the channel bottom with the ADCR-1 improvements. Channel improvements in the form of streambank stabilization from the Chicago and Northwestern Railroad to Lake Street would prevent sedimentation of the channel. ADCR-4 would benefit the communities of Stone Park and Melrose Park.

Alternative ADCR-6 would add channel improvements from Hirsch Street to Madison Street to the ADCR-1 improvements. ADCR-6 would increase the channel capacity and lower the water surface profile through Northlake, Stone Park, Melrose Park, Bellwood, and Westchester. To maintain the same water surface profile reduction benefits as ADCR-2b through the Village of Westchester, ADCR-6b would also include channel improvements from Gladstone Avenue to Gardner Road. Alternative ADCR-6 could be completed in 3 phases. Phase 1 would be the construction of the 960 A-F flood control reservoir. Phase 2 would be to incorporate channel improvements from Hirsch St. to the Chicago and Northwest Railroad followed by Phase 3 which would include additional channel improvements from Gladstone Avenue to Gardner Road.

Alternative ADCR-8 would address flooding problems within the City of Northlake, and the benefits would extend further downstream through Stone Park and Melrose Park. ADCR-8 includes the construction of a 200 A-F reservoir at Centerpoint Preserve Park in conjunction with gate and spillway modifications at the upstream Northlake Structure 86 reservoir. The gate would be modified to remain 0.5 feet open during flooding conditions instead of being completely closed to reduce flood elevations upstream. The Northlake Structure 86 spillway elevation is decreased 0.7 feet to utilize storage for the smaller storm events. Lowering the inlet would not decrease the design reservoir capacity because the 100-year flood elevation in the creek is above the design storage elevation. Two degraded dams would be removed in the park, the creek would be relocated to flow along the east side of the park, and Wolf Road would be bulk headed to attenuate smaller storm events.

Erosion Control Alternatives. Alternatives were developed for Addison Creek Watershed based on methodology consistent with Chapter 6 of the CCSMP and described above in Section 1.4.3. Table 3.2.12 describes the alternatives for the Addison Creek Watershed.

TABLE 3.2.12
Erosion Control Alternatives for Addison Creek

Alternative	Addressed Problem Area IDs	Location	Description
ADCR-7	NL-SM-01	City of Northlake	*Erosion Control:* Adjacent to Wolf Road and along King Arthur Drive
ADCR-9	NR-ER-01	Village of North Riverside	*Erosion Control:* South of Cermak Road along east bank

Alternative ADCR-7 would provide streambank stabilization to addresses critical erosion problems adjacent to Wolf Road and along King Arthur Drive. ADCR-7 was not modeled because only minimal regrading is proposed.

Alternative ADCR-9 would involve stabilizing the east bank south of Cermak Road along 19th Avenue. ADCR-9 was not modeled because the project is within the Salt Creek backwater and minimal regrading is proposed.

3.2.3.5 Alternative Evaluation and Selection

Alternatives listed in Table 3.2.11 and 3.2.12 were evaluated to determine their effectiveness and to produce data for the countywide prioritization of watershed projects. Flood control alternatives were modeled to evaluate their impact on water surface elevations and flood damages. Erosion control alternatives were evaluated through field investigations to recommend appropriate streambank stabilization alternatives. Table 3.2.20 provides a summary of B/C ratios, net benefits, total project costs, number of structures protected, and other relevant alternative data.

ADCR-1. The reservoir project would reduce water surface profiles and flood damages, but would not eliminate all flood damages. ADCR-1a includes a 480 A-F reservoir, and ADCR-1b includes a 960 A-F reservoir. Both alternatives were modeled with the Melrose Park pump station dewatering the depressional area in the Village of Stone Park and Melrose Park. The pump station alone would increase the water surface elevations within Addison Creek due to the loss of the neighborhood as a storage area, but the reservoir would mitigate the storage loss, and create a water surface elevation reduction throughout the creek. Both alternatives (small and large reservoir) resulted in reduced stage along the waterway, however ADCR-1b results in a greater elevation reduction. ADCR-1b is recommended as the first phase of a larger flood control project (see Alternative ADCR-6b). Table 3.3.13 compares the peak modeled water surface elevation and flow for Alternative ADCR-1.

TABLE 3.2.13
Addison Creek Existing and Alternative Condition ADCR-1 Flow and WSEL Comparison

Location	Station	Existing Conditions		With Alternatives ADCR-1a[1]		With Alternatives ADCR-1b[2]	
		Max WSEL (ft)	Max Flow (cfs)	Max WSEL (ft)	Max Flow (cfs)	Max WSEL (ft)	Max Flow (cfs)
Upstream of Gardner Road	7573	623.9	1671	623.8	1651	623.7	1624
I-290 Diversion at 30th Ave	12847	627.6	1299	627.5	1273	627.3	1222
Downstream of Madison Street	15355	629.9	1133	629.7	1066	629.3	972
Upstream of Washington Blvd	16858	630.8	966	630.6	867	630.0	755
Upstream of St. Charles Road	18885	632.0	923	631.5	821	630.8	701
Upstream of Lake Street[3]	24781	636.0	337	635.4	433	634.3	491
Upstream of Mannheim Road[3]	26016	636.8	509	636.6	528	636.6	517
Upstream of North Avenue	30353	639.6	527	639.6	527	639.6	526

[1] 480 A-F Reservoir, [2] 960 A-F Reservoir
[3] Decreased elevations and increased flows upstream of reservoir are due to improved conveyance to the reservoir

ADCR-2. ADCR-2 would add downstream channel improvements from Madison Street in the Village of Bellwood to Lake Street in the Village of Melrose Park to the ADCR-1 improvements. Both alternatives (480 A-F and 960 A-F reservoirs) resulted in reduced stage along the waterway. ADCR-2a and ADCR-2b are not recommended because similar benefits would result from a large reservoir (ADCR-1b). Table 3.2.14 compares the peak modeled water surface elevation and flow for ADCR-2.

TABLE 3.2.14
Addison Creek Existing and Alternative Condition ADCR-2 Flow and WSEL Comparison

Location	Station	Existing Conditions		With Alternatives ADCR-2a[1]		With Alternatives ADCR-2b[2]	
		Max WSEL (ft)	Max Flow (cfs)	Max WSEL (ft)	Max Flow (cfs)	Max WSEL (ft)	Max Flow (cfs)
Upstream of Gardner Road	7573	623.9	1671	623.7	1629	623.6	1588
I-290 Diversion at 30th Ave	12847	627.6	1299	627.4	1243	627.3	1206
Downstream of Madison Street	15355	629.9	1133	629.5	1007	629.2	945
Upstream of Washington Blvd	16858	630.8	966	630.1	916	629.7	718
Upstream of St. Charles Road	18885	632.0	923	630.6	887	630.0	655
Upstream of Lake Street[3]	24781	636.0	337	635.6	372	633.8	472
Upstream of Mannheim Road[3]	26016	636.8	509	636.7	511	636.7	502
Upstream of North Avenue	30353	639.6	527	639.6	527	639.6	527

[1] 480 A-F Reservoir, [2] 960 A-F Reservoir
[3] Decreased elevations and increased flows upstream of reservoir are due to improved conveyance to the reservoir

ADCR-3. ADCR-3 would add upstream channel improvements from the Chicago and Northwest Railroad in the Village of Melrose Park to Hirsch Street in the City of Northlake to the ADCR-1 improvements. The center Mannheim Road culvert opening would be modified to match the new lower channel invert elevation. Alternative ADCR-3a and ADCR-3b (480 A-F and 960 A-F reservoirs, respectively) would result in reduced stage along the waterway. ADCR-3b would create the greatest benefits for the entire reach because the upstream channel improvements would convey stormwater to the reservoir more efficiently to reduce upstream stages while the large reservoir would reduce downstream flowrates and stages. ADCR-3b is recommended as the second phase of a larger flood control project (see Alternative ADCR-6b). Table 3.2.15 compares the peak modeled water surface elevation and flow for Alternative ADCR-3.

TABLE 3.2.15
Addison Creek Existing and Alternative Condition ADCR-3 Flow and WSEL Comparison

Location	Station	Existing Conditions		With Alternatives ADCR-3a[1]		ADCR-3b[2]	
		Max WSEL (ft)	Max Flow (cfs)	Max WSEL (ft)	Max Flow (cfs)	Max WSEL (ft)	Max Flow (cfs)
Upstream of Gardner Road	7573	623.9	1671	623.8	1651	623.7	1632
I-290 Diversion at 30th Ave	12847	627.6	1299	627.5	1271	627.4	1246
Downstream of Madison Street	15355	629.9	1133	629.7	1062	629.5	1014
Upstream of Washington Blvd	16858	630.8	966	630.6	929	630.3	804
Upstream of St. Charles Road	18885	632.0	923	631.8	902	631.1	757
Upstream of Lake Street[3]	24781	636.0	337	635.9	405	634.6	605
Upstream of Mannheim Road[3]	26016	636.8	509	636.2	563	635.8	631
Upstream of North Avenue[3]	30353	639.6	527	639.2	596	639.2	598

[1] 480 A-F Reservoir, [2] 960 A-F Reservoir
[3] Decreased elevations and increased flows upstream of reservoir are due to improved conveyance to the reservoir

ADCR-4. ADCR-4 would include less extensive channel improvements involving sediment removal and streambank stabilization from the Chicago and Northwest Railroad to Lake Street in the Village of Melrose Park with the ADCR-1 improvements. The channel improvements would address sedimentation problems at the Lake Street culvert and excavate downstream to improve conveyance through the culvert and reach. Alternative ADCR-4a and ADCR-4b (480 A-F and 960 A-F reservoirs, respectively) would result in reduced stage along the waterway. However, the ADCR-4 water surface profiles are lower than the ADCR-1 profiles only near the channel excavation area, and higher than ADCR-1 further upstream and downstream of the project. ADCR-4a and ADCR-4b are not recommended because benefits are reduced from alternative ADCR-1a and ADCR-1b, respectively. Table 3.2.16 compares the peak modeled water surface elevation and flow for Alternative ADCR-4.

TABLE 3.2.16
Addison Creek Existing and Alternative Condition ADCR-4 Flow and WSEL Comparison

Location	Station	Existing Conditions		With Alternatives ADCR-4a[1]		With Alternatives ADCR-4b[2]	
		Max WSEL (ft)	Max Flow (cfs)	Max WSEL (ft)	Max Flow (cfs)	Max WSEL (ft)	Max Flow (cfs)
Upstream of Gardner Road	7573	623.9	1671	623.8	1651	623.7	1616
I-290 Diversion at 30th Ave	12847	627.6	1299	627.5	1272	627.4	1226
Downstream of Madison Street	15355	629.9	1133	629.7	1065	629.3	979
Upstream of Washington Blvd	16858	630.8	966	630.5	866	630.1	765
Upstream of St. Charles Road	18885	632.0	923	631.5	820	630.8	713
Upstream of Lake Street[3]	24781	636.0	337	635.3	442	633.9	473
Upstream of Mannheim Road[3]	26016	636.8	509	636.6	524	636.7	497
Upstream of North Avenue	30353	639.6	527	639.7	531	639.6	527

[1] 480 A-F Reservoir, [2] 960 A-F Reservoir
[3] Decreased elevations and increased flows upstream of reservoir are due to improved conveyance

ADCR-6. ADCR-6 would add downstream and upstream channel improvements from Madison Street in the Village of Bellwood to Hirsch Street in the City of Northlake to the ADCR-1 improvements. The center Mannheim Road culvert opening would be modified to match the new lower channel invert elevation for ADCR-6a, and all three culverts would be lowered for ADCR-6b. ADCR-6b would also include minor channel improvements from Gardner Road to Gladstone Avenue in the Village of Westchester to prevent erosion and sedimentation of a 30-foot wide channel, and match the lower ADCR-2b water surface profile. Alternative ADCR-6a and ADCR-6b (480 A-F and 960 A-F reservoirs, respectively) would result in reduced stage along the waterway. ADCR-6b is recommended as the last phase of a large flood control project to maximize the 100-year floodplain reduction, number of homes removed from the floodplain, and benefits. Table 3.2.17 compares the peak modeled water surface elevation and flow for Alternative ADCR-6.

TABLE 3.2.17
Addison Creek Existing and Alternative Condition ADCR-6 Flow and WSEL Comparison

Location	Station	Existing Conditions		With Alternatives ADCR-6a[1]		With Alternatives ADCR-6b[2]	
		Max WSEL (ft)	Max Flow (cfs)	Max WSEL (ft)	Max Flow (cfs)	Max WSEL (ft)	Max Flow (cfs)
Upstream of Gardner Road	7573	623.9	1671	623.8	1647	623.8	1645
I-290 Diversion at 30th Ave	12847	627.6	1299	627.5	1269	627.2	1254
Downstream of Madison Street[3]	15355	629.9	1133	629.8	1137	629.3	992
Upstream of Washington Blvd[3]	16858	630.8	966	630.7	1008	629.9	770
Upstream of St. Charles Road[3]	18885	632.0	923	631.2	979	630.2	708
Upstream of Lake Street[3]	24781	636.0	337	635.9	408	634.1	414
Upstream of Mannheim Road[3]	26016	636.8	509	636.2	564	634.7	431
Upstream of North Avenue[3]	30353	639.6	527	639.1	604	639.1	611

[1] 480 A-F Reservoir, [2] 960 A-F Reservoir
[3] Decreased elevations and increased flows are due to improved conveyance

ADCR-7. ADCR-7 would provide streambank stabilization to alleviate critical erosion problems within 30 feet of Wolf Road near Whitehall Avenue. Additionally, streambank stabilization is proposed along Addison Creek near King Arthur Drive which is the only entrance to the adjacent King Arthur Condominiums. ADCR-7 was not modeled because the channel geometry is proposed to be maintained under stabilized conditions. ADCR-7 is recommended to maintain access to the residences at King Arthur Drive and to address critical erosion adjacent to Wolf Road.

ADCR-8. ADCR-8 would include a reservoir at the Centerpoint Preserve Park, channel relocation along the east side of the park adjacent to the reservoir, and a section of channel improvements downstream of the reservoir to Wolf Road. The timing of the upstream Northlake Reservoir gate would be modified to send more stormwater downstream to the proposed reservoir location and reduce water surface elevations through the City of Northlake and Leyden Township adjacent to the Northlake Structure 86 reservoir. ADCR-8 would result in reduced water surface elevations through the City of Northlake from North Avenue to the county line at the Chicago and Northwestern Railroad. A significant amount of overburden soil at the park location would need to be removed before reaching the reservoir high water level elevation. This alternative is not recommended because the City of Northlake does not support the use of their park for constructing a flood control reservoir. Table 3.2.18 compares the peak modeled water surface elevation and flow for Alternative ADCR-8.

TABLE 3.2.18
Addison Creek Existing and Alternative Condition ADCR-8 Flow and WSEL Comparison

Location	Station	Existing Conditions		With Alternative ADCR-8	
		Max WSEL (ft)	Max Flow (cfs)	Max WSEL (ft)	Max Flow (cfs)
Upstream of North Avenue	30353	639.6	527	639.3	486
Downstream of Wolf Road	34500	642.0	525	641.6	479
Upstream of Wolf Road	34625	642.1	528	642.0	480
Upstream of Palmer Avenue[1]	37856	645.0	387	643.1	390
Downstream of Northlake Structure 86[1]	41318	647.7	344	647.5	347

[1] Increased flows upstream of reservoir due to improved conveyance

ADCR-9. ADCR-9 would include minor streambank stabilization at 19th Avenue just south of Cermak Road in the Village of North Riverside. ADCR-9 was not modeled because the problem area is located at the mouth of Addison Creek in the backwater of Salt Creek. ADCR-9 is recommended to maintain access to the residences at 19th Avenue.

A number of properties are at risk of shallow flooding during the 100-year flood event under existing conditions or recommended alternative conditions. In addition, due to their locations, other properties' risk of flooding cannot be feasibly mitigated by structural measures. Such properties are candidates for protection using nonstructural flood control measures, such as flood-proofing or acquisition. These measures may be considered to address damages that are not fully addressed by capital projects recommended in the Lower Des Plaines River DWP.

Hydraulic modeling results identified 2 roadway crossings (state route, US highway, or four-lane road or greater) where Addison Creek overtops for storm events of 100-year recurrence interval and below by a depth of greater than 0.5 feet. Table 3.2.20 lists the 2 locations and provides a summary of the depth of road flooding for existing conditions and with recommended alternatives. To alleviate Mannheim Road flooding, channel improvements would be required near Mannheim Road (upstream of the proposed reservoir). Addison Creek would still overtop toward the Interstate 290 interchanges for all alternatives at the 100-year flood elevation; however the storm sewer and Interstate 290 pump station would be able to handle the reduced flow rates from several alternatives. The Interstate 290 underpasses would remain dry for alternatives ADCR-2a, 1b, 2b, 3b, 4b, and 6b.

TABLE 3.2.19
Addison Creek Road Overtopping Summary

Road Crossing	Road Elevation	25-yr Depth of Flooding	50-yr Depth of Flooding	100-yr Depth of Flooding
Mannheim Road	636.0	0.21	0.56	0.83
Mannheim Road (ADCR-3a)	636.0	-	-	0.25
Mannheim Road (ADCR-3b)	636.0	-	-	-
Mannheim Road (ADCR-6a)	636.0	-	-	0.24
Mannheim Road (ADCR-6b)	636.0	-	-	-
I-290 Underpasses	612.0	-	-	3.24
I-290 Underpasses (ADCR-2a)	612.0	-	-	-
I-290 Underpasses (ADCR-1b)	612.0	-	-	-
I-290 Underpasses (ADCR-2b)	612.0	-	-	-
I-290 Underpasses (ADCR-3b)	612.0	-	-	-
I-290 Underpasses (ADCR-4b)	612.0	-	-	-
I-290 Underpasses (ADCR-6b)	612.0	-	-	-

Note: ”-“ indicates that road crossing does not overtop for that particular storm event.

3.2.3.6 Data Required for Countywide Prioritization of Watershed Projects

Appendix I presents conceptual level cost estimates for the recommended alternatives. Table 3.2.20 lists alternatives analyzed in detail as part of the DWP development.

The recommended alternatives for Addison Creek are alternatives ADCR-1b, ADCR-3b, ADCR-6b, ADCR-7, and ADCR-9. Alternative ADCR-1b is recommended as the first phase of a flood control project because the reservoir would reduce flow rates and stages with minimal land acquisition issues. Alternative ADCR-3b is recommended as the second phase of a flood control project to further reduce stages and benefit both upstream and downstream property owners. Alternative ADCR-6b is recommended as the final phase of a flood control project to further reduce downstream stages and benefit both upstream and downstream property owners. ADCR-7 is recommended to address erosion problem areas in Northlake. ADCR-9 is recommended to maintain access to the residences along 19th Avenue in North Riverside.

Figures 3.2.11 through 3.2.23 show the locations and a summary of the proposed and recommended alternatives described in Table 3.2.20. Figures 3.2.11 through 3.2.23 also show comparisons of the existing condition and alternative condition inundation areas.

TABLE 3.2.20
Addison Creek Project Alternative Matrix to Support District CIP Prioritization

Alternative ID	Description	B/C Ratio	Net Benefits ($)	Total Project Cost ($)	Cumulative Structures Protected	Roadways Protected	Water Quality Benefit	Recom-mended	Communities Involved
ADCR-1a	Lake and Mannheim Reservoir	3.4	171,743,547	51,102,124	623	0	Positive	N	Westchester to Stone Park
ADCR-1b		1.9	186,954,960	98,853,311	760	1	Positive	N	
ADCR-2a	Downstream Channel Improvements	2.7	187,948,782	70,824,229	709	1	Positive	N	Westchester to Stone Park
ADCR-2b		1.6	188,404,195	118,575,416	788	1	Positive	N	
ADCR-3a	Upstream Channel Improvements	3.0	185,891,645	62,412,920	736	1	Positive	N	Westchester to Northlake
ADCR-3b		1.7	188,940,063	110,164,107	859	2	Positive	N	
ADCR-4a	Sediment Removal	3.0	161,356,819	54,178,622	625	0	Positive	N	Westchester to Northlake
ADCR-4b		1.7	176,742,100	101,929,809	745	1	Positive	N	
ADCR-6a	Reservoir with Downstream and Upstream Chan-nel Improvements	2.4	191,169,717	79,058,527	723	1	Positive	N	Westchester to Northlake
ADCR-6b[1]		1.5	196,463,022	133,921,295	954	2	Positive	Y	
ADCR-7	Northlake Erosion Control	2.3	1,896,358	809,039	N/A	2	Positive	Y	Northlake, Leyden Township
ADCR-8	Northlake Reservoir	0.2	12,751,807	66,846,104	122	0	Positive	N	Melrose Park to Leyden Township
ADCR-9	19th Avenue Erosion Control	1.2	270,053	218,819	N/A	0	Positive	Y	North Riverside

[1] Alternatives 1b and 3b are included in recommended Alternative 6b.

3.3 Buffalo Creek

The Buffalo Creek Subwatershed is located in northern Cook County and southern Lake County and encompasses an area of approximately 27 square miles. The subwatershed drains areas within the Lake County municipalities of the Village of Lake Zurich, Village of Kildeer, Village of Deer Park, Village of Long Grove, and Unincorporated Lake County and the Cook County municipalities of Village of Deer Park, Village of Palatine, Village of Arlington Heights, Village of Buffalo Grove, Village of Wheeling, and Unincorporated Cook County. The Buffalo Creek Subwatershed within Cook County is comprised of Buffalo Creek mainstem (also known as the Wheeling Drainage Ditch east of the Metra/Wisconsin Central Railroad bridge), Buffalo Creek Tributary A, the Unnamed Tributary to Buffalo Creek Tributary A, White Pine Ditch, and the William Rogers Memorial Diversion Channel. The subwatershed also includes 3 flood control reservoirs: the Buffalo Creek Reservoir (located in Lake County), the Heritage Park Reservoir, and the White Pine Ditch Reservoir. Buffalo Creek generally flows southeast until its confluence with the Des Plaines River.

TABLE 3.3.1
Communities Draining to Buffalo Creek

Community	Tributary Area (mi^2)
Arlington Heights	1.37
Buffalo Grove	1.98
Deer Park	0.00
Long Grove	0.00
Palatine	0.25
Prospect Heights	0.31
Unincorporated Cook County	3.92
Wheeling	4.59
	12.42

Note: This list includes community areas tributary to the Buffalo Creek within the approximately 12.4 square mile study area in Cook County. It does not include upstream tributary areas in Lake County.

The headwaters of Buffalo Creek Tributary A are located west of Smith Street adjacent to the Arlington Heights Branch of Salt Creek in the Village of Palatine. This is an area that can experience interbasin flow during the 100-year storm event. Downstream of Smith Street, Buffalo Creek Tributary A flows from southwest to northeast. The Unnamed Tributary to Buffalo Creek Tributary A joins Buffalo Creek Tributary A within the Jens Jensen Preserve and flows east under Hicks Road as Buffalo Creek Tributary A and continues northeast into the Buffalo Creek Reservoir north of Lake-Cook Road. The Buffalo Creek Tributary A modeling has been coordinated with the Upper Salt Creek Detailed Watershed Plan modeling to address the interba-

TABLE 3.3.2
Land Use Distribution for Buffalo Creek within Cook County

Land Use Category	Area (acres)	%
Residential	4,418	55.6
Commercial/Industrial	1,511	19.0
Forest/Open Land	1,005	12.6
Institutional	308	3.9
Transportation/Utility	284	3.6
Water/Wetland	340	4.3
Agricultural	82	1.0

Source: Chicago Metropolitan Agency for Planning's 2005 Land Use Inventory for Cook, DuPage, Kane, Kendall, Lake, McHenry and Will Counties, Illinois. Version 1.0. Published January 2009

sin flow.

Buffalo Creek exits the Buffalo Creek Reservoir and generally flows southeast through the Village of Buffalo Grove to its confluence with White Pine Ditch just downstream of Lake-Cook Road. Buffalo Creek then flows southeast through the Village of Buffalo Grove and Wheeling and crosses the Metra/Wisconsin Central Railroad. Immediately downstream of the Metra/Wisconsin Central Railroad bridge, an overflow weir on the north side of Buffalo Creek conveys flood flow from Buffalo Creek to the William Rogers Memorial Diversion Channel. The William Rogers Memorial Diversion Channel traverses the Village of Wheeling and Unincorporated Cook County and joins the Des Plaines River east of Milwaukee Avenue and south of Lake-Cook Road within the FPDCC. The mainstem of Buffalo Creek continues east from the Metra/Wisconsin Central Railroad, then southeast to its confluence with the Des Plaines River downstream of Hintz Road in the Village of Wheeling.

Figure 3.3.1 shows an overview of the tributary area of the subwatershed. Table 3.3.1 lists the communities located in areas directly tributary to the Buffalo Creek Subwatershed. Reported stormwater problem areas, flood inundation areas, and proposed alternative projects are also shown and discussed in the following subsections. Table 3.3.2 lists the land use breakdown by area within the Buffalo Creek Subwatershed.

3.3.1 Sources of Data

3.3.1.1 Previous Studies

The background hydrologic modeling for the Buffalo Creek Subwatershed is based on the 2007 LOMR for Buffalo Creek and the William Rogers Memorial Diversion Channel through the Village of Wheeling.

The hydraulic model for Buffalo Creek from the Des Plaines River continuing upstream to the Buffalo Creek Reservoir utilized the 2007 LOMR for Buffalo Creek and the William Rogers Memorial Diversion Channel. The data for the modeling of the reach of White Pine Ditch was based on the construction plans provided by the Village of Buffalo Grove for the 2006 White Pine Ditch Drainage Channel Restoration Improvements. The other studied tributaries within the subwatershed incorporated survey data prepared by D.B. Sterlin Inc.

3.3.1.2 Water Quality Data

The District monitors the water quality of the streams and canals within its jurisdiction and has one water quality monitoring station on Buffalo Creek as listed in Table 3.3.3. Annual water quality summaries have been published by the District from 1974 through the present for Buffalo Creek station.

Table 3.3.3
District Water Quality Monitoring Stations in the Buffalo Creek Subwatershed

Station ID	Waterbody	Location	Station Start Date
WW_12	Buffalo Creek	Lake-Cook Road	1974

There are no IEPA water quality monitoring stations within the DWP study area in the Buffalo Creek Subwatershed.

IEPA's 2010 *Integrated Water Quality Report*, which includes the CWA 303(d) and 305(b) lists, lists two segments within the DWP study area of the Buffalo Creek subwatershed as impaired. Table 3.3.4 lists the 303(d) listed impairments. TMDLs have been investigated for Buffalo Creek in the *Des Plaines River/Higgins Creek Watershed TMDL Stage 1 Report*, March 2009. The development of TMDLs is ongoing.

Table 3.3.4
IEPA Use Support Categorization and 303(d) Impairments in the Buffalo Creek Subwatershed

Station ID	Waterbody	Impaired Designated Use	Potential Causes	Potential Sources
GST	Buffalo Creek	Aquatic Life	Chloride, TSS, Cause Unknown	Urban Runoff/Storm Sewers, Combined Sewer Overflow, Sediments
		Primary Contact Recreation	Fecal Coliform	Urban Runoff/Storm Sewers, Combined Sewer Overflow

NPDES point source discharges within the Buffalo Creek subwatershed are listed in Table 3.3.5. In addition to the point source discharges listed, municipalities discharging to the Buffalo Creek Subwatershed are regulated by IEPA's NPDES Phase II Stormwater Permit Program, which was created to improve the water quality of stormwater runoff from urban areas, and requires that municipalities obtain permits for discharging stormwater and implement the six minimum control measures for limiting runoff pollution to receiving systems.

TABLE 3.3.5
Point Source Discharges in the Buffalo Creek Subwatershed

Name	NPDES	Community	Receiving Waterway
Prairie Material Sales-Yard 8	IL0068063	Des Plaines	Buffalo Creek
Jiffy Lube-Wheeling 986	IL0072729	Wheeling	Buffalo Creek

Note: NPDES facilities were identified from the IEPA website at http://www.epa.state.il.us/water/permits/waste-water/npdes-statewide.pdf, and from the USEPA website at http://www.epa.gov/r5water/weca/pcs.htm.

3.3.1.3 Wetland and Riparian Areas

Figures 2.3.6 and 2.3.7 contain mapping of wetland and riparian areas in the Lower Des Plaines River Watershed. Wetland areas were identified using NWI mapping. NWI data includes approximately 327 acres of wetlands in the Buffalo Creek subwatershed. Riparian areas are defined as vegetated areas between aquatic and upland ecosystems adjacent to a waterway or body of water that provides flood management, habitat, and water quality enhancement. Identified riparian environments offer potential opportunities for restoration.

3.3.1.4 Floodplain Mapping

Flood inundation areas supporting the NFIP were revised in 2008 as a part of the FEMA's Map Modernization Program. Floodplain boundaries were revised based upon updated Cook County topographic information; however, the effective models, which are used to estimate flood levels, were generally not updated. LOMRs were incorporated into revised floodplain areas. Buffalo Creek and its tributaries are currently mapped as studied Zone AE floodplain with a floodway, with the exception of the Unnamed Tributary to Buffalo Creek Tributary A which is mapped as unstudied Zone A floodplain. The original hydrologic and hydraulic analysis was performed in the early 1980s, with several updates over the years. The hydrologic modeling was performed using HEC-1. Hydraulic modeling was performed using HEC-2 and WSP-2 steady state hydraulic models. Appendix A includes a comparison of FEMA's effective floodplain mapping from updated DFIRM panels with inundation areas developed for the DWP.

3.3.1.5 Stormwater Problem Data

Communities, agencies (e.g., IDOT, CCHD), and stakeholders submitted Form B questionnaire response data to the District summarizing known stormwater problems within their jurisdictions. Table 3.3.6 summarizes reported problem areas reviewed as a part of the DWP development. Problems are classified in Table 3.3.6 as regional or local. This classification is based on a process described in the Introduction of Section 1 of this report.

TABLE 3.3.6
Community Response Data for Buffalo Creek

Problem Area ID	Municipality	Problems as Reported by Local Agency	Location	Problem Description	Local/ Regional	Resolution in DWP
BCTA-AH-FL-01	Arlington Heights	Pavement flooding	IL Route 68 at IL Route 53	Reported by IDOT: Last Incident 2/21/97	Local	This is a local problem.[2]
BCTA-BG-FL-01	Buffalo Grove	Streambank erosion along Buffalo Creek Tributary A	Lake-Cook Road and Ridge Ave	Bank Erosion	Local	Problem is not addressed in DWP since the maintenance of the channel and reservoir is the responsibility of the local municipality
BCTA-CD-SM-01	CCHD	Sediment deposits and vegetative growth	CCHD Struct. 016-4011 at Buffalo Creek Tributary A	Sediment accumulation and vegetative growth	Local	This is a local problem.[2]

TABLE 3.3.6
Community Response Data for Buffalo Creek

Problem Area ID	Municipality	Problems as Reported by Local Agency	Location	Problem Description	Local/ Regional	Resolution in DWP
BCTA-PL-FL-01	Palatine	Pavement flooding	IL Route 68 at US Route 12 to Baldwin St	Reported by IDOT: Last incident 3/30/97	Local	This is a local problem.[2]
BCTA-PL-FL-02	Palatine	Pavement flooding	IL Route 68 at US Route 12 to Hicks Rd	Reported by IDOT: Last incident 7/15/03	Local	This is a local problem.[2]
BUCR-CD-SM-01	CCHD, Deer Park	Maintenance	CCHD Struct.016-3203 at Buffalo Creek, 0.5 mi. west of Buffalo Grove Road	Sediment accumulation and vegetative growth	Local	This is a local problem.[2]
BUCR-CD-SM-02	CCHD	Maintenance	Buffalo Grove Road from Hintz Road to Lake-Cook Road	Sediment accumulation in streambed	Local	This is a local problem.[2]
BUCR-CD-SM-03	CCHD	Maintenance	Hintz Road from Arlington Heights Road to Milwaukee Avenue	Mild sedimentation accumulation downstream of CCHD Structure #016-3229	Local	This is a local problem.[2]
BUCR-CD-SM-04	CCHD, Wheeling	Maintenance	Aptakisic Road from Buffalo Grove Road to McHenry Road	West barrel is heavily silted with significant vegetation	Local	This is a local problem.[2]
BUCR-PH-FL-01	Prospect Heights	Pavement flooding	IL Route 83 from Dundee Road to Hintz Road	Last incident 7/8/03	Local	This is a local problem.[2]
BUCR-PL-FL-01	Palatine	Pavement flooding	US Route 12 from IL Route 68 to Winslowe Drive	Reported by IDOT: Last incident 3/28/04	Local	This is a local problem.[2]

TABLE 3.3.6
Community Response Data for Buffalo Creek

Problem Area ID	Municipality	Problems as Reported by Local Agency	Location	Problem Description	Local/ Regional	Resolution in DWP
BUCR-PL-FL-02	Palatine	Erosion	1800 N Rand Road	Sinkhole forming in back parking lot behind building	Local	This is a local problem.[2]
BUCR-WH-FL-01	Wheeling	Pavement flooding	Wolf Road at IL Route 68 to Manchester Drive	Reported by IDOT: Last incident 5/21/96	Local	This is a local problem.[2]
BUCR-WH-FL-02	Wheeling	Pavement flooding	IL Route 68 at Wheeling Drainage Ditch	Reported by IDOT	Local	This is a local problem.[2]
BUCR-WH-FL-03	Wheeling	Storm sewer/ residential flooding	Hintz Road and Schoenbeck Road	Undersized storm sewers back up into low lying, flood residential areas	Local	This is a local problem.[2]
BUCR-WH-FL-04	Wheeling	Pavement flooding	Wheeling Road and Exchange Court	Wheeling Road closed due to flooding 1-2 times per year	Local	This is a local problem.[2]
BUCR-WH-FL-05	Wheeling	Pavement flooding	Bridle Trail and Pleasant Run Drive	Undersized storm sewers flood Pleasant Run Drive and parts of Bridle Trail	Local	This is a local problem.[2]
BUCR-WH-FL-06	Wheeling	Detention basin overflow	Lee Street Detention Basin (Dundee Road and Schoenbeck Road)	Ponding in local streets in Wheeling and Buffalo Grove	Local	This is a local problem.[2]
BUCR-WH-FR-01	Wheeling	Overbank flooding	Dundee Road and Elmhurst Road	Dunhurst Subdivision flooding	Regional	BUCR-2A, BUCR-2B, BUCR-2C, BUCR-2D, BUCR-3, BUCR-5, BUCR-9
BUCR-WH-FR-03	Wheeling	Overbank flooding	Wheeling Road and Mercantile Court	Wheeling Road closed due to flooding 1-2 times a year	Regional	BUCR-2A, BUCR-2B, BUCR-2C, BUCR-2D, BUCR-3, BUCR-5, BUCR-9

TABLE 3.3.6
Community Response Data for Buffalo Creek

Problem Area ID	Municipality	Problems as Reported by Local Agency	Location	Problem Description	Local/ Regional	Resolution in DWP
BUCR-WH-FR-10	Wheeling	Overbank flooding	Wolf Road and Highland Ave	Wolf Road floods at the intersection of Wolf Road and Highland Ave	Regional	BUCR-2A, BUCR-2B, BUCR-2C, BUCR-2D, BUCR-3, BUCR-5, BUCR-9
WPDT-BG-FL-01	Buffalo Grove	Storm sewer/ residential flooding	600-700 MacArthur Drive	Water ponds and enters residences	Local	This is a local problem.[2]
WPDT-BG-FL-02	Buffalo Grove	Pavement flooding	IL Route 68 at Arlington Heights Road	Reported by IDOT: Last incident 10/13/01	Local	This is a local problem.[2]
WPDT-BG-FL-03	Buffalo Grove	Residential flooding	Beechwood Road, Beechwood Court, and Weidner Road	Storm sewer under Weidner Road surcharges, homes with driveways flood	Local	This is a local problem.[2]
WPDT-BG-FL-04	Buffalo Grove	Residential flooding	514 to 644 White Pine Road	Runoff accumulates in homes with at-grade driveways	Local	This is a local problem.[2]
WPDT-BG-FL-05	Buffalo Grove	Pavement flooding	IL Route 68 at Old Arlington Heights Road	Reported by IDOT: Last incident 10/17/98	Local	This is a local problem.[2]
WPDT-BG-FR-01	Buffalo Grove	Residential flooding	St. Mary's Parkway and adjacent areas	Culvert at St. Mary's Parkway undersized	Regional	BUCR-1A, BUCR-1B

[1] Problem Area IDs begin with DP- as they are in the Des Plaines River Watershed.
[2] Problem does not meet regional definition (refer to chapter 1). Solutions for the local problems are not addressed in the DWP.

3.3.1.6 Near Term Planned Projects

The White Pine Ditch St. Mary's Parkway culvert replacement project was completed in July 2010 and the existing hydraulic modeling was updated using the engineering plans for the culvert. The Dundee Road bridge in the Village of Wheeling is proposed to be replaced in 2010. The plans for this reconstruction were obtained from the Village and have also been incorporated into the hydraulic modeling. Additionally, as part of the Levee 37 project along the Des Plaines River, mitigating storage is being provided within Heritage Park in the Village of Wheeling. The proposed plan by the District for Heritage Park was used as the existing conditions for all proposed alternative analyses. Two concept plans were obtained from the roadway planner in April 2010 for the Weiland Road extension south of Aptakisic Road between McHenry Road and Buffalo Grove Road in the Village of Wheeling. Alternatives 2A, 2B, 2C, and 2D investigate the two concept alignments for the Weiland Road extension with proposed projects that could be impacted due to the road extension.

3.3.2 Watershed Analysis

3.3.2.1 Hydrologic Model Development

Subbasin Delineation. The Buffalo Creek tributary area was delineated based upon 2003 Cook County LiDAR topographic data developed by Cook County. These subbasins correspond to the effective 2005 HEC-1 model subbasins determined and permitted by IDNR-OWR. Portions of the subwatershed boundary were coordinated with the boundaries of adjacent subwatersheds included with this DWP. The subwatershed boundary is generally consistent with boundaries from previous studies and those shown on the HA. Subbasins were delineated based on the major hydraulic features of the subwatershed. There are 31 subbasins ranging in size from 0.12 to 3.05 square miles with a total drainage area of 27.0 square miles.

Hydrologic Parameter Calculations. CN were estimated for each subbasin based upon NRCS soil data and 2001 CMAP land use data. This method is further described in Section 1.3.2, with lookup values for specific combinations of land use and soil data presented in Appendix C. An area-weighted average of the CN was generated for each subbasin.

Clark's unit hydrograph parameters were estimated using the method described in Section 1.3.2. Appendix G provides a summary of the hydrologic parameters used for subbasins in each subwatershed.

3.3.2.2 Hydraulic Model Development

Field Data, Investigation, and Existing Model Data. The Buffalo Creek Subwatershed unsteady HEC-RAS hydraulic model incorporates the cross-section location, channel data, and structure data from three sources: (1) the 2007 FEMA LOMR study, (2) the construction plans for the 2006 White Pine Ditch Drainage Channel Restoration Improvements, and (3) a channel and structure survey of Buffalo Creek Tributary A and the Unnamed Tributary to Buffalo Creek Tributary A, completed by D.B. Sterlin Inc. The cross-section location, channel data, and structure data from the 2007 LOMR HEC-RAS hydraulic model were utilized for the mainstem of Buffalo Creek and the William Rogers Memorial Diversion Channel. The cross-section location, channel data, and structure data for Buffalo Creek Tributary A and the Unnamed Tributary to Buffalo Creek Tributary A were taken from the D.B. Sterlin Inc. survey. The channel and structure data collected was incorporated into the HEC-GeoRAS cross-sections extracted from the TIN created in GIS from the 2003 Cook County LiDAR topographic data.

Boundary Conditions. The starting water surface conditions for the various storm frequencies are based on the 5-year Des Plaines River flood elevation at the confluence with Buffalo Creek. The downstream boundary condition used for the historical storm event runs was the normal depth based on channel slope.

3.3.2.3 Calibration and Verification.

Observed Data. Buffalo Creek has one USGS stream gage located in the Village of Buffalo Grove (USGS 05528500) upstream of Aptakisic Road. Based on the hydrologic analysis, the subwatershed drainage area tributary to the gage is approximately 20.5 square miles.

Stage and flow gage records were obtained from the USGS for the September 13-14, 2008 and September 30-October 3, 2006 storm events. No surveyed HWMs were available for these two storm events.

Calibration Results. Based on the USGS gage records, the Buffalo Creek HEC-HMS hydrologic model and unsteady HEC-RAS hydraulic models were calibrated to the September 13-14, 2008 storm event. Calibration was performed by multiplying the Clark storage coefficient (R) value by a factor of 2.50 for all subbasins in the HEC-HMS hydrologic model. By modifying the R value for the subwatershed, the general shape and peak values of the model flow hydrograph improved compared to those of the recorded flow hydrograph. The resulting calibration satisfies the District model calibration criteria established in Chapter 6 of the CCSMP (within 0.5 feet of stage and within 30% of total hydrograph volume). As a verification of the calibrated model, the September 30-October 3, 2006 storm event was also performed. These results also satisfy the calibration criteria described in Chapter 1. Figures 3.3.2 -3.3.5 show the stage/flow comparisons between the calibrated model results and the historical gage records.

FIGURE 3.3.2
Buffalo Creek Flow Comparison at Aptakisic Road for the September 2008 Storm Event

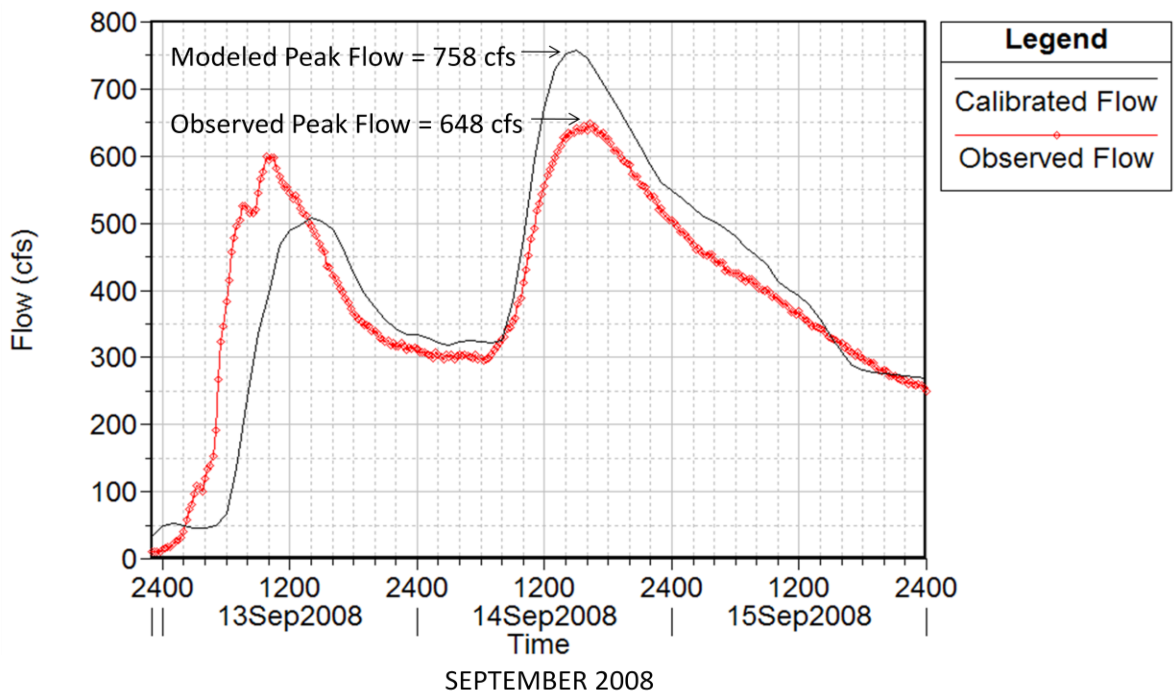


FIGURE 3.3.3
Buffalo Creek Stage Comparison at Aptakisic Road for the September 2008 Storm Event

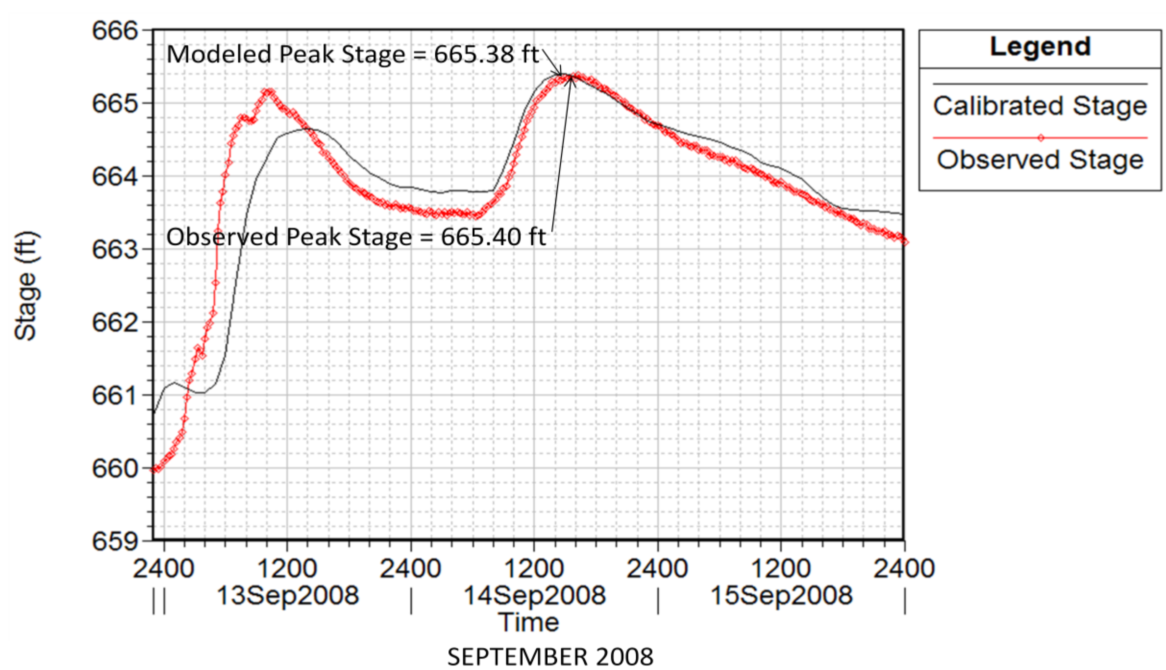


FIGURE 3.3.4

Buffalo Creek Flow Comparison at Aptakisic Road for the September 30 – October 3, 2006 Storm Event

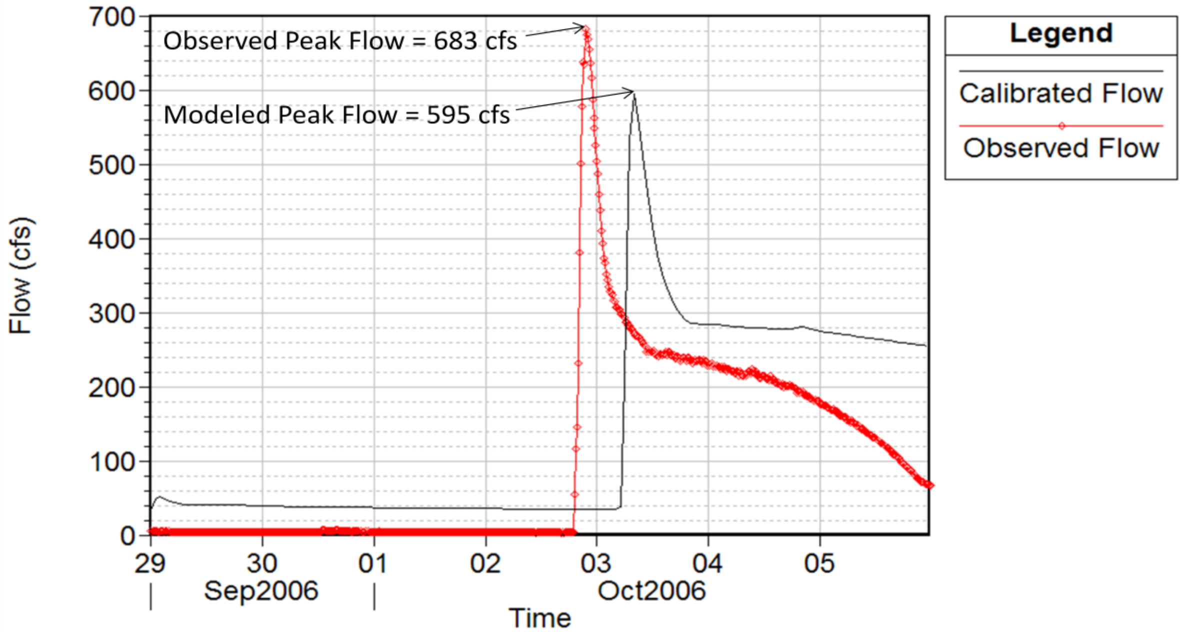


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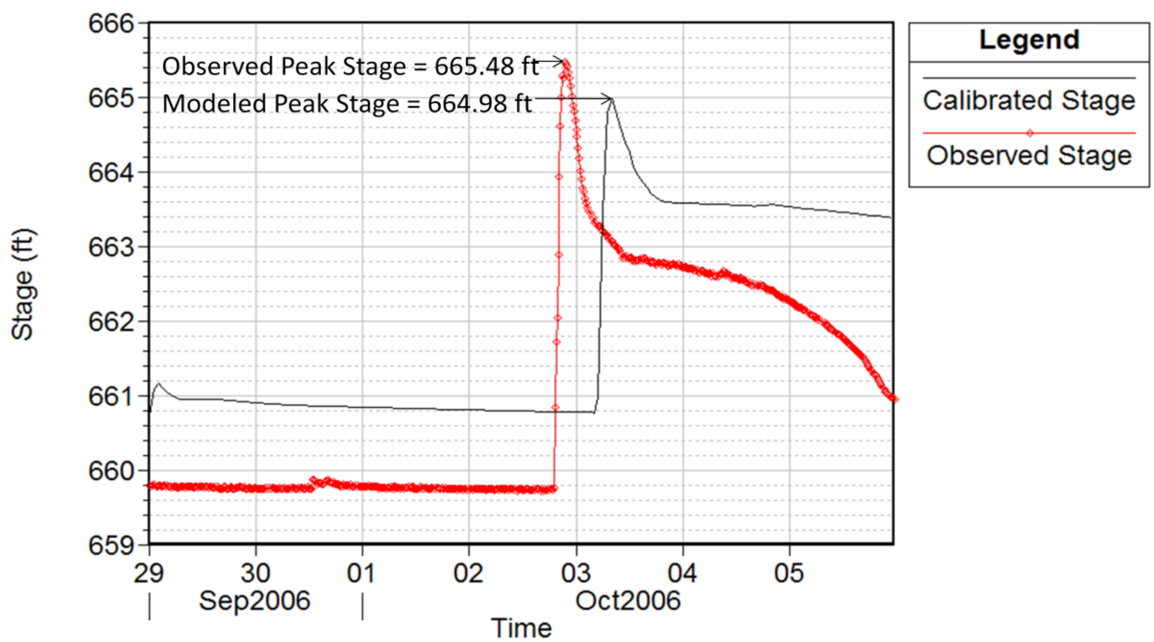
FIGURE 3.3.5

Buffalo Creek Stage Comparison at Aptakisic Road for the September 30 – October 3, 2006 Storm Event



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3.3.2.4 Existing Conditions Evaluation

Flood Inundation Areas. Figure 3.3.1 shows inundation areas in the Buffalo Creek Subwatershed produced by the DWP's hydraulic model for the critical duration 100-year, 24-hour duration design storm.

Hydraulic Profiles. Appendix H contains existing conditions hydraulic profiles for Buffalo Creek. Profiles are shown for the 2-, 5-, 10-, 25-, 50-, 100-, and 500-year recurrence interval design storms.

3.3.3 Development and Evaluation of Alternatives

3.3.3.1 Problem Definition

Hydraulic model results were reviewed with inundation mapping to identify locations where property damage due to flooding is predicted. Table 3.3.7 summarizes problem areas identified through hydraulic modeling of Buffalo Creek.

TABLE 3.3.7
Modeled Problem Definition for Buffalo Creek

Problem Area ID[1]	Location	Recurrence Interval (yr) of Flooding	Associated Form B	Resolution in DWP
BCTA-PL-FR-02	Village of Palatine between Hicks Road and Baldwin Road	100	N[2]	BUCR-4
BCTA-PL-FR-05	Village of Palatine at Laurel Drive	100, 50, 25, 10	N	BUCR-4
BCTA-PL-FR-06	Village of Palatine at East Lily Court	100, 50, 25, 10, 5	N	BUCR-4
BCTA-PL-FR-07	Village of Palatine at Capri Drive	100, 50, 25, 10, 5	N	BUCR-4
BCTA-PL-FR-08	Village of Palatine at the Green Lane North Apartments	100	N	BUCR-4
BUCR-WH-FR-02	Village of Wheeling at the Gaslight Shopping Center	100, 50, 25, 10, 5, 2	N	BUCR-2A, BUCR-2B, BUCR-2C, BUCR-2D, BUCR-3, BUCR-5, BUCR-9
BUCR-WH-FR-04	Village of Wheeling at South Wheeling Road	100, 50, 25, 10, 5, 2	N	BUCR-2A, BUCR-2B, BUCR-2C, BUCR-2D, BUCR-3, BUCR-5, BUCR-9
BUCR-WH-FR-08	Village of Wheeling at 6th Street	100	N	BUCR-2A, BUCR-2B, BUCR-2C, BUCR-2D, BUCR-3, BUCR-5, BUCR-6, BUCR-8, BUCR-9

Problem Area ID[1]	Location	Recurrence Interval (yr) of Flooding	Associated Form B	Resolution in DWP
BUCR-WH-FR-11	Village of Wheeling, west of creek, south of Dundee Road and north of Jeffrey Avenue	100, 50, 25	N	BUCR-2A, BUCR-2B, BUCR-2C, BUCR-2D, BUCR-3, BUCR-5, BUCR-6, BUCR-7, BUCR-8, BUCR-9
BUCR-WH-FR-13	Village of Wheeling Valley View Subdivision at Wheeling Avenue	100	N	BUCR-2A, BUCR-2B, BUCR-2C, BUCR-2D, BUCR-3, BUCR-5, BUCR-9
BUCR-WH-FR-16	Village of Wheeling between the Wisconsin Central RR and Dundee Road at Industrial Lane	100, 50, 25, 10, 5, 2	N	BUCR-2A, BUCR-2B, BUCR-2C, BUCR-2D, BUCR-3, BUCR-5, BUCR-6, BUCR-8, BUCR-9
BUCR-WH-FR-17	Village of Wheeling, Meadow Lane at the Diversion Channel	100, 50, 25, 10, 5, 2	N	Addressed in the Mainstem Des Plaines River section
WPDT-BG-FR-02	Village of Buffalo Grove, at St. Mary's Parkway	100	N	BUCR-1A, BUCR-1B, BUCR-3

[1] All Problem Area IDs begin with DP- as they are in the Des Plaines River Watershed.
[2] Although no Form B was submitted for these problem areas, stakeholders verified the location and extent of the problem areas.

3.3.3.2 Damage Assessment

Economic damages were defined following the protocol defined in Chapter 6.6 of the CCSMP. Recreation damages due to flooding are not being identified as part of the DWP. No erosion damages due to flooding were identified for Buffalo Creek. Transportation damages were estimated as 15 percent of property damages. Table 3.3.8 lists the damage assessment for existing conditions.

TABLE 3.3.8
Estimated Average Annual Damages for Buffalo Creek

Damage Category	Estimated Damage ($)	Description
Property	3,188,603	Includes residential and non-residential structure and contents damage
Erosion	0	No critical erosion damages were identified
Transportation	478,290	Assumed as 15% of property damage

3.3.3.3 Technology Screening

Flood control technologies were screened to identify those most appropriate for addressing the flooding problems in the subwatershed. Increased conveyance, storage, or floodwalls were identified as the principal technologies applicable for addressing stormwater problems in the Buffalo Creek Subwatershed. The feasibility of the technologies defined in Chapter 6.6 of the CCSMP is summarized for each alternative in Table 3.3.9.

TABLE 3.3.9
Technology Screening for Buffalo Creek

Technology	**Feasibility for BCTA-PL-FR-02 through -08 (Village of Palatine between Hicks Road and Baldwin Road)**
Storage Facility	Feasible – Will not alleviate flooding as a stand-alone project, but flood storage is required to offset flow increases from channel improvements
Conveyance Improvement – Culvert/Bridge Replacement	Feasible – There is one restrictive culvert and two that will need to be replaced due to channel profile lowering
Conveyance Improvement – Channel Improvement	Feasible – Will require easements and upstream flood storage for mitigation
Conveyance Improvement – Diversion	Not Feasible – Adequate vacant land not available
Flood Barriers, Levees/Floodwalls	Not Feasible – Space issues due to adjacent homes proximity to creek, property buy-outs required
Technology	**Feasibility for BUCR-WH-FR-01 through -06 (Village of Wheeling from Dundee Road to South Wheeling Road)**
Storage Facility	Feasible – Upstream storage will provide a reduction in frequency of occurrence of flooding
Conveyance Improvement – Culvert/Bridge Replacement	Not Feasible - Culverts/bridges not a source of flood problem
Conveyance Improvement – Channel Improvement	Feasible – Will require easements and upstream flood storage for mitigation
Conveyance Improvement – Diversion	Not Feasible – Space limitations
Flood Barriers, Levees/Floodwalls	Feasible – Will require easements and upstream flood storage for mitigation
Technology	**Feasibility for WPDT-BG-FR-01 and -02 (Village of Buffalo Grove at St. Mary's Parkway)**
Storage Facility	Feasible – Upstream storage will provide a reduction in flooding
Conveyance Improvement – Culvert/Bridge Replacement	Not Feasible - Culverts/bridges not a source of flood problem

Conveyance Improvement – Channel Improvement	Feasible – Will require easements and upstream flood storage for mitigation
Conveyance Improvement – Diversion	Not Feasible – Adequate vacant land not available for a diversion channel
Flood Barriers, Levees/Floodwalls	Feasible – Will require easements and upstream flood storage for mitigation
Technology	**Feasibility for BUCR-WH-FR-10, -11, and-13 (Village of Wheeling from South Wolf Road to Wheeling Avenue)**
Storage Facility	Feasible – Will not alleviate flooding as a stand-alone project, but will provide a reduction in frequency of occurrence of flooding
Conveyance Improvement – Culvert/Bridge Replacement	Not Feasible - Culverts/bridges not a source of flood problem
Conveyance Improvement – Channel Improvement	Feasible – Will require easements and upstream flood storage for mitigation
Conveyance Improvement – Diversion	Feasible – The capacity of the existing diversion channel can be increased
Flood Barriers, Levees/Floodwalls	Not Feasible – Storage will not off-set the flood elevation increases, property buy-outs required

3.3.3.4 Alternative Development

Flood Control Alternatives. Alternative solutions to regional flooding were developed and evaluated consistent with the methodology described in Section 1.4 of this report. Table 3.3.10 summarizes flood control alternatives for the Buffalo Creek Subwatershed.

TABLE 3.3.10
Flood Control Alternatives for Buffalo Creek

Alternative	Addressed Problem Area IDs	Location	Description
BUCR-1A	WPDT-BG-FR-01 WPDT-BG-FR-02	Buffalo Grove, Wheeling	*Floodwall:* 2,185 feet of floodwall between Lake-Cook Road and downstream of Raupp Boulevard *Channel Improvements:* From Raupp Boulevard to Aptakisic Road
BUCR-1B	WPDT-BG-FR-01 WPDT-BG-FR-02	Buffalo Grove	*Channel Improvements:* Lower the channel profile to a constant slope from Lake-Cook Road to Aptakisic Road *Bridge Modification:* Bulkhead Lake-Cook Road to increase WSEL on Buffalo Grove Golf Course to provide storage volume

TABLE 3.3.10
Flood Control Alternatives for Buffalo Creek

Alternative	Addressed Problem Area IDs	Location	Description
BUCR-2A	BUCR-WH-FR-01 BUCR-WH-FR-02 BUCR-WH-FR-03 BUCR-WH-FR-04 BUCR-WH-FR-08 BUCR-WH-FR-10 BUCR-WH-FR-11 BUCR-WH-FR-13	Wheeling	*Reservoir:* Provide 310 A-F of storage volume on undeveloped private property in the Village of Wheeling
BUCR-2B	BUCR-WH-FR-01 BUCR-WH-FR-02 BUCR-WH-FR-03 BUCR-WH-FR-04 BUCR-WH-FR-08 BUCR-WH-FR-10 BUCR-WH-FR-11 BUCR-WH-FR-13	Wheeling	*Reservoir:* Provide 300 A-F of storage volume on undeveloped private property in the Village of Wheeling
BUCR-2C	BUCR-WH-FR-01 BUCR-WH-FR-02 BUCR-WH-FR-03 BUCR-WH-FR-04 BUCR-WH-FR-08 BUCR-WH-FR-10 BUCR-WH-FR-11 BUCR-WH-FR-13	Wheeling	*Reservoir:* Provide 300 A-F of storage volume on undeveloped private property in the Village of Wheeling
BUCR-2D	BUCR-WH-FR-01 BUCR-WH-FR-02 BUCR-WH-FR-03 BUCR-WH-FR-04 BUCR-WH-FR-08 BUCR-WH-FR-10 BUCR-WH-FR-11 BUCR-WH-FR-13	Wheeling	*Reservoir:* Provide 305 A-F of storage volume on undeveloped private property
BUCR-3	WPDT-BG-FR-01 WPDT-BG-FR-02 BUCR-WH-FR-01 BUCR-WH-FR-02 BUCR-WH-FR-03 BUCR-WH-FR-04 BUCR-WH-FR-08 BUCR-WH-FR-10 BUCR-WH-FR-11 BUCR-WH-FR-13	Buffalo Grove, Wheeling	*Reservoir:* Expand the Buffalo Creek Flood Control Reservoir by 800 A-F

TABLE 3.3.10
Flood Control Alternatives for Buffalo Creek

Alternative	Addressed Problem Area IDs	Location	Description
BUCR-4	BCTA-PL-FR-02 BCTA-PL-FR-05 BCTA-PL-FR-06 BCTA-PL-FR-07 BCTA-PL-FR-08	Palatine	*Channel Improvements:* Lower the channel profile from downstream of Hicks Road to Lynda Road and Laurel Drive to Baldwin Road *Reservoir:* Provide 45 A-F of mitigating storage within the Jens Jensen Preserve to offset increases due to channel improvements *Culvert Replacement:* Replace the culverts at Laurel Drive, Iris Drive, Capri Drive, and Rand Road
BUCR-5	BUCR-WH-FR-01 BUCR-WH-FR-02 BUCR-WH-FR-03 BUCR-WH-FR-04 BUCR-WH-FR-08 BUCR-WH-FR-10 BUCR-WH-FR-11 BUCR-WH-FR-13	Wheeling	*Floodwall*: 4,125 feet of floodwall from 3,960 feet upstream of Elmhurst Road to the upstream face of Elmhurst Road *Reservoir:* Provide 310 A-F of storage volume on non-developed private property
BUCR-6	BUCR-WH-FR-01 BUCR-WH-FR-02	Wheeling	*Reservoir:* Provide 100 A-F of storage volume within the existing Village of Wheeling water tower site
BUCR-7	BUCR-WH-FR-11	Wheeling	*Channel Improvements:* Lower the channel profile from Jeffrey Avenue to upstream face of Hintz Road *Reservoir:* Provide storage volume within Village of Wheeling and private property
BUCR-8	BUCR-WH-FR-08 BUCR-WH-FR-17	Unincorporated Cook County, Palatine	*Channel Improvements:* Lower the channel profile of the Diversion Channel from the Swaminarayan Temple main entrance to upstream of Milwaukee Avenue *Reservoir:* Provide 300 A-F of storage volume on non-developed private property and Village of Wheeling property
BUCR-9	BUCR-WH-FR-02 BUCR-WH-FR-03 BUCR-WH-FR-04	Wheeling	*Channel Improvements:* Relocate and excavate the creek to create a constant channel slope from 2,800 feet downstream of Aptakisic Road to 3,960 feet upstream of IL Route 83 *Reservoir:* Provide 255 A-F of storage volume on non-developed private property

Stormwater detention, channel improvements, bridge modifications, diversion structure improvements, and floodwall alternatives were evaluated to address regional flooding problems along Buffalo Creek. For alternatives that include conveyance improvements, a storage element is required to offset the downstream increases in flows. Because Buffalo Creek experiences overbank flooding throughout the subwatershed, flood storage is required for several of the alternatives to mitigate for increases in flood elevations elsewhere in the subwatershed. Storage is also required for floodwalls to compensate for lost storage and increases in water surface elevations due to the proposed alternatives.

Alternative BUCR-1A includes the construction of a floodwall, averaging approximately 6 feet in height along the south side of the creek from Lake-Cook Road to just downstream of Raupp Boulevard. The problem area is a cluster of 10 residences that experience overbank flooding from Buffalo Creek. To protect these structures from flooding, 2,180 linear feet of floodwall will be constructed along the creek. BUCR-1A also includes channel improvements from downstream of Raupp Boulevard to upstream of Aptakisic Road. To mitigate for lost storage, the bridge crossing at Lake-Cook Road will be bulkheaded. This will cause an increase in water surface elevation on the Buffalo Grove Golf Course by approximately 0.1 foot. This alternative does not require any excavation within the golf course and does not affect any structures on the golf course.

Alternative BUCR-1B includes channel improvements from Lake-Cook Road to Aptakisic Road to create a constant slope through this reach. The channel will be lowered between 0.5 and 3 feet through this reach. To mitigate for lost storage, the bridge crossing at Lake-Cook Road will be bulkheaded. This will cause an increase in water surface elevation on the Buffalo Grove Golf Course by approximately 0.1 foot. This alternative does not require any excavation within the golf course and does not affect any structures on the golf course.

Alternative BUCR-2A includes the construction of a flood control reservoir on undeveloped private property within the Village of Wheeling. This alternative will provide approximately 310 A-F of storage volume. Because the reservoir will be excavated below the elevation of Buffalo Creek, a pump station will be required.

Alternatives BUCR-2B includes the construction of a flood control reservoir on undeveloped private property within the Village of Wheeling. This alternative will provide approximately 300 A-F of storage volume. Because the reservoir will be excavated below the elevation of Buffalo Creek, a pump station will be required.

Alternative BUCR-2C includes the construction of a flood control reservoir on undeveloped private property within the Village of Wheeling. This alternative will provide approximately 300 A-F of storage volume. Because the reservoir will be excavated below the elevation of Buffalo Creek, a pump station will be required.

Alternative BUCR-2D includes the construction of a flood control reservoir on non-developed private property within the Village of Wheeling. This alternative will provide approximately 305 A-F of storage volume. Because the reservoir will be excavated below the elevation of Buffalo Creek, a pump station will be required.

Alternative BUCR-3 involves the expansion of the Buffalo Creek Flood Control Reservoir. By utilizing adjacent non-developed areas of the forest preserve, an additional 800 A-F of storage volume can be provided. With additional flood storage, the maximum elevation in the flood control reservoir is decreased by approximately 0.5 foot, decreasing the flow over the spillway during larger storm events.

Alternative BUCR-4 includes channel improvements along Buffalo Creek Tributary A in the Village of Palatine. The improvements include lowering the channel profile from Hicks Road to Lynda Road and Laurel Drive to Baldwin Road. Lowering the channel profile will require the replacement at the culverts at Laurel Drive, Iris Drive and Capri Drive. To mitigate for the increases in conveyance, 45 A-F of flood storage will be provided in the Jens Jensen Preserve (FPDCC) property located upstream of Hicks Road which will require a pump station.

Alternative BUCR-5 includes the construction of a flood control reservoir on undeveloped private property within the Village of Wheeling. This alternative will provide approximately 310 A-F of storage volume. The reservoir will be excavated below the elevation of Buffalo Creek; therefore a pump station will be required. This alternative also includes the construction of approximately 4,125 feet of floodwall, averaging approximately 6 feet in height along the south side of the creek from approximately 3,960 feet upstream of Elmhurst Road to the upstream face of Elmhurst Road.

Alternative BUCR-6 includes the expansion of the existing storage basin located on the Village of Wheeling water tower site. By utilizing the undeveloped portion of this property, an additional 100 A-F of flood storage can be provided on this site.

Alternative BUCR-7 includes channel improvements from Jeffrey Avenue to Wolf Road. Buffalo Creek will be lowered to a constant profile through this reach. This alternative also includes the excavation of three parcels to provide 90 A-F of stormwater storage to mitigate for the channel improvements and to provide additional storage volume along Buffalo Creek.

Alternative BUCR-8 includes the construction of three reservoirs along the William Rogers Memorial Diversion Channel. The diversion channel is will be widened by an average of 20 feet from the diversion structure on Buffalo Creek to the main entrance of the Swaminarayan Temple. From the main entrance of the Swaminarayan Temple to Milwaukee Avenue, the channel will be lowered between 1 and 3.5 feet. The reservoirs will provide mitigation for the increase in conveyance along this reach.

Alternative BUCR-9 includes the construction of a flood control reservoir on undeveloped private property within the Village of Wheeling. This alternative will provide approximately 255 A-F of storage volume. This alternative also includes relocating Buffalo Creek along the northern parcel boundary of the Arlington Club subdivision in the Village of Wheeling.

Because the reservoir will be excavated below the elevation of Buffalo Creek, a pump station will be required.

3.3.3.5 Alternative Evaluation and Selection

Alternatives listed in Table 3.3.10 were evaluated to determine their effectiveness and to produce data for the countywide prioritization of watershed projects. Flood control alternatives were modeled to evaluate their impact on water surface elevations and flood damages. Table 3.3.24 provides a summary B/C ratio, net benefits, total project costs, number of structures protected, and other relevant alternative data.

BUCR-1A. BUCR-1A would include the construction of approximately 2,180 linear feet of floodwall from the downstream face of Lake-Cook Road to approximately 260 feet downstream of Raupp Boulevard in the Village of Buffalo Grove. To mitigate for the lost flood storage, the bridge at Lake-Cook Road will be partially bulkheaded to increase the flood elevation within the Buffalo Grove Golf Course property. No excavation within the golf course is required. BUCR-1A is not recommended because channel improvements from Lake-Cook Road to Aptakisic Road (alternative BUCR-1B) will provide the same benefits for less cost and disruption. This floodwall removes 10 structures within the Village of Buffalo Grove. Table 3.3.11 compares the peak modeled water surface elevation and flow for Alternative BUCR-1A.

TABLE 3.3.11
Buffalo Creek Existing and Alternative Condition BUCR-1A Flow and WSEL Comparison

		Existing Conditions		Alternative BUCR-1A	
Location	Station	Max WSEL (ft)	Max Flow (cfs)	Max WSEL (ft)	Max Flow (cfs)
Downstream of Lake-Cook Road	27748.4	675.6	1,666	675.2	1,653
Upstream of Raupp Boulevard	26567.53	673.3	1,740	673.1	1,727

BUCR-1B. BUCR-1B would include channel improvements from Lake-Cook Road to Aptakisic Road. This alternative results in a reduction in flood elevations from the project site to the confluence with the Des Plaines River and would remove 10 structures from the 100-year inundation area. BUCR-1B is recommended because it will remove all ten of the structures identified in Buffalo Grove from the 100-year inundation area. Table 3.3.12 compares the peak modeled water surface elevation and flow for Alternative BUCR-1B.

TABLE 3.3.12
Buffalo Creek Existing and Alternative Condition BUCR-1B Flow and WSEL Comparison

		Existing Conditions		Alternative BUCR-1B	
Location	Station	Max WSEL (ft)	Max Flow (cfs)	Max WSEL (ft)	Max Flow (cfs)
Downstream of Lake-Cook Road	27748.4	675.6	1,666	675.0	1,661
Upstream of Raupp Boulevard	26567.53	673.3	1,740	673.2	1,736

BUCR-2A. BUCR-2A would include providing 310 A-F of flood storage volume on the west side of Buffalo Creek within the privately owned property located south of Aptakisic Road and east of Buffalo Grove Road in the Village of Wheeling. The location of this storage area was used in conjunction with the concept plans 1 and 1a for the Weiland Road extension. This alternative results in a reduction in flood elevations from the project site to the confluence with the Des Plaines River and would remove 94 structures from the 100-year inundation area. BUCR-2A is not recommended because it does not remove all of the structures upstream of Elmhurst Road from flood inundation. Table 3.3.13 compares the peak modeled water surface elevation and flow for Alternative BUCR-2A.

TABLE 3.3.13
Buffalo Creek Existing and Alternative Condition BUCR-2A Flow and WSEL Comparison

		Existing Conditions		Alternative BUCR-2A	
Location	Station	Max WSEL (ft)	Max Flow (cfs)	Max WSEL (ft)	Max Flow (cfs)
Upstream of Elmhurst Road	15790.6	653.1	1,808	652.1	1,373
Upstream of McHenry Road	14217.48	651.4	1,838	650.3	1,405
Upstream of Dundee Road	9673.499	643.8	1,265	643.3	1,004
Upstream of Jeffrey Avenue	7162.17	642.5	1,451	642.2	1,197
Downstream of Jeffrey Avenue	6563.224	640.5	1,452	640.1	1,189

BUCR-2B. BUCR-2B would include providing 300 A-F of flood storage volume on the west side of Buffalo Creek within the privately owned property located south of Aptakisic Road and east of Buffalo Grove Road in the Village of Wheeling. The location of this storage area was used in conjunction with the concept plan 2 for the Weiland Road extension. This alternative results in a reduction in flood elevations from the project site to the confluence with the Des Plaines River and would remove 94 structures from the 100-year inundation area. BUCR-2B is not recommended because it does not remove all of the structures upstream of Elmhurst Road from flood inundation. Table 3.3.14 compares the peak modeled water surface elevation and flow for Alternative BUCR-2B.

TABLE 3.3.14
Buffalo Creek Existing and Alternative Condition BUCR-2B Flow and WSEL Comparison

		Existing Conditions		Alternative BUCR-2B	
Location	Station	Max WSEL (ft)	Max Flow (cfs)	Max WSEL (ft)	Max Flow (cfs)
Upstream of Elmhurst Road	15790.6	653.1	1,808	652.4	1,517
Upstream of McHenry Road	14217.48	651.4	1,838	650.6	1,531
Upstream of Dundee Road	9673.499	643.8	1,265	643.4	1,079
Upstream of Jeffrey Avenue	7162.17	642.5	1,451	642.2	1,223
Downstream of Jeffrey Avenue	6563.224	640.5	1,452	640.1	1,189

BUCR-2C. BUCR-2C would include providing 300 A-F of flood storage volume on the east side of Buffalo Creek within the privately owned property located south of Aptakisic Road and east of Buffalo Grove Road in the Village of Wheeling. This location of this storage area was used in conjunction with the concept plan 2 for the Weiland Road extension. This alternative results in a reduction in flood elevations from the project site to the confluence with the Des Plaines River and would remove 94 structures from the 100-year inundation area. BUCR-2C is not recommended because it does not remove all of the structures upstream of Elmhurst Road from flood inundation. Table 3.3.15 compares the peak modeled water surface elevation and flow for Alternative BUCR-2C.

TABLE 3.3.15
Buffalo Creek Existing and Alternative Condition BUCR-2C Flow and WSEL Comparison

		Existing Conditions		Alternative BUCR-2C	
Location	**Station**	**Max WSEL (ft)**	**Max Flow (cfs)**	**Max WSEL (ft)**	**Max Flow (cfs)**
Upstream of Elmhurst Road	15790.6	653.1	1,808	652.1	1,397
Upstream of McHenry Road	14217.48	651.4	1,838	650.4	1,429
Upstream of Dundee Road	9673.499	643.8	1,265	643.3	1,021
Upstream of Jeffrey Avenue	7162.17	642.5	1,451	642.2	1,212
Downstream of Jeffrey Avenue	6563.224	640.5	1,452	640.1	1,190

BUCR-2D. BUCR-2D would include providing 310 A-F of flood storage volume on the east side of Buffalo Creek within the privately owned property located south of Aptakisic Road and east of Buffalo Grove Road in the Village of Wheeling. The location of this storage area was used in conjunction with the concept plans 1 and 1a for the Weiland Road extension. This alternative results in a reduction in flood elevations from the project site to the confluence with the Des Plaines River and would remove 94 structures from the 100-year inundation area. BUCR-2D is not recommended because it does not remove all of the structures upstream of Elmhurst Road from flood inundation. Table 3.3.16 compares the peak modeled water surface elevation and flow for Alternative BUCR-2D.

TABLE 3.3.16
Buffalo Creek Existing and Alternative Condition BUCR-2D Flow and WSEL Comparison

		Existing Conditions		Alternative BUCR-2D	
Location	**Station**	**Max WSEL (ft)**	**Max Flow (cfs)**	**Max WSEL (ft)**	**Max Flow (cfs)**
Upstream of Elmhurst Road	15790.6	653.1	1,808	652.1	1,397
Upstream of McHenry Road	14217.48	651.4	1,838	650.4	1,429
Upstream of Dundee Road	9673.499	643.8	1,265	643.3	1,021
Upstream of Jeffrey Avenue	7162.17	642.5	1,451	642.2	1,212
Downstream of Jeffrey Avenue	6563.224	640.5	1,452	640.1	1,190

BUCR-3. BUCR-3 would include expanding the Buffalo Grove Flood Control Reservoir located in the Lake County Forest Preserve. This alternative results in a reduction in flood elevations from the project site to the confluence with the Des Plaines River and would remove 116 structures from the 100-year inundation area. BUCR-3 is not recommended because other studied alternatives provide similar benefits for less cost. Table 3.3.17 compares the peak modeled water surface elevation and flow for Alternative BUCR-3.

TABLE 3.3.17
Buffalo Creek Existing and Alternative Condition BUCR-3 Flow and WSEL Comparison

		Existing Conditions		Alternative BUCR-3	
Location	Station	Max WSEL (ft)	Max Flow (cfs)	Max WSEL (ft)	Max Flow (cfs)
Upstream of Elmhurst Road	15790.6	653.1	1,808	651.8	1,277
Upstream of McHenry Road	14217.48	651.4	1,838	650.0	1,290
Upstream of Dundee Road	9673.499	643.8	1,265	643.0	845
Upstream of Jeffrey Avenue	7162.17	642.5	1,451	642.2	1,175
Downstream of Jeffrey Avenue	6563.224	640.5	1,452	640.1	1,192

BUCR-4. BUCR-4 would include channel improvements from Hicks Road to Lynda Road and from Rand Road to Baldwin Street. To mitigate for the increases in conveyance, 45 A-F of flood storage will be provided in the Jens Jensen Preserve (FPDCC) property located upstream of Hicks Road which will require a pump station. This storage facility will require an area of approximately 4 acres. This alternative results in a reduction in flood elevations from the project site to Ventura Drive in the Village of Arlington Heights and would remove 48 structures from the 100-year inundation area. BUCR-4 is recommended because it will remove all of the identified structures from the 100-year inundation area along Buffalo Creek Tributary A. Table 3.3.18 compares the peak modeled water surface elevation and flow for Alternative BUCR-4.

TABLE 3.3.18
Buffalo Creek Existing and Alternative Condition BUCR-4 Flow and WSEL Comparison

		Existing Conditions		Alternative BUCR-4	
Location	Station	Max WSEL (ft)	Max Flow (cfs)	Max WSEL (ft)	Max Flow (cfs)
Downstream of Hicks Road	13783.32	735.2	406	734.6	356
Upstream of Rand Road	12165.31	730.8	419	730.7	372
Upstream of Laurel Drive	11032.8	723.6	439	722.5	371
Upstream of Capri Drive	9625.93	721.2	478	719.9	408
Upstream of Baldwin Road	8411.23	718.2	511	717.4	441

BUCR-5. BUCR-5 would include providing 310 A-F of flood storage volume on the east side of Buffalo Creek within the privately owned property located south of Aptakisic Road and east of Buffalo Grove Road in the Village of Wheeling with approximately 4,125 feet of floodwall. This alternative results in a reduction in flood elevations from the project site to the confluence with the Des Plaines River and would remove 106 structures from the 100-year inundation area. BUCR-5 is recommended because of its proximity to the problem areas in the Village of Wheeling and it will remove all of the structures in the inundation area located upstream of Elmhurst Road. Table 3.3.19 compares the peak modeled water surface elevation and flow for Alternative BUCR-5.

TABLE 3.3.19
Buffalo Creek Existing and Alternative Condition BUCR-5 Flow and WSEL Comparison

		Existing Conditions		Alternative BUCR-5	
Location	**Station**	**Max WSEL (ft)**	**Max Flow (cfs)**	**Max WSEL (ft)**	**Max Flow (cfs)**
Upstream of Elmhurst Road	15790.6	653.1	1,808	652.1	1,372
Upstream of McHenry Road	14217.48	651.4	1,838	650.3	1,405
Upstream of Dundee Road	9673.499	643.8	1,265	643.3	1,004
Upstream of Jeffrey Avenue	7162.17	642.5	1,451	642.2	1,197
Downstream of Jeffrey Avenue	6563.224	640.5	1,452	640.1	1,189

BUCR-6. BUCR-6 would include a 100 A-F expansion of the Village of Wheeling Water Tower Reservoir. This alternative results in a reduction in flood elevations from the project site to the confluence with the Des Plaines River and would remove 8 structures from the 100-year inundation area. BUCR-6 is not recommended because it provides a minimal increase in the level of protection to the inundated areas downstream and because of its proximity to the problem areas in the watershed. It does not provide a benefit to the inundated structures located upstream of Elmhurst Road. Table 3.3.20 compares the peak modeled water surface elevation and flow for Alternative BUCR-6.

TABLE 3.3.20
Buffalo Creek Existing and Alternative Condition BUCR-6 Flow and WSEL Comparison

		Existing Conditions		Alternative BUCR-6	
Location	**Station**	**Max WSEL (ft)**	**Max Flow (cfs)**	**Max WSEL (ft)**	**Max Flow (cfs)**
Upstream of Dundee Road	9673.499	643.8	1,265	643.6	1,150
Upstream of Jeffrey Avenue	7162.17	642.5	1,451	642.4	1,331
Downstream of Jeffrey Avenue	6563.224	640.5	1,452	640.3	1,332

BUCR-7. BUCR-7 would include providing 90 A-F of storage in three reservoirs along Buffalo Creek south of Jeffrey Avenue. This alternative results in a reduction in flood elevations upstream to Jeffrey Avenue to the confluence with the Des Plaines River. No structures are removed from the 100-year inundation area by this alternative. BUCR-7 is not recommended because it does not remove any structures from the 100-year inundation area.

Table 3.3.21 compares the peak modeled water surface elevation and flow for Alternative BUCR-7.

TABLE 3.3.21
Buffalo Creek Existing and Alternative Condition BUCR-7 Flow and WSEL Comparison

		Existing Conditions		Alternative BUCR-7	
Location	**Station**	**Max WSEL (ft)**	**Max Flow (cfs)**	**Max WSEL (ft)**	**Max Flow (cfs)**
Upstream of Jeffrey Avenue	7162.17	642.5	1,451	642.5	1,446
Downstream of Jeffrey Avenue	6563.224	640.5	1,452	640.1	1,447

BUCR-8. BUCR-8 would include providing 320 A-F of flood storage volume in three reservoirs along the William Rogers Memorial Diversion Channel. This alternative results in a reduction in flood elevations from the project site to the confluence with the Des Plaines River and would remove 8 structures from the 100-year inundation area. BUCR-9 is not recommended because it provides a minimal benefit to the structures downstream and does not address any problem areas west of the Metra/Wisconsin Central railroad. Table 3.3.22 compares the peak modeled water surface elevation and flow for Alternative BUCR-8.

TABLE 3.3.22
Buffalo Creek Existing and Alternative Condition BUCR-8 Flow and WSEL Comparison

		Existing Conditions		Alternative BUCR-8	
Location	**Station**	**Max WSEL (ft)**	**Max Flow (cfs)**	**Max WSEL (ft)**	**Max Flow (cfs)**
Upstream of Dundee Road	9673.499	643.8	1,265	643.4	1,051
Upstream of Jeffrey Avenue	7162.17	642.5	1,451	642.3	1,232
Downstream of Jeffrey Avenue	6563.224	640.5	1,452	640.1	1,233

BUCR-9. BUCR-9 would include providing 255 A-F of flood storage volume on non-developed private property in the Village of Wheeling. Channel improvements are also proposed along the north side of the Arlington Club Subdivision. This alternative results in a reduction in flood elevations from the project site to the confluence with the Des Plaines River and would remove 94 structures from the 100-year inundation area. BUCR-9 is not recommended because it does not address all of the flooded structures located between Aptakisic Road and Elmhurst Road. Table 3.3.23 compares the peak modeled water surface elevation and flow for Alternative BUCR-9.

TABLE 3.3.23
Buffalo Creek Existing and Alternative Condition BUCR-9 Flow and WSEL Comparison

		Existing Conditions		Alternative BUCR-9	
Location	Station	Max WSEL (ft)	Max Flow (cfs)	Max WSEL (ft)	Max Flow (cfs)
Upstream of Elmhurst Road	15790.6	653.1	1,808	652.1	1,373
Upstream of McHenry Road	14217.48	651.4	1,838	650.3	1,405
Upstream of Dundee Road	9673.499	643.8	1,265	643.3	1,005
Upstream of Jeffrey Avenue	7162.17	642.5	1,451	642.2	1,200
Downstream of Jeffrey Avenue	6563.224	640.5	1,452	640.1	1,194

3.3.3.6 Data Required for Countywide Prioritization of Watershed Projects

Appendix I presents conceptual level cost estimates for the recommended alternatives. Table 3.3.10 lists alternatives analyzed in detail as part of the DWP development.

The recommended alternatives for Buffalo Creek are BUCR-1B, BUCR-4 and BUCR-5. When compared to the benefits of Alternative BUCR-1B, the costs associated with the proposed improvements are relatively small. This alternative is recommended based on the computed B/C ratio of 1.3, as shown in Table 3.3.24. Alternative BUCR-4 is also recommended based on its B/C ratio of 0.7. Although the B/C ratio is less than 1.0, this project removes all structures within the Village of Palatine from the 100-year inundation area and provides a lower water surface elevation through a portion of Arlington Heights. Alternative BUCR-5 would block the southern overflow from Buffalo Creek between Aptakisic Road and Elmhurst Road. This alternative is recommended based on the number of residences to the south that would be benefited in significant storm events.

Figures 3.3.6 through 3.3.18 show the locations and a summary of the proposed and recommended alternatives described in Table 3.3.24. Figures 3.3.7 through 3.3.18 also show comparisons of the existing condition and alternative condition inundation areas.

TABLE 3.3.24
Buffalo Creek Project Alternative Matrix to Support District CIP Prioritization

Alternative ID	Description	B/C Ratio	Net Benefits ($)	Total Project Cost ($)	Cumulative Structures Protected	Roadways Protected	Water Quality Benefit	Recom-mended	Communities Involved
BUCR-1A	Floodwall, Channel Improvements, and Culvert Modification	0.1	1,147,163	10,750,201	10	0	Slightly Positive	N	Buffalo Grove, Wheeling
BUCR-1B	Channel Improvements and Culvert Modification	1.3	808,186	613,435	10	0	Slightly Positive	Y	Buffalo Grove, Wheeling
BUCR-2A	310 A-F Reservoir	0.04	1,778,274	47,711,974	94	0	Positive	N	Wheeling
BUCR-2B	300 A-F Reservoir	0.04	1,724,056	40,815,895	94	0	Positive	N	Wheeling
BUCR-2C	300 A-F Reservoir	0.04	1,747,756	47,971,982	94	0	Positive	N	Wheeling
BUCR-2D	305 A-F Reservoir	0.04	1,747,756	49,603,841	94	0	Positive	N	Wheeling
BUCR-3	Reservoir Expansion	0.03	1,962,520	62,642,321	116	0	Positive	N	Unincorporated Lake County
BUCR-4	Channel Improvements and Mitigation Storage	0.7	5,671,193	8,544,202	48	0	Positive	Y	Palatine, Palatine Township
BUCR-5	310 A-F Reservoir and Floodwall	0.03	1,925,650	61,687,084	106	0	Positive	Y	Wheeling
BUCR-6	Reservoir Expansion	0.08	785,113	9,897,117	8	0	Positive	N	Wheeling
BUCR-7	Reservoir and Channel Improvements	0.07	827,772	11,163,497	0	0	Positive	N	Wheeling
BUCR-8	Reservoir, Channel Improvements, and Diversion Channel Modification	0.02	907,186	45,505,319	8	0	Positive	N	Wheeling
BUCR-9	255 A-F Reservoir and Channel Improvements	0.06	1,760,381	30,146,042	94	0	Positive	N	Wheeling

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3.4 Chicago Sanitary and Ship Canal

The Chicago Sanitary and Ship Canal links the South Branch of the Chicago River to the Des Plaines River downstream of the Lockport Lock and Dam in Lockport, Illinois. The reach of the Chicago Sanitary and Ship Canal included in this study is located approximately west of Harlem Avenue continuing southwest to the Will County border and flows parallel to the Des Plaines River on the south side.

The Chicago Sanitary and Ship Canal is part of the CAWS, which is a 76-mile network of man-made canals that is artificially controlled by the District and primarily serves to drain the Chicago metropolitan area and provide water based commercial transportation. There are three intake controls on the CAWS at the lakefront and a single outlet at Lockport. In dry weather, the CAWS is maintained at a water level prescribed by the Code of Federal Regulations. In wet weather, the CAWS is a critical element along with local sewer collection systems, and the District's intercepting sewer network, water reclamation plants, and tunnels to remove excess stormwater from the area. On occasion, it is necessary to discharge excess floodwater to Lake Michigan at one or more of the three lakefront control locations, to avoid extensive flood damage in the City of Chicago and several suburbs. Excessive floodwater is infrequently discharged to the lake through sluice gates or, when necessary, with the cooperation of the USACE, through the navigation lock channel. Because the Chicago Sanitary and Ship Canal discharges into the Des Plaines River downstream at Lockport, the control of the Chicago Sanitary and Ship Canal does not have a direct impact on floodwater stage in the Des Plaines River within the DWP study area.

3.4.1 Sources of Data

3.4.1.1 Previous Studies

The best available hydrologic and hydraulic study information for the Chicago Sanitary and Ship Canal are recently updated models from the USACE. These models were obtained from the USACE.

3.4.1.2 Water Quality Data

Water quality for the Chicago Sanitary and Ship Canal is monitored by the District. The District is responsible for monitoring the water quality of the streams and canals within its jurisdiction and has three water quality monitoring stations on Chicago Sanitary and Ship Canal from Harlem Avenue to the Cook-Will County line as listed in Table 3.4.1. Annual water quality summaries have been published by the District from 1974 through the present for Chicago Sanitary and Ship Canal.

TABLE 3.4.1

MWRD Water Quality Monitoring Stations in the Chicago Sanitary and Ship Canal Subwatershed

Station ID	Waterbody	Location	Station Start Date
WW_41	Chicago Sanitary and Ship Canal	Harlem Avenue	1970
WW_42	Chicago Sanitary and Ship Canal	IL State Route 83	1970
WW_48	Chicago Sanitary and Ship Canal	Stephen Street	1975

The IEPA monitors water quality data at two locations in the DWP study area for the Chicago Sanitary and Ship Canal Subwatershed. Table 3.4.2 provides the locations of the water quality monitoring station.

TABLE 3.4.2

IEPA Water Quality Monitoring Stations in the Chicago Sanitary and Ship Canal Subwatershed

Station ID	Waterbody	Location	Station Start Date
GI-02	Chicago Sanitary and Ship Canal	Lockport	1970

IEPA's 2010 *Integrated Water Quality Report*, which includes the CWA 303(d) and 305(b) lists, lists three segments within the DWP study area of the Chicago Sanitary and Ship Canal subwatershed as impaired. Segment GI-02 extends into Will County. Table 3.4.3 lists the 303(d) listed impairments.

TABLE 3.4.3

IEPA Use Support Categorization and 303(d) Impairments in the Chicago Sanitary and Ship Canal Subwatershed

IEPA Segment ID	Waterbody	Impaired Designated Use	Potential Cause	Potential Source
GI-02	Chicago Sanitary and Ship Canal	Fish Consumption	Polychlorinated biphenyls	Cause Unknown
		Indigenous Aquatic Life	Iron, Oil and Grease, Phosphorus (Total)	Source Discharge, Combined Sewer Overflow
GI-03	Chicago Sanitary and Ship Canal	Fish Consumption	Mercury, Polychlorinated biphenyls	Cause Unknown
		Indigenous Aquatic Life	Ammonia (Un-ionized), Phosphorus (Total)	Municipal Point Sources
GI-06	Chicago Sanitary and Ship Canal	Fish Consumption	Polychlorinated biphenyls	Cause Unknown
		Indigenous Aquatic Life	Phosphorus (Total)	Municipal Point Sources

NPDES point source discharges within the Chicago Sanitary and Ship Canal Subwatershed are listed in Table 3.4.4. In addition to the point source discharges listed, municipalities discharging to the Chicago Sanitary and Ship Canal Subwatershed are regulated by IEPA's NPDES Phase II Stormwater Permit Program, which was created to improve the water quality of stormwater runoff from urban areas, and requires that municipalities obtain permits for discharging stormwater and implement the six minimum control measures for limiting runoff pollution to receiving systems.

TABLE 3.4.4
Point Source Discharges in the Chicago Sanitary and Ship Canal Subwatershed

Name	NPDES	Community	Receiving Waterway
UOP McCook-Riverside Facility	IL0001694	McCook	Chicago Sanitary & Ship Canal
Electro-Motive Diesel, Inc.	IL0001813	LaGrange	Chicago Sanitary & Ship Canal
Cook Composite Andpolymers	IL0002399	Lemont	Chicago Sanitary & Ship Canal
IMTT-Lemont	IL0005126	Lemont	Chicago Sanitary & Ship Canal
K.A. Steel Chemicals, Inc.	IL0022934	Lemont	Chicago Sanitary & Ship Canal
MWRDGC Lemont WRP	IL0028070	Lemont	Chicago Sanitary & Ship Canal
R.P. Donohoe Company	IL0032042	Lemont	Chicago Sanitary & Ship Canal
Illinois-American Water Company	IL0032760	Lemont	Chicago Sanitary & Ship Canal
Lemont, Village of	IL0039551	Lemont	Chicago Sanitary & Ship Canal
Corn Products Internatl-Argo	IL0041009	Bedford Park	Chicago Sanitary & Ship Canal
Bodie Hoover Petroleum Corporation	IL0061182	Lemont	Chicago Sanitary & Ship Canal
Rowell Chemical Corporation	IL0066613	Willow Springs	Chicago Sanitary & Ship Canal
Heritage Environmental Service	IL0068888	Lemont	Chicago Sanitary & Ship Canal
Golden Grain Co-Bridgeview	IL0073342	Bridgeview	Chicago Sanitary & Ship Canal
Hexion Specialty Chemicals, Inc.	IL0075205	Bedford Park	Chicago Sanitary and Ship Canal

Note: NPDES facilities were identified from the IEPA website at http://www.epa.state.il.us/water/permits/waste-water/npdes-statewide.pdf, and from the USEPA website at http://www.epa.gov/r5water/weca/pcs.htm.

3.4.1.3 Wetland and Riparian Areas

Figures 2.3.6 and 2.3.7 contain mapping of wetland and riparian areas in the Lower Des Plaines River Watershed. Wetland areas were identified using NWI mapping. While the Chicago Sanitary and Ship Canal is a man-made, concrete walled channel, the NWI data includes roughly 460 acres of wetland areas within the Chicago Sanitary and Ship Canal inundation boundary (as the subwatershed boundary was not defined for this study). Of the 460 acres of wetland areas shown using the NWI mapping, approximately 442 acres is considered Perennial Deepwater River or Open Water Wetland.

3.4.1.4 Floodplain Mapping

The Chicago Sanitary and Ship Canal is mapped on the DFIRM mapping update as Zone A floodplain across the length of the reach included in this study. Appendix A includes a comparison of FEMA's effective floodplain mapping from updated DFIRM panels with inundation areas developed for the DWP.

3.4.1.5 Stormwater Problem Data

Starting in the 3rd quarter of 2007, communities, agencies (e.g., IDOT, CCHD), and stakeholders submitted Form B questionnaire response data to the District summarizing known stormwater problems within their jurisdictions. The questionnaires were requested again by the District following the September 2008 storm event. There were no reported problem areas for Chicago Sanitary and Ship Canal.

3.4.1.6 Near Term Planned Projects

No near-term planned major flood control projects to be constructed by others were identified for Chicago Sanitary and Ship Canal.

3.4.2 Watershed Analysis

3.4.2.1 Hydrologic Model Development

The hydrologic model for the reach of the Chicago Sanitary and Ship Canal included in the study was developed by the USACE. The hydrologic model is the continuous period HSPF.

3.4.2.2 Hydraulic Model Development

The hydraulic model for the reach of the Chicago Sanitary and Ship Canal included in the study was developed by the USACE. The unsteady flow HEC-RAS was used for the Chicago Sanitary and Ship Canal.

3.4.2.3 Existing Conditions Evaluation

Flood Inundation Areas. Figure 3.1.3 shows inundation areas in the Chicago Sanitary and Ship Canal mapped 2003 Cook County LiDAR topographic data developed by Cook County. The water surface profile mapped is the results of the 100-year USACE hydraulic analysis.

Hydraulic Profiles. Appendix H contains existing conditions hydraulic profiles for the reach of the Chicago Sanitary and Ship Canal included in this study. Profiles are shown for the 20-, 50-, 100-, and 500-year recurrence interval design storms.

3.4.3 Development and Evaluation of Alternatives

3.4.3.1 Problem Definition

There were no problem areas identified for the Chicago Sanitary and Ship Canal.

3.5 Crystal Creek

The Crystal Creek Subwatershed includes the southeast portion of the O'Hare and portions of the City of Chicago, the Village of Franklin Park, and the Village of Schiller Park within Cook County. Four major tributaries discharge into Crystal Creek, making up a 6.19 square mile area. Crystal Creek Tributary, Industrial Tributary, Motel Tributary, and Sexton Ditch all flow into Crystal Creek. The watershed contains 1 flood control reservoir: the South Detention Basin located within O'Hare.

TABLE 3.5.1
Communities Draining to Crystal Creek

Community	Tributary Area (mi^2)
Bensenville	0.01
Schiller Park	1.68
Chicago	3.93
Franklin Park	0.52
Rosemont	0.03
Unincorporated	0.02
TOTAL	6.19

Within O'Hare, the Crystal Creek Subwatershed drains to the South Detention Basin. Because runoff within the airport can be contaminated with deicing chemicals, the South Detention Basin is dewatered by a pump station. The 15 cfs pump station's 24-inch force main extends eastward to a District (TARP) drop shaft located along the Des Plaines River. The tunnel conveys the flow southward to the Mainstream pumping station which pumps it to the District's Stickney Water Reclamation Plant for treatment. The design detention volume for the South Detention Basin was based on 45 years of historical rainfall at O'Hare and was designed to eliminate the overtopping into Crystal Creek that could occur from the effect of multiple storms during an extended time period. The hydrologic modeling for the Crystal Creek Subwatershed reflects the runoff from O'Hare not entering Crystal Creek under the simulated design storm events. The South Detention Basin has sufficient storage to entirely store the tributary stormwater volume up to and including the 100-year design storm event. Therefore, the actual tributary contributing watershed size is reduced to 2.59 square miles.

TABLE 3.5.2
Land Use Distribution for Crystal Creek within Cook County

Land Use Category	Area (acres)	%
Residential	504	12.7
Commercial/Industrial	403	10.2
Forest/Open Land	42	1.1
Institutional	85	2.1
Transportation/Utility	2684	67.8
Water/Wetland	241	6.1
Agricultural	0	0

Source: Chicago Metropolitan Agency for Planning's 2005 Land Use Inventory for Cook, DuPage, Kane, Kendall, Lake, McHenry and Will Counties, Illinois. Version 1.0. Published January 2009

Figure 3.5.1 shows the areas directly tributary to Crystal Creek. Table 3.5.1 lists the communities located in areas directly tributary to the Crystal Creek Subwatershed. Areas directly tributary to Crystal Creek are drained by storm sewer systems. Reported stormwater problem areas, flood inundation areas, and proposed alternative projects are also shown and discussed in the following subsections.

Table 3.5.2 lists the land use breakdown by area within the Crystal Creek Subwatershed.

3.5.1 Sources of Data

3.5.1.1 Previous Studies

The Illinois IDNR-OWR prepared a HEC-1 hydrologic model and HEC-2 hydraulic model for the Crystal Creek Flood Control Project which was used as the background information for this study. All 4 phases (Phase I, II, IIA, and IIB) of the Crystal Creek Flood Control Project were considered as existing conditions for the District analysis and are described in Section 3.5.1.6.

3.5.1.2 Water Quality Data

There are no District or IEPA water quality monitoring stations in the Crystal Creek Subwatershed. The IEPA's 2010 *Integrated Water Quality Report*, which includes the CWA 303(d) and 305(b) lists, lists no impaired waterways within the subwatershed. While included in the watershed area for the *Des Plaines River/Higgins Creek Watershed TMDL Stage 1 Report*, March 2009, no TMDLs have been investigated for Crystal Creek or its tributaries.

According to the water permit discharge data provided by the USEPA and IEPA, there are no NPDES permits issued by IEPA for discharges to Crystal Creek. Municipalities discharging to Crystal Creek are regulated by IEPA's NPDES Phase II Stormwater Permit Program, which was instituted to improve water quality by requiring that municipalities develop six minimum measure controls for limiting runoff pollution to receiving systems**.**

3.5.1.3 Wetland and Riparian Areas

Figures 2.3.6 and 2.3.7 contain mapping of wetland and riparian areas in the Lower Des Plaines River Watershed. Wetland areas were identified using NWI mapping. NWI data includes roughly 177 acres of wetland areas in the Crystal Creek watershed. Riparian areas are defined as vegetated areas between aquatic and upland ecosystems adjacent to a waterway or body of water that provides flood management, habitat, and water quality enhancement. Identified riparian environments offer potential opportunities for restoration.

3.5.1.4 Floodplain Mapping

Flood inundation areas supporting the NFIP were revised in 2008 as a part of FEMA's Map Modernization Program. Floodplain boundaries were revised based upon updated Cook County topographic information; however, the effective models, which are used to estimate flood levels, were generally not updated. LOMRs were incorporated into revised floodplain areas. Crystal Creek is mapped in detail in the DFIRM mapping update, with Zone AE floodplain shown across the length of Crystal Creek. The original hydrologic and hydraulic analyses were performed in 1977 for the FIS which was superseded by the November 6, 2000 FIS for Cook County. The hydrologic analysis was performed using the HEC-1 hydrologic model and the hydraulic analysis was performed using HEC-2 hydraulic model. Appendix A includes a comparison of FEMA's effective floodplain mapping from updated DFIRM panels with inundation areas developed for the DWP.

3.5.1.5 Stormwater Problem Data

Starting in the 3rd quarter of 2007, communities, agencies (e.g., IDOT, CCHD), and stakeholders submitted Form B questionnaire response data to the District summarizing known stormwater problems within their jurisdictions. The questionnaires were requested again by the District following the September 2008 storm event. Table 3.5.3 summarizes reported problem areas reviewed as a part of the DWP development. Problems are classified in Table 3.5.3 as regional or local. This classification is based on a process described in Section 1 of this report. The Problem Area ID naming convention was found in Technical Memorandum entitled, "Proposed Naming Conventions for Database Elements" dated August 3, 2007.

TABLE 3.5.3
Community Response Data for Crystal Creek

Problem Area ID[1]	Municipality	Problems as Reported by Local Agency	Location	Problem Description	Local/ Regional	Resolution in DWP
CYCR-SP-FL-01[1]	Schiller Park	Pavement Flooding	Lawrence Avenue at Soo Line Railroad	IDOT reported pavement flooding	Local	This is a local problem[2]
CYCR-SP-FL-03[1]	Schiller Park	Pavement Flooding	Lawrence Avenue at 25th Avenue	IDOT reported pavement flooding	Local	This is a local problem.[2]
CYCR-SP-FL-02[1]	Schiller Park	Pavement Flooding	US Route 12/45 at Lawrence Avenue entrance	IDOT reported pavement flooding	Local	This is a local problem.[2]
CYTR-FP-FL-01[2]	Franklin Park	Pavement Flooding	US Route 12/45 at I-294 entrance	IDOT reported pavement flooding	Local	This is a local problem.[2]

[1] All Problem Area IDs begin with DP- as they are in the Des Plaines River Watershed.
[2] Problem does not meet regional definition (refer to chapter 1). Solutions for the local problems are not addressed in the DWP.

3.5.1.6 Near Term Planned Projects

Flood control projects have been proposed for Crystal Creek, Crystal Creek Tributary, and Sexton Ditch as part of the IDNR-OWR Crystal Creek Flood Control Project. Phase I (the replacement and upsizing of the culvert along Lawrence Avenue) and Phase II (the replacement and upsizing of the Soo Line Railroad Yard culverts) of the Crystal Creek Flood Control Project were completed by 2006. Phase IIA (replacement and upsizing of street culverts between Soo Line Railroad Yard and upstream of Irving Park Road, including elevating many pedestrian bridges, channel clearing and modification) is under construction in 2010. Phase IIB (channel clearing and modification along Crystal Creek Tributary near Sexton Ditch and addition of culverts along Sexton Ditch) is projected to start in 2012 and was considered as existing condition for the District's analysis.

3.5.2 Watershed Analysis

3.5.2.1 Hydrologic Model Development

Subbasin Delineation. The Crystal Creek tributary area was delineated based upon 2003 Cook County LiDAR topographic data developed by Cook County. There are 12 subbasins ranging in size from 0.08 to 3.6 square miles with a total drainage area of 6.19 square miles.

Hydrologic Parameter Calculations. CN values were estimated for each subbasin based upon NRCS soil data and 2001 CMAP land use data. This method is further described in Section 1.3.2, with lookup values for specific combinations of land use and soil data presented in Appendix C. An area-weighted average of the CN was generated for each subbasin.

Clark's unit hydrograph parameters were estimated using the method described in Section 1.3.2. Appendix G provides a summary of the hydrologic parameters used for subbasins in each subwatershed.

3.5.2.2 Hydraulic Model Development

Field Data, Investigation, and Existing Model Data. The FEMA effective hydraulic model was developed by NRCS in the mid 1977 using HEC-2 and was revised in 2000 by the IDNR-OWR for the Countywide FIS. Crystal Creek, Crystal Creek Tributary, Motel Tributary, Industrial Tributary and Sexton Ditch were all included in the revisions. This information was only used as background information as the existing conditions modeling updated for this analysis was associated with the IDNR-OWR Crystal Creek Flood Control Project. Information from the IDNR-OWR model was converted from NGVD 1929 to NAVD 1988 for use in this study.

A field reconnaissance was conducted in early 2009. Information was compiled on stream crossings, land use, and channel conditions. The collected hydraulic structure dimensions were compared to bridge/culvert dimensions data in the IDNR-OWR HEC-2 hydraulic model. To supplement the information in the IDNR-OWR HEC-2 hydrologic model, culvert crossings were surveyed by D.B. Sterlin Inc. in early 2010.

Boundary Conditions. The downstream boundary condition for the Crystal Creek Subwatershed is the 5-year water surface elevation for the Des Plaines River at its confluence with Crystal Creek.

3.5.2.3 Calibration and Verification

No stream flow gages are located within the watershed and no HWM were available for calibration purposes. Based on the large storage area within O'Hare that diverts approximately 60% of the total watershed area away from Crystal Creek, it was determined that a CUH storage coefficient (R) calibration would not be performed for this watershed.

3.5.2.4 Existing Conditions Evaluation

Flood Inundation Areas. Figure 3.5.1 shows inundation areas in the Crystal Creek Subwatershed produced by the DWP's hydraulic model for the 100-year, 12-hour critical duration design storm.

Hydraulic Profiles. Appendix H contains existing conditions hydraulic profiles for Crystal Creek and its tributaries. Profiles are shown for the 2-, 5-, 10-, 25-, 50-, 100-, and 500-year recurrence interval design storms.

3.5.3 Development and Evaluation of Alternatives

3.5.3.1 Problem Definition

Hydraulic model results were reviewed with inundation mapping to identify locations where property damage due to flooding is predicted. Table 3.5.4 summarizes problem areas identified through hydraulic modeling of Crystal Creek.

TABLE 3.5.4
Modeled Problem Definition for Crystal Creek

Problem Area ID[1, 2]	Location	Recurrence Interval (yr) of Flooding	Associated Form B	Resolution in DWP	No. of Structures Flooded
CYCR-SP-FR-03	Village of Schiller Park	25, 50, 100, 500	N	CYCR-1, CYCR-4	69
CYMT-SP-FR-01	Belle Plaine Road - Village of Schiller Park	25, 50, 100, 500	N	CYCR-2	0
SXDT-FP-FR-01	Village of Franklin Park, southwest of Sexton Ditch	50, 100, 500	N	CYCR-3, CYCR-4	33

[1] All Problem Area IDs begin with DP- as they are in the Des Plaines River Watershed.
[2] Problem areas verified by local communities.

3.5.3.2 Damage Assessment

Economic damages were defined following the protocol defined in Chapter 6.6 of the CCSMP. Recreation damages due to flooding are not being identified as part of the DWP. No erosion damages due to flooding were identified for Crystal Creek. Transportation damages were estimated as 15 percent of property damages plus additional site specific traffic damages computed for Belle Plaine Avenue along Motel Tributary. Table 3.5.5 lists the damage assessment for existing conditions.

TABLE 3.5.5
Estimated Average Annual Damages for Crystal Creek

Damage Category	Estimated Damage ($)	Description
Property	55,745	Includes residential and non-residential structure and contents damage
Erosion	0	No critical erosion damages were identified
Transportation	9,775	Assumed as 15% of property damage plus regional transportation damages

3.5.3.3 Technology Screening

Flood control technologies were screened to identify those most appropriate for addressing the flooding problems in the subwatershed. Increased conveyance or storage was identified as the principal technologies applicable for addressing stormwater problems in Crystal Creek. The feasibility of the technologies defined in Chapter 6.6 of the CCSMP are summarized for each alternative in Table 3.5.6.

TABLE 3.5.6
Technology Screening for Crystal Creek

Technology	Feasibility for CYCR-SP-FR-03 (Schiller Park from Irving Park Road to Soo Line Railroad Tracks)
Storage Facility	Feasible - Open space is available west of I-294 and east of Mannheim Road along Crystal Creek. Additional area is available for channel widening upstream of Soo Line Railroad Tracks
Conveyance Improvement – Culvert/Bridge Replacement	Not Feasible - culverts/bridges not a source of flood problem
Conveyance Improvement – Channel Improvement	Not Feasible
Conveyance Improvement – Diversion	Not Feasible
Flood Barriers, Levees/Floodwalls	Not Feasible - space issues due to adjacent structures proximity to creek, property buy-outs required
Technology	**Feasibility** for CYMT-SP-FR-01 **(Belle Plaine Avenue crossing of Motel Tributary)**
Storage Facility	Not Feasible
Conveyance Improvement – Culvert/Bridge Replacement	Feasible – Existing culvert enlargement at Belle Plaine Avenue
Conveyance Improvement – Channel Improvement	Not Feasible
Conveyance Improvement - Diversion	Not Feasible
Flood Barriers, Levees/Floodwalls	Not Feasible

Technology	Feasibility for SXDT-FP-FR-01(Floodwall and channel modification)
Storage Facility	Feasible – Open space is available west of I-294 and east of Mannheim Road along Crystal Creek
Conveyance Improvement – Culvert/Bridge Replacement	Not Feasible - culverts/bridges not a source of flood problem
Conveyance Improvement – Channel Improvement	Not Feasible – Channel improvements will not help the source of the problem
Conveyance Improvement – Diversion	Feasible – Diversion to proposed storage facility west of I-294 and east of Mannheim Road
Flood Barriers, Levees/Floodwalls	Feasible – Floodwall constructed along Sexton Ditch north of Panoramic Drive and west of Dora Street

3.5.3.4 Alternative Development

Flood Control Alternatives. Alternative solutions to regional flooding and streambank erosion were developed and evaluated consistent with the methodology described in Section 1.4 of this report. Table 3.5.7 summarizes flood control alternatives for the Crystal Creek Watershed.

TABLE 3.5.7
Flood Control Alternatives for Crystal Creek

Alternative	Addressed Problem Area IDs	Location	Description
CYCR-1	CYCR-SP-FR-03	Schiller Park	*Storage*: Excavate a storage facility (20 A-F) north of Crystal Creek west of I-294 and upstream of the Soo Line Railroad Culvert (4 A-F).
CYCR-2	CYMT-SP-FR-01	Schiller Park	*Conveyance and Road Raise*: Replace Belle Plaine Avenue culvert (34” x 27” Elliptical Pipe) to a 4’H x 7’ W RCBC and raise profile of roadway to 640.1 feet. Provides 0.5 feet of freeboard above Motel Tributary 100-year flood elevation.

TABLE 3.5.7
Flood Control Alternatives for Crystal Creek

Alternative	Addressed Problem Area IDs	Location	Description
CYCR-3	SXDT-FP-FR-01 CYCR-SP-FR-03	Franklin Park	*Floodwall*: Construct a 1,620 feet long floodwall north of Panoramic Drive and west Dora Street at an elevation of 644.5 feet. Includes 3-feet of freeboard above Sexton Ditch 100-year flood profile. Pump Station required addressing interior drainage. 20 A-F of mitigation storage volume in storage facility located west of I-294.
CYCR-4	CYCR-SP-FR-03 CYCR-SP-FR-01 SXDT-FP-FR-01	Schiller Park, Franklin Park	*Storage:* Divert flow from Crystal Creek Tributary west under I-294 though 5 - 6' RCP culverts and north under Irving Park Road through 2 – 6'H x 11'W RCBC. 100 A-F storage facility will be constructed west of I-294 Tollway and north of Irving Park Road. Pump station and storm sewer system required to address interior drainage south of Sexton Ditch, along Panoramic Drive.

Stormwater detention and conveyance improvement alternatives were evaluated to address regional flooding problems within the Crystal Creek Subwatershed. An increase in storage is required for each alternative because improvements to the channel would decrease elevations in problem areas, but also increase conveyance and impact downstream water surface elevations. Crystal Creek floods its overbanks along most of the downstream reach through the Village Schiller Park in Cook County. Therefore, regulations and project goals stipulate that flood elevations and flowrates cannot increase on the waterway, and storage volume is required to mitigate for all alternatives.

Alternative CYCR-1 includes construction of two storage facilities at two separate locations along Crystal Creek to provide additional storage volume to the watershed. Excavation in the vacant parcel west of Interstate 294 and east of Mannheim Road would provide an additional 20A-F within the watershed. The second area for excavation is located west of the Soo Line Railroad tracks and will provide an additional 4 A-F of storage within the watershed. Both will drain by gravity. Alternative CYCR-1 does not remove structures from the 100-year inundation area, but it does slightly reduce water surface elevations throughout the area downstream of Irving Park Road and west of the Soo Line Railroad tracks.

Alternative CYCR-2 eliminates the overtopping of Belle Plaine Avenue west of the Interstate 294 Tollway. Belle Plaine Avenue crosses Motel Tributary and provides the only access to O'Hare Oasis service road. Belle Plaine Avenue overtops during the 100-year flood event and when overtopped, access to the oasis from this location is eliminated. Access to the O'Hare Oasis is still available from Interstate 294 Tollway. Alternative CYCR-2 does not reduce flood elevations to any tributary within the Crystal Creek Subwatershed. The purpose of this alternative is to eliminate the overtopping of Belle Plaine Road.

Alternative CYCR-3 uses both a floodwall and excavation of the channel banks to reduce or eliminate the inundation of homes located along Sexton Ditch. The proposed 1,620 foot long floodwall is located along Panoramic Drive and Dora Street in the Village of Franklin Park. This would be constructed at an elevation of 644.5 feet providing 3 feet of freeboard above the 100-year flood profile of Sexton Ditch. Flood mitigation storage of 20 A-F would be provided west of the Interstate 294 Tollway and east of Mannheim Road. The floodwall will have an average height of 4.5 feet. A pump station and storm sewer will be required to handle the interior drainage.

Alternative CYCR-4 is a combination of increasing conveyance within Crystal Creek Tributary and providing additional storage within the watershed. Crystal Creek Tributary would be diverted west under the Interstate 294 Tollway downstream of Berteau Avenue. Flow would then be diverted north under Irving Park Road to the proposed 100 A-F storage facility located north of Irving Park Road and east of Mannheim Road. Alternative CYCR-4 results in a reduction to the water surface elevation along Sexton Ditch and also Crystal Creek downstream of Scott Street.

Erosion Control Alternatives. No regional erosion problems were reported within the Crystal Creek Subwatershed; therefore, no erosion control alternatives were evaluated.

3.5.3.5 Alternative Evaluation and Selection

Alternatives listed in Table 3.5.7 were evaluated to determine their effectiveness and to produce data for the countywide prioritization of watershed projects. Flood control alternatives were modeled to evaluate their impact on water surface elevations and flood damages. Table 3.5.12 provides a summary of B/C ratio, net benefits, total project costs, number of structures protected, and other relevant alternative data.

CYCR-1. Alternative CYCR-1 proposed to utilize two open spaces located along Crystal Creek to provide storage to the watershed. One stormwater storage facility would be located west of the Interstate 294 Tollway on an existing wooded site. Approximately 20 A-F of storage would be excavated on the north of the channel. Another stormwater storage facility is proposed upstream of the Soo Line Railroad Tracks adjacent to Crystal Creek. Similar to the first location, the northern overbank area will be excavated to provide an additional 4 A-F of storage. Excavation at both locations will be kept to a minimum, only removing the area located below the base flood elevation and meeting the existing grade at 4:1 side slope above the floodplain elevation. This alternative will minimize the excavation of haul away of removed material. CYCR-1 produced minimal benefits downstream of Interstate 294 and upstream of the Soo Line Railroad because of the minimal reduction in flood elevations.

TABLE 3.5.8
Crystal Creek Existing and Alternative Condition CYCR-1 Flow and WSEL Comparison

Location	Station	Existing Conditions		Alternative CYCR-1	
		Max WSEL (ft)	Max Flow (cfs)	Max WSEL (ft)	Max Flow (cfs)
Upstream of Soo Line Railroad	5897	634.9	694	634.8	684
Upstream of Scott Street	6322	635.4	668	635.2	660
Upstream of Montrose Avenue	7393	636.1	624	636.1	624
Upstream of Scott Avenue	8245	637.1	601	637.1	593

CYCR-2. Replacing the Belle Plaine Avenue culvert and increasing the profile of the road will address the overtopping of Belle Plaine Avenue during the 100-year storm event. A 4-feet high by 7-feet wide RCBC is proposed to convey Motel Tributary north under Belle Plaine Avenue. Increasing the roadway profile to 640.1 feet will meet the District freeboard requirements of 0.5 feet above the 100-year flood profile. This alternative will not result in a change to the flood profile of Motel Tributary. While this alternative is not recommended, alternative CYCR-4 would address emergency vehicle access to the O'Hare Oasis during the 100-year storm event.

TABLE 3.5.9
Motel Tributary Existing and Alternative Condition CYCR-2 Flow and WSEL Comparison

Location	Station	Existing Conditions		Alternative CYCR-2[1]	
		Max WSEL (ft)	Max Flow (cfs)	Max WSEL (ft)	Max Flow (cfs)
Downstream of Belle Plaine Avenue	115	639.5	60	639.5	60
Upstream of Belle Plaine Avenue	198	639.6	60	639.5	60

CYCR-3. Alternative CYCR-3 includes the construction of a floodwall along Panoramic Drive and Dora Street and a 20 A-F stormwater storage facility between Mannheim Road and the Interstate 294 Tollway. The floodwall will be approximately 1,620 feet long at an elevation of 644.5 feet. The average height of the floodwall will be approximately 4.5 feet which provides 3 feet of freeboard above the 100-year flood profile of Sexton Ditch. A back-flow preventer is proposed to keep water from entering the subdivision south of Panoramic Drive. Additionally, a pump station is proposed to address internal drainage south of the proposed floodwall. A storm sewer system will be necessary along Panoramic Drive to convey flow west to the pump station. The pump station will then discharge back into Sexton Ditch or Crystal Creek Tributary.

TABLE 3.5.10
Crystal Creek Existing and Alternative Condition CYCR-3 Flow and WSEL Comparison

Location	Station	Existing Conditions Max WSEL (ft)	Existing Conditions Max Flow (cfs)	Alternative CYCR-3 Max WSEL (ft)	Alternative CYCR-3 Max Flow (cfs)
Upstream of Soo Line Railroad	5897	634.9	694	634.9	691
Upstream of 25th Avenue	6322	635.4	668	635.3	666
Upstream of Scott Street	8245	637.1	601	637.1	599
Upstream of Seymour Avenue	3019	640.7	178	640.7	178
At Ivanhoe Avenue[1]	862	641.0	54	641.0	54
At Panoramic Drive and Dora Street [1]	2100	641.2	28.2	641.3	29

[1] Along Sexton Ditch

CYCR-4. Alternative CYCR-4 consists of an increase in conveyance of Crystal Creek Tributary, construction of a storage facility and will require a pump station to address internal drainage issues. CYCR-4 will divert flow from Crystal Creek Tributary, west across the Interstate 294 Tollway through five 6-foot diameters reinforced concrete pipe culverts. Flow will then be conveyed through two – 6'H x 11'W RCBC under Irving Park Road to a 100 A-F stormwater storage facility located west of the Interstate 294 Tollway and east of Mannheim Road. The results of this alternative include decreasing the 100-year water surface profile of Motel Tributary to remove Belle Plaine Avenue as a regional problem area. The upstream reach of Sexton Ditch, near Panoramic Drive, would experience a decrease to the water surface elevation of the ditch; however, a backflow preventer will be required to prevent flows from Sexton Ditch surcharging the storm sewer system south of Panoramic Drive. Additionally, a pump station and a new storm sewer along Panoramic Drive will be necessary to address interior drainage.

TABLE 3.5.11

Crystal Creek Existing and Alternative Condition CYCR-4 Flow and WSEL Comparison

Location	Station	Existing Conditions		Alternative CYCR-4	
		Max WSEL (ft)	Max Flow (cfs)	Max WSEL (ft)	Max Flow (cfs)
Upstream of Soo Line Railroad	5897	634.9	694	630.8	404
Upstream of 25th Avenue	6322	635.4	668	631.6	376
Upstream of Scott Street	8245	637.1	601	637.8	282
Upstream of Seymour Avenue	3019	640.7	178	639.7	180
At Ivanhoe Avenue[1]	862	641.0	54	639.9	55
At Panoramic Drive and Dora Street[1]	2100	641.2	28	640.4	29
Upstream of Belle Plaine Avenue[2]	198	639.6	60	639.1	54
Upstream of Mannheim Road	10577	637.8	166	637.8	157
Upstream limit of Industrial Tributary	12357	638.5	2	638.4	2

[1] Along Sexton Ditch
[2] Along Motel Tributary

A number of properties are at risk of shallow flooding during the 100-year flood event under existing conditions or recommended alternative conditions. In addition, due to their locations, other properties' risk of flooding cannot be feasibly mitigated by structural measures. Such properties are candidates for protection using nonstructural flood control measures, such as flood-proofing or acquisition. These measures may be considered to address damages that are not fully addressed by capital projects recommended in the Lower Des Plaines River DWP.

3.5.3.6 Data Required for Countywide Prioritization of Watershed Projects

Appendix I presents conceptual level cost estimates for the recommended alternatives. Table 3.5.12 lists alternatives analyzed in detail as part of the DWP development.

The recommended alternative for Crystal Creek is Alternative CYCR-4. CYCR-4 is recommended since it provides the most damage reduction through Schiller Park and Franklin Park. Diverting flow away from the reach of Crystal Creek located downstream of Irving Park Road, to the mouth of Crystal Creek, reduces the water surface elevation downstream of Irving Park Road. CYCR-4 also removes the overtopping of Irving Park Road and reduces the overtopping elevation of Belle Plaine Avenue.

Figures 3.5.2 through 3.5.5 show the locations and a summary of the proposed and recommended alternatives described in Table 3.5.12. Figures 3.5.2 through 3.5.5 also show comparisons of the existing condition and alternative condition inundation areas.

TABLE 3.5.12
Crystal Creek Project Alternative Matrix to Support District CIP Prioritization

Alternative ID	Description	B/C Ratio	Net Benefits ($)	Total Project Cost ($)	Cumulative Structures Protected	Roadways Protected	Water Quality Benefit	Recom-mended	Communities Involved
CYCR-1	Storage along Crystal Creek	0.01	98,760	7,425,208	0	0	Positive	N	Chicago, Schiller Park
CYCR-2	Belle Plaine Avenue Culvert Replacement	<0.01	14	312,085	0	1	No Impact	N	Schiller Park
CYCR-3	Floodwall Along Sex-ton Ditch	0.02	294,025	13,278,911	33	0	No Impact	N	Franklin Park
CYCR-4	Flow Diversion of Crystal Creek Tributary	0.03	1,198,534	42,671,156	94	2	Positive	Y	Franklin Park, Schiller Park, Chicago

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3.6 Mainstem Lower Des Plaines River

The headwaters of the Des Plaines River begin in Racine County, Wisconsin and flow south through Kenosha County, Wisconsin before entering Lake County, Illinois just east of Interstate 94 at the Wisconsin/Illinois state line. The Des Plaines River continues to flow south through Lake County and into Cook County before flowing southwest parallel to the Chicago Sanitary and Ship Canal and entering into Will County. There is roughly 700 square miles of tributary area from Illinois and Wisconsin to the Des Plaines River at the Cook County/Will County border. The Mainstem Lower Des Plaines River (MLDPR) Watershed is defined for the purposes of this study as the portion of the Des Plaines River Watershed located in Cook County north of the Chicago Sanitary and Ship Canal extending north to the Cook County limits at Lake-Cook Road. There are sixteen subwatersheds included in the MLDPR Watershed for which hydrologic and hydraulic modeling was completed independently for Phase B of the Lower Des Plaines River DWP. These subwatersheds are the 67th Street Ditch, Addison Creek, Buffalo Creek, Chicago Sanitary and Ship Canal, Crystal Creek, Des Plaines River Tributary A, East Avenue Ditch, Farmers-Prairie Creek, Feehanville Ditch, Flagg Creek, Golf Course Tributary, McDonald Creek, Salt Creek, Silver Creek, Weller Creek, and Willow Creek Subwatersheds.

TABLE 3.6.1

Communities Draining to the Mainstem Lower Des Plaines River

Community	Tributary Area (mi^2)
Bedford Park	0.11
Bellwood	0.03
Berwyn	0.04
Broadview	0.70
Brookfield	0.48
Buffalo Grove	<0.1
Chicago	6.89
Countryside	1.16
Des Plaines	7.28
Elmwood Park	1.55
Forest Park	2.39
Forest View	<0.1
Franklin Park	1.25
Glenview	1.29
Harwood Heights	1.20
Hodgkins	1.70
Indian head Park	0.01
Justice	0.04
La Grange	<0.1
Lemont	0.11
Lyons	1.99
Maywood	2.61
McCook	0.13
Melrose Park	0.61
Mount Prospect	0.59
Niles	0.27
Norridge	1.25
North Riverside	1.27
Northbrook	1.55
Oak Park	1.12
Park Ridge	6.51
Prospect Heights	1.05
River Forest	2.52
River Grove	2.19
Riverside	1.97
Riverwoods	<0.1
Rosemont	0.76

The portion of the Des Plaines River upstream of the Lake County Border was included in the hydrologic portion of this study but was not studied in detail through hydraulic modeling. All references to MLDPR and the MLDPR Subwatershed from this point forward refer to the areas direct tributary within study area in Cook County, unless otherwise noted.

The MLDPR Subwatershed drains areas within numerous municipalities. There are no flood control reservoirs within the MLDPR Subwatershed; however, multiple flood control projects have been implemented along the MLDPR including Levee 37, Levee 50, McCook Levee and the Groveland Avenue Levee. The MLDPR also receives diversion outflows from control structures within the Addison Creek, Buffalo Creek, Salt Creek, and Weller Creek Subwatersheds.

Figure 3.6.1 shows the areas directly tributary to the MLDPR (but does not include tributary areas in DuPage County or areas north of Lake-Cook Road. Table 3.6.1 lists the communities located in areas directly tributary to the MLSPR Subwatershed. Reported stormwater problem areas, flood inundation areas, and proposed alternative projects are also shown and discussed in the following subsections. Table 3.6.2 lists the land use breakdown by area within the MLDPR Subwatershed.

TABLE 3.6.1 (continued)

Communities Draining to the Mainstem Lower Des Plaines River

Community	Tributary Area (mi^2)
Schiller Park	1.08
Stickney	0.09
Summit	0.35
Unincorporated	11.40
Wheeling	2.94
Willow Springs	1.42
TOTAL	69.9

Note: This list includes community areas located within the direct tributary area to the MLDPR within Cook County and does not include the area tributary to the Summit Conduit. It does not include tributary areas in DuPage County, Lake County, or Will County, Illinois or Kenosha County or Racine County, Wisconsin.

TABLE 3.6.2

Land Use Distribution for the Mainstem Lower Des Plaines River

Land Use Category	Area (acres)	%
Residential	19,988	45
Commercial/Industrial	6,330	14
Forest/Open Land	10,059	22
Institutional	3,644	8
Transportation/Utility	2,396	5
Water/Wetland	2,246	5
Agricultural	56	0

Source: Chicago Metropolitan Agency for Planning's 2005 Land Use Inventory for Cook, DuPage, Kane, Kendall, Lake, McHenry and Will Counties, Illinois. Version 1.0. Published January 2009

3.6.1 Sources of Data

3.6.1.1 Previous Studies

Many studies of the MLDPR Subwatershed have been prepared by various consulting engineers and governmental agencies over the years. The USACE has released studies in 1955, 1966, 1974, 1981, 1990, 1995, 1999, and 2007. The SCS also issued studies in 1976, 1985, and 1987. Portions of the subwatersheds tributary to the MLDPR were also addressed in the Upper Des Plaines River Tributary Watershed Plan prepared by DuPage County which was updated in 2004.

The USACE performed HEC-1 hydrologic and HEC-2 hydraulic analyses of the entire Des Plaines River Watershed. The models were part of the 2007 Des Plaines River Phase I study and included the latest proposed improvements to the Watershed including Levee 37 and Levee 50 projects. The USACE HEC-1 hydrologic model was obtained from the USACE in October 2009 for the 2-, 5-, 10-, 25-, 50-, 100-, and 500-year storm events and includes the portion of the watershed that extends into Lake County, Illinois and Kenosha and Racine Counties in Wisconsin.

The 2008 Cook County FIS states that log-Pearson Type III was utilized to determine the hydrology except for in the area of Wheeling which used HEC-1 and the hydraulic modeling was HEC-2 except for in Brookfield.

3.6.1.2 Water Quality Data

Water quality for the Des Plaines River is monitored by the District or the IEPA The District monitors the water quality of the streams and canals within its jurisdiction, and has seven water quality monitoring stations on of the Des Plaines River within the DWP study area as listed in Table 3.6.3. Annual water quality summaries have been published by the District from 1970 through the present for the Des Plaines River monitoring stations.

TABLE 3.6.3

District Water Quality Monitoring Stations in the Mainstem Lower Des Plaines River Watershed

Station ID	Waterbody	Location	Start Date
WW_13	Des Plaines River	Lake-Cook Road	1970
WW_17	Des Plaines River	Oakton Street, Des Plaines	1970
WW_19	Des Plaines River	Belmont Avenue	1970
WW_20	Des Plaines River	Roosevelt Road	1970
WW_21	Des Plaines River	Near Salt Creek Confluence	1970
WW_22	Des Plaines River	Ogden Avenue	1970
WW_23	Des Plaines River	Willow Springs Road	1970

The IEPA monitors water quality data at two locations in the DWP study area for the Des Plaines River subwatershed. Table 3.6.4 provides the locations of the water quality monitoring station.

TABLE 3.6.4

IEPA Water Quality Monitoring Stations in the Mainstem Lower Des Plaines River Watershed

Station ID	Waterbody	Location
G-22	Des Plaines River	Des Plaines
G-15	Des Plaines River	Schiller Park
G-39	Des Plaines River	Riverside

IEPA's 2010 *Integrated Water Quality Report*, which includes the CWA 303(d) and 305(b) lists, lists three segments within the DWP study area of the Des Plaines River subwatershed as impaired. Table 3.6.5 lists the 303(d) listed impairments. TMDLs have been investigated for the Des Plaines River in the *Des Plaines River/Higgins Creek Watershed TMDL Stage 1 Report*, March 2009. The development of TMDLs is ongoing.

TABLE 3.6.5

IEPA Use Support Categorization and 303(d) Impairments in the Mainstem Lower Des Plaines River Watershed

Station ID	Waterbody	Impaired Designated Use	Potential Cause	Potential Source
IL_G-36	Des Plaines River (upstream of Buffalo Creek confluence)	Aquatic Life	pH, Phosphorus (Total)	Urban Runoff/Storm Sewers, Combined Sewer Overflow, Municipal Point Source Discharge
		Fish Consumption	Mercury, Polychlorinated biphenyls	Cause Unknown
		Primary Contact Recreation	Fecal Coliform	Urban Runoff/Storm Sewers, Combined Sewer Overflow, Municipal Point Source Discharge
IL_G-22	Des Plaines River (upstream of McDonald Creek confluence)	Aquatic Life	Arsenic, Chloride, Methoxychlor, Total Suspended Solids (TSS), Phosphorus (Total)	Urban Runoff/Storm Sewers, Combined Sewer Overflow, Contaminated Sediments, Municipal Point Source Discharge
		Fish Consumption	Mercury, Polychlorinated biphenyls	Cause Unknown
		Primary Contact Recreation	Fecal Coliform	Urban Runoff/Storm Sewers, Combined Sewer Overflow, Municipal Point Source Discharge
IL_G-28	Des Plaines River (near Weller Creek confluence)	Aquatic Life	Chloride, Phosphorus (Total)	Urban Runoff/Storm Sewers, Combined Sewer Overflow, Municipal Point Source Discharge
		Fish Consumption	Mercury, Polychlorinated biphenyls	Cause Unknown

TABLE 3.6.5

IEPA Use Support Categorization and 303(d) Impairments in the Mainstem Lower Des Plaines River Watershed

Station ID	Waterbody	Impaired Designated Use	Potential Cause	Potential Source
		Primary Contact Recreation	Fecal Coliform	Urban Runoff/Storm Sewers, Combined Sewer Overflow, Municipal Point Source Discharge
IL_G-15	Des Plaines River (near Silver Creek confluence)	Aquatic Life	Chloride, Sedimentation/Siltation, Phosphorus (Total)	Urban Runoff/Storm Sewers, Combined Sewer Overflow, Contaminated Sediments, Municipal Point Source Discharge
		Fish Consumption	Mercury, Polychlorinated biphenyls	Cause Unknown
		Primary Contact Recreation	Fecal Coliform	Urban Runoff/Storm Sewers, Combined Sewer Overflow, Municipal Point Source Discharge
IL_G-30	Des Plaines River (downstream of Crystal Creek confluence)	Aquatic Life	Chloride, Total Suspended Solids (TSS), Phosphorus (Total)	Urban Runoff/Storm Sewers, Combined Sewer Overflow, Contaminated Sediments, Municipal Point Source Discharge
		Fish Consumption	Mercury, Polychlorinated biphenyls	Cause Unknown
		Primary Contact Recreation	Fecal Coliform	Urban Runoff/Storm Sewers, Combined Sewer Overflow, Municipal Point Source Discharge
IL_G-32	Des Plaines River (upstream of Salt Creek confluence)	Aquatic Life	Chloride, Phosphorus (Total)	Urban Runoff/Storm Sewers, Combined Sewer Overflow, Municipal Point Source Discharge
		Fish Consumption	Mercury, Polychlorinated biphenyls	Cause Unknown
		Primary Contact Recreation	Fecal Coliform	Urban Runoff/Storm Sewers, Combined Sewer Overflow, Municipal Point Source Discharge
IL_G-39	Des Plaines River (upstream of Flagg Creek confluence)	Aquatic Life	Aldrin, Arsenic, Chloride, Lindane, Methoxychlor, pH, Phosphorus (Total)	Urban Runoff/Storm Sewers, Combined Sewer Overflow, Contaminated Sediments, Municipal Point Source Discharge
		Fish Consumption	Mercury, Polychlorinated biphenyls	Cause Unknown

TABLE 3.6.5
IEPA Use Support Categorization and 303(d) Impairments in the Mainstem Lower Des Plaines River Watershed

Station ID	Waterbody	Impaired Designated Use	Potential Cause	Potential Source
		Primary Contact Recreation	Fecal Coliform	Urban Runoff/Storm Sewers, Combined Sewer Overflow, Municipal Point Source Discharge
RGE*	Beck Lake	Aesthetic Quality	Phosphorus (total)	Source Unknown
RGL*	Big Bend Lake	Aesthetic Quality	Phosphorus (total)	Source Unknown

* Des Plaines River subwatershed lake with impairments as identified in the *Des Plaines River/Higgins Creek Watershed TMDL Stage 1 Report*, March 2009.

NPDES point source discharges within the Des Plaines River subwatershed are listed in Table 3.6.6. In addition to the point source discharges listed, municipalities discharging to the Des Plaines River subwatershed are regulated by IEPA's NPDES Phase II Stormwater Permit Program, which was created to improve the water quality of stormwater runoff from urban areas, and requires that municipalities obtain permits for discharging stormwater and implement the six minimum control measures for limiting runoff pollution to receiving systems.

TABLE 3.6.6
Point Source Discharges in the Mainstem Lower Des Plaines River Watershed

Name	NPDES	Community	Receiving Waterway
Union Pacific Railroad-Melrose	IL0002127	Melrose Park	Des Plaines River
Vulcan Materials-McCook Lime	IL0035785	McCook	Des Plaines River
Vulcan Materials-McCook Quarry	IL0037737	McCook	Des Plaines River
Chicago CSOS	IL0045012	Chicago	Des Plaines River
Fox Point Mhp Stp-Wheeling	IL0049930	Wheeling	Des Plaines River
Commonwealth Edison-Maywood-Sw	IL0059064	Maywood	Des Plaines River
Ashland Distribution-Willow Sp	IL0064408	Willow Springs	Des Plaines River
Leider Greenhouse	IL0067881	Buffalo Grove	Des Plaines River
Comdisco-Rosemont	IL0069086	Rosemont	Des Plaines River
Illinois Tool Works	IL0070971	Harwood Heights	Des Plaines River
Western Springs CSOS	IL0045039	Western Springs	Des Plaines River/ Flagg Creek/ Salt Creek

Note: NPDES facilities were identified from the IEPA website at http://www.epa.state.il.us/water/permits/waste-water/npdes-statewide.pdf, and from the USEPA website at http://www.epa.gov/r5water/weca/pcs.htm.

3.6.1.3 Wetland and Riparian Areas

Figures 2.3.6 and 2.3.7 contain mapping of wetland and riparian areas in the Lower Des Plaines River Watershed. Wetland areas were identified using NWI mapping. NWI data includes roughly 2,391 acres of wetland areas in the MLDPR Subwatershed. Riparian areas are defined as vegetated areas between aquatic and upland ecosystems adjacent to a waterway or body of water that provides flood management, habitat, and water quality enhancement. Identified riparian environments offer potential opportunities for restoration.

3.6.1.4 Floodplain Mapping

Flood inundation areas supporting the NFIP were revised in 2008 as part of the FEMA's Map Modernization Program. As part of the new mapping, floodplain boundaries were revised based upon updated Cook County topographic information; however, the hydrologic and hydraulic computer models, which are used to estimate flood levels, were not updated. LOMRs were incorporated into revised floodplain areas. The MLDPR is mapped in detail in the DFIRM mapping update with Zone AE and Zone X floodplain shown across the length of the MLDPR. The original hydrologic and hydraulic analyses were completed in 1978. Appendix A includes a comparison of FEMA's effective floodplain mapping from updated DFIRM panels with inundation areas developed for the DWP.

3.6.1.5 Stormwater Problem Data

Starting in the 3rd quarter of 2007, communities, agencies (e.g., IDOT, CCHD), and stakeholders submitted Form B questionnaire response data to the District summarizing known stormwater problems within their jurisdictions. The questionnaires were requested again by the District following the September 2008 storm event. Table 3.6.7 summarizes reported problem areas reviewed as a part of the DWP development. Problems are classified in Table 3.6.7 as regional or local. This classification is based on a process described in Section 1 of this report. The Problem Area ID naming convention was found in Technical Memorandum entitled, "Proposed Naming Conventions for Database Elements" dated August 3, 2007.

TABLE 3.6.7
Community Response Data for Mainstem Lower Des Plaines River Watershed

Problem Area ID[1,3]	Municipality	Problems Reported by Local Agency	Location	Problem Description	Local/ Regional	Resolution in DWP
CH-FL-01	Chicago	Pavement flooding	Interstate Route 90 at Canfield Avenue to Oriole Avenue	Drainage Investigation completed not implemented	Local	This is a local problem.[2]
CH-FL-02	Chicago	Pavement flooding	Interstate Route 90 at Des Plaines River	Reported by IDOT	Local	This is a local problem.[2]
CS-FL-01	Countryside	Pavement flooding	Bobolink Drive between LaGrange Road & 7th Avenue	City storm sewer discharges into IDOT storm sewer on 55th Street, which occasionally surcharges causing street ponding	Local	This is a local problem.[2]
CS-FL-02	Countryside	Pavement flooding	5400 block of Madison Avenue	IDOT 55th Street storm sewer surcharge	Local	This is a local problem.[2]
DP-FL-01	Des Plaines	Pavement flooding	Central Road at West of US Route 45	Reported by IDOT: Last incident 10/13/01	Local	This is a local problem.[2]
DP-FL-02	Des Plaines	Pavement flooding	Des Plaines River Road at between IL 72 & Devon Avenue	Reported by IDOT: Last incident 10/14/01	Local	This is a local problem.[2]

TABLE 3.6.7
Community Response Data for Mainstem Lower Des Plaines River Watershed

Problem Area ID[1,3]	Municipality	Problems Reported by Local Agency	Location	Problem Description	Local/ Regional	Resolution in DWP
DP-FL-03	Des Plaines	Pavement flooding	Devon Avenue at I-294 West of River Road	Reported by IDOT: Last incident 8/14/87	Local	This is a local problem.[2]
DP-FL-04	Des Plaines	Pavement flooding	Touhy Avenue at east of Interstate Route 294	Reported by IDOT: Last incident 5/09/90	Local	This is a local problem.[2]
DP-FL-05	Des Plaines	Pavement flooding	Des Plaines River Road at Touhy Ave To Dempster Street	Reported by IDOT: Last incident 8/24/07	Local	This is a local problem.[2]
DP-FL-06	Des Plaines	Pavement flooding	Illinois Route 58 at Des Plaines River	Reported by IDOT	Local	This is a local problem.[2]
DP-FL-07	Des Plaines	Pavement flooding	Illinois Route 58 at C&NW RR (Des Plaines River)	8/23/07 Des Plaines River cresting	Local	This is a local problem.[2]
DP-FR-03	Des Plaines	Pavement flooding	Des Plaines River Road at Gregory to Central Road	Reported by IDOT: Last incident 8/24/07 (Feehanville Ditch problem area DP-FHDT-WT-FR-02)	Regional	FHDT-2, see Section 3.10
DP-FR-04	Des Plaines	Pavement flooding	US Route 14 (Miner Street) at Des Plaines River	Reported by IDOT	Regional	DPR-3A,
DP-FR-06	Des Plaines	Structure flooding	Oakton Street (Locust and Maple Street)	09/13/08: Major flooding on Des Plaines River. Seventeen businesses had up to 24 inches of first floor flooding. 06/19/09: 4 inches in 1 hour. Des Plaines River did not over top but low area held water to foundation level.	Regional	DPR-2B
DP-FR-07	Des Plaines	Structure flooding	Fargo Avenue and River Road	09/13/08: Major flooding on Des Plaines River. Seventeen businesses had up to 24 inches of first floor flooding. 06/19/09: 4 inches in 1 hour. Des Plaines River did not over top but low area held water to foundation level.	Regional	DPR-3A
DP-FR-08	Des Plaines	Structure flooding	River Road and Oakton Street	09/13/08: Major flooding on Des Plaines River. Seventeen businesses had up to 24 inches of first floor flooding.	Regional	DPR-3A

TABLE 3.6.7
Community Response Data for Mainstem Lower Des Plaines River Watershed

Problem Area ID[1,3]	Municipality	Problems Reported by Local Agency	Location	Problem Description	Local/ Regional	Resolution in DWP
DP-FR-11	Des Plaines	Pavement flooding	Illinois Route 58 (Golf Road) at Oakton Community College	Reported by IDOT: Last incident 4/24/99	Regional	Could not raise Golf Road due to railroad underpass east of Des Plaines River Road
PR-FR-01	Park Ridge	Pavement flooding	Illinois Route 72 at Des Plaines River	Reported by IDOT	Regional	DPR-4
PR-FL-02	Park Ridge	Pavement flooding	Devon Avenue at Des Plaines River	Reported by IDOT	Local	This is a local problem.[2]
CD-FR-01	CCHD	Pavement flooding	Fullerton Avenue at Des Plaines River Road	Des Plaines River floods over bank	Regional	DPR-6D
CD-SM-02	CCHD	Maintenance/Debris	Structure #016-3251, 0.2 mi. east of US 45.	Debris collected at center pier.	Local	This is a local problem.[2]
CF-ER-01	FPDCC	Erosion	LaGrange Road and 63rd Street	Severe erosion within Theodore Stone Forest Preserve ravine needs to be restored to natural topography.	Local	This is a local problem.[2]
HH-FL-01	Harwood Heights	Combined sewers	Lawrence Avenue and Harlem Avenue	Separate combined sewer proposal	Local	This is a local problem.[2]
LT-FL-01	Lyons Township	Pavement flooding	Interstate Route 55 at Des Plaines River	Reported by IDOT: Last incident 5/28/00	Local	This is a local problem.[2]
MT-FR-01	Maine Township	Pavement flooding	Central Road at East River Road to River Road	Reported by IDOT: Last incident 3/1/07	Regional	DPR-2B
NT-FL-01	Northfield Township	Pavement flooding	Illinois Route 21 at Central Road	Reported by IDOT: Last incident 8/10/98	Local	This is a local problem.[2]
NT-FL-02	Northfield Township	Pavement flooding	Central Avenue, between Dearlove and Glenwood Road	Street and structural flooding due to undersized storm sewer along Central, IDOT has preliminary study that did not proceed due to lack of funding, pictures included in Form B	Local	This is a local problem.[2]
PT-FL-01	Proviso Township	Pavement flooding	Illinois Route 171 at 13th Street (Loyola Hospital)	Reported by IDOT: Last incident 5/28/96	Local	This is a local problem.[2]
EP-FL-01	Elmwood Park	Pavement flooding	Illinois Route 64 at Des Plaines River	Reported by IDOT	Local	This is a local problem.[2]

TABLE 3.6.7
Community Response Data for Mainstem Lower Des Plaines River Watershed

Problem Area ID[1,3]	Municipality	Problems Reported by Local Agency	Location	Problem Description	Local/ Regional	Resolution in DWP
EP-FR-01	Elmwood Park	Residential flooding	Flooding from Des Plaines River at Thatcher Road	Village sand bags now when River rises. Street and house flooding when overtopping occurs. Village would like to build berm but were told no by State.	Regional	GCTR-1, see Section 3.12
FO-EL-01	Forest Park	Erosion	Roosevelt Road & Des Plaines Avenue	Significant bank erosion, sedimentation, and pollution present.	Local	This is a local problem.[2]
FO-FL-01	Forest Park	Pavement flooding	Interstate Route 290 at Des Plaines	Reported by IDOT. Phase I studies complete.	Local	This is a local problem.[2]
FO-FL-02	Forest Park	Pavement flooding	Illinois Route 171 at Roosevelt to Cermak	Reported by IDOT: Last incident 11/4/03	Local	This is a local problem.[2]
FP-FL-01	Franklin Park	Pavement flooding	Des Plaines River Road at Belmont Avenue	Reported by IDOT: Last incident 4/23/99	Local	This is a local problem.[2]
FP-FR-01	Franklin Park	Pavement flooding	Des Plaines River Road between King Avenue and Robinson Avenue	Reported by IDOT: Last incident 6/5/00	Regional	DPR-5
GV-FL-01	Glenview	Storm sewer	Central Road at Milwaukee Road	Storm sewer at Milwaukee and Central is undersized, causing flooding impacts in areas that drain to Central Road storm sewer, also impacts 600 Naples Court Condo.	Local	This is a local problem.[2]
GV-FL-02	Glenview	Erosion	Forest Drive near Des Plaines River	Deteriorating of ditch on FPDCC property has caused flooding problems in the subdivision. The FPDCC is not allowing the Village to perform the required corrective work	Local	This is a local problem.[2]
GV-FL-03	Glenview	Pavement flooding	Illinois Route 21 at Glenview Road	Reported by IDOT: Last incident 10/13/01	Local	This is a local problem.[2]
LG-FL-01	LaGrange	Pavement flooding	47th Street at East Avenue	Reported by IDOT: Last incident 5/9/03	Local	This is a local problem.[2]
LY-FL-01	Lyons	Pavement flooding	Illinois Route 171 at 45th Street	Reported by IDOT: Last incident 11/10/06	Local	This is a local problem.[2]
LY-FR-01	Lyons	Pavement flooding	US Route 34 (Ogden Avenue) east of Plainfield Road	Reported by IDOT: Last incident 8/15/87	Regional	DPR-12
LY-FR-02	Lyons	Pavement flooding	47th Street at Des Plaines River	Reported by IDOT	Regional	DPR-14B
LY-FR-03	Lyons	Residential flooding	Forest Avenue and 1st Avenue	High River levels cause property damage	Regional	DPR-11C

TABLE 3.6.7
Community Response Data for Mainstem Lower Des Plaines River Watershed

Problem Area ID[1,3]	Municipality	Problems Reported by Local Agency	Location	Problem Description	Local/ Regional	Resolution in DWP
MW-FL-01	Maywood	Combined sewers	Various Locations	Village experience extensive basement flooding. After heavy rainfall, combined sewers cannot handle runoff, therefore, causing basement flooding.	Local	This is a local problem.[2]
MW-FL-02	Maywood	Pavement flooding	Illinois Route 171 at south of Lake Street	Reported by IDOT: Last incident 7/7/04	Local	This is a local problem.[2]
MW-FL-03	Maywood	Pavement flooding	Illinois Route 171 at Madison Street (School Street)	Reported by IDOT: Last incident 6/7/93	Local	This is a local problem.[2]
MC-FR-01	McCook	Overbank flooding	McCook Levee at Des Plaines River	March 1979 Des Plaines River breach of levee caused damage in McCook and Summit.	Regional	DPR-14C
NR-FL-01	North Riverside	Overbank flooding	General overbank flooding - no location specified	Flooding occurs as indicated on FIRM panels. (Structures not affected.)	Local	This is a local problem.[2]
NR-FL-02	North Riverside	Pavement flooding	Illinois Route 171 at 31st St to Ogden Avenue	Reported by IDOT: Last incident 8/17/97	Local	This is a local problem.[2]
NR-FL-03	North Riverside	Pavement flooding	26th Street at Des Plaines River	Reported by IDOT	Local	This is a local problem.[2]
NB-EL-01	Northbrook	Erosion	Portwine Road and Forest View Drive along ditch	Severe bank erosion along 0.5 miles of Portwine Ditch	Local	This is a local problem.[2]
RF-FL-01	River Forest	Sewer	Lake Street and River Oaks Drive near 1st Avenue and Lake	Sewer Surcharging into basements and streets due to high River levels and overland flooding. River Forest completed study of problem area for levee project in 1988.	Local	This is a local problem.[2]
RF-FR-01	River Forest	Restrictive structure	Lake Street crossing	Possible restrictive structure	Regional	DPR-8B
RF-FR-02	River Forest	Restrictive structure	UPRR crossing	Possible restrictive structure	Regional	DPR-8B
RF-FR-03	River Forest	Sewer	Chicago Avenue and Thatcher Avenue	Sewer Surcharging into basements and streets due to high River levels and overland flooding. River Forest completed study of problem area for levee project in 1988.	Regional	DPR-8A
RG-EL-01	River Grove	Erosion	Des Plaines River Road and Grand Avenue to Fullerton	Bank Erosion along roadway	Local	This is a local problem.[2]

TABLE 3.6.7
Community Response Data for Mainstem Lower Des Plaines River Watershed

Problem Area ID[1,3]	Municipality	Problems Reported by Local Agency	Location	Problem Description	Local/ Regional	Resolution in DWP
RG-ER-01	River Grove	Erosion/Overbank Flooding	Des Plaines River Road and 1st Avenue. Drainage ditch along west side of Des Plaines River Road	Pile of crushed stone along west side of Des Plaines River Road began to erode. Stone eroded into drainage ditch and filled ditch enough to cause surface runoff to flood over banks onto Des Plaines River Road. IDOT planning to dredge and re-contour ditch.	Regional	DPR-6D
RG-FL-01	River Grove	Storm and combined sewer	Basements throughout Village	Storm and combined sewer backup into basements	Local	This is a local problem.[2]
RG-FL-02	River Grove	Pavement flooding	Belmont Avenue at Des Plaines River	Reported by IDOT	Local	This is a local problem.[2]
RG-FL-03	River Grove	Pavement flooding	Belmont Avenue at Forest Reserve	Reported by IDOT: Last incident 7/18/93	Local	This is a local problem.[2]
RG-FR-01	River Grove	Pavement flooding	Along Des Plaines River from Grand to Fullerton	After heavy rains, the Des Plaines River cannot handle the volume of stormwater and results in bank erosion and severe overbank flooding and often results in lane closures along Des Plaines River Road.	Regional	DPR-6D
RG-FR-02	River Grove	Pavement flooding	Des Plaines River Road at Grand Avenue to 1st Avenue	Reported by IDOT: Last incident 5/27/04	Regional	DPR-6D
RS-FL-01	Riverside	Pavement flooding	31st Street at Des Plaines River	Reported by IDOT	Local	This is a local problem.[2]
RS-FR-01	Riverside	Residential flooding	Groveland north of Forest Avenue	Structure flooding	Regional	DPR-11C
RS-FR-02	Riverside	Residential flooding	Forest Avenue and 1st Avenue	High River levels cause property damage	Regional	DPR-11C
RM-FL-01	Rosemont	Pavement flooding	US Route 12/45 at IL Route 72	Reported by IDOT: Last incident 2/21/97	Local	This is a local problem.[2]
RM-FL-02	Rosemont	Pavement flooding	Touhy Avenue at US Route 12/45	Reported by IDOT: Last incident 8/30/01	Local	This is a local problem.[2]
RM-FL-03	Rosemont	Sediment Deposition	West of intersection of Rosemont Avenue and Kirschoff Street	Sedimentation in Willow Creek channel creating an island	Local	This is a local problem.[2]

TABLE 3.6.7
Community Response Data for Mainstem Lower Des Plaines River Watershed

Problem Area ID[1,3]	Municipality	Problems Reported by Local Agency	Location	Problem Description	Local/ Regional	Resolution in DWP
SM-FL-01	Summit	Pavement flooding	Interstate Route 55 at Illinois Route 171	Reported by IDOT	Local	This is a local problem.[2]
WH-FL-03	Wheeling	Pavement flooding	Illinois Route 68 west of Interstate Route 294	Reported by IDOT: Last incident 2/21/97	Local	This is a local problem.[2]
WH-FL-04	Wheeling	Pavement flooding	Illinois Route 68 at Des Plaines River	Submitted by IDOT	Local	This is a local problem.[2]
WT-SM-01	Wheeling Township	Sediment deposition	Portwine Road and Forest View Road, Northbrook	Outlet to Des Plaines River has large sediment deposits causing restricted flow into Des Plaines River and causing basement flooding and ponding in residential area. Channel needs to be reconstructed	Local	This is a local problem.[2]

[1] All Problem Area IDs begin with DP-DP- as they are in the Des Plaines River – MLDPR Subwatershed.
[2] Problem does not meet regional definition (refer to chapter 1). Solutions for the local problems are not addressed in the DWP.
[3]These problem areas were identified prior to the June and July 2010 storm events.

3.6.1.6 Near Term Planned Projects

In the 3rd Quarter of 2010, the USACE and the IDNR signed a Project Participation Agreement for the Phase 1 and 2 Des Plaines River Dam Projects. Phase 1 includes the removal of the Armitage and Fairbanks dams. Phase 2 includes the notching of the Hofmann Dam and re-grading of Swan Pond to return it to a more natural drainage state. The notching of the Hofmann Dam was included in the existing conditions analysis for the MLDPR. Levee 37, which is under construction in 2010 and 2011, and the associated compensatory storage facility at Heritage Park flood storage projects were also included in the existing conditions analysis for the MLDPR.

3.6.2 Watershed Analysis

3.6.2.1 Hydrologic Model Development

Subbasin Delineation. The eastern portion of the subbasin boundary of the direct tributary area to the MLDPR Subwatershed was coordinated with HDR, Inc. who prepared the North Branch Chicago River DWP.

The southern boundary of the direct tributary area to the MLDPR is located between the Des Plaines River and the Chicago Sanitary and Ship Canal. The east boundary of the MLDPR Watershed in between the North Branch Chicago River and the Chicago Sanitary and Ship Canal is consistent with the TARP service area.

Areas in the southwest corner of the MLDPR Subwatershed are tributary from DuPage County and were delineated based on the DuPage County 2-foot topographic mapping. The west boundary is the Will County boundary at the Des Plaines River and then DuPage County proceeding north to the Lake County boundary which comprises the north limits of the detailed study.

The subdivides for the direct tributary area were based on the USACE HEC-1 watershed areas, the Cook County 2-foot topographic mapping, and the available combined sewer mapping. Additionally, MLDPR direct tributary area draining to the Summit Conduit was diverted out of the watershed. The Summit Conduit is described below. There are 24 sub-basins ranging in size from 0.1 to 20.0 square miles with a total drainage area of approximately 89 square miles in Cook County.

Portions of the direct tributary area to the MLDPR Watershed have flow diversions to storm sewers, water reclamation plant, and the TARP system. The area tributary to these diversions was incorporated into the HEC-HMS hydraulic model with respect to estimates of the associated tributary area boundaries for each diversion rating curve. The diversion rating curves were taken from the HEC-1 hydrologic model. Additionally, flow diversions from sub-watersheds that contribute to the MLDPR Watershed were included in the HEC-RAS hydraulic model. These flow diversions included the William Rogers Memorial Diversion Channel in the Buffalo Creek Watershed, the diversion pipe from the Farmers Prairie Creek Subwatershed, and diversion channels in the Weller Creek and Salt Creek Watersheds.

The detailed subwatershed studies within Cook County and the tributary area north of Lake-Cook Road were incorporated by reading in the downstream hydrograph results, in DSS format, from the respective Unsteady HEC-RAS hydraulic modeling. The hydrographs for the subwatershed studies were input into the September 2008 and 100-year storm event basin models in HEC-HMS only for reference purposes.

Summit Conduit. The Summit Conduit is an inverted siphon that conveys flow from west of the Des Plaines River under the Des Plaines River to discharge in the Chicago Sanitary and Ship Canal. The area tributary to the Summit Conduit is roughly bounded by Willow Springs Road to the west, Joliet Road to the south and east, and 47th Street to the north. The northeast portion of the drainage area extends southeast past Joliet Road to the McCook Levee to the northeast and the Des Plaines River south of the McCook Levee to approximately East 55th Street. In addition to direct tributary area from the MLDPR being tributary to the Summit Conduit, the entire East Avenue Ditch Subwatershed and the area tributary to the Plainfield Road storm sewer are tributary to the Summit Conduit. The Plainfield Road storm sewer conveys flow from the area south of Plainfield Road away from the Des Plaines River Tributary A Subwatershed to the Summit Conduit.

Depth Area Method. The USACE HEC-1 hydrologic model applied rainfall depths for the design storms using the depth-area method. The depth-area method relationship follows the reasoning that rainfall depth decreases as drainage area increases for large watersheds. The depth-area methodology applied in the HEC-1 hydrologic model cannot be duplicated in the HEC-HMS hydrologic model. The rainfall depths incorporated into the HEC-HMS hydrologic model are based on the rainfall depth-area relationship in the HEC-1 hydrologic models. At the approximate point along the Des Plaines River a sub-watershed or subbasin is added, the drainage area of the Des Plaines River was approximated and the associated rainfall depth was applied for that area from the HEC-1 relationship.

Hydrologic Parameter Calculations. CN values were estimated for each subbasin based upon NRCS soil data and 2001 CMAP land use data. This method is further described in Section 1.3.2, with lookup values for specific combinations of land use and soil data presented in Appendix C. An area-weighted average of the CN was generated for each subbasin.

Clark's unit hydrograph parameters were estimated using the method described in Section 1.3.2. Appendix G provides a summary of the hydrologic parameters used for subbasins in each subwatershed.

3.6.2.2 Hydraulic Model Development

Field Data, Investigation, and Existing Model Data. The USACE HEC-2 hydraulic model for 2007 Des Plaines River Phase I study was utilized as the best available information for the MLDPR Subwatershed.

Supplemental field survey was performed by D.B. Sterlin, Inc. in mid 2010 under the protocol of FEMA's *Guidelines and Specifications for Flood Hazard Mapping partners, Appendix A: Guidance for Aerial Mapping and Surveying*. The field survey was completed for the McCook Levee, 47th Street Levee, and the Union Pacific railroad bridge south of Lake Street.

HEC-GeoRAS cross-sections extracted from the TIN created in GIS from the 2003 Cook County LiDAR topographic data were imported into HEC-RAS. Cross-section placement was generally consistent with the locations of the cross-sections in the USACE HEC-2 hydraulic model. The surveyed channel from the USACE HEC-2 hydraulic model was integrated into each cross-section to better define the channel. The structure information from the USACE HEC-2 hydraulic model was also utilized to represent stream crossings in the HEC-RAS hydraulic model. Available plans, Cook County topographic data, and information gathered at site visits were used to better define stream crossings of the MLDPR. The geometry for the existing conditions also includes the proposed USACE project, notching the Hofmann Dam.

Field visits were performed to assess channel and overbank roughness characteristics at several locations along the MLDPR. Photographs and aerial photography were reviewed with the Manning's n roughness coefficients from the USACE HEC-2 hydraulic model. The Manning's n roughness coefficients from the USACE HEC-2 hydraulic model concurred with the review; therefore, they were incorporated into unsteady HEC-RAS hydraulic model.

Boundary Conditions. The downstream boundary condition for the MLDPR Subwatershed is the normal depth method associated with the channel slope of the downstream portion of the Des Plaines River.

3.6.2.3 Calibration and Verification

The MLDPR Watershed HEC-HMS hydrologic model and unsteady HEC-RAS hydraulic models were calibrated to the September 13-14, 2008 storm event.

The MLDPR Watershed existing conditions HEC-HMS hydrologic model and unsteady HEC-RAS hydraulic models incorporate gaged subwatershed models that were calibrated to the September 13-14, 2008 storm event USGS stream gages and ungaged subwatersheds run for the September 13-14 storm event. A verification run was also completed utilizing the October 2006 storm event. The peak flow from the tributary area upstream of Lake-Cook Road (modeled in HEC-HMS) was calibrated to USGS stream gage 05528000 – Des Plaines River near Gurnee and USGS stream gage 05529000 - Des Plaines River Near Des Plaines stream gages. The direct tributary areas were directly incorporated into the HEC-HMS and HEC-RAS models.

Additionally, the USGS provided location information to District for HWM along the MLDPR associated with the September 2008 storm event that were surveyed by D.B. Sterlin, Inc. Three additional HWM locations and elevations along the Des Plaines River were provided by the Village of Wheeling. Table 3.6.9 lists the approximate locations of the HWMs used in the study.

The existing conditions water surface profile for the September 2008 storm event meets the MWRD calibration criteria of 0.5 feet from the observed HWM from Irving Park Road continuing upstream to Lake Cook Road. The existing conditions water surface profile from Hofmann Dam upstream to Irving Park Road deviates from the observed conditions for the September storm event. The model also reflects the partially blocked conditions due to debris jam of the Salt Creek Diversion for the September 2008 storm event.

Stream Gage Data. The USGS stream gage near the City of Des Plaines measured a peak stream elevation of 636.0 feet, NAVD, and had an associated discharge of 3,010 cfs during the September 2008 storm event. The elevation of 636.0 feet, NAVD, correlates well to the HWLs for the September 2008 storm both upstream and downstream of the gage. The discharge-elevation relationship for the September 2008 storm event does not correlate with previous storm events where a flowrate of 3,010 cfs would correspond to a water surface elevation of approximately 633.1 feet, NAVD. The USGS measured the gage height at the Des Plaines stream gage three times during the September 2008 storm event and made measurements within approximately 0.5 feet of the River cresting. While the exact cause of the discharge-elevation discrepancy is not known, it is estimated that seasonal growth in the channel and overbanks, general watershed development, sandbagging, and potential blockages could have contributed to the higher water surface elevations during the large storm event.

The USGS stream gage at the Village of Riverside measured a peak discharge of 9,560 cfs during the September 2008 storm event with an associated stream elevation of 604.3 feet, which correlates well to the discharge-elevation relationship of previous large historical storm events.

Table 3.6.8 provides a summary of the USGS stream gage data and the existing conditions modeling for the September 2008 storm event. Plots of the USGS stream gage data versus the Existing Conditions data are provided in Appendix 2.

TABLE 3.6.8
September 2008 Existing Conditions Versus USGS Stream Gages

USGS Gage	Sept 2008 Peak Flowrate (cfs)	Existing Peak Flowrate (cfs)	% Diff	Sept 2008 Volume (A-F)	Existing Volume (A-F)	% Diff	Sept 2008 Peak WSEL (ft)	Existing Peak WSEL (ft)	% Diff
Gurnee	973	1,002	3	12,909	6,137	-52	N/A	N/A	N/A
Des Plaines	3,010	3,269	8	35,194	27,406	-22	636.0	635.3	-0.7
Riverside	9,560	10,353	8	96,118	85,485	-11	604.3	605.4	1.1

The above summary shows that the flowrates at the gages meet the District 30% calibration criteria of calculated versus observed conditions for the gages at Gurnee, Des Plaines, and Riverside. The volume is also within the 30% criteria except for at the Gurnee gage, where the peak flowrate is within 3% of the observed conditions. As previously noted, the water surface profile for the September 2008 storm event is within the District criteria of 0.5 feet of the observed HWM from the Irving Park Road continuing upstream to Lake Cook Road.

Table 3.6.9 shows the computed water surface elevations at the HWMs upstream of Irving Park road are generally within the District calibration specifications of 0.5 feet from the observed HWM.

TABLE 3.6.9
Observed High Water Marks vs. Modeled Results for September 2008 Storm Event

Cross Section River Station	Closest Road Crossing	Observed HWM (NAVD 1988)	Modeled Water Surface Elevation (NAVD 1988)	Difference
257312.2	Lake Cook Road	640.3	639.1	-1.2
244642	Dundee Road	638.3	637.6	-0.7
223894	Lake-Euclid	635.5	635.2	-0.3
223710.6	Lake-Euclid	635.4	635.1	-0.3
217872.3	Central Road	634.1	633.9	-0.2
212188.4	Golf Road	633.6	633.1	-0.5
210121.3	Golf Road	632.8	633.0	0.2
205899.2	Rand Road	632.5	632.6	0.1
205290.7	Rand Road	632.9	632.5	-0.4
204117.9	Rand Road	632.5	632.3	-0.2
204051.1	Rand Road	631.1	632.3	1.2

TABLE 3.6.9
Observed High Water Marks vs. Modeled Results for September 2008 Storm Event

Cross Section River Station	Closest Road Crossing	Observed HWM (NAVD 1988)	Modeled Water Surface Elevation (NAVD 1988)	Difference
201080.5	Dempster Street	631.7	631.9	0.2
201005.5	Dempster Street	631.7	632.0	0.3
198043.7	Algonquin Road	631.2	631.2	0.0
195111.8	Oakton Street	630.1	630.9	-0.1
186147.6	Touhy Avenue	629.9	630.3	0.4
179188.1	Devon Avenue	629.4	629.8	0.4
164813.3	Lawrence Avenue	627.3	627.5	0.2
159665	Irving Park Road	625.2	627.3	2.1
159488.5	Irving Park Road	625.9	627.2	1.3
159385	Irving Park Road	626.8	627.2	0.4
159201.4	Irving Park Road	626.4	627.0	0.6
156620	Irving Park Road	626.7	626.8	0.1
152985.3	Belmont Road	625.2	626.3	1.1
149821.2	Grand Avenue	625.0	625.7	0.7
144976.1	First Avenue	624.3	625.2	0.9
131539.4	Chicago Avenue	623.2	623.8	0.6
128942.1	Lake Street	622.8	623.6	0.8
118208.9	Roosevelt Road	621.5	620.0	-1.5
112199	22nd Street	617.5	618.4	0.9
108517.6	26th Street	616.4	616.6	0.2
104526.1	31st Street	615.7	615.7	0.0
93124.5	Barrypoint Road	604.3	605.4	1.1

Figure 3.6.2 shows the modeled peak flowrate near Gurnee from the HEC-HMS hydrologic model for the September 2008 storm event is within 3% of observed peak flowrate for the September 2008 storm event.

FIGURE 3.6.2
Mainstem Lower Des Plaines River
Flow Comparison near Gurnee for the September 2008 Storm Event

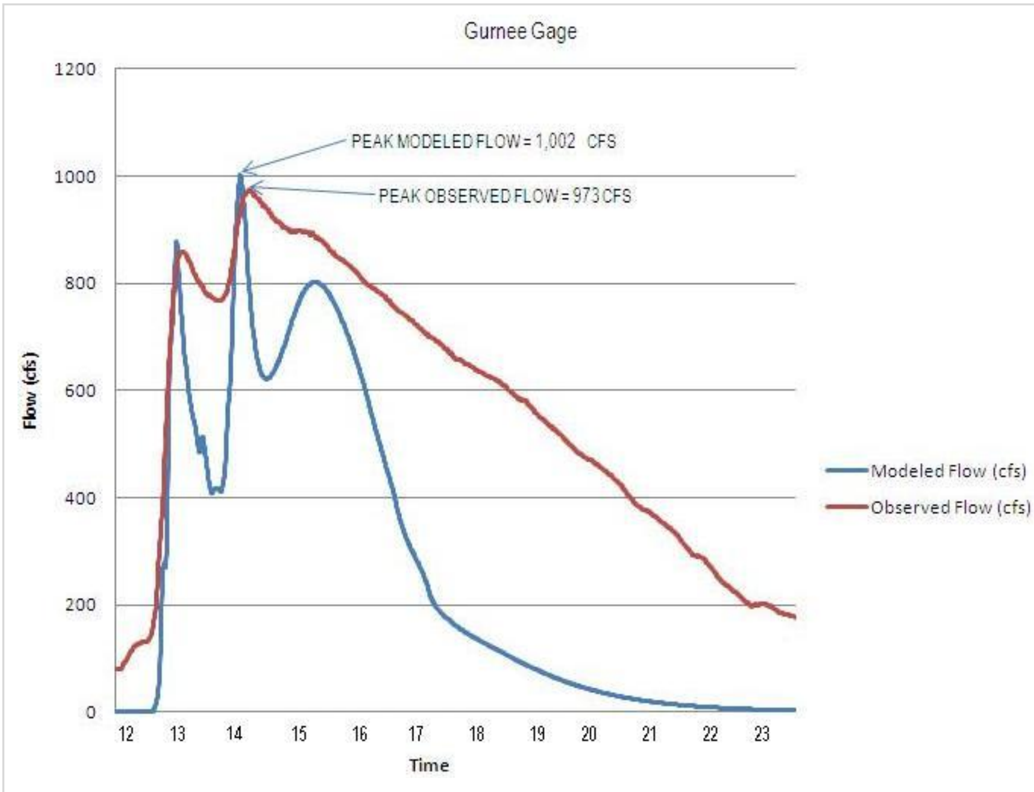
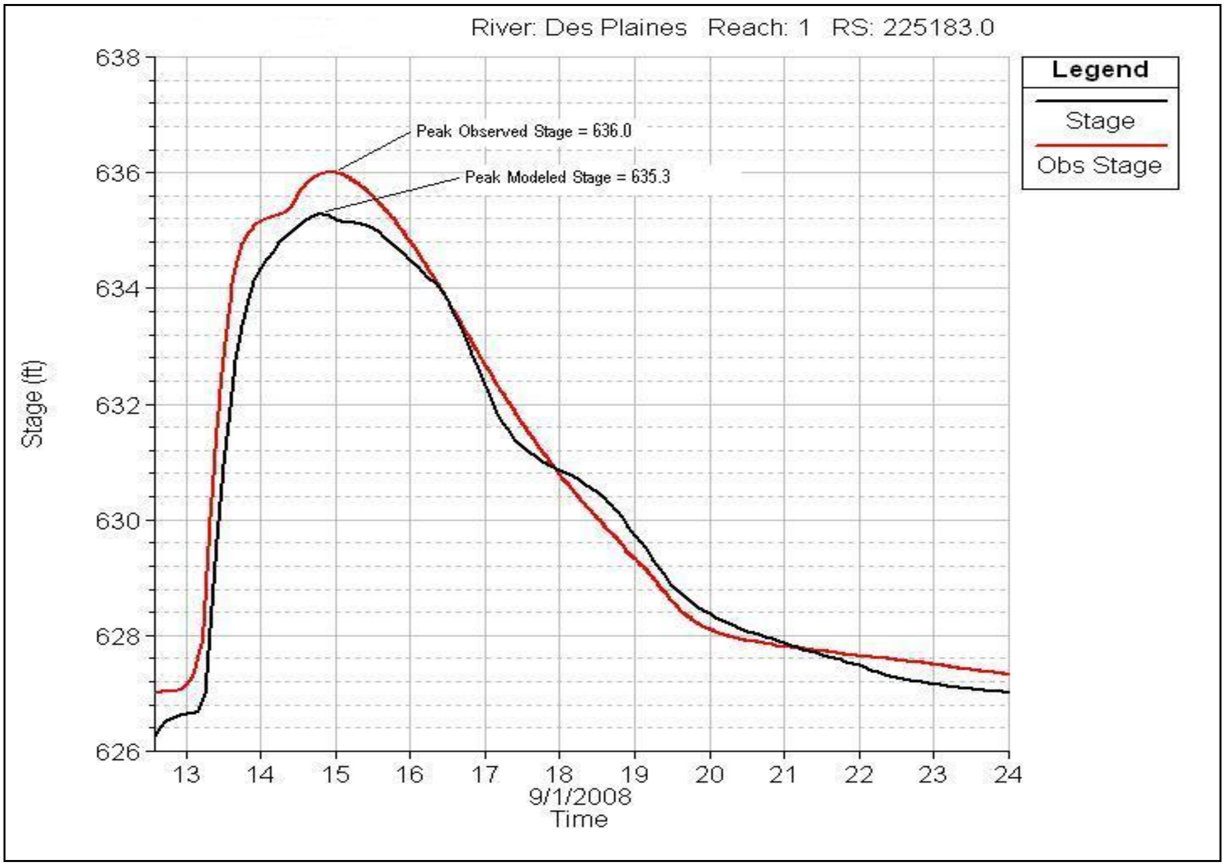


Figure 3.6.3 shows the modeled peak water surface elevation near Des Plaines at HEC-RAS cross-section 225183.0 is within 0.7 feet of observed peak stage elevation.

FIGURE 3.6.3
Mainstem Lower Des Plaines River
Stage Comparison near Des Plaines for the September 2008 Storm Event



The peak flowrate of the unsteady HEC-RAS model near Des Plaines at cross section 225183.0 is within 9% of the peak gaged flowrate as shown in Figure 3.6.4. Figure 3.6.4 also shows the computed volume is within 22%.

FIGURE 3.6.4
Mainstem Lower Des Plaines River
Flow Comparison near Des Plaines for the September 2008 Storm Event

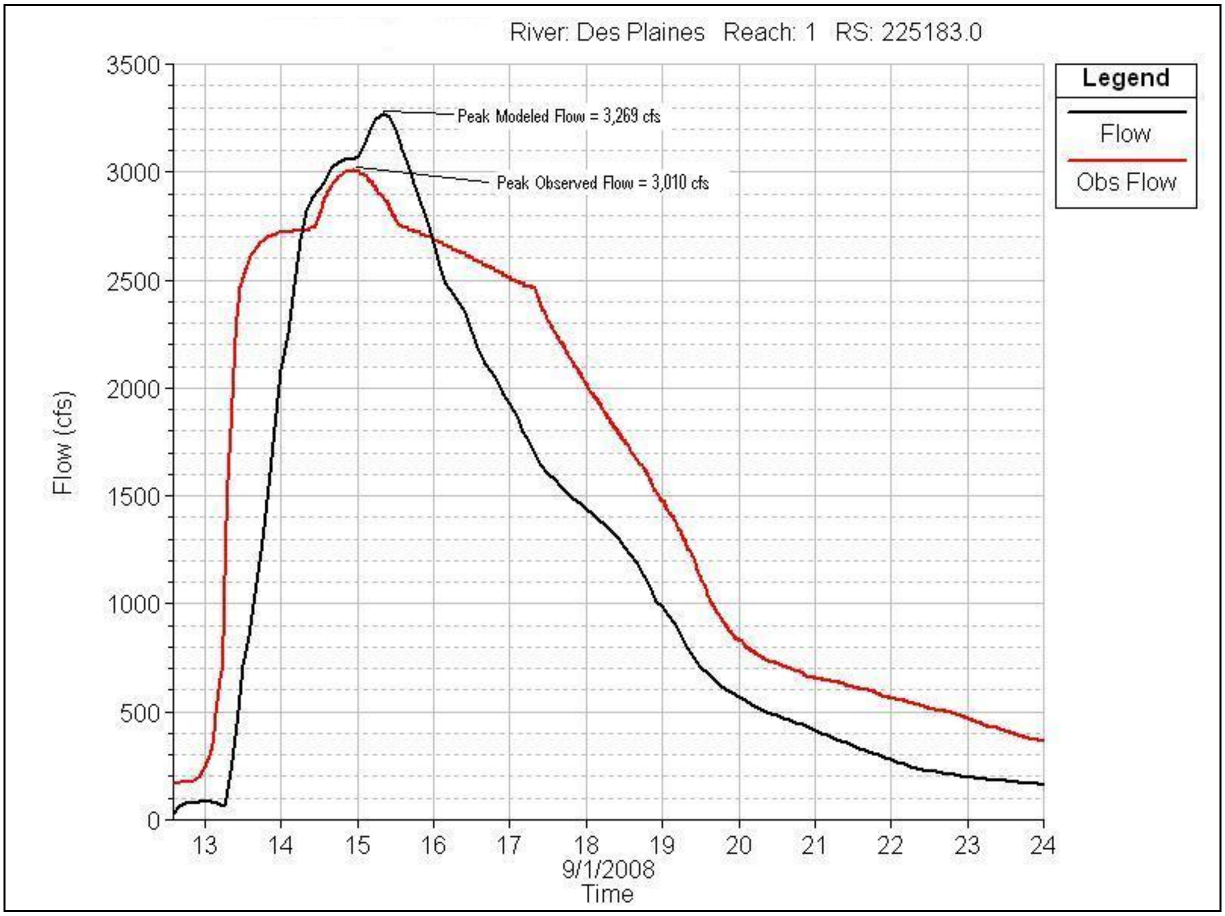
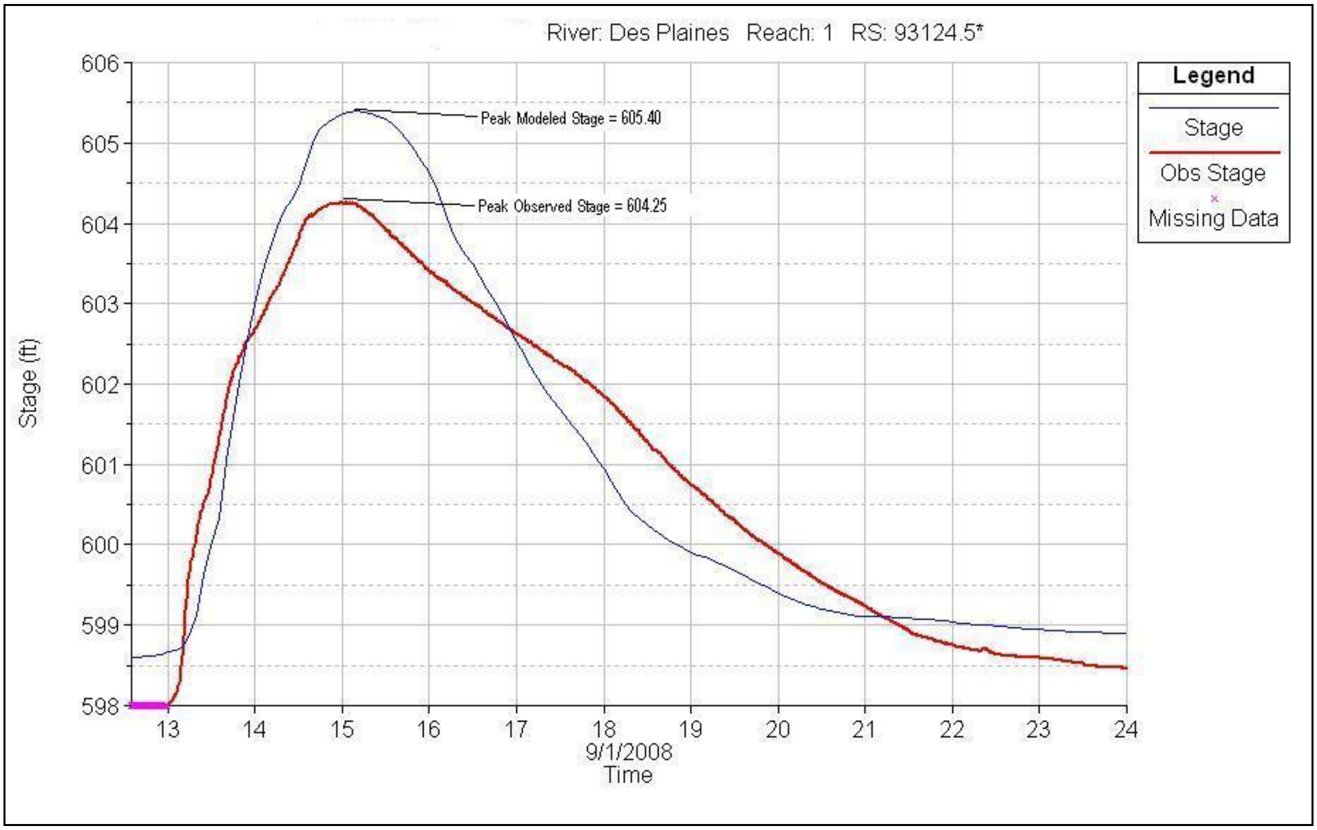


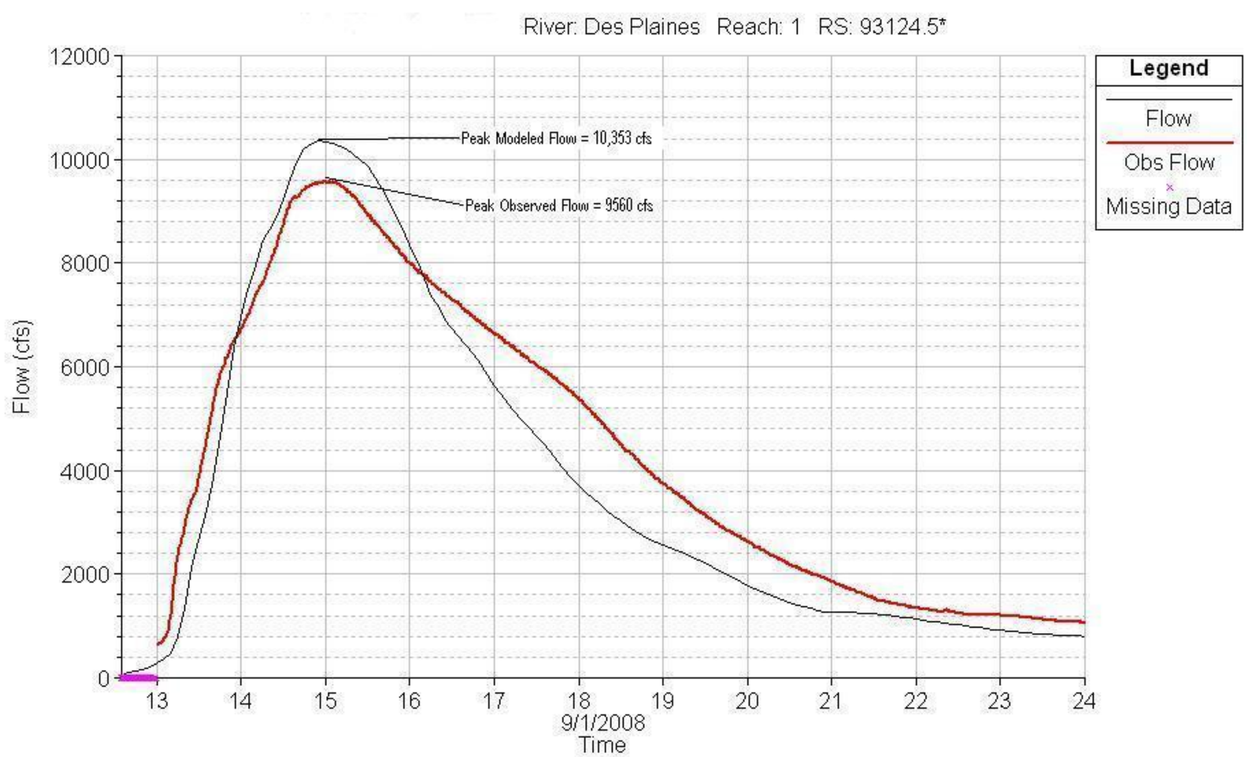
Figure 3.6.5 shows the modeled peak water surface elevation near Riverside at HEC-RAS cross-section 93124.5 is within 1.1 feet of observed peak stage elevation.

FIGURE 3.6.5
Mainstem Lower Des Plaines River
Stage Comparison near Riverside for the September 2008 Storm Event



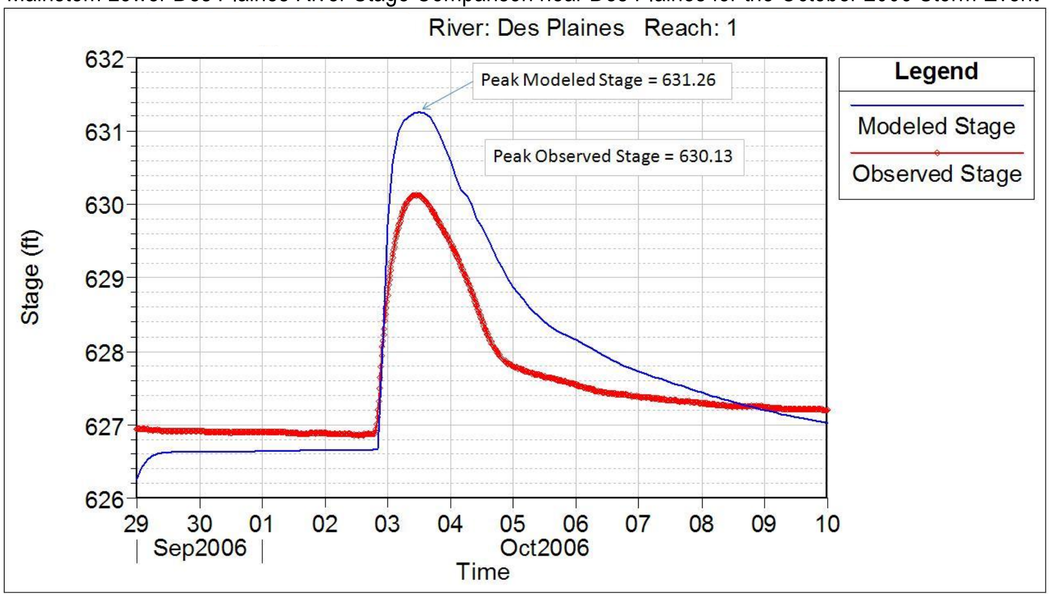
The peak flowrate of the unsteady HEC-RAS model near Riverside at cross section 93124.5 is within 9% of the peak gaged flowrate as shown in Figure 3.6.6. Figure 3.6.6 also shows the computed volume is within 11%.

FIGURE 3.6.6
Mainstem Lower Des Plaines River
Flow Comparison near Riverside for the September 2008 Storm Event



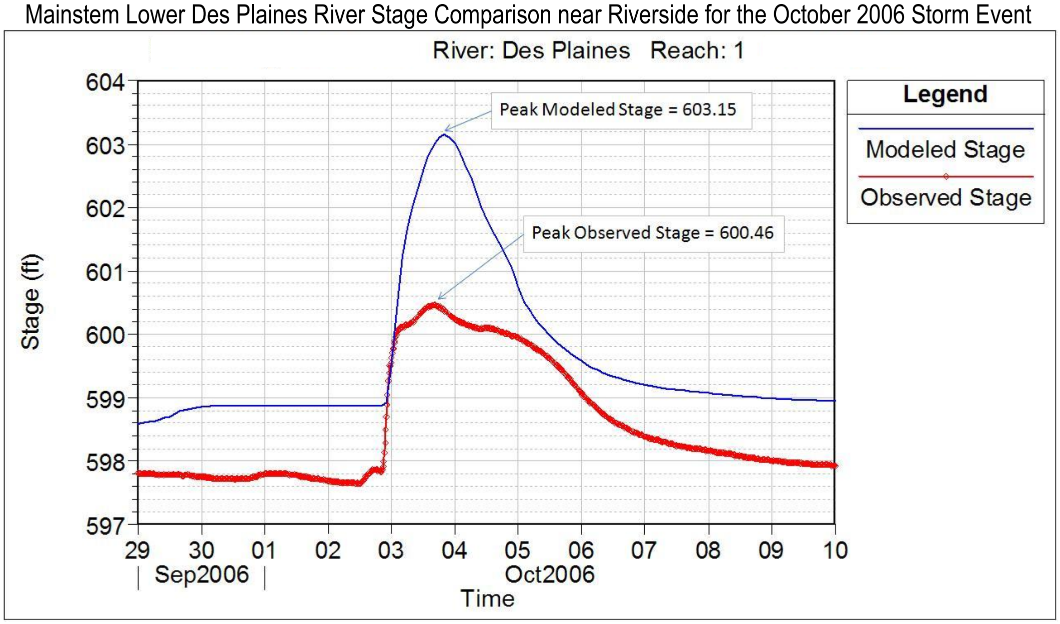
The peak stage of the unsteady HEC-RAS model near Des Plaines is shown below in Figure 3.6.7a for the verification storm event run for the October 2006 storm event.

FIGURE 3.6.7a
Mainstem Lower Des Plaines River Stage Comparison near Des Plaines for the October 2006 Storm Event



The peak stage of the unsteady HEC-RAS model near Riverside is shown below in Figure 3.6.7b for the verification storm event run for the October 2006 storm event.

FIGURE 3.6.7b
Mainstem Lower Des Plaines River Stage Comparison near Riverside for the October 2006 Storm Event



3.6.2.4 Existing Conditions Evaluation

Flood Inundation Areas. Figure 3.6.1 shows inundation areas in the MLDPR Subwatershed produced by the DWP's hydraulic model for the 100-year, 10-day duration design storm, which was used as the critical duration storm event. The 10-day duration storm event is consistent with the USACE analysis.

Hydraulic Profiles. Appendix H contains existing conditions hydraulic profiles for the MLDPR. Profiles are shown for the 2-, 5-, 10-, 25-, 50-, 100-, and 500-year recurrence interval design storms.

3.6.3 Development and Evaluation of Alternatives

3.6.3.1 Problem Definition

Hydraulic model results were reviewed with inundation mapping and Form B questionnaire response data to identify locations where property damage due to overbank flooding is predicted. Table 3.6.10 summarizes additional regional problem areas identified through hydraulic modeling of the MLDPR.

TABLE 3.6.10
Modeled Problem Definition for Mainstem Lower Des Plaines River Watershed

Problem Area ID[1]	Location	Recurrence Interval (yr) of Flooding	Associated Form B[2]	Resolution in DWP	No. of Structures Flooded
CC-FR-01	Bismark Street and Stanley Avenue	2, 5, 10, 25, 50, 100	N	DPR-13	39
CC-FR-02	Des Plaines River at Cermak Avenue/22nd Street	50, 100	N	DPR-10	0
CH-FR-01	Lawrence Avenue at the Des Plaines River	100	N	See Table 3.6.12	-
DP-FR-01	West of Des Plaines River Road between Howard Avenue and Sherwin Avenue	5, 10, 25, 50, 100	N	DPR-3A	300-500
DP-FR-02	Shagbark Lake east of Des Plaines River Road	25, 50, 100	N	DPR-3A	300-500
DP-FR-05	Des Plaines River Road at Algonquin Road	100	N	DPR-2A, DPR-2B	0
DP-FR-09	West of Des Plaines River north of Rand Road	5, 10, 25, 50, 100	N	DPR-3A	300-500
DP-FR-12	Des Plaines River at Rand Road	25, 50, 100	N	DPR-2A, DPR-2B	0
DP-FR-13	Des Plaines River at Oakton Street	25, 50, 100	N	DPR-2A, DPR-2B	0

TABLE 3.6.10
Modeled Problem Definition for Mainstem Lower Des Plaines River Watershed

Problem Area ID[1]	Location	Recurrence Interval (yr) of Flooding	Associated Form B[2]	Resolution in DWP	No. of Structures Flooded
DP-FR-14	East of River Road and north of Central Road	10, 25, 50, 100	N	DPR-2A, DPR-2B	0
DP-FR-10	South of Miner Street north of Oakton west of the Des Plaines River	25, 50, 100	N	DPR-2A, DPR-2B	0
FP-FR-02	Des Plaines River at Roosevelt Road	25, 50, 100	N	DPR-9A	0
FV-FR-01	47th Street Levee	100	N	DPR-14D	220
HK-FR-01	North of Interstate Route 55	50, 100	N	DPR-15	5
HK-FR-02	West of Interstate Route 55	50, 100	N	DPR-15	5
LY-FR-04	46th Street and Fishermanns Terrace	50, 100	N	DPR-14A	12
MW-FR-01	Des Plaines River at 1st Avenue	25, 50, 100	N	DPR-11A, DPR-11B, DPR-11C	59
RG-FR-04	South of Fullerton west of Des Plaines River Road	5, 10, 25, 50, 100	N	DPR-6D	115
RG-FR-05	West of Des Plaines River between Grand and Fullerton	5, 10, 25, 50, 100	N	DPR-6D	115
RM-FR-01	Higgins and River Road at Des Plaines River	25, 50, 100	N	DPR-4	0
SP-FR-01	South of Irving Park Road, west of and at Des Plaines River Road	25, 50, 100	N	DPR-5	13
WH-FR-01	East of Des Plaines River Road at Manchester Drive	10, 25, 50, 100	N	DPR-1	6
WH-FR-02	Illinois Route 21 at Hintz Road to Palatine Road	100	N	See table 3.6.12	-
WH-FR-03	Diversion Channel: Meadow Lane	100	N	See table 3.6.12	-

[1] All Problem Area IDs begin with DP-DP- as they are in the Des Plaines River – Lower Des Plaines River Mainstem Watershed.

3.6.3.2 Damage Assessment

Economic damages were defined following the protocol outlined in Chapter 6.6 of the CCSMP. Recreation damages due to flooding are not being identified as part of the DWP. No erosion damages due to flooding were identified for the MLDPR. Transportation damages were estimated as 15 percent of property damages plus regional transportation damages associated with the regional transportation damages listed in Table 3.6.37. Table 3.6.10 lists the existing estimated average annual damages for the MLDPR.

TABLE 3.6.11
Estimated Average Annual Damages for Mainstem Lower Des Plaines River

Damage Category	Estimated Average Annual Damage ($)	Description
Property	4,794,549	Includes structure and content damage for residential and non-residential structures
Erosion	0	No critical erosion damages were identified
Transportation	2,910,405	Assumed as 15% of property damage plus regional transportation damages

3.6.3.3 Technology Screening

Flood control technologies were screened to identify those most appropriate for addressing the flooding problems in the Watershed. Storage, floodwalls, and roadway modifications were identified as the principal technologies applicable for addressing stormwater problems in the MLDPR Watershed. The feasibility of the technologies defined in Chapter 6.6 of the CCSMP is summarized for each alternative in Table 3.6.12.

TABLE 3.6.12
Technology Screening for Mainstem Lower Des Plaines River

Technology	Feasibility for DP-FR-03 (River Road at Gregory to Central)
See Table 3.10.6 problem areas FHDT-WT-FR-01 and FHDT-WT-FR-02	
Technology	**Feasibility for DP-FR-04 (Miner Street at Des Plaines River)**
Storage Facility	Feasible – May be required for mitigation storage
Conveyance Improvement – Culvert/Bridge Replacement	Feasible – Raise road
Conveyance Improvement – Channel Improvement	Not feasible – Significant environmental impacts
Flood Barriers, Levees/Floodwalls	Feasible – Levee 50 and proposed floodwall with closure structure would address problem
Technology	**Feasibility for DP-FR-06 (Oakton Street, Locust and Maple Street)**
Storage Facility	Feasible – May be required for mitigation storage

Conveyance Improvement – Culvert/Bridge Replacement	Not feasible – Culvert/bridge not the source of problem
Conveyance Improvement – Channel Improvement	Not feasible – Significant environmental impacts
Flood Barriers, Levees/Floodwalls	Feasible – Floodwall
Technology	**Feasibility for DP-FR-07 (Fargo Avenue and River Road)**
Storage Facility	Feasible – May be required for mitigation storage
Conveyance Improvement – Culvert/Bridge Replacement	Not Feasible – culvert/bridge not the source of problem
Conveyance Improvement – Channel Improvement	Not feasible – Significant environmental impacts
Flood Barriers, Levees/Floodwalls	Feasible – Floodwall
Technology	**Feasibility for DP-FR-08 (River Road and Oakton Street)**
Storage Facility	Feasible – May be required for mitigation storage
Conveyance Improvement – Culvert/Bridge Replacement	Feasible – Road raise would address problem
Conveyance Improvement – Channel Improvement	Not feasible – Significant environmental impacts
Flood Barriers, Levees/Floodwalls	Feasible – Floodwall
Technology	**Feasibility for DP-FR-11 (Golf Road at Oakton Community College)**
Storage Facility	Not feasible – roadway flooding
Conveyance Improvement – Culvert/Bridge Replacement	Not Feasible – Not adequate road clearance to raise Golf Road profile under railroad
Conveyance Improvement – Channel Improvement	Not feasible – Significant environmental impacts
Flood Barriers, Levees/Floodwalls	Not feasible – Road closures would be required for freeboard tie-ins
Technology	**Feasibility for CD-FR-01 (Fullerton Avenue at River Road)**
Storage Facility	Not feasible – Roadway flooding
Conveyance Improvement – Culvert/Bridge Replacement	Not Feasible – culvert/bridge not the source of problem
Conveyance Improvement – Channel Improvement	Not feasible – Significant environmental impacts
Flood Barriers, Levees/Floodwalls	Feasible – Floodwall

Technology	Feasibility for MT-FR-01 (Central Road at East River Road to River Road)
Storage Facility	Not feasible – Roadway flooding
Conveyance Improvement – Culvert/Bridge Replacement	Feasible – Road raise and enlarge bridge opening
Conveyance Improvement – Channel Improvement	Not feasible – Significant environmental impacts
Flood Barriers, Levees/Floodwalls	Not feasible – Road closures would be required for freeboard tie-ins
Technology	**Feasibility for EP-FR-01 (Thatcher Road at Des Plaines River)**
See Table 3.12.5 problem areas DP-FR-01	
Technology	**Feasibility for FP-FR-01 (River Road between King Avenue and Robinson Avenue)**
Storage Facility	Feasible – May be required for mitigation storage
Conveyance Improvement – Culvert/Bridge Replacement	Feasible – Raising roadway
Conveyance Improvement – Channel Improvement	Not feasible – Significant environmental impacts
Flood Barriers, Levees/Floodwalls	Feasible – Floodwall
Technology	**Feasibility for LY-FR-01 (Ogden Avenue east of Plainfield Road)**
Storage Facility	Not feasible – Roadway flooding
Conveyance Improvement – Culvert/Bridge Replacement	Feasible – Road raise of Ogden Avenue
Conveyance Improvement – Channel Improvement	Not feasible – Significant environmental impacts
Flood Barriers, Levees/Floodwalls	Not feasible – Road closures would be required for freeboard tie-ins
Technology	**Feasibility for LY-FR-02 (47th Street at Des Plaines River)**
Storage Facility	Not feasible – Roadway flooding
Conveyance Improvement – Culvert/Bridge Replacement	Feasible – Road raise of 47th Street
Conveyance Improvement – Channel Improvement	Not feasible – Significant environmental impacts
Flood Barriers, Levees/Floodwalls	Not feasible – Road closures would be required for freeboard tie-ins
Technology	**Feasibility for LY-FR-03 (Forest Avenue and 1st Avenue)**

Storage Facility	Feasible – May be required for mitigation storage
Conveyance Improvement – Culvert/Bridge Replacement	Not Feasible – culvert/bridge not the source of problem
Conveyance Improvement – Channel Improvement	Not feasible – Significant environmental impacts
Flood Barriers, Levees/Floodwalls	Feasible – Floodwall
Technology	**Feasibility for MC-FR-01 (McCook Levee)**
Storage Facility	Feasible – Adequate vacant land not available for effective storage
Conveyance Improvement – Culvert/Bridge Replacement	Not feasible –Bridge not the source of problem
Conveyance Improvement – Channel Improvement	Not feasible – Significant environmental impacts
Flood Barriers, Levees/Floodwalls	Feasible – Enhancement of existing levee
Technology	**Feasibility for RF-FR-01 (Lake Street at Des Plaines River)**
Storage Facility	Feasible – May be required for mitigation storage
Conveyance Improvement – Culvert/Bridge Replacement	Not Feasible – culvert/bridge not the source of problem
Conveyance Improvement – Channel Improvement	Not feasible – Significant environmental impacts
Flood Barriers, Levees/Floodwalls	Feasible – Floodwall
Technology	**Feasibility for RF-FR-02 (UPRR Railroad south of Lake Street)**
Storage Facility	Feasible – May be required for mitigation storage
Conveyance Improvement – Culvert/Bridge Replacement	Not Feasible – Bridge not the source of problem
Conveyance Improvement – Channel Improvement	Not feasible – Significant environmental impacts
Flood Barriers, Levees/Floodwalls	Feasible – Would not address problem
Technology	**Feasibility for RF-FR-03 (Chicago Avenue and Thatcher Avenue)**
Storage Facility	Not feasible – Roadway flooding
Conveyance Improvement – Culvert/Bridge Replacement	Not Feasible – Raise road and enlarge waterway opening
Conveyance Improvement – Channel Improvement	Not feasible – Significant environmental impacts

Flood Barriers, Levees/Floodwalls	Not feasible – Road closures would be required for freeboard tie-ins
Technology	**Feasibility for RF-ER-01 (River Road at First Avenue)**
Storage Facility	Feasible – May be required for mitigation storage
Conveyance Improvement – Culvert/Bridge Replacement	Not Feasible – culvert/bridge not the source of problem
Conveyance Improvement – Channel Improvement	Not feasible – Significant environmental impacts
Flood Barriers, Levees/Floodwalls	Feasible – Floodwalls
Technology	**Feasibility for RG-FR-01 (River Road from Grand to Fullerton)**
Storage Facility	Feasible – May be required for mitigation storage
Conveyance Improvement – Culvert/Bridge Replacement	Not Feasible – culvert/bridge not the source of problem
Conveyance Improvement – Channel Improvement	Not feasible – Significant environmental impacts
Flood Barriers, Levees/Floodwalls	Feasible – Floodwalls
Technology	**Feasibility for RG-FR-02 (River Road at Grand to 1st Avenue)**
Storage Facility	Feasible – May be required for mitigation storage
Conveyance Improvement – Culvert/Bridge Replacement	Feasible – 1st Avenue road raise
Conveyance Improvement – Channel Improvement	Not feasible – Significant environmental impacts
Flood Barriers, Levees/Floodwalls	Feasible – Floodwalls
Technology	**Feasibility for RS-FR-01 (Groveland north of First Avenue)**
Storage Facility	Feasible – May be required for mitigation storage
Conveyance Improvement – Culvert/Bridge Replacement	Feasible – Railroad bridge pier improvement
Conveyance Improvement – Channel Improvement	Not feasible – Significant environmental impacts
Flood Barriers, Levees/Floodwalls	Feasible – Floodwall enhancement
Technology	**Feasibility for RS-FR-02 (Forest Avenue and 1st Avenue)**
Storage Facility	Feasible – May be required for mitigation storage

Conveyance Improvement – Culvert/Bridge Replacement	Feasible – Railroad bridge pier improvement
Conveyance Improvement – Channel Improvement	Not feasible – Significant environmental impacts
Flood Barriers, Levees/Floodwalls	Feasible – Floodwalls

Technology	**Feasibility for CC-FR-01 (Riverside Lawndale)**
Storage Facility	Feasible – May be required for mitigation storage
Conveyance Improvement – Culvert/Bridge Replacement	Not feasible – Culvert/bridge not the source of problem
Conveyance Improvement – Channel Improvement	Not feasible – Significant environmental impacts
Flood Barriers, Levees/Floodwalls	Feasible – Floodwall

Technology	**Feasibility for CC-FR-02 (Cermak Avenue/22nd Street at Des Plaines River)**
Storage Facility	Not feasible – Roadway flooding
Conveyance Improvement – Culvert/Bridge Replacement	Feasible – Road raising
Conveyance Improvement – Channel Improvement	Not feasible – Significant environmental impacts
Flood Barriers, Levees/Floodwalls	Not feasible – Road closures would be required for freeboard tie-ins

Technology	**Feasibility for CH-FR-01 (Lawrence Avenue at Des Plaines River)**
Storage Facility	Not feasible – Roadway flooding
Conveyance Improvement – Culvert/Bridge Replacement	Not feasible – Raising not feasible due to intersection conflicts
Conveyance Improvement – Channel Improvement	Not feasible – Significant environmental impacts
Flood Barriers, Levees/Floodwalls	Not feasible – Road closures would be required for freeboard tie-ins

Technology	**Feasibility for DP-FR-01 (Howard Avenue to Sherwin Avenue west or River Road)**
Storage Facility	Feasible – May be required for mitigation storage
Conveyance Improvement – Culvert/Bridge Replacement	Not feasible – Culvert/bridge not the source of problem
Conveyance Improvement – Channel Improvement	Not feasible – Significant environmental impacts
Flood Barriers, Levees/Floodwalls	Feasible – Floodwall

Technology	Feasibility for DP-FR-02 (Shagbark Lake east of River Road)
Storage Facility	Feasible – May be required for mitigation storage
Conveyance Improvement – Culvert/Bridge Replacement	Not feasible – Culvert/bridge not the source of problem
Conveyance Improvement – Channel Improvement	Not feasible – Significant environmental impacts
Flood Barriers, Levees/Floodwalls	Feasible – Floodwall

Technology	Feasibility for DP-FR-05 (Algonquin Road at Des Plaines River)
Storage Facility	Feasible – May be required for mitigation storage
Conveyance Improvement – Culvert/Bridge Replacement	Not feasible – Roadway raising
Conveyance Improvement – Channel Improvement	Not feasible – Significant environmental impacts
Flood Barriers, Levees/Floodwalls	Not feasible – Road closures would be required for freeboard tie-ins

Technology	Feasibility for DP-FR-09 (West of Des Plaines River north of Rand Road)
Storage Facility	Feasible – May be required for mitigation storage
Conveyance Improvement – Culvert/Bridge Replacement	Not feasible – Culvert/bridge not the source of problem
Conveyance Improvement – Channel Improvement	Not feasible – Significant environmental impacts
Flood Barriers, Levees/Floodwalls	Feasible – Floodwall

Technology	Feasibility for DP-FR-10 (South of Miner Street west of Des Plaines River)
Storage Facility	Feasible – May be required for mitigation storage
Conveyance Improvement – Culvert/Bridge Replacement	Not feasible – Culvert/bridge not the source of problem
Conveyance Improvement – Channel Improvement	Not feasible – Significant environmental impacts
Flood Barriers, Levees/Floodwalls	Feasible – Floodwall

Technology	Feasibility for DP-FR-12 (Rand Road at Des Plaines River)
Storage Facility	Feasible – May be required for mitigation storage
Conveyance Improvement – Culvert/Bridge Replacement	Feasible – Road raising

Conveyance Improvement – Channel Improvement	Not feasible – Significant environmental impacts
Flood Barriers, Levees/Floodwalls	Not feasible – Road closures would be required for freeboard tie-ins
Technology	**Feasibility for DP-FR-13 (Oakton Street at Des Plaines River)**
Storage Facility	Feasible – May be required for mitigation storage
Conveyance Improvement – Culvert/Bridge Replacement	Feasible – Road raising
Conveyance Improvement – Channel Improvement	Not feasible – Significant environmental impacts
Flood Barriers, Levees/Floodwalls	Not feasible – Road closures would be required for freeboard tie-ins
Technology	**Feasibility for DP-FR-14 (East of Des Plaines River north of Central)**
Storage Facility	Feasible – May be required for mitigation storage
Conveyance Improvement – Culvert/Bridge Replacement	Feasible – Road raising/enlarge waterway opening
Conveyance Improvement – Channel Improvement	Not feasible – Significant environmental impacts
Flood Barriers, Levees/Floodwalls	Not feasible – Road closures would be required for freeboard tie-ins
Technology	**Feasibility for FP-FR-02 (Roosevelt Road at Des Plaines River)**
Storage Facility	Not feasible – Roadway flooding
Conveyance Improvement – Culvert/Bridge Replacement	Feasible – Road raising
Conveyance Improvement – Channel Improvement	Not feasible – Significant environmental impacts
Flood Barriers, Levees/Floodwalls	Not feasible – Road closures would be required for freeboard tie-ins
Technology	**Feasibility for HK-FR-01 (North of Interstate 55)**
Storage Facility	Feasible – May be required for mitigation storage
Conveyance Improvement – Culvert/Bridge Replacement	Not feasible – Culvert/bridge not the source of problem
Conveyance Improvement – Channel Improvement	Not feasible – Significant environmental impacts
Flood Barriers, Levees/Floodwalls	Feasible – Floodwall
Technology	**Feasibility for HK-FR-02 (West of Interstate 55)**

Storage Facility	Feasible – May be required for mitigation storage
Conveyance Improvement – Culvert/Bridge Replacement	Not feasible – Culvert/bridge not the source of problem
Conveyance Improvement – Channel Improvement	Not feasible – Significant environmental impacts
Flood Barriers, Levees/Floodwalls	Feasible – Floodwall

Technology	**Feasibility for LY-FR-04 (46th Street at Fishermanns Terrace)**
Storage Facility	Feasible – May be required for mitigation storage
Conveyance Improvement – Culvert/Bridge Replacement	Not feasible – Culvert/bridge not the source of problem
Conveyance Improvement – Channel Improvement	Not feasible – Significant environmental impacts
Flood Barriers, Levees/Floodwalls	Feasible – Floodwall

Technology	**Feasibility for MW-FR-01 (1st Avenue at Des Plaines River)**
Storage Facility	Feasible – However, adequate benefits not provided
Conveyance Improvement – Culvert/Bridge Replacement	Not feasible – Culvert/bridge not the source of problem
Conveyance Improvement – Channel Improvement	Not feasible – Significant environmental impacts
Flood Barriers, Levees/Floodwalls	Feasible – Floodwall

Technology	**Feasibility for RG-FR-04 (South of Fullerton, west of River Road)**
Storage Facility	Feasible – May be required for mitigation storage
Conveyance Improvement – Culvert/Bridge Replacement	Not feasible – Culvert/bridge not the source of problem
Conveyance Improvement – Channel Improvement	Not feasible – Significant environmental impacts
Flood Barriers, Levees/Floodwalls	Feasible – Floodwall

Technology	**Feasibility for RG-FR-05 (Between Grand and Fullerton west of Des Plaines River)**
Storage Facility	Feasible – May be required for mitigation storage
Conveyance Improvement – Culvert/Bridge Replacement	Not feasible – Culvert/bridge not the source of problem
Conveyance Improvement – Channel Improvement	Not feasible – Significant environmental impacts

Flood Barriers, Levees/Floodwalls	Feasible – Floodwall
Technology	**Feasibility for RM-FR-01 (Higgins and River Road at Des Plaines River)**
Storage Facility	Not feasible – Roadway flooding
Conveyance Improvement – Culvert/Bridge Replacement	Feasible – Road raise
Conveyance Improvement – Channel Improvement	Not feasible – Significant environmental impacts
Flood Barriers, Levees/Floodwalls	Not feasible – Road closures would be required for freeboard tie-ins
Technology	**Feasibility for RM-FR-01 (South of Irving Park Road west of River Road)**
Storage Facility	Feasible – May be required for mitigation storage
Conveyance Improvement – Culvert/Bridge Replacement	Not feasible – Culvert/bridge not the source of problem
Conveyance Improvement – Channel Improvement	Not feasible – Significant environmental impacts
Flood Barriers, Levees/Floodwalls	Feasible – Floodwall
Technology	**Feasibility for SP-FR-01 (Higgins and River Road at Des Plaines River)**
Storage Facility	Not feasible – Roadway flooding
Conveyance Improvement – Culvert/Bridge Replacement	Feasible – Road raise
Conveyance Improvement – Channel Improvement	Not feasible – Significant environmental impacts
Flood Barriers, Levees/Floodwalls	Not feasible – Road closures would be required for freeboard tie-ins
Technology	**Feasibility for WH-FR-01 (Manchester Drive west of River Road)**
Storage Facility	Feasible – May be required for mitigation storage
Conveyance Improvement – Culvert/Bridge Replacement	Not feasible – Culvert/bridge not the source of problem
Conveyance Improvement – Channel Improvement	Not feasible – Significant environmental impacts
Flood Barriers, Levees/Floodwalls	Feasible – Floodwall
Technology	**Feasibility for WH-FR-02 (Route 21 at Hintz Road to Palatine Road)**
Storage Facility	Not feasible – Roadway flooding

Conveyance Improvement – Culvert/Bridge Replacement	Not feasible – Culvert/bridge not the source of problem
Conveyance Improvement – Channel Improvement	Not feasible – Significant environmental impacts
Flood Barriers, Levees/Floodwalls	Not feasible – Floodwall would block Buffalo Creek
Technology	**Feasibility for WH-FR-03 (Diversion Channel: Meadow Lane)**
Storage Facility	Not feasible – Des Plaines River backwater area
Conveyance Improvement – Culvert/Bridge Replacement	Not feasible – Culvert/bridge not the source of problem
Conveyance Improvement – Channel Improvement	Not feasible – New channel
Flood Barriers, Levees/Floodwalls	Not feasible – Flooding caused by backwater

3.6.3.4 Alternative Development

Flood Control Alternatives. Alternative solutions to regional flooding were developed and evaluated consistent with the methodology described in Section 1.4 of this report. At the time this report is being printed, the USACE is developing its Upper Des Plaines Feasibility Study (Phase 2) of the Des Plaines River and its tributaries upstream of its confluence with Salt Creek. The District attended multiple agency coordination meetings with the USACE while preparing this report to ensure that any alternatives being considered were incorporated into both studies. Table 3.6.13 summarizes flood control alternatives for the MLDPR Watershed.

TABLE 3.6.13
Flood Control Alternatives for Mainstrem Lower Des Plaines River

Alternative	Addressed Problem Area IDs[1]	Location	Description
DPR-1	WH-FR-01	Wheeling	*Floodwall:* Approximately 6,000 feet of floodwall on east side of Milwaukee Avenue from Alexia Court to Hintz Road. Average wall height 3.5 feet. Two pump stations to address interior drainage.
DPR-2A	MT-FR-01, DP-FR-05, FP-FR-10, DP-FR-13, DP-FR-14	Des Plaines	*Road raises and mitigation storage:* Raise Central Road, Rand Road, Algonquin Road, Oakton Street to approximately 0.5 feet above the 100-year flood inundation. Mitigation storage provided in two USACE concept reservoirs.

TABLE 3.6.13
Flood Control Alternatives for Mainstrem Lower Des Plaines River

Alternative	Addressed Problem Area IDs[1]	Location	Description
DPR-2B	MT-FR-01, DP-FR-05, FP-FR-10, DP-FR-13, DP-FR-14	Des Plaines	*Road raise and bridge modification:* Raise Central Road, Rand Road, Algonquin Road, Oakton Street to approximately 0.5 feet above the 100-year flood inundation. Enlarge waterway opening at Central Road.
DPR-3A	DP-FR-01, DP-FR-02, DP-FR-09, DP-FR-04, DP-FR-07, DP-FR-08,	Des Plaines	*Floodwall and mitigation storage:* City of Des Plaines Regional Floodwall. Five floodwalls approximately 26,500 feet total length from railroad south of Golf Road to Sherwin Avenue. Twelve pump stations to address interior drainage.
DPR-4	RM-FR-01	Rosemont	*Road raise:* Raise intersection of River Road and Higgins Road, and intersection of River Road and Glenlake Avenue to approximately 0.5 feet above the 100-year inundation.
DPR-5	SP-FR-01, FR-FR-01	Schiller Park, Franklin Park	*Floodwall and road raise:* Approximately 6,600 feet of floodwall on the east side of River Road from Irving Park Road to Belmont Avenue. Average wall height is 8 feet. Four pump stations to address interior drainage. Raise Irving Park Road and Lawrence Avenue to approximately 0.5 feet above the 100-year inundation.
DPR-6D	RG-FR-01, RG-FR-02, RG-FR-04, RG-FR-05, RG-ER-01, CD-FR-01	River Grove	*Floodwalls and road raises:* 7,500 feet 4-8 feet average height west floodwall and 3,000 feet 4-8 feet average height east floodwall. Approximately 6 total pump stations to address interior drainage. Raise Grand Avenue and 1st Avenue to approximately 0.5 feet above the 100-year inundation.
DPR-8A	RF-FR-03	River Forest	*Road raise and bridge modification:* Raise Chicago Avenue to approximately 0.5 feet above the 100-year flood inundation and enlarge waterway opening.
DPR-8B	RF-FR-01, RF-FR-02	River Forest	*Floodwall:* Approximately 2,200 feet of floodwall on the east side of the Des Plaines River north of Lake Street. Average wall height

TABLE 3.6.13
Flood Control Alternatives for Mainstrem Lower Des Plaines River

Alternative	Addressed Problem Area IDs[1]	Location	Description
			4 feet. Pump station to address interior drainage.
DPR-9A	FP-FR-02	Forest Park	*Road raise and bridge modification:* Raise Roosevelt road to approximately 0.5 feet above the 100-year flood inundation and enlarge the waterway opening. Raise low chord.
DPR-10	CC-FR-02	Proviso Township and Riverside Township	*Road raise:* Raise Cermak Road/22nd Street to approximately 0.5 feet above the 100-year flood inundation.
DPR-11A	MW-FR-01, RS-FR-01, RS-FR-02	Riverside	*Floodwalls and road raises:* Groveland Avenue/east floodwall approximately 3,500 feet in length with 3 pump stations to address interior drainage. Raise 1st Avenue and Forest Avenue to approximately 0.5 feet over the 100-year flood inundation.
DPR-11B	MW-FR-01, RS-FR-01	Riverside	*Floodwall:* Enhance existing Groveland Avenue floodwall from 31st Street to Brookfield Avenue, approximately 3,500 feet. Average wall height 7 feet.
DPR-11C	MW-FR-01, RS-FR-01, RS-FR-02, LY-FR-03	Riverside	*Floodwalls, road raises, pier extension:* Groveland Avenue/east floodwall approximately 3,500 feet in length with 3 pump stations to address interior drainage. USACE/IDNR concept CB&Q Railroad pier extension. Raise 1st Avenue and Forest Avenue to approximately 0.5 feet over the 100-year flood inundation.
DPR-12	LY-FR-01, NR-FR-01	Lyons	*Road raise:* Raise Ogden Avenue east of 1st Avenue to approximately 0.5 feet over the 100-year flood inundation.
DPR-13	CC-FR-01	Unincorporated Cook County	*Floodwall:* Approximately 2,400 feet of average 6 feet high floodwall from Joliet Avenue to Ogden Avenue. Two pump stations to address interior drainage.

TABLE 3.6.13
Flood Control Alternatives for Mainstrem Lower Des Plaines River

Alternative	Addressed Problem Area IDs[1]	Location	Description
DPR-14A	LY-FR-04	Lyons	*Floodwall:* Approximately 1,200 feet of 3-4 feet average high floodwall from 45th Street to 47th Street west of the MLDPR. Pump station to address interior drainage.
DPR-14B	LY-FR-02	Lyons	*Road raise:* Raise 47th Street to approximately 0.5 feet over the 100-year flood inundation.
DPR-14C	MC-FR-01	McCook, Lyons, Summit	*Floodwall:* Enhance existing McCook Levee from 47th Street to Interstate 55, approximately 5,000 feet. Average wall height 4 feet.
DPR-14D	FV-FR-01	Lyons	*Floodwall and mitigating storage:* Enhance existing 47th Street Levee from 43rd Street to 47th Street, approximately 3,000 feet. Mitigating storage in Lyons Quarry.
DPR-15	HK-FR-01, HK-FR-02	Hodgkins	*Floodwall:* Approximately 10,000 feet of average 3-5 feet high floodwall north of Interstate 55. Pump stations to address interior drainage.
DPR-22[2]	N/A	Lyons	*Storage:* *Utilized existing Lyons Quarry as flood control reservoir with approximately 3,500 A-F*
DPR-23	Across watershed	Lower Des Plaines River Watershed	*Storage:* Five USACE concept flood control reservoirs totaling approximately 4,600 A-F
DPR-26	EP-FL-01	Elmwood Park, River Forest, River Grove	*Road raise:* Raise North Avenue to approximately 0.5 feet over the 100-year flood inundation.

[1] All Problem Area IDs begin with DP- as they are in the Des Plaines River Watershed.
[2] Alternative was evaluated per request of Riverside Residents for Flood Prevention.

Regional problems identified in the study area involve overbank flooding into residential neighborhoods, and commercial and industrial areas. Channel improvements, floodwalls, and stormwater detention alternatives were evaluated to address regional flooding problems along the MLDPR. Mitigating storage is required for floodwalls that would result in adverse increases in water surface elevations or to compensate for lost floodplain storage due to the proposed alternative.

Alternative DPR-1 includes the construction of a floodwall, averaging approximately 3.5 feet in height along the east side of Milwaukee Avenue from Alexia Court to Hintz Road. The problem area contains structures that are at risk of overbank flooding from the MLDPR east of Milwaukee Avenue. To protect these structures from the risk of flooding, approximately 6,000 linear feet of floodwall will be constructed along the MLDPR. The floodwall would have approximately 3 feet of freeboard above the 100-year flood inundation. Pump stations would be required to address interior drainage.

Alternative DPR-2A proposes to raise four roadways, Central Road, Rand Road, Algonquin Road, and Oakton Street to approximately 0.5 feet above the 100-year inundation. Mitigation storage is proposed in two USACE concept reservoirs located between Lake-Cook Road and Dundee Road and between Euclid and Central Road. The reservoirs are proposed on the east side of the Des Plaines River on FPDCC property. This alternative would address the regional transportation damages associated with Central Road, Rand Road, Algonquin Road, and Oakton Street.

Alternative DPR-2B proposes to raise four roadways, Central Road, Rand Road, Algonquin Road, and Oakton Street to approximately 0.5 feet above the 100-year flood inundation. Additionally, the waterway opening of Central Road would be enlarged. This alternative would address the regional transportation damages associated with Central Road, Rand Road, Algonquin Road, and Oakton Street. This alternative produces the same damage reductions as Alternative DPR-2A but has no requirement for mitigating storage.

The City of Des Plaines Regional Floodwall is proposed as Alternative DPR-3A. The regional floodwall would consist of five floodwalls totaling approximately 26,500 feet in length. The system of floodwalls would extend between the railroad south of Golf Road to Sherwin Avenue. Pump stations would be required to address interior drainage. Mitigating storage could be provided in the USACE concept reservoirs located east of the Des Plaines River within FPDCC property between Lake-Cook Road and Dundee Road, between Euclid and Central Avenue, and south of Dundee Road. This alternative would address structural flooding risks associated with the MLDPR west of the River. The floodwall would have approximately 3 feet of freeboard above the 100-year inundation.

Alternative DPR-4 consists of raising the intersection of River Road and Higgins Road and the intersection of River Road and Glenlake Avenue to approximately 0.5 feet above the 100-year inundation. This alternative would address the regional transportation damages associated with the River Road and Higgins Road intersection.

Alternative DPR-5 consists of an approximately 6,600 feet long floodwall from Irving Park Road south to Belmont Avenue on the east side of River Road. The average height of the wall would be approximately 8 feet and includes approximately 3 feet of freeboard above the 100-year flood inundation. Pump stations would be required to address interior drainage. Approximately 520 feet of Irving Park Road would be raised approximately 2.5 feet to approximately 0.5 feet above the 100-year flood inundation. Additionally, Lawrence Avenue would be raised to approximately 0.5 feet above the 100-year flood inundation. This alternative would address residential flood risk in the Villages of Schiller Park and Franklin Park and regional transportation damages associated with River Road.

Two floodwalls and two road raises comprise Alternative DPR-6D. The floodwalls consist of a west and an east floodwall measuring approximately 7,500 and 3,000 linear feet, respectively. Each floodwall would average approximately 4-8 feet in height and have approximately 3 feet of freeboard over the 100-year flood inundation. Pump stations would be required to address interior drainage. The floodwall would address the residential structures at risk of flooding west of 1st Avenue. The two road raises include 1,400 feet along Grand Avenue and 1,850 feet along 1st Avenue over the Des Plaines River to 0.5 feet above the 100-year inundation.

Alternative DPR-8A would raise Chicago Avenue a maximum 4.25 feet to an elevation approximately 0.5 feet above the 100-year flood inundation. The waterway opening would also be enlarged. This alternative would address the regional transportation damages associated with Chicago Avenue.

The floodwall north of Lake Street was evaluated as Alternative DPR-8B. The approximately 2,200 feet long floodwall would average approximately 4 feet in height and would incorporate approximately 3 feet of freeboard over the 100-year flood inundation. Pump stations would be required to address interior drainage. The floodwall would address the residential structures at risk of flooding at Lake Street east of the MLDPR.

Alternative DPR-9A would raise Roosevelt Road a maximum of 2.5 feet to approximately 0.5 feet above the 100-year flood inundation. Additionally, the waterway opening would be enlarged and the low chord would be raised. This alternative would address the regional transportation damages associated with Roosevelt Road.

Alternative DPR-10 would raise Cermak Road/22nd Street a maximum of 1.5 feet to approximately 0.5 feet above the 100-year flood inundation. This alternative would address regional transportation damages associated with Cermak Road/22nd Street.

Alternative DPR-11A consists of enhancing the existing Groveland Avenue Levee for a length of approximately 3,500 feet. The floodwall would have an average height of approximately 7 feet and would include approximately 3 feet of freeboard over the 100-year flood inundation. Pump stations would be required to address interior drainage. Additionally, a west floodwall would be added south of Forest Avenue east of 1st Avenue. First Avenue and Forest Avenues would be raised approximately 2.5 feet to an elevation approximately 0.5 feet above the 100-year flood inundation. This alternative would add height and freeboard to the existing Groveland Avenue Levee and address the regional transportation damages associated with 1st Avenue and Forest Avenue.

Alternative 11-B consists of enhancement of the existing Groveland Avenue Levee for a length of approximately 3,500 feet between 31st Street and Brookfield Avenue. The average height of the floodwall would be approximately 7 feet which would include approximately 3 feet of freeboard over the 100-year flood inundation. Pump stations would be required to address interior drainage. This alternative would add height and freeboard to the existing Groveland Avenue Levee to address the flooding risk to residential structures behind the existing levee.

Alternative DPR-11C consists of enhancement of the existing Groveland Avenue Levee for a length of approximately 3,500 feet between 31st Street and Brookfield Avenue. The average height of the floodwall would be approximately 7 feet which would include approximately 3 feet of freeboard over the 100-year flood inundation. Pump stations would be required to address interior drainage. Additionally, the USACE/IDNR proposed pier extension of the CB & Q railroad is proposed. First Avenue and Forest Avenues would be raised approximately 1.0 foot and 1.5 feet, respectively, to an elevation approximately 0.5 feet above the 100-year flood inundation. This alternative would add height and freeboard to the existing Groveland Avenue Levee and address the regional transportation damages associated with 1st Avenue and Forest Avenue.

Ogden Avenue at the Lyons Quarry will be raised a maximum of 2.5 feet to approximately 0.5 feet above the 100-year flood inundation for Alternative DPR-12. This alternative will address the regional transportation damages associated with Ogden Avenue.

Alternative DPR-13 consists of an approximately 2,400 feet long floodwall south of the Des Plaines River and north of 39th Street to address the flood risk in the Riverside Lawndale area. The average wall height would be approximately 6 feet and includes approximately 3 feet of freeboard above the 100-year flood inundation. Pump stations would be required to address interior drainage.

Alternative DPR-14A consists of an approximately 1,200 feet long floodwall west of the Des Plaines River from 45th Street to 47th Street. The average wall height would be approximately 3-4 feet and includes approximately 3 feet of freeboard above the 100-year flood inundation. Pump stations would be required to address interior drainage.

Alternative DPR-14B would raise 47th Street a maximum of 3.5 feet to approximately 0.5 feet above the 100-year flood inundation. This alternative would address regional transportation damages associated with 47th Street.

Alternative 14-C consists of enhancement of the existing McCook Levee for a length of approximately 5,000 feet between 47th Street and Interstate 55. The average height of the floodwall would be approximately 4 feet which would include approximately 3 feet of freeboard over the 100-year flood inundation. Pump stations would be required to address interior drainage. This alternative would add height and freeboard to the existing McCook Levee to address the flooding risk behind the existing levee.

Alternative 14-D consists of enhancement of the existing 47th Street Diversion Levee for a length of approximately 3,000 feet between 43rd Street and 47th Street. The average height of the floodwall would be approximately 2.5 feet which would include approximately 3 feet of freeboard over the 100-year flood inundation. Pump stations would be required to address interior drainage. This alternative would add height and freeboard to the existing 47th Street Levee to address the flooding risk behind the existing levee. Mitigating storage would be required and could be provided in the Lyons Quarry, south of Ogden Avenue.

Alternative DPR-15 includes the construction of a floodwall, averaging approximately 3-5 feet in height along the west side of the Des Plaines River north of Interstate 55. The floodwall would have approximately 3 feet of freeboard above the 100-year flood inundation. Pump stations would be required to address interior drainage. The floodwall would address structures that are at risk of overbank flooding from the MLDPR north of Interstate 55.

Alternative DPR-22 would raise Ogden Avenue to approximately 0.5 feet above the 100-year flood inundation and allow for a diversion structure to convey flow under Ogden Avenue to the existing Lyons Quarry. The Lyons Quarry would be utilized as a flood control reservoir to provide approximately 3,500 A-F of storage volume. This alternative would provide an increased level of protection in the area of the quarry.

Five USACE concept flood control reservoir locations comprise DPR-23 which would provide a total of approximately 4,600 A-F of storage volume along the MLDPR. This alternative would provide an increased level of protection along reaches of the Des MLDPR.

Alternative DPR-26 would raise North Avenue a maximum of 2.5 feet to approximately 0.5 feet above the 100-year flood inundation. This alternative would address regional transportation damages associated with North Avenue.

Erosion Control Alternatives. No regional erosion problem areas were reported; therefore, alternatives were not developed for the MLDPR Watershed.

3.6.3.5 Alternative Evaluation and Selection

Alternatives listed in Table 3.6.13 were evaluated to determine their effectiveness and to produce data for the countywide prioritization of watershed projects. Flood control alternatives were modeled to evaluate their impact on water surface elevations and flood damages. Table 3.6.39 provides a summary B/C ratio, net benefits, total project costs, number of structures protected, and other relevant alternative data.

DPR-1. DPR-1 was developed to address the flooding risk of 6 structures which can incur flooding at the 100-year flood inundation along the west side of the Des Plaines River south of Dundee Road north of Hintz Road within the Village of Wheeling.

The proposed strategy for DPR-1 is to construct an approximately 6,000 feet long floodwall on the east side of Milwaukee Avenue from Alexia Court to Hintz Road. The average wall height would be approximately 3.5 feet which would include 3 feet of freeboard over the 100-year flood inundation. Two pump stations would be required to address interior drainage. Table 3.6.14 compares the peak modeled water surface elevation and flow for Alternative DPR-1.

TABLE 3.6.14
Mainstem Lower Des Plaines River Existing and Alternative Condition DPR-1 Flow and WSEL Comparison

		Existing Conditions		Alternative DPR-1	
Location	Station	Max WSEL (ft)	Max Flow (cfs)	Max WSEL (ft)	Max Flow (cfs)
Upstream of Dundee Road	252101.0	641.1	4,816	641.1	4,816
Upstream of Buffalo Creek Confluence	244642.0	639.5	4,173	639.5	4,175
Upstream of Palatine Road	238260.0	638.5	5,113	638.5	5,116

DPR-2A. DPR-2A was developed to address the flooding risk of 4 roadways in the City of Des Plaines which can incur flooding at the 100-year flood inundation of the MLDPR. The 4 roadways, Central Road, Rand Road, Algonquin Road, and Oakton Street would be raised to approximately 0.5 feet above the 100-year flood inundation. Mitigating storage could be provided in 2 USACE concept flood control reservoirs located within FPDCC property between Lake-Cook Road and Dundee Road, and between Euclid Avenue and Milwaukee Avenue on the east side of the Des Plaines River. Approximately 1,100 A-F is proposed in the reservoir between Lake-Cook Road and Dundee Road and approximately 2,100 A-F is proposed in the reservoir between Euclid and Central Road. Each reservoir would be pump evacuated. Table 3.6.15 compares the peak modeled water surface elevation and flow for Alternative DPR-2A.

TABLE 3.6.15
Mainstem Lower Des Plaines River Existing and Alternative Condition DPR-2A Flow and WSEL Comparison

		Existing Conditions		Alternative DPR-2A	
Location	Station	Max WSEL (ft)	Max Flow (cfs)	Max WSEL (ft)	Max Flow (cfs)
Upstream of Euclid Avenue	227415.6	636.7	5,188	636.5	4,953
Upstream of Central Road	217928.2	635.0	5,556	634.9	4,978
Upstream of Rand Road	204117.9	633.1	5,823	632.6	5,252
Upstream of Algonquin Road	197957.7	631.8	5,993	631.3	5,426
Upstream of Oakton Street	195201.0	631.4	6,013	630.9	5,443
Upstream of Touhy Avenue	186437.3	630.7	6,057	630.2	5,484
Upstream of Lawrence Avenue	164910.7	627.7	6,706	627.4	6,335

DPR-2B. DPR-2B was developed to address the flooding risk of 4 roadways in the City of Des Plaines which can incur flooding at the 100-year flood inundation of the MLDPR. The 4 roadways, Central Road, Rand Road, Algonquin Road, and Oakton Street would be raised to approximately 0.5 feet above the 100-year flood inundation. In addition to raising the road profiles, the waterway opening of Central Road would be enlarged. Table 3.6.16 compares the peak modeled water surface elevation and flow for Alternative DPR-2B. No mitigating storage is required for this alternative.

TABLE 3.6.16
Mainstem Lower Des Plaines River Existing and Alternative Condition DPR-2B Flow and WSEL Comparison

		Existing Conditions		Alternative DPR-2B	
Location	Station	Max WSEL (ft)	Max Flow (cfs)	Max WSEL (ft)	Max Flow (cfs)
Upstream of Euclid Avenue	227415.6	636.7	5,188	636.7	5,180
Upstream of Central Road	217928.2	635.0	5,556	635.0	5,549
Upstream of Rand Road	204117.9	633.1	5,823	633.1	5,807
Upstream of Algonquin Road	197957.7	631.8	5,993	631.8	5,978
Upstream of Oakton Street	195201.0	631.4	6,013	631.4	5,997
Upstream of Touhy Avenue	186437.3	630.7	6,057	630.7	6,044

DPR-3A. DPR-3A was developed to address the flooding risk to hundreds of structures in the City of Des Plaines which can occur west of the Des Plaines River. The proposed City of Des Plaines Regional Floodwall would consist of 5 floodwall segments totaling approximately 26,500 feet in length. The regional floodwall would extend from the railroad south of Golf Road to Sherwin Avenue and would require approximately 12 pump stations to address interior drainage. Mitigating storage would be provided in 3 USACE concept flood control reservoirs located within FPDCC property between Lake-Cook Road and Dundee Road, between Euclid Avenue and Milwaukee Avenue, and south of Dundee Road on the east side of the Des Plaines River. Table 3.6.17 compares the peak modeled water surface elevation and flow for Alternative DPR-3A.

TABLE 3.6.17
Mainstem Lower Des Plaines River Existing and Alternative Condition DPR-3A Flow and WSEL Comparison

		Existing Conditions		Alternative DPR-3A	
Location	Station	Max WSEL (ft)	Max Flow (cfs)	Max WSEL (ft)	Max Flow (cfs)
Upstream of Central Road	217928.2	635.0	5,556	634.6	5,048
Upstream of Golf Road	212317.5	633.9	5,555	633.5	4,499
Upstream of Rand Road	204117.9	633.1	5,823	632.4	4,923
Upstream of Miner Street	201165.7	632.7	5,914	632.0	5,030
Upstream of Algonquin Road	197957.7	631.8	5,993	631.2	5,131
Upstream of Oakton Street	195201.0	631.4	6,013	630.8	5,164
Upstream of Lawrence Avenue	165073.0	627.8	6,705	627.3	6,215

DPR-4. DPR-4 was developed to address the flooding risk at the intersections of Higgins Road and River Road, and River Road and Glenlake Avenue which can occur during the 100-year flood inundation in the Village of Rosemont. River Road, Higgins Road, and Glenlake Avenue would be raised to approximately 0.5 feet above the 100-year flood inundation. Table 3.6.18 compares the peak modeled water surface elevation and flow for Alternative DPR-4.

TABLE 3.6.18
Mainstem Lower Des Plaines River Existing and Alternative Condition DPR-4 Flow and WSEL Comparison

		Existing Conditions		Alternative DPR-4	
Location	Station	Max WSEL (ft)	Max Flow (cfs)	Max WSEL (ft)	Max Flow (cfs)
Upstream of Devon Avenue	179270.9	630.1	6,100	630.1	6,102
Upstream of Higgins Road	176103.1	629.9	6,122	629.9	6,118
Upstream of Interstate 90	174628.0	629.5	6,672	629.5	6,675

DPR-5. DPR-5 was developed to address the flooding risk which can occur on River Road, Irving Park Road, Lawrence Avenue, and 13 structures west of River Road between Irving Park Road and Belmont Avenue in the Villages of Franklin Park and Schiller Park. The proposed strategy includes the construction of an approximately 6,600 feet long floodwall averaging 8 feet high and raising a section of Irving Park Road. The floodwall height includes 3 feet of freeboard over the 100-year inundation. Approximately 4 pump stations would be required to address interior drainage. Irving Park Road would be raised for approximately 500 feet to approximately 0.5 feet above the 100-year flood inundation. Lawrence Avenue would also be raised above the 0.5 feet above the 100-year flood inundation. Table 3.6.19 compares the peak modeled water surface elevation and flow for Alternative DPR-5.

TABLE 3.6.19
Mainstem Lower Des Plaines River Existing and Alternative Condition DPR-5 Flow and WSEL Comparison

		Existing Conditions		Alternative DPR-5	
Location	Station	Max WSEL (ft)	Max Flow (cfs)	Max WSEL (ft)	Max Flow (cfs)
Upstream of Lawrence Avenue	165073.0	627.8	6,705	627.8	6,714
Upstream of Irving Park Road	159385.0	627.2	6,915	627.2	6,922
Upstream of Belmont	153106.6	626.4	6,912	626.4	6,920
Upstream of Grand	149902.6	625.8	6,915	625.8	6,921

DPR-6D. DPR-6D was developed to address the risk of flooding to 115 structures on the east and west sides of the Des Plaines River between Franklin Street and 1st Avenue and the risk of flooding to 1st and Grand Avenues which can incur flooding at the 100-year flood inundation of the MLDPR in the Village of River Grove. The west floodwall would average between 4-8 feet high for approximately 7,500 feet and require 4 pump stations to address interior drainage. The east floodwall, from River Grove Avenue to Fullerton Avenue, would measure approximately 3,000 feet long, average 4-8 feet high, and require 2 pump stations to address interior drainage. Both floodwalls include 3 feet of freeboard over the 100-year flood inundation.

Additionally, Grand Avenue would be raised for approximately 1,400 feet and would require the waterway opening to be enlarged. First Avenue would be raised for approximately 1,800 feet. Both roads would be raised to approximately 0.5 feet over the 100-year flood inundation. Table 3.6.20 compares the peak modeled water surface elevation and flow for Alternative DPR-6D.

TABLE 3.6.20
Mainstem Lower Des Plaines River Existing and Alternative Condition DPR-6D Flow and WSEL Comparison

		Existing Conditions		Alternative DPR-6D	
Location	Station	Max WSEL (ft)	Max Flow (cfs)	Max WSEL (ft)	Max Flow (cfs)
Upstream of Belmont	153106.6	626.4	6,912	626.4	6,912
Upstream of Soo Line Railroad	151370.3	626.0	6,910	626.0	6,910
Upstream of Grand	149902.6	625.8	6,915	625.8	6,915
Upstream of 1st Avenue	145060.7	615.1	6,917	625.1	6,918
Upstream of North Avenue	138355.0	624.7	6,932	624.7	6,934

DPR-8A. DPR-8A was developed to address the risk of flooding at Chicago Avenue in the Village of River Forest. The proposed alternative would raise approximately 3,300 feet of Chicago Avenue to approximately 0.5 above the 100-year flood inundation. Additionally, the waterway opening would be enlarged. Table 3.6.21 compares the peak modeled water surface elevation and flow for Alternative DPR-8A.

TABLE 3.6.21
Mainstem Lower Des Plaines River Existing and Alternative Condition DPR-8A Flow and WSEL Comparison

		Existing Conditions		Alternative DPR-8A	
Location	Station	Max WSEL (ft)	Max Flow (cfs)	Max WSEL (ft)	Max Flow (cfs)
Upstream of North Avenue	138355.0	624.7	6,932	624.7	6,935
Upstream of Chicago Avenue	131616.0	623.7	7,081	623.7	7,084
Upstream of Lake Street	128749.8	623.4	7,096	623.4	7,100

DPR-8B. DPR-8B was developed to address the risk of flooding to 19 structures north and south of Lake Street, east of the Des Plaines River in the Village of River Forest. The proposed alternative would consist of an approximately 2,200 feet long floodwall with an average height of 4 feet. The floodwall would include 3 feet of freeboard over the 100-year flood inundation and would require pump stations to address interior drainage. Table 3.6.22 compares the peak modeled water surface elevation and flow for Alternative DPR-8B.

TABLE 3.6.22
Mainstem Lower Des Plaines River Existing and Alternative Condition DPR-8B Flow and WSEL Comparison

		Existing Conditions		Alternative DPR-8A	
Location	Station	Max WSEL (ft)	Max Flow (cfs)	Max WSEL (ft)	Max Flow (cfs)
Upstream of Chicago Avenue	131616.0	623.7	7,081	623.7	7,083
Upstream of Lake Street	128749.8	623.4	7,096	623.4	7,097
Upstream of CB & Q Railroad	128467.0	623.1	7,097	623.1	7,098

DPR-9A. DPR-9A was developed to address the flooding risk at Roosevelt Road in the Village of Forest Park. The proposed alternative would raise approximately 715 feet of Roosevelt Road and would include enlarging the waterway opening and raising the low chord. The road profile would be raised to approximately 0.5 feet above the 100-year flood inundation. Table 3.6.23 compares the peak modeled water surface elevation and flow for Alternative DPR-9A.

TABLE 3.6.23
Mainstem Lower Des Plaines River Existing and Alternative Condition DPR-9A Flow and WSEL Comparison

		Existing Conditions		Alternative DPR-9A	
Location	Station	Max WSEL (ft)	Max Flow (cfs)	Max WSEL (ft)	Max Flow (cfs)
Upstream of Cemetery Bridge	119541.8	620.3	7,155	620.3	7,147
Upstream of Roosevelt Road	118367.1	620.1	7,162	620.1	7,154
Upstream of Cermak/22nd Street	111577.9	618.3	7,147	618.3	7,148

DPR-10. DPR-10 was developed to address the flooding Risk at Cermak Road/22nd Street in Proviso Township and Riverside Township. Cermak Road/22nd Street would be raised for approximately 450 feet to approximately 0.5 feet above the 100-year flood inundation. Table 3.6.24 compares the peak modeled water surface elevation and flow for Alternative DPR-10.

TABLE 3.6.24
Mainstem Lower Des Plaines River Existing and Alternative Condition DPR-10 Flow and WSEL Comparison

		Existing Conditions		Alternative DPR-10	
Location	Station	Max WSEL (ft)	Max Flow (cfs)	Max WSEL (ft)	Max Flow (cfs)
Upstream of Roosevelt Road	118367.1	620.1	7,162	620.1	7,162
Upstream of Cermak/22nd Street	111577.9	618.3	7,147	618.3	7,147
Upstream of 26th Street	108602.1	617.0	7127	617.0	7126

DPR-11A. DPR-11A was developed to address the flooding risk at Forest Avenue, 1st Avenue, and 59 structures located east of the existing Groveland Avenue Levee in Village of Riverside. The proposed alternative would consist of enhancing the existing Groveland Levee north to 31st Street and provide 3 feet of freeboard above the 100-year flood inundation. The floodwall would be approximately 3, 500 feet long with an average height of 7 feet. Three pump stations would be required to address interior drainage. Additionally, 1st Avenue would be raised for approximately 2,600 feet and Forest Avenue would be raised for approximately 1,800 feet to approximately 0.5 feet above the 100-year flood inundation. Table 3.6.25 compares the peak modeled water surface elevation and flow for Alternative DPR-11A.

TABLE 3.6.25
Mainstem Lower Des Plaines River Existing and Alternative Condition DPR-11A Flow and WSEL Comparison

		Existing Conditions		Alternative DPR-11A	
Location	Station	Max WSEL (ft)	Max Flow (cfs)	Max WSEL (ft)	Max Flow (cfs)
Upstream of 26th Street	108602.1	617.0	7,127	617.0	7,161
Upstream of 31st Street	104720.2	616.0	8,304	616.0	8,302
Downstream of Forest Avenue	101667.1	615.0	8,315	615.0	8,306
Upstream of CB & Q Railroad	100937.8	614.8	8,318	614.8	8,306

DPR-11B. DPR-11B was developed to address the flooding risk for 59 homes east of the existing Groveland Avenue Levee north of Brookfield Avenue and south of 31st Street in the Village of Riverside. The proposed strategy for this area is to extend the levee to the north to block off flow that goes around the north side of the levee and to provide 3 feet of freeboard for the subject area. To provide 3 feet of freeboard, the levee was extended north to 31st Street. The average height of the approximately 3,500 feet long levee would be 7 feet and would require 3 pump stations to address interior drainage. Table 3.6.26 compares the peak modeled water surface elevation and flow for Alternative DPR-11B.

TABLE 3.6.26
Mainstem Lower Des Plaines River Existing and Alternative Condition DPR-11B Flow and WSEL Comparison

		Existing Conditions		Alternative DPR-11B	
Location	Station	Max WSEL (ft)	Max Flow (cfs)	Max WSEL (ft)	Max Flow (cfs)
Upstream of 26th Street	108602.1	617.0	7,127	617.0	7139
Upstream of 31st Street	104720.2	616.0	8,304	616.0	8,285
Downstream of Forest Avenue	101667.1	615.0	8,315	615.0	8,299
Upstream of CB & Q Railroad	100937.8	614.8	8,318	614.8	8,299

DPR-11C. DPR-11C was developed to address the flooding risk at Forest Avenue, 1st Avenue, and 59 structures located east of the existing Groveland Avenue Levee in Village of Riverside. The proposed strategy was to incorporate the proposed USACE/IDNR pier extension project at the CB & Q Railroad to provide upstream benefits and allow optimization of the projects to address risks at Forest Avenue and 1st Avenue.

The USACE/IDNR pier extension project would extend the piers 50 feet to 100 feet upstream and downstream of the existing CB & Q Railroad. The angle of the pier extension will be in the direction of flow of the Des Plaines River. The Groveland Avenue floodwall would average 7 feet high for approximately 3,500 feet and require 3 pump stations to address interior drainage. First Avenue would be raised for approximately 1,100 feet and Forest Avenue would be raised approximately 750 feet to approximately 0.5 feet above the 100-year flood inundation. Table 3.6.27 compares the peak modeled water surface elevation and flow for Alternative DPR-11C.

TABLE 3.6.27
Mainstem Lower Des Plaines River Existing and Alternative Condition DPR-11C Flow and WSEL Comparison

		Existing Conditions		Alternative DPR-11C	
Location	Station	Max WSEL (ft)	Max Flow (cfs)	Max WSEL (ft)	Max Flow (cfs)
Upstream of 26th Street	108602.1	617.0	7,127	616.7	7,163
Upstream of 31st Street	104720.2	616.0	8,304	615.6	8,299
Downstream of Forest Avenue	101667.1	615.0	8,315	614.3	8,283
Downstream of CB & Q Railroad	99283.76	613.0	7,026	613.0	7,055

DPR-12. DPR-12 was developed to address the flooding risk at Ogden Avenue east of First Avenue in Village of Lyons. Approximately 900 feet of Ogden Avenue would be raised to approximately 0.5 feet above the 100-year flood inundation. Table 3.6.28 compares the peak modeled water surface elevation and flow for Alternative DPR-12.

TABLE 3.6.28
Mainstem Lower Des Plaines River Existing and Alternative Condition DPR-12 Flow and WSEL Comparison

		Existing Conditions		Alternative DPR-12	
Location	Station	Max WSEL (ft)	Max Flow (cfs)	Max WSEL (ft)	Max Flow (cfs)
Adjacent to Ogden Avenue	96674.10	612.1	9,058	612.1	9,058

DPR-13. DPR-13 was developed to address the flooding risk of 39 structures which can incur flooding at the 100-year inundation level along the south side of the Des Plaines River north of 39th Street between Joliet Avenue and Ogden Avenue in Unincorporated Cook County. The Riverside Lawndale Floodwall would be approximately 2,300 feet long with an average height of 6 feet. The floodwall would include 3 feet of freeboard above the 100-year flood inundation and would require 2 pump stations to address interior drainage. Table 3.6.29 compares the peak modeled water surface elevation and flow for Alternative DPR-13.

TABLE 3.6.29
Mainstem Lower Des Plaines River Existing and Alternative Condition DPR-13 Flow and WSEL Comparison

Location	Station	Existing Conditions Max WSEL (ft)	Existing Conditions Max Flow (cfs)	Alternative DPR-13 Max WSEL (ft)	Alternative DPR-13 Max Flow (cfs)
Downstream of Hofmann Dam	93298.31	605.4	9,888	605.4	9,886
Upstream of 43rd Street	85781.03	603.3	9,877	603.3	9,884

DPR-14A. DPR-14A was developed to address the flooding risk of 12 structures which can incur flooding at the 100-year inundation level along the west side of the Des Plaines River between 45th Street and 47th Street. The proposed alternative is comprised of an approximately 1,200 feet long floodwall averaging 3 to 4 feet in height. The floodwall would include 3 feet of freeboard over the 100-year inundation and would require pump stations to address interior drainage. Table 3.6.30 compares the peak modeled water surface elevation and flow for Alternative DPR-14A.

TABLE 3.6.30
Mainstem Lower Des Plaines River Existing and Alternative Condition DPR-14A Flow and WSEL Comparison

Location	Station	Existing Conditions Max WSEL (ft)	Existing Conditions Max Flow (cfs)	Alternative DPR-14A Max WSEL (ft)	Alternative DPR-14A Max Flow (cfs)
Upstream of 43rd Street	85781.03	603.3	9,877	603.3	9,898
Upstream of 47th Street	82725.92	602.9	9,868	602.9	9,901
Upstream of Chicago and Illinois Railroad	82234.2	602.8	9,866	602.8	9,899

DPR-14B. DPR-14B was developed to address the flooding risk at the 47th Street crossing of the Des Plaines River in the Village of Lyons. The proposed alternative would raise approximately 700 feet of 47th Street to approximately 0.5 feet over the 100-year flood inundation. Table 3.6.31 compares the peak modeled water surface elevation and flow for Alternative DPR-14B.

TABLE 3.6.31
Mainstem Lower Des Plaines River Existing and Alternative Condition DPR-14B Flow and WSEL Comparison

Location	Station	Existing Conditions Max WSEL (ft)	Existing Conditions Max Flow (cfs)	Alternative DPR-14B Max WSEL (ft)	Alternative DPR-14B Max Flow (cfs)
Upstream of 43rd Street	85781.03	603.3	9,877	603.3	9,877
Upstream of 47th Street	82725.92	602.9	9,868	602.9	9,868
Upstream of Chicago and Illinois Railroad	82234.2	602.8	9,866	602.8	9,866

DPR-14C. DPR-14C was developed to address the flooding risk behind the existing McCook Levee in the Village of McCook, Summit, and Lyons. The proposed strategy for this area is to enhance the existing McCook Levee to meet 3 feet of freeboard along the length of the levee from 47th Street to Interstate 55. To provide 3 feet of freeboard, additional sheet pile would be added to the appropriate elevation. The average height of the approximately 5,000 feet long levee would be 4 feet above the existing levee and would require pump stations to address interior drainage. Table 3.6.32 compares the peak modeled water surface elevation and flow for Alternative DPR-14C.

TABLE 3.6.32
Mainstem Lower Des Plaines River Existing and Alternative Condition DPR-14C Flow and WSEL Comparison

		Existing Conditions		Alternative DPR-14C	
Location	**Station**	**Max WSEL (ft)**	**Max Flow (cfs)**	**Max WSEL (ft)**	**Max Flow (cfs)**
Upstream of 43rd Street	85781.03	603.3	9,877	603.3	9,898
Upstream of 47th Street	82725.92	602.9	9,868	602.9	9,901
Upstream of Chicago and Illinois Railroad	82234.2	602.8	9,866	602.8	9,899
Approximately 5,100 feet downstream of 47th Street	77614.32	602.1	9,865	602.1	9,896

DPR-14D. DPR-14D was developed to address the flooding risk to 204 structures behind the existing 47th Street Levee between 43rd Street and 47th Street in the Village of Lyons. The average height of the floodwall that would enhance the height of the existing levee, would be approximately 2.5 feet which would include approximately 3 feet of freeboard over the 100-year flood inundation. Pump stations would be required to address interior drainage. Mitigating storage would be provided in the Lyons Quarry. Table 3.6.33 compares the peak modeled water surface elevation and flow for Alternative DPR-14D.

TABLE 3.6.33
Mainstem Lower Des Plaines River Existing and Alternative Condition DPR-14D Flow and WSEL Comparison

		Existing Conditions		Alternative DPR-14D	
Location	**Station**	**Max WSEL (ft)**	**Max Flow (cfs)**	**Max WSEL (ft)**	**Max Flow (cfs)**
Upstream of 43rd Street	85781.03	603.3	9,877	602.6	8,940
Upstream of 47th Street	82725.92	602.9	9,868	602.2	8,946
Upstream of Chicago and Illinois Railroad	82234.2	602.8	9,866	602.1	8,947

DPR-15. DPR-15 was developed to address the flooding risk to 5 non-residential structures west of the Des Plaines River north of Interstate 55 in the Village of Hodgkins. An approximately 10,000 feet long floodwall would be proposed averaging 3 to 5 feet in height which would include 3 feet of freeboard above the 100-year flood inundation. Pump stations would be required to address interior drainage. Table 3.6.34 compares the peak modeled water surface elevation and flow for Alternative DPR-15.

TABLE 3.6.34
Mainstem Lower Des Plaines River Existing and Alternative Condition DPR-15 Flow and WSEL Comparison

		Existing Conditions		Alternative DPR-15	
Location	Station	Max WSEL (ft)	Max Flow (cfs)	Max WSEL (ft)	Max Flow (cfs)
Upstream of 43rd Street	85781.03	603.3	9,877	603.3	9,878
Upstream of 47th Street	82725.92	602.9	9,868	602.9	9,870
10,100 feet upstream of Flagg Creek Confluence	48224.2	599.0	9,930	599.0	9,937

DPR-22. DPR-22 was developed per the request of the Riverside Residents for Flood Prevention. The proposed alternative consists of utilizing the existing Lyons Quarry as a flood control reservoir. The proposed storage volume evaluated was approximately 3,500 A-F. Ogden Avenue would also be raised to address the flooding risk on Ogden Avenue and accommodate a control structure to divert flow from the Des Plaines River to the Lyons Quarry. This alternative does not address a specific reported problem area but does provide an increase in the level of protection in the area of the quarry. This alternative does not remove the downstream structures from the risk of flooding. Table 3.6.35 compares the peak modeled water surface elevation and flow for Alternative DPR-22.

TABLE 3.6.35
Mainstem Lower Des Plaines River Existing and Alternative Condition DPR-22 Flow and WSEL Comparison

		Existing Conditions		Alternative DPR-22	
Location	Station	Max WSEL (ft)	Max Flow (cfs)	Max WSEL (ft)	Max Flow (cfs)
Downstream of 31st Street	103825.6	615.7	8,308	615.7	8,307
Downstream of Forest Avenue	101667.1	615.0	8,315	615.0	8,192
Upstream of CB & Q Railroad	100937.8	614.8	8,318	614.8	8,191
Upstream of 43rd Street	85781.03	603.3	9,877	602.8	9,364
Upstream of 47th Street	82725.92	602.9	9,868	602.4	9,335

DPR-23. DPR-23 was developed to evaluate 5 USACE concept flood control reservoirs along the MLDPR corridor. The five flood control reservoirs are located as follows: In Lake County along Aptakisic Creek, between Lake-Cook Road and Dundee Road, south of Dundee Road, between Euclid Avenue and Central Road, and between Irving Park Road and Belmont Avenue. The flood control reservoirs would provide approximately 400 A-F, 1,100 A-F, 300 A-F, 2,100 A-F, and 700 A-F, respectively, for a total of approximately 4,600 A-F of flood control storage. This alternative does not address a specific reported problem area but does provide an increase in the level of protection along reaches of the MLDPR corridor. This alternative does not remove structures from the risk of flooding. Table 3.6.36 compares the peak modeled water surface elevation and flow for Alternative DPR-23.

TABLE 3.6.36
Mainstem Lower Des Plaines River Existing and Alternative Condition DPR-23 Flow and WSEL Comparison

		Existing Conditions		Alternative DPR-23	
Location	Station	Max WSEL (ft)	Max Flow (cfs)	Max WSEL (ft)	Max Flow (cfs)
Upstream of Dundee Road	252101.0	641.1	4,816	640.8	4,604
Upstream of Central Road	217928.2	635.0	5,556	634.7	5,057
Upstream of Oakton Street	195201.0	631.4	6,013	631.0	5,620
Upstream of Lawrence Avenue	165073.0	627.8	6,705	627.3	6,559
Upstream of North Avenue	138355.0	624.7	6,932	624.3	6,468
Upstream of Cermak/22nd Street	111577.9	618.3	7,147	618.2	6,833

DPR-26. DPR-26 was developed to address the flooding risk at the North Avenue crossing of the Des Plaines River that impacts portions of the Villages of Elmwood Park, River Forest, and River Grove. The proposed alternative would raise approximately 2,000 feet of North Avenue to approximately 0.5 feet over the 100-year flood inundation. Table 3.6.37 compares the peak modeled water surface elevation and flow for Alternative DPR-26.

TABLE 3.6.37
Mainstem Lower Des Plaines River Existing and Alternative Condition DPR-26 Flow and WSEL Comparison

		Existing Conditions		Alternative DPR-26	
Location	Station	Max WSEL (ft)	Max Flow (cfs)	Max WSEL (ft)	Max Flow (cfs)
Downstream of 1st Avenue	144976.1	625.1	6918	625.1	6,905
Upstream of North Avenue	138355.0	624.7	6,932	624.7	6,919
Upstream of Chicago Avenue	131616.0	623.7	7,081	623.7	7,067

A number of properties are at risk of shallow flooding during the 100-year flood event under existing conditions or recommended alternatives. In addition, due to their locations, other properties' risk of flooding cannot be feasibly mitigated by structural measures. Such properties are candidates for protection using nonstructural flood control measures, such as flood-proofing or acquisition. These measures may be considered to address damages that are not fully addressed by capital projects recommended in the Lower Des Plaines River DWP.

Hydraulic modeling results for MLDPR Watershed shows the roadways crossings (state route, US highway, or four-lane road or greater) that are overtopped for storm events of 100-year recurrence interval and below by a depth of greater than 0.5 feet. Table 3.6.38 provides a summary of the depth of road flooding for existing conditions and with recommended alternatives.

TABLE 3.6.38
MLDPR Watershed Road Overtopping Summary

Road Crossing	Road Elevation	25-yr Depth of Flooding	50-yr Depth of Flooding	100-yr Depth of Flooding
Central Road	631.43	2.64	3.1	3.52
Central Road (with DPR-2A)	636	-	-	-
Central Road (with DPR-2B)	636	-	-	-
Golf Road[1]	631.4	1.5	1.99	2.49
Rand Road	630	1.85	2.45	3.07
Rand Road (with DPR-2A)	634	-	-	-
Rand Road (with DPR-2B)	634	-	-	-
Des Plaines River Road at Rand Road	629.4	0.77	1.51	2.13
Des Plaines River Road between Thacker and Campbell	629	-	0.94	1.51
Algonquin Road	629.52	1.12	1.71	2.33
Algonquin Road (with DPR-2A)	632.5	-	-	-
Algonquin Road (with DPR-2B)	632.5	-	-	-
Des Plaines River Road between Algonquin and Whitcomb	630.5	0.22	0.8	1.4
Oakton Street	630	0.24	0.85	1.45
Oakton Street (with DPR-2A)	632	-	-	-
Oakton Street (with DPR-2B)	632	-	-	-
Des Plaines River Road between Howard and Fargo	627.5	0.78	1.56	2.14
Higgins Road	627.9	0.54	1.4	2.03
Higgins Road (with DPR-4)	630.5	-	-	-
Lawrence Avenue	626.0	-	1.1	1.8
Lawrence Avenue (with DPR-5)	628.3	-	-	-
Irving Park Road	621.7	3.91	4.72	5.35
Irving Park Road (with DPR-5)	627.2	-	-	-
River Road between Irving Park	622.9	2.33	3.15	3.76

TABLE 3.6.38
MLDPR Watershed Road Overtopping Summary

Road Crossing	Road Elevation	25-yr Depth of Flooding	50-yr Depth of Flooding	100-yr Depth of Flooding
Road and Belmont Avenue				
River Road between Irving Park Road and Belmont Avenue (with DPR-5)		-	-	-
Des Plaines River Road between Irving Park and Ivanhoe	622.5	0.83	1.75	2.31
Des Plaines River Road between Ivanhoe & Robinson	622.5	-	1.49	2.07
Des Plaines River Road between Robinson and Belmont	623.5	-	-	0.97
Grand Avenue	621.68	2.7	3.45	4.01
Grand Avenue (with DPR-6D)	626.2	-	-	-
1st Avenue	622	1.87	2.59	3.16
1st Avenue (with DPR-6D)	625.6	-	-	-
North Avenue	621.75	-	2.16	2.89
North Avenue (with DPR-26)	625.14	-	-	-
Chicago Avenue	619.53	2.79	3.59	4.16
Chicago Avenue (DPR-8A)	624.2	-	-	-
Roosevelt Road	618	0.93	1.51	1.95
Roosevelt Road (DPR-9A)	620.5	-	-	-
Cermak Road/22nd Street	614.63	2.7	3.28	3.71
Cermak Road/22nd Street (with DPR-10)	618.85	-	-	-
1st Avenue south of 31st Street	614.6	0.03	0.52	1.01
1st Avenue south of 31st Street (with DPR-11A)	617.1	-	-	-
1st Avenue south of 31st Street (with DPR-11C)	616.1	-	-	-
Forest Avenue	614	0.07	1.55	1.03
Forest Avenue (with DPR-11A)	615.6	-	-	-

TABLE 3.6.38
MLDPR Watershed Road Overtopping Summary

Road Crossing	Road Elevation	25-yr Depth of Flooding	50-yr Depth of Flooding	100-yr Depth of Flooding
Forest Avenue (with DPR-11C)	614	-	-	0.43
Ogden Avenue	612	-	-	0.74
Ogden Avenue (with DPR-12)	614.5	-	-	-
47th Street	600.34	1.09	1.91	2.52
47th Street (with DPR-14B)	603.5	-	-	-
River Road at Gregory Street[2]				

Note: Blank entry indicates that road crossing does not overtop for that particular storm event.

[1] Golf Road cannot be raised because it goes under a viaduct.

[2] See the Feehanville Ditch Section 3.6 for River Road at Gregory Street

3.6.3.6 Data Required for Countywide Prioritization of Watershed Projects

Appendix I presents conceptual level cost estimates for the recommended alternatives. Table 3.6.12 lists alternatives analyzed in detail as part of the DWP development.

Alternatives DPR-1, DPR-3A, DPR-5, DPR-6D, DPR-8B, DPR-11C, DPR-13, DPR-14A, and DPR-15 all address the risk of flooding for structures and roads primarily by the construction of floodwalls. Alternatives DPR-14D and DRP-15 address the risk of flooding that can occur by enhancing existing levees. Alternatives DPR-2B, DPR-4, DPR-8A, DPR-9A, DPR-12, DPR-14B, and DPR-26 address regional transportation damages through raising roadways and modifying waterway openings, if necessary.

Figures 3.6.8 through 3.6.31 show the locations and a summary of the proposed and recommended alternatives described in Table 3.6.39. Figures 3.6.8 through 3.6.31 also show comparisons of the existing condition and alternative condition inundation areas.

TABLE 3.6.39
Des Plaines River Project Alternative Matrix to Support District CIP Prioritization

Alternative ID	Description	B/C Ratio	Net Benefits ($)	Total Project Cost ($)	Cumulative Structures Removed from 100-year Inundation	Roadways Protected	Water Quality Benefit	Recom-mended	Communities Involved
DPR-1	Dundee to Hintz Roads Floodwall	0.01	258,750	17,826,218	6	0	No Impact	Y	Wheeling
DPR-2A	Raise 4 Roads, Mitigating Storage	0.03	11,936,692	385,800,282	N/A	4	Positive	N	Des Plaines, Unincorporated Cook County
DPR-2B	Raise 4 Roads, Modify Central Road Bridge	0.4	7,884,379	18,967,319	0	4	No Impact	Y	Des Plaines
DPR-3A	City of Des Plaines Regional Floodwall	0.1	52,565,869	523,018,856	300 - 500	N/A	No Impact	Y	Des Plaines, Unincorporated Cook County
DPR-4	Raise Higgins and River Roads, Glenlake Avenue	0.2	1,558,254	9,305,254	0	3	No Impact	Y	Rosemont
DPR-5	Irving Park Road to Belmont Ave-nue. Floodwall, raise Irving Park Road, Lawrence Avenue	0.3	9,936,443	28,619,651	13	3	No Impact	Y	Franklin Park, Schiller Park
DPR-6D	Franklin Street to First Avenue Floodwalls, Raise Grand and First Avenues	0.4	19,352,980	45,891,893	115	3	No Impact	Y	River Grove
DPR-8A	Raise Chicago Avenue and Modify Bridge	0.04	407,298	10,371,259	0	1	No Impact	Y	River Forest

TABLE 3.6.39
Des Plaines River Project Alternative Matrix to Support District CIP Prioritization

Alternative ID	Description	B/C Ratio	Net Benefits ($)	Total Project Cost ($)	Cumulative Structures Removed from 100-year Inundation	Roadways Protected	Water Quality Benefit	Recom-mended	Communities Involved
DPR-8B	Floodwall North of Lake Street	0.2	985,073	6,097,943	19	0	No Impact	Y	River Forest
DPR-9A	Raise Roosevelt Road and Modify Bridge	0.2	821,943	4,596,656	0	1	No Impact	Y	Forest Park
DPR-10	Raise Cermak Road	0.2	126,538	538,276	0	1	No Impact	Y	Proviso Town-ship and River-side Township
DPR-11A	Groveland Ave-nue Floodwall, Raise 1st and Forest Avenues	0.4	11,553,857	29,244,335	59	2	No Impact	N	Riverside
DPR-11B	Groveland Ave-nue Floodwall	0.6	10,083,162	15,930,181	59	0	No Impact	N	Riverside
DPR-11C	Groveland Ave-nue Floodwall, Raise 1st and Forest Avenues, Railroad Pier Extension	0.4	11,767,856	28,267,020	59	2	No Impact	Y	Riverside
DPR-12	Raise Ogden Avenue	0.05	51,782	1,029,060	0	1	No Impact	Y	Lyons
DPR-13	Riverside Lawn-dale Floodwall	1.4	14,100,116	9,880,904	39	0	No Impact	Y	Unincorporated Cook County
DPR-14A	Floodwall North of 47th Street	0.08	370,987	4,594,661	12	0	No Impact	Y	Lyons

TABLE 3.6.39
Des Plaines River Project Alternative Matrix to Support District CIP Prioritization

Alternative ID	Description	B/C Ratio	Net Benefits ($)	Total Project Cost ($)	Cumulative Structures Removed from 100-year Inundation	Roadways Protected	Water Quality Benefit	Recom-mended	Communities Involved
DPR-14B	Raise 47th Street	0.01	269,713	18,200,778	0	1	No Impact	Y	Lyons
DPR-14C	McCook Levee Enhancement	0.2	1,350,067	8,265,570	17	0	No Impact	Y	McCook, Sum-mit, Lyons
DPR-14D	47th Street Levee Enhancement	0.03	8,621,560	260,991,361	204	0	Positive	Y	Stickney, Forest View
DPR-15	Floodwall North of Interstate55	<0.01	194,043	25,785,787	5	0	No Impact	Y	Hodgkins
DPR-22	Lyons Quarry Storage	<0.01	648,217	251,163,010	0	1	Positive	N	Lyons
DPR-23	USACE Concept Reservoirs	<0.01	5,000,000	> 600,000,000	N/A	N/A	Positive	N	Numerous Communities
DPR-26	Raise North Avenue	0.08	322,411	4,243,200	0	1	No Impact	Y	Elmwood Park, River Forest, River Grove

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3.7 Des Plaines River Tributary A

TABLE 3.7.1
Communities Draining to Des Plaines Tributary A

Community	Tributary Area (mi^2)
Countryside	0.09
La Grange	0.07
Unincorporated Cook County	0.23
Western Springs	0.01
TOTAL	0.40

Note: This list includes community areas tributary to the Des Plaines River Tributary A within Cook County.

The Des Plaines River Tributary A Watershed area studied measures approximately 0.40 square miles and is located north of Joliet Road, east of Wolf Road, west of Brainard Ave and south of 47th Street within the Village of LaGrange Park and the City of Countryside. The watershed contains no flood control reservoirs. The tributary originates downstream of Plainfield Road and flows north through the LaGrange Country Club where it enters a 48-inch RCP and empties into the local sewer system located within the Salt Creek Watershed.

The Des Plaines River Tributary A study terminates at the LaGrange Country Club where it enters the local storm sewer system. No problem areas were reported downstream of this point and there is also no FEMA defined floodplain downstream. The studied area of the Des Plaines River Tributary A Subwatershed primarily consists of residential landuse.

TABLE 3.7.2
Land Use Distribution for Des Plaines Tributary A within Cook County

Land Use Category	Area (acres)	%
Residential	121	47.2
Commercial/Industrial	5.46	2.1
Forest/Open Land	98.78	38.5
Institutional	29.13	11.4
Transportation/Utility	0.0	0
Water/Wetland	2.04	0.8
Agricultural	0	0

Source: Chicago Metropolitan Agency for Planning's 2005 Land Use Inventory for Cook, DuPage, Kane, Kendall, Lake, McHenry and Will Counties, Illinois. Version 1.0. Published January 2009

Figure 3.7.1 shows the areas directly tributary to Des Plaines River Tributary A. Table 3.7.1 lists the communities located in areas directly tributary to the Des Plaines River Tributary A Subwatershed. No stormwater problem areas were reported in the Des Plaines River Tributary A subwatershed. Table 3.7.2 lists the land use breakdown by area within the Des Plaines River Tributary A Subwatershed.

3.7.1 Sources of Data

3.7.1.1 Previous Studies

Limited study information was available for review for the Des Plaines River Tributary A Watershed. The original hydrologic and hydraulic analysis was performed in March 1980 by Harza Engineering Company for the FIA. The August 2008 Cook County FIS reports that Regional Equations were originally used to determine the flow rates used in the analysis. The original hydrologic information was not available for review. The Cook County FIS states that WSP-2 hydraulic modeling was prepared and used a rating curve for the outlet culvert as the starting water surface elevation. The WSP-2 hydraulic model was revised to include the Peck Avenue Ditch Improvements that were approved by FEMA in a 2003 LOMR.

3.7.1.2 Water Quality Data

There are no District or IEPA water quality monitoring stations in the Des Plaines River Tributary A Subwatershed. The IEPA's 2010 *Integrated Water Quality Report*, which includes the CWA 303(d) and 305(b) lists, lists no impaired waterways within the subwatershed. The Des Plaines River Tributary A Subwatershed was not included the *Des Plaines River/Higgins Creek Watershed TMDL Stage 1 Report*, March 2009. No TMDLs have been investigated for the Des Plaines River Tributary A or its tributaries.

According to the water permit discharge data provided by the USEPA, there are no NPDES permits issued by IEPA for discharges to the Des Plaines River Tributary A Subwatershed. Municipalities discharging to the Des Plaines River Tributary A are regulated by IEPA's NPDES Phase II Stormwater Permit Program, which was instituted to improve water quality by requiring that municipalities develop six minimum measure controls for limiting runoff pollution to receiving systems.

3.7.1.3 Wetland and Riparian Areas

Figures 2.3.6 and 2.3.7 contain mapping of wetland and riparian areas in the Lower Des Plaines River Watershed. Wetland areas were identified using NWI mapping. NWI data includes roughly 0.68 acres of wetland areas in the Des Plaines River Tributary A Subwatershed. Riparian areas are defined as vegetated areas between aquatic and upland ecosystems adjacent to a waterway or body of water that provides flood management, habitat, and water quality enhancement. Identified riparian environments offer potential opportunities for restoration.

3.7.1.4 Floodplain Mapping

Flood inundation areas supporting the NFIP were revised in 2008 as part of the FEMA's Map Modernization Program. As part of the new mapping, floodplain boundaries were revised based upon updated Cook County topographic information; however, the hydrologic and hydraulic computer models, which are used to estimate flood levels, were not updated. LOMRs were incorporated into revised floodplain areas. Des Plaines Tributary A is mapped in detail in the DFIRM mapping update, with Zone AE floodplain. The original hydrologic and hydraulic analysis was performed in March 1980 by Harza Engineering Company for the FIA. Regional Equations were originally used to determine the flow rates used in the analysis. The original hydrologic information was not available for review. Appendix A includes a comparison of FEMA's effective floodplain mapping from updated DFIRM panels with inundation areas developed for the DWP.

3.7.1.5 Stormwater Problem Data

Starting in the 3rd quarter of 2007, communities, agencies (e.g., IDOT, CCHD), and stakeholders submitted Form B questionnaire response data to the District summarizing known stormwater problems within their jurisdictions. The questionnaires were requested again by the District following the September 2008 storm event. Table 3.7.3 summarizes reported problem areas reviewed as a part of the DWP development. Problems are classified in Table 3.7.3 as regional or local. This classification is based on a process described in Section 1 of this report. The Problem Area ID naming convention was found in Technical Memorandum entitled, "Proposed Naming Conventions for Database Elements" dated August 3, 2007.

TABLE 3.7.3
Community Response Data for Des Plaines River Tributary A

Problem Area ID[1,3]	Municipality	Problems as Reported by Local Agency	Location	Problem Description	Local/ Regional	Resolution in DWP
LT-FL-01	Lyons Township	Blockage	5441 Edgewood Avenue	Obstruction inhibits natural flow of water north into LaGrange Country Club	Local	This is a local problem.[2]
LT-FL-02	Lyons Township	Pavement Flooding	58^{th} and Peck Avenue	Ditch conveyance to culvert at 58th and Peck. Water is obstructed from west causing backup and flooding.	Local	This is a local problem.[2]

[1] All Problem Area IDs begin with DP-DPTA- as they are in the Des Plaines River – Des Plaines River Tributary A Subwatershed.
[2] Problem does not meet regional definition (refer to chapter 1). Solutions for the local problems are not addressed in the DWP.
[3]These problem areas were identified prior to the June and July 2010 storm events.

3.7.1.6 Near Term Planned Projects

No near-term planned major flood control projects to be constructed by others were identified for the Des Plaines River Tributary A Subwatershed.

3.7.2 Watershed Analysis

3.7.2.1 Hydrologic Model Development

Subbasin Delineation. The Des Plaines River Tributary A drainage area was delineated based upon 2003 Cook County LiDAR topographic data developed by Cook County. There are 2 subbasins ranging in size from 0.13 to 0.27 square miles with a total drainage area of 0.40 square miles. No subbasins were delineated south of Plainfield Road as the area south of Plainfield Road is tributary to a 36-inch culvert that discharges into the Plainfield Road storm sewer. The Plainfield Road storm sewer conveys flow to the northeast to the Summit Conduit which is discussed in Section 3.6.2.1.

Hydrologic Parameter Calculations. CN values were estimated for each subbasin based upon NRCS soil data and 2001 CMAP land use data. This method is further described in Section 1.3.2, with lookup values for specific combinations of land use and soil data presented in Appendix C. An area-weighted average of the CN was generated for each subbasin.

Clark's unit hydrograph parameters were estimated using the method described in Section 1.3.2. Appendix G provides a summary of the hydrologic parameters used for subbasins in each Subwatershed.

3.7.2.2 Hydraulic Model Development

Field Data, Investigation, and Existing Model Data. The FEMA effective hydraulic model was developed by Harza Engineering Company in 1980 using WSP-2. Selected data from the WSP-2 hydraulic model was incorporated into the new unsteady HEC-RAS hydraulic model as it was the best available data for the Des Plaines River Tributary A. Data used from the FIS hydraulic model include existing culvert sizes and inverts and the overtopping elevation of the existing weir located within the golf course.

The new unsteady HEC-RAS hydraulic model incorporated HEC-GeoRAS cross-sections extracted from the TIN created in GIS from the 2003 Cook County LiDAR topographic data were imported into HEC-RAS.

Field visits were performed to assess channel and overbank roughness characteristics. The information gathered in the field was compared to photographs and aerial photography to review and determine Manning's *n* roughness coefficients for the unsteady HEC-RAS hydraulic model. Obstructions were also added to the cross-sections in locations where homes could be inundated by the floodplain. A rating curve for the existing 48-inch RCP located at Brainard Ave was developed and utilized as the tailwater elevation for the unsteady HEC-RAS hydraulic model.

Boundary Conditions. The downstream boundary condition for the Des Plaines River Tributary A is a rating curve developed for the existing 48-inch RCP storm sewer located at Brainard Avenue.

3.7.1.1.1 Calibration and Verification

No stream gage or HWM was available within the Des Plaines River Tributary A Subwatershed. Based on previous Lower Des Plaines River Tributary calibrations, the CUH storage coefficient, R, was multiplied by a factor of 2.57 for all subbasins in the Des Plaines River Tributary A HEC-HMS hydrologic model. The R multiplier was determined for ungaged watersheds based on the results of calibrations performed for gaged subwatersheds. An equation was developed based on the average of the slopes calculated for use in determining the time of concentration. That equation was used to determine an R value for ungaged subwatersheds.

3.7.2.3 Existing Conditions Evaluation

Flood Inundation Areas. Figure 3.1.3 shows inundation areas in the Des Plaines River Tributary A Subwatershed produced by the DWP's hydraulic model for the 100-year, 2-hour critical duration design storm.

Hydraulic Profiles. Appendix H contains existing conditions hydraulic profiles for Des Plaines River Tributary A. Profiles are shown for the 2-, 5-, 10-, 25-, 50-, 100-, and 500-year recurrence interval design storms.

3.7.3 Development and Evaluation of Alternatives

3.7.3.1 Problem Definition

No regional stormwater problem areas were reported or identified through modeling; therefore, no proposed alternative projects were evaluated.

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3.8 East Avenue Ditch and 57th Street Ditch

The East Avenue Ditch Watershed measures approximately 1.6 square miles and is located east of Brainard Avenue and south of 55th Street, mainly within the City of Countryside, Lyons Township, and Village of McCook. The watershed consists mainly of residential and industrial land use. There are no flood control reservoirs located within the watershed, but flood control projects have been constructed which include three lateral weirs where water is allowed to leave the watershed and enter the quarry located between East 55th Street and East Avenue.

TABLE 3.8.1
Communities Draining to East Avenue Ditch and 57th Street Ditch

Community		Tributary Area (mi^2)
LaGrange		0.04
Countryside		0.85
Lyons Township		0.35
Indian Head Park		0.01
Hodgkins		0.10
McCook		0.28
	Total	1.63

The East Avenue Ditch channel begins east of LaGrange Road and flows from west to east along the southern boundary of Ideal Elementary School. At the eastern side of the Ideal School property, East Avenue Ditch enters two 9 feet wide by 4 feet high RCBCs that are located under a vertical wall bituminous overflow channel. The RCBCs and channel continue east to a point approximately 375 feet west of East Avenue where they both turn 90 degrees to the north and continue north along the rear lots of the apartments on Rose Avenue, under 58th Street, and through the parking lots for the apartments located along East Avenue. West of the apartments along East Avenue, the East Avenue Ditch combines with the 57th Street Ditch.

57th Street Ditch originates downstream of LaGrange Road and flows west to east between 57th and 58th Street. 57th Street Ditch is enclosed in two 6 feet wide by 4 feet high RCBCs which combine with the East Avenue Ditch upstream of the three 12 feet wide by 4 feet high RCBCs and a 63 inch by 98 inch elliptical RCP which convey the East Avenue Ditch under East Avenue. The flood control improvements described in the above paragraphs were constructed by the City of Countryside to mitigate overbank flooding.

TABLE 3.8.2
Land Use Distribution for East Avenue and 57th Street Ditch within Cook County

Land Use Category	Area (acres)	%
Residential	532	51.6
Commercial/Industrial	245	23.8
Forest/Open Land	16	1.6
Institutional	21	2.0
Industrial	166	16.1
Water/Wetland	51	4.9

On the east side of the East Avenue crossing, the tributary turns 90 degrees to the north and flows north along the east side of East Avenue. Approximately 250 feet north of the East Avenue crossing, a 100 feet long lateral weir was installed by the City of Countryside as a flood control structure. The lateral weir allows flows from the East Avenue Ditch to be conveyed into the McCook quarry. The East Avenue Ditch continues north to the southern side of 55th Street where it turns 90 degrees to the east and flows east past the General Motors Electro-Motive Plant and then crosses under 55th Street. Just upstream of the 55th Street crossing there is a lateral weir which allows flows from the East Avenue Ditch to be conveyed into the quarry. After crossing under 55th Street, the ditch continues east to Joliet Road where it follows the west side of Joliet Road to a railroad crossing. Along Joliet Road there is another lateral weir which allows flow from the East Avenue Ditch to be conveyed into the quarry.

At the intersection of Joliet Road and the railroad, the East Avenue Ditch turns 90 degrees from the northeast to the northwest and flows northwest along the southwest side of the railroad tracks. The East Avenue Ditch study terminates at the upstream face of the culvert which enters the industrial park located northeast of the General Motors Electro-Motive plant. No problem areas were reported downstream of the railroad and there is also no FEMA defined floodplain downstream of the railroad.

East Avenue Ditch is a tributary to the Summit Conduit which is an inverted siphon located downstream of the railroad yard that conveys flow under the Des Plaines River into the Chicago Sanitary and Ship Canal. Because the East Avenue Ditch is not tributary to the Des Plaines River, it is not included as a tributary to the Des Plaines River in the Mainstem Des Plaines River hydrologic and hydraulic analysis.

Figure 3.8.1 shows the areas directly tributary to East Avenue and 57th Street Ditch. Table 3.8.1 lists the communities located in areas directly tributary to the East Avenue and 57th Street Ditch Subwatershed. Most of the surface runoff in the subwatershed is collected by municipal storm sewers and conveyed to East Avenue or 57th Street Ditch. There is very little surface runoff directed to the East Avenue or 57th Street Ditch in open channels. No stormwater problem areas were reported in the East Avenue Ditch Subwatershed. Table 3.8.2 lists the land use breakdown by area within the East Avenue and 57th Street Ditch Subwatershed.

3.8.1 Sources of Data

3.8.1.1 Previous Studies

The 1980 City of Countryside FIS has been continually updated through the years. Numerous channel improvements which have been constructed along the ditches:

- Lateral weir allowing East Avenue Ditch flow into the quarry, 1993.
- Widening and deepening of the East Avenue Ditch between the East Avenue crossing and the lateral weir, 1993.
- Additional crossing of East Avenue and enclosure of the 57th Street Ditch, 2001.
- Enclosure of the East Avenue Ditch from the East Avenue crossing to the end of the residential impacts, 2005.
- A LOMR for the listed flood control projects was issued, February 9, 2006.

The FIS information was used for reference purposes only.

3.8.1.2 Water Quality Data

There are no District or IEPA water quality monitoring stations within the DWP study area in the East Avenue or 57th Street Ditch subwatershed. The IEPA's 2010 *Integrated Water Quality Report*, which includes the CWA 303(d) and 305(b) lists, lists no impaired waterways within the subwatershed. The East Avenue Ditch Subwatershed area was not included in the *Des Plaines River/Higgins Creek Watershed TMDL Stage 1 Report*, March 2009. No TMDLs have been investigated for East Avenue and 57th Street Ditch or its tributaries.

There are no NPDES point source discharges to East Avenue and 57th Street Ditch. Municipalities discharging to East Avenue and 57th Street Ditch are regulated by IEPA's NPDES Phase II Stormwater Permit Program, which was instituted to improve water quality by requiring that municipalities develop six minimum measure controls for limiting runoff pollution to receiving systems.

3.8.1.3 Wetland and Riparian Areas

Figures 2.3.6 and 2.3.7 contain mapping of wetland and riparian areas in Lower Des Plaines River Watershed. Wetland areas were identified using NWI mapping. NWI data includes roughly 3.2 acres of wetland areas in the East Avenue and 57th Street Ditch Subwatershed. Riparian areas are defined as vegetated areas between aquatic and upland ecosystems adjacent to a waterway or body of water that provides flood management, habitat, and water quality enhancement. Identified riparian environments offer potential opportunities for restoration.

3.8.1.4 Floodplain Mapping

Flood inundation areas supporting the NFIP were revised in 2008 as a part of FEMA's Map Modernization Program. Floodplain boundaries were revised based upon updated Cook County topographic information.

East Avenue and 57th Street Ditch are mapped in detail in the DFIRM mapping update, with Zone AE floodplain shown across the length of East Avenue and 57th Street Ditch. Appendix A includes a comparison of FEMA's effective floodplain mapping from updated DFIRM panels with inundation areas developed for the DWP.

3.8.1.5 Stormwater Problem Data

Starting in the 3rd quarter of 2007, communities, agencies (e.g., IDOT, CCHD), and stakeholders submitted Form B questionnaire response data to the District summarizing known stormwater problems within their jurisdictions. The questionnaires were requested again by the District following the September 2008 storm event. Table 3.8.3 summarizes reported problem areas reviewed as a part of the DWP development. Problems are classified in Table 3.8.3 as regional or local. This classification is based on a process described in Section 1 of this report. The Problem Area ID naming convention was found in Technical Memorandum entitled, "Proposed Naming Conventions for Database Elements" dated August 3, 2007.

TABLE 3.8.3
Community Response Data for East Avenue Ditch

Problem Area ID[1,3]	Municipality	Problems as Reported by Local Agency	Location	Problem Description	Local/ Regional	Resolution in DWP
CS-FL-01	Countryside	Pavement Flooding	Plainfield Road at Salem Square Shopping Center	Roadway drainage problems	Local	This is a local problem.[2]
CS-FL-02	Countryside	Pavement Flooding	East Avenue at 56th Street	Reported by IDOT: Last incident 01/22/09	Local	This is a local problem.[2]
CS-FL-03	Countryside	Pavement Flooding	57th Street and Madison Avenue	Area floods when 5500 block of Kensington Avenue floods	Local	This is a local problem.[2]
CS-FL-04	Countryside	Pavement Flooding	Bobolink Drive between LaGrange Road and 7th Avenue	Discharges to IDOT 55th Street storm sewer which surcharges	Local	This is a local problem.[2]
LT-FL-01	Lyons Township	Pavement Flooding	62nd Street and Brainard Avenue	Nuisance flooding from Edgewood Avenue to Brainard Avenue	Local	This is a local problem.[2]
LT-FL-02	Lyons Township	Pavement Flooding	Between 61st Street and 62nd Street	Creek between 61st and 62nd Streets acts as outlet for storm sewer drainage	Local	This is a local problem.[2]

[1] All Problem Area IDs begin with DP-EADT- as they are in the Des Plaines River – East Avenue Ditch Subwatershed.
[2] Problem does not meet regional definition (refer to chapter 1). Solutions for the local problems are not addressed in the DWP.
[3] These problem areas were identified prior to the June and July 2010 storm events.

3.8.1.6 Near-Term Planned Projects

No near-term planned major flood control projects to be constructed by others were identified for East Avenue Ditch or 57th Street Ditch.

3.8.2 Watershed Analysis

3.8.2.1 Hydrologic Model Development

Subbasin Delineation. The East Avenue Ditch and 57th Street Ditch tributary areas were delineated based upon 2003 Cook County LiDAR topographic data developed by Cook County. There are 8 subbasins ranging in size from 0.04 to 0.58 square miles with a total drainage area of approximately 1.6 square miles. The East Avenue Ditch Subwatershed is tributary to the Summit Conduit which is discussed in Section 3.6.2.1.

Hydrologic Parameter Calculations. CN values were estimated for each subbasin based upon NRCS soil data and 2001 CMAP land use data. This method is further described in Section 1.3.2, with lookup values for specific combinations of land use and soil data presented in Appendix C. An area-weighted average of the CN was generated for each subbasin.

Clark's unit hydrograph parameters were estimated using the method described in Section 1.3.2. Appendix G provides a summary of the hydrologic parameters used for subbasins in each subwatershed.

3.8.2.2 Hydraulic Model Development

Field Data, Investigation, and Existing Model Data. The existing 2006 LOMR hydrologic and hydraulic models of East Avenue and 57th Street Ditch did not meet District criteria, as identified in Section 6.3.3.2 of the CCSMP, and therefore were not used to support DWP development.

The East Avenue Ditch and 57th Street Ditch unsteady HEC-RAS hydraulic model is a new model. Downstream of the East Avenue crossing, HEC-GeoRAS was utilized to extract the cross-section data from the TIN created in GIS from the 2003 Cook County LiDAR topographic data. These cross-sections were incorporated into the HEC-RAS geometry.

The surveyed channel information from D.B. Sterlin Inc. was integrated into each cross-section to better define the channel. Survey data for each structure, provided by D.B Sterlin Inc., was added to the model. The Manning's n-values were assessed based on information obtained in the field and aerial photography. The overland flow elevation at the downstream end of the model of 616 feet was utilized as the tailwater elevation for the unsteady HEC-RAS hydraulic model. The design and as-built drawings for the lateral weir, the East Avenue roadway crossing, the East Avenue Ditch enclosure and the 57th Street Ditch enclosure were applied to define the previously constructed improvements. Upstream of the East Avenue and 57th Street Ditch enclosures, HEC-GeoRAS was utilized to extract the cross-section data from the TIN created in GIS from the 2003 Cook County LiDAR topographic data.

Boundary Conditions. East Avenue Ditch is a tributary to Summit Conduit which is an inverted siphon that conveys flow under the Des Plaines River into the Sanitary and Ship Canal. At the downstream end of the model the channel enters twin 36-inch diameter culverts under the railroad tracks then into the approximately 700 foot culvert through the railroad yard. The flow through the culvert joins a channel from the north which is tributary to the Summit Conduit. At approximately elevation 616, headwater created by the culvert is directed along the south side of the railroad tracks towards the Joliet Road underpass. At approximately elevation 616, headwater created by the storage lot culvert is also directed southeast to the Joliet Road underpass. At roughly 800 feet upstream of the culvert crossing under the railroad, the East Avenue Ditch also begins spilling through the Joliet Road underpass at approximately elevation 616 feet, NAVD. The flow conveyed to the Joliet Road underpass then flows overland to the channel which directs flow to the Summit Conduit.

Therefore, for establishment of the East Avenue Ditch's downstream boundary condition, the tailwater condition was assumed to be elevation 616 feet, NAVD.

3.8.2.3 Calibration and Verification

No stream gage or HWM was available within the 67th Street Ditch Subwatershed; however, flow conveyed over the lateral weir east of East Avenue and into the quarry is monitored by the City of Countryside. It is reported by the City of Countryside that since its construction in 1993, the weir has never been overtopped.

Based on previous Lower Des Plaines River Tributary calibrations, the CUH storage coefficient, R, was multiplied by a factor of 2.1 for all subbasins in the 67th Street Ditch HEC-HMS hydrologic model. The R multiplier was determined for ungaged watersheds based on the results of calibrations performed for gaged subwatersheds. An equation was developed based on the average of the slopes calculated for use in determining the time of concentration. That equation was used to determine an R value for ungaged subwatersheds.

The East Avenue Ditch HEC-HMS hydrologic model and unsteady HEC-RAS hydraulic models were run for the September 13-14, 2008 storm event. The peak water surface elevation at the lateral weir east of East Avenue did not overtop the structure which verifies to the conditions noted by the City of Countryside for the September 13-14, 2008 storm event.

3.8.2.4 Existing Conditions Evaluation

Flood Inundation Areas. Figure 3.8.1 shows inundation areas in the East Avenue and 57th Street Ditch Subwatershed produced by the DWP's hydraulic model for the 100-year, 24-hour critical duration design storm.

Hydraulic Profiles. Appendix H contains existing conditions hydraulic profiles for East Avenue and 57th Street Ditch. Profiles are shown for the 2-, 5-, 10-, 25-, 50-, 100-, and 500-year recurrence interval design storms.

3.8.3 Development and Evaluation of Alternatives

No regional stormwater problem areas were reported or identified through modeling; therefore, no proposed alternative projects were evaluated.

3.9 Farmers Prairie Creek

The Farmers Prairie Creek Subwatershed measures 4.5 square miles and is comprised of Farmers Creek, Prairie Creek, Golf Road Storm Sewer, and Dempster Street Storm Sewer. There are no major flood control reservoirs in the Subwatershed; however the Rand Park Flood Control & Multi-Use Trail Project (Levee 50) is located at the downstream end of the subwatershed. There are small reservoirs and diversions along Farmers and Prairie Creeks. A schematic of the Farmers Prairie Creek Subwatershed is shown in Figure 3.9.1.

TABLE 3.9.1
Communities Draining to Farmers Prairie Creek

Community	Tributary Area (mi^2)
Des Plaines	0.6
Glenview	0.1
Morton Grove	0.01
Niles	1.3
Park Ridge	0.4
Unincorporated Cook County	2.1
TOTAL	4.5

The Farmers Prairie Creek Subwatershed, which is located entirely within Cook County, drains areas within the City of Des Plaines, the Village of Glenview, the Village of Morton Grove, the Village of Niles, the City of Park Ridge and unincorporated areas. Table 3.9.1 lists the communities located in areas directly tributary to the Farmers Prairie Creek Subwatershed. Table 3.9.2 lists the land use breakdown by area within the Farmers Prairie Creek Subwatershed.

Within the Farmers Prairie Creek Subwatershed a total of 3.45 stream miles were studied, including Farmers Creek and Prairie Creek, and the Golf Road storm sewer area and the Dempster Street storm sewer area.

- The mainstem of Farmers Creek portion of the watershed is 1.26 square miles and begins just south of Golf Road, 0.25 miles east of the Interstate 294, with the headwaters consisting of Lake Mary Ann, Golf Road storm sewer overflows, and Dude Ranch Pond inflows. From this location, Farmers Creek flows south for 1.87 miles, passing through the Good Avenue Pond, Levee 50 area, and finally joins the Des Plaines River at River Mile 65.23.

TABLE 3.9.2
Land Use Distribution for Farmers Prairie Creek within Cook County

Land Use Category	Area (acres)	%
Residential	1,536	54
Commercial/Industrial	457	16
Forest/Open Land	150	5
Institutional	423	15
Transportation/Utility	154	5
Water/Wetland	53	2
Agricultural	62	2

Source: Chicago Metropolitan Agency for Planning's 2005 Land Use Inventory for Cook, DuPage, Kane, Kendall, Lake, McHenry and Will Counties, Illinois. Version 1.0. Published January 2009

- The mainstem of Prairie Creek begins just to the north of a shopping strip mall located on the northwest corner of Greenwood Avenue and Ballard Road in the Village of Niles. The headwaters of Prairie Creek are from the Greenwood Avenue Storm Sewer area. Prairie Creek flows in a westerly direction for approximately 1.5 miles until its confluence with Farmer Creek at river mile 1.00. The Prairie Creek watershed contains the Ballard Road Reservoir and the Lutheran General Hospital East and West ponds, which are flow-through reservoirs. Flood flows that exceed the Dee Road culvert capacity (HEC-RAS Station 22893.5) flow along Dee Road to the Dempster Street storm sewer.

- Golf Road Storm Sewer drains approximately 1.1 square miles of tributary area. The Golf Road storm sewer consists of a 42-inch pipe from Greenwood Avenue to Western Avenue, a 96-inch pipe from Western Avenue to Dee Road, and a 108-inch pipe from Dee Road to the Golf Road Interceptor, located adjacent to Lake Mary Ann. The Golf Road Interceptor junction box is designed such that any flows up to 550 cfs continue to Big Bend Lake via a 96-inch pipe. Flows over 550 cfs enter the upper end of Farmer Creek via a 54-inch diameter pipe.

- Dempster Street storm sewer drains approximately 0.6 square miles of tributary area. The Dempster Street sewer and ditch consist of a 15-inch pipe from Luther Avenue to Potter Road and a 27-inch pipe from Potter Road to Lyman Avenue. At Lyman Avenue, the sewer outfalls to a ditch before crossing under the northbound Interstate 294 to eastbound Dempster Street off ramp and joins Farmer Creek at river mile 0.83.

The Rand Park Flood Control & Multi-Use Trail Project (Levee 50) is located at the downstream end of the Subwatershed. This project consists of a floodwall with operable gates and pumps which prevent Des Plaines water from backing up into the Farmers Prairie Creek Subwatershed.

3.9.1 Sources of Data

3.9.1.1 Previous Studies

A number of studies and reports have been prepared for the Farmers Prairie Creek Subwatershed over the past decades. Previous studies include:

- U.S. Army Corps of Engineers, *Inventory and Analysis of Urban Water Damage Problems, Farmers and Prairie Creeks, Cook County, Illinois*, August 1988.

- U.S. Army Corps of Engineers, *Flood Damage Reduction Study Reconnaissance Report (Draft), Upper Des Plaines River, Illinois*, February 1989.

- Harza Environmental Services, Inc., *Farmers/Prairie Creek Strategic Planning Study (Draft), Des Plaines, Maine Township, Park Ridge, Niles*, August, 1991.

- Illinois Department of Natural Resources, Office of Water Resources, *Executive Summary - Des Plaines River, Rand Park Flood Control For Des Plaines and Park Ridge, Cook County, Illinois*, August, 1997.

In November 1999, the USACE completed the "Upper Des Plaines River Feasibility Study Phase I" for Illinois and Wisconsin. The Rand Park Flood Control and Multi-Use Trail Project (Levee 50) is one of six recommended flood control projects included Phase I study. The Rand Park Flood Control Project has essentially been constructed.

The hydrology and hydraulics of Farmers Prairie Creek were studied by IDNR-OWR for the design of Levee 50 and for further investigation of the Subwatershed. Findings of their investigation are presented in the *Farmers / Prairie Creek Strategic Planning Study, Cook County, IL*, September 2009 (IDNR-OWR Report). Data from the hydrologic (HEC-1) and hydraulic (steady state HEC-RAS) models used for the IDNR-OWR Report were incorporated into this DWP.

3.9.1.2 Water Quality Data

There are no District or IEPA water quality monitoring stations in the Farmers Prairie Creek Subwatershed. The IEPA's 2010 *Integrated Water Quality Report*, which includes the CWA 303(d) and 305(b) lists, lists no impaired waterways within the subwatershed. While included in the watershed area for the *Des Plaines River/Higgins Creek Watershed TMDL Stage 1 Report*, March 2009, no TMDLs have been investigated for Farmers Prairie Creek or its tributaries.

According to the water permit discharge data provided by USEPA, there are no NPDES permits issued by IEPA for discharges to the Farmers Prairie Creek. Municipalities discharging to Farmers Prairie Creek are regulated by IEPA's NPDES Phase II Stormwater Permit Program, which was instituted to improve water quality by requiring that municipalities develop six minimum measure controls for limiting runoff pollution to receiving systems.

3.9.1.3 Wetland and Riparian Areas

Figures 2.3.6 and 2.3.7 contain mapping of wetland and riparian areas in the Lower Des Plaines River Watershed. Wetland areas were identified using NWI mapping. NWI data includes roughly 53 acres of wetland areas in the Farmers Prairie Creek Subwatershed. Riparian areas are defined as vegetated areas between aquatic and upland ecosystems adjacent to a waterway or body of water that provides flood management, habitat, and water quality enhancement. Identified riparian environments offer potential opportunities for restoration.

3.9.1.4 Floodplain Mapping

The current effective FIRMs for the Farmers Prairie Creek Subwatershed are dated 2006 and were completed as part of the Cook County DFIRM submittal by the Illinois State Water Survey. For the 2006 submittal, the ISWS performed the floodway analysis for the Farmers Prairie Subwatershed based on the IDNR-OWR study and also submitted the IDNR-OWR Existing Conditions as part of the Cook County TSDN. Computed water surface elevations from the IDNR-OWR study were remapped to Cook County LiDAR data dated 2003.

3.9.1.5 Stormwater Problem Data

Beginning in the third quarter of 2007, communities, agencies (e.g., IDOT, CCHD), and stakeholders submitted Form B questionnaire response data to the District summarizing known stormwater problems within their jurisdictions. The questionnaires were requested again by the District following the September 2008 storm event. Table 3.9.3 summarizes reported problem areas reviewed as a part of the DWP development. Problems are classified in Table 3.9.3 as regional or local. This classification is based on a process described in Section 1 of this report. The Problem Area ID naming convention was found in Technical Memorandum entitled, "Proposed Naming Conventions for Database Elements" dated August 3, 2007.

TABLE 3.9.3
Community Response Data for Farmers Prairie Creek

Problem Area ID[1,3]	Municipality	Problems as Reported by Local Agency	Location	Problem Description	Local/ Regional	Resolution in DWP
FRCR-DP-FL-01	Des Plaines	Overbank Flooding	Ballard Road (Dawn Court & Lyman Avenue)	Severe cross sectional restrictions north of Ballard Road cause minor flooding.	Local	This is a local problem.[2]
FRCR-DP-SM-01	Des Plaines	Erosion	Farmers Creek from Railroad to Des Plaines River	Channel deterioration at confluence with Des Plaines River.	Local	This is a local problem.[2]
FRCR-PR-FR-03	Park Ridge	Residential Flooding	Lake Mary Ann	Level of Lake Mary Ann rises and floods surrounding homes.	Regional	FRCR-1 /FRCR-12
PRCR-DP-FL-01	Des Plaines	Pavement Flooding	IL Route 68 at I-294	Reported by IDOT: Last incident 5/26/04.	Local	This is a local problem.[2]
PRCR-NI-FL-01	Niles	Pavement Flooding	IL Route 21 at Greenwood Road	Reported by IDOT: Last incident 10/13/01	Local	This is a local problem.[2]

TABLE 3.9.3
Community Response Data for Farmers Prairie Creek

Problem Area ID[1,3]	Municipality	Problems as Reported by Local Agency	Location	Problem Description	Local/ Regional	Resolution in DWP
PRCR-NI-FL-02	Niles	Pavement Flooding	IL Route 21 at Maryland Drive	Reported by IDOT: Last incident 2/21/98	Local	This is a local problem.[2]
PRCR-PR-FL-01	Park Ridge	Pavement Flooding	US Route 14 at Dee Road	Watershed study required.	Local	This is a local problem.[2]
PRCR-PR-FL-02	Park Ridge	Overbank Flooding	Lutheran General Hospital detention basin	Flooding located at the detention basin.	Local	This is a local problem.[2]

[1] Problem Area IDs begin with DP- as they are in the Des Plaines River Watershed.
[2] Problem does not meet regional definition (refer to chapter 1). Solutions for the local problems are not addressed in the DWP.
[3] These problem areas were identified prior to the July 2010 storm events.

3.9.1.6 Near-Term Planned Projects

The Levee 50 project is effectively completed. The Ballard Road closure is scheduled to be completed in 2010. No other major flood control projects are planned.

3.9.2 Watershed Analysis

IDNR-OWR developed hydrologic (HEC-1) and hydraulic (steady state HEC-RAS) models for their study of the Farmers Prairie Creek Subwatershed (summarized in the IDNR-OWR Report). Information from these models was incorporated into the HEC-HMS and unsteady HEC-RAS models for this DWP.

Due to differences in the hydrologic and hydraulic programs,HEC-1 versus HEC-HMS, and steady state verses unsteady HEC-RAS, there are minor differences resulting from two different analyses.

Stage-storage information for ponds and storage areas from the IDNR-OWR HEC-1 model were recomputed/updated using the 2-foot Cook County topographic information. Storage areas directly connect to the main channel modeled in the unsteady HEC-RAS model.

3.9.2.1 Hydrologic Model Development

The Farmers Prairie Creek Subwatershed HEC-HMS hydrologic model was developed from the IDNR-OWR HEC-1 hydrologic model. All hydrologic elements from the IDNR-OWR HEC-1 model were incorporated into the HEC-HMS model.

Some watershed features were modeled differently in the HEC-HMS model than the IDNR-OWR HEC-1 model, either due to HEC-HMS model abilities or additional field findings:

The Golf Road storm sewer and interceptor are contained within the HEC-HMS model. Also, the existing 60-inch sewer along Potter from Ballard Road to Prairie Street and the 30-inch sewer along Howard Court from Ballard Road to Prairie Street were simulated in HEC-HMS model.

3.9.2.2 Subbasin Delineation

Subbasins were delineated by IDNR-OWR using extensive field investigation, storm sewer, and roadway drainage plans. The IDNR-OWR subbasins were compared against the 2-foot Cook County topographic mapping and were found to be in general agreement with the mapped contours. Any differences were assumed to be attributed to the additional information used by IDNR-OWR in their study.

The subbasins were left unmodified from the IDNR-OWR study, with the exception of two locations: Levee 50 has been completed in the interim, and is now the existing condition, therefore, Levee 50 and not ground topography was used as the watershed boundary between the Farmers Prairie Creek and Des Plaines River watersheds. The second location where subbasins were modified was along the eastern edge of the watershed, subbasins were modified to match those submitted as part of the North Branch Chicago River DWP.

Hydrologic Parameter Calculations. CN values in Cook County were estimated for each subbasin based upon NRCS soil data and 2001 CMAP land use data. This method is further described in Section 1.3.2, with lookup values for specific combinations of land use and soil data presented in Appendix C. An area-weighted average of the CN was generated for each subbasin.

Clark's unit hydrograph parameters were estimated using the method described in Section 1.3.2. Appendix G provides a summary of the hydrologic parameters used for subbasins in each Subwatershed.

3.9.2.3 Hydraulic Model Development

IDNR-OWR completed a steady-state HEC-RAS existing conditions simulation of Farmers and Prairie Creeks in December 2005, based on field surveys of channel and structures. The geometry used in the IDNR-OWR study was incorporated into the unsteady HEC-RAS model. No additional surveying was performed as part of this DWP. The surveyed portion of cross sections was left unmodified and the overbank portions of the cross sections were extracted using HEC-GeoRAS from the TIN created in GIS from the 2003 Cook County LiDAR topographic data. Changes made and other watershed features incorporated into the unsteady HEC-RAS model include:

- Lake Mary Ann and the Lake Mary Ann junction box modeled.
- Dude Ranch Pond, Bay Colony Pond, and Lake Belleau incorporated as off-line storage areas.

- Lutheran General Hospital East and West Ponds and Ballard Road Reservoir included as flow through storage areas.
- Good Avenue Pond incorporated as a side channel storage area, allowing for storage at low flows and storage and conveyance at higher flows.
- The Parkside Avenue culvert crossing was corrected, with the two existing openings now being simulated as in series, rather than in parallel.
- The Parkside Avenue and Dee Road culverts were modeled as culverts instead of as bridges in the IDNR-OWR study.

The Dempster Street Sewer experiences basin interflow with Prairie Creek along Kennedy/Dee Road near Maine East High School and also experiences basin interflow with Prairie and Farmers Creek near its downstream end. To account for these basin interflows, the Dempster Street Sewer and Ditch were modeled within HEC-RAS, as connections between storage areas. Even though HEC-RAS does not model closed conduits, the ability to connect the Dempster Street Sewer with Prairie Creek was provided for in the HEC-RAS model.

Levee 50 Floodwall. The floodwall constructed in the Levee 50 project is included in the HEC-RAS model. The operable pumps and gates constructed with the Levee 50 project were studied and modeled in the HEC-RAS model, but were not made "operational." Normal depth on the Des Plaines River was assumed as the starting condition for the HEC-RAS model. This DWP assumes that Des Plaines backwater flooding within the Farmers Prairie Creek Subwatershed is addressed by the Levee 50 project, and therefore, focuses on overbank flooding within the Subwatershed.

Levee 50 Gate & Pump Operation. When the stages on the Des Plaines are higher than the stages on Farmers Creek, the gates are closed preventing the higher stages from the Des Plaines River from entering Farmers Creek. The gates remain closed until, the stages on Farmers Creek upstream of the gate location are 0.2 feet higher than the stages on the Des Plaines River. Once Farmers Creek stages are 0.2 feet or greater than the stages of the Des Plaines, the gates open. Without Levee 50, the Des Plaines River backwater extends nearly the entire distance up Farmers Creek as well as the first 1,500 feet on Prairie Creek (up to Potter Road).

The rules for the pumps are based on the stages along Farmers Creek on the upstream side of the gates. When the stage is below 624.0 feet the pumps are off, between stages 624 and 625 feet, 83.3 cfs are pumped over the floodwall to the Des Plaines River. From stages 625 to 626 feet, 166.6 cfs are pumped, and above 626 feet, 250 cfs are pumped. 250 cfs corresponds to approximately a 10-year event.

Field reconnaissance was performed to confirm watershed conditions and to investigate existing structures, such as the Parkside Avenue culverts. Local knowledge was obtained from the communities and additional information was received through coordination with IDNR-OWR.

Boundary Conditions. There are two external boundaries existing in the Farmers Prairie Creek Subwatershed. The first is near the confluence of Farmers Creek with the Des Plaines River, downstream of the Levee 50 project. Farmers Creek's confluence with the Des Plaines River is located at Des Plaines River Mile 65.23. Two models were developed with the following scenarios:

- A 5-year flood elevation assumed on the Des Plaines River (with Levee 50 gates open and pumps off) for the purpose of flood inundation mapping for backwater flood conditions, and
- Normal depth on the Des Plaines River (with Levee 50 gates open) for overbank flood inundation mapping and for the development of flood reduction alternatives.

The second external boundary is at the downstream end of the Golf Road sewer, where it discharges into Big Bend Lake. Big Bend Lake is at River Mile 66.67 on the Des Plaines River. Information regarding the Golf Road sewer was taken from the IDNR-OWR model which assumed an inlet capacity of 550 cfs and no outlet restrictions. These assumptions were maintained in the DWP study and, therefore no tailwater condition was used at this boundary.

3.9.2.4 Calibration and Verification

The Farmers Prairie Creek Subwatershed is an ungaged watershed; however, IDNR-OWR maintains crest stage gages to measure high water marks after flood events. High water marks were available for the August 1987, September 2008, and July 2010 events. As of the July 2010 event, only three gages remain in service.

Manning's n values were adjusted to match the observed September 2008 HWMs. The final n values are between 0.04 and 0.07 for the channels and 0.06 to 0.09 for the overbanks.

Table 3.9.4 shows the computed water surface elevations at the HWM are within the District's calibration specifications of 0.5 feet from the observed HWM for the September 2008 storm event. The August 1987 and July 2010 storms were used as verification events and are summarized in Tables 3.9.5 and 3.9.6.

TABLE 3.9.4
Farmers Prairie Creek Calibration Results for the September 2008 Flood

Crest Gage	Location	Observed HWM (feet NAVD 1988)	Modeled Water Surface Elevation (feet NAVD 1988)	Difference (feet)
Gage 1	Unavailable	--	--	--
Gage 2	Downstream Face of Busse Road	630.35	630.42	0.07
Gage 5	Farmers and Prairie Creek Confluence	631.55	631.64	0.09
Gage 3	Upstream Face of Church Street	631.84	631.85	0.01
Gage 4	Upstream face of Emerson Avenue	632.50	632.81	0.31
Gage 6	Upstream face of Potter Road	633.63	634.03	0.40
Gage 7	Upstream face of Robin Drive	638.93	638.91	-0.02
Gage 8	Upstream of Walgreens Culvert	643.85	644.26	0.41

TABLE 3.9.5
Farmers Prairie Creek Calibration Results for the August 1987 Flood

Crest Gage	Location	Observed HWM (feet NAVD 1988)	Modeled Water Surface Elevation (feet NAVD 1988)	Difference (feet)
Gage 5	Farmers and Prairie Creek Confluence	632.40	632.65	0.25
1987_2	Rancho Lane	637.10	637.23	0.13
1987_3	Township Hall	641.90	641.88	-0.02

TABLE 3.9.6
Farmers Prairie Creek Calibration Results for the July 2010 Flood

Crest Gage	Location	Observed HWM (feet NAVD 1988)	Modeled Water Surface Elevation (feet NAVD 1988)	Difference (feet)
Gage 3	Upstream Face of Church Street	629.70	630.01	0.31
Gage 4	Upstream face of Emerson Avenue	631.64	631.58	-0.06
Gage 8	Upstream of Walgreens Culvert	643.58	643.59	0.01

3.9.2.5 Existing Conditions Evaluation

The 2-, 5-, 10-, 25-, 50, 100-, and 500-year design events were run for the 12-hour duration design storm.

3.9.2.6 Flood Inundation Areas

An inundation map was prepared based on the 100-year 12-hour synthetic event and the 2-ft contours generated from the Cook County LiDAR.

3.9.2.7 Hydraulic Profiles

Appendix H contains existing conditions hydraulic profiles for Farmers Prairie Creek and its tributaries. Profiles are shown for the 2-, 5-, 10-, 25-, 50-, 100-, and 500-year recurrence interval design storms.

3.9.3 Development and Evaluation of Alternatives

3.9.3.1 Problem Definition

The results of the hydraulic modeling, inundation mapping, and Form B questionnaire responses were reviewed to identify locations where property damages and/or transportation inaccessibility due to overbank flooding is predicted. Table 3.9.7 summarizes problem areas identified through hydraulic modeling of Farmers Prairie Creek.

TABLE 3.9.7
Modeled Problem Definition for Farmers Prairie Creek

Problem Area ID[1, 3]	Location	Recurrence Interval (year) of Flooding	Associated Form B[2]	Resolution in DWP	No. of Structures Flooded
FRCR-PR-FR-03	Lake Mary Ann	5, 10, 25, 50, 100	No	FRCR-1	12
FRCR-DP-FR-01	Farmers Creek from Prairie Creek to I-294	25, 50, 100	No	FRCR-1, FRCR-4, FRCR-5	4
PRCR-CC-FR-03 FRCR-PR-FR-01	Prairie Creek from Farms Creek to Lutheran General Hospital[3]	5, 10, 25, 50, 100	No	FRCR-4, FRCR-5, FRCR-7, FRCR-8	102
PRCR-CC-FR-01	Prairie Creek upstream of Lutheran General Hospital[3]	5, 10, 25, 50, 100	No	FRCR-9	15

[1] Problem Area IDs begin with DP- as they are in the Des Plaines River Watershed.
[2] Although no Form B was submitted for these problem areas, subwatershed communities verified the location and extent of the problem areas at Workshop 1.
[3] Includes transportation damages.

3.9.3.2 Damage Assessment

Economic damages were defined following the procedures outlined in Chapter 6.6 of the CCSMP. Recreation damages due to flooding are not being identified as part of the DWP. No erosion damages due to flooding were identified for Farmers Prairie Creek Subwatershed. Non-specific transportation damages were estimated as 15% of total property damages. Specific transportation damages based on time delay were computed for regional or critical roadways. Table 3.9.8 lists the existing estimated average annual damages for Farmers Prairie Creek.

TABLE 3.9.8
Estimated Average Annual Damages for Farmers Prairie Creek

Damage Category	Estimated Average Annual Damage ($)	Description
Property	868,721	Includes structure and content damage for residential and non-residential structures
Erosion	0	No erosion damages were identified
Transportation	131,885	Assumed as 15% of property damage, plus regional transportation damages

3.9.3.3 Technology Screening

Flood control technologies were screened to identify those most appropriate for addressing the flooding problems in the Farmers Prairie Creek Subwatershed. Storage and increased conveyance were identified as the most feasible technologies. Some of the conclusions of the screening were based on the finding of the IDNR-OWR report. The feasibility of the technologies defined in Chapter 6.6 of the CCSMP is summarized for each alternative in Table 3.9.9.

TABLE 3.9.9
Technology Screening for Farmers Prairie Creek

Technology	Feasibility for FRCR-PR-FR-03 (Lake Mary Ann)
Storage Facility	Feasible –Lake Mary Ann to remain at current level, however mitigation storage is available south of Golf Road (Dude Ranch)
Conveyance Improvement – Culvert/Bridge Replacement	Feasible - due to other infrastructure at Golf Road, limited space available for Lake Mary Ann outlet pipe; outlet must be a force-main
Conveyance Improvement – Channel Improvement	Not feasible - no channel - Lake Mary Ann discharge contained in pipe.
Conveyance Improvement – Diversion	Not feasible – no diversion path present
Flood Barriers, Levees/Floodwalls	Not feasible – no local acceptance
Technology	**Feasibility for FRCR-DP-FR-01 (Farmers Creek from Prairie Creek to I-294)**
Storage Facility	Feasible - possible locations investigated at Dude Ranch Lake Mary Ann and Lutheran General Hospital and Maine Township East High School
Conveyance Improvement – Culvert/Bridge Replacement	Not feasible – culvert/bridges not the source of problem
Conveyance Improvement – Channel Improvement	Not feasible
Conveyance Improvement – Diversion	Not feasible – no diversion path present
Flood Barriers, Levees/Floodwalls	Not feasible - due to freeboard requirement

Technology	Feasibility for PRCR-CC-FR-03 (Prairie Creek from Farmers Creek to Lutheran General Hospital)
Storage Facility	Feasible – at Lutheran General Hospital and Maine Township East High School
Conveyance Improvement – Culvert/Bridge Replacement	Feasible - investigated
Conveyance Improvement – Channel Improvement	Feasible – would require flood control reservoir for compensatory storage
Conveyance Improvement – Diversion	Feasible - investigated at Dempster Street
Flood Barriers, Levees/Floodwalls	Not feasible - due to freeboard requirement

Technology	Feasibility for PRCR-CC-FR-01 (Prairie Creek upstream of Lutheran General Hospital)
Storage Facility	Not feasible - insufficient land area available
Conveyance Improvement – Culvert/Bridge Replacement	Feasible – investigated through the reach
Conveyance Improvement – Channel Improvement	Feasible – investigated through the reach
Conveyance Improvement – Diversion	Not feasible – no diversion path present
Flood Barriers, Levees/Floodwalls	Not feasible - due to freeboard requirement

3.9.3.4 Alternative Development

Alternatives which provide solutions to the regional flooding were developed and evaluated consistent with the methodology described in Section 1.4 of this report. Table 3.9.10 summarizes the flood control alternatives for the Farmers Prairie Creek Subwatershed.

TABLE 3.9.10
Flood Control Alternatives for Farmers Prairie Creek

Alternative	Addressed Problem Area IDs	Location	Description
FRCR-1	FRCR-PR-FR-03 FRCR-DP-FR-02	Maine Township	Lake Mary Ann pump outlet and expansion of Dude Ranch storage
FRCR-4	FRCR-DP-FR-01 PRCR-CC-FR-03	Maine Township, Park Ridge, Des Plaines	Expand Lutheran General Hospital storage
FRCR-5	FRCR-DP-FR-01 PRCR-CC-FR-03	Maine Township, Park Ridge, Des Plaines	New High School reservoir
FRCR-7	PRCR-CC-FR-03	Maine Township, Park Ridge, Des Plaines	Dempster Street conveyance improvement

TABLE 3.9.10
Flood Control Alternatives for Farmers Prairie Creek

Alternative	Addressed Problem Area IDs	Location	Description
FRCR-8	PRCR-CC-FR-03	Maine Township	Lower Prairie Creek conveyance improvements
FRCR-9	PRCR-CC-FR-01	Maine Township, Niles	Upper Prairie Creek conveyance improvements
FRCR-12	FRCR-1, FRCR-4, FRCR-7, FRCR-8, FRCR-9	Maine Township, Park Ridge, Des Plaines, Niles	All of the above without the High School reservoir

Regional problems identified in the Farmers Prairie Creek Subwatershed involve overbank flooding into residential neighborhoods and closure of primary transportation routes. Based on the nature of the flooding problem, storage and channel improvements were selected. The alternatives presented in Table 3.9.10, except for FRCR-9, were considered in the IDNR-OWR Report.

Alternative FRCR-1 includes the installation of a pump and force main that provides an improved outlet for Lake Mary Ann and connects Lake Mary Ann to the Dude Ranch Pond. The existing Lake Mary Ann normal water elevation would remain unchanged. The Dude Ranch Pond would be enlarged to provide compensatory storage.

Alternative FRCR-4 includes the lowering of the Lutheran General Hospital West Pond to create more effective storage. Two 60-inch bypass pipes with a capacity of 180 cfs are necessary around the south end of the pond. An existing pond inlet allows flows in excess 180 cfs to enter the Lutheran General Hospital West Pond. FRCR-4 also includes a 24-inch pipe around the east side of the Pond to bypass Ballard Road flows around the Pond to the twin 60-inch pipe bypass. A pump would dewater the West Pond to 627 feet when it is used for flood storage.

Alternative FRCR-5 includes a 50 A-F reservoir within the sports fields at the Maine Township East High School. The reservoir would be connected to the existing 60-inch Kennedy Avenue sewer and a flow restrictor at the junction box would allow inflow into the reservoir. Also included in FRCR-5 are a pump station to dewater the reservoir, reservoir underdrains to assist in the drying of the playing fields, and a maintenance road around the reservoir.

Alternative FRCR-7 includes a 4,200 foot diversion under Dempster Street from Vernon Lane to the confluence of Prairie Creek and Farmers, with 3,200 feet of pipe with a 72-inch diameter from the confluence of Prairie Creek and Farmers Creek to Dee Road and 1,000 feet of pipe with a 60-inch diameter from Dee Road to Vernon Avenue. A connection to the existing Kennedy Avenue sewer is included, along with a connection to the existing Dempster Street sewer, which consists of a 27-inch and a 15-inch pipe near Vernon Avenue.

FRCR-8 includes the replacement of a double 6.2 foot by 3.4 foot (ellipse) concrete pipe with a double 7.5 foot by 6 foot RCBC at Landings Lane, the replacement of culvert at a private driveway at the end of Rancho Road with a 9 foot by 4.5 foot RCBC, and the replacement of the 503 foot long 60-inch CMP culvert under Dee Road with an 11.5 foot by 8.5 foot RCBC. FRCR-8 also includes channel improvements for approximately 320 foot reach between Rancho Road and the Dee Road culvert. Also included is the removal of a fence crossing Prairie Creek at the upstream end of the Landings Apartments, and the replacement of a private footbridge on the Landings Apartments.

Alternative FRCR-9 includes removal of a 220 foot long 48-inch pipe located downstream of Parkside Drive and the daylighting of Prairie Creek, the removal of flow restrictors located in the stream at Simmons, Western, and Knight Streets, and the re-routing of Prairie Creek around an apartment building near Ballard Road (approximately 430 feet of channel). This alternative also includes the replacement of existing parking south of Parkside Drive, the removal of two foot bridges and the construction of a new foot path. Compensatory storage is provided by the inclusion of FRCR-4 (Lutheran General Hospital West Pond improvement) within this alternative. Additionally, streambank stabilization along approximately 220 feet of Prairie Creek west of Greenwood Avenue, north of Ballard Road is included to address critical erosion adjacent to commercial building and Greenwood Avenue.

Alternative FRCR-12 alternative combines FRCR-1, FRCR-4 FRCR-7, FRCR-8 and FRCR-9.

Erosion Control Alternatives. No regional erosion problems were reported or identified, therefore no erosion control alternatives were screened nor selected.

3.9.3.5 Alternative Selection

Alternatives listed in Table 3.9.18 were evaluated to determine their effectiveness and to produce data for the countywide prioritization of subwatershed projects. Flood Control alternatives were modeled to evaluate their impact on water surface elevations and flood damages. Table 3.9.18 provides a summary benefit B/C, net benefits, total project costs, number of structures protected, and other relevant alternative data.

FRCR-1. FRCR-1 targets the risk of flood damages in the Lake Mary Ann area by adding additional capacity to the Lake Mary Ann outlet. Mitigation storage for this alternative would be provided at the Dude Ranch Pond site.

FRCR-1 includes the installation of a pump and force main that would connect Lake Mary Ann to Dude Ranch Pond. The pump and force main are required because of the utility conflicts at Golf Road. The existing Lake Mary Ann normal water elevation of 632.5 feet would remain unchanged. Mitigation storage for the increase in flood stage downstream of Lake Mary Ann would be provided in the Dude Ranch Pond.

Dude Ranch Pond would be enlarged such that the reach of Farmers Creek that currently flows adjacent to the pond would be a part of the pond. A control structure would be constructed along the southeast corner of the enlarged pond. This structure would allow Dude Ranch Pond to store additional flows from Lake Mary Ann. Dude Ranch Pond would store an additional 10 acre-feet of floodwaters at the 100-year event, an increase of approximately 25 percent. Also, flood stages along the entire length of Farmers Creek are slightly reduced with Alternative FRCR-1.

Table 3.9.11 compares the peak modeled water surface elevation and flow for Alternative FRCR-1

TABLE 3.9.11
Farmers Prairie Creek Existing and Alternative Condition FRCR-1 Flow and WSEL Comparison

Location (FRCR-PR-FR-03 and FRCR-DP-FR-02)	Station	Existing Conditions		FRCR-1	
		Max WSEL (ft)	Max Flow[1] (cfs)	Max WSEL (ft)	Max Flow[1] (cfs)
Lake Mary Ann	10000	634.8	0	634.1	0
Downstream of Lake Mary Ann at Dude Ranch Pond Site[2]	9690	633.2	59	633.4	59
Farmers Creek at Church Street	7495	630.9	50	630.7	45
Farmers Creek at Ballard	6179	630.6	76	630.6	69

[1] Flow rate at maximum WSEL. [2] Dude Ranch storing additional flood flows.

FRCR-4. FRCR-4 would reduce overbank flooding in the reach of Prairie Creek downstream of the Lutheran General Hospital Ponds by increasing the capacity in the Lutheran General Hospital West Pond. This alternative proposes that the normal water elevation in the Pond be lowered by approximately 6 feet (to elevation 627 feet).

While the existing bottom elevation of the Lutheran General Hospital West Pond is lower than 627 feet, a quantity of excavation is proposed below normal water level to maintain the aesthetics on the property. Two 60-inch pipes would be constructed from Luther Lane, around the south end of the Pond to Kennedy Avenue. The approximate capacity of these pipes is 180 cfs. Only flows in excess 180 cfs would enter the Lutheran General Hospital West Pond, via the existing inlet. A 24-inch pipe would be constructed around the west side of the Lutheran General Hospital (east side of the Pond) as a bypass of flows from the Ballard Road subbasin around the Pond to the twin 60-inch pipe bypass. A pump would be required to dewater the Lutheran General Hospital West Pond to 627 feet when it is used for flood storage.

Table 3.9.12 compares the peak water surface elevation and flow for Alternative FRCR-4.

TABLE 3.9.12
Farmers Prairie Creek Existing and Alternative Condition FRCR-4 Flow and WSEL Comparison

Location (FRCR-DP-FR-01)	Station	Existing Conditions		FRCR-4	
		Max WSEL (ft)	Max Flow (cfs) [1]	Max WSEL (ft)	Max Flow (cfs) [1]
Farmers Creek above Confluence with Prairie Creek	5300	630.6	110	630.3	104
Farmers Creek at Dempster	4458	630.2	573	629.8	509
Farmers Creek at I-294	3415	629.3	593	629.1	525
Farmers Creek at Des Plaines River	132	622.9	598	622.8	549
Location (PRCR-CC-FR-03)	**Station**	**Existing Conditions**		**FRCR-4**	
		Max WSEL (ft)	**Max Flow (cfs) [1]**	**Max WSEL (ft)**	**Max Flow (cfs) [1]**
Prairie Creek at Ballard Reservoir	26866	644.1	224	644.1	205
Prairie Creek at Knight Street	26207	643.8	230	643.8	210
Prairie Creek at Lutheran General Hospital Ponds	24619	639.2	249	639.1	217
Prairie Creek at Robin Drive	23421	639.0	145	638.8	118
Prairie Creek at Dee Road	23146	638.7	316	638.4	256
Prairie Creek at Landings Lane	21685	635.5	526	635.3	405
Prairie Creek at Potter Road	21351	633.9	566	633.6	433
Prairie Creek at Confluence with Farmers Creek	20037	630.6	606	630.3	470

[1] Flow rate at maximum WSEL.

FRCR-5. FRCR-5 would reduce the risk of overbank flooding in the reach of Prairie Creek below the Lutheran General Hospital Ponds by temporarily storing floodwaters which currently enter Prairie Creek via the 60-inch Kennedy Avenue Sewer in a reservoir to be constructed on the grounds of Maine Township East High School property (High School).

This alternative would require a 50 A-F reservoir within the sports fields at the High School. The reservoir would be connected to the existing 60-inch Kennedy Avenue sewer and a flow restrictor would be placed on the sewer causing excess flows to enter the reservoir. A pump station would be required to dewater the reservoir. Under-drains would be installed at the reservoir to assist in the drying of the playing fields. A ten foot maintenance road would be constructed around the reservoir.

Table 3.9.13 compares the peak water surface elevation and flow for Alternative FRCR-5.

TABLE 3.9.13
Farmers Prairie Creek Existing and Alternative Condition FRCR-5 Flow and WSEL Comparison

Location (FRCR-DP-FR-01)	Station	Existing Conditions		FRCR-5	
		Max WSEL (ft)	Max Flow (cfs) [1]	Max WSEL (ft)	Max Flow (cfs) [1]
Farmers Creek at Confluence with Prairie Creek	5300	630.6	110	630.4	92
Farmers Creek at Dempster	4458	630.2	573	629.9	534
Farmers Creek at I-294	3415	629.3	593	629.1	551
Farmers Creek at Des Plaines River	132	622.9	598	622.8	550
Location (PRCR-CC-FR-03)	**Station**	**Existing Conditions**		**FRCR-5**	
		Max WSEL (ft)	**Max Flow (cfs) [1]**	**Max WSEL (ft)**	**Max Flow (cfs) [1]**
Prairie Creek at Ballard Reservoir	26866	644.1	224	644.1	224
Prairie Creek at Knight Street	26207	643.8	230	643.8	230
Prairie Creek at Lutheran General Hospital Ponds	24619	639.2	249	639.1	249
Prairie Creek at Robin Drive	23421	639.0	145	638.8	130
Prairie Creek at Dee Road	23146	638.7	316	638.3	281
Prairie Creek at Landings Lane	21685	635.5	526	635.4	454
Prairie Creek at Potter Road	21351	633.9	566	633.7	493
Prairie Creek at Confluence with Farmers Creek	20037	630.6	606	630.4	535

[1] Flow rate at maximum WSEL.

FRCR-7. FRCR-7 would reduce overbank flooding in the reach of Prairie Creek below the Lutheran General Hospital Ponds by diverting floodwaters which currently enter Prairie Creek via the 60-inch Kennedy Avenue sewer then to the pipe under to Dempster Street that flows to Farmers Prairie Creek

This alternative would require the construction of a 4,200 foot long diversion under Dempster Street from Vernon Lane to the confluence of Prairie Creek and Farmers Creek near the Dempster Street Exit Ramp at Interstate 294. The alternative would require 3,200 feet of 72-inch pipe from the confluence of Prairie Creek and Farmers Creek to Dee Road, 1,000 feet of 60-inch pipe from Dee Road to Vernon Avenue, and a connection with the existing Kennedy Avenue sewer. The proposed sewer would be connected to the existing Dempster Street sewer, which consists of a 27-inch and a 15-inch pipe that would remain in place as additional conveyance.

Table 3.9.14 compares the peak water surface elevation and flow for Alternative FRCR-7.

TABLE 3.9.14
Farmers Prairie Creek Existing and Alternative Condition FRCR-7 Flow and WSEL Comparison

Location (FRCR-DP-FR-01)	Station	Existing Conditions		FRCR-7	
		Max WSEL (ft)	Max Flow (cfs) [1]	Max WSEL (ft)	Max Flow (cfs) [1]
Farmers Creek at Confluence with Prairie Creek	5300	630.6	110	630.4	98
Farmers Creek at Dempster	4458	630.2	573	630.1	475
Farmers Creek at I-294	3415	629.3	593	629.2	577
Farmers Creek at Des Plaines River	132	622.9	598	622.9	590
Location (PRCR-CC-FR-03)	**Station**	**Existing Conditions**		**FRCR-7**	
		Max WSEL (ft)	**Max Flow (cfs) [1]**	**Max WSEL (ft)**	**Max Flow (cfs) [1]**
Prairie Creek at Ballard Reservoir	26866	644.1	224	644.1	224
Prairie Creek at Knight Street	26207	643.8	230	643.8	230
Prairie Creek at Lutheran General Hospital Ponds	24619	639.2	249	639.0	248
Prairie Creek at Robin Drive	23421	639.0	145	638.7	124
Prairie Creek at Dee Road	23146	638.7	316	638.3	262
Prairie Creek at Landings Lane	21685	635.5	526	635.3	417
Prairie Creek at Potter Road	21351	633.9	566	633.5	455
Prairie Creek at Confluence with Farmers Creek	20037	630.6	606	630.4	496

[1] Flow rate at maximum WSEL.

FRCR-8. FRCR-8 would reduce overbank flooding in the reach of Prairie Creek below the Lutheran General Hospital Ponds by increasing channel conveyance in this reach from upstream of Dee Road and downstream to Potter Road. This alternative includes the following components:

- The current Landings Lane crossing, consisting of double 6.2 foot by 3.4 foot (ellipse) concrete pipes, would be replaced with a double 7.5 foot by 6 foot RCBC.
- The private footbridge on the Landings Apartments property would be replaced.
- The fence crossing Prairie Creek at the upstream end of the Landings Apartments would be removed.
- The Prairie Creek crossing at the private driveway at the end of Rancho Road consisting of triple 3.5 foot CMPs, would be replaced with a 9 foot by 4.5 foot RCBC.
- Channel improvements would be constructed in the approximately 320 foot reach between Rancho Road and the Dee Road culvert.

- The current 503 foot long 60-inch CMP culvert under Dee Road would be replaced with an 11.5 foot by 8.5 foot RCBC.

Table 3.9.15 compares the peak modeled water surface elevation and flow for Alternative FRCR-8.

TABLE 3.9.15
Farmers Prairie Creek Existing and Alternative Condition FRCR-8 Flow and WSEL Comparison

Location (FRCR-DP-FR-01)	Station	Existing Conditions		FRCR-8	
		Max WSEL (ft)	Max Flow (cfs) [1]	Max WSEL (ft)	Max Flow (cfs) [1]
Farmers Creek at Confluence with Prairie Creek	5300	630.6	110	630.6	110
Farmers Creek at Dempster	4458	630.2	573	630.2	557
Farmers Creek at I-294	3415	629.3	593	629.3	573
Farmers Creek at Des Plaines River	132	622.9	598	622.9	595
Location (PRCR-CC-FR-03)	**Station**	**Existing Conditions**		**FRCR-8**	
		Max WSEL (ft)	**Max Flow (cfs) [1]**	**Max WSEL (ft)**	**Max Flow (cfs) [1]**
Prairie Creek at Ballard Reservoir	26866	644.1	224	644.1	224
Prairie Creek at Knight Street	26207	643.8	230	643.8	230
Prairie Creek at Lutheran General Hospital Ponds	24619	639.2	249	639.2	248
Prairie Creek at Dee Road	23146	638.7	316	638.6	278
Location (PRCR-CC-FR-03)	**Station**	**Existing Conditions**		**FRCR-8**	
		Max WSEL (ft)	**Max Flow (cfs) [1]**	**Max WSEL (ft)**	**Max Flow (cfs) [1]**
Prairie Creek at Landings Lane	21685	635.5	526	635.0	509
Prairie Creek at Potter Road	21351	633.9	566	633.8	546
Prairie Creek at Confluence with Farmers Creek	20037	630.6	606	630.6	587

[1] Flow rate at maximum WSEL.

FRCR-9. FRCR-9 would reduce the risk of overbank flooding in the reach of Prairie Creek above the Lutheran General Hospital Ponds by increasing the channel conveyance capacity in Prairie Creek. Additionally, streambank stabilization is proposed along Prairie Creek west of Greenwood Avenue, north of Ballard Road. At present, overflows leave the Prairie Creek flow path upstream of Robin Lane, and flow south towards Dempster Road. These flows reenter Prairie Creek downstream of Dee Road. This strategy would require compensatory storage, which would be obtained by the inclusion of FRCR-4 (Lutheran General

Hospital West Pond improvement). The costs and benefits of Alternative FRCR-9 include the costs and benefits of Alternative FRCR-4. This alternative includes the following components:

- The 220 foot long 48-inch pipe located downstream of Parkside Drive would be removed and the channel would be daylighted in this reach. This would require replacing approximately 1400 ft^2 of parking.
- Flow restrictors currently located at Simmons, Western, and Knight Street would be removed.
- Prairie Creek would be rerouted around an apartment building which it currently flows through. This would require creating approximately 430 feet of new channel and removing one vehicle entrance to the apartment complex.
- Two foot bridges across the creek would be removed. The removal of these footbridges would require the construction of a footpath between these two locations.
- Streambank stabilization along approximately 220 feet of Prairie Creek west of Greenwood Avenue, north of Ballard Road to address critical erosion adjacent to commercial building and Greenwood Avenue.

Table 3.9.16 compares the peak modeled water surface elevation and flow for Alternative FRCR-9.

TABLE 3.9.16
Farmers Prairie Creek Existing and Alternative Condition FRCR- 9 Flow and WSEL Comparison

Location (FRCR-DP-FR-01)	Station	Existing Conditions		FRCR-9	
		Max WSEL (ft)	Max Flow (cfs) [1]	Max WSEL (ft)	Max Flow (cfs) [1]
Farmers Creek at Confluence with Prairie Creek	5300	630.6	110	630.4	97
Farmers Creek at Dempster	4458	630.2	573	629.9	507
Farmers Creek at I-294	3415	629.3	593	629.1	522
Farmers Creek at Des Plaines River	132	622.9	598	622.8	552

TABLE 3.9.16
Farmers Prairie Creek Existing and Alternative Condition FRCR- 9 Flow and WSEL Comparison

Location (PRCR-CC-FR-01)	Station	Existing Conditions		FRCR-9	
		Max WSEL (ft)	Max Flow (cfs) [1]	Max WSEL (ft)	Max Flow (cfs) [1]
Prairie Creek at Walgreens Culvert	27485	644.3	201	643.7	199
Prairie Creek at Ballard Reservoir	26866	644.1	224	642.9	224
Prairie Creek at Knight Street	26207	643.8	230	642.1	225
Prairie Creek at Lutheran General Hospital Ponds	24619	639.2	249	639.1	244
Prairie Creek at Robin Drive	23421	639.0	145	638.9	135
Prairie Creek at Dee Road	23146	638.7	316	638.4	291
Prairie Creek at Landings Lane	21685	635.5	526	635.4	465
Prairie Creek at Potter Road	21351	633.9	566	633.7	495
Prairie Creek at Confluence with Farmers Creek	20037	630.6	606	630.4	528

[1] Flow rate at maximum WSEL.

FRCR-12. FRCR-12 combines the components of FRCR-1, FRCR-4 FRCR-7, FRCR-8, and FRCR-9. Table 3.9.17 compares the peak modeled water surface elevation and flow for Alternative FRCR-9.

TABLE 3.9.17
Farmers Prairie Creek Existing and Alternative Condition FRCR-12 Flow and WSEL Comparison

Location (FRCR-DP-FR-01)	Station	Existing Conditions		FRCR-12	
		Max WSEL (ft)	Max Flow (cfs) [1]	Max WSEL (ft)	Max Flow (cfs) [1]
Farmers Creek at Confluence with Prairie Creek	5300	630.6	110	630.0	68
Farmers Creek at Dempster	4458	630.2	573	629.6	388
Farmers Creek at I-294	3415	629.3	593	629.0	520
Farmers Creek at Des Plaines River	132	622.9	598	622.8	525

TABLE 3.9.17
Farmers Prairie Creek Existing and Alternative Condition FRCR-12 Flow and WSEL Comparison

Location (PRCR-CC-FR-03)	Station	Existing Conditions		FRCR-12	
		Max WSEL (ft)	Max Flow (cfs) [1]	Max WSEL (ft)	Max Flow (cfs) [1]
Prairie Creek at Walgreens Culvert	27485	644.3	201	643.7	199
Prairie Creek at Ballard Reservoir	26866	644.1	224	642.9	224
Prairie Creek at Knight Street	26207	643.8	230	642.1	225
Prairie Creek at Lutheran General Hospital Ponds	24619	639.2	249	638.8	245
Prairie Creek at Robin Drive	23421	639.0	145	637.8	185
Prairie Creek at Dee Road	23146	638.7	316	637.5	225
Prairie Creek at Landings Lane	21685	635.5	526	633.4	257
Prairie Creek at Potter Road	21351	633.9	566	632.7	299
Prairie Creek at Confluence with Farmers Creek	20037	630.6	606	630.0	338

[1] Flow rate at maximum WSEL.

3.9.3.6 Summary of Alternatives for Countywide Prioritization

Appendix I presents conceptual level cost estimates for the recommended alternatives. Table 3.9.18 lists alternatives analyzed in detail as part of the DWP development.

The recommended alternative for Farmer Prairie Creek is FRCR-12. Alternatives FRCR-1, FRCR-4, FRCR-7, FRCR-8, and FRCR-9 are included in FRCR-12. Alternative FRCR-5 is not recommended since more cost-effective storage can be provided in the other alternatives. Only FRCR-1 has a B/C ratio less than 1.0, though it removes nine structures from the 100-year inundation area in unincorporated Cook County. Alternatives FRCR-4, FRCR-7, FRCR-8 and FRCR-8 each protect numerous structures in the City of Park Ridge, the City of Des Planes, the Village of Niles, and unincorporated Cook County. They provide a lower WSEL from the alternative location to the confluence of Farmers Creek and the Des Plaines River. The combined alternative, FRCR-12 has a B/C 1.0 and removes 128 structures and two roadways from the 100-year inundation area. Alternatives FRCR-4, FRCR-7, FRCR-8 and FRCR-8 can be implemented as phased components of FRCR-12, with the mitigation storage components being performed in the first phase to avoid adverse impacts.

Figures 3.9.2 through 3.9.8 show the locations and a summary of the proposed and recommended alternatives described in Table 3.9.18. Figures 3.9.2 through 3.9.8 also show comparisons of the existing condition and alternative condition inundation areas.

TABLE 3.9.18
Farmers Prairie Creek Project Alternative Matrix to Support District CIP Prioritization

Alternative ID	Description	B/C Ratio	Net Benefits ($)	Total Project Cost ($)	Cumulative Structures Removed from 100-year Inundation	Roadways Protected	Water Quality Benefit	Recom-mended	Communities Involved
FRCR-1	Lake Mary Ann pump out-let and expansion of Dude Ranch storage	0.7	$2,179,672	$3,077,059	9	0	Positive	N	Maine Township
FRCR-4	Expand Lutheran General Hospital West Pond[1]	1.2	$7,918,847	$6,635,011	40	0	Positive	N	Maine Township, Park Ridge, Des Plaines
FRCR-5	New Maine Township East High School reservoir[1]	0.6	$4,679,253	$7,614,226	34	0	Positive	N	Maine Township, Park Ridge, Des Plaines
FRCR-7	Dempster Street diversion[1]	1.3	$8,681,568	$6,650,095	34	0	Slightly Positive	N	Township, Park Ridge, Des Plaines
FRCR-8	Lower Prairie Creek conveyance improvements	5.2	$12,317,274	$2,389,090	0	0	Slightly Positive	N	Maine Township
FRCR-9	Upper Prairie Creek conveyance improvements	1.1	$8,123,019	$7,671,620	48	1	Slightly Positive	N	Maine Township, Niles
FRCR-12	FRCR-1, FRCR-4, FRCR-7, FRCR-8, and FRCR-9	1.0	$18,876,571	$19,787,864	128	2	Positive	Y	Maine Township, Park Ridge, Des Plaines, Niles

[1] Reduces but does not remove transportation losses from Dempster Street and Dee Road

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3.10 Feehanville Ditch

TABLE 3.10.1
Communities Draining to Feehanville Ditch

Community	Tributary Area (mi^2)
Arlington Heights	0.01
Des Plaines	0.55
Mount Prospect	1.99
Unincorporated Cook County	0.13
Total	2.68

The Feehanville Ditch Subwatershed measures approximately 2.7 square miles and is located north and adjacent to the Weller Creek Subwatershed (north of O'Hare International Airport). Feehanville Ditch is an open channel beginning in an industrial/commercial park and flows east past Wolf Road. The open channel continues to and enters a long culvert just upstream of a railroad crossing which daylights and converges with an overland flow channel at the upstream face of Des Plaines River Road. The subwatershed consists mainly of residential and commercial landuse and also contains an area of forest preserve (Camp Pine Woods Forest Preserve) east of Des Plaines River Road. West of Rand Road, the subwatershed is tributary to the District's O'Hare TARP system.

Table 3.10.1 lists the communities located in areas directly tributary to the Feehanville Ditch Subwatershed. Figure 3.10.1 shows an overview of the tributary area of the subwatershed. Reported stormwater problem areas, flood inundation areas, and proposed alternative projects are also shown and discussed in the following subsections. Table 3.10.2 lists the land use breakdown by area within the Feehanville Ditch Subwatershed.

3.10.1 Sources of Data

3.10.1.1 Previous Studies

Limited study information was available for review for the Feehanville Ditch Subwatershed. No hydrologic modeling information was available except for the USACE Des Plaines River Phase I HEC-1 hydrologic model which included Feehanville Ditch as a tributary. The WSP-2 hydraulic models obtained from the ISWS dated 1979, 1980, and 1981 were not incorporated into this study due to the age of the models and that the hydrologic modeling was also being restudied.

TABLE 3.10.2
Land Use Distribution for Feehanville Ditch

Land Use Category	Area (acres)	%
Residential	916	53.3
Commercial/Industrial	537	31.2
Forest/Open Land	62	3.5
Institutional	147	8.4
Transportation/Utility	31	1.7
Water/Wetland	39	2.1
Agricultural	0	0

Source: Chicago Metropolitan Agency for Planning's 2005 Land Use Inventory for Cook, DuPage, Kane Kendall, Lake McHenry and Will Counties, Illinois. Version 1.0. Published January 2009

3.10.1.2 Water Quality Data

There are no District or IEPA water quality monitoring stations in the Feehanville Ditch subwatershed. The IEPA's 2010 *Integrated Water Quality Report*, which includes the CWA 303(d) and 305(b) lists, lists no impaired waterways within the subwatershed. While included in the watershed area for the *Des Plaines River/Higgins Creek Watershed TMDL Stage 1 Report*, March 2009, no TMDLs have been investigated for Feehanville Ditch or its tributaries.

According to the water permit discharge data provided by the USEPA, there are no NPDES permits issued by IEPA for discharges to Feehanville Ditch. Municipalities discharging to the Feehanville Ditch are regulated by IEPA's NPDES Phase II Stormwater Permit Program, which was instituted to improve water quality by requiring that municipalities develop six minimum measure controls for limiting runoff pollution to receiving systems.

3.10.1.3 Wetland and Riparian Areas

Figures 2.3.6 and 2.3.7 contain mapping of wetland and riparian areas in the Lower Des Plaines River Watershed. Wetland areas were identified using NWI mapping. NWI data includes roughly 35 acres of wetland areas in the Feehanville Ditch Subwatershed. Riparian areas are defined as vegetated areas between aquatic and upland ecosystems adjacent to a waterway or body of water that provides flood management, habitat, and water quality enhancement. Identified riparian environments offer potential opportunities for restoration.

3.10.1.4 Floodplain Mapping

Flood inundation areas supporting the NFIP were revised in 2008 as a part of the FEMA's Map Modernization Program. As part of the new mapping, floodplain boundaries were revised based upon updated Cook County topographic information; however, hydrologic and hydraulic computer models, which are used to estimate flood levels, were not updated. LOMRs were incorporated into revised floodplain areas. Feehanville Ditch is mapped in detail in the DFIRM mapping update, with Zone AE floodplain shown across the length of the ditch. The original hydrologic and hydraulic analyses were performed in the early 1980's. The hydrologic modeling was performed using TR-20 according to the FIS for the Village of Mount Prospect published in 1982. Hydraulic routing performed was steady state and used the WSP-2 modeling application. Appendix A includes a comparison of FEMA's effective floodplain mapping from updated DFIRM panels with inundation areas developed for the DWP.

3.10.1.5 Stormwater Problem Data

Starting in the 3rd quarter of 2007, communities, agencies (e.g., IDOT, CCHD), and stakeholders submitted Form B questionnaire response data to the District summarizing known stormwater problems within their jurisdictions. The questionnaires were requested again by the District following the September 2008 storm event. Table 3.10.3 summarizes reported problem areas reviewed as a part of the DWP development. Problems are classified in Table 3.10.3 as regional or local. This classification naming convention is based on a process described in the Introduction of Section 1 of this report.

TABLE 3.10.3
Community Response Data for Feehanville Ditch

Problem Area ID[1]	Municipality	Problems as Reported by Local Agency	Location	Problem Description	Local/ Regional	Resolution in DWP
FHDT-DP-FL-01	Des Plaines	Pavement Flooding	Wolf Road at Central Road	Last incident 05/04/09, Submitted by IDOT	Local	This is a local problem.[2]
FHDT-DP-SM-01	Des Plaines	Maintenance	River Road and Gregory Street	48-inch storm sewer carrying Feehanville Ditch needs to be televised, cleaned, repaired	Local	This is a local problem. [2]
FHDT-MP-FL-01	Mount Prospect	Pavement Flooding	US Route 12 at Kensington Road	Last incident 06/17/96, submitted by IDOT	Local	This is a local problem. [2]
FHDT-MP-FL-02	Mount Prospect	Pavement Flooding	IL Route 83 at Kensington Road	Last incident 06/26/93, submitted by	Local	This is a local problem. [2]
FHDT-WT-FR-01	Wheeling Township	Structure and Roadway Flooding	River Road and Gregory Street	Backwater from Des Plaines River causes flooding in unincorporated residential areas	Regional	FHDT-2
FHDT-WT-FR-02	Wheeling Township	Roadway Flooding	River Road and Feehanville Ditch	Roadway inundation greater than 0.5 feet	Regional	FHDT-1, FHDT-2

[1] All Problem Area IDs begin with DP- as they are in the Des Plaines River Watershed.
[2] Problem does not meet regional definition (refer to chapter 1). Solutions for the local problems are not addressed in the DWP.

3.10.1.6 Near Term Planned Projects

No near-term planned major flood control projects to be constructed by others were identified for the Feehanville Subwatershed; however Gregory Street and Graylynn Drive improvements are slated to be completed by Wheeling Township Highway Department to upgrade the roads and provide an incremental additional level of protection from flooding along the roadways.

3.10.2 Watershed Analysis

3.10.2.1 Hydrologic Model Development

Subbasin Delineation. The Feehanville Ditch tributary area was delineated based upon 2003 Cook County LiDAR topographic data developed by Cook County. There are 4 subbasins ranging in size from 0.07 to 1.88 square miles with a total drainage area of 2.71 square miles. The subwatershed area west of Rand Road has diversions to the O'Hare TARP system.

Hydrologic Parameter Calculations. CN values were estimated for each subbasin based upon NRCS soil data and 2001 CMAP land use data. This method is further described in Section 1.3.2, with lookup values for specific combinations of land use and soil data presented in Appendix C. An area-weighted average of the CN was generated for each subbasin.

Clark's unit hydrograph parameters were estimated using the method described in Section 1.3.2. Appendix G provides a summary of the hydrologic parameters used for subbasins in each subwatershed.

The subwatershed west of Rand Road has combined sewer flow diversions to the District's O'Hare TARP system. These diversions were incorporated into the HEC-HMS hydraulic model based on the USACE Des Plaines River Phase I HEC-1 hydrologic model.

For consistency with other subwatersheds within the Lower Des Plaines River Watershed analysis, the Huff rainfall distribution was utilized in the HEC-HMS hydrologic model for watershed areas between 10 to 50 square miles. The Bulletin 71 rainfall depths were adjusted according to the areal mean/point rainfall frequency distribution table for a watershed area of approximately 10 square miles (which is the minimum adjustment provided in the table).

3.10.2.2 Hydraulic Model Development

Field Data, Investigation, and Existing Model Data. The FEMA effective hydraulic model was developed by NRCS in 1982 using WSP-2. The model data was only used as background information. A field reconnaissance was conducted in late 2008 and early 2009 by CBBEL. Information was compiled on stream crossings, land use, and channel conditions. Based on the field reconnaissance data and hydraulic structures dimensions data, a field survey plan for Feehanville Ditch was developed.

Field survey was performed under the protocol of FEMA's *Guidelines and Specifications for Flood Hazard Mapping partners, Appendix A: Guidance for Aerial Mapping and Surveying*. Field survey was performed in early 2009 by D.B. Sterlin Inc. Channel cross-sections were surveyed approximately 500 feet apart in addition to the survey of hydraulic structures. The actual cross-section spacing and location was determined based on the variability of the channel shape, roughness, and slope.

HEC-GeoRAS was utilized to extract the cross-section data from the TIN created from the Cook County 2-foot topographic mapping. The surveyed channel information from the D.B. Sterlin Inc. data was integrated into each cross-section to better define the channel. Survey data for each structure, provided by D.B. Sterlin, was added to the model. The Manning's n-values were assessed based on information obtained in the field and aerial photography.

Boundary Conditions. The downstream boundary condition for the Feehanville Ditch Subatershed is the 5-year water surface elevation for the Des Plaines River at its confluence with Feehanville Ditch.

3.10.2.3 Calibration and Verification

No stream gage or HWM was available within the Feehanville Ditch Subwatershed. Based on previous Lower Des Plaines River Tributary calibrations, the CUH storage coefficient, R, was multiplied by a factor of 2.18 for all subbasins in the Feehanville Ditch HEC-HMS hydrologic model. The R multiplier was determined for ungaged watersheds based on the results of calibrations performed for gaged subwatersheds. An equation was developed based on the average of the slopes calculated for use in determining the time of concentration. That equation was used to determine an R value for ungaged subwatersheds.

3.10.2.4 Existing Conditions Evaluation

Flood Inundation Areas. Figure 3.10.1 shows inundation areas in the Feehanville Ditch Subwatershed produced by the DWP's hydraulic model for the 100-year, 24-hour critical duration design storm.

Hydraulic Profiles. Appendix H contains existing conditions hydraulic profiles for Feehanville Ditch. Profiles are shown for the 2-, 5-, 10-, 25-, 50-, 100-, and 500-year recurrence interval design storms.

3.10.3 Development and Evaluation of Alternatives

3.10.3.1 Problem Definition

Hydraulic model results were reviewed with inundation mapping to identify locations where property damage due to flooding is predicted.

3.10.3.2 Damage Assessment

Economic damages were defined following the protocol defined in Chapter 6.6 of the CCSMP. Recreation damages due to flooding are not being identified as part of the DWP. No erosion damages due to flooding were identified for Feehanville Ditch. Transportation damages were estimated as 15 percent of property damages plus additional site specific traffic damages computed for the River Road at the confluence with Feehanville Ditch. Table 3.10.5 lists the damage assessment for existing conditions.

TABLE 3.10.5
Estimated Average Annual Damages for Feehanville Ditch

Damage Category	Estimated Average Annual Damage ($)	Description
Property	8,444	Includes 9 residential structures and contents damages
Erosion	0	No critical erosion damages identified
Transportation	20,436	Assumed as 15% of property damage plus regional transportation damages

3.10.3.3 Technology Screening

Flood control technologies were screened to identify those most appropriate for addressing the flooding problems in the subwatershed. Road raising and floodwalls were identified as the principal technologies applicable for addressing stormwater problems in the Feehanville Ditch Subwatershed. The feasibility of the technologies defined in Chapter 6.6 of the CCSMP are summarized for each alternative in Table 3.10.6.

TABLE 3.10.6
Technology Screening for Feehanville Ditch Subwatershed

Technology	Feasibility for WT-FR-01 (Wheeling Township, River Road and Gregory Street)
Storage Facility	Not Feasible – No large open space available.
Conveyance Improvement – Culvert/Bridge Replacement	Not Feasible – Would not address problem of Des Plaines River backwater.
Conveyance Improvement – Channel Improvement	Not Feasible – Would not address problem of Des Plaines River backwater.
Flood Barriers, Levees/Floodwalls	Feasible – With pump station, would remove structures and River Road from Des Plaines River backwater.
Technology	**Feasibility for WT-FR-02 (River Road at Feehanville Ditch)**
Storage Facility	Not Feasible – Would not address Des Plaines River backwater
Conveyance Improvement – Culvert/Bridge Replacement	Not Feasible – Would not address Des Plaines River backwater
Conveyance Improvement – Channel Improvement	Not Feasible – Would not address Des Plaines River backwater
Flood Barriers, Levees/Floodwalls	Feasible – Road raise would address Des Plaines River backwater

3.10.3.4 Alternative Development

Flood Control Alternatives. Alternative solutions to regional flooding were developed and evaluated consistent with the methodology described in Section 1.4 of this report. Table 3.10.7 summarizes flood control alternatives for the Feehanville Ditch Subwatershed.

TABLE 3.10.7
Flood Control Alternatives for Feehanville Ditch Subwatershed

Alternative	Addressed Problem Area IDs	Location	Description
FHDT-1	WT-FR-02	Wheeling Township	*Raise River Road:* Raise approximately 720 feet length of River Road at Gregory Street to elevation of 636.5 feet. Includes 0.5 feet of freeboard above Des Plaines River 100-year profile.
FHDT-2	WT-FR-01, WT-FR-02	Wheeling Township	*Floodwall:* Approximately 1,130 feet of floodwall located east of River Road at elevation of 638 feet. Average wall height 5 feet. Includes 2 feet of freeboard above Des Plaines River 100-year profile. Pump station required to address interior drainage.

Feehanville Ditch does not experience any regional flooding problems except for backwater conditions due to the Des Plaines River. The backwater condition floods River Road and residential structures located west of River Road along Gregory Street and Graylynn Drive. The subdivision is located in Unincorporated Cook County. Options of raising River Road, and a floodwall and pump station were investigated as improvement alternatives to address the regional flooding problem. For both alternatives, a storage element is not required based on analysis of each alternative in Des Plaines River unsteady HEC-RAS hydraulic modeling.

Erosion Control Alternatives. No regional erosion problems were reported within the Feehanville Ditch Subwatershed; therefore, no erosion control alternatives were evaluated.

3.10.3.5 Alternative Evaluation and Selection

Alternatives listed in Table 3.10.7 were evaluated to determine their effectiveness and to produce data for the countywide prioritization of watershed projects. Flood control alternatives were modeled to evaluate their impact on water surface elevations and flood damages. Table 3.10.11 provides a summary including B/C ratio, net benefits, total project costs, number of structures protected, and other relevant alternative data.

FHDT-1. Alternative FHDT-1 would raise approximately 720 feet of River Road from an approximate minimum elevation of 634.0 feet to a minimum elevation of approximately 636.5 feet. Raising River Road to 0.5 feet above the 100-year water surface profile of the Des Plaines River (District minimum requirements) will address the risk of flooding on River Road up to the 100-year flood inundation. The structures on the west side of River Road will not be protected from flooding due to the backwater of the Des Plaines River. Alternative FHDT-1 was modeled in the Des Plaines River Mainstem Unsteady HEC-RAS hydraulic model to see if mitigation storage was required. The results of the hydraulic modeling analysis showed that no mitigation storage is required for this project. The WSEL and peak flowrate at the confluence of River Road and Feehanville Ditch do not change from existing conditions.

Table 3.10.8 compares the peak modeled water surface elevation and flow for Alternative FHDT-1.

TABLE 3.10.8
Feehanville Ditch Subwatershed Existing and Alternative Condition FHDT-1 Flow and WSEL Comparison

Location	Station	Existing Conditions		Alternative FHDT-1	
		Max WSEL (ft)	Max Flow (cfs)	Max WSEL (ft)	Max Flow (cfs)
River Road at Feehanville Ditch Confluence	221516	635.8	5,393	635.8	5,393

Note: Station, Max WSEL, Max Flow information from Existing Conditions MLDPR Unsteady HEC-RAS hydraulic model.

FHDT-2. Alternative FHDT-2 would construct approximately 1,130 feet of floodwall at an approximate elevation of 638.0 feet to keep the backwater from the Des Plaines River from flooding River Road and structures along Feehanville Ditch to the west of River Road. The top elevation of the floodwall provides approximately 2 feet of freeboard per District requirements. A pump station would be required to convey the approximately 200 cfs of interior drainage from the Feehanville Ditch Subwatershed during a 100-year storm event.

Alternative FHDT-2 was modeled in the MLDPR Unsteady HEC-RAS hydraulic model to see if mitigation storage was required if the existing storage west of the proposed floodwall would be blocked. The results of the hydraulic modeling analysis showed that no mitigation storage is required for this project.

Table 3.10.9 compares the peak modeled water surface elevation and flow for Alternative FHDT-2.

TABLE 3.10.9
Feehanville Ditch Subwatershed Existing and Alternative Condition FHDT-2 Flow and WSEL Comparison

Location	Station	Existing Conditions		Alternative FHDT-2	
		Max WSEL (ft)	Max Flow (cfs)	Max WSEL (ft)	Max Flow (cfs)
River Road at Feehanville Ditch Confluence	221516	635.8	5,393	635.8	5,393

Note: Station, Max WSEL, Max Flow information from Existing Conditions MLDPR Unsteady HEC-RAS hydraulic model.

A number of properties are at risk of shallow flooding during the 100-year flood event under existing conditions or recommended alternative conditions. In addition, due to their locations, other properties risk of flooding cannot be feasibly mitigated by structural measures. Such properties are candidates for protection using nonstructural flood control measures, such as flood-proofing or acquisition. These measures may be considered to address damages that are not fully addressed by capital projects recommended in the Lower Des Plaines River DWP.

Hydraulic modeling results for Feehanville Ditch show no roadways inundated by a depth greater than 0.5 feet; however, the Des Plaines River hydraulic model identified River Road at Feehanville Ditch and Gregory Street as roadway crossings (state route, US highway, or four-lane road or greater) that are overtopped for storm events of 100-year recurrence interval and below by a depth of greater than 0.5 feet. Table 3.10.10 provides a summary of the depth of road flooding for existing conditions and with recommended alternatives.

Alternatives FHDT-1 and FHDT-2 both address the flooding risk of Des Plaines River Road. While FHDT-1 addresses the roadway flooding by raising River Road, Alternative FHDT-2 addresses the roadway flooding and structure flooding by the construction of a floodwall.

TABLE 3.10.10
Feehanville Ditch Subwatershed Road Overtopping Summary

Road Crossing	Road Elevation	25-yr Depth of Flooding	50-yr Depth of Flooding	100-yr Depth of Flooding
River Road	634.0	0.7[1]	1.5[1]	1.8[1]
River Road (with FHDT-1)	636.5	-	-	-
River Road (with FHDT-2)	634.0	-	-	-

Note: "-" indicates that road crossing does not overtop for that particular storm event.

[1] Depth of flooding with respect to Des Plaines River flood profiles.

3.10.3.6 Data Required for Countywide Prioritization of Watershed Projects

Appendix I presents conceptual level cost estimates for the recommended alternatives. Table 3.10.11 lists alternatives analyzed in detail as part of the DWP development.

The recommended alternative for Feehanville Ditch is the floodwall alternative FHDT-2 which would address the risk of structure and River Road flooding up to the 100-year flood inundation. Alternative FHDT-2 proposes 2-feet of freeboard; however, to achieve 3-feet of freeboard for the floodwall alternative, the floodwall would have to be extended by approximately 4,000 feet and an additional pump station constructed to handle the interior drainage for McDonald Creek which discharges into the Des Plaines River upstream of this location. The cost to achieve this is extremely prohibitive (approximately $32,900,000), so the recommended alternative includes a floodwall with 2-feet of freeboard which may require additional analysis during detailed design to meet the requirements of Section 65.10 of the NFIP regulations to remove structures behind the floodwall from the regulatory floodplain.

Figures 3.10.1 shows the locations and a summary of the proposed and recommended alternatives described in Table 3.10.11. Figures 3.10.2 and 3.10.3 also show comparisons of the existing condition and alternative condition inundation areas.

TABLE 3.10.11
Feehanville Ditch Subwatershed Project Alternative Matrix to Support District CIP Prioritization

Alternative ID	Description	B/C Ratio	Net Benefits ($)	Total Project Cost ($)	No. Structures Removed From 100-Yr Inundation	Roadways Protected	Water Quality Benefit	Recom-mended	Communities Involved
FHDT-1	Raise River Road	0.1	356,629	3,678,786	0	1	No Impact	N	Wheeling Township
FHDT-2	Floodwall east of River Road	0.06	537,242	8,570,197	9	1	No Impact	Y	Wheeling Township

3.11 Flagg Creek

The Flagg Creek Subwatershed measures approximately 19.8 square miles and drains areas within Cook and DuPage Counties. The DuPage County portion of the Subwatershed accounts for approximately 61% of the total drainage area. The Cook County portion of the Flagg Creek Subwatershed is 7.7 square miles. Flagg Creek Mainstem flows in a general south-southeast direction until its confluence with the Des Plaines River in Willow Springs near the Cook-DuPage County line.

TABLE 3.11.1
Communities Draining to Flagg Creek

Community	Tributary Area (mi^2)
Burr Ridge	2.4
Countryside	0.1
Hinsdale	1.0
Indian Head Park	0.9
Western Springs	1.6
Willow Springs	0.8
Unincorporated Cook County	0.9
TOTAL	7.7

Note: This list includes community areas tributary to the Flagg Creek within the 7.7 square mile study area in Cook County. It does not include upstream tributary areas in DuPage County.

The Flagg Creek Subwatershed drains areas within the Village of Burr Ridge, the City of Countryside, the Village of Hinsdale, the Village of Indian Head Park, the Village of Western Springs, and the Village of Willow Springs.

Table 3.11.1 lists the communities located in areas directly tributary to the Flagg Creek Subwatershed. Table 3.11.2 lists the land use breakdown by area within the Flagg Creek Subwatershed.

TABLE 3.11.2
Land Use Distribution for Flagg Creek within Cook County

Land Use Category	Area (acres)	%
Residential	3,127	63
Commercial/Industrial	284	6
Forest/Open Land	558	11
Institutional	174	4
Transportation/Utility	357	7
Water/Wetland	32	1
Agricultural	393	8

Source: Chicago Metropolitan Agency for Planning's 2005 Land Use Inventory for Cook, DuPage, Kane, Kendall, Lake, McHenry and Will Counties, Illinois. Version 1.0. Published January 2009

Within the Flagg Creek Subwatershed a total of 13.7 stream miles were studied, which includes seven tributaries: 59th St. Ditch, 63rd St. Ditch, Plainfield Road Ditch, Flagg Creek Tributary A, Flagg Creek Tributary B, 79th Street Ditch, and Flagg Creek Tributary C (in order from north to south).

- Flagg Creek Mainstem has its headwaters in the Village of Westmont, which is located 3.25 miles west of County Line Road within DuPage County. Flagg Creek enters Cook County with a drainage area of 2.9 square miles, one block north of the BNSF Railroad Tracks. From this location Flagg Creek flows generally in a southerly path for 7.6 miles until it crosses into DuPage County once again, approximately 0.25 miles south of the intersection of 91st Street and County Line Road in Willow Springs. From this location, Flagg Creek flows an additional 0.25 miles and joins the Des Plaines River at River Mile 32.2. The main stem drainage area is 9.13 square miles with 5.54 square miles in Cook County.

- The 59th Street Ditch extends from 55th Street and Madison Street in Hinsdale and drains 1.31 square miles until its confluence with the 63rd Street Ditch in Western Springs. The Cook County portion of the 59th Street ditch tributary area is 0.33 square miles.
- The 63rd Street Ditch drains 4.1 square miles with its headwaters at 59th Street and Cass Avenue in DuPage County. The Cook County drainage area of the 63rd Street Ditch is 0.22 square miles.
- The Plainfield Road Ditch originates near Illinois Route 83 and Plainfield Road and drains 1.7 square miles at its confluence with Flagg Creek at river mile 4.82 in Indian Head Park. The Cook County drainage area of the Plainfield Road ditch is 0.32 square miles.
- Flagg Creek Tributary A has its headwaters at the Burr Ridge Village Center and drains 0.57 square miles with 0.21 square miles within Cook County.
- Flagg Creek Tributary B also originates in the Burr Ridge Village Center and flows west until its confluence with Flagg Creek in Lyons Township. Tributary B has a drainage area of 0.61 square miles with 0.35 square miles in Cook County.
- The 79th Street Ditch has its headwaters near Interstate 55 and Madison Street in Burr Ridge and flows to Tributary C. The 79th Street Ditch drainage area is 0.64 square miles with 0.05 square miles in Cook County.
- Flagg Creek Tributary C originates near Interstate 55 and Illinois Route 83 in Willowbrook in DuPage County and drains 1.76 square miles until its confluence with Flagg Creek in Willow Springs. The Cook County portion of Tributary C is 0.64 square miles.

The portion of the Flagg Creek Subwatershed located within DuPage County was included in the hydrologic model of this study, but not in the hydraulic models. All Cook County streams previously mapped by the FEMA FIS, including mapped areas with less than one square mile drainage, were studied in detail in this study. The Flagg Creek Subwatershed currently does not have any flood control reservoirs.

Figure 3.11.1 shows the areas directly tributary to Flagg Creek. Reported stormwater problem areas, flood inundation areas, and proposed alternative projects are also shown and discussed in the following subsections.

3.11.1 Sources of Data

3.11.1.1 Previous Studies

The Flagg Creek Mainstem, and most if its tributaries, were studied between 1978 and 1980 using a combination of RE73, RE75, LP3, TR-20, and WSP-2 in the analysis. Since that time, various FEMA Letter of Map Changes have been issued for development permitting, however no updated study was performed. Available previous studies include:

1980 FIS. A WSP-2 hydraulic model for Flagg Creek in Western Springs was completed by the former United States Department of Agriculture Soil Conservation Service through 49th Street. This model was extended to Interstate 294 by Harza Engineering Company in 1978 for the July 1980 FIS. The WSP-2 hydraulic model was also used in the November 6, 2000 FIS and is considered the regulatory hydraulic model for Flagg Creek. There have been no Letters of Map Revision issued by FEMA for the hydrology or hydraulics of Flagg Creek since the original Harza study.

The floodway widths of this reach of Flagg Creek were analyzed using the HUD-15 computer model. The HUD-15 computer program is no longer approved by FEMA for analysis.

The hydrologic model for Flagg Creek and Flagg Creek Tributaries A, B, and C through Burr Ridge, Unincorporated Cook County, and Willow Springs was developed using Regional Equation 73 (RE73) and Water Resources Council Log-Pearson Type III (LP-3) methodologies. These methodologies are no longer used for the evaluation and certification of flow rates. The subwatershed hydrology in Western Springs and Indian Head Park was studied using TR-20. The hydrology developed for the 1980 FEMA FIS was not available for review.

1995 Study. James J. Benes and Associates, Inc. completed a study for Flagg Creek in February 1995 that included hydraulic modeling. This study updated the WSP-2 hydraulic model to a HEC-RAS hydraulic model for a portion of the subwatershed and incorporated revised existing conditions topography. This study also incorporated various improvements to Flagg Creek since the 1980 study.

2003 Study. A study was completed by Manhard Consulting in 2003 that utilized the HEC-RAS hydraulic model, and converted other reaches of the subwatershed from the WSP-2 model into HEC-RAS. This study also modeled proposed channel improvements in the area of 47th and 48th streets. This model was not submitted to FEMA, however it was available for review for this study.

3.11.1.2 Water Quality Data

There are no District or IEPA water quality monitoring stations in the Flagg Creek Subwatershed.

The IEPA's 2010 *Integrated Water Quality Report*, which includes the CWA 303(d) and 305(b) lists, lists one segment within the DWP study area of the Flagg Creek subwatershed as impaired. Table 3.11.3 lists the 303(d) listed impairments. The Flagg Creek subwatershed area was not included in the *Des Plaines River/Higgins Creek Watershed TMDL Stage 1 Report*, March 2009. No TMDLs have been investigated for Flagg Creek or its tributaries.

TABLE 3.11.3

IEPA Use Support Categorization and 303(d) Impairments in the Flagg Creek Subwatershed

Station ID	Waterbody	Impaired Designated Use	Potential Cause	Potential Source
IL_GK-03	Flagg Creek*	Aquatic Life	Arsenic, DDT, Hexachlo-robenzene, Methoxychlor, Phosphorus (Total)	Urban Runoff/Storm Sewers, Combined Sew-er Overflow, Contami-nated Sediments, Municipal Point Source Discharge

NPDES point source discharges within the Flagg Creek subwatershed are listed in Table 3.11.4. In addition to the point source discharges listed, municipalities discharging to the Flagg Creek subwatershed are regulated by IEPA's NPDES Phase II Stormwater Permit Program, which was created to improve the water quality of stormwater runoff from urban areas, and requires that municipalities obtain permits for discharging stormwater and implement the six minimum control measures for limiting runoff pollution to receiving systems.

TABLE 3.11.4
Point Source Discharges in the Flagg Creek Subwatershed

Name	NPDES	Community	Receiving Waterway
Material Serv Corp-Yard 19	ILG840029	--	Flagg Creek
Flagg Creek Wrd Mcelwain Stp	IL0022586	Burr Ridge	Flagg Creek
Hinsdale CSO	IL0066818	Hinsdale	Flagg Creek
Hinsdale Family Aquatic Center	IL0069752	Hinsdale	Flagg Creek
Western Springs CSOS	IL0045039	Western Springs	Des Plaines River/ Flagg Creek/ Farmers Prairie Creek

Note: NPDES facilities were identified from the IEPA website at http://www.epa.state.il.us/water/permits/waste-water/npdes-statewide.pdf, and from the USEPA website at http://www.epa.gov/r5water/weca/pcs.htm.

3.11.1.3 Wetland and Riparian Areas

Figures 2.3.6 and 2.3.7 contain mapping of wetland and riparian areas in the Lower Des Plaines River Watershed. Wetland areas were identified using NWI mapping. NWI data includes roughly 95 acres of wetland areas in the Flagg Creek Subwatershed. Riparian areas are defined as vegetated areas between aquatic and upland ecosystems adjacent to a waterway or body of water that provides flood management, habitat, and water quality enhancement. Identified riparian environments offer potential opportunities for restoration.

3.11.1.4 Floodplain Mapping

The current effective FIRMs for the Flagg Creek Subwatershed are dated 2006 and were completed as part of the Cook County DFIRM submittal by the Illinois State Water Survey. For the 2006 submittal, no additional hydrologic or hydraulic analysis was undertaken. Existing water surface elevations from the year 2000 Cook County FIS were remapped to Cook County LiDAR data dated 2003.

3.11.1.5 Stormwater Problem Data

Beginning in the third quarter of 2007, communities, agencies (e.g., IDOT, CCHD), and stakeholders submitted Form B questionnaire response data to the District summarizing known stormwater problems within their jurisdictions. The questionnaires were requested again by the District following the September 2008 storm event. Table 3.11.5 summarizes reported problem areas reviewed as a part of the DWP development. Problems are classified in Table 3.11.5 as regional or local. This classification is based on a process described in Section 1 of this report. The Problem Area ID naming convention was found in Technical Memorandum entitled, “Proposed Naming Conventions for Database Elements” dated August 3, 2007.

TABLE 3.11.5
Community Response Data for Flagg Creek

Problem Area ID[1,3]	Municipality	Problems as Reported by Local Agency	Location	Problem Description	Local/ Regional	Resolution in DWP
CS-FL-01	Countryside	Pavement Flooding	55th Street at Gilbert Avenue	Reported by IDOT: Last incident 5/23/04	Local	This is a local problem.[2]
CS-FL-02	Countryside	Pavement Flooding	Willow Springs Road at 55th Street	Reported by IDOT: Last incident 5/10/90	Local	This is a local problem.[2]
FD-FL-01	Flagg Creek Water Reclamation District	Overbank Flooding	Joliet Road and I-55-west bank of Flagg Creek, 200 feet north of Joliet Road	Floodwaters impact hydraulics and contaminants from pond are discharged.	Local	This is a local problem.[2]
FD-FL-02	Flagg Creek Water Reclamation District	Storm Sewer Problem	Harvey Avenue	Drainage problem for east side of subdivision off of Harvey Avenue.	Local	This is a local problem.[2]
IH-FL-01	Indian Head Park	Pavement Flooding	I-55 and I-294	Reported by IDOT: Last incident no reported	Local	This is a local problem.[2]

TABLE 3.11.5
Community Response Data for Flagg Creek

Problem Area ID[1,3]	Municipality	Problems as Reported by Local Agency	Location	Problem Description	Local/ Regional	Resolution in DWP
LT-FL-01	Lyons Township	Drainage Problem	55th Street and Laurel Avenue	Debris and poor grading cause ponding and flooding problems.	Local	This is a local problem.[2]
LT-FL-02	Lyons Township	Drainage Problem	55th Street and Wolf Road	Problems with drainage flowpath.	Local	This is a local problem.[2]
LT-FL-03	Lyons Township	Storm Sewer Problem	55th Street and Willow Springs Road	Drainage problems at storm sewer.	Local	This is a local problem[2]
LT-FL-04	Lyons Township	Drainage Problem	54th Street to 54th Place drainage easement	Obstructions impede flow and cause ponding and flooding.	Local	This is a local problem.[2]
WL-FL-01	Willow Springs	Pavement Flooding and Residential Flooding	91st Street and Orchard Road	Corner floods in heavy rains; intersection impassable and threatens homes.	Local	This is a local problem.[2]
WS-FL-01	Village of Willow Springs	Sediment deposition	Southwest of German Church Road and Wolf Road	Sediment and sedge build up along north side of creek. Obstructing proper flowage and causing creek to re-channel itself. Covers 70 x 40 feet. Along south end of banks creek is starting to erode behind homes.	Local	This is a local problem.[2]

[1] Problem Area IDs begin with DP-FGCR- as they are in the Des Plaines River along Flagg Creek.
[2] Problem does not meet regional definition (refer to chapter 1). Solutions for the local problems are not addressed in the DWP.
[3] These problem areas were identified prior to the June and July 2010 storm events.

3.11.1.6 Near Termed Planned Projects

No near-term planned major flood control projects to be constructed by others were identified in the Flagg Creek Subwatershed.

3.11.2 Watershed Analysis

3.11.2.1 Hydrologic Model Development

Subbasin Delineation. Subbasins were delineated based on the 2-foot Cook County topographic mapping. As the Cook County topography did not extend into DuPage County, subbasins that extended into DuPage County were delineated based on USGS 30m DEM data & field reconnaissance. The subbasins were drawn in GIS and incorporated into the HEC-HMS hydrologic model.

Hydrologic Parameter Calculation. CN values in Cook County were estimated for each subbasin based upon NRCS soil data and 2001 CMAP land use data. This method is further described in Section 1.3.2, with lookup values for specific combinations of land use and soil data presented in Appendix C. An area-weighted average of the CN was generated for each subbasin.

All subwatersheds in DuPage County used the SSURGO database distributed by the NRCS National Cartography and Geospatial Center.

Clark's unit hydrograph parameters were estimated using the method described in Section 1.3.2. Appendix G provides a summary of the hydrologic parameters used for subbasins in each Subwatershed.

3.11.2.2 Hydraulic Model Development

Field Data, Investigation, and Existing Model Data. The FEMA effective hydraulic models for Flagg Creek and its tributaries were developed in the late 1970s using a combination of RE73, RE75, LP3, TR-20, and WSP-2. The model data was over 30 years old and was not used in the DWP development.

Field survey was performed by D.B. Sterlin, Inc. in early 2009 under the protocol of FEMA's *Guidelines and Specifications for Flood Hazard Mapping partners, Appendix A: Guidance for Aerial Mapping and Surveying.* Channel cross-sections were surveyed along the entire creek and tributaries in addition to the survey of hydraulic structures. The actual spacing and location was determined based on the variability of the channel geometry, shape, roughness, and slope.

HEC-GeoRAS cross-sections extracted from the TIN created in GIS from the 2003 Cook County LiDAR topographic data were imported into HEC-RAS. The field survey was incorporated into these GIS created cross sections for modeling.

Field visits were performed to assess channel and overbank roughness characteristics at several locations along Flagg Creek and its tributaries. Field visits were also made to confirm flow paths and directions of tributary areas. The information gathered in the field was compared to photographs and aerial photography to review and determine Manning's n roughness coefficients for the unsteady HEC-RAS hydraulic model.

Additional data was obtained from the communities during two workshops held on February 18, 2010 and May 20, 2010.

Boundary Conditions. The downstream boundary condition for the Flagg Creek Subwatershed is the 5-year water surface elevation for the Des Plaines River at the Flagg Creek confluence.

3.11.2.3 Calibration and Verification

The Flagg Creek Subwatershed HEC-HMS hydrologic model and unsteady HEC-RAS hydraulic models were calibrated to the September 13-14, 2008 storm event conditions observed at USGS stream gage 05533000 - Flagg Creek near Willow Springs, Illinois. This stream gage measures gage height and estimates stream flow based on the measured stage combined with the published USGS rating curve of the stream gage. The location of the stream gage is at 41.739 N, 87.896 W (NAD 83) and is located on the upstream face of German Church Road which corresponds to Flagg River Mile 2.18 and HEC-RAS cross section number 11520.45. The drainage area of Flagg Creek at the stream gage is 16.5 square miles. No HWM was available.

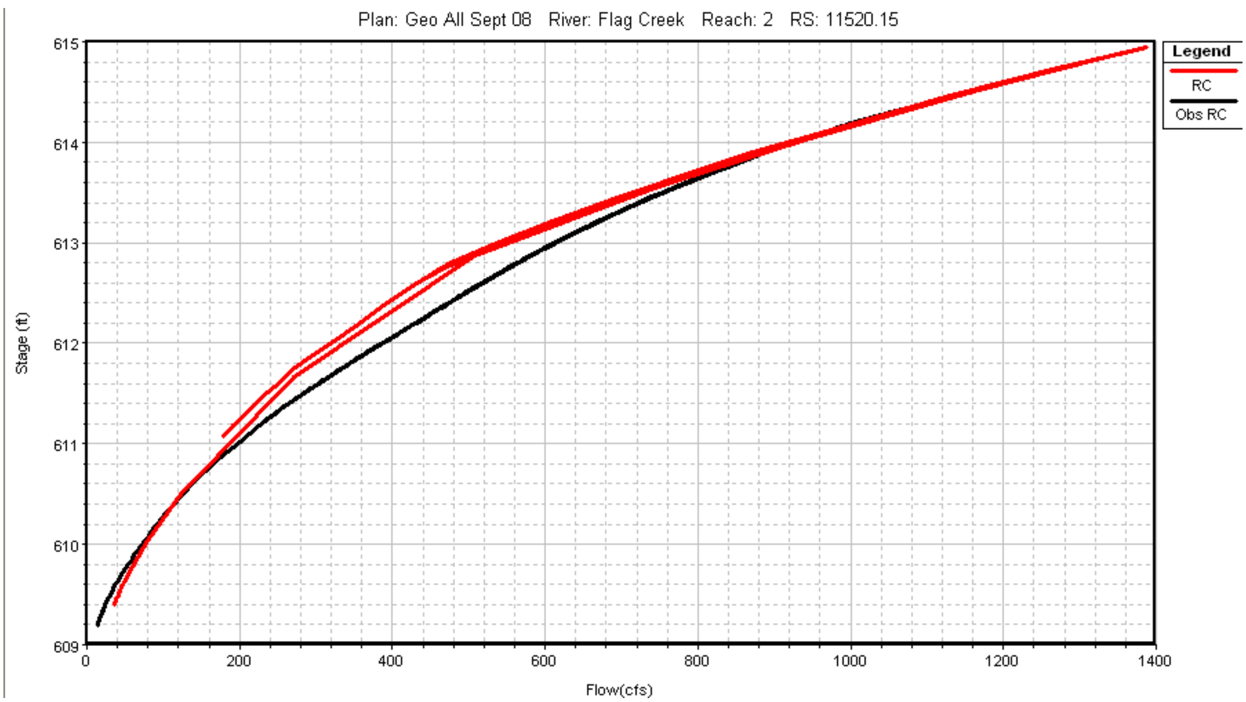
To calibrate the unsteady HEC-RAS hydraulic model to the gage data, channel hydraulics were matched to the USGS rating curve at the gage location (German Church Road). Field visits and additional survey data were collected to aid in developing the hydraulic model, along with Manning's n adjustments (generally between 20% of the initial estimated values). The Manning's n adjustments were applied to the entire watershed.

Figure 3.11.2 shows the USGS rating curve (black line) and the simulated rating curve (red line) at the location of the Flagg Creek gage. USGS Rating Curve #34 has been in effect from November 1997 to present (August 2010).

With the hydraulics calibrated to the gage, the watershed hydrology was calibrated to the September 2008 event. The models were verified using the August 2007 and October 2001 events.

FIGURE 3.11.2

Flagg Creek Comparison of USGS Rating Curve #34 and Simulated Rating Curve at 05533000



Two restrictive culverts were found in the Flagg121 and Flagg131 subbasins, located just upstream (west) of the Interstate 294 in Cook County. Though these subbasins were not studied in detail, the restrictive culverts were put in the model to better simulate the flows that reach Flagg Creek.

A storage area just to the west of the Flagg Creek Water Reclamation District was added to the HMS model. The surface area was estimated based on the aerials and the outlet weir measured during field investigation.

Field reconnaissance showed the areas along Illinois Route 83 in DuPage County drain toward the west and not to the Flagg Creek Subwatershed. Also, an area in the southeast portion of the watershed was removed. Field reconnaissance showed there to be a culvert draining towards the south through the railroad tracks near Oak Grove and 91st Street. This culvert was not readily seen on aerials and the outlet did not show up in the 2-foot topography.

The final hydrology was calibrated using a multiple of three on the R coefficient. Table 3.11.6 below shows the model to be within the specified tolerance for stage and flow, and also agrees well with the LP3 and Streamstats estimates of the 100-year flow.

TABLE 3.11.6
Flagg Creek Calibration Results

	Observed		Modeled		CCSMP's Criteria[1]	
Storm Event	**Flow (cfs)**	**State (ft)**	**Flow (cfs)**	**Stage (ft)**	**Percent Difference in Peak Flow**	**Difference in Stage (ft)**
October 2001	962	614.37	935	614.03	-3%	-0.34
August 2007	1,100	614.38	1,216	614.61	11%	0.23
September 2008	1,110	614.41	1,097	614.38	-1%	-0.03
100-year, 24-hour[2]			2,895	617.15		

[1] Flow within 30% and stage within 6 inches.
[2] 100-year LP3 = 2,638 cfs and USGS StreamStats = 2,930 cfs

Figures 3.11.3 through 3.11.8 present the hydrographs for the HEC-HMS model calibration for the October 2001, August 2007, and September 2008 storm events, respectively. During model calibration, only the above storm events, which are on the order of 4-year to 6-year events, were available. On July 24, 2010 at 8:00AM CST, the USGS gage recorded a stage of 615.78 with a corresponding flow of 1,780 cfs. This was approximately a 25-year event and was the highest recorded peak flow since 2,300 cfs on July 18, 1996. This storm event was not utilized as a verification storm as the models already met the District calibration criteria and the storm was only approximately a 25-year storm event.

FIGURE 3.11.3
Flagg Creek Flow Comparison at German Church Road for the October 2001 Storm Event

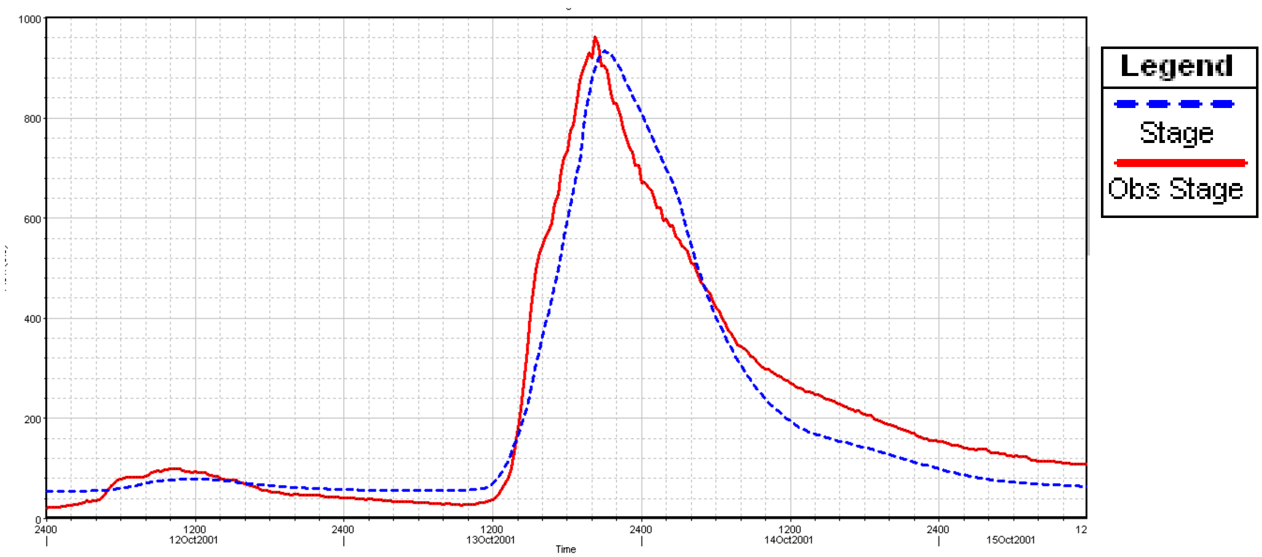


FIGURE 3.11.4
Flagg Creek Stage Comparison at German Church Road for the October 2001 Storm Event

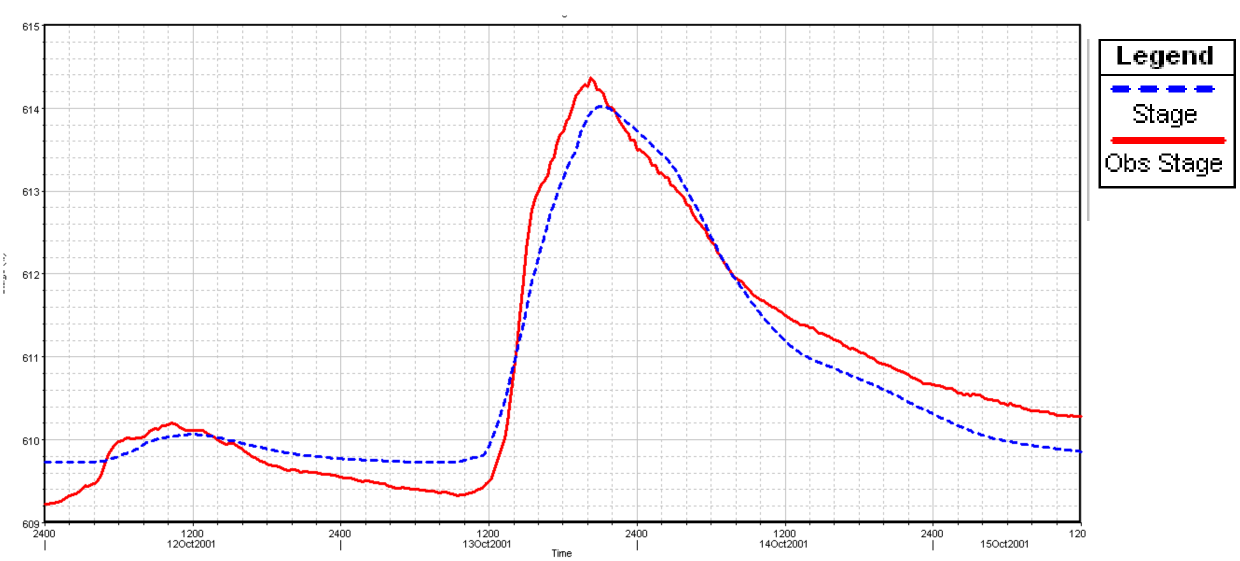


FIGURE 3.11.5
Flagg Creek Flow Comparison at German Church Road for the August 2007 Storm Event

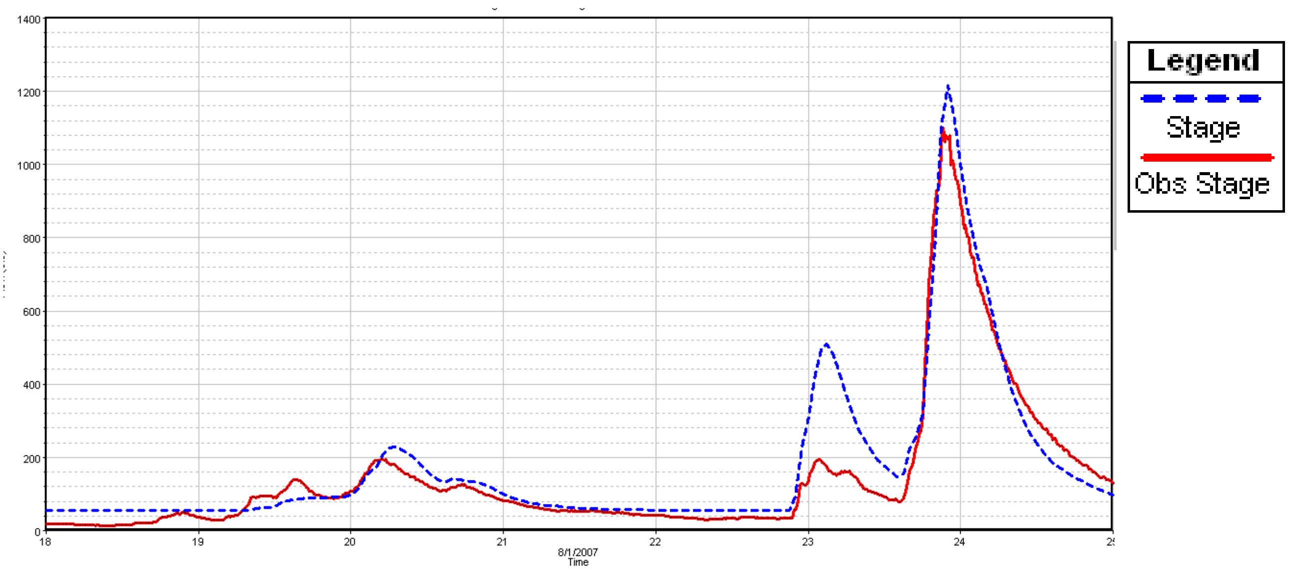


FIGURE 3.11.6
Flagg Creek Stage Comparison at German Church Road for the August 2007 Storm Event

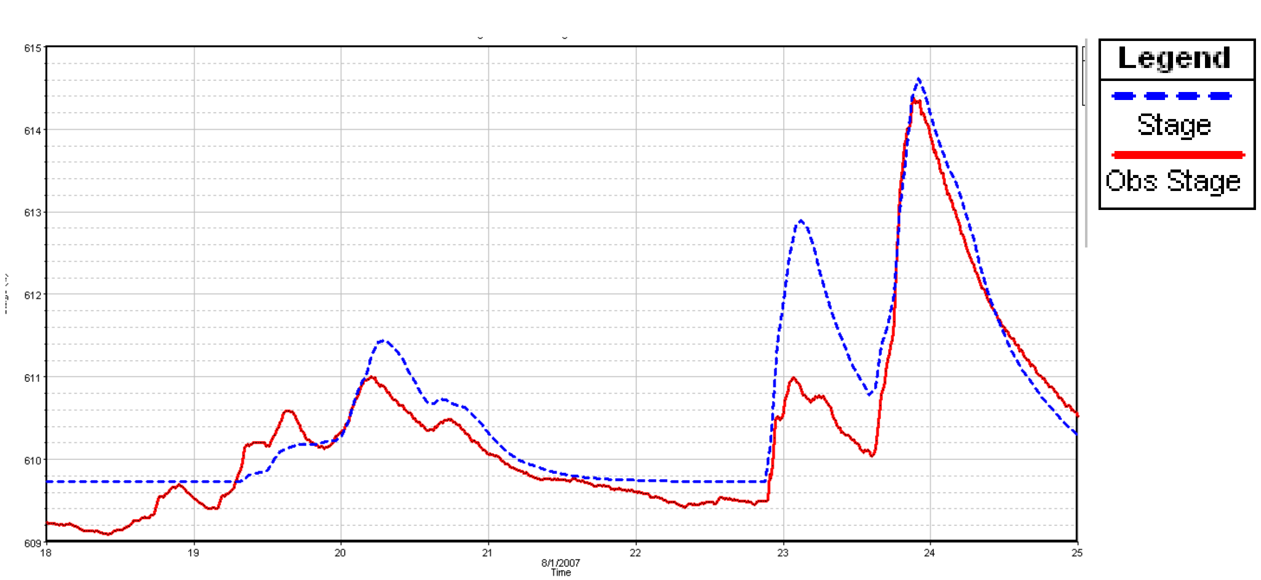


FIGURE 3.11.7
Flagg Creek Flow Comparison at German Church Road for the September 2008 Storm Event

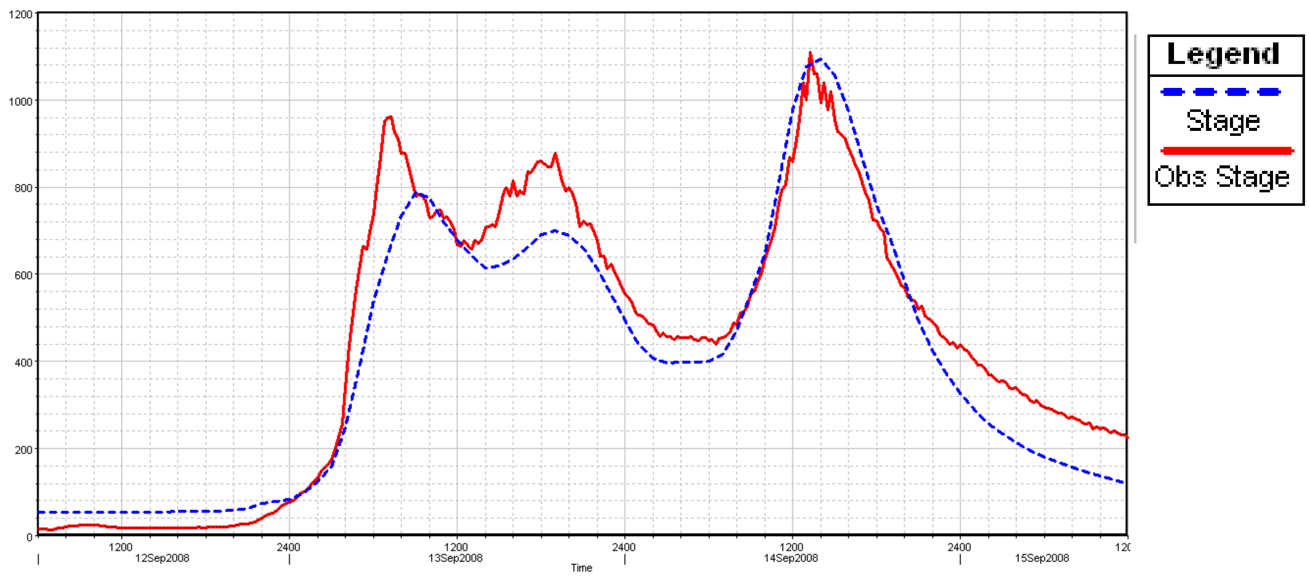
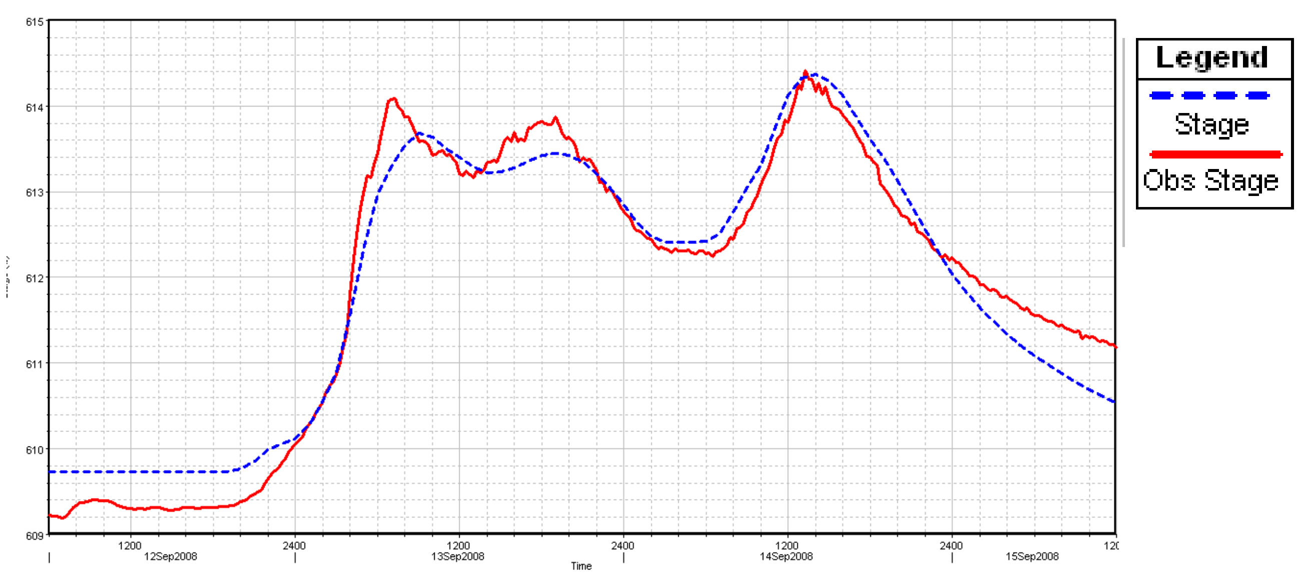


FIGURE 3.11.8
Flagg Creek Stage Comparison at German Church Road for the September 2008 Storm Event



3.11.2.4 Existing Conditions Evaluation

The 2-, 5-, 10-, 25-, 50, 100-, and 500-year design events were run for the 24-hour duration design storm.

3.11.2.5 Flood Inundation Areas

Appendix A shows inundation areas in the Flagg Creek Subwatershed produced by the DWP's hydraulic model for the 100-year, 24-hour duration design storm, which was determined to be the critical duration storm event.

3.11.2.6 Hydraulic Profiles

Appendix H contains existing conditions hydraulic profiles for Flagg Creek and its tributaries. Profiles are shown for the 2-, 5-, 10-, 25-, 50-, 100-, and 500-year recurrence interval design storms.

3.11.3 Development and Evaluation of Alternatives

3.11.3.1 Problem Definition

Hydraulic model results were reviewed with inundation mapping and Form B questionnaire response data to identify locations where property damage due to overbank flooding is predicted. Table 3.11.7 summarizes additional regional problem areas identified through hydraulic modeling of Flagg Creek.

TABLE 3.11.7
Modeled Problem Definition for Flagg Creek

Problem Area ID[1]	Location	Recurrence Interval (yr) of Flooding	Associated Form B[2]	Resolution in DWP	No. of Structures Flooded
FGCR-WS-FR-02	Left Bank of Flagg Creek from 47th to 51st Streets	100	No	FGCR-1	23
FGCR-IH-FR-01[3] FGCR-IH-FR-03	Flagg Creek at Wolf Road	25, 50, 100	No	FGCR-2	-
FGCR-CC-FR-02	Flagg Creek at 79th Street to 1,000 feet upstream	25, 50, 100	No	FGCR-3	5
FGCR-WS-FR-01 [3]	Flagg Creek from Wolf Road to German Church	5, 10, 25, 50, 100	No	FGCR-4	6
FGCR-WL-FR-01 [3]	Flagg Creek at 91st Street	5, 10, 25, 50, 100	No	FGCR-5	0
59DT-HS-FR-01	59th Street to Laurie Lane	50, 100	No	59DT-1	5

TABLE 3.11.7
Modeled Problem Definition for Flagg Creek

Problem Area ID[1]	Location	Recurrence Interval (yr) of Flooding	Associated Form B[2]	Resolution in DWP	No. of Structures Flooded
FGTB-BR-FR-01 FGTB-BR-FR-02 [3]	Tributary B at Wolf Road	2, 10, 25, 50, 100	No	FGTB-1	3

[1] Problem Area IDs begin with DP- as they are in the Des Plaines River Watershed.
[2] Although no Form B was submitted for these problem areas, local officials verified the location and extent of the problem areas at Workshop 1.
[3] Includes transportation damages.

3.11.3.2 Damage Assessment

Economic damages were defined following the procedures outlined in Chapter 6.6 of the CCSMP. Recreation damages due to flooding are not being identified as part of the DWP. No erosion damages due to flooding were identified for Flagg Creek. Non-specific transportation damages were estimated as 15% of total property damages. Specific transportation damages based on time delay were computed for regional roadways. Table 3.11.8 lists the existing estimated average annual damages for Flagg Creek.

TABLE 3.11.8
Estimated Average Annual Damages for Flagg Creek

Damage Category	Estimated Average Annual Damage ($)	Description
Property	223,113	Includes structure and content damage for residential and non-residential structures
Erosion	0	No critical erosion damages were identified
Transportation	36,729	Assumed as 15% of property damage plus regional transportation damages

3.11.3.3 Technology Screening

Flood control technologies were screened to identify those most appropriate for addressing the flooding problems in the Flagg Creek Subwatershed. Storage, increased conveyance, and floodwalls were identified as the most feasible technologies for all areas except for at 91st Street where the only solution was to raise the roadway above the 100-year flood. The feasibility of the technologies defined in Chapter 6.6 of the CCSMP is summarized for each alternative in Table 3.11.9.

TABLE 3.11.9
Technology Screening for Flagg Creek

Technology	Feasibility for FGCR-WS-FR-02 (Left Bank of Flagg Creek from 47th to 51st Streets)
Storage Facility	Feasible - in Spring Rock Park
Conveyance Improvement – Culvert/Bridge Replacement	Not feasible – Culvert/bridge not source of problem
Conveyance Improvement – Channel Improvement	Not feasible - No area to widen channel
Conveyance Improvement – Diversion	Not feasible - No diversion pathway present
Flood Barriers, Levees/Floodwalls	Not feasible - Will require road closure structures
Technology	**Feasibility for FGCR-IH-FR-01 (Flagg Creek from Joliet Street to Wolf Road)**
Storage Facility	Not feasible - Not feasible - Adequate vacant land not available for effective storage
Conveyance Improvement – Culvert/Bridge Replacement	Not feasible – Culvert/bridges not the source of problem
Conveyance Improvement – Channel Improvement	Not feasible – Adequate vacant land not available for adequate compensatory storage
Conveyance Improvement – Diversion	Not feasible - No diversion pathway present
Flood Barriers, Levees/Floodwalls	Feasible - Floodwall
Technology	**Feasibility for FGCR-CC-FR-02 (Flagg Creek at 79th Street to 1,000 feet upstream)**
Storage Facility	Feasible – Mitigating storage
Conveyance Improvement – Culvert/Bridge Replacement	Not feasible – culvert/bridges not the source of problem
Conveyance Improvement – Channel Improvement	Not feasible - Vacant land not available for adequate compensatory storage
Conveyance Improvement – Diversion	Not feasible - No diversion pathway present
Flood Barriers, Levees/Floodwalls	Feasible – Floodwall
Technology	**Feasibility for FGCR-WS-FR-01 (Flagg Creek from Wolf Road to German Church Road)**
Storage Facility	Not feasible - Adequate vacant land not available
Conveyance Improvement – Culvert/Bridge Replacement	Feasible - bridges partially the problem
Conveyance Improvement – Channel Improvement	Not feasible – Sufficient vacant land not available

Conveyance Improvement – Diversion	Not feasible - No diversion pathway present
Flood Barriers, Levees/Floodwalls	Not feasible – No mitigation storage available

Technology	**Feasibility for FGCR-WL-FR-01 (Flagg Creek at 91st Street)**
Storage Facility	Not feasible – Roadway flooding
Conveyance Improvement – Culvert/Bridge Replacement	Feasible – Raise roadway
Conveyance Improvement – Channel Improvement	Not feasible - channel not the problem
Conveyance Improvement – Diversion	Not feasible - no diversion pathway present
Flood Barriers, Levees/Floodwalls	Not feasible - Road closure structures required for freeboard tie-in

Technology	**Feasibility for 59DT-HS-FR-01 (59th Street to Laurie Lane)**
Storage Facility	Feasible – Increased storage in the existing Legge Park storage facility
Conveyance Improvement – Culvert/Bridge Replacement	Not feasible – culvert/bridges not the source of problem
Conveyance Improvement – Channel Improvement	Not feasible - channel not the problem
Conveyance Improvement – Diversion	Not feasible - no diversion pathway present
Flood Barriers, Levees/Floodwalls	Feasible - flood easement required

Technology	**Feasibility for FGTB-BR-FR-01 and FGTB-BR-FR-02 (Tributary B at Wolf Road)**
Storage Facility	Not feasible - Adequate vacant land not available
Conveyance Improvement – Culvert/Bridge Replacement	Feasible - Wolf Road crossing and channel
Conveyance Improvement – Channel Improvement	Feasible - Wolf Road crossing and channel
Conveyance Improvement – Diversion	Feasible - Wolf Road crossing and channel
Flood Barriers, Levees/Floodwalls	Not feasible - Adequate vacant land not available for compensatory storage

3.11.3.4 Alternative Development

Flood Control Alternatives. Alternatives which provide solutions to the regional flooding were developed and evaluated consistent with the methodology described in Section 1.4 of this report. Table 3.11.10 summarizes the flood control alternatives for the Flagg Creek Subwatershed.

TABLE 3.11.10
Flood Control Alternatives for Flagg Creek

Alternative	Addressed Problem Area IDs	Location	Description
FGCR-1	FGCR-WS-FR-02	Western Springs	*Flood control storage:* Add 32 acre-feet of storage volume to Spring Rock Park
FGCR-2	FGCR-IH-FR-01	Indian Head Park	*Floodwall:* Floodwall at Roofers Lane and Wolf Road
FGCR-3	FGCR-CC-FR-02	Lyons Township	*Floodwall:* Floodwall left bank of Flagg Creek, upstream of 79th Street
FGCR-4	FGCR-WS-FR-01	Burr Ridge, Willow Springs, Lyons Township	*Bridge modification:* Replacement of two private bridges
FGCR-5	FGCR-WL-FR-01	Lyons Township	*Road raising/culvert modification:* Additional culverts at 91st Street road raising and Orchard Lane
59DT-1	59DT-HS-FR-01	Burr Ridge, Hinsdale	*Berm enhancement:* Increase berm height at Legge Park
FGTB-1	FGTB-BR-FR-01 FGTB-BR-FR-02	Burr Ridge, Lyons Township	*New channel:* New channel and road crossing at Wolf Road

Regional problems identified in the study area involve overbank flooding into residential neighborhoods and closure of primary transportation routes. Based on the nature of the flooding problems, storage, channel improvements, floodwalls, or raising of the roadway, was selected.

Alternative FGCR-1 includes the lowering of existing soccer fields in Spring Rock Park by approximately 8 feet to create a defined reservoir that will capture flows once the stage in Flagg Creek, adjacent to the Park, reaches 641 feet elevation. Excavation of high areas in the flow path in the area to the west of the current soccer fields is included. FGCR-1 also includes a gravity outlet pipe with a flap gate and ties into an existing swale located along the southern edge of Spring Rock Park.

Alternative FGCR-2 includes the construction of two floodwalls along Roofers Lane and a third floodwall along the east side of the Wolf Road viaduct under the Stevenson Expressway to protect the commercial structure. Two floodwalls are required along Roofers Lane due to the unnamed minor creek flowing between the two of the structures. A pump station is not needed in this area. Channel improvements are included to provide compensatory storage. Along the Wolf Road floodwall, two closure structures will be constructed at 70th Place and Roofers Lane, and a pump station for the flows in a second unnamed creek that flows to Flagg Creek between the two roadways. The purchase of a flood easement for 0.3 acres of vacant land is also included near the Wolf Road floodwall due to increases water surface elevations upstream of Wolf Road to 70th Place.

Alternative FGCR-3 consists of one floodwall to protect three structures on the west side of Flagg Creek. The average floodwall height is 4 feet. A pump and outlet structure are part of the floodwall design, along with compensatory storage provided through channel improvements in this reach of Flagg Creek.

Alternative FGCR-4 includes the replacement of two restrictive bridges over Flagg Creek used by the Pleasant Dale Park District on the west side of Wolf Road.

Alternative FGCR-5 includes the elevation of the 91st Street roadway to the west of the existing bridge structure, adjacent to Orchard Lane, and a new double 10-foot by 8-foot box culvert to be added at this location under the roadway. This solution does not call for raising Orchard Lane, as Orchard Lane is not a critical roadway.

Alternative 59DT-1 includes the raising the existing berm that spans the 59th Street Ditch at the east end of Legge Park in Hinsdale by approximately seven feet to provide flood storage. This alternative includes three feet of freeboard. 59DT-1 also includes an overflow spillway to be constructed and tied in to the existing topography to the south of Legge Park. The purchase of two acres of flood easement within Legge Park is also included.

Alternative FGTB-1 includes a new (additional) 48-inch culvert at Wolf Road and a new channel upstream and downstream of Wolf Road to provide a new outlet for Tributary B to Flagg Creek to north of the existing crossing and the existing confluence. FGTB-1 also includes an inline control structure to divert flood flows into the new channel. The new outfall channel will be constructed on the east side of Wolf Road and this requires the construction of a bridge for the existing park district service road and existing pedestrian path. The existing outlet of Tributary B to Flagg Creek will remain in place.

Erosion Control Alternatives. No regional erosion problems were reported or identified; therefore, no erosion control alternatives were developed for the Flagg Creek Subwatershed.

3.11.3.5 Alternative Evaluation and Selection

Alternatives listed in Table 3.11.10 were evaluated to determine their effectiveness and to produce data for the countywide prioritization of subwatershed projects. Flood control alternatives were modeled to evaluate their impact on water surface elevations and flood damages. Table 3.11.18 provides a summary B/C ratio, net benefits, total project costs, number of structures protected, and other relevant alternative data.

FGCR-1. Alternative FGCR-1 was developed to eliminate the flooding risk of 23 residential structures which can incur flooding at the 100-year level along the east side of Flagg Creek between 47th Street and 51st Street. Alternatives investigated for this location were additional flood control storage at Spring Rock Park, additional flood control storage at Brook Park, and the replacement of the 53rd Street Bridge.

Only the Spring Rock option was feasible because approximately 70 acre-feet of storage volume was needed and Brook Park is only 7 acres in size. A replacement of the 53rd Street Bridge insufficiently lowered water surface elevations.

The proposed strategy for FGCR-1 is to lower the soccer fields in Spring Rock Park approximately 8 feet (to elevation 633 feet) to create a defined reservoir, and to allow flood water to flow unimpeded into the storage area once the stage in Flagg Creek, adjacent to the Park, reaches 641 feet elevation. The soccer field area is within the existing floodplain and is inundated at the 25-year event. A control structure will limit the flooding at the soccer fields to the 100-year event and maximize the efficiency of the storage area for the 100-year flood. 32 acre-feet of storage are provided. Excavation to remove high spots will be necessary in the area to the west of the current soccer fields. This strategy also includes a gravity outlet pipe with a flap gate and ties into an existing swale located along the southern edge of Spring Rock Park.

Table 3.11.11 compares the peak modeled water surface elevation and flow for Alternative FGCR-1.

TABLE 3.11.11
Flagg Creek Existing and Alternative Condition FGCR-1 Flow and WSEL Comparison

Location (FGCR-WS-FR-02)	Station	Existing Conditions		FGCR-1	
		Max WSEL (ft)	Max Flow (cfs) [1]	Max WSEL (ft)	Max Flow (cfs) [1]
Upstream of I-294	38732.3	642.9	642	642.6	619
Downstream of I-294	38167.19	642.5	639	642.0	615
Upstream of Proposed Reservoir	37900.0	642.5	655	642.0	629
Downstream of Proposed Reservoir	37806.31	642.5	656	642.0	634
Downstream of Commonwealth	36824.46	642.4	681	641.9	656
Downstream of 53rd Street	33433.21	641.3	1072	640.8	986

[1] Flow rate at maximum WSEL.

FGCR-2. Alternative FGCR-2 was developed to eliminate the flood risk along Flagg Creek between Flagg Creek's northern Wolf Road crossing and Joliet Road. The flood problems in this reach include the potential inundation of three commercial structures, which can flood at the 25-year level, and the closure of Wolf Road at the 50-year level. Alternatives investigated include additional channel capacity adjacent to the structures, additional flood water storage along the reach, and floodwalls.

Only the floodwalls were determined to be feasible based on available vacant land area and other constraints. The amount of flood control storage required to eliminate the flood risk was much greater than the vacant land area available for effective storage in this reach.

FGCR-2 consists of two floodwalls for the three commercial structures and a third floodwall along the east side of the Wolf Road viaduct under the Stevenson Expressway. Two floodwalls were selected for the three commercial structures, as there is an unnamed minor creek flowing between the three commercial structures. Using two floodwalls eliminates the need to add a major pump station at the downstream end of this creek. The floodwalls include three feet of freeboard.

Additional components needed for this alternative include channel improvements in the reach where the floodwalls are proposed for the purpose of compensatory storage due to the loss of storage resulting from the placement of the floodwalls.

Along the Wolf Road floodwall, two closure structures will need to be constructed at 70th Place and Roofers Lane. Additionally, a pump station will be needed for the creek that joins Flagg Creek between these two roadways. The Wolf Road floodwall will raise water surface elevations from the upstream side of Wolf Road to 70th Place greater than 0.04 ft, necessitating purchase of a flood easement for the additional 0.3 acres of vacant land that would be expected to flood.

Table 3.11.12 compares the peak modeled water surface elevation and flow for Alternative FGCR-2.

TABLE 3.11.12
Flagg Creek Existing and Alternative Condition FGCR-2 Flow and WSEL Comparison

Location (FGCR-IH-FR-01)	Station	Existing Conditions		FGCR-2	
		Max WSEL (ft)	Max Flow (cfs)[1]	Max WSEL (ft)	Max Flow (cfs)[1]
Upstream of Joliet Road	21915.1	636.4	2301	636.4	2301
Downstream of Joliet Road	21987.81	635.9	2301	635.9	2301
Beginning of Comp. Storage Area	21915.1	635.9	2301	635.9	2301
End of Comp. Storage Area	21423.09	635.4	2306	635.6	2307
Upstream of Roofers Lane	20632.11	634.6	2432	634.8	2433
Upstream of Wolf Road/end of Flood Easement Area	20129.19	633.4	2432	634.1	2432
Downstream of Wolf Road	20024.19	632.7	2432	632.7	2432

[1] Flow rate at maximum WSEL.

FGCR-3. Alternative FGCR-3 is directed at the reduction of flood risk along Flagg Creek to residential structures located upstream of 79th Street. Four residences experience flooding at the 25-year level and can experience flooding at the 100-year level.

Floodwalls were determined to be the only viable alternative. The floodwater storage required to eliminate or reduce losses was much greater than the available vacant land in this reach. Floodwalls on the east side of Flagg Creek were found to be infeasible where one structure is located. Therefore the alternative protects the three structures located on the west side of Flagg Creek.

FGCR-3 consists of one floodwall for three structures on the west side of Flagg Creek with three feet of freeboard. The average floodwall height is 4 feet. Additionally, a pump station and outlet structure is needed as part of the floodwall design, along with 6 acre-feet of compensatory storage provided through channel improvements in this reach of Flagg Creek.

Table 3.11.13 compares the peak modeled water surface elevation and flow for Alternative FGCR-3.

TABLE 3.11.13
Flagg Creek Existing and Alternative Condition FGCR-3 Flow and WSEL Comparison

Location (FGCR-CC-FR-02)	Station	Existing Conditions		FGCR-3	
		Max WSEL (ft)	Max Flow (cfs) [1]	Max WSEL (ft)	Max Flow (cfs)[1]
Upstream of Tributary A confluence with Flagg Creek	17760.1	628.4	2537	628.4	2537
Downstream of Tributary A confluence with Flagg Creek	17366	628.1	2675	628.0	2675
Upstream of Tributary B confluence with Flagg Creek	15714.38	626.5	2761	626.5	2758
Downstream of Tributary B confluence with Flagg Creek	15361.93	626.5	2845	626.4	2843
At Beginning of Comp. Storage Area	15102.3	626.4	2845	626.3	2842
At Beginning of Right Floodwall	15022.51	626.3	2845	626.3	2842
At Beginning of Left Floodwall	14650.1	626.2	2868	626.2	2865
End of Floodwalls and Comp. Storage	14486.62	626.1	2868	626.2	2865
Upstream of 79th Street	14456.62	626.1	2868	626.1	2865
Downstream of 79th Street	14305.03	624.8	2868	624.8	2865

[1] Flow rate at maximum WSEL.

FGCR-4. The goal of Alternative FGCR-4 was to eliminate flood risk due to the 5 through 50 -year event along Flagg Creek to four residential structures located between German Church Road and the southern Wolf Road crossing, as well as eliminate the risk of flooding of Wolf Road which can begin to occur at the 10-year level.

This alternative calls for the replacement of two bridges used by the Pleasant Dale Park District on the west side of Wolf Road. This would remove four structures from the risk of flooding.

Table 3.11.14 compares the peak modeled water surface elevation and flow for Alternative FGCR-4.

TABLE 3.11.14
Flagg Creek Existing and Alternative Condition FGCR-4 Flow and WSEL Comparison

Location (FGCR-WS-FR-01)	Station	Existing Conditions		FGCR-4	
		Max WSEL (ft)	Max Flow (cfs) [1]	Max WSEL (ft)	Max Flow (cfs) [1]
Upstream of Park District Bridges	12604	621.9	2888	621.4	2888

[1] Flow rate at maximum WSEL.

FGCR-5. Alternative FGCR-5 addresses the overtopping of 91st Street beginning approximately at the 5-year flood event of Flagg Creek. Flood flows in the existing condition overtop 91st Street and Orchard Street beginning several hundred feet upstream of the 91st Street culvert, and return to Flagg Creek several hundred feet downstream of 91st Street. Alternatives investigated included flood control storage upstream of the road crossing, the replacement of the road crossing, and elevating the roadway above the 100-year flood event just west of the stream crossing.

The recommended alternative FGCR-5 is the raising of the 91st Street roadway in an area just to the west of the bridge structure, adjacent to Orchard Street, and the addition of a twin 10-foot by 8-foot box culvert. This alternative does not include the raising of Orchard Street, as Orchard Street is not a critical roadway.

Table 3.11.15 compares the peak modeled water surface elevation and flow for Alternative FGCR-5.

TABLE 3.11.15
Flagg Creek Existing and Alternative Condition FGCR-5 Flow and WSEL Comparison

Location (FGCR-WL-FR-01)	Station	Existing Conditions		FGCR-5	
		Max WSEL (ft)	Max Flow (cfs) [1]	Max WSEL (ft)	Max Flow (cfs) [1]
Upstream of Tributary C Confluence with Flagg Creek	5181.72	604.4	2939	604.4	2933
Downstream of Tributary C Confluence with Flagg Creek	5131.72	604.4	3412	604.4	3403
Upstream of 91st Street	4639.02	603.2	3413	603.1	3404
Downstream of 91st Street	3444.67	599.8	3018	599.8	3415
End of Alternative Benefits	3347.15	599.7	3395	599.7	3416

[1] Flow rate at maximum WSEL.

59DT-1. Alternative 59DT-1 was developed to eliminate the flood risk from 59th Street Ditch that impacts five residences, beginning at the 50-year flood event.

Alternatives considered included replacing the long culvert under Laurie Lane and adding flood control storage in Legge Park. The replacement of the long culvert was determined to be cost prohibitive. Additional flood control storage in Legge Park was investigated by increasing the elevation of an existing berm between Legge Park and the Tomlin Drive subdivision.

Alternative 59DT-1 includes the raising the existing berm that spans the 59th Street Ditch at the east end of Legge Park by approximately seven feet to provide mitigating storage with three feet of freeboard. Two acres of flood easement will need to be purchased within Legge Park. This alternative also includes an overflow spillway constructed and tied in to the existing topography to the south of Legge Park.

Table 3.11.16 compares the peak modeled water surface elevation and flow for Alternative 59DT-1.

TABLE 3.11.16
Flagg Creek Existing and Alternative Condition 59DT-1 Flow and WSEL Comparison

Location (59DT-HS-FR-01)	Station	Existing Conditions		59DT-1	
		Max WSEL (ft)	Max Flow (cfs) [1]	Max WSEL (ft)	Max Flow (cfs) [1]
Downstream of County Line Road	3012.44	657.6	250	657.6	250
Beginning of Flood Easement in Legge Park	2969.27	657.1	253	657.2	242
End of Flood Easement	2503.13	653.2	290	656.7	269
Proposed Berm	2493.13	653.2	291	656.7	270
Downstream of Laurie Lane	1827.87	647.1	291	646.9	268
Downstream of Laurie Lane	1791.69	647.4	291	647.3	266
Downstream of 59th St. Ditch & 63rd St. Ditch Confluence	548.25	639.6	549	639.5	530

[1] Flow rate at maximum WSEL.

FGTB-1. Alternative FGTB-1 addresses the flood risk to three residences along Flagg Creek Tributary B, which begins between the 2-year and 25-year events, and addresses the overtopping of Wolf Road that begins at the 25-year flood level at the existing Flagg Creek road crossing.

A new (additional) outlet for Tributary B to Flagg Creek north of the existing crossing (before Tributary B turns south along Wolf Road) was determined to be the only feasible alternative. This alternative requires the construction of a new 48-inch diameter culvert at Wolf Road crossing for Tributary B, and an inline control structure to divert flows into the new channel. A new outfall channel will need to be constructed on the east side of Wolf Road. Also the service bridge for park district maintenance requires replacement, plus a pedestrian path will need to be constructed. The existing outlet of Tributary B to Flagg Creek will remain in place, but will handle reduced flood flows.

Table 3.11.17 compares the peak modeled water surface elevation and flow for Alternative FGTB-1.

TABLE 3.11.17
Flagg Creek Existing and Alternative Condition FGTB-1 Flow and WSEL Comparison

Location (FGTB-BR-FR-01 and FGTB-BR-FR-02)	Station	Existing Conditions		FGTB-1	
		Max WSEL (ft)	Max Flow (cfs) [1]	Max WSEL (ft)	Max Flow (cfs) [1]
Upstream of 77^{th} Street	1854.94	634.4	176	634.4	176
Beginning of Comp. Storage Area	1556.33	633.5	178	633.1	178
End of Comp. Storage Area	1408.05	633.2	182	632.8	182
New Wolf Rd. Crossing & Channel	1358.63	632.9	183	631.9	183
Downstream of New Tributary B Crossing	1310.22	632.8	184	632.0	81
Upstream of 77^{th} Street	772.68	629.0	89	628.6	76
Downstream of 77^{th} Street	642.273	626.8	86	626.6	63
Upstream of Wolf Road at Existing Crossing	604.94	626.7	86	626.6	62
Downstream of Wolf Road at Existing Crossing	459.366	626.5	86	626.5	62
Downstream End of Tributary B	100	626.5	86	626.5	61
Flagg Creek Downstream of Tributary B Confluence	18210.5	628.9	2517	628.9	2517

[1] Flow rate at maximum WSEL.

3.11.3.6 Summary of Alternatives for Countywide Prioritization

Appendix I presents conceptual level cost estimates for the recommended alternatives. Table 3.11.18 lists alternatives analyzed in detail as part of the DWP development.

All of the alternatives listed in Table 3.11.18 are recommended. Although the B/C ratio is less than 1.0 for most of the alternatives, they are effective in protecting structures and roadways from flood risk. FGCR-1 removes 23 structures within the Village of Western Springs from the 100-year inundation area. Alternative FGCR-2 protects three commercial structures in the Village of Indian Head Park and Wolf Road between the Village of Indian Head Park and the City of Countryside. The floodwall in FGCR-3 removes three residences from 100-year inundation area in Lyons Township. FGCR-4 removed 4 structures from the 100-year inundation area. Alternative FGCR-5 recommended since it protects 91st Street from flooding in Willow Springs. 59DT-1 also has a low B/C ratio, however five homes in the Village of Burr Ridge benefit from this project. Alternative FGTB-1 has a B/C of 2.2, and protects five structures and protects Wolf Road from inundation at the 100-year event in the Village Burr Ridge and Unincorporated Cook County.

Figures 3.11.9 through 3.11.15 show the locations and a summary of the proposed and recommended alternatives described in Table 3.11.18. Figures 3.11.9 through 3.11.15 also show comparisons of the existing condition and alternative condition inundation areas.

TABLE 3.11.18
Flagg Creek Project Alternative Matrix to Support District CIP Prioritization

Alternative ID	Description	B/C Ratio	Net Benefits ($)	Total Project Cost ($)	Cumulative Structures Removed from 100-year Inundation	Roadways Protected	Water Quality Benefit	Recom-mended	Communities Involved
FGCR-1	Add 40 acre-feet of storage to Spring Rock Park	0.05	$290,306	$6,229,554	23	0	Positive	Y	Western Springs
FGCR-2	Floodwall	0.02	$183,916	$10,563,338	3	1	No Impact	Y	Indian Head Park
FGCR-3	Floodwall	0.06	$222,718	$3,689,102	3	0	No Impact	Y	Lyons Township
FGCR-4	Replacement of two private bridges and channel improvements	0.7	$489,707	$668,351	4	0	Slightly Positive	Y	Burr Ridge, Willow Springs, Lyons Township
FGCR-5	Additional culverts at 91st Street and Wolf	0.01	$26,676	$2,455,384	0	1	No Impact	Y	Lyons Township
59DT-1	Berm at Legge Park	0.1	$126,823	$969,361	5	0	Positive	Y	Burr Ridge, Hinsdale
FGTB-1	New channel and road crossing at Wolf Road	2.2	$1,831,974	$815,713	1	1	Slightly Positive	Y	Burr Ridge, Lyons Township

3.12 Golf Course Tributary

Golf Course Tributary Subwatershed measures approximately 0.55 square miles and is located south of West Grand Avenue, mainly within the Villages of Elmwood Park and River Grove in the southern part of the Des Plaines River Watershed.

TABLE 3.12.1
Communities Draining to Golf Course Tributary

Community	Tributary Area (mi^2)
Elmwood Park	0.34
River Grove	0.21
	0.55

Figure 3.12.1 shows the areas directly tributary to Golf Course Tributary. Table 3.12.1 lists the communities located in areas directly tributary to the Golf Course Tributary Subwatershed. Figure 3.12.1 shows an overview of the tributary area of the subwatershed. Reported stormwater problem areas, flood inundation areas, and proposed alternative projects are also shown and discussed in the following subsections. Table 3.12.2 lists the land use breakdown by area within the Golf Course Tributary Subwatershed.

3.12.1 Sources of Data

3.12.1.1 Previous Studies

The Cook County FIS reports that TR-55 hydrologic modeling was prepared by the SCS for the FEMA in 1979. The original hydrologic modeling information was not available for review. The Cook County FIS states that WSP-2 hydraulic modeling was prepared by SCS for FEMA in 1979 and applied the normal depth starting water surface elevation at the confluence with the Des Plaines River.

3.12.1.2 Water Quality Data

There are no District or IEPA water quality monitoring stations in the Golf Course Tributary subwatershed. The IEPA's 2010 *Integrated Water Quality Report*, which includes the CWA 303(d) and 305(b) lists, lists no impaired waterways within the subwatershed. While included in the watershed area for the *Des Plaines River/Higgins Creek Watershed TMDL Stage 1 Report*, March 2009, no TMDLs have been investigated for the Golf Course Tributary or its tributaries.

TABLE 3.12.2
Land Use Distribution for Golf Course Tributary within Cook County

Land Use Category	Area (acres)	%
Residential	133	37.8
Commercial/Industrial	0.9	0.3
Forest/Open Land	193	54.8
Institutional	25	7.1

Source: Chicago Metropolitan Agency for Planning's 2005 Land Use Inventory for Cook, DuPage, Kane, Kendall, Lake, McHenry and Will Counties, Illinois. Version 1.0. Published January 2009

According to water permit discharge data provided by the USEPA, there are no NPDES permits issued by IEPA for discharges to the Golf Course Tributary. Municipalities discharging to the Golf Course Tributary are regulated by IEPA's NPDES Phase II Stormwater Permit Program, which was instituted to improve water quality by requiring that municipalities develop six minimum measure controls for limiting runoff pollution to receiving systems.

3.12.1.3 Wetland and Riparian Areas

Figures 2.3.6 and 2.3.7 contain mapping of wetland and riparian areas in the Lower Des Plaines River Watershed. Wetland areas were identified using NWI mapping. NWI data includes roughly 4 acres of wetland areas in the Golf Course Tributary Subwatershed. Riparian areas are defined as vegetated areas between aquatic and upland ecosystems adjacent to a waterway or body of water that provides flood management, habitat, and water quality enhancement. Identified riparian environments offer potential opportunities for restoration.

3.12.1.4 Floodplain Mapping

Flood inundation areas supporting the NFIP were revised in 2008 as a part of FEMA's Map Modernization Program. Floodplain boundaries were revised based upon updated Cook County topographic information; however, the effective models, which are used to estimate flood levels, were generally not updated. Golf Course Tributary is mapped in detail in the DFIRM mapping update, with Zone AE floodplain shown across its length. The original hydrologic and hydraulic analysis was performed in 1979. The hydrologic modeling was performed by using TR-55. Hydraulic routing performed was steady state and used the WSP-2 modeling application. Appendix A includes a comparison of FEMA's effective floodplain mapping from updated DFIRM panels with inundation areas developed for the DWP.

3.12.1.5 Stormwater Problem Data

Starting in the 3rd quarter of 2007, communities, agencies (e.g., IDOT, CCHD), and stakeholders submitted Form B questionnaire response data to the District summarizing known stormwater problems within their jurisdictions. The questionnaires were requested again by the District following the September 2008 storm event. No Form B questionnaire responses were received for stakeholders within the Golf Course Tributary Subwatershed.

3.12.1.6 Near Term Planned Projects

No near-term planned major flood control projects to be constructed by others were identified for the Golf Course Tributary Subwatershed.

3.12.2 Watershed Analysis

3.12.2.1 Hydrologic Model Development

Subbasin Delineation. The Golf Course Tributary drainage area was delineated based upon 2003 Cook County LiDAR topographic data developed by Cook County. There is one subbasin with a total drainage area of 0.55 square miles. Prior to the development of the Villages of Elmwood Park and River Grove, the watershed was larger. These communities were developed with combined sewer systems which convey both sanitary and storm flow away from the Golf Course Tributary to District intercepting sewers. These interceptors are tributary to the District's TARP system.

Hydrologic Parameter Calculations. CN values were estimated for each subbasin based upon NRCS soil data and 2001 CMAP land use data. This method is further described in Section 1.3.2, with lookup values for specific combinations of land use and soil data presented in Appendix C. An area-weighted average of the CN was generated for each subbasin.

Clark's unit hydrograph parameters were estimated using the method described in Section 1.3.2. Appendix G provides a summary of the hydrologic parameters used for subbasins in each subwatershed.

3.12.2.2 Hydraulic Model Development

Field Data, Investigation, and Existing Model Data.

The FEMA effective hydraulic model was developed by NRCS in the late 1970s using WSP-2. The model data was over 20 years old and was not used in the DWP development. A field reconnaissance was conducted in early 2008 by CBBEL. Information was compiled on stream crossings, land use, and channel conditions.

Field survey was performed under the protocol of FEMA's *Guidelines and Specifications for Flood Hazard Mapping partners, Appendix A: Guidance for Aerial Mapping and Surveying.* Field survey was performed in early 2008 by D.B. Sterlin Inc. Channel cross sections were surveyed between 500 and 1,000 feet apart. The actual spacing and location was determined based on the variability of the channel shape, roughness, and slope. To develop the model, one hydraulic structure, including immediate upstream and downstream cross sections, was surveyed, as well as eight additional cross sections along the tributary. The downstream limit of the tributary was not surveyed as it is located deep within the FPDCC property where no problem areas are reported.

Boundary Conditions. The downstream boundary condition for the Golf Course Tributary Subwatershed is the 5-year water surface elevation for the Des Plaines River at its confluence with Golf Course Tributary.

3.12.2.3 Calibration and Verification

No stream gage or HWM was available within the Golf Course Tributary Subwatershed. Based on previous Lower Des Plaines River Tributary calibration, the CUH storage coefficient, R, was multiplied by a factor of 2.18 for all subbasins in the HEC-HMS hydrologic model. The R multiplier was determined based on the results of calibrations performed for gauged subwatersheds. An equation was developed based on the average of the slopes calculated for use in determining the time of concentration. That equation was used to determine an R value for the Golf Course Tributary Subwatershed.

3.12.2.4 Existing Conditions Evaluation

Flood Inundation Areas. Figure 3.12.1 shows inundation areas in the Golf Course Tributary Subwatershed produced by the DWP's hydraulic model for the 100-year, 24-hour critical duration design storm.

Hydraulic Profiles. Appendix H contains existing conditions hydraulic profiles for Golf Course Tributary. Profiles are shown for the 2-, 5-, 10-, 25-, 50-, 100-, and 500-year recurrence interval design storms.

3.12.3 Development and Evaluation of Alternatives

3.12.3.1 Problem Definition

Hydraulic model results were reviewed with inundation mapping to identify locations where property damage due to flooding is predicted. Table 3.12.3 summarizes problem areas identified through hydraulic modeling of Golf Course Tributary.

TABLE 3.12.3
Modeled Problem Definition for Golf Course Tributary

Problem Area ID[1]	Location	Recurrence Interval (yr) of Flooding	Associated Form B	Resolution in DWP	Number of Structures Flooded
EP-FR-01	Elmwood Park	25, 50, 100, 500	N	GCTR-1	43
EP-FR-02	Elmwood Park	2, 5, 10, 25, 50, 100, 500	N	GCTR-1	7

[1] All Problem Area IDs begin with DP-GCTR- as they are in the Des Plaines River – Golf Course Tributary Sub-watershed.

3.12.3.2 Damage Assessment

Economic damages were defined following the protocol defined in Chapter 6.6 of the CCSMP. Recreation damages due to flooding are not being identified as part of the DWP. Table 3.12.4 lists the damage assessment for existing conditions. Transportation damages were estimated as 15 percent of property damages.

TABLE 3.12.4
Estimated Average Annual Damages for Golf Course Tributary

Damage Category	Estimated Average Annual Damage ($)	Description
Property	241, 710	Includes structure and contents damages for residential structures
Erosion	0	No critical erosion damages identified
Transportation	36,256	Assumed as 15% of property damage

3.12.3.3 Technology Screening

Flood control technologies were screened to identify those most appropriate for addressing the flooding problems in the subwatershed. Floodwalls and storage were identified as the principal technologies applicable for addressing stormwater problems in the Golf Course Tributary Subwatershed. The feasibility of the technologies defined in Chapter 6.6 of the CCSMP is summarized for each alternative in Table 3.12.5.

TABLE 3.12.5
Technology Screening for Golf Course Tributary

Technology	Feasibility for EP-FR-01 (Floodwall with pump station)
Storage Facility	Feasible – However, no large open space available. Open space owned by private entity
Conveyance Improvement – Culvert/Bridge Replacement	Not Feasible - Would not address Des Plaines River backwater
Conveyance Improvement – Channel Improvement	Not Feasible - Would not address Plaines River backwater
Flood Barriers, Levees/Floodwalls	Feasible –With pump station. Along Thatcher Avenue from Division Street to Fullerton Avenue. Will remove structures from floodplain

3.12.3.4 Alternative Development

Flood Control Alternatives. Alternative solutions to regional flooding were developed and evaluated consistent with the methodology described in Section 1.4 of this report. Table 3.12.6 summarizes flood control alternatives for the Golf Course Tributary Subwatershed.

TABLE 3.12.6
Flood Control Alternatives for Golf Course Tributary

Alternative	Addressed Problem Area IDs	Location	Description
GCTR-1	EP-FR-01 EP-FR-02	Elmwood Park	*Floodwall:* 1,940 feet Floodwall to elevation 627.0 feet. 3 feet of freeboard above Des Plaines River 100-year profile. Average height of 3.5 feet. Pump station will be required to address interior drainage.

Golf Course Tributary becomes inundated as a direct result of the backwater effect created by the Des Plaines River. Alternative GCTR-1 will isolate the Golf Course Tributary from the Des Plaines River. The alternative will require a combination of a floodwall and pump configuration. The floodwall will keep the Des Plaines River from back flowing into residential subdivisions and the pumps will be configured to address internal drainage.

GCTR-1 will utilize a single pump station to address internal drainage associated with the residential neighborhood and Golf Course Tributary. All tributary runoff will be conveyed to the pump station where it will then be discharged to the Des Plaines River. A floodwall will be constructed west of Thatcher Road to eliminate the Des Plaines River from inundating the upstream properties.

This alternative includes use of Cook County Forest Preserve District land during construction. The District will require the consent of the Forest Preserve District for stormwater or flood control projects on their land.

Erosion Control Alternatives. No regional erosion problems were reported within the Golf Course Tributary Subwatershed; therefore, no erosion control alternatives were evaluated.

3.12.3.5 Alternative Evaluation and Selection

The alternative listed in Table 3.12.6 was evaluated to determine its effectiveness and to produce data for the countywide prioritization of watershed projects. The flood control alternative was modeled to evaluate the impact on water surface elevations and flood damages. Table 3.12.8 provides a summary B/C ratio, net benefit, total project costs, number of structures protected, and other relevant alternative data.

GCTR-1. Alternative GCTR-1 would construct approximately 1,940 feet of floodwall at an approximate elevation of 627.0 feet to keep the backwater from the Des Plaines River from flooding Thatcher Road and residential neighborhoods east of Thatcher Road. The floodwall would be located on the west side of Thatcher Road within the ROW. The wall will be approximately 3.5 feet tall and the top elevation of the floodwall provides approximately 3 feet of freeboard per District requirements. A 300 cfs pump station, approximately, would be required to convey the interior drainage from the Golf Course Tributary Subwatershed during a 100-year storm event. New storm sewer systems are proposed along Courtland Drive and Country Club Lane to convey flow from the residential subdivisions to the proposed pump station. Table 3.12.7 compares the peak modeled water surface elevation and flow for the Alternative.

TABLE 3.12.7
Golf Course Tributary Existing and Alternative Condition GCTR-1 Flow and WSEL Comparison

Location	Station	Existing Conditions		GCTR-1	
		Max WSEL (ft)	Max Flow (cfs)	Max WSEL (ft)	Max Flow (cfs)
Thatcher Road	2855.894	624.1	91	622.0	73

Results taken from Golf Course Tributary HEC-RAS hydraulic model

Hydraulic modeling results for Golf Course Tributary identified no roadways inundated by a depth greater than 0.5 feet; however several homes located along Thatcher Road were unable to be accessed during events which exceeded the overtopping elevation.

3.12.3.6 Data Required for Countywide Prioritization of Watershed Projects

Appendix I presents conceptual level cost estimate for the recommended alternative. Table 3.12.8 lists the alternative analyzed in detail as part of the DWP development.

The recommended alternative for Golf Course Tributary is GCTR-1. Alternative GCTR-1 is recommended because this alternative best provides protection for the residential structures located east of Thatcher Road and east of the Oak Park Country Club. The proposed floodwall will provide protection for storm events greater than the 100-year storm. The construction of a pump station will address interior drainage issues, east of the proposed floodwall.

Figure 3.12.1 shows the location and a summary of the recommended alternative is described in Table 3.12.8. Figure 3.12.2 also shows comparisons of the existing condition and alternative condition inundation areas.

TABLE 3.12.8
Golf Course Tributary Project Alternative Matrix to Support District CIP Prioritization

Alternative ID	Description	B/C Ratio	Net Benefits ($)	Total Project Cost ($)	Cumulative Structures Protected	Roadways Protected	Water Quality Benefit	Recom-mended	Communities Involved
GCTR-1	Floodwall and pump station	0.3	5,170,087	15,486,491	50	1	No Impact	Y	Elmwood Park, River Grove

3.13 McDonald Creek

The McDonald Creek Subwatershed is located in northwestern Cook County and encompasses an area of approximately 10.1 square miles. The subwatershed includes portions of the municipalities of Arlington Heights, Prospect Heights, Mount Prospect, Wheeling, Buffalo Grove, Des Plaines, Palatine, and areas of Unincorporated Cook County. The McDonald Creek Subwatershed is comprised of the McDonald Creek North Branch, McDonald Creek South Branch, McDonald Creek Tributary A, McDonald Creek Tributary B, and the main stem of McDonald Creek. The subwatershed also includes Lake Arlington, an on-line flood control reservoir with a capacity of approximately 550 acre-feet. The headwaters of McDonald Creek are located just east of Route 53 in the Village of Arlington Heights, and the creek generally flows southeast until its confluence with the Des Plaines River in the Village of Mount Prospect.

TABLE 3.13.1
Communities Draining to McDonald Creek

Community	Tributary Area (mi^2)
Arlington Heights	4.50
Prospect Heights	2.79
Mount Prospect	1.65
Wheeling	0.56
Unincorporated Cook County	0.42
Buffalo Grove	0.17
Des Plaines	0.01
Palatine	<0.01
Total	10.10

Note: This list includes community areas tributary to the entire McDonald Creek system.

The McDonald Creek North and South Branch combine at Lake Arlington, the outlet of which forms the headwaters of the main stem of McDonald Creek. There are three outlet control structures that comprise the outlet for Lake Arlington: (1) a 100 cfs by-pass pipe that diverts all low flows to the channel located at the northwestern corner of the lake; (2) a 60-inch diameter RCP at the NWL of the lake that discharges to the channel at a point northeast of the lake; (3) an emergency overflow spillway that discharges to the channel at a point in between the pipe outlets. Starting at the outlet of Lake Arlington, the main stem of McDonald Creek generally flows southeast until its confluence with the Des Plaines River.

TABLE 3.13.2
Land Use Distribution for McDonald Creek within Cook County

Land Use Category	Area (acres)	%
Residential	4509	69.8
Commercial/Industrial	619	9.6
Forest/Open Land	566	8.8
Institutional	329	5.1
Transportation/Utility	181	2.8
Water/Wetland	257	4.0

Source: Chicago Metropolitan Agency for Planning's 2005 Land Use Inventory for Cook, DuPage, Kane, Kendall, Lake, McHenry and Will Counties, Illinois. Version 1.0. Published January 2009

McDonald Creek Tributary A is an approximately 6,500 foot long creek with a drainage area of approximately 0.9 square miles.

The headwaters of McDonald Creek Tributary A begin at the Old Orchard County Club, located at the southwest corner of the intersection of Camp McDonald Road and Elmhurst Road (Route 83) in the Village of Mount Prospect. The creek generally flows northeast until its confluence with the main stem of McDonald Creek near the intersection of Wheeling Road and Palatine Road in the City of Prospect Heights.

McDonald Creek Tributary B is an approximately 5,200 foot long creek with a drainage area of approximately 1.0 square mile. McDonald Creek Tributary B parallels Euclid Avenue, flowing east from Wheeling Road until its confluence with the mainstem of McDonald Creek.

Figure 3.13.1 shows an overview of the tributary area of the subwatershed. Table 3.13.1 lists the communities located in areas directly tributary to the MLSPR Subwatershed. Reported stormwater problem areas, flood inundation areas, and proposed alternative projects are also shown and discussed in the following subsections. Table 3.13.2 lists the land use breakdown by area within the McDonald Creek Subwatershed.

3.13.1 Sources of Data

3.13.1.1 Previous Studies

The hydrologic and hydraulic analyses of the McDonald Creek Subwatershed for the FIS were originally performed in the late 1970's and early 1980's. Since those studies were completed, the subwatershed underwent significant changes in land use that included the construction of the Lake Arlington flood control reservoir. Several updated hydrologic and hydraulic studies have been completed for portions of the subwatershed since the original FIS.

The USACE performed a detailed hydrologic and hydraulic study of the McDonald Creek Subwatershed in July 2008. The study included two separate hydraulic models: one model for the McDonald Creek North Branch (upstream of Lake Arlington) and a second model for the main stem of McDonald Creek (downstream of Lake Arlington). Lake Arlington was modeled in the HEC-1 hydrologic model. The study did not explicitly model the McDonald Creek South Branch, McDonald Creek Tributary A, and McDonald Creek Tributary B.

3.13.1.2 Water Quality Data

There are no District or IEPA water quality monitoring stations within the DWP study area in the McDonald Creek subwatershed.

NPDES point source discharges within the DWP study area in the McDonald Creek subwatershed are listed in Table 3.13.3. In addition to the point source discharges listed, municipalities discharging to McDonald Creek are regulated by IEPA's NPDES Phase II Stormwater Permit Program, which was instituted to improve water quality by requiring that municipalities develop six minimum measure controls for limiting runoff pollution to receiving systems.

TABLE 3.13.3
Point Source Discharges in the McDonald Creek Subwatershed

Name	NPDES	Community	Receiving Waterway
West Shore Pipeline-Wheeling	ILG910016	Wheeling	McDonald Creek

3.13.1.3 Wetland and Riparian Areas

Figures 2.3.6 and 2.3.7 contain mapping of wetland and riparian areas in the Lower Des Plaines River Watershed. Wetland areas were identified using NWI mapping. NWI data includes roughly 132 acres of wetland areas in the McDonald Creek subwatershed. Riparian areas are defined as vegetated areas between aquatic and upland ecosystems adjacent to a waterway or body of water that provides flood management, habitat, and water quality enhancement. Identified riparian environments offer potential opportunities for restoration.

3.13.1.4 Floodplain Mapping

Flood inundation areas supporting the NFIP were revised in 2008 as a part of the FEMA's Map Modernization Program. Floodplain boundaries were revised based upon updated Cook County topographic information; however, the effective models, which are used to estimate flood levels, were generally not updated. LOMRs were incorporated into revised floodplain areas. McDonald Creek and its tributaries are currently mapped as studied Zone AE floodplain with a floodway. The original hydrologic and hydraulic analysis was performed in the late 1970's, with several updates over the years. The hydrologic modeling was performed by using a variety of methods, including: TR-20, ILLUDAS, and regression equations. Hydraulic modeling was performed using HEC-2 and WSP-2 steady state hydraulic models. Appendix A includes a comparison of FEMA's effective floodplain mapping from updated DFIRM panels with inundation areas developed for the DWP.

3.13.1.5 Stormwater Problem Data

Starting in the 3rd quarter of 2007, communities, agencies (e.g., IDOT, CCHD), and stakeholders submitted Form B questionnaire response data to the District summarizing known stormwater problems within their jurisdictions. The questionnaires were requested again by the District following the September 2008 storm event. Table 3.13.4 summarizes reported problem areas reviewed as a part of the DWP development. Problems are classified in Table 3.13.4 as regional or local. This classification is based on a process described in Section 1 of this report. The Problem Area ID naming convention was found in Technical Memorandum entitled, "Proposed Naming Conventions for Database Elements" dated August 3, 2007.

TABLE 3.13.4
Community Response Data for McDonald Creek

Problem Area ID[1]	Municipality	Problems as Reported by Local Agency	Location	Problem Description	Local/ Regional	Resolution in DWP
MCTA-AH-FL-01	Arlington Heights	Pavement flooding	US Route 12 at Camp McDonald Road	Reported by IDOT: Last Incident 9/08	Local	This is a local problem.[2]
MCTA-CD-FL-01	CCHD	Pavement flooding	Willow Road west of Wheeling Road	Road flooding	Local	This is a local problem.[2]
MDCR-AH-FL-01	Prospect Heights	Home/ Pavement flooding	East of Wilke Road near Concord Drive.	Residential and road flooding	Local	This is a local problem.[2]
MDCR-AH-FL-02	Arlington Heights	Pavement flooding	US Route 12 at Kennicott Avenue	Reported by IDOT: Last Incident 2/21/97	Local	This is a local problem.[2]
MDCR-CD-SM-01	CCHD	Sediment deposits	Camp McDonald Road bridge	Sediment accumulation	Local	This is a local problem.[2]
MDCR-MP-FL-01	Mount Prospect	Bank erosion and sediment deposits	Downstream of Euclid Avenue	Sedimentation accumulation and bank erosion	Local	MDCR-4[3]
MDCR-PH-FL-01	Prospect Heights	Road flooding	Palatine Road at IL 83	Reported by IDOT: Last Incident 10/13/01	Local	This is a local problem.[2]
MDCR-PH-FL-02	Prospect Heights	Road flooding	Palatine Road under Wolf Road	Reported by IDOT: Last Incident 9/23/06	Local	This is a local problem.[2]
MDCR-PH-FL-03	Prospect Heights	Road flooding	Wolf Road at Palatine Road	Reported by IDOT: Last Incident 5/4/93	Local	This is a local problem.[2]
MCTA-PH-FR-03	Prospect Heights	Road flooding	Hillcrest Drive and Owen Court	Flooding on critical access roads	Regional	Project MCTA-1
MDCR-WH-FL-01	Wheeling	Road flooding	IL Route 68 at Des Plaines River	Reported by IDOT: Last Incident unknown	Local	This is a local problem.[2]

TABLE 3.13.4
Community Response Data for McDonald Creek

Problem Area ID[1]	Municipality	Problems as Reported by Local Agency	Location	Problem Description	Local/ Regional	Resolution in DWP
MDCR-WH-FL-02	Wheeling	Road flooding	IL Route 68 at I-294	Reported by IDOT: Last Incident 2/21/97	Local	This is a local problem.[2]
MDCR-WH-FL-03	Wheeling	Road flooding	IL Route 21 at Hintz Road	Reported by IDOT: Last Incident 2/21/97	Local	This is a local problem.[2]
MDCR-WH-FL-04	Wheeling	Road flooding	Palatine Road west of Wolf Road	Reported by IDOT: Last Incident 4/3/03	Local	This is a local problem.[2]
MDCR-WT-FL-01	Wheeling Township	Bank erosion	Woodlawn Drive and Bonnie Brae Avenue	Bank erosion along yards of residences.	Local	This is a local problem.[2]
MDCR-MP-FR-01	City of Mount Prospect	Erosion	North of Euclid Avenue west of Wolf Road	Bank erosion at bridges	Regional	MDCR-5

[1] Problem Area IDs begin with DP- as they are in the Des Plaines River Watershed.
[2] Problem does not meet regional definition (refer to chapter 1). Solutions for the local problems are not addressed in the DWP.
[3]Alternative MDCR-4 was developed at the urging of local officials to evaluate whether the removal of sediment would provide measureable reductions in water surface elevations. Refer to Section 3.13.3.5 for further analysis and discussion of this alternative.

3.13.1.6 Near Term Planned Projects

No near-term planned major flood control projects to be constructed by others were identified for the McDonald Creek Subwatershed. IDOT is planning to implement future projects along McDonald Creek, including bridge maintenance at the Elmhurst Road crossing (City of Prospect Heights) and replacement of the culverts under Euclid Avenue/Wolf Road intersection (Village of Mount Prospect). These projects will not affect the results of the existing and proposed conditions hydrologic and hydraulic modeling.

3.13.2 Watershed Analysis

3.13.2.1 Hydrologic Model Development

Subbasin Delineation. The McDonald Creek tributary area was delineated based on 2003 Cook County LiDAR topographic data developed by Cook County in 2003. Portions of the subwatershed boundary were taken from the boundaries of adjacent subwatersheds included with this study. The subwatershed boundary is generally consistent with boundaries from previous studies and those shown on the HA. Subbasins were delineated based on the major hydraulic features of the subwatershed. There are 14 subbasins ranging in size from 0.2 to 1.3 square miles with a total drainage area of 10.1 square miles.

Hydrologic Parameter Calculations. CN values were estimated for each subbasin based upon NRCS soil data and 2001 CMAP land use data. This method is further described in Section 1.3.2, with lookup values for specific combinations of land use and soil data presented in Appendix C. An area-weighted average of the CN was generated for each subbasin.

Clark's unit hydrograph parameters were estimated using the method described in Section 1.3.2. Appendix G provides a summary of the hydrologic parameters used for subbasins in each subwatershed.

3.13.2.2 Hydraulic Model Development

Field Data, Investigation, and Existing Model Data. The McDonald Creek Subwatershed unsteady HEC-RAS hydraulic model incorporates the cross-section location, channel data, and structure data from three sources: (1) the 2008 USACE subwatershed study, (2) the WSP-2 FIS models for McDonald Creek Tributary A and Tributary B, and (3) a channel and structure survey of reaches not included in previous studies, completed by D.B. Sterlin Inc. The cross-section location, channel data, and structure data from the 2008 USACE HEC-RAS hydraulic model were utilized for the mainstem of McDonald Creek and the McDonald Creek North Branch. The cross-section location, channel data, and structure data for the McDonald Creek South Branch and McDonald Creek Tributaries A and B were taken from the FIS models and from the D.B. Sterlin Inc. survey. The channel and structure data collected was incorporated into the HEC-GeoRAS cross-sections extracted from the TIN created in GIS from the 2003 Cook County LiDAR topographic data. Field visits were performed to assess channel and overbank roughness characteristics at several locations along McDonald Creek. The information gathered in the field was compared to photographs and aerial photography to review and determine Manning's *n* roughness coefficients for the unsteady HEC-RAS hydraulic model.

Boundary Conditions. The starting water surface conditions for the various storm frequencies are based on the 5-year Des Plaines River flood elevation at the confluence with McDonald Creek. The downstream boundary condition used for the historical storm event runs was the normal depth based on channel slope.

3.13.2.3 Calibration and Verification

Observed Data. McDonald Creek has one USGS stream gage located in the Village of Mount Prospect (USGS 05529500) at the upstream face of Camp McDonald Road. The stream gage measures both gage height and stream flow. Based on the hydrologic analysis, the subwatershed drainage area to the gage is approximately 7.9 square miles.

Stage and flow gage records were obtained from the USGS for the September 13-14, 2008 and August 19-26, 2007 storm events. No high water marks were made by the USGS following the September 2008 storm event.

Calibration Results. Based on the USGS gage records, the McDonald Creek HEC-HMS hydrologic model and unsteady HEC-RAS hydraulic models were calibrated to the September 13-14, 2008 storm event. Calibration was performed by multiplying the Clark storage coefficient (R) value by a factor of 2.95 for all subbasins in the HEC-HMS hydrologic model. By modifying the R value for the subwatershed, the general shape and peak values of the model flow hydrograph improved compared to those of the recorded flow hydrograph. The resulting calibration satisfies the model calibration criteria established in the *Cook County Stormwater Management Plan* (within 0.5 feet of stage, within 30% of total hydrograph volume and flowrate). As a verification of the calibrated model, the August 19-26, 2007 storm event was also analyzed. These results also satisfy the calibration criteria described above. Figures 3.13.2 -3.13.7 show the stage/flow comparisons between the calibrated model results and the historical gage records.

FIGURE 3.13.2
McDonald Creek Flow Comparison at Camp McDonald Road for the September 2008 Storm Event

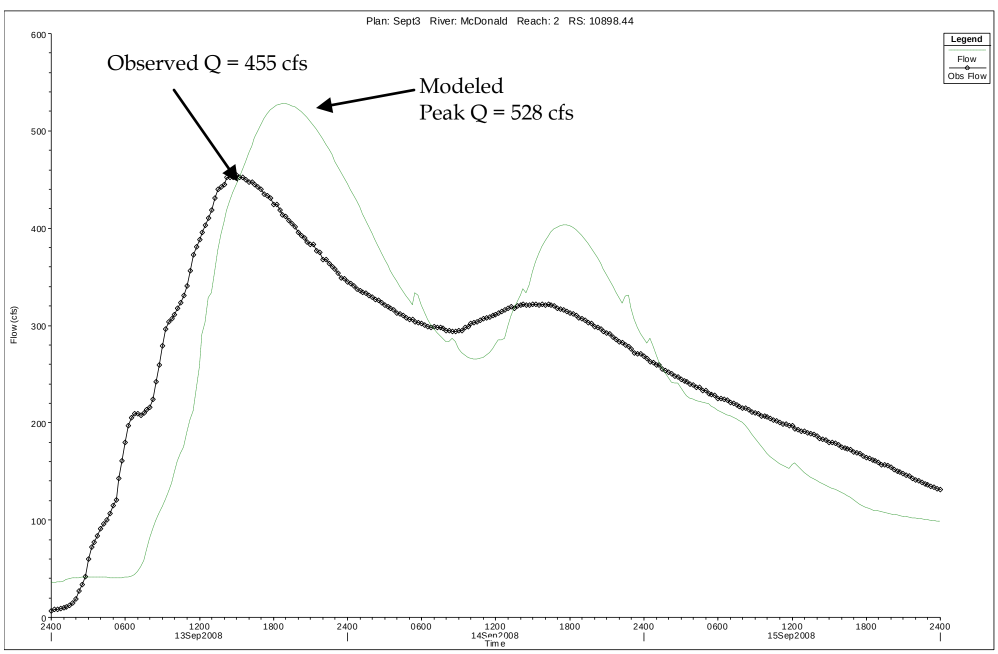


FIGURE 3.13.3
McDonald Creek Stage Comparison at Camp McDonald Road for the September 2008 Storm Event

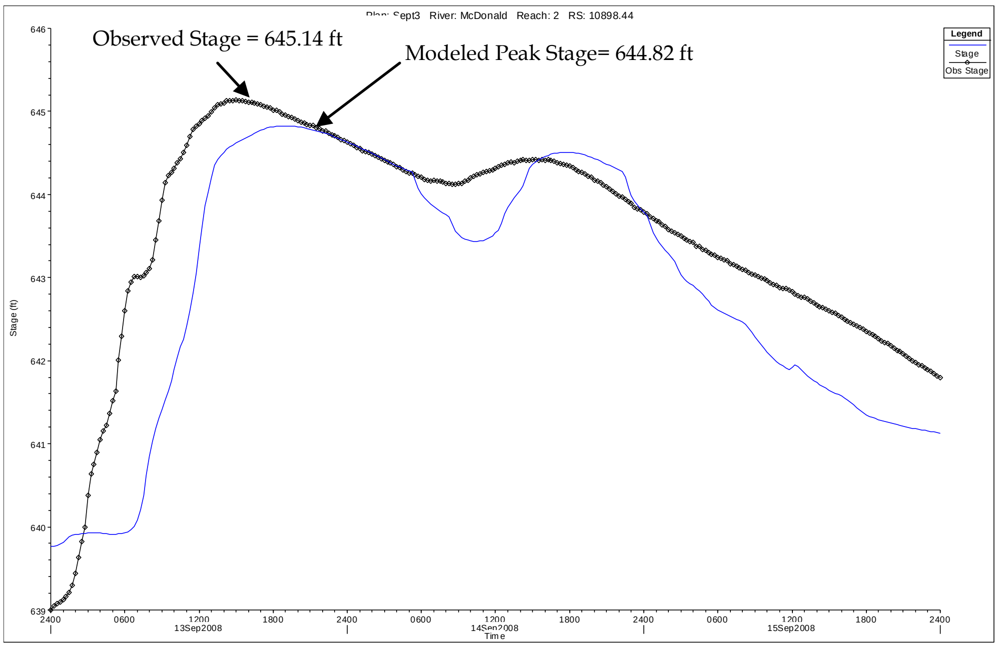


FIGURE 3.13.4
McDonald Creek Flow Comparison at Camp McDonald Road for the August 19-23, 2007 Storm Event

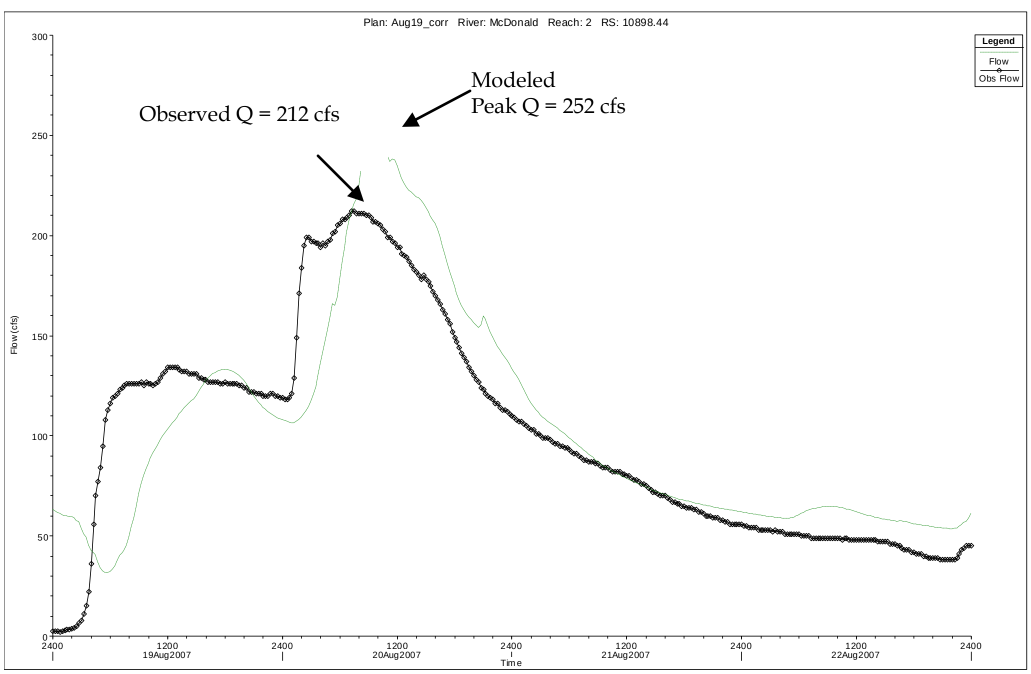


FIGURE 3.13.5
McDonald Creek Stage Comparison at Camp McDonald Road for the August 19-23, 2007 Storm Event

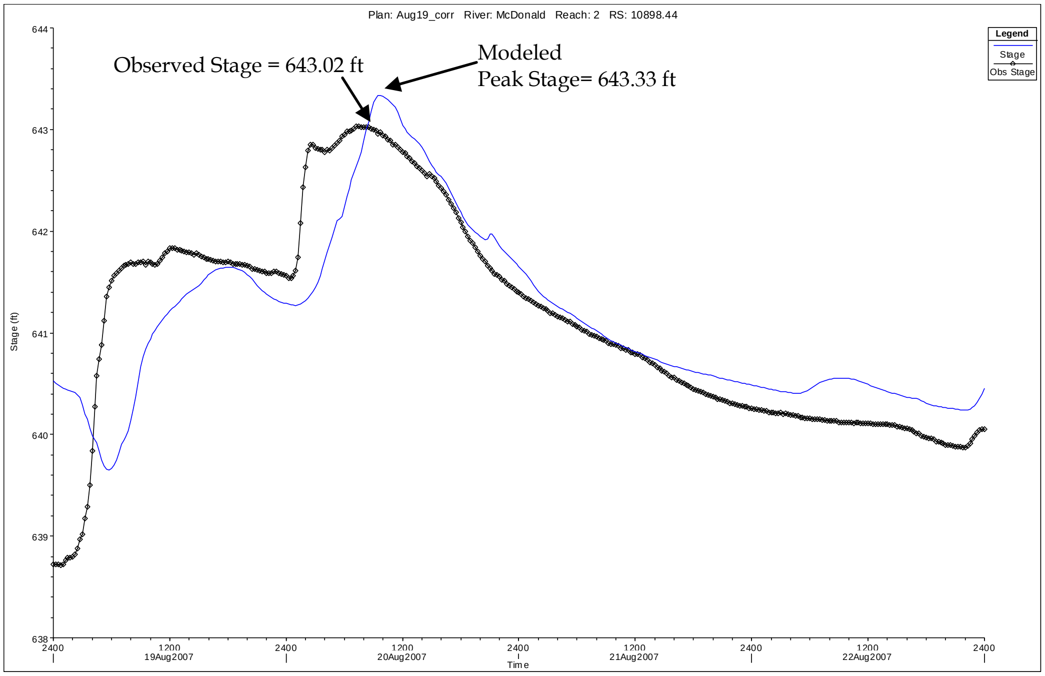


FIGURE 3.13.6
McDonald Creek Flow Comparison at Camp McDonald Road for the August 23-26, 2007 Storm Event

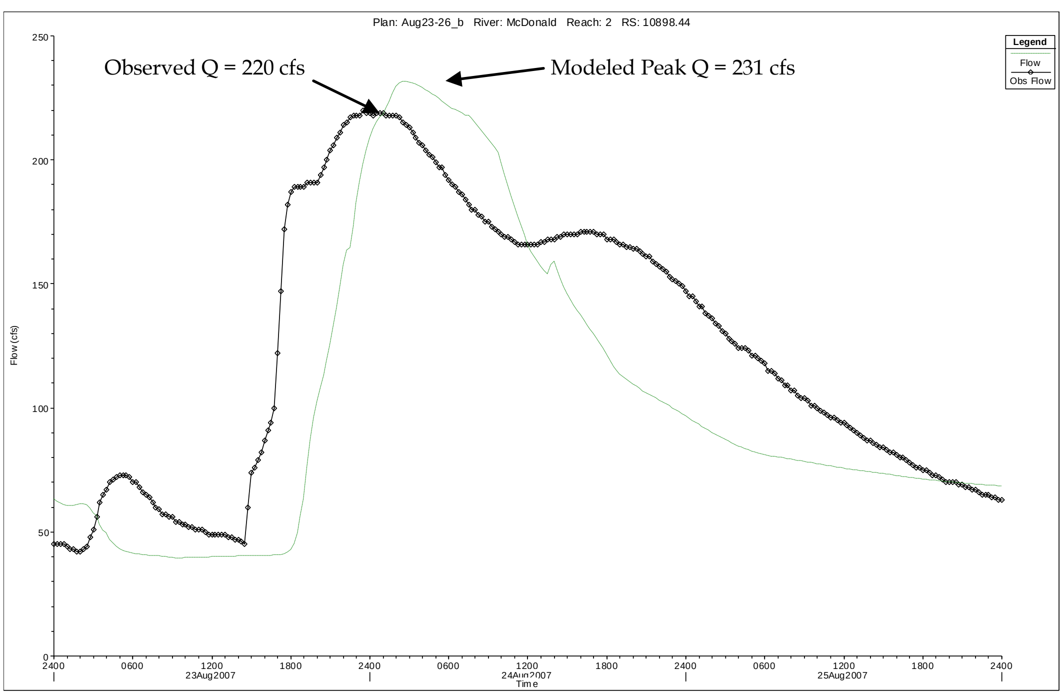
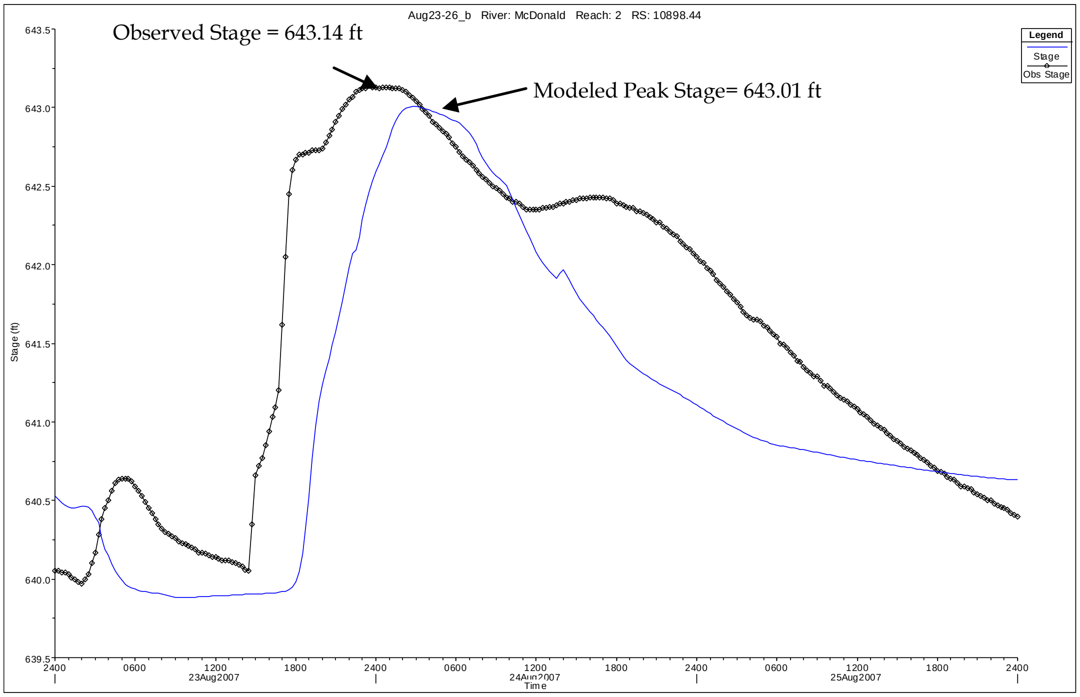


FIGURE 3.13.7

McDonald Creek Stage Comparison at Camp McDonald Road for the August 23-26, 2007 Storm Event



3.13.2.4 Existing Conditions Evaluation

Flood Inundation Areas. Figure 3.13.1 shows inundation areas in the McDonald Creek Subwatershed produced by the DWP's hydraulic model for the 100-year, 24-hour critical duration design storm.

Hydraulic Profiles. Appendix H contains existing conditions hydraulic profiles for McDonald Creek. Profiles are shown for the 2-, 5-, 10-, 25-, 50-, 100-, and 500-year recurrence interval design storms.

3.13.3 Development and Evaluation of Alternatives

3.13.3.1 Problem Definition

Hydraulic model results were reviewed with inundation mapping to identify locations where property damage due to flooding is predicted. Table 3.13.5 summarizes problem areas identified through hydraulic modeling of McDonald Creek.

TABLE 3.13.5
Modeled Problem Definition for McDonald Creek

Problem Area ID[1]	Location	Recurrence Interval (yr) of Flooding	Associated Form B	Resolution in DWP
MDCR-PH-FR-02[1]	City of Prospect Heights at Camp McDonald Road and Alton Road	10, 25, 50, 100, 500	N[3]	MDCR-2
MDCR-MP-FR-01[1]	Wheeling Township at Kensington Road and River Road	5, 10, 25,50, 100, 500	N[3]	MDCR-3
MCTA-PH-FR-03[2]	City of Prospect Heights at Hillcrest Drive and Owen Court	2, 5, 10, 25, 50, 100, 500	N[3]	MCTA-1

[1] All Problem Area IDs begin with DP-MDCR as they are in the Des Plaines River – McDonald Creek Subwatershed.
[2] All Problem Area IDs begin with DP-MCTA as they are in the Des Plaines River – McDonald Creek Subwatershed.
[3] Although no Form Bs were submitted for these problem areas, the location and approximate extent of the problem areas were field verified by CBBEL and Village staff.

3.13.3.2 Damage Assessment

Economic damages were defined following the protocol defined in Chapter 6.6 of the CCSMP. Recreation damages due to flooding are not being identified as part of the DWP. No erosion damages due to flooding were identified for McDonald Creek. Transportation damages were estimated as 15 percent of property damages plus regional roadway flooding. Table 3.13.6 lists the damage assessment for existing conditions.

TABLE 3.13.6
Estimated Average Annual Damages for McDonald Creek

Damage Category	Estimated Average Annual Damage ($)	Description
Property	335,053	Includes structure and contents damage for residential and non-residential structures
Erosion	10,968	Streambank stabilization to protect pedestrian bridges
Transportation	57,133	Assumed as 15% of property damage plus regional transportation damages

3.13.3.3 Technology Screening

Flood control technologies were screened to identify those most appropriate for addressing the flooding problems in the subwatershed. Floodwalls and flood storage were identified as the principal technologies applicable for addressing stormwater problems in McDonald Creek. The feasibility of the technologies defined in Chapter 6.6 of the CCSMP is summarized for each alternative in Table 3.13.7.

TABLE 3.13.7
Technology Screening for McDonald Creek

Technology	Feasibility for MDCR-PH-FR-02 (City of Prospect Heights at Camp McDonald Road and Alton Road)
Storage Facility	Feasible – However, no large open space available, would require significant amount of property buy-outs as stand-alone option
Conveyance Improvement – Culvert/Bridge Replacement	Not Feasible - Culverts/bridges not a source of flood problem
Conveyance Improvement – Channel Improvement	Feasible – Channel improvements to offset flood elevation increases due to floodwall
Flood Barriers, Levees/Floodwalls	Feasible – Along both sides of creek, will require mitigation storage and channel improvements.
Technology	**Feasibility for MDCR-MP-FR-01 (Unincorporated Cook County at Kensington Road and River Road)**
Storage Facility	Not Feasible – Flooding due to backwater of Des Plaines River, not enough open space in subwatershed to alleviate flooding.
Conveyance Improvement – Culvert/Bridge Replacement	Not Feasible - Culverts/bridges not a source of flood problem
Conveyance Improvement – Channel Improvement	Not Feasible – Flooding due to backwater of Des Plaines River.
Flood Barriers, Levees/Floodwalls	Feasible – Along west side of creek, no mitigation storage required.
Technology	**Feasibility for MCTA-PH-FR-03 (City of Prospect Heights at Hillcrest Drive and Owen Court)**
Storage Facility	Feasible – Downstream property required to offset increases in culvert conveyance. No large open parcels upstream as stand-alone option.
Conveyance Improvement – Culvert/Bridge Replacement	Feasible – Replace Hillcrest Lake overland flow route with box culvert outlet.
Conveyance Improvement – Channel Improvement	Not feasible.
Conveyance Improvement – Diversion	Feasible - Flow diversion to McDonald Creek further downstream.
Flood Barriers, Levees/Floodwalls	Not Feasible – no structural damages; inundated road that provides critical access.

3.13.3.4 Alternative Development

Flood Control Alternatives. Alternatives solutions to regional flooding and streambank erosion were developed and evaluated consistent with the methodology described in Section

1.4 of this report. Table 3.13.8 summarizes flood control alternatives for the McDonald Creek Subwatershed.

TABLE 3.13.8
Flood Control Alternatives for McDonald Creek

Alternative	Addressed Problem Area IDs	Location	Description
MDCR-2	PH-FR-02	Prospect Heights, Mount Prospect	*Channel Improvements:* South of Camp McDonald Road *Floodwall*: 4,137 feet of floodwall south of Camp McDonald Road *Reservoir*: 20 acre-feet of flood storage to offset conveyance increases
MDCR-3	MP-FR-01	Wheeling Township	*Floodwall:* 2,238 feet of floodwall between Kensington Road and Morrison Avenue
MDCR-4	MP-FL-01	Prospect Heights	*Sediment Removal:* Palatine Road culvert and between Euclid Avenue and Kensington Road
MCTA-1	PH-FR-03	Prospect Heights, Wheeling	*Culvert/Bridge Replacement*: Replace Hillcrest Lake overland flow route with box culvert outlet *Reservoir*: 40 acre-feet of flood storage upstream and downstream of problem area *Road Improvements*: Raise Hillcrest Drive and Owen Court
MDCR-5	MP-FR-01	Mount Prospect	*Streambank Stabilization:* Provide streambank stabilization to protect pedestrian bridges in Woodland Trails Park.

Flood storage, channel improvements, road improvements, and floodwall alternatives were evaluated to address regional flooding problems along McDonald Creek. For alternatives that include conveyance improvements, a storage element is required to offset the downstream increases in flows. Because McDonald Creek experiences overbank flooding throughout the subwatershed, flood storage is required for several of the alternatives to mitigate for increases in flood elevations elsewhere in the subwatershed.

Alternative MDCR-2 addresses Problem Area MDCR-PH-FR-02 in the City of Prospect Heights and the Village of Mount Prospect. The problem area is a cluster of 13 residences that experience overbank flooding from McDonald Creek. To protect these structures from flooding, 4,137 linear feet of floodwall will be constructed along both sides of the creek, south of Camp McDonald Road and west of Wolf Road. The average height of the floodwall is 4.4 feet, which provides two feet of freeboard above the 100-year flood elevation of McDonald Creek. To mitigate for the lost flood storage, channel improvements and downstream flood storage will be required. The channel improvements would consist of channel widening within the banks and are not intended to impact adjacent structures. Approximately 20 acre-feet of flood storage is required to offset the proposed conveyance improvements. This storage can be provided on approximately 5.0 acres of Woodland Trails Park, which is owned by the Village of Mount Prospect Park District and located in the Village of Mount Prospect. Two pump stations, each with a pump capacity of 5 cfs, will be required behind the floodwalls to control the interior drainage.

Alternative MDCR-3 addresses Problem Area MDCR-MP-FR-01 in Wheeling Township. The problem area is a cluster of 8 homes that experience overbank flooding from the backwater of the Des Plaines River. To protect these structures from flooding, 2,238 linear feet of floodwall is proposed along McDonald Creek, between Kensington Road and Morrison Avenue. The average height of the floodwall is 6.6 feet, which provides two feet of freeboard above the 100-year flood elevation of the Des Plaines River. Because the floodwall cuts off flood storage from the Des Plaines River, the proposed floodwall was analyzed in the Des Plaines River hydraulic model. It was determined that the lost flood storage does not result in an increase in Des Plaines River flood elevations. Therefore, no mitigation storage is required for this alternative. To control interior drainage, a pump station with a capacity of 5 cfs will be required behind the floodwall.

Alternative MDCR-4 includes sediment removal along McDonald Creek. The two areas of sediment removal include the culverts under Palatine Road and the stretch of McDonald Creek between Euclid Avenue and Kensington Road. Sediment will be removed from the culverts under Euclid Avenue/Wolf Road and at the CN Railroad. There are approximately 2,200 linear feet of channel improvements through the City of Prospect Heights and the Village of Mount Prospect.

Alternative MCTA-1 addresses Problem Area MCTA-PH-FR-03 in the City of Prospect Heights. There are no structural damages associated with this problem area, but involves the flooding of two roads that provide critical access to 22 residences along McDonald Creek Tributary A. This alternative includes roadway improvements for Hillcrest Drive and Owen Court, which are frontage roads along Hillcrest Lake, an on-line storage area along McDonald Creek Tributary A. The roads will be raised above the 100-year flood elevation. An additional outlet (triple 4-foot by 2-foot box culverts) of Hillcrest Lake will be constructed underneath Hillcrest Drive, discharging to McDonald Creek further downstream on the east side of Wheeling Road. Approximately 40 acre-feet of flood storage is proposed upstream of this area at Lions Park in the City of Prospect Heights (20 acre-feet on 3.5 acres) and also downstream on a non-developed parcel in the Village of Wheeling (20 acre-feet on 5.9 acres). These improvements would remove both Hillcrest Drive and Owen Court from the 100-year inundation area.

Alternative MDCR-5 includes streambank stabilization adjacent to three pedestrian bridges. Two on McDonald Creek mainstem, and one on Tributary A. The streambank stabilization is necessary to protect severe erosion problems at the bridge abutments.

3.13.3.5 Alternative Evaluation and Selection

Alternatives listed in Table 3.13.8 were evaluated to determine their effectiveness and to produce data for the countywide prioritization of subwatershed projects. Flood control alternatives were modeled to evaluate their impact on water surface elevations and flood damages. Table 3.13.14 provides a summary of B/C ratio, net benefits, total project costs, number of structures protected, and other relevant alternative data.

The expansion of the Lake Arlington Flood Control Reservoir was evaluated as a flood control alternative. Two scenarios of the expansion were included in the analysis: (1) the expansion of the flood control reservoir onto adjacent non-developed parcels, providing an additional 160 acre-feet of flood storage, and (2) the conversion of the gravity-drained reservoir to a pump-evacuated reservoir, providing an additional 550 acre-feet of flood storage. Although these flood control alternatives reduce flood profiles along McDonald Creek, they do not completely remove any problem areas from the 100-year inundation area. Because they do not address any of the specific problem areas in the subwatershed, the Lake Arlington Flood Control Reservoir expansion scenarios were not included in the proposed flood control alternatives.

MDCR-2. MDCR-2 addresses Problem Area MDCR-PH-FR-02 in the City of Prospect Heights and the Village of Mount Prospect. The problem area is a cluster of 13 residences that experience overbank flooding from McDonald Creek. To protect these structures from flooding, 4,137 linear feet of floodwall will be constructed along the creek. The average height of the floodwall above the ground is 4.4 feet. To mitigate for the lost flood storage, channel improvements and downstream storage will be required. Approximately 20 acre-feet of flood storage is required to offset the proposed conveyance improvements, which can be provided on approximately 5.0 acres of Woodland Trails Park in the Village of Mount Prospect. Two pump stations (5 cfs capacity) are required to handle the interior drainage behind the floodwalls. Table 3.13.9 compares the peak modeled water surface elevation and flow for Alternative MDCR-2.

TABLE 3.13.9
McDonald Creek Existing and Alternative Condition MDCR-2 Flow and WSEL Comparison

Location	Station	Existing Conditions		MDCR-2	
		Max WSEL (ft)	Max Flow (cfs)	Max WSEL (ft)	Max Flow (cfs)
Upstream of Schoenbeck Road	27500	660.7	220	660.7	220
Upstream of Palatine Road	23000	655.9	420	655.9	420
Upstream of Elmhurst Road	21250	653.0	538	653.0	538
Upstream of Wheeling Road	18500	649.4	614	649.4	613
Upstream of Camp McDonald Road	10850	645.5	895	645.4	895
Upstream of Euclid Avenue	7500	641.3	1,118	641.0	1,118
Upstream of Kensington Road	2500	638.0	1,200	638.0	1,199

TABLE 3.13.9
McDonald Creek Existing and Alternative Condition MDCR-2 Flow and WSEL Comparison

Location	Station	Existing Conditions		MDCR-2	
		Max WSEL (ft)	Max Flow (cfs)	Max WSEL (ft)	Max Flow (cfs)
Upstream of River Road	900	637.6	1,226	637.6	1,217

MDCR-3. MDCR-3 addresses Problem Area MDCR-MP-FR-01 in Wheeling Township. The problem area is a cluster of 8 homes that experience overbank flooding from the backwater of the Des Plaines River. To protect these structures from flooding, 2,238 linear feet of floodwall is proposed along McDonald Creek between Kensington Road and River Road. The average height of the floodwall above the ground is 6.6 feet. One pump station (5 cfs capacity) is also proposed to handle the interior drainage behind the floodwall. Table 3.13.10 compares the peak modeled water surface elevation and flow for Alternative MDCR-3.

TABLE 3.13.10
McDonald Creek Existing and Alternative Condition MDCR-3 Flow and WSEL Comparison

Location	Station	Existing Conditions		MDCR-3	
		Max WSEL (ft)	Max Flow (cfs)	Max WSEL (ft)	Max Flow (cfs)
Upstream of Schoenbeck Road	27500	660.7	220	660.7	220
Upstream of Palatine Road	23000	655.9	420	655.9	420
Upstream of Elmhurst Road	21250	653.0	538	653.0	538
Upstream of Wheeling Road	18500	649.4	614	649.4	614
Upstream of Camp McDonald Road	10850	645.5	895	645.5	895
Upstream of Euclid Avenue	7500	641.3	1,118	641.3	1,118
Upstream of Kensington Road	2500	638.0	1,200	638.0	1,200
Upstream of River Road	900	637.6	1,226	637.6	1,226

MDCR-4. Alternative MDCR-4 includes sediment removal along McDonald Creek at the Palatine Road culverts and along the stretch of creek between Euclid Avenue and Kensington Road. Sediment will be removed at the Euclid Avenue/Wolf Road culverts and at the CN Railroad culverts; sediment will also be removed from the channel between these two crossings. There are approximately 2,200 linear feet of channel improvements through the City of Prospect Heights and the Village of Mount Prospect. This alternative results in a very minor reduction in the water surface profile for McDonald Creek, as shown in Table 3.13.11, and does not produce long-term flood reduction benefits for any regional problems meeting the District's criteria.

TABLE 3.13.11
McDonald Creek Existing and Alternative Condition MDCR-4 Flow and WSEL Comparison

Location	Station	Existing Conditions		MDCR-4	
		Max WSEL (ft)	Max Flow (cfs)	Max WSEL (ft)	Max Flow (cfs)
Upstream of Schoenbeck Road	27500	660.7	220	660.7	220
Upstream of Palatine Road	23000	655.9	420	655.8	420
Upstream of Elmhurst Road	21250	653.0	538	653.0	538
Upstream of Wheeling Road	18500	649.4	614	649.4	613
Upstream of Camp McDonald Road	10850	645.5	895	645.5	895
Upstream of Euclid Avenue	7500	641.3	1,118	641.0	1,118
Upstream of Kensington Road	2500	638.0	1,200	638.0	1,200
Upstream of River Road	900	637.6	1,226	637.6	1,226

MCTA-1. This alternative addresses Problem Area MCTA-PH-FR-03, which consists of two inundated roads that provide critical access to 22 residences in the City of Prospect Heights. Hillcrest Drive and Owen Court are both frontage roads along Hillcrest Lake, an on-line storage area on McDonald Creek Tributary A. This alternative includes roadway improvements for Hillcrest Drive and Owen Court to raise the roads above the 100-year flood elevation. An additional outlet to Hillcrest Lake (triple 4-foot by 2-foot box culverts) will be constructed underneath the roads, tying into McDonald Creek further downstream. Approximately 40 acre-feet of flood storage is proposed upstream of this area at Lions Park in the City of Prospect Heights (20 acre-feet on 3.5 acres) and also downstream on a non-developed parcel in the Village of Wheeling (20 acre-feet on 5.9 acres). These improvements would remove both Hillcrest Drive and Owen Court from the 100-year inundation area. The results are shown in Table 3.13.12.

TABLE 3.13.12
McDonald Creek Existing and Alternative Condition MCTA-1 Flow and WSEL Comparison

Location	Station	Existing Conditions		MCTA-1	
		Max WSEL (ft)	Max Flow (cfs)	Max WSEL (ft)	Max Flow (cfs)
Upstream of Schoenbeck Road	27500	660.7	220	660.7	220
Upstream of Palatine Road	23000	655.9	420	655.9	420
Upstream of Elmhurst Road	21250	653.0	538	653.0	538
Upstream of Wheeling Road	18500	649.4	614	649.3	611
Upstream of Camp McDonald Road	10850	645.5	895	645.4	817
Upstream of Euclid Avenue	7500	641.3	1,118	641.0	1,028
Upstream of Kensington Road	2500	638.0	1,200	637.9	1,121
Upstream of River Road	900	637.6	1,226	637.6	1,226

MDCR-5. This alternative addresses Problem Area MDCR-MP-FR-01, which consists of stream bank erosion upstream and downstream of 3 pedestrian bridges within Woodland Trails Park in the Village of Mount Prospect. There are two bridges on McDonald Creek and one bridge on McDonald Creek Tributary B. The bridge abutments have been undercut due to stream bank erosion. This alternative includes stream bank stabilization upstream and downstream of the pedestrian bridges including dumped rock for toe protection and a sloped concrete stream bank to protect the abutment from further erosion. These improvements are for erosion control only and do not impact the water surface elevations of either McDonald Creek or McDonald Creek Tributary B.

A number of properties are at risk of shallow flooding during the 100-year flood event under existing conditions or recommended alternative conditions. In addition, due to their locations, other properties risk of flooding cannot be feasibly mitigated by structural measures. Such properties are candidates for protection using nonstructural flood control measures, such as flood-proofing or acquisition. These measures may be considered to address damages that are not fully addressed by capital projects recommended in the Lower Des Plaines River DWP.

Hydraulic modeling results for the McDonald Creek Subwatershed show two roadways inundated by a depth greater than 0.5 feet for 100-year flood event. These roadways provide primary access to several residences. Table 3.9.10 provides a summary of the depth of road flooding for existing conditions and with the recommended alternative MCTA-1.

TABLE 3.13.13
McDonald Creek Subwatershed Road Overtopping Summary

Road Crossing	Road Elevation	25-yr Depth of Flooding	50-yr Depth of Flooding	100-yr Depth of Flooding
Hillcrest Drive/Owen Court	650.0	0.6[1]	0.7[1]	0.8[1]
Hillcrest Drive/Owen Court (with MCTA-1)	651.5	-	-	-

Note: Blank entry indicates that road crossing does not overtop for that particular storm event.
[1] Depth of flooding with respect to McDonald Creek Tributary A flood inundation.

3.13.3.6 Data Required for Countywide Prioritization of Watershed Projects

Appendix I presents conceptual level cost estimates for the recommended alternatives. Table 3.13.8 lists alternatives analyzed in detail as part of the DWP development.

The recommended alternatives for McDonald Creek are Alternatives MCTA-1, MDCR-2, and MDCR-3. Although the B/C ratio of Alternative MCTA-1 is significantly less than 1.0, it is low because there are no structural damages associated with the problem area. The problem area includes two roads that are frequently inundated (Hillcrest Drive and Owen Court) and provide critical access to 22 residences. Additional damages beyond those calculated for MCTA-1 may exist, including those not easily quantified in financial terms such as loss of emergency access and loss of business or operations due to limited transportation access. Alternative MCTA-1 is recommended based on the number of residences that would be accessible during significant storm events. Alternatives MDCR-2 and MDCR-3 are floodwall alternatives with low B/C ratios. These alternatives are recommended based on the number of structures that are removed from the 100-year inundation area, as shown in Table 3.13.14. Alternative MDCR-4 does not permanently address any regional problems; therefore, it is not recommended. Alternative MDCR-5 is recommended to address the reported streambank erosion issues on McDonald Creek and Tributary B.

Figures 3.13.8 through 3.13.12 show the locations and a summary of the proposed and recommended alternatives described in Table 3.13.14. Figures 3.13.8 through 3.13.12 also show comparisons of the existing condition and alternative condition inundation areas.

TABLE 3.13.14
McDonald Creek Project Alternative Matrix to Support District CIP Prioritization

Alternative ID	Description	B/C Ratio	Net Benefits ($)	Total Project Cost ($)	Cumulative Structures Protected	Roadways Protected	Water Quality Benefit	Recom-mended	Communities Involved
MCTA-1	Roadway Improvements/Culvert Replacement/Mitigation Storage	0.03	314,091	9,430,341	0	Y	No Impact	Y	Prospect Heights, Wheeling
MDCR-2	Floodwall/Channel Improvements/Mitigation Storage	0.1	1,841,550	15,625,015	13	N	Positive	Y	Prospect Heights, Mount Prospect
MDCR-3	Floodwall	0.2	2,438,071	10,368,339	8	N	No Impact	Y	Wheeling Township
MDCR-4	Sediment Removal	0.0	880	89,757	0	N	No Impact	N	Prospect Heights, Mount Prospect
MDCR-5	Erosion Stabilization	0.3	204,000	797,625	0	N	Positive	Y	Mount Prospect

3.14 Lower Salt Creek

The Salt Creek Subwatershed measures approximately 150 square miles in area, is located in both Cook and DuPage Counties, and is tributary to the Des Plaines River. The Salt Creek Subwatershed consists of the Upper Salt Creek and Lower Salt Creek. The Upper Salt Creek Subwatershed (north of and including Busse Woods Reservoir) is located in northwest Cook County. The Lower Salt Creek (Salt Creek) Subwatershed begins south of Busse Woods Reservoir outlet and flows south through DuPage County to the Village of Oak Brook, were it turns east and flows under Interstate 294 into the study area in Cook County. The tributary area to
Salt Creek at Wolf Road, just downstream of Interstate 294, is approximately 112 square miles according to the FEMA FIS.

The Upper Salt Creek and the portion of Lower Salt Creek upstream of Wolf Road were included in the hydrologic portion of this study, but were not studied in detail through hydraulic modeling. All references to Salt Creek and the Salt Creek Subwatershed from this point forward refer to the 13 square miles of study area in Cook County, downstream of Wolf Road, unless otherwise noted.

Salt Creek is located in western Cook County, in the Des Plaines River Watershed. The Salt Creek Subwatershed measures approximately 13 square miles and is comprised of Salt Creek and the following tributaries: Salt Creek South Fork, and Salt Creek Middle Fork.

TABLE 3.14.1
Communities Draining to Salt Creek

Community	Tributary Area (mi^2)
Brookfield	2.6
Broadview	0.1
Countryside	0.1
Hillside	0.1
Indian Head Park	0.1
LaGrange	2.2
LaGrange Park	2.2
Lyons	0.2
North Riverside	0.2
Westchester	1.8
Western Springs	0.6
Unincorporated Cook County	2.8
TOTAL	12.9

Note: This list includes community areas tributary to the Salt Creek within the 13 square mile study area in Cook County. It does not include upstream tributary areas in Lake County, DuPage County, or northern Cook County.

TABLE 3.14.2
Land Use Distribution for Salt Creek within Cook County

Land Use Category	Area (acres)	%
Residential	4911	59.7
Commercial/Industrial	639	7.8
Forest/Open Land	1750	21.2
Institutional	544	6.6
Transportation/Utility	336	4.1
Water/Wetland	46	0.6
Agricultural	0	0

Source: Chicago Metropolitan Agency for Planning's 2005 Land Use Inventory for Cook, DuPage, Kane, Kendall, Lake, McHenry and Will Counties, Illinois. Version 1.0. Published January 2009

The Salt Creek Subwatershed drains areas within the municipalities of the Village of Brookfield, Village of Broadview, City of Countryside, Village of Hillside, Village of Indian Head Park, Village of LaGrange, Village of LaGrange Park, Village of Lyons, Village of North Riverside, Village of Westchester, Village of Western Springs, and portions of Unincorporated Cook County. The Mayfair Reservoir is the only flood control reservoir within the Subwatershed. The Subwatershed also contains a diversion structure north of 31st Street which conveys flows from Salt Creek directly to the Des Plaines River.

Addison Creek is a 21.8 square mile Subwatershed which is tributary to Salt Creek. The confluence with Addison Creek is approximately 1 mile upstream of the diversion structure north of 31st Street. The Addison Creek Subwatershed is described in detail in Section 3.2 of the DWP.

While Salt Creek consists of open channels mainly traversing Cook County Forest Preserve District lands through Cook County, the Salt Creek Middle Fork and Salt Creek South Fork contain long reaches enclosed in pipes with overflow routes. The upstream areas of the Salt Creek Middle Fork and Salt Creek South Fork are conveyed through an open channel west of Wolf Road.

Figure 3.14.1 shows the areas directly tributary to Salt Creek (but do not include tributary areas in DuPage County or areas in Cook County tributary to Upper Salt Creek, which are addressed in separate DWPs). Table 3.14.1 lists the communities located in areas directly tributary to the Salt Creek Subwatershed. Reported stormwater problem areas, flood inundation areas, and proposed alternative projects are also shown and discussed in the following subsections. Table 3.14.2 lists the land use breakdown by area within the Salt Creek Subwatershed.

3.14.1 Sources of Data

3.14.1.1 Previous Studies

Hydrologic and hydraulic analyses of the Salt Creek Subwatershed were previously prepared by various consulting engineers and governmental agencies in 1978 and 1979 for the FIA. The hydrologic modeling was performed by using TR-20 and the Hydraulic routing performed was steady state and used the WSP-2 modeling application. This analysis was use to generate the FEMA effective floodplain mapping.

3.14.1.2 Water Quality Data

Water quality for the Salt Creek Subwatershed is monitored by the District and the Illinois IEPA. The District is responsible for monitoring the water quality of the streams and canals within its jurisdiction, and has two water quality monitoring stations on Salt Creek within the DWP study area as listed in Table 3.14.3. Annual water quality summaries have been published by the District from 1970 through the present for the Salt Creek monitoring stations.

TABLE 3.14.3
District Water Quality Monitoring Stations in the Salt Creek Subwatershed

Station ID	Waterbody	Location	Station Start Date
WW_24	Salt Creek	Wolf Road	1970
WW_109	Salt Creek	Brookfield Avenue	2002

The IEPA monitors water quality data at one location within the DWP study area in the Salt Creek Subwatershed as part of the Ambient Water Quality Monitoring Network. Table 3.14.4 provides the locations of the water quality monitoring station.

TABLE 3.14.4
IEPA Water Quality Monitoring Stations in the Salt Creek Subwatershed

Station ID	Waterbody	Location
GL-09	Salt Creek	Western Springs

IEPA's 2010 *Integrated Water Quality Report*, which includes the CWA 303(d) and 305(b) lists, lists two segments within the DWP study area of Salt Creek Subwatershed as impaired. Table 3.14.5 lists the 303(d) listed impairments. TMDLs have been established for the Salt Creek Subwatershed in the USEPA-approved *Total Maximum Daily Loads for Salt Creek, Illinois*, October 2004, report. The report states that the chloride–total dissolved solids–conductivity TMDL will require an 8 percent reduction in overall chloride application to Salt Creek and a 41 percent reduction in Addison Creek. The dissolved oxygen TMDL will require a 56 percent reduction in 5-day carbonaceous biochemical oxygen demand and a 38 percent reduction of ammonia nitrogen unless other remediation, such as a proposed dam removal, are implemented.

TABLE 3.14.5

IEPA Use Support Categorization and 303(d) Impairments in the Salt Creek Subwatershed

Station ID	Waterbody	Impaired Designated Use	Potential Causes	Potential Sources
IL_GL-09	Salt Creek	Aquatic Life	Aldrin, Methoxychlor, Sedimentation/Siltation, TSS, pH, Phosphorus (Total)	Urban Runoff/Storm Sewers, Combined Sewer Overflow, Contaminated Sediments, Private and Municipal Point Source Discharge
		Fish Consumption	Mercury, Polychlorinated biphenyls	Source Unknown

TABLE 3.14.5

IEPA Use Support Categorization and 303(d) Impairments in the Salt Creek Subwatershed

Station ID	Waterbody	Impaired Designated Use	Potential Causes	Potential Sources
IL_GL-19	Salt Creek	Primary Contact Recreation	Fecal Coliform	Urban Runoff/Storm Sewers, Combined Sewer Overflow, Municipal Point Source Discharge
		Aquatic Life	pH, Phosphorus (Total)	Urban Runoff/Storm Sewers
		Fish Consumption	Mercury, Polychlorinated biphenyls	Source Unknown
		Primary Contact Recreation	Fecal Coliform	Urban Runoff/Storm Sewers, Combined Sewer Overflow, Municipal Point Source Discharge

NPDES point source discharges within the DWP study area in the Salt Creek Subwatershed are listed in Table 3.14.6. In addition to the point source discharges listed, municipalities discharging to the Salt Creek Subwatershed are regulated by IEPA's NPDES Phase II Stormwater Permit Program, which was created to improve the water quality of stormwater runoff from urban areas, and requires that municipalities obtain permits for discharging stormwater and implement the six minimum control measures for limiting runoff pollution to receiving systems.

TABLE 3.14.6
Point Source Discharges in the Salt Creek Subwatershed

Name	NPDES	Community	Receiving Waterway
Material Service Corp-Fed Quarry	IL0001945	McCook	Salt Creek
Office Park of Hinsdale	IL0068381	Hinsdale	Salt Creek
West Shore Pipe Line Co	IL0078166	Arlington Heights	Salt Creek

Note: NPDES facilities were identified from the IEPA website at http://www.epa.state.il.us/water/permits/waste-water/npdes-statewide.pdf, and from the USEPA website at http://www.epa.gov/r5water/weca/pcs.htm.

3.14.1.3 Wetland and Riparian Areas

Figures 2.3.6 and 2.3.7 contain mapping of wetland and riparian areas in the Lower Des Plaines River Watershed. Wetland areas were identified using NWI mapping. NWI data includes roughly 181 acres of wetland areas in the Salt Creek Subwatershed. Riparian areas are defined as vegetated areas between aquatic and upland ecosystems adjacent to a waterway or body of water that provides flood management, habitat, and water quality enhancement. Identified riparian environments offer potential opportunities for restoration.

3.14.1.4 Floodplain Mapping

Flood inundation areas supporting the NFIP were revised in 2008 as part of the FEMA's Map Modernization Program. As part of the new mapping, floodplain boundaries were revised based upon updated Cook County topographic information; however, the hydrologic and hydraulic computer models, which are used to estimate flood levels, were not updated. LOMRs were incorporated into revised floodplain areas. Salt Creek is mapped in detail in the DFIRM mapping update, with Zone AE, AH, and AO floodplain shown across the length of Salt Creek, except for the most upstream portion located in Unincorporated Cook County between Interstate 294 and the Village of LaGrange Park, which is unnumbered Zone A. The original hydrologic and hydraulic analyses were performed between 1978 and 1979. The hydrologic modeling for the entire region flowing into Salt Creek was performed using TR-20 according to the FIS for Brookfield dated June 1980. The FIS stated that the hydraulic routing performed was steady state and used the WSP-2 modeling application. Appendix A includes a comparison of FEMA's effective floodplain mapping from updated DFIRM panels with inundation areas developed for the DWP.

3.14.1.5 Stormwater Problem Data

Starting in the 3rd quarter of 2007, communities, agencies (e.g., IDOT, CCHD), and stakeholders submitted Form B questionnaire response data to the District summarizing known stormwater problems within their jurisdictions. The questionnaires were requested again by the District following the September 2008 storm event. Table 3.14.7 summarizes reported problem areas reviewed as a part of the DWP development. Problems are classified in Table 3.14.7 as regional or local. This classification is based on a process described in Section 1 of this report. The Problem Area ID naming convention was found in Technical Memorandum entitled, "Proposed Naming Conventions for Database Elements" dated August 3, 2007.

TABLE 3.14.7
Community Response Data for Salt Creek

Problem Area ID[4]	Municipality	Problems as Reported by Local Agency	Location	Problem Description	Local/ Regional	Resolution in DWP
LG-FL-01[1]	LaGrange	General Village Flooding	Throughout Village	The Village is drained by combined sewers that flow west to east to the Districts interceptor sewer and TARP dropshafts. Street and home flooding occurs due to combined sewers	Local	This is a local problem.[3]
PV-FL-01[1]	Proviso Township	Pavement Flooding	US Route 12/20/45 at IL Route 38	Reported by IDOT: Last incident 8/8/91	Local	This is a local problem.[3]
WC-FL-01[2]	Westchester	Pavement Flooding	31st Street at Wolf Road	Reported by IDOT: Last incident 7/3/98	Local	This is a local problem.[3]
BF-FL-01[1]	Brookfield	Street and basement flooding	Throughout Village	After heavy rains, combined sewer cannot handle runoff which causes street and basement flooding	Local	This is a local problem.[3]
BV-FL-01[1]	Broadview	Local flooding due to undersized ditch	25th Avenue south of Cermak to Salt Creek	Parking lot and industrial building dock flooding due to undersized ditch on east side of 25th Avenue	Local	This is a local problem.[3]
CF-SM-01[1]	FPDCC	Odor	LaGrange Road and 31st Street	Water within creek has odor of raw sewage, possible problem with sewer overflow	Local	This is a local problem.[3]
LP-FL-01[1]	LaGrange Park	Basement flooding due to undersized sewers	East of LaGrange Road and south of 31st Street	After heavy rains, combined sewer cannot handle runoff which causes basement flooding	Local	This is a local problem.[3]
LY-FR-01[1]	Lyons	Pavement flooding	Ogden Avenue and First Avenue	During the September 2008 storm, Salt Creek overtopped its banks and flooded the Czech Terrace subdivision in Lyons and a portion of Southview Ave. Arden Ave. and McCormick Ave. in Brookfield	Regional	STCR-1234 / STCR-5

TABLE 3.14.7
Community Response Data for Salt Creek

Problem Area ID[4]	Municipality	Problems as Reported by Local Agency	Location	Problem Description	Local/ Regional	Resolution in DWP
WC-FL-01[1]	Westchester	Pavement Flooding	22nd Street / Cermak Road at Boeger Street	Reported by IDOT: Last incident 8/26/87	Local	This is a local problem.[3]
WS-FL-01[1]	Western Springs	Storm Sewer Flow Restriction	Howard Avenue north of Ogden Avenue	Under permits for sewer extensions within service area for drop shaft 55, Village of is limited to 200 cfs plus available outfall capacity. This restriction required until proposed phase II TARP is in operation	Local	This is a local problem.[3]
WS-FL-02[1]	Western Springs	Pavement Flooding	US Route 34 at Wolf Road	Reported by IDOT: Last incident 11/4/03	Local	This is a local problem.[3]

[1] Problem Area IDs begin with DP-STCR- as they are in the Des Plaines River – Salt Creek Subwatershed.
[2] Problem Area IDs begin with DP-SCSF- as they are in the Des Plaines River – Salt Creek South Fork Subwatershed.
[3] Problem does not meet regional definition (refer to chapter 1). Solutions for the local problems are not addressed in the DWP.
[4] These problem areas were identified prior to the June and July 2010 storm events.

3.14.1.6 Near Term Planned Projects

No near-term planned major flood control projects to be constructed by others were identified for the Salt Creek Subwatershed.

3.14.2 Watershed Analysis

3.14.2.1 Hydrologic Model Development

Subbasin Delineation. The Salt Creek tributary area was delineated based upon 2003 Cook County LiDAR topographic data developed by Cook County. There are 14 subbasins ranging in size from 0.07 to 3.77 square miles with a total drainage area of 12.98 square miles. No subbasins were delineated upstream of Wolf Road. The US Army Corps of Engineers hydrologic model of the Des Plaines River was used for the portion upstream of Wolf Road. The Subwatershed area has diversions to the District TARP system. These diversions were incorporated into the HEC-HMS hydraulic model based on the USACE Des Plaines River Phase I HEC-1 model.

Hydrologic Parameter Calculations. CN values were estimated for each subbasin based upon NRCS soil data and 2001 CMAP land use data. This method is further described in Section

1.3.2, with lookup values for specific combinations of land use and soil data presented in Appendix C. An area-weighted average of the CN was generated for each subbasin.

Clark's unit hydrograph parameters were estimated using the method described in Section 1.3.2. Appendix G provides a summary of the hydrologic parameters used for subbasins in each Subwatershed.

Critical Duration Analysis. Over 87% of the Salt Creek watershed is upstream of Wolf Road, therefore the timing of the peak flows from this area will greatly impact the critical duration of the study area. The critical duration analysis was determined from the HEC-HMS flows generated by the upper 87% of the watershed, at Wolf Road. The peak flow at Wolf Road was determined to be during the 72-hour storm event, therefore, the 72-hour event was used as the critical duration event for hydraulic analysis of Lower Salt Creek. The critical flow is 3,700 cfs.

3.14.2.2 Hydraulic Model Development

Field Data, Investigation, and Existing Model Data. The FEMA effective hydraulic model was developed by NRCS in the late 1970s using WSP-2. The model data was over 30 years old and was not used in the DWP development.

Field survey was performed by D.B. Sterlin, Inc. in early 2009 under the protocol of FEMA's *Guidelines and Specifications for Flood Hazard Mapping partners, Appendix A: Guidance for Aerial Mapping and Surveying.* Channel cross-sections were surveyed along the entire creek and tributaries in addition to the survey of hydraulic structures. The actual spacing and location was determined based on the variability of the channel geometry, shape, roughness, and slope.

HEC-GeoRAS cross-sections extracted from the TIN created in GIS from the 2003 Cook County LiDAR topographic data were imported into HEC-RAS. The field survey was incorporated into these GIS created cross sections for modeling.

Field visits were performed to assess channel and overbank roughness characteristics at several locations along Salt Creek. The information gathered in the field was compared to photographs and aerial photography to review and determine Manning's *n* roughness coefficients for the unsteady HEC-RAS hydraulic model.

Boundary Conditions. The downstream boundary condition for the Salt Creek Subwatershed is the 5-year water surface elevation for the Des Plaines River at its confluence with Salt Creek.

The upstream boundary condition for the Salt Creek Subwatershed is a HEC-HMS generated hydrograph of the approximately 137 square miles of the Salt Creek Subwatershed tributary to Wolf Road. The US Army Corps of Engineers HEC-1 model of the Des Plaines Watershed was converted to HEC-HMS to generate the hydrograph.

3.14.2.3 Calibration and Verification

The Salt Creek Subwatershed HEC-HMS hydrologic model and unsteady HEC-RAS hydraulic models were calibrated to the September 13-14, 2008 storm event conditions observed at USGS stream gage 05531500 - Salt Creek at Western Springs and USGS stream gage 05532300 - Salt Creek at Brookfield, and at HWM surveyed along Salt Creek.

Calibration was achieved by multiplying the CUH storage coefficient, R, by a factor of 1.65 for Salt Creek subbasins in the HEC-HMS hydrologic model.

The unsteady HEC-RAS hydraulic model results for the September 13-14, 2008 storm event were compared to two USGS stream gages and three HWMs located downstream of the confluence with Addison Creek. HWMs made by the USGS following the September 2008 storm event were surveyed by D.B. Sterlin Inc. and used for model calibration. The District calibration and verification specifications for model calibration are 0.5 feet difference between observed and modeled water surface elevation, 30% difference in volume and 30% difference in flow. All calibration and verification specifications have been met for Salt Creek

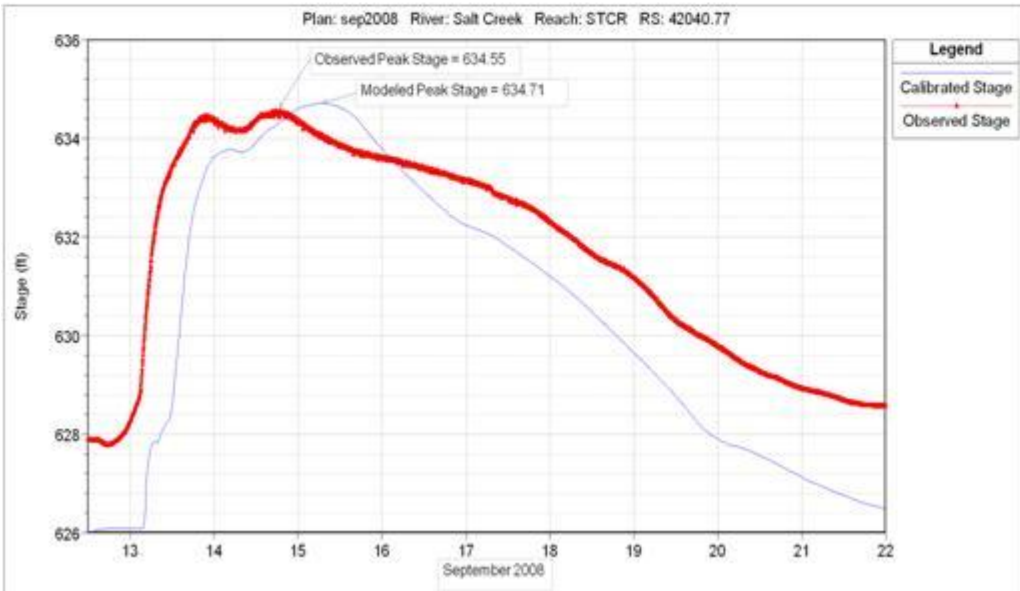
Table 3.14.8 shows the computed water surface elevations at the HWMs are within the District calibration specifications of 0.5 feet from the observed HWM.

Table 3.14.8
Observed High Water Marks vs. Modeled Results for September 2008 Storm Event

Cross Section River Station	Closest Road Crossing	Observed HWM (NAVD 1988)	Modeled Water Surface Elevation (NAVD 1988)	Difference
6283.729	Washington Avenue	616.4	616.4	0.0
5603.98	Washington Avenue	616.4	616.2	-0.2
3467.278	Brookfield Avenue	615.2	615.6	0.4

Figure 3.14.2 shows the modeled peak water stage elevation at HEC-RAS cross-section 42040.77 (Wolf Road) is within 0.5 feet of observed peak stage elevation.

FIGURE 3.14.2
Salt Creek Stage Comparison at Wolf Road for the September 2008 Storm Event



The peak flowrate of the unsteady HEC-RAS model at cross section 42040.77 (Wolf Road) is within 10% of the peak gaged flowrate as shown in Figure 3.14.3. Figure 3.14.3 also shows the computed volume is within 15%.

FIGURE 3.14.3
Salt Creek Flow Comparison at Wolf Road for the September 2008 Storm Event

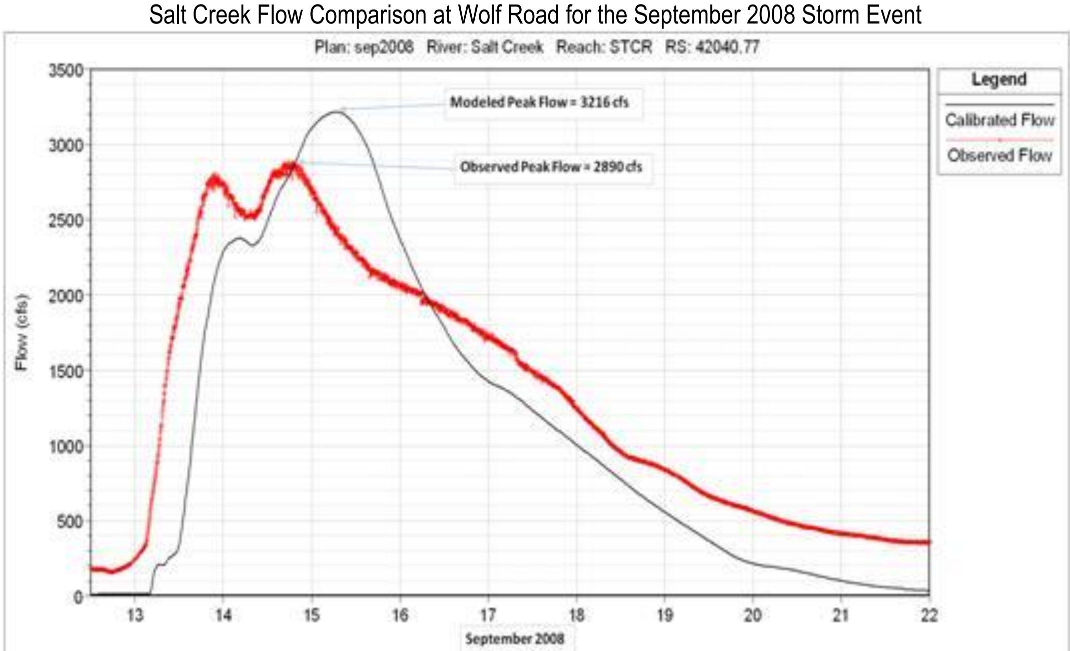
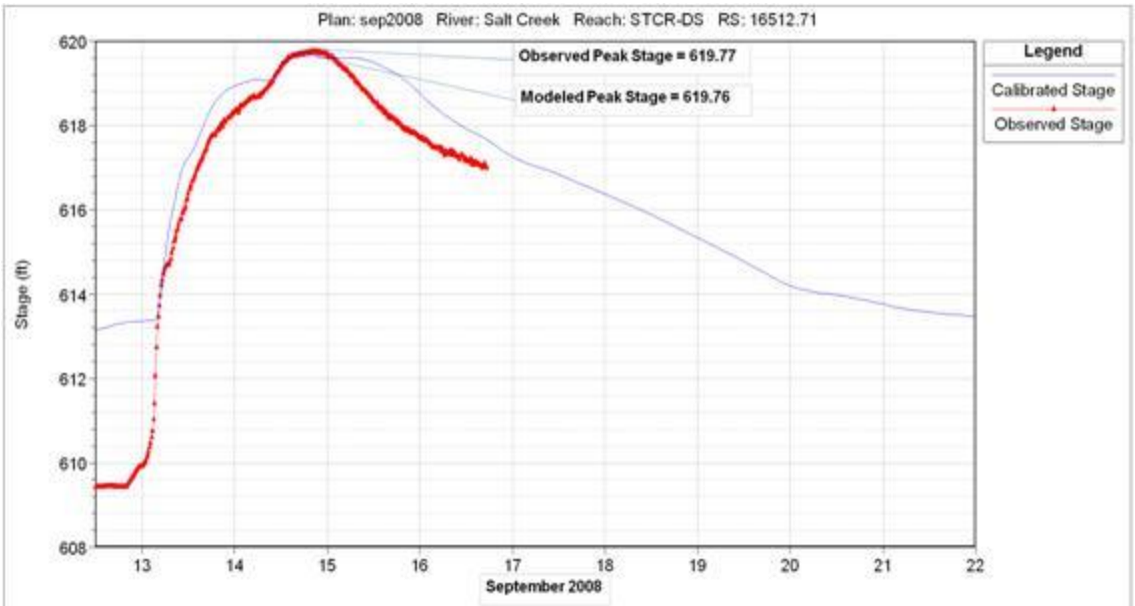


Figure 3.14.4 shows the modeled peak water stage elevation at HEC-RAS cross-section 16512.71 (confluence with Addison Creek) is within 0.5 feet of observed peak stage elevation.

FIGURE 3.14.4
Salt Creek Stage Comparison at Confluence with Addison Creek for the September 2008 Storm Event



A verification storm for a storm event from October 10th to October 16th, 2001 was run and Figure 3.14.5 shows the resulting peak water surface elevation at HEC-RAS cross section 42040.77 is within 0.5 feet of peak gage water surface elevation.

FIGURE 3.14.5
Salt Creek Stage Comparison at Wolf Road for the October 2001 Storm Event

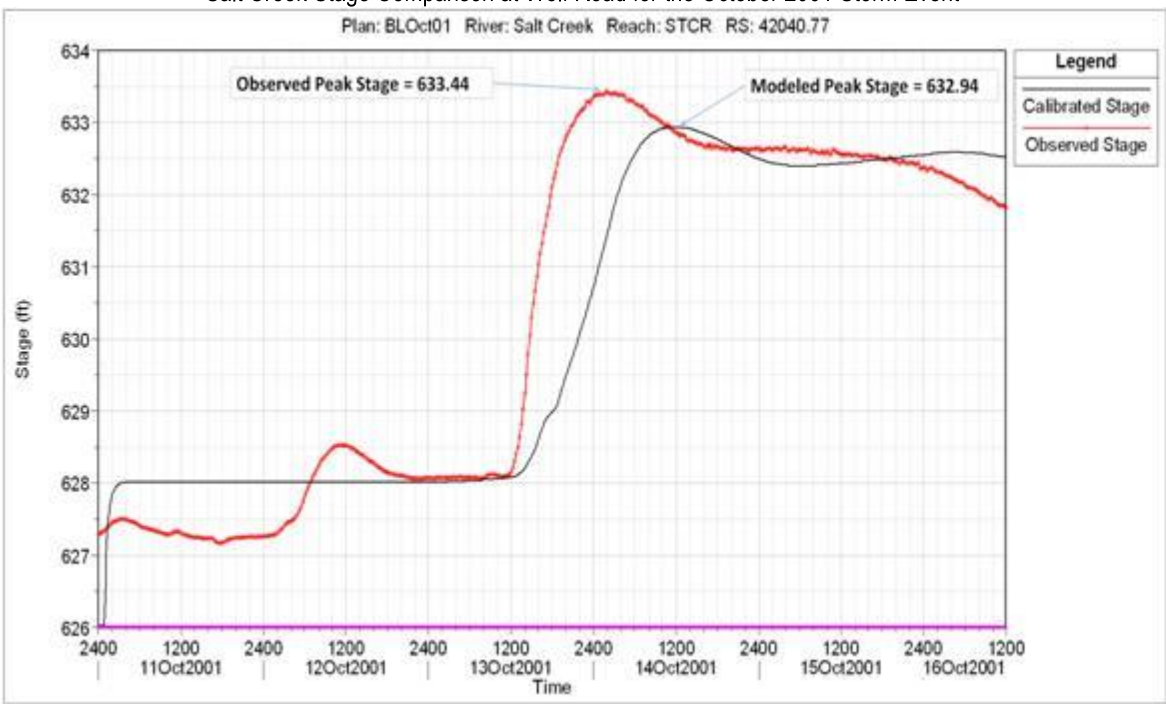
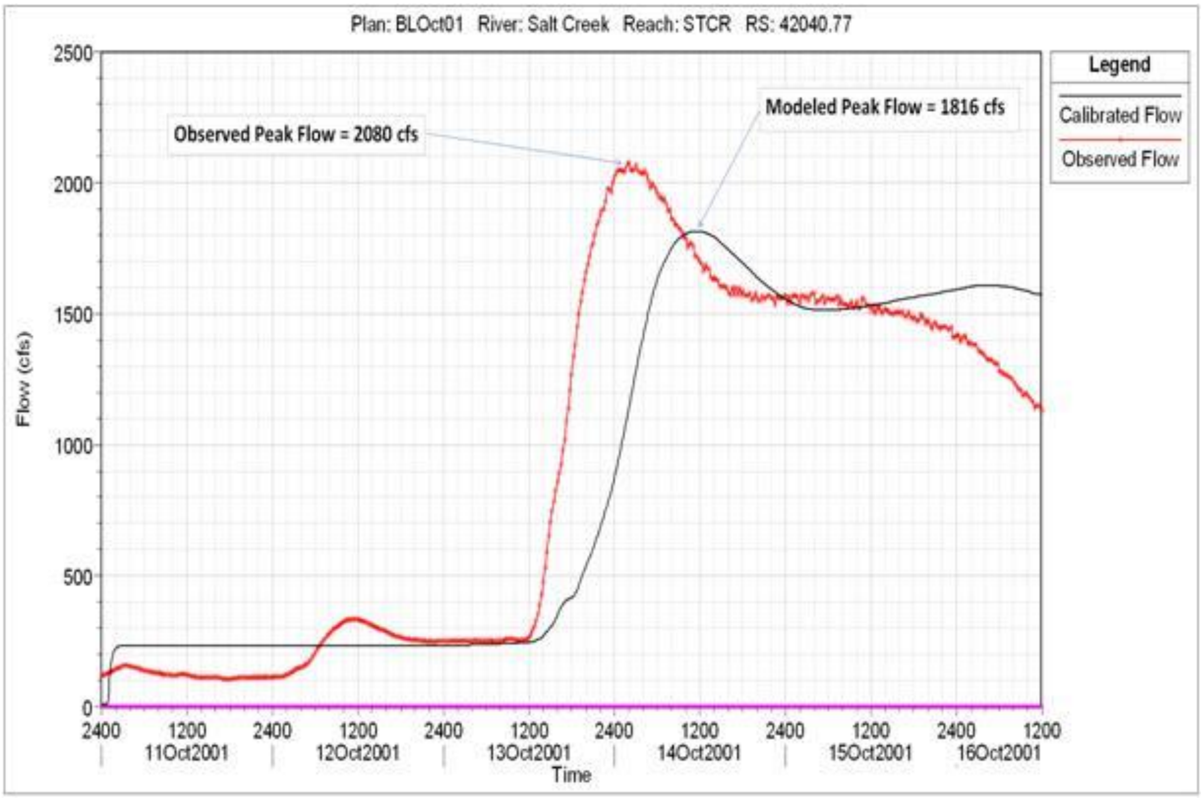


Figure 3.14.6 shows the resulting peak flow at HEC-RAS cross section 42040.77 is within 13% of peak gage flow. Figure 3.14.6 also shows the computed volume is within 6%. The verification storm event meets the same District specifications as the calibration event.

FIGURE 3.14.6
Salt Creek Flow Comparison at Wolf Road for the October 2001 Storm Event



An additional verification storm was run that occurred during the summer of 2010. The July 23rd to July 26th, 2010 was run and Figure 3.14.7 shows the resulting peak water surface elevation at HEC-RAS cross section 42040.77 is within 0.5 feet of peak gage water surface elevation.

FIGURE 3.14.7
Salt Creek Stage Comparison at Wolf Road for the July 2010 Storm Event

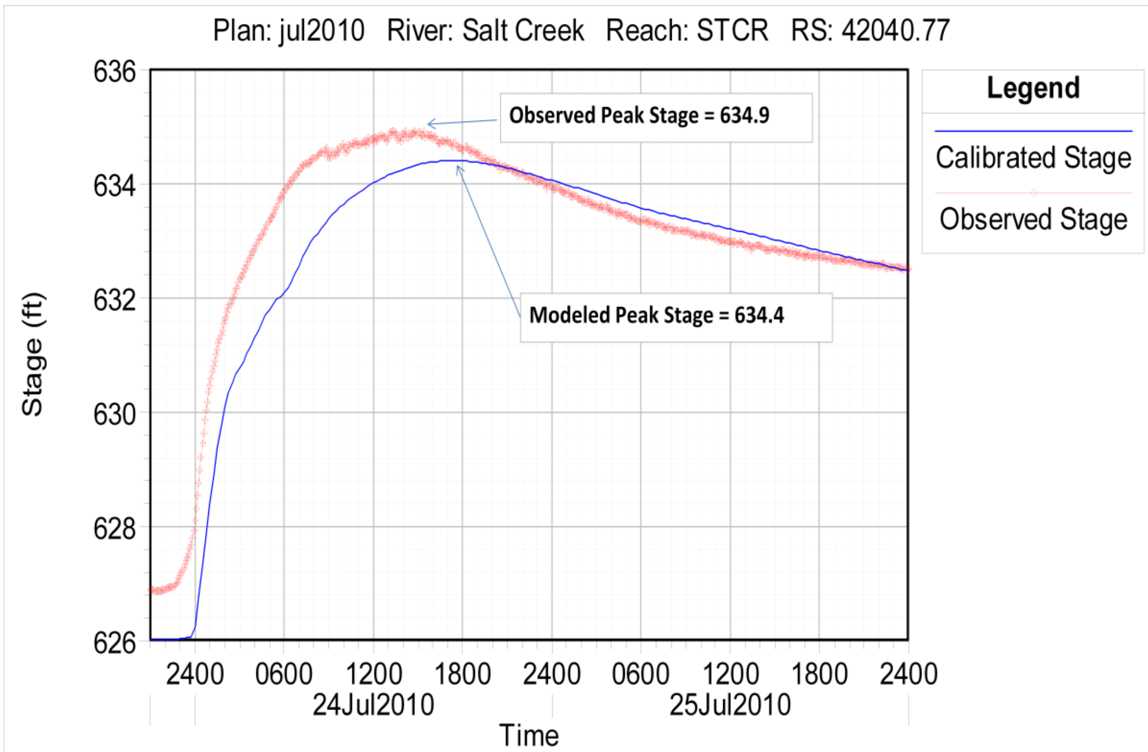
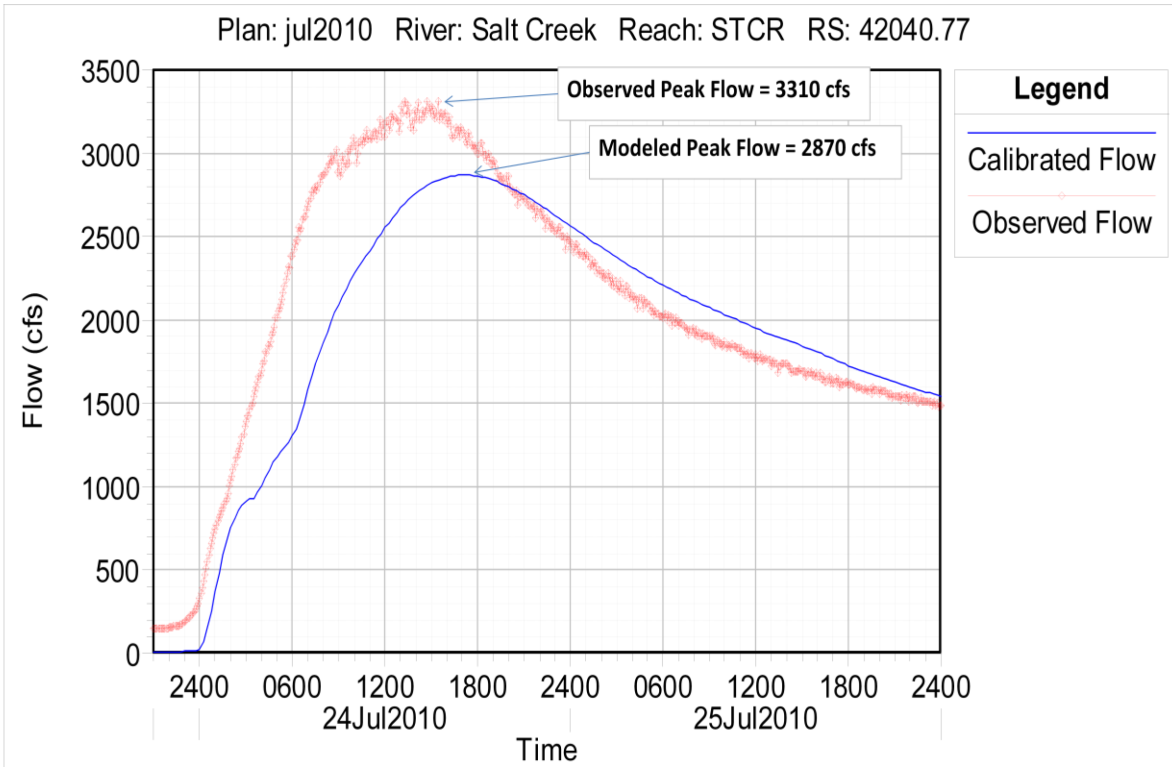


Figure 3.14.8 shows the resulting peak flow at HEC-RAS cross section 42040.77 is within 13% of peak gage flow. Figure 3.14.8 also shows the computed volume is within 8%. The verification storm event meets the same District specifications as the calibration event.

FIGURE 3.14.8
Salt Creek Flow Comparison at Wolf Road for the July 2010 Storm Event



3.14.2.4 Existing Conditions Evaluation

Flood Inundation Areas. Figure 3.14.1 shows inundation areas in the Salt Creek Subwatershed produced by the DWP's hydraulic model for the 100-year, 72-hour duration design storm, which was determined to be the critical duration storm event. Over 87% of the Salt Creek watershed is upstream of Wolf Road, therefore the timing of the peak flows from this area will greatly impact the critical duration of the study area.

Hydraulic Profiles. Appendix H contains existing conditions hydraulic profiles for Salt Creek and its tributaries. Profiles are shown for the 2-, 5-, 10-, 25-, 50-, 100-, and 500-year recurrence interval design storms.

3.14.3 Development and Evaluation of Alternatives

3.14.3.1 Problem Definition

Hydraulic model results were reviewed with inundation mapping and Form B questionnaire response data to identify locations where property damage due to overbank flooding is predicted. Table 3.14.9 summarizes additional regional problem areas identified through hydraulic modeling of Salt Creek.

TABLE 3.14.9
Modeled Problem Definition for Salt Creek

Problem Area ID[1]	Location	Recurrence Interval (yr) of Flooding	Associated Form B[2]	Resolution in DWP	No. of Structures Flooded
BF-FR-01	Near Forest Avenue and 30th Street	100	N	STCR-1234 or STCR 5	5
BF-FR-02	Near Prairie Avenue and Washington Avenue	25, 50, 100	N	STCR-1234 or STCR-5	21
BF-FR-03	Near Custer Avenue and Southview Avenue	25, 50, 100	N	STCR-1234 or STCR-5	25

[1] All Problem Area IDs begin with DP-STCR- as they are in the Des Plaines River – Salt Creek Subwatershed.
[2] Although no Form B was submitted for these problem areas, Village of Brookfield staff verified the location and extent of the problem areas.

3.14.3.2 Damage Assessment

Economic damages were defined following the protocol outlined in Chapter 6.6 of the CCSMP. Recreation damages due to flooding are not being identified as part of the DWP. No erosion damages due to flooding were identified for Salt Creek. Transportation damages were estimated as 15 percent of property damages. Table 3.14.10 lists the existing estimated average annual damages for Salt Creek.

TABLE 3.14.10
Estimated Average Annual Damages for Salt Creek

Damage Category	Estimated Average Annual Damage ($)	Description
Property	336,820	Includes structure and content damage for residential and non-residential structures
Erosion	0	No critical erosion damages were identified
Transportation	50,523	Assumed as 15% of property damage

3.14.3.3 Technology Screening

Flood control technologies were screened to identify those most appropriate for addressing the flooding problems in the Subwatershed. Increased conveyance, storage, or floodwalls were identified as the principal technologies applicable for addressing stormwater problems in Salt Creek. The feasibility of the technologies defined in Chapter 6.6 of the CCSMP is summarized for each alternative in Table 3.14.11.

TABLE 3.14.11
Technology Screening for Salt Creek

Technology	Feasibility for BF-FR-01 (Near Forest Avenue and 30th Street)
Storage Facility	Feasible – open space available on Village of Brookfield property north of Village Hall
Conveyance Improvement – Culvert/Bridge Replacement	Not Feasible – culvert/bridge not the source of problem
Conveyance Improvement – Channel Improvement	Feasible – will require flood control reservoir for mitigation storage
Conveyance Improvement – Diversion	Not Feasible
Flood Barriers, Levees/Floodwalls	Feasible – consider west side of Salt Creek, will require mitigation storage
Technology	**Feasibility for BF-FR-02 (Near Prairie Avenue and Washington Avenue)**
Storage Facility	Feasible – open space available on Village of Brookfield property north of Village Hall
Conveyance Improvement – Culvert/Bridge Replacement	Not Feasible – culvert/bridge not the source of problem
Conveyance Improvement – Channel Improvement	Feasible – will require flood control reservoir for mitigation storage
Conveyance Improvement – Diversion	Not Feasible
Flood Barriers, Levees/Floodwalls	Feasible – consider west side of Salt Creek, will require mitigation storage
Technology	**Feasibility for BF-FR-03 (Near Custer Avenue and Southview Avenue)**
Storage Facility	Feasible – open space available on Village of Brookfield property north of Village Hall
Conveyance Improvement – Culvert/Bridge Replacement	Not Feasible – culvert/bridge not the source of problem
Conveyance Improvement – Channel Improvement	Feasible – will require flood control reservoir for mitigation storage
Conveyance Improvement – Diversion	Not Feasible
Flood Barriers, Levees/Floodwalls	Feasible – consider east side of Salt Creek, will require mitigation storage

3.14.3.4 Alternative Development

Flood Control Alternatives. Alternatives solutions to regional flooding were developed and evaluated consistent with the methodology described in Section 1.4 of this report. Table 3.14.12 summarizes flood control alternatives for the Salt Creek Subwatershed.

TABLE 3.14.12
Flood Control Alternatives for Salt Creek

Alternative	Addressed Problem Area IDs	Location	Description
STCR-1234	BF-FR-01 BF-FR-02 BF-FR-03	Brookfield, Lyons	*Channel Improvements:* Channel improvements from the diversion structure north of 31st Street to the confluence with Des Plaines River. Construction of an 85 A-F flood control reservoir on vacant 10 acre parcel north of Brookfield Village Hall.
STCR-5	BF-FR-01 BF-FR-02 BF-FR-03	Brookfield, Lyons	*Floodwalls:* Floodwalls at regional problem area locations between the diversion structure north of 31st Street and the confluence with Des Plaines River. Channel improvements and enlarged flood control reservoir from STCR 1234, the reservoir will have 160 A-F of flood storage volume.

Regional problems identified in the study area involve overbank flooding into residential neighborhoods. Channel improvements, floodwalls, and stormwater detention alternatives were evaluated to address regional flooding problems along Salt Creek. For channel improvement alternatives, a storage element is required due to increased conveyance and lowered elevations in the area of interest .Stormwater storage is also required for floodwalls to compensate for lost storage and increases in water surface elevations due to the proposed project.

Alternative STCR-1234 aimed to reduce water surface elevations for all three regional problem areas. The channel of Salt Creek is well defined through this reach; however, there is debris within the channel and significant trees and underbrush growth adjacent to the channel. Removal of the debris within the channel, including sediment removal near bridges, and clearing of the undergrowth and non-native trees adjacent to the channel will reduce the water surface elevations along this reach. An 85 acre-feet flood control reservoir with gravity outlet will be required along with the channel improvements to effectively reduce the water surface elevations and flows within this reach. The flood control reservoir would be located on approximately 10 acres of vacant land north of the Brookfield Village Hall, on property owned by the Village of Brookfield.

Alternative STCR-5 evaluated the use of a series of floodwalls located adjacent to Salt Creek to reduce the risk of overbank flooding to residential structures. Floodwalls will be constructed between the creek and the residential neighborhoods which back up to the creek throughout Brookfield and Lyons. For regional problem area BF-FR-01, a floodwall would be constructed that is approximately 3,115 feet long ranging in height from one foot to five feet above existing ground elevation, just north of 31st Street on the west side of Salt Creek. The northern half of this floodwall is constructed outside of the inundation area but is needed to provide three feet of freeboard above the 100-year water surface profile. All floodwall heights above existing ground elevation include three feet of freeboard above the 100-year water surface profile. For regional problem area BF-FR-02, a floodwall would be constructed that is approximately 2,100 feet long ranging in height from three feet to nine feet above existing ground elevation. Only the northernmost 200 feet of this floodwall is less than seven feet high. For regional problem area BF-FR-03, a floodwall would be constructed that is approximately 2,465 feet long ranging in height from 1 foot to 12 feet above existing ground elevation. The northernmost 500 feet averages four feet above existing ground elevation while the remainder of the floodwall averages nine feet above existing ground elevation. The channel improvements and flood control reservoir described in alternative STCR-1234 will also be part of this alternative. The reservoir would provide approximately 160 acre-feet of storage volume in the 10 acre vacant parcel located north of Brookfield Village Hall. Because of the flood control reservoir depth, dewatering by a pump station would be required.

Erosion Control Alternatives. No regional erosion problem areas were reported; therefore, alternatives were not developed for the Salt Creek Subwatershed.

3.14.3.5 Alternative Evaluation and Selection

Alternatives listed in Table 3.14.12 were evaluated to determine their effectiveness and to produce data for the countywide prioritization of Subwatershed projects. Flood control alternatives were modeled to evaluate their impact on water surface elevations and flood damages. Table 3.14.15 provides a summary B/C ratio, net benefits, total project costs, number of structures protected, and other relevant alternative data.

STCR-1234. Channel improvements lower water surface profiles and reduce flood damages, but do not eliminate damages. STCR-1234 includes an 85 A-F reservoir along with the channel improvements. Alternative STCR-1234 was modeled and resulted in reduced stage along the waterway but is not recommended because it does not eliminate significant amount of damages.

Table 3.14.13 compares the peak modeled water surface elevation and flow for Alternative STCR-1234.

TABLE 3.14.13
Salt Creek Existing and Alternative Condition STCR-1234 Flow and WSEL Comparison

Location (BF-FR-01)	Station	Existing Conditions		STCR-1234	
		Max WSEL (ft)	Max Flow (cfs)	Max WSEL (ft)	Max Flow (cfs)
Between diversion structure and 31st Street	11778.9	618.7	2831	618.4	2829
Between diversion structure and 31st Street	10629.5	618.5	2842	618.2	2840
Between diversion structure and 31st Street	9439.641	618.2	2854	617.8	2850
Location (BF-FR-02)	**Station**	**Existing Conditions**		**STCR-1234**	
		Max WSEL (ft)	**Max Flow (cfs)**	**Max WSEL (ft)**	**Max Flow (cfs)**
Between 31st Street and Brookfield Avenue	8872.167	618.0	2857	617.6	2853
Between 31st Street and Brookfield Avenue	7303.83	617.4	2871	617.1	2865
Between 31st Street and Brookfield Avenue	6330.059	616.9	2882	616.5	2875
Between 31st Street and Brookfield Avenue	4811.5	616.4	2897	616.1	2889
Between 31st Street and Brookfield Avenue	3543.278	615.8	2908	615.5	2901
Location (BF-FR-03)	**Station**	**Existing Conditions**		**STCR-1234**	
		Max WSEL (ft)	**Max Flow (cfs)**	**Max WSEL (ft)**	**Max Flow (cfs)**
From Brookfield Avenue to confluence with Des Plaines River	3383.10	615.3	2903	615.1	2902
From Brookfield Avenue to confluence with Des Plaines River	1908.79	614.0	3077	613.7	3051
From Brookfield Avenue to confluence with Des Plaines River	917.946	612.6	3176	612.0	3129
From Brookfield Avenue to confluence with Des Plaines River	468.8499	611.5	-------	611.5	------

STCR 5. STCR-5 provides floodwalls along Salt Creek as well as the channel improvements and reservoir from STCR-1234, with the reservoir enlarged to 162 A-F. This alternative results in a reduction in damages from the floodwall construction. 50 structures are removed from the 100-year inundation area by alternative STCR-5. Alternative STCR-5 is therefore recommended because it eliminates damages to all but three residential structures currently in the 100-year inundation area in Brookfield. Table 3.14.14 compares the peak modeled water surface elevation and flow for Alternative STCR-5.

TABLE 3.14.14
Salt Creek Existing and Alternative Condition STCR-5 Flow and WSEL Comparison

Location (BF-FR-01)	Station	Existing Conditions		STCR-5	
		Max WSEL (ft)	Max Flow (cfs)	Max WSEL (ft)	Max Flow (cfs)
Between diversion structure and 31st Street	11778.9	618.7	2831	618.5	2802
Between diversion structure and 31st Street	10629.5	618.5	2842	618.3	2811
Between diversion structure and 31st Street	9439.641	618.2	2854	617.9	2821
Location (BF-FR-02)	**Station**	**Existing Conditions**		**STCR-5**	
		Max WSEL (ft)	**Max Flow (cfs)**	**Max WSEL (ft)**	**Max Flow (cfs)**
Between 31st Street and Brookfield Avenue	8872.167	618.0	2857	617.7	2824
Between 31st Street and Brookfield Avenue	7303.83	617.4	2871	617.3	2835
Between 31st Street and Brookfield Avenue	6330.059	616.9	2882	616.8	2844
Between 31st Street and Brookfield Avenue	4811.5	616.4	2897	616.2	2857
Between 31st Street and Brookfield Avenue	3543.278	615.8	2908	615.7	2867
Location (BF-FR-03)	**Station**	**Existing Conditions**		**STCR-5**	
		Max WSEL (ft)	**Max Flow (cfs)**	**Max WSEL (ft)**	**Max Flow (cfs)**
From Brookfield Avenue to confluence with Des Plaines River	3383.10	615.3	2903	615.3	2902
From Brookfield Avenue to confluence with Des Plaines River	1908.79	614.0	3077	613.7	3009
From Brookfield Avenue to confluence with Des Plaines River	917.946	612.6	3176	612.0	3083
From Brookfield Avenue to confluence with Des Plaines River	468.8499	611.5	------	611.5	------

A number of properties are at risk of shallow flooding during the 100-year flood event under existing conditions or recommended alternatives. In addition, due to their locations, other properties' risk of flooding cannot be feasibly mitigated by structural measures. Such properties are candidates for protection using nonstructural flood control measures, such as flood-proofing or acquisition. These measures may be considered to address damages that are not fully addressed by capital projects recommended in the Lower Des Plaines River DWP.

Hydraulic modeling results identified no roadway crossings (state route, US highway, or four-lane road or greater) where Salt Creek overtops for storm events of 100-year recurrence interval by a depth greater than 0.5 feet.

3.14.3.6 Data Required for Countywide Prioritization of Watershed Projects

Appendix I presents conceptual level cost estimates for the recommended alternatives. Table 3.14.12 lists alternatives analyzed in detail as part of the DWP development.

The recommended alternative for Salt Creek is alternatives STCR-5. Alternative STCR-5 is recommended because it removes the most structures from the 100-year inundation area.

Figures 3.14.9 and 3.14.10 show the locations and a summary of the proposed and recommended alternatives described in Table 3.14.15. Figures 3.14.9 and 3.14.10 also show comparisons of the existing condition and alternative condition inundation areas.

TABLE 3.14.15
Salt Creek Project Alternative Matrix to Support District CIP Prioritization

Alternative ID	Description	B/C Ratio	Net Benefits ($)	Total Project Cost ($)	Cumulative Structures Removed from 100-year Inundation	Roadways Protected	Water Quality Benefit	Recom-mended	Communities Involved
STCR-1234	Channel Improvements and Mitigation Storage	0.1	1,525,502	11,864,497	5	N/A	Positive	N	Brookfield, Lyons
STCR-5	Floodwalls and STCR-1234	0.2	7,179,906	39,964,011	50	N/A	Positive	Y	Brookfield, Lyons

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3.15 Silver Creek

The Silver Creek Subwatershed measures approximately 11.1 square miles in area, is located in both Cook and DuPage Counties, and is tributary to the Des Plaines River. The watershed includes the southwest portion of the O'Hare International Airport (O'Hare) and includes portions of the Village of Bensenville, City of Chicago, Leyden Township, Town of Northlake, Village of Melrose Park, and the Village of Franklin Park within Cook County. Portions of the Village of Bensenville, Town of Wood Dale, and the City of Chicago are located within DuPage County and are also tributary to the watershed where the creek is commonly referred to as Bensenville Ditch. The Silver Creek Subwatershed within Cook County is 8.3 square miles.

The subwatershed contains 2 flood control reservoirs: the Silver Creek Reservoir (Structure 102) located in Leyden Township and the Jack B. Williams Reservoir (Structure 106) located in the Village of Franklin Park. The Silver Creek headwaters originate south of Irving Park Road in DuPage County and flows east through the Village of Bensenville crossing York Road and eventually into O'Hare property. The creek then flows southeast crossing Irving Park Road and intersecting the control structure for Structure 102. The creek and outflow from Structure 102 then turn east along the Godfrey Railroad Yard where it enters a long twin box culvert entering into the Village of Franklin Park. The creek then traverses in a southeast direction through urbanized areas eventually meeting its confluence with the Des Plaines River.

TABLE 3.15.1
Communities Draining to Silver Creek

Community	Tributary Area (mi^2)
Chicago	0.7
Bensenville	0.2
Franklin Park	2.8
Leyden Township	2.0
Maywood	0.1
Melrose Park	2.0
Northlake	0.4
Schiller Park	<0.05
Stone Park	<0.05
Unincorporated Cook County	0.1
TOTAL	8.3

Note: This list includes community areas tributary to Silver Creek within the 8.3 square mile study area in Cook County. It does not include upstream tributary areas in DuPage County.

TABLE 3.15.2
Land Use Distribution for Silver Creek within Cook County

Land Use Category	Area (acres)	%
Residential	2289	43.2
Commercial/Industrial	1930	36.4
Forest/Open Land	36	0.7
Institutional	193	3.6
Transportation/Utility	673	12.7
Water/Wetland	181	3.4
Agricultural	0	0

Source: Chicago Metropolitan Agency for Planning's 2005 Land Use Inventory for Cook, DuPage, Kane, Kendall, Lake, McHenry and Will Counties, Illinois. Version 1.0. Published January 2009

Figure 3.15.1 shows the areas directly tributary to Silver Creek. Table 3.15.1 lists the communities located in areas directly tributary to the Silver Creek Subwatershed. Reported stormwater problem areas, flood inundation areas, and proposed alternative projects are also shown and discussed in the following subsections. Table 3.15.2 lists the land use breakdown by area within the Silver Creek Subwatershed.

3.15.1 Sources of Data

3.15.1.1 Previous Studies

Hydrologic and hydraulic analyses of the Silver Creek Subwatershed were previously prepared by various consulting engineers and governmental agencies in the mid-1970's. The hydrologic modeling was performed by using Regional Equations (RE73 and RE75) and TR-20. Hydraulic modeling was completed using the WSP-2 modeling application. Additional studies completed after the development of the original FIS are summarized below.

- A hydrologic and hydraulic analysis was completed by the Village of Bensenville in August 1980 to develop the municipality FIS data. The analysis was performed from Irving Park (west of York Road) through the Village limits. This analysis is entirely within DuPage County.
- IDNR developed an alternative analysis to address flooding and future channel improvements on Silver Creek in DuPage County. The Strategic Planning Study for Flood Control was completed in December 1987.
- IDOT-OWR and an engineering consultant created HEC-1 and HEC-2 models to evaluate channel improvements within the Village of Bensenville and City of Chicago. This study was completed in March 1993.
- A FEMA LOMR was completed for the channel improvements completed as part of the March 1993 study. The FEMA LOMR was completed in 1996.
- The City of Chicago received an IDNR-OWR Floodway Construction Permit for the relocation of Silver Creek as part of the O'Hare Modernization Program in January 2008. The relocation is located near the DuPage-Cook County border. The relocated creek alignment and revised watershed boundaries were used as an existing condition for the Lower Des Plaines River DWP.
- The USACE completed a study in March 2008 for the entire Silver Creek Subwatershed. This modeling was also used as an existing condition for the Lower Des Plaines River DWP.

3.15.1.2 Water Quality Data

There are no District or IEPA water quality monitoring stations in the Silver Creek Subwatershed. The IEPA's 2010 *Integrated Water Quality Report*, which includes the CWA 303(d) and 305(b) lists, lists no impaired waterways within the subwatershed. While included in the watershed area for the *Des Plaines River/Higgins Creek Watershed TMDL Stage 1 Report*, March 2009, no TMDLs have been investigated for Silver Creek or its tributaries.

According to the water permit discharge data provided by the USEPA and IEPA, there are no NPDES permits issued by IEPA for discharges to Silver Creek. Municipalities discharging to Silver Creek are regulated by IEPA's NPDES Phase II Stormwater Permit Program, which was instituted to improve water quality by requiring that municipalities develop six minimum measure controls for limiting runoff pollution to receiving systems.

3.15.1.3 Wetland and Riparian Areas

Figures 2.3.6 and 2.3.7 contain mapping of wetland and riparian areas in the Lower Des Plaines Watershed. Wetland areas were identified using NWI mapping. NWI data includes roughly 70 acres of wetland areas in the Silver Creek Subwatershed. Riparian areas are defined as vegetated areas between aquatic and upland ecosystems adjacent to a waterway or body of water that provides flood management, habitat, and water quality enhancement. Identified riparian environments offer potential opportunities for restoration.

3.15.1.4 Floodplain Mapping

Flood inundation areas supporting the NFIP were revised in 2008 as part of the FEMA's Map Modernization Program. As part of the new mapping, floodplain boundaries were revised based upon updated Cook County topographic information; however, the hydrologic and hydraulic computer models, which are used to estimate flood levels, were not updated. LOMRs were incorporated into revised floodplain areas. Silver Creek is mapped in detail in the DFIRM mapping update, with Zone A and AE floodplain within Cook County. As previously noted, the original hydrologic and hydraulic analyses were performed in the mid-1970's. Appendix A includes a comparison of FEMA's effective floodplain mapping from updated DFIRM panels with inundation areas developed for the DWP.

3.15.1.5 Stormwater Problem Data

Starting in the 3rd quarter of 2007, communities, agencies (e.g., IDOT, CCHD), and stakeholders submitted Form B questionnaire response data to the District summarizing known stormwater problems within their jurisdictions. The questionnaires were requested again by the District following the September 2008 storm event. Table 3.15.3 summarizes reported problem areas reviewed as a part of the DWP development. Problems are classified in Table 3.15.3 as regional or local. This classification is based on a process described in Section 1 of this report. The Problem Area ID naming convention was found in Technical Memorandum entitled, "Proposed Naming Conventions for Database Elements" dated August 3, 2007.

TABLE 3.15.3
Community Response Data for Silver Creek

Problem Area ID[1,3]	Municipality	Problems as Reported by Local Agency	Location	Problem Description	Local/ Regional	Resolution in DWP
LE-FL-01 LE-FL-02 LE-FL-03	Leyden Township	Street, Yard, and Basement Flooding	Throughout Township	Flooding during moderate to medium rains or snow melt	Local	This is a local problem.[2]
LE-FR-01 LE-FR-02	Leyden Township	Street, Yard, and Basement Flooding	Between Fullerton Avenue and Armitage Avenue	Flooding during moderate to medium rains or snow melt	Regional	SLCR-1, SLCR-2, SLCR-3
LE-FR-03 LE-FR-04	Leyden Township	Street, Yard, and Basement Flooding	Between Grand Avenue and Mannheim Avenue	Flooding during moderate to medium rains or snow melt	Regional	SLCR-1, SLCR-2
LE-FR-05 LE-FR-06	Leyden Township	Street, Yard, and Basement Flooding	Between Belmont Ave and Grand Avenue	Flooding during moderate to medium rains or snow melt	Regional	SLCR-1, SLCR-2
FP-FL-01 FP-FL-02 FP-SM-01	Franklin Park	Street and Structure Flooding	Between I-294 and Franklin Avenue	Flooding occurs in events greater than 25-year	Local	This is a local problem.[2]
FP-FL-03	Franklin Park	Street Flooding	Mannheim Ave from Belmont Avenue to Grand Avenue	Reported by IDOT, last incident 8/31/01	Local	This is a local problem.[2]
FP-FR-01	Franklin Park	Street, Yard, and Basement Flooding	Lee Street south of Belmont Avenue	Homes subject to frequent flooding due to insufficient capacity.	Regional	SLCR-1, SLCR-2
FP-FR-02	Franklin Park	Structural Failure and Flooding of Residents	Riverside Drive near Structure 106	Failing and Undersized Culvert	Regional	SLCR-1, SLCR-2, SCLR-3
MW-FL-01	Maywood	Insufficient Capacity	1st Avenue	Backwater from Des Plaines River	Local	This is a local problem.[2]

TABLE 3.15.3
Community Response Data for Silver Creek

Problem Area ID[1,3]	Municipality	Problems as Reported by Local Agency	Location	Problem Description	Local/ Regional	Resolution in DWP
MR-FL-01	Melrose Park	Erosion	From 14th Avenue to 1st Avenue	Eroding Streambank	Local	This is a local problem.[2]
MR-ER-01	Melrose Park	Pavement Flooding	North Avenue at IHB Railroad	Pavement Flooding, insufficient storm sewer capacity	Local	This is a local problem.[2]

[1] All Problem Area IDs begin with DP-SLCR- as they are in the Des Plaines River – Silver Creek Subwatershed.
[2] Problem does not meet regional definition (refer to chapter 1). Solutions for the local problems are not addressed in the DWP.
[3]These problem areas were identified prior to the June and July 2010 storm events.

3.15.1.6 Near Term Planned Projects

Activities on O'Hare associated with the OMP will be ongoing until at least 2014. Current conditions on O'Hare were modeled as part of this study, including the revised tributary area taken out of Silver Creek as a result of the O'Hare Modernization Plan improvements Significant projects will be started in 2011 including the relocation of Irving Park Road, the final alignment of Bensenville Ditch, and the relocation of the Union Pacific Railroad. These projects, along with the construction of Runway 10R/28L will further reduce the watershed area of Silver Creek. No near-term planned major flood control projects to be constructed by others were identified for the Silver Creek Subwatershed. As reported by the Village of Franklin Park, the proposed Elgin-O'Hare West Bypass may include additional detention storage to address some local flooding problems in the Village's industrial area.

3.15.2 Watershed Analysis

3.15.2.1 Hydrologic Model Development

Subbasin Delineation. The Silver Creek tributary area was delineated based upon 2003 LiDAR topographic data developed by Cook County. There are 23 subbasins ranging in size from 0.06 to 0.80 square miles with a total drainage area of 11.1 square miles (within DuPage and Cook County). Subbasins within DuPage County and outside of O'Hare used available 2-foot topography. Interbasin flow from Addison Creek is conveyed to Silver Creek during the 100-year critical duration storm event. Approximately 40 cfs is conveyed to Silver Creek upstream of 25th Avenue.

Hydrologic Parameter Calculations. CN values were estimated for each subbasin based upon NRCS soil data and 2001 CMAP land use data. This method is further described in Section 1.3.2, with lookup values for specific combinations of land use and soil data presented in Appendix C. An area-weighted average of the CN was generated for each subbasin.

Clark's unit hydrograph parameters were estimated using the method described in Section 1.3.2. Appendix G provides a summary of the hydrologic parameters used for subbasins in each subwatershed.

3.15.2.2 Hydraulic Model Development

Field Data, Investigation, and Existing Model Data. The FEMA effective hydraulic model was developed in the mid-1970s using WSP-2. Several updates to this model have occurred since its development. The HEC-RAS model created by the USACE in February 2007 was used as the background information for the hydraulic modeling.

Field survey was performed by D.B. Sterlin Inc. in early 2009 under the protocol of FEMA's *Guidelines and Specifications for Flood Hazard Mapping partners, Appendix A: Guidance for Aerial Mapping and Surveying*. D.B. Sterlin Inc. verified invert elevations of the control structures of Structures 102 and 106 and verified the culvert geometry and invert elevations of structures located upstream of North Avenue .

HEC-GeoRAS cross-sections extracted from the TIN created in GIS from the 2003 Cook County LiDAR topographic data were imported into HEC-RAS. The channel geometry information from the USACE 2007 HEC-RAS hydraulic model and the channel field survey were incorporated into these GIS created cross sections.

Field visits were performed to assess channel and overbank roughness characteristics at several locations along Silver Creek. The information gathered in the field was compared to photographs and aerial photography to review and determine Manning's *n* roughness coefficients for the unsteady HEC-RAS hydraulic model.

Boundary Conditions. The downstream boundary condition for the Silver Creek Subwatershed is the 5-year water surface elevation for the Des Plaines River.

The upstream boundary condition for the Silver Creek Subwatershed is a HEC-HMS generated hydrograph of the approximately 2.8 square miles of tributary area to the DuPage-Cook County border.

3.15.2.3 Calibration and Verification

There are no stream flow gages located within the Silver Creek Subwatershed; however, observed HWM elevations associated with the September 13-14, 2008 storm event were obtained from the IDNR-OWR. These HWMs were used to verify the hydrologic and hydraulic modeling and help determine a CUH storage coefficient, R, which best fit the watershed. Verification was achieved by multiplying R by a factor of 1.88 for the Silver Creek subbasins in the HEC-HMS hydrologic model.

The July 23-24, 2010 storm event was also run as a verification storm. The storm event was run in HEC-RAS and results were similar to the existing 50-year storm event water surface profile throughout the subwatershed.

3.15.2.4 Existing Conditions Evaluation

Flood Inundation Areas. Figure 3.15.1 shows inundation areas in the Silver Creek Subwatershed produced by the DWP's hydraulic model for the 100-year, 48-hour duration design storm, which was determined to be the critical duration storm event.

Hydraulic Profiles. Appendix H contains existing conditions hydraulic profiles for Silver Creek. Profiles are shown for the 2-, 5-, 10-, 25-, 50-, 100-, and 500-year recurrence interval design storms.

3.15.3 Development and Evaluation of Alternatives

3.15.3.1 Problem Definition

Hydraulic model results were reviewed with inundation mapping and Form B questionnaire response data to identify locations where property damage due to overbank flooding is predicted. Table 3.15.4 summarizes additional regional problem areas identified through hydraulic modeling of Silver Creek.

TABLE 3.15.4
Modeled Problem Definition for Silver Creek

Problem Area ID[1]	Location	Recurrence Interval (yr) of Flooding	Associated Form B	Resolution in DWP	No. of Structures Flooded[2,3]
CH-FR-01	Irving Park Road	10, 25,50, 100	N	SLCR-5	N/A
FP-FR-03	Scott Street and Grand Ave	100	N	SLCR-1, SLCR-2, SLCR-3	19
FP-FR-04	Manor Drive and Sarah Street	10, 25, 50, 100	N	SLCR-1, SLCR-2, SLCR-3	57
FP-FR-05	Richard Ave and Westbrook Ave	25, 50, 100	N	SLCR-1, SLCR-2, SLCR-3	191
MR-FR-01	Ruby Avenue Industrial Park south of Armitage Ave	50, 100	N	SLCR-1, SLCR-2, SLCR-3	7
MR-FR-02	North Avenue and 19th Ave	25, 50, 100	N	SLCR-1, SLCR-2, SLCR-3	5
MR-FR-03	Le Moyne Ave and 19th Place	50, 100	N	SLCR-1, SLCR-2, SLCR-3	32

[1] All Problem Area IDs begin with DP-SLCR- as they are in the Des Plaines River – Silver Creek Subwatershed.
[2] The number of structures is an approximation per problem area as most problem areas within the subwatershed overlap.
[3]Structures flooded represent modeled problem areas only. Additional structures are flooded as part of reported regional problem areas.

3.15.3.2 Damage Assessment

Economic damages were defined following the protocol outlined in Chapter 6.6 of the CCSMP. Recreation damages due to flooding are not being identified as part of the DWP.

No critical erosion damages due to flooding were identified for Silver Creek. Transportation damages were estimated as 15 percent of property damages plus regional transportation damages associated with North Avenue, Mannheim Road, and Irving Park Road. Table 3.15.5 lists the existing estimated average annual damages for Silver Creek.

TABLE 3.15.5
Estimated Average Annual Damages for Silver Creek

Damage Category	Estimated Average Annual Damage ($)	Description
Property	565,309	Includes structures and contents damage for residential and non-residential structures
Erosion	0	No critical erosion damages were identified
Transportation	96,567	Assumed as 15% of property damage plus regional transportation damages

3.15.3.3 Technology Screening

Flood control technologies were screened to identify those most appropriate for addressing the flooding problems in the Subwatershed. Storage was identified as the principal technology applicable for addressing stormwater problems in Silver Creek; however, open public parcels are extremely limited throughout the subwatershed. There are several regional stormwater problems located throughout the subwatershed. Instead of discussing each problem area, Table 3.15.6 will summarize screening for broader areas within the watershed.

TABLE 3.15.6
Technology Screening for Silver Creek

Technology	Feasibility for Belmont Avenue to Mannheim Avenue LE-FR-03 to 06, FP-FR-01
Storage Facility	Feasible – No public open spaces are located within this corridor. However, as of June 2010 several industrial parcels were available for purchase. Only increases in the level of protection can be obtained without significant property acquisition.
Conveyance Improvement – Culvert/Bridge Replacement	Feasible – Restrictive culverts upstream of Grand Ave. Must be combined with storage alternative.
Conveyance Improvement – Channel Improvement	Not Feasible – Channel corridor is too narrow. Structure/property purchase would be necessary to improve conveyance.
Flood Barriers, Levees/Floodwalls	Not Feasible – Lack of open space to compensate for overbank flood storage.
Technology	**Feasibility for Mannheim Avenue to Armitage Avenue LE-FR-01 to 02, FP-FR-02 to 05**
Storage Facility	Feasible – No public open spaces are located within this corridor. However, expansion of Structure 106 utilizing vertical walls is possible. Only increases in the level of protection can be obtained without significant property acquisition.
Conveyance Improvement – Culvert/Bridge Replacement	Feasible – Two structures downstream of Structure 106 are undersized

Conveyance Improvement – Channel Improvement	Not Feasible – Channel corridor is too narrow. Structure/property purchase would be necessary to improve conveyance.
Flood Barriers, Levees/Floodwalls	Not Feasible – Lack of open space to compensate for overbank flood storage.

Technology	Feasibility for Armitage Avenue to North Avenue MR-FR-01 to 03
Storage Facility	Not Feasible – No public open spaces are located within this corridor.
Conveyance Improvement – Culvert/Bridge Replacement	Not Feasible – Culvert/bridge not the source of problem.
Conveyance Improvement – Channel Improvement	Not Feasible – Channel corridor is too narrow. Structure/property purchase would be necessary to improve conveyance.
Flood Barriers, Levees/Floodwalls	Not Feasible – Lack of open space to compensate for overbank flood storage.

3.15.3.4 Alternative Development

Flood Control Alternatives. Alternative solutions to regional flooding were developed and evaluated consistent with the methodology described in Section 1.4 of this report. Table 3.15.7 summarizes flood control alternatives for the Silver Creek Subwatershed.

TABLE 3.15.7
Flood Control Alternatives for Silver Creek

Alternative	Addressed Problem Area IDs	Location	Description
SLCR-1	LE-FR-01-06 FP-FR-01-05 MR-FR-01-03	Leyden Township	*Reservoir:* Expand Structure 102 to provide an additional approximately 250 A-F on For-Sale property to the east.
SLCR-2	LE-FR-01-06 FP-FR-01-05 MR-FR-01-03	Leyden Township, Franklin Park	*Reservoir:* Including SLCR-1, create two basins on For-Sale Industrial parcels located adjacent to creek. Both basins would provide approximately 230 A-F.
SLCR-3	LE-FR-01-06 FP-FR-01-05 MR-FR-01-03	Leyden Township, Franklin Park	*Conveyance Improvement and Reservoir:* Including SLCR-1 and SLCR- 2, expand Structure 106 via vertical walls to provide an additional approximately 200 A-F. Also replace two culverts at Riverside Drive and Louis Street.
SLCR-4	LE-FR-01-02 MR-FR-01	Melrose Park	*Conveyance Improvement:* Remove sediment downstream of triple 12 feet x 12feet RCBC to provide temporary benefits upstream.
SLCR-5	CH-FR-01	Chicago	*Conveyance Improvement:* Raise Irving Park Road and increase culvert size

Regional problems identified in the study area involve overbank flooding into residential neighborhoods. Conveyance improvements and flood control volume alternatives were evaluated to address regional flooding problems along Silver Creek. For channel improvement alternatives, a storage element is required due to increased conveyance and lowered elevations in the area of interest, but increased water surface elevations and flows downstream. Alternatives SLCR-1, SLCR-2, and SLCR-3 are cumulative and illustrate the need for additional flood storage to eliminate or reduce regional problem areas within the subwatershed.

Alternative SLCR-1 serves to reduce water surface elevations and flowrates for all regional problems downstream of Structure 102. The expansion of the Structure 102 Flood Control Reservoir will provide an additional approximately 250 A-F to increase the capacity of the flood control reservoir to just below the 100-year storm event. The basin will be grassed with 3:1 side slopes and be approximately 25 feet deep. The existing pump station will be utilized to evacuate the additional volume. The effectiveness of this alternative is reduced because a significant amount of tributary area (approx. 1.3 square miles) from the Godfrey Railroad and a Village of Franklin Park Industrial Park (between Interstate 294 and Franklin Avenue) enters the creek upstream of the regional problem areas in Franklin Park and Leyden Township. This alternative will provide an increased level of protection for all regional problem areas located downstream; however, no regional problems will be removed completely.

Alternative SLCR-2 utilizes two industrial parcels currently for sale (as of June 2010). Each parcel will be excavated approximately 40 feet deep with 3:1 side slopes. A pump station will be required for each reservoir. Since there is little open space within the watershed, private property is necessary to provide flood storage for the subwatershed. These parcels will provide approximately 230 A-F (3.8 acre parcel – 80 A-F, 6.2 acre parcel – 150 A-F) of flood storage. This alternative will provide an increased level of protection for all regional problem areas located downstream. Only structures associated with regional problem area FP-FR-04 would be removed from the 100-year inundation area.

Alternative SLCR-3 will expand the capacity of the Structure 106 Flood Control Reservoir by approximately 200 A-F by incorporating vertical walls. The existing pump station will be utilized to evacuate the additional volume. Culvert crossings at Riverside Drive and Louis Street would be replaced with single cell 10 feet wide x 5 feet high RCBC to provide capacity similar to the existing channel. This alternative will provide an increased level of protection for all regional problem areas located downstream; however, no regional problems will be removed completely. As an alternate site for expansion of Structure 106, the property located adjacent to the north of the reservoir was considered; however, based on discussions with local officials, the site was eliminated since it was occupied by a major commercial retailer. It should be noted that the site could provide a significant opportunity for storage to address flooding along Silver Creek if it were to become available.

Alternative SLCR-4 will remove accumulated sediment downstream of a triple 12 feet high x 12 feet wide RCBC, upstream of North Avenue. The removal of this sediment will provide temporary upstream reductions in water surface elevations by 0.2-0.5 feet. Annual maintenance should be provided to prevent this siltation from re-occurring in the future. Replacement of the smaller twin 8 feet Corrugated Metal Arch Pipe located immediately downstream is not feasible since it is located under an existing industrial building.

Alternative SLCR-5 will raise Irving Park Road to elevation 651 feet and replace the existing culvert with a triple 11 feet wide x 5 feet high RCBC. Irving Park Road currently overtops during events greater than a 5-year recurrence interval. This alternative will eliminate frequent overtopping; therefore, eliminating regional problem area CH-FR-01.

Erosion Control Alternatives. No regional erosion problem areas were reported; therefore, alternatives were not developed for the Silver Creek Subwatershed.

3.15.3.5 Alternative Evaluation and Selection

Alternatives listed in Table 3.15.7 were evaluated to determine their effectiveness and to produce data for the countywide prioritization of subwatershed projects. Flood control alternatives were modeled to evaluate their impact on water surface elevations and flood damages. Table 3.4.12 provides a summary B/C ratio, net benefits, total project costs, number of structures protected, and other relevant alternative data.

SLCR-1. The expanded reservoir will decrease downstream water surface profiles and flowrates; therefore, reducing flood damages. SLCR-1 includes the expansion of Structure 102 by approximately 250 A-F. Alternative SLCR-1 was modeled and resulted in reduced stage along the waterway

Table 3.15.8 compares the peak water surface elevation and flow for Alternative SLCR-1.

TABLE 3.15.8
Silver Creek Existing and Alternative Condition SLCR-1 Flow and WSEL Comparison

Location Belmont Avenue to Mannheim Road	Station	Existing Conditions		Alternative SLCR-1	
		Max WSEL (ft)	Max Flow (cfs)	Max WSEL (ft)	Max Flow (cfs)
Downstream of Belmont Avenue	26417.32	644.7	780	644.5	554
Upstream of Grand Avenue	24477.44	643.9	789	643.0	571
Upstream of Granville Avenue	23522.82	641.8	797	641.3	578
Location Mannheim Road to Armitage Avenue	**Station**	**Existing Conditions**		**Alternative SLCR-1**	
		Max WSEL (ft)	**Max Flow (cfs)**	**Max WSEL (ft)**	**Max Flow (cfs)**
Downstream of Mannheim Road	21454.8	641.0	1005	640.8	758
Upstream of Scott Street	16921.8	635.8	1048	635.5	795
Downstream of Fullerton Avenue	15229.46	634.4	1039	633.7	794
Upstream of Armitage Avenue	13162.37	633.8	1071	633.1	849

Location Armitage Avenue to North Avenue	Station	Existing Conditions		Alternative SLCR-1	
		Max WSEL (ft)	Max Flow (cfs)	Max WSEL (ft)	Max Flow (cfs)
Downstream of Armitage Avenue	11788.51	633.2	1129	632.5	939
Upstream of North Avenue	8940.12	629.4	1218	629.1	1055
Downstream of North Avenue	7979.07	629.2	1269	628.5	1135

SLCR-2. Two reservoirs will be combined with the expanded reservoir in Alternative SLCR-1 to provide an additional approximately 230 A-F of floodplain storage. The Village of Franklin Park is considering purchasing the vacant parcels to secure them as floodwater storage sites. The additional storage will decrease downstream water surface profiles and flowrates; therefore, reducing flood damages. Alternative SLCR-2 was modeled and resulted in reduced stage along the waterway. Table 3.15.9 compares the peak modeled water surface elevation and flow for Alternative SLCR-2.

TABLE 3.15.9
Silver Creek Existing and Alternative Condition SLCR-2 Flow and WSEL Comparison

Location Belmont Avenue to Mannheim Road	Station	Existing Conditions		Alternative SLCR-2	
		Max WSEL (ft)	Max Flow (cfs)	Max WSEL (ft)	Max Flow (cfs)
Downstream of Belmont Avenue	26417.32	644.7	780	644.2	425
Upstream of Grand Avenue	24477.44	643.9	789	642.2	408
Upstream of Granville Avenue	23522.82	641.8	797	641.1	423
Location Mannheim Road to Armitage Avenue	**Station**	**Existing Conditions**		**Alternative SLCR-2**	
		Max WSEL (ft)	**Max Flow (cfs)**	**Max WSEL (ft)**	**Max Flow (cfs)**
Downstream of Mannheim Road	21454.8	641.0	1005	640.6	662
Upstream of Scott Street	16921.8	635.8	1048	635.2	670
Downstream of Fullerton Avenue	15229.46	634.4	1039	633.4	680
Upstream of Armitage Avenue	13162.37	633.8	1071	632.9	723
Location Armitage Avenue to North Avenue	**Station**	**Existing Conditions**		**Alternative SLCR-2**	
		Max WSEL (ft)	**Max Flow (cfs)**	**Max WSEL (ft)**	**Max Flow (cfs)**
Downstream of Armitage Avenue	11788.51	633.2	1129	631.7	790
U/S North Avenue	8940.12	629.4	1218	628.6	897
D/S North Avenue	7979.07	629.2	1269	627.6	955

SLCR-3. Alternative SLCR-3 will be combined Alternatives SLCR-1 and SLCR-2 to provide additional storage in the subwatershed. Alternative SLCR-3 will expand Structure 106 by approximately 200 A-F by incorporating vertical walls. The alternative will also replace two restrictive culverts located downstream of Structure 106. The expanded reservoir will decrease downstream water surface profiles and flowrates; therefore, reducing flood damages. Alternative SLCR-3 was modeled and resulted in reduced stages and flowrates along the waterway. Table 3.15.10 compares the peak modeled water surface elevation and flow for Alternative SLCR-3.

TABLE 3.15.10
Silver Creek Existing and Alternative Condition SLCR 3 Flow and WSEL Comparison

Location Belmont Avenue to Mannheim Road (FP-FR-01, LE-FR-03-06)	Station	Existing Conditions		Alternative SLCR-3	
		Max WSEL (ft)	Max Flow (cfs)	Max WSEL (ft)	Max Flow (cfs)
Downstream of Belmont Avenue	26417.32	644.7	780	644.3	423
Upstream of Grand Avenue	24477.44	643.9	789	642.3	420
Upstream of Granville Avenue	23522.82	641.8	797	641.3	415
Location Mannheim Road to Armitage Avenue (LE-FR-01 to 02, FP-FR-02 to 05)	**Station**	**Existing Conditions**		**Alternative SLCR-3**	
		Max WSEL (ft)	**Max Flow (cfs)**	**Max WSEL (ft)**	**Max Flow (cfs)**
Downstream of Mannheim Road	21454.8	641.0	1005	641.0	483
Upstream of Scott Street	16921.8	635.8	1048	634.4	571
Downstream of Fullerton Avenue	15229.46	634.4	1039	632.9	569
Upstream of Armitage Avenue	13162.37	633.8	1071	632.2	590
Location Armitage Avenue to North Avenue (MR-FR-01 to 03)	**Station**	**Existing Conditions**		**Alternative SLCR-3**	
		Max WSEL (ft)	**Max Flow (cfs)**	**Max WSEL (ft)**	**Max Flow (cfs)**
Downstream of Armitage Avenue	11788.51	633.2	1129	630.6	623
Upstream of North Avenue	8940.12	629.4	1218	628.2	673
Downstream of North Avenue	7979.07	629.2	1269	626.3	712

SLCR-4. This alternative removes accumulated silt downstream of a triple box culvert in the Village of Melrose Park. This alternative was modeled and results estimated a decrease in the 100-year water surface elevation in the range of 0.2-0.5 feet. Since the downstream culvert has substantially less waterway opening area (432 square feet compared to 203 square feet) silt will continue to accumulate after the initial silt is removed; therefore, any benefits from this alternative are considered temporary and no B/C ratio was determined. Replacement of the smaller downstream culvert was not considered as it is located beneath a currently occupied industrial warehouse.

SLCR-5. This alternative evaluated the raising of Irving Park Road (elevated to a minimum of 0.5 feet above the 100-year flood profile) to eliminate frequent overtopping of a critical road crossing. The road will be raised and the existing culvert will be replaced as to not cause upstream water surface impacts greater than 0.1 feet. This will also eliminate traffic congestion due to overbank flooding during storm events between the 25-year and 100-year storm and eliminate the need for a 10-mile detour to the north. The OMP will be relocating a section of Irving Park Road west of this location to approximately York Road. This project is due to let in 2011 and coordination with the City of Chicago and/or the Illinois Department of Transportation may be required depending on timeframes of this alternative and OMP relocation.

A number of properties are at risk of shallow flooding during the 100-year flood event under existing conditions or recommended alternatives. In addition, due to their locations, other properties' risk of flooding cannot be feasibly mitigated by structural measures. Such properties are candidates for protection using nonstructural flood control measures, such as flood-proofing or acquisition. These measures may be considered to address damages that are not fully addressed by capital projects recommended in the Lower Des Plaines River DWP.

Hydraulic modeling identified three regional roadway crossings where Silver Creek overtops for the 100-year recurrence interval by a depth greater than 0.5 feet. Two of these regional roadway flooding problems (Mannheim Avenue and North Avenue) are addressed as part of Alternatives SLCR-1, SLCR-2, and SLCR-3. Overtopping at the third critical roadway (Irving Park Road) is reduced as part of Alternative SLCR-5. Table 3.15.11 summarizes the effects of individual alternatives on critical roadway overtopping.

TABLE 3.15.11
Silver Creek Subwatershed Road Overtopping Summary

Road Crossing	Road Elevation	25-yr Depth of Flooding	50-yr Depth of Flooding	100-yr Depth of Flooding
Mannheim Road	640.0	0.5’	0.6’	1.0’
Mannheim Road (with SLCR-1)	640.0	0.5’	0.6’	0.8’
Mannheim Road (with SLCR-2)	640.0	0.2’	0.4’	0.6’
Mannheim Road (with SLCR-3)	640.0	0.2’	0.3’	1.0’
North Avenue	628.0	0.1’	0.5’	1.4’
North Avenue (with SLCR-1)	628.0	0.1’	0.5’	1.1’
North Avenue (with SLCR-2)	628.0	-	-	0.6’
North Avenue (with SLCR-3)	628.0	-	-	0.2’
Irving Park Road	648.0	0.7’	1.1’	2.3’
Irving Park Road (with SLCR-5)	651.0	-	-	-

Note: Blank entry indicates that road crossing does not overtop for that particular storm event.

3.15.3.6 Data Required for Countywide Prioritization of Watershed Projects

Appendix I presents conceptual level cost estimates for the proposed alternatives. Table 3.15.7 lists alternatives analyzed in detail as part of the DWP development.

The recommended alternative for Silver Creek is Alternative SLCR-2. Alternative SLCR-2 is recommended because it removes 269 structures from the 100-year floodplain and has the highest B/C ratio. Alternative SLCR-5 is also recommended to address the regional roadway flooding of Irving Park Road.

Figures 3.15.2 through 3.15.6 show the locations and a summary of the proposed and recommended alternatives described in Table 3.15.12. Figures 3.15.2 through 3.15.6 also show comparisons of the existing condition and alternative condition inundation areas.

TABLE 3.15.12
Silver Creek Project Alternative Matrix to Support District CIP Prioritization

Alternative ID	Description	B/C Ratio	Net Benefits ($)	Total Project Cost ($)	Cumulative Structures Removed from 100-year Inundation[1]	Roadways Protected	Water Quality Benefit	Recom-mended	Communities Involved
SLCR-1	Reservoir	0.1	2,053,569	21,171,664	204	0	Positive	N	Melrose Park, Franklin Park, Leyden Township
SLCR-2	Reservoir	0.2	10,415,557	51,501,231	269	0	Positive	Y	Melrose Park, Franklin Park, Leyden Township
SLCR-3	Reservoir	0.1	11,168,866	116,511,266	342	1	Positive	N	Melrose Park, Franklin Park, Leyden Township
SLCR-4	Stream Maintenance	N/A	N/A	N/A	N/A	N/A	No Impact	N	Melrose Park, Franklin Park, Leyden Township
SLCR 5	Roadway	0.06	239,448	3,944,629	0	1	No Impact	Y	City of Chicago

[1]Structures removed from 100-year Inundation include regional and modeled problem areas.

3.16 Weller Creek

TABLE 3.16.1
Communities Draining to Weller Creek

Community	Tributary Area (mi^2)
Arlington Heights	8.33
Des Plaines	3.63
Mount Prospect	5.36
Palatine	0.04
Prospect Heights	0.11
Rolling Meadows	0.69
Unincorporated Cook County	0.57
Total	18.73

The Weller Creek Subwatershed measures approximately 19 square miles and is located north of O'Hare International Airport mainly within the Village of Mount Prospect and the Village of Arlington Heights. The watershed contains 4 flood control reservoir sites: Clearwater Park, Crumley, Wilke-Kirchoff (Basins I and II), and the Mount Prospect Flood Control Reservoir. The creek originates downstream of Central Road and flows south to the Mount Prospect Golf Course where it turns east towards Elmhurst Road and continues east to Mount Prospect Road. The creek then flows south under Golf Road where there is a USGS stream gage. The creek then flows east under a railroad crossing where it enters a long culvert and continues south of a subdivision. An old/overflow channel with a significantly higher invert than the existing main channel begins just downstream of the railroad and flows northeast and then south to join the main channel west of Northwest Highway. The main channel continues east and splits at a triple box culvert crossing west of Rand Road. The main channel flows southeast to its confluence with the Des Plaines River while the diversion channel is conveyed in a long culvert to the northeast to its outlet with the Des Plaines River.

Figure 3.16.1 shows the areas directly tributary to Weller Creek. Table 3.16.1 lists the communities located in areas directly tributary to the Weller Creek Subwatershed. Most of the surface runoff in the subwatershed is collected by municipal storm sewers and combined sewer systems and conveyed to Weller Creek or District treatment facilities. There is very little surface runoff directed to Weller Creek in open channels. Figure 3.16.1 shows an overview of the tributary area of the subwatershed. Reported stormwater problem areas, flood inundation areas, and proposed alternative projects are also shown and discussed in the following subsections. Table 3.16.2 lists the land use breakdown by area within the Weller Creek Subwatershed.

TABLE 3.16.2
Land Use Distribution for Weller Creek within Cook County

Land Use Category	Area (acres)	%
Residential	8,515	71.0
Commercial/Industrial	1,616	13.5
Forest/Open Land	702	5.9
Institutional	814	6.8
Transportation/Utility	209	1.7
Water/Wetland	134	1.1
Agricultural	0	0

Source: Chicago Metropolitan Agency for Planning's 2005 Land Use Inventory for Cook, DuPage, Kane, Kendall, Lake, McHenry and Will Counties, Illinois. Version 1.0. Published January 2009

3.16.1 Sources of Data

3.16.1.1 Previous Studies

In 1980, the FEMA completed a hydrologic and hydraulic study of Weller Creek within the City of Des Plaines as part of the Des Plaines FIS. In 2005, CTE (Consoer, Townsend, Envirodyne Engineering Inc.) performed a restudy of the Weller Creek Subwatershed which included incorporating Bulletin 70 rainfall into the HEC-1 hydrologic model and iterative Modified Puls channel routing with the prepared HEC-RAS hydraulic model. The CTE restudy included several projects completed by INDR, the USACE, and the District; however, it did not include Basin II of the Wilke-Kirchoff Flood Control Reservoir, which is included in the DWP analysis. In 2006, the ISWS performed a floodway analysis based on the 2004 Cook County topographic mapping which included a datum adjustment from NAVD 1929 to NGVD 1988.

3.16.1.2 Water Quality Data

There are no District or IEPA water quality monitoring stations within the DWP study area in the Weller Creek subwatershed.

The IEPA's 2010 *Integrated Water Quality Report*, which includes the CWA 303(d) and 305(b) lists, lists no impaired waterways within the subwatershed. While included in the watershed area for the *Des Plaines River/Higgins Creek Watershed TMDL Stage 1 Report*, March 2009, no TMDLs have been investigated for Weller Creek or its tributaries.

NPDES point source discharges within the Weller Creek subwatershed are listed in Table 3.16.3. In addition to the point source discharges listed, municipalities discharging to Weller Creek are regulated by IEPA's NPDES Phase II Stormwater Permit Program, which was instituted to improve water quality by requiring that municipalities develop six minimum measure controls for limiting runoff pollution to receiving systems.

TABLE 3.16.3
Point Source Discharges in the Weller Creek Subwatershed

Name	NPDES	Community	Receiving Waterway
UOP LLC-DesPlaines	IL0048119	Des Plaines	Weller Creek

3.16.1.3 Wetland and Riparian Areas

Figures 2.3.6 and 2.3.7 contain mapping of wetland and riparian areas in the Lower Des Plaines River Watershed. Wetland areas were identified using NWI mapping. NWI data includes roughly 76 acres of wetland areas in the Weller Creek Subwatershed. Riparian areas are defined as vegetated areas between aquatic and upland ecosystems adjacent to a waterway or body of water that provides flood management, habitat, and water quality enhancement. Identified riparian environments offer potential opportunities for restoration.

3.16.1.4 Floodplain Mapping

Flood inundation areas supporting the NFIP were revised in 2008 as a part of FEMA's Map Modernization Program. Floodplain boundaries were revised based upon updated Cook

County topographic information. Modifications to the 2005 CTE hydrologic analysis for Weller Creek were completed for inclusion into the 2008 Cook County FIS. The modifications to the 2005 CTE hydrologic modeling include a floodway analysis and remapping of the 2005 study based on the 2004 Cook County topographic mapping.

Weller Creek is mapped in detail in the DFIRM mapping update, with Zone AE floodplain shown across the length of Weller Creek. Appendix A includes a comparison of FEMA's effective floodplain mapping from updated DFIRM panels with inundation areas developed for the DWP.

3.16.1.5 Stormwater Problem Data

Starting in the 3rd quarter of 2007, communities, agencies (e.g., IDOT, CCHD), and stakeholders submitted Form B questionnaire response data to the District summarizing known stormwater problems within their jurisdictions. The questionnaires were requested again by the District following the September 2008 storm event. Table 3.16.4 summarizes reported problem areas reviewed as a part of the DWP development. Problems are classified in Table 3.16.4 as regional or local. This classification is based on a process described in Section 1 of this report. The Problem Area ID naming convention was found in Technical Memorandum entitled, "Proposed Naming Conventions for Database Elements" dated August 3, 2007.

TABLE 3.16.4
Community Response Data for Weller Creek

Problem Area ID	Municipality	Problems as Reported by Local Agency	Location	Problem Description	Local/ Regional	Resolution in DWP
WECR-AH-FL-01	Arlington Heights	Pavement and/or Residential Flooding	Between Magnolia Street and Noyes	Home and/or road flooding during September 2008 event	Local	This is a local problem.[2]
WECR-AH-FL-02	Arlington Heights	Pavement and/or Residential Flooding	North of Central Road between Dryden Place and Arthur Avenue	Home and/or road flooding during September 2008 event	Local	This is a local problem.[2]
WECR-AH-FL-03	Arlington Heights	Pavement and/or Residential Flooding	South of Euclid Avenue and Rolling Lane	Home and/or road flooding during September 2008 event	Local	This is a local problem.[2]
WECR-AH-FL-04	Arlington Heights	Pavement and/or Residential Flooding	Regency Drive west of Peachtree Land north of Kensington Road	Home and/or road flooding during September 2008 event	Local	This is a local problem.[2]
WECR-AH-FL-05	Arlington Heights	Pavement and/or Residential Flooding	Regency Drive east, north of Kensington Road	Home and/or road flooding during September 2008 event	Local	This is a local problem.[2]

TABLE 3.16.4
Community Response Data for Weller Creek

Problem Area ID	Municipality	Problems as Reported by Local Agency	Location	Problem Description	Local/ Regional	Resolution in DWP
WECR-AH-FL-06	Arlington Heights	Pavement Flooding	Vail Avenue and White Oak Street	Cypress Basin	Local	This is a local problem.[2]
WECR-AH-FL-07	Arlington Heights	Pavement Flooding	US Route 14 at Euclid Avenue to Ridge Avenue	Reported by IDOT: Last incident 03/01/97	Local	This is a local problem.[2]
WECR-CD-SM-01	CCHD	Bridge Debris	Structure #016-3051,	Single span bridge with debris and partially silted at north abutment	Local	This is a local problem.[2]
WECR-DP-FL-01	Des Plaines	Pavement Flooding	US Route 12 at Miner Street to Ballard Road	Reported by IDOT: Last incident 05/30/06	Local	This is a local problem.[2]
WECR-DP-FL-02	Des Plaines	Pavement Flooding	US Route 14 west of Graceland Avenue	Reported by IDOT: Last incident 08/28/08	Local	This is a local problem.[2]
WECR-DP-FL-03	Des Plaines	Drainage Investigation	Illinois Route 58 at C&NW RR (Wolf Road)	Reported by IDOT: Drainage Investigation completed. Not implemented	Local	This is a local problem.[2]
WECR-DP-FR-03	Des Plaines	Pavement Flooding	US Route 12 at River Road to Golf Road	Reported by IDOT: Last incident 10/17/06	Local	This is a local problem.[2]
WECR-DP-SM-01	Des Plaines	Stream Maintenance	Near Seegers and Rand Road	Diversion structure/emergency overflow needs maintenance	Local	This is a local problem.[2]
WECR-MP-EL-01	Mount Prospect	Erosion	Busse Road and Central Road to Lincoln Street	Bank erosion and water odor problem	Local	This is a local problem.[2]
WECR-MP-FL-01	Mount Prospect	Future detention	Elmhurst Road and Council Trail	Possible location for future Park District detention	Local	This is a local problem.[2]

TABLE 3.16.4
Community Response Data for Weller Creek

Problem Area ID	Municipality	Problems as Reported by Local Agency	Location	Problem Description	Local/ Regional	Resolution in DWP
WECR-MP-FL-02	Mount Prospect	Structure Flooding	Busse Road and Lincoln Street	Flooding in basements and rear yards due to undersized storm sewer	Local	This is a local problem.[2]
WECR-MP-FL-03	Mount Prospect	Pavement Flooding	IL Route 83 at IL Route 62 to Dempster Street	Reported by IDOT: Last incident 08/22/02	Local	This is a local problem.[2]

[1] All Problem Area IDs begin with DP as they are in the Des Plaines River Watershed.[2] Problem does not meet regional definition (refer to chapter 1). Solutions for the local problems are not addressed in the DWP.

3.16.1.6 Near Termed Planned Projects

No near-term planned major flood control projects to be constructed by others were identified for the Weller Creek Subwatershed.

3.16.2 Watershed Analysis

3.16.2.1 Hydrologic Model Development

Subbasin Delineation. The CTE subbasin map was used as a template to delineate the subbasins on the based upon 2003 Cook County LiDAR topographic data developed by Cook County. There are 24 subbasins ranging in size from 0.04 to 4.05 square miles with a total drainage area of 18.73 square miles.

Hydrologic Parameter Calculations. The 2005 CTE HEC-1 hydrologic model was imported into HEC-HMS and debugged. CBBEL reviewed and revised the storage parameters of the Wilke-Kirchoff Flood Control Reservoir and the outlet control of the Crumley Flood Control Reservoir based on the Cook County 2-foot topographic mapping information provided by the City of Mount Prospect. The drainage area to Basin I and Basin II of the Wilke-Kirchoff Flood Control Reservoir and Subbasin WC2 were revised based on information provided by the Village of Arlington Heights. Many of the subwatersheds within the CTE hydrologic model have flow diversions to storm sewers, water reclamation plants, and the TARP system. These diversions were incorporated into the HEC-HMS hydraulic model based on the 2005 CTE HEC-1 hydrologic model.

CN values were estimated for each subbasin based upon NRCS soil data and 2001 CMAP land use data. This method is further described in Section 1.3.2, with lookup values for specific combinations of land use and soil data presented in Appendix C. An area-weighted average of the CN was generated for each subbasin.

Clark's unit hydrograph parameters were estimated using the method described in Section 1.3.2. Appendix G provides a summary of the hydrologic parameters used for subbasins in each subwatershed.

3.16.2.2 Hydraulic Model Development

Field Data, Investigation, and Existing Model Data. The existing 2005 CTE hydrologic and hydraulic models of Weller Creek met District criteria, as identified in Section 6.3.3.2 of the CCSMP, and was therefore used to support DWP development. The geometry of several cross-sections in the HEC-RAS hydraulic model were compared to the Cook County 2-foot topographic mapping. It was determined that there was a good correlation between the recent 2005 CTE cross-sections and the 2-foot topography; therefore, the channel geometry was incorporated into the cross-sections extracted through HEC-GeoRAS. Field visits and aerial photography were utilized to assess channel and overbank roughness characteristics along Weller Creek to verify the Manning's *n* roughness coefficients included in the hydraulic model.

Boundary Conditions. The downstream boundary condition for the Weller Creek Subwatershed is the 5-year water surface elevation for the Des Plaines River at its confluence with Weller Creek.

3.16.2.3 Calibration

Weller Creek has a USGS stream gage at Golf Road (USGS 05530000) that measures gage height. No HWM was available for the Weller Creek Subwatershed.

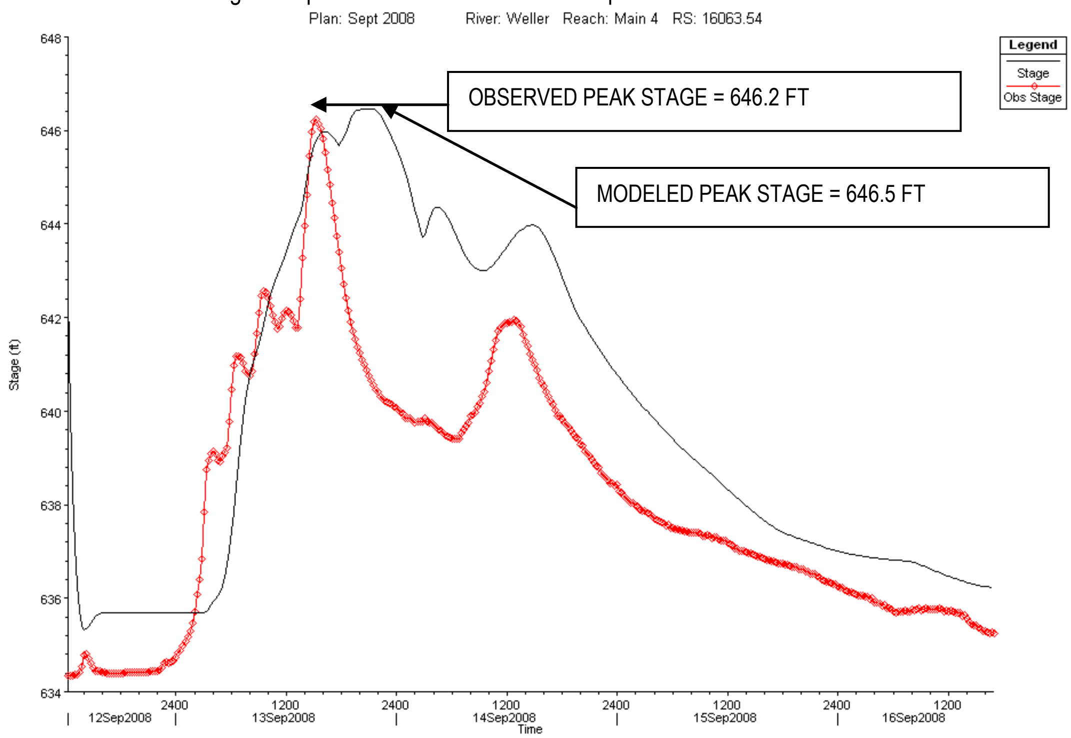
The Weller Creek HEC-HMS hydrologic model and unsteady HEC-RAS hydraulic models were calibrated to the September 13-14, 2008 storm event USGS stream gage at Golf Road. The calibration was achieved by multiplying the CUH storage coefficient, R, by a factor of 1.6 for all subbasins in the HEC-HMS hydrologic model.

The District calibration specifications for model calibration are 0.5 feet difference between observed and modeled water surface elevation, 30% difference in volume, and 30% difference in flow. All calibration specifications have been met for Weller Creek. The resulting peak water surface elevation at HEC-RAS cross-section 16063.54 is within 0.4 feet of peak gage water surface elevation, and the peak flowrate is within 13% of the peak gaged flowrate at Golf Road. The volume of the calibrated runoff hydrograph at Golf Road is approximately 13% less than the volume of the observed hydrograph for the September 13-14, 2008 storm event; however, this is because of the dip the hydrograph between multiple storm events and the loss in storage at the trailing end of the hydrograph.

Figure 3.16.2 shows the modeled peak water surface elevation at HEC-RAS cross-section 16063.54 (Golf Road) is within 0.4 feet of the observed peak stage elevation.

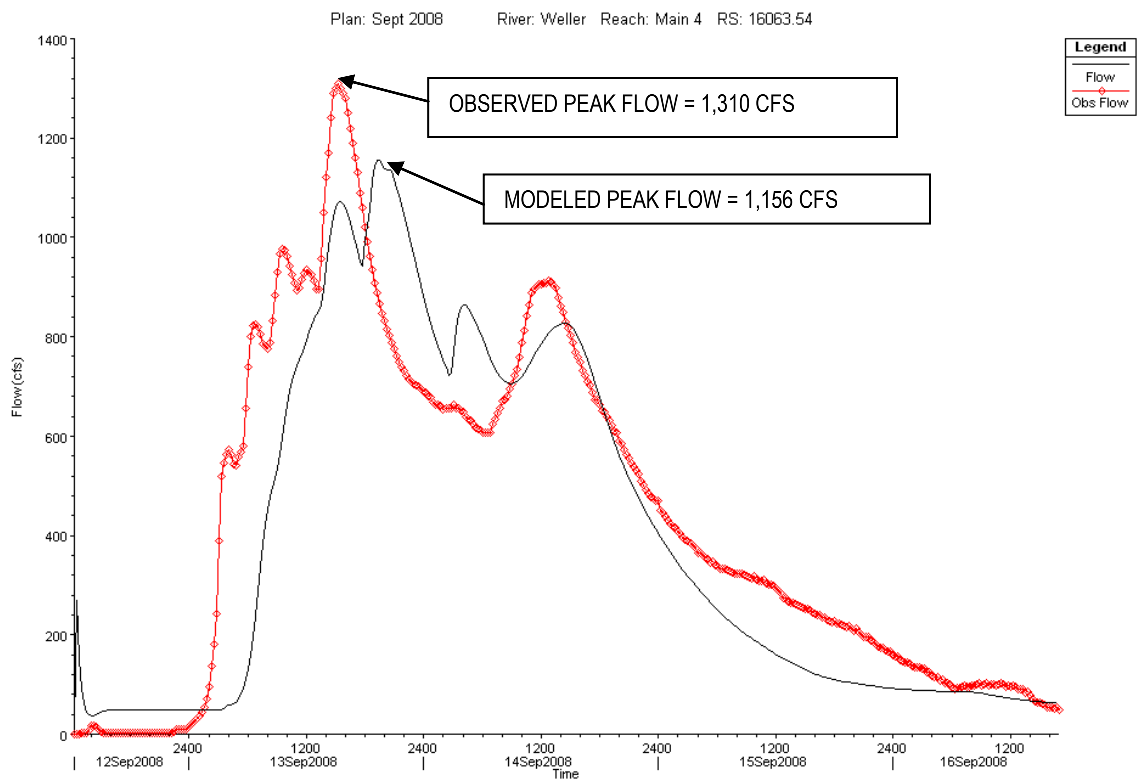
FIGURE 3.16.2

Stage Comparison at Golf Road for the September 2008 Storm Event



The peak flowrate of the unsteady HEC-RAS model at cross-section 16063.54 (Golf Road) is within 13% of the peak gaged flowrate as shown in Figure 3.16.3. Figure 3.16.3 also shows the computed volume is within 13%.

FIGURE 3.16.3
Flow Comparison at Golf Road for the September 2008 Storm Event



3.16.2.4 Existing Conditions Evaluation

Flood Inundation Areas. Figure 3.16.1 shows inundation areas in the Weller Creek Subwatershed produced by the DWP's hydraulic model for the 100-year, 48-hour critical duration design storm.

Hydraulic Profiles. Appendix H contains existing conditions hydraulic profiles for Weller Creek and its tributaries. Profiles are shown for the 2-, 5-, 10-, 25-, 50-, 100-, and 500-year recurrence interval design storms.

3.16.3 Development and Evaluation of Alternatives

3.16.3.1 Problem Definition

Hydraulic model results were reviewed with inundation mapping to identify locations where property damage due to flooding is predicted. Table 3.16.5 summarizes problem areas identified through hydraulic modeling of Weller Creek.

TABLE 3.16.5
Modeled Problem Definition for Weller Creek

Problem Area ID[1]	Location	Recurrence Interval (yr) of Flooding	Associated Form B	Resolution in DWP	Number of Structures Flooded
WECR-DP-FR-01	City of Des Plaines, Cumberland Parkway and East Washington Street		N	WECR-1	24
WECR-DP-FR-02	City of Des Plaines, Weller Creek Old Channel		N	WECR-1	24
WECR-DP-FR-04[2]	Des Plaines River Road at Miner Street		N	DPR-3A	N/A, transportation damage

[1] All Problem Area IDs begin with DP as they are in the Des Plaines River Watershed.
[2] Problem Areas due to Des Plaines River backwater.
[3] Addressed in MLDPR Subwatershed, see Section 3.6.

3.16.3.2 Damage Assessment

Economic damages were defined following the protocol defined in Chapter 6.6 of the CCSMP. Recreation damages due to flooding are not being identified as a part of the DWP. Transportation damages were estimated as 15 percent of property damages. Table 3.16.6 lists the damage assessment for existing conditions.

TABLE 3.16.6
Estimated Average Annual Damages for Weller Creek

Damage Category	Estimated Average Annual Damage ($)	Description
Property	5,419	Includes structure and contents damage for residential and non-residential structures
Erosion	0	No critical erosion damages were identified
Transportation	813	Assumed as 15% of property damage plus regional transportation damages

3.16.3.3 Technology Screening

Flood control technologies were screened to identify those most appropriate for addressing the flooding problems in the subwatershed. Increased conveyance and storage were identified as the principal technologies applicable for addressing stormwater problems in Weller Creek. The feasibility of the technologies defined in Chapter 6.6 of the CCSMP are summarized for each alternative in Table 3.16.7.

TABLE 3.16.7
Technology Screening for Weller Creek

Technology	Feasibility for DP-FR-01 and DP-FR-02 (Conveyance improvement and storage)
Storage Facility	Not Feasible – Vacant available land was park district property and would not be functional park district land if utilized for storage facilities
Conveyance Improvement – Culvert/Bridge Replacement	Feasible – Culvert addition
Conveyance Improvement – Channel Improvement	Not Feasible – Downstream culvert would still be restrictive and would not provide sufficient storage
Conveyance Improvement – Diversion	Not Feasible
Flood Barriers, Levees/Floodwalls	Not Feasible – Vacant land not available - adjacent homes in close proximity to Weller Creek Old Channel

3.16.3.4 Alternative Development

Flood Control Alternatives. Alternatives solutions to regional flooding and streambank erosion were developed and evaluated consistent with the methodology described in Section 1.4 of this report. Table 3.16.8 summarizes flood control alternatives for the Weller Creek Watershed.

TABLE 3.16.8
Flood Control Alternatives for Weller Creek

Alternative	Addressed Problem Area IDs	Location	Description
WECR-1	DP-FR-01, DP-FR-02	Des Plaines	*Culvert Addition:* Adjacent to existing culverts located south of Washington Street; Permanent Easements and flood wall downstream of the culvert addition.

Stormwater detention, channel and culvert improvement alternatives were evaluated to address regional flooding problems along Weller Creek. For all alternatives, a storage element or permanent easement acquisition is required in association with any channel and culvert improvements since the improvements would increase conveyance and lower elevations at the area of interest, but increase flows and water surface elevations downstream. Weller Creek is mainly contained within the channel banks and culverts except for overbank flooding along Old Weller Creek located west of Columbia Avenue, downstream of Golf Road and backwater due to the Des Plaines River (which is addressed in the Des Plaines River model). These flooding areas are located along the reaches in the Village of Mount Prospect and the City of Des Plaines in Cook County. Therefore, regulations and project goals stipulate that flood elevations and flowrates cannot increase on the waterway (unless easements are acquired), and storage volume is required to mitigate for all alternatives.

WECR-1 will address flood damages in the area of the Weller Creek Old Channel and downstream of Golf Road. The improvements include the installation of an additional 10 foot high by 15 foot wide RCBC adjacent to the existing twin 10 foot high by 13 foot wide RCBC which conveys Weller Creek under Wolf Road. An easement and flood wall will be required from the downstream end of the culverts to the Weller Creek Diversion due to slight increases in the flood profile. WECR-1 requires a pump station for the depressional area upstream (southwest) of Seegers Road the City of Des Plaines. The concept pump discharge alignment would collect the existing Weller Creek Old Channel tributary runoff and discharge into Weller Creek upstream of the railroad crossing southwest of the Northwest Highway crossing.

Erosion Control Alternatives. No regional erosion problems were reported within the Weller Creek Subwatershed; therefore, no erosion control alternatives were evaluated.

3.16.3.5 Alternative Evaluation and Selection

Alternatives listed in Table 3.16.9 were evaluated to determine their effectiveness and to produce data for the countywide prioritization of watershed projects. Flood control alternatives were modeled to evaluate their impact on water surface elevations and flood damages. Table 3.16.10 provides a summary B/C ratio, net benefits, total project costs, number of structures protected, and other relevant alternative data.

WECR-1. The conveyance increase project alone lowers water surface profiles and eliminates flood damages, but increases flood rates and elevations downstream. The improvements include the installation of an additional 10 foot high by 15 foot wide RCBC adjacent to the existing twin 10 foot high by 13 foot wide RCBC which conveys Weller Creek under Wolf Road. An easement and flood wall will be required from the downstream end of the culverts to the Weller Creek Diversion due to slight increases in the flood profile. WECR-1 requires a pump station for the depressional area upstream (southwest) of Seegers Road the City of Des Plaines. The concept pump discharge alignment would collect the existing Weller Creek Old Channel tributary runoff and discharge into Weller Creek upstream of the railroad crossing southwest of the Northwest Highway crossing.

Table 3.16.9 compares the peak modeled water surface elevation and flow for Alternative WECR-1.

TABLE 3.16.9
Weller Creek Existing and Alternative ConditionWECR-1 Flow and WSEL Comparison

Location	Station	Existing Conditions		WECR-1	
		Max WSEL (ft)	Max Flow (cfs)	Max WSEL (ft)	Max Flow (cfs)
Upstream of Elmhurst Road	23319	653.6	928	653.6	928
Upstream of Mt. Prospect Road	17548	647.2	1,083	646.7	1,061
Upstream of Washington Street	14446	645.5	1,254	644.2	1,289
Upstream of Seegers Road	10377	639.6	1,265	640.0	1,420

Note: Increase in water surface elevation to be contained in flood easement.

3.16.3.6 Data Required for Countywide Prioritization of Watershed Projects

Appendix I presents conceptual level cost estimates for the recommended alternative. Table 3.16.8 lists the alternative analyzed in detail as part of the DWP development.

The recommended alternative for Weller Creek is alternative WECR-1. Alternative WECR-1 is recommended because it removes all structures currently at risk of inundation by Weller Creek and the Weller Creek Old Channel.

Figure 3.16.5 shows the locations and a summary of the recommended alternative described in Table 3.16.10. Figure 3.16.5 also shows comparisons of the existing condition and alternative condition inundation areas.

TABLE 3.16.10
Weller Creek Project Alternative Matrix to Support District CIP Prioritization

Alternative ID	Description	B/C Ratio	Net Benefits ($)	Total Project Cost ($)	Structures removed from Inundation	Roadways Protected	Water Quality Benefit	Recom-mended	Communities Involved
WECR-1	Culvert addition, pump station, floodwall	0.01	115,918	10,659,963	24	0	No Impact	Y	Des Plaines

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3.17 Willow Creek

The Willow Creek Watershed measures approximately 20 square miles and is comprised of Willow Creek, Higgins Creek, Higgins Creek Tributary A, and Higgins Creek Tributary B within Cook County. The watershed, which contains the north portion of the O'Hare, includes portions of Unincorporated Cook County, City of Chicago, City of Des Plaines, Village of Rosemont, Village of Elk Grove Village, Village of Mount Prospect, and Village of Arlington Heights within Cook County. A portion of the Village of Bensenville and the City of Wood Dale within DuPage County are also tributary to the watershed. The Willow Creek Subwatershed tributary area in DuPage County is included in the hydrologic potion of this study, but is not studied in detail through hydraulic modeling. All references to the Willow Creek Subwatershed from this point forward refer to the approximately 15 square miles of study area in Cook County unless otherwise noted.

TABLE 3.17.1
Communities Draining to Willow Creek

Community	Tributary Area (mi^2)
Arlington Heights	0.47
Chicago	4.09
Des Plaines	2.07
Elk Grove Village	4.66
Mount Prospect	0.64
Rolling Meadows	0.01
Rosemont	0.94
Unincorporated Cook County	2.30
Total	15.18

Does not include tributary area in DuPage County.

The watershed contains 2 flood control reservoirs: the Willow Creek Flood Control Reservoir interconnected with the North Detention Basin within O'Hare, and the Touhy Avenue Flood Control Reservoir Cells 1 and 2.

Willow Creek enters Cook County at York Road west of O'Hare and is conveyed northeast to its confluence with Higgins Creek within O'Hare downstream of Mount Prospect Road. The headwaters of Higgins Creek originate in the Ned Brown Forest Preserve located west of Arlington Heights Road. Higgins Creek flows southeast on the north side of Interstate 90 to its confluence with Higgins Creek Tributary A west of Elmhurst Road. Higgins Creek continues flowing southeast and under Interstate 90 where it is conveyed through the Touhy Avenue Flood Control Reservoir corridor before its confluence with Willow Creek within O'Hare.

TABLE 3.17.2
Land Use Distribution for Willow Creek within Cook County

Land Use Category	Area (acres)	%
Residential	1,020	10.5
Commercial/Industrial	4,270	44.0
Forest/Open Land	562	5.8
Institutional	53	0.5
Transportation/Utility	3,300	34.0
Water/Wetland	445	4.6
Agricultural	64	0.6

Source: Chicago Metropolitan Agency for Planning's 2005 Land Use Inventory for Cook, DuPage, Kane, Kendall, Lake, McHenry and Will Counties, Illinois. Version 1.0. Published January 2009

Downstream of the confluence of Willow and Higgins Creeks, the creek is known as Willow Creek and is conveyed through the relocated reach completed for the Phase I OMP which includes the Willow Creek Flood Control Reservoir corridor. Willow Creek then continues to the southeast, through the Village of Rosemont where several channel improvement projects have been implemented, then to the Des Plaines River.

Figure 3.17.1 shows the areas directly tributary to Willow Creek. Table 3.17.1 lists the communities located in areas directly tributary to the Willow Creek Subwatershed. Areas directly tributary to Willow Creek in general are heavily drained by storm sewer systems.

Figure 3.17.1 shows an overview of the tributary area of the subwatershed. Reported stormwater problem areas, flood inundation areas, and proposed alternative projects are also shown and discussed in the following subsections. Table 3.17.2 lists the land use breakdown by area within the Willow Creek Subwatershed.

3.17.1 Sources of Data

3.17.1.1 Previous Studies

Several watershed analyses have been completed for the Willow Creek Watershed beginning in the 1960's, including the 1980 FIS for the Cities of Des Plaines and Chicago that included the Des Plaines River and its tributaries, the Structure 140 Flood Control Reservoir, and O'Hare improvements, Bensenville Improvements and various LOMRs. Most studies focused on the reach of Willow Creek from the Des Plaines River to Touhy Avenue. Background hydrologic modeling for the Willow Creek Subwatershed is comprised of the Phase I OMP TR-20 hydrologic model.

Several hydraulic models are available for the watershed including the 2007 LOMR incorporating the 2 flood control reservoirs, the 2005 CCHD Upper Des Plaines River Tributaries Hydrologic and Hydraulic Model Conversion of Willow-Higgins Creek Watershed, and the OMP Phase I Floodway Construction Permit for the Willow Higgins Creek Relocation. These models were utilized as background information for this subwatershed analysis.

3.17.1.2 Water Quality Data

Water quality for waterways within the Willow Creek Subwatershed is monitored by the District and the IEPA. The District is responsible for monitoring the water quality of the streams and canals within its jurisdiction, and has two water quality monitoring stations within the Willow Creek Subwatershed as listed in Table 3.17.3. Annual water quality summaries have been published by the District from 1976 through the present for the Higgins Creek stations.

TABLE 3.17.3
District Water Quality Monitoring Stations in the Willow Creek Subwatershed

Station ID	Waterbody	Location	Begin Date
WW_77	Higgins Creek	Elmhurst Road	1976
WW_78	Higgins Creek	Wille Road	1976

The IEPA monitors water quality data at one location within the DWP study area in the Willow Creek Subwatershed as part of the Ambient Water Quality Monitoring Network. Table 3.17.4 provides the location of the water quality monitoring station.

TABLE 3.17.4

IEPA Water Quality Monitoring Stations in the Willow Creek Subwatershed

Station ID	Waterbody
GO-01	Willow Creek

IEPA's 2010 *Integrated Water Quality Report*, which includes the CWA 303(d) and 305(b) lists, lists three segments within the DWP study area of the Willow Creek Subwatershed as impaired. Table 3.17.5 lists the 303(d) listed impairments.

TMDLs have been investigated for Willow Creek in the *Des Plaines River/Higgins Creek Watershed TMDL Stage 1 Report*, March 2009. The development of TMDLs is ongoing.

TABLE 3.17.5

IEPA Use Support Categorization and 303(d) Impairments in the Willow Subwatershed

Station ID	Waterbody	Impaired Designated Use	Potential Cause	Potential Source
IL_GO-01	Higgins Creek Tributary A[1]	Aquatic Life	Phosphorus (Total)	Urban Runoff/Storm Sewers
IL_GOA-01	Higgins Creek	Aquatic Life	Chloride, Fluoride, Zinc, Phosphorus (Total)	Urban Runoff/Storm Sewers, Combined Sewer Overflow
		Primary Contact Recreation	Fecal Coliform	Urban Runoff/Storm Sewers, Combined Sewer Overflow, Municipal Point Source Discharge
IL_GOA-02	Higgins Creek	Aquatic Life	Chloride, Dissolved Oxygen, Cause Unknown	Urban Runoff/Storm Sewers, Combined Sewer Overflow
		Primary Contact Recreation	Fecal Coliform	Urban Runoff/Storm Sewers, Combined Sewer Overflow, Municipal Point Source Discharge

[1] Listed as Willow Creek in 303(d) list but labeled as Higgins Creek Tributary A on the IEPA interactive map that shows the 2006 303(d) assessed streams.

NPDES point source discharges within the Willow Creek Subwatershed are listed in Table 3.17.6. In addition to the point source discharges listed, municipalities discharging to the Willow Creek Subwatershed are regulated by IEPA's NPDES Phase II Stormwater Permit Program, which was created to improve the water quality of stormwater runoff from urban areas, and requires that municipalities obtain permits for discharging stormwater and implement the six minimum control measures for limiting runoff pollution to receiving systems.

TABLE 3.17.6
Point Source Discharges in the Willow Creek Subwatershed

Name	NPDES	Community	Receiving Waterway
City of Chicago-JAWA WTRMN REL	ILG670044	Chicago	Willow Creek
CITGO Petroleum-Mt Prospect	IL0025461	Arlington Heights	Willow Creek
BP Products-O'Hare Terminal	IL0034347	Des Plaines	Willow Creek
PDV Midwest Refining-Mt Prospect	IL0042242	Mt. Prospect	Willow Creek
Equilon Enterprises-DesPlaines	IL0046736	Arlington Heights	Willow Creek
Touhy Mobile Home Park-Des Plaines	IL0049859	Des Plaines	Willow Creek
DesPlaines Mhp	IL0054160	Des Plaines	Willow Creek
Marathon Petroleum-Mt Prospect	IL0062791	Arlington Heights	Willow Creek
ExxonMobil Corp-DesPlaines	IL0066362	Arlington Heights	Willow Creek
Aircraft Services Interntl Grp	IL0066567	Chicago	Willow Creek
Illinois Tool Works	IL0068179	Elk Grove Village	Willow Creek
Turn-Key Forging&Design-Elk Grove	IL0076741	Elk Grove	Willow Creek
District Kirie WRP	IL0047741	Chicago	Willow Creek
Chicago O'Hare Intrnl Airport	IL0002283	Chicago	Willow Creek

Note: NPDES facilities were identified from the IEPA website at http://www.epa.state.il.us/water/permits/waste-water/npdes-statewide.pdf, and from the USEPA website at http://www.epa.gov/r5water/weca/pcs.htm.

3.17.1.3 Wetland and Riparian Areas

Figures 2.3.6 and 2.3.7 contain mapping of wetland and riparian areas in the Lower Des Plaines River Watershed. Wetland areas were identified using NWI mapping. NWI data includes roughly 184 acres of wetland areas in the Willow Creek Subwatershed. Riparian areas are defined as vegetated areas between aquatic and upland ecosystems adjacent to a waterway or body of water that provides flood management, habitat, and water quality enhancement. Identified riparian environments offer potential opportunities for restoration.

3.17.1.4 Floodplain Mapping

Flood inundation areas supporting the NFIP were revised in 2008 as a part of the FEMA's Map Modernization Program. Floodplain boundaries were revised based upon updated Cook County topographic information in some upstream reaches; however, the 2007 LOMR incorporating the Willow Creek and Touhy Avenue Flood Control Reservoirs is reflected in the reach of Willow Creek from the confluence with the Des Plaines River to the confluence with Higgins Creek and the reach of Higgins Creek from the confluence with Willow Creek upstream to the Northwest Tollway (Interstate-90). Willow Creek is mapped in detail in the DFIRM mapping update as Zone AE floodplain from the confluence with the Des Plaines River to just upstream of the confluence with Higgins Creek. Willow Creek then changes to Zone A floodplain extending to the Cook County border. Higgins Creek is mapped as Zone AE floodplain from the confluence with Willow Creek to just upstream of the confluence with Higgins Creek Tributary A. The remaining mapped reach of Higgins

Creek is Zone A floodplain extending to the Northwest Tollway (Interstate-90). The original hydrologic and hydraulic analysis was performed in 1975 for the 1980 FIS for the city of Des Plaines. Numerous studies have been completed between 1975 and 2006 when the LOMR was prepared. Appendix A includes a comparison of FEMA's effective floodplain mapping from updated DFIRM panels with inundation areas developed for the DWP.

3.17.1.5 Stormwater Problem Data

Starting in the 3rd quarter of 2007, communities, agencies (e.g., IDOT, CCHD), and stakeholders submitted Form B questionnaire response data to the District summarizing known stormwater problems within their jurisdictions. The questionnaires were requested again by the District following the September 2008 storm event. Table 3.17.7 summarizes reported problem areas reviewed as a part of the DWP development. Problems are classified in Table 3.17.7 as regional or local. This classification is based on a process described in the Introduction of Section 1 of this report. The Problem Area ID naming convention was found in Technical Memorandum entitled, "Proposed Naming Conventions for Database Elements" dated August 3, 2007.

TABLE 3.17.7
Community Response Data for Willow Creek

Problem Area ID	Municipality	Problems as Reported by Local Agency	Location	Problem Description	Local/ Regional	Resolution in DWP
EG-FL-01[1]	Elk Grove Village	Siltation, Roadway Flooding	Landmeier Road west of Elmhurst Road	Siltation in Tributary B and roadway flooding	Local	This is a local problem.[4]
AH-FL-01[2]	Arlington Heights	Pavement Flooding	Arlington Heights Road south of I-90	Submitted by IDOT: Last incident 10/24/01	Local	This is a local problem.[4]
DP-ER-01[3]	Des Plaines	Weir Deterioration and Erosion	Elmhurst Road and Oakton Street	Deteriorating weir and streambank erosion	Regional	HGCR-1
DP-FL-01[2]	Des Plaines	Pavement Flooding	IL Route 72 at Wolf Road	Submitted by IDOT: Last incident 08/30/01	Local	This is a local problem.[4]
DP-FL-02[2]	Des Plaines	Pavement Flooding	IL Route 72 at Lee Street	Submitted by IDOT: Last incident 10/25/91	Local	This is a local problem.[4]

TABLE 3.17.7
Community Response Data for Willow Creek

Problem Area ID	Municipality	Problems as Reported by Local Agency	Location	Problem Description	Local/ Regional	Resolution in DWP
DP-FL-03[2]	Des Plaines	Pavement Flooding	Oakton Street between IL 72 and IL 83	Submitted by IDOT: Last incident 05/09/90	Local	This is a local problem.[4]
DP-FL-04[2]	Des Plaines	Pavement Flooding	Touhy Avenue at Higgins Creek	Submitted by IDOT	Local	This is a local problem.[4]
EG-FL-01[2]	Elk Grove Village	Pavement Flooding	Arlington Heights Road at IL 72	Submitted by IDOT: Last incident 09/12/91	Local	This is a local problem.[4]
EG-FL-02[2]	Elk Grove Village	Pavement Flooding	Devon Avenue at Busse Avenue to Elmhurst Road	Submitted by IDOT: Last incident 08/22/02	Local	This is a local problem.[4]
EG-FL-03[2]	Elk Grove Village	Pavement Flooding	IL Route 72 at Touhy Avenue	Submitted by IDOT: Last incident 02/21/97	Local	This is a local problem.[4]
EG-FL-04[2]	Elk Grove Village	Pavement Flooding	IL Route 72 at Elmhurst Road to Mount Prospect Road	Submitted by IDOT: 08/31/01	Local	This is a local problem.[4]
EG-FL-05[2]	Elk Grove Village	Pavement Flooding	IL Route 83 to Devon Avenue	Submitted by IDOT: Last incident 12/28/90	Local	This is a local problem.[4]
RM-FL-01[2]	Rosemont	Pavement Flooding	IL Route 72 at Soo Line Railroad east of Mannheim Road	Submitted by IDOT: Last incident 09/22/06	Local	This is a local problem.[4]

TABLE 3.17.7
Community Response Data for Willow Creek

Problem Area ID	Municipality	Problems as Reported by Local Agency	Location	Problem Description	Local/ Regional	Resolution in DWP
RM-SM-01[2]	Rosemont	Sedimentation	Southeast of Higgins Road and Willow Creek Way	Sediment accumulation in channel	Local	This is a local problem.[4]
RM-SM-02[2]	Rosemont	Sedimentation	Southeast of Higgins Road and River Road	Sediment accumulation in channel	Local	This is a local problem.[4]

[1] Problem Area IDs begin with DP-HGTB- as they are in the Des Plaines River along Higgins Creek Tributary B.
[2] Problem Area IDs begin with DP-WICR- as they are in the Des Plaines River along Willow Creek.
[3] Problem Area IDs begin with DP-HGCR- as they are in the Des Plaines River along Higgins Creek.
[4] Problem does not meet regional definition (refer to chapter 1). Solutions for the local problems are not addressed in the DWP.

3.17.1.6 Near Term Planned Projects

No near-term planned major flood control projects to be constructed by others were identified for the Willow Creek Subwatershed.

3.17.2 Watershed Analysis

3.17.2.1 Hydrologic Model Development

Subbasin Delineation. The subbasin map associated with the Phase I OMP TR-20 hydrologic model was used as a template to delineate the subbasins within the Willow Creek Watershed on the 2003 Cook County LiDAR topographic data developed by Cook County and 2-foot DuPage County topographic mapping. The subbasins within O'Hare were generally not revised, as they reflect Phase I OMP drainage and site conditions. There are 32 subbasins ranging in size from 0.13 to 5.40 square miles with a total drainage area of 19.71 square miles.

Hydrologic Parameter Calculations. CN values were estimated for each subbasin based upon NRCS soil data and 2001 CMAP land use data. This method is further described in Section 1.3.2, with lookup values for specific combinations of land use and soil data presented in Appendix C. An area-weighted average of the CN was generated for each subbasin.

Clark's unit hydrograph parameters were estimated using the method described in Section 1.3.2. Appendix G provides a summary of the hydrologic parameters used for subbasins in each subwatershed.

3.17.2.2 Hydraulic Model Development

Field Data, Investigation, and Existing Model Data. Several watershed analyses have been completed for the Willow Creek Watershed, focusing mainly on the reach of Willow Creek from the Des Plaines River to around Touhy Avenue. Background hydrologic modeling for the Willow Creek Watershed is comprised of the Phase I OMP TR-20 hydrologic model.

Several hydraulic models are available for the watershed including the 2007 LOMR incorporating the Willow Creek and Touhy Avenue Flood Control Reservoirs, the 2005 CCHD Upper Des Plaines River Tributaries Hydrologic and Hydraulic Model Conversion of Willow-Higgins Creek Watershed, and the OMP Phase I Floodway Construction Permit for the Willow Higgins Creek Relocation. These models were utilized as background information for this watershed analysis.

The existing hydrologic and hydraulic models utilized for the Zone AE floodplain areas within the Willow Creek Subwatershed met District criteria, as identified in Section 6.3.3.2 of the CCSMP, and were therefore used to support DWP development.

The Willow Creek unsteady HEC-RAS hydraulic model was based on data from two hydraulic models. The cross-section location, channel data, and structure data from the 2007 LOMR HEC-RAS hydraulic model was utilized for Willow Creek from the confluence with the Des Plaines River continuing upstream to Lee Street. As part of the Phase I OMP, Willow Creek was relocated from Lee Street through O'Hare. The IDNR-OWR WSP-2 hydraulic model cross-section location, channel, and structure data was utilized for the reach of Willow Creek upstream of Lee Street. This data was incorporated into the HEC-GeoRAS cross-sections extracted from the TIN created in GIS from the Cook County 2-foot topographic mapping. It should be noted, that, while the 100-year floodplain remains within the relocated channel through O'Hare, future floodplain mapping efforts for this reach will be based on available topographic data, as the Cook County 2-foottopographic mapping does not show the relocated Willow Creek channel.

The cross-section locations for Higgins Creek were generally based on the 2005 CCHD Upper Des Plaines River Tributaries Hydrologic and Hydraulic Model Conversion of Willow-Higgins Creek Watershed approximately through the confluence with Higgins Creek Tributary A which is the end of the FEMA Zone AE study.

For the Zone A reach of Higgins Creek and for Higgins Creeks Tributaries A and B, field survey was performed under the protocol of FEMA's *Guidelines and Specifications for Flood Hazard Mapping partners, Appendix A: Guidance for Aerial Mapping and Surveying*. Field survey was performed in mid 2009. Cross sections were generally surveyed 500 feet apart. The actual spacing and location was determined based on the variability of the channel shape, roughness, and slope. To develop the model, hydraulic structures throughout the subwatershed were surveyed, including immediate upstream and downstream cross sections. The structure information and channel survey were incorporated into the HEC-GeoRAS cross-sections.

Field visits were performed to assess channel and overbank roughness characteristics at several locations along Willow and Higgins Creeks. These were then compared with information on photographs and aerial photography to review and determined Manning's *n* roughness coefficients included in the Unsteady HEC-RAS hydraulic model.

The Willow Creek Flood Control Reservoir and Touhy Avenue Flood Control Reservoir cells 1 and 2 were modeled in the Unsteady HEC-RAS hydraulic model as they receive inflow directly from Willow and Higgins Creeks, respectively. As-built plans were available for the Willow Creek Flood Control Reservoir and Touhy Avenue Flood Control Reservoir cells 1 and 2; however, the inlet weir for Touhy Avenue Flood Control Reservoir cell 1 was based on survey data as it was not included in the available as-built plans. An overflow weir was also included in the model for Cell 1 of the Touhy Avenue Flood Control Reservoir per the as-built plans.

Boundary Conditions. The downstream boundary condition for the Willow Watershed is the 5-year water surface elevation for the Des Plaines River at its confluence with Willow Creek.

3.17.2.3 Calibration and Verification

While no stream flow gages are located within the Willow Creek Watershed, conditions of the Willow Creek Flood Control Reservoir and through the reaches of channel improvements within the Village of Rosemont were noted during the September 2008 storm event. The Willow Creek Flood Control Reservoir control structure did not overtop and the reservoir was full. Through the Village of Rosemont, Willow Creek did not exceed the height of the flood control walls, except just west of Ruby Street at Emerson Street on the north side of the creek. The water surface elevations were surveyed upstream of Ruby Street during the September 2008 storm event.

Based on previous Lower Des Plaines River Tributary calibration, the CUH storage coefficient, R, was multiplied by a factor of 2.09 for all subbasins in the HEC-HMS hydrologic model. The R multiplier was determined based on the results of calibrations performed for gauged watersheds. An equation was developed based on the average of the slopes calculated for use in determining the time of concentration. That equation was used to determine an R value for the Willow Creek Subwatershed.

The result of the hydrologic and hydraulic modeling met within 0.5 feet of the average of the September 2008 surveyed water surface elevation of 628.9 feet, NAVD 1988, at Emerson and the Willow Creek Flood Control Reservoir control structure did not overtop the control structure.

3.17.2.4 Existing Conditions Evaluation

Flood Inundation Areas. Figure 3.17.1 shows inundation areas in the Willow Creek Subwatershed produced by the DWP's hydraulic model for the 100-year, 24-hour critical duration design storm.

Hydraulic Profiles. Appendix H contains existing conditions hydraulic profiles for Willow Creek and its tributaries Higgins Creek, Higgins Creek Tributary A, and Higgins Creek Tributary B. Profiles are shown for the 2-, 5-, 10-, 25-, 50-, 100-, and 500-year recurrence interval design storms.

3.17.3 Development and Evaluation of Alternatives

3.17.3.1 Problem Definition

Hydraulic model results were reviewed with inundation mapping to identify locations where property damage due to flooding is predicted. There are only 7 parcels within the Higgins Creek slightly impacted (no more than $1,300 in damages over 50 years) during the 100-year storm event. No additional problem areas were identified through hydraulic modeling.

3.17.3.2 Damage Assessment

Economic damages were defined following the protocol defined in Chapter 6.6 of the CCSMP. Recreation damages due to flooding are not being identified as part of the DWP. Transportation damages were estimated as 15 percent of property damages. Table 3.17.8 lists the damage assessment for existing conditions.

TABLE 3.17.8
Estimated Average Annual Damages for Willow Creek

Damage Category	Estimated Average Annual Damage ($)	Description
Property	263	Includes structures and contents damage for non-residential structures
Erosion	13,255	Includes erosion damage associated with DP-ER-01
Transportation	40	Assumed as 15% of property damage

3.17.3.3 Technology Screening

No flood control technologies were screened as the only regional problem area is an erosion problem. The erosion problem area is discussed below.

3.17.3.4 Alternative Development

Erosion Control Alternatives. Alternative solutions to streambank erosion were developed for Willow Creek Subwatershed based on methodology consistent with Chapter 6 of the CCSMP and described above in Section 1.4.3. Table 3.17.9 describes the alternative for the Willow Creek Subwatershed.

TABLE 3.17.9
Erosion Control Alternatives for Willow Creek

Alternative	Addressed Problem Area IDs	Location	Description
HGCR-1	DP-ER-01	Upstream of Elmhurst Road to weir	*Erosion Control:* Weir rehabilitation and streambank stabilization

The alternative selected, HGCR-1, proposes to rehabilitate the existing weir in-kind in its current location. The left/west overbank would need to be stabilized and modified to convey flow over the weir and not around it to the west. The channel immediately downstream of the weir would also need to be reinforced. Additionally, the left/west streambank adjacent to the Asbury Court Retirement Community would need to be stabilized. Alternative HGCR-1 would deliver the benefit of stabilizing the streambank to prevent further erosion.

3.17.3.5 Alternative Evaluation and Selection

The alternative listed in Table 3.17.9 was evaluated to determine its effectiveness and to produce data for the countywide prioritization of watershed projects. As the proposed stabilization is intended to rehabilitate the existing streambank, the alternative should not impact the water surface elevations or flood damages. This alternative was evaluated through field investigations to recommend appropriate weir rehabilitation and streambank stabilization measures. Table 3.17.10 provides a summary of the B/C ratio, net benefit, total project cost and other relevant alternative data.

HGCR-1. The existing weir located upstream of Elmhurst Road is collapsing and causing erosion damages to the left/west streambank. The nursing home located downstream of the existing weir on the left overbank was undercut on the southeast corner by flow going around the west side of the weir. Placement of broken concrete adjacent to the existing undercut corner of the building was observed as a temporary measure to address this problem.

Based on a review of historical aerial photographs, the weir was built between 1962 and 1974; however, permitting agencies contacted by the District could not identify the entity responsible for its construction or maintenance.

Alternative HGCR-1 would rehabilitate the degraded weir just upstream of Elmhurst Road in the City of Des Plaines and restore the eroded west streambank from the weir to Elmhurst Road. The geometry of the weir would not be modified; however, riprap would be placed in the channel bottom for approximately 10 feet downstream of the weir to reduce channel erosion. The existing concrete channel from the west that outlets north of the weir would be extended to tie-in to the left streambank and the adjacent storm outfall pipe would be stabilized. The broken concrete to the west and northwest of the weir would be removed and the area stabilized and armored. The existing armoring on the left overbank downstream of the weir would be removed and replaced. The weir rehabilitation in conjunction with the streambank stabilization addresses critical erosion problems along the west bank that impact the Asbury Court Retirement Community. This alternative was not modeled as it is not intended to change the existing channel or weir geometry of the subject area.

Removing the weir was considered as it would not adversely affect the water surface elevations or flowrates upstream or downstream of the proposed project location. However, addressing the amount of sediment with unknown water quality issues translating downstream and the transitional regrading of the channel and upstream streambanks would be expensive. Stabilization of the west streambank adjacent to the Asbury Court Retirement Community would still be required. Due to the significant channel transitioning and no benefited problem areas upstream, this alternative was not pursued.

A number of properties are at risk of shallow flooding during the 100-year flood event under existing conditions. In addition, due to their locations, other properties' risk of flooding cannot be feasibly mitigated by structural measures. Such properties are candidates for protection using nonstructural flood control measures, such as flood-proofing or acquisition. These measures may be considered to address damages that are not fully addressed by capital projects recommended in the Des Plaines River DWP.

3.17.3.6 Data Required for Countywide Prioritization of Watershed Projects

Appendix I presents conceptual level cost estimates for the recommended alternative. Table 3.17.10 lists alternative analyzed in detail as part of the DWP development.

The recommended alternative for the Willow Creek Subwatershed is Alternative HGCR-1. Alternative HGCR-1 is recommended because it will repair the existing deteriorating weir and address the streambank erosion threatening the Ashbury Court Retirement Community.

Figure 3.17.2 shows the location and the recommended alternative described in Table 3.17.10. Figure 3.17.2 shows a comparison of the existing condition and alternative condition inundation areas.

TABLE 3.17.10
Willow Creek Project Alternative Matrix to Support District CIP Prioritization

Alternative ID	Description	B/C Ratio	Net Benefits ($)	Total Project Cost ($)	Structures Protected from 100-Yr Inundation	Roadways Protected	Water Quality Benefit	Recom-mended	Communities Involved
HGCR-1	Weir Rehabilitation and bank stabilization	0.3	246,547	762,604	1	0	Positive	Y	Des Plaines

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4. Watershed Action Plan

This section summarizes the DWP recommendations. The recommendations and supporting information will be considered by the District's Board of Commissioners in their prioritization of a countywide Stormwater CIP. The recommendations within the DWP consist of maintenance activities (Section 4.1) and recommended capital improvements (Section 4.2).

4.1 Watershed Maintenance Activities

Review of reported stormwater problem data indicated that certain types of maintenance activities would be helpful in preventing these stormwater problems. The District, through its maintenance activities, has been actively removing blockages such as tree limbs and woody debris from channels throughout Cook County. Local communities have reported benefits from these maintenance activities and it is recommended that the District maintenance activities be continued to address ongoing future maintenance needs.

Sedimentation is a dynamic process that is affected by soil protective measures taken in upland tributary areas as well as dynamic streambank conditions. The District's WMO will define standard practices for erosion protection on construction sites. Best management practices in upland areas should be paired with stream maintenance measures to reduce sediment delivered to waterways to reduce the need for extensive dredging programs.

Stormwater improvement alternatives recommended in the Lower Des Plaines River DWP including levees/floodwalls, flood control reservoirs, conveyance improvements, bridge and culvert modifications, control structure modifications, or erosion control armoring will require ongoing maintenance after construction. Costs associated with maintenance over a 50-year life-cycle period were included in cost estimates. It is recommended that the District develop maintenance plans for capital improvements, and where applicable, execute agreements with local governments, delegating certain maintenance responsibilities. Maintenance agreements will follow current District practice, where the District is responsible for operation and maintenance of structural, electrical, and mechanical facilities and grounds are the responsibility of partnering organizations.

Table 4.1.1 lists all problem area locations where standard stream maintenance activities are recommended including debris and blockage removal, removal of silt from culverts, and removal of sediment from stream channels.

TABLE 4.1.1
Summary of Problem Areas where Debris Removal or Other Maintenance is Recommended

Problem Area ID	Tributary	Location	Type of Maintenance Activity Required
CD-SM-02	Mainstem Lower Des Plaines River	Cook County Highway Department Structure 016-3258 at the Des Plaines River, 0.2 miles east of US 45	Remove debris and clear channel
WS-FL-01	Mainstem Lower Des Plaines River	Southwest of German Church Road and Wolf Road	Remove debris and clear channel of sedimentation
ST-SM-01	Mainstem Lower Des Plaines River	Portwine Road and Forest View Road	Remove silt from outlet and repair streambank
BK-FL-01	Addison Creek	IL RTE 56 at Interstate 290	Remove debris and clear channel
CD-SM-01	Buffalo Creek Tributary A	Cook County Highway Department Structure 016-4011 at Buffalo Creek Tributary A	Remove debris and clear channel of sedimentation
CD-SM-01	Buffalo Creek	Cook County Highway Department Structure 016-3203, at Buffalo Creek, 0.5 Miles west of Buffalo Grove	Sediment accumulation and vegetative growth
CD-SM-02	Buffalo Creek	Buffalo Grove Road from Hintz Road to Lake-Cook Road	Clear channel of sedimentation
CD-SM-03	Buffalo Creek	Hintz Road from Arlington Heights Road to Milwaukee Avenue	Clear channel of sedimentation
CD-SM-04	Buffalo Creek	Aptakisic Road from Buffalo Grove Road to McHenry Road	Clear channel of sedimentation
DP-SM-01	Feehanville Ditch	River Road and Gregory Street	48-inch RCP cleaning
CD-SM-01	McDonald Creek	Camp McDonald Road bridge	Clear channel of sedimentation
MP-FL-01	McDonald Creek	Downstream of Euclid Avenue	Clear channel of sedimentation
MR-ER-01	Silver Creek	North Avenue at IHB railroad	Clear channel of sedimentation
CD-SM-01	Weller Creek	Mount Prospect Road, Oakton Street to Busse Road	Remove debris and clear channel
DP-SM-01	Weller Creek	Near Seegers and Rand Road	Remove debris and clear overflow channel

TABLE 4.1.1
Summary of Problem Areas where Debris Removal or Other Maintenance is Recommended

Problem Area ID	Tributary	Location	Type of Maintenance Activity Required
EG-FL-01	Higgins Creek Tributary B	Landmeier Road west of Elmhurst Road	Clear channel of sedimentation
RM-SM-01	Willow Creek	Southeast of Higgins Road and Willow Creek Way	Clear channel of sedimentation
RM-SM-02	Willow Creek	Southeast of Higgins Road and River Road	Clear channel of sedimentation
RM-FL-03	Willow Creek	West of intersection of Rosemont Avenue and Kirschoff Street	Clear channel of sedimentation

4.2 Recommended Capital Improvements

Table 4.2.1 lists all recommended improvements addressing the regional stormwater problem areas in the Lower Des Plaines River DWP. The District will use data presented here to support prioritization of a countywide stormwater CIP.

4.3 Implementation Plan

Table 4.2.1 presents a prioritization matrix for recommended alternatives for the Lower Des Plaines Watershed. The recommended alternatives listed in Table 4.2.1 can be constructed independently. However, in many cases, benefits associated with constructing several alternatives in a subwatershed will exceed the sum of the benefits of the individual alternatives. The data presented in Table 4.2.1, along with noneconomic factors, will allow the District to prioritize its CIP and to implement projects. A number of alternatives in Table 4.2.1 require the acquisition of land that currently may be unavailable. It is recommended that upon selecting an alternative for implementation, the District identify land acquisition needs and procedures.

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TABLE 4.2.1
Lower Des Plaines River Watershed Prioritization Matrix

Project	B/C Ratio	Total Benefits ($)	Total Project Cost ($)	Probable Construction Cost ($)	Relative Damage Averted 25% 50% 75%	Acreage Removed from Inundation Area (ac)	Wetland or Riparian Areas Impacted (ac)	Cumulative Structures Protected	Implementation Time (months)	Water Quality Benefit	Communities Involved
ADCR-6b	1.5	$196,463,022	$133,921,295	$102,500,193		623	163	954	24	Positive	Northlake, Stone Park, Melrose Park, Bellwood, Westchester
ADCR-7	2.3	$1,896,358	$809,039	$438,236		0	0	0	6	Positive	Northlake
ADCR-9	1.2	$270,053	$218,819	$119,524		0	<1	0	3	Positive	North Riverside
BUCR-1B	1.3	$808,186	$613,435	$310,408		2	0	10	6	Slightly Positive	Buffalo Grove, Wheeling
BUCR-4	0.7	$5,671,193	$8,544,202	$5,468,576		15	4	48	6	Positive	Palatine, Palatine Township
BUCR-5	0.03	$1,925,650	$61,687,084	$37,314,719		96	<1	106	12	Positive	Wheeling
CYCR-4	0.03	$1,198,534	$42,671,156	$21,523,207		22	1	94	12	Positive	Franklin Park, Schiller Park, Chicago
DPR-1	0.01	$258,750	$17,826,218	$10,415,636		9	4	6	12	No Impact	Wheeling
DPR-2B	0.4	$7,884,379	$18,967,319	$14,465,589		51	0	0	18	No Impact	Des Plaines
DPR-3A	0.1	$52,565,869	$523,018,856	$284,074,806		1887	0	300-500	24	No Impact	Des Plaines
DPR-4	0.2	$1,558,254	$9,305,254	$6,709,558		5	0	0	6	No Impact	Rosemont
DPR-5	0.3	$9,936,443	$28,619,651	$17,527,519		34	0	13	18	No Impact	Schiller Park, Franklin Park
DPR-6D	0.4	$19,352,980	$45,891,893	$30,270,524		56	0	115	24	No Impact	River Grove, Elmwood Park
DPR-8A	0.04	$407,298	$10,371,259	$8,651,684		4	0	0	6	No Impact	River Forest
DPR-8B	0.2	$985,073	$6,097,943	$3,538,851		8	0	19	6	No Impact	River Forest
DPR-9A	0.2	$821,943	$4,596,656	$3,996,246		2	0	0	6	No Impact	Forest Park
DPR-10	0.2	$126,538	$538,276	$383,432		<1	0	0	6	No Impact	Proviso Township, Riverside Township
DPR-11C	0.4	$11,767,856	$28,267,020	$17,539,890		57	0	59	18	No Impact	Riverside, North Riverside
DPR-12	0.05	$51,782	$1,029,060	$723,627		1	0	0	6	No Impact	Lyons
DPR-13	1.4	$14,100,116	$9,880,904	$5,917,821		21	0	39	6	No Impact	Riverside
DPR-14A	0.08	$370,987	$4,594,661	$2,773,390		5	0	12	6	No Impact	Lyons
DPR-14B	0.01	$269,713	$18,200,778	$16,361,185		2	0	0	6	No Impact	Lyons
DPR-14C	0.2	$1,350,067	$8,265,570	$6,555,093		45	0	17	12	No Impact	McCook, Summit, Lyons
DPR 14D	0.03	$8,621,560	$260,991,361	$217,547,800		70	0	204	12	Positive	Stickney, Forest View
DPR-15	<0.01	$194,043	$25,785,787	$15,372,070		72	0	5	12	No Impact	Hodgkins
DPR-26	0.08	$322,411	$4,243,200	$2,514,784		6	0	0	6	No Impact	Elmwood Park, River Forest, River Grove

TABLE 4.2.1

Lower Des Plaines River Watershed Prioritization Matrix

Project	B/C Ratio	Total Benefits ($)	Total Project Cost ($)	Probable Construction Cost ($)	Relative Damage Averted 25% 50% 75%	Acreage Removed from Inundation Area (ac)	Wetland or Riparian Areas Impacted (ac)	Cumulative Structures Protected	Implementation Time (months)	Water Quality Benefit	Communities Involved
FRCR-12	1.0	$18,876,571	$19,787,864	$12,695,379		40	7	128	24	Positive	Maine Township, Park Ridge, Des Plaines, Niles
FHDT-2	0.06	$537,242	$8,570,197	$5,647,843		4	<1	9	6	No Impact	Wheeling Township
FGCR-1	0.05	$290,306	$6,229,554	$3,615,335		15	0	23	6	Positive	Western Springs
FGCR-2	0.02	$183,916	$10,563,338	$6,788,183		7	0	3	12	No Impact	Indian Head Park
FGCR-3	0.06	$222,718	$3,689,102	$2,417,901		1	2	3	12	No Impact	Lyons Township
FGCR-4	0.7	$489,707	$668,351	$607,592		1	<1	4	6	Slightly Positive	Burr Ridge, Willow Springs, Lyons Township
FGCR-5	0.01	$26,676	$2,455,384	$1,461,013		<1	<1	0	6	No Impact	Lyons Township
59DT-1	0.1	$126,823	$969,361	$52,621		2	0	5	6	Positive	Burr Ridge, Hinsdale
FGTB-1	2.2	$1,831,974	$815,713	$327,536		5	0	1	6	Slightly Positive	Burr Ridge Lyons Township
GCTR-1	0.3	$5,170,087	$15,486,491	$9,883,989		42	28	50	6	No Impact	Elmwood Park, River Grove
MCTA-1	0.03	$314,091	$9,430,341	$6,194,570		1	1	0	6	No Impact	Prospect Heights, Wheeling
MDCR-2	0.1	$1,841,550	$15,625,015	$9,844,624		10	7	13	12	Positive	Prospect Heights, Mount Prospect
MDCR-3	0.2	$2,438,071	$10,368,339	$6,773,586		3	<1	8	6	No Impact	Wheeling Township
MDCR-5	0.3	$204,000	$797,625	$422,921		0	<1	0	6	Positive	Mount Prospect
STCR-5	0.2	$7,179,906	$39,964,011	$24,592,947		13	7	50	12	Positive	Brookfield, Lyons
SLCR-2	0.2	$10,415,557	$51,501,231	$36,718,325		159	<1	269	6	Positive	Melrose Park, Franklin Park, Leyden Township
SLCR-5	0.06	$239,448	$3,944,629	$2,652,258		3	<1	0	6	No Impact	Chicago, Franklin Park
WECR-1	0.01	$115,918	$10,659,963	$5,223,226		19	0	24	6	No Impact	Des Plaines
HGCR-1	0.3	$246,547	$762,604	$531,211		0	<1	1	6	Positive	Des Plaines

Property Damage   Erosion   Transportation

Note: Implementation time includes construction time, but does not include time for design, permitting or land acquisition

5. Summary and Conclusions

The Lower Des Plaines River DWP was developed in coordination with the Lower Des Plaines River WPC. The coordination focused on integrating community knowledge of stormwater problems and ideas for feasible solutions into the District's regional stormwater plan. All stormwater problem data received from stakeholders was recorded in a spatial database, and classified as local or regional according to the criteria defined in Section 1. Hydrologic and hydraulic models were developed to estimate flow and stage along regional waterways and assess the frequency and depth of flooding problems for a range of modeled recurrence intervals. Inundation mapping was developed for the 2-, 5-, 10, 25, 50, 100-year, and 500-year modeled storm events, identifying areas estimated to be at risk of flooding. Modeled water depths and inundation mapping were used to help estimate damages due to flooding within each tributary.

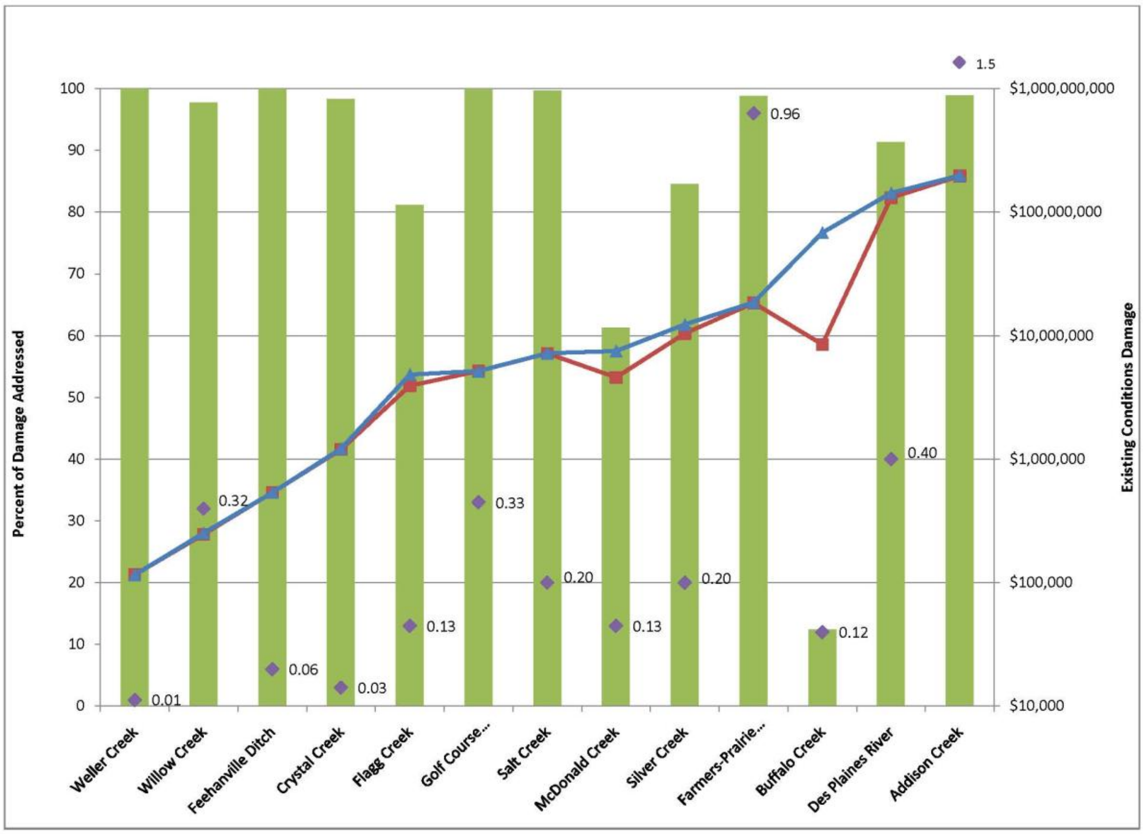
Stormwater improvements were developed to address regional problems throughout the Lower Des Plaines River Watershed. Appropriate tributary-specific technologies were screened considering their applicability for addressing problem areas, constructability in the area required, and regulatory feasibility. Hydrologic and hydraulic models were modified to represent possible future conditions. Damage estimates for proposed alternatives were performed to evaluate the alternative's effectiveness at reducing regional stormwater damages. The difference in damages between existing and alternative conditions was quantified as the alternative's benefit. In addition to numeric benefits, several other criteria were noted for each alternative, such as the number of structures protected, water-quality benefit, and wetland/riparian areas affected. Conceptual level cost estimates were developed to estimate the construction and maintenance cost of proposed alternatives over a 50-year period. The estimated benefits were divided by the conceptual cost to develop a B/C ratio for each alternative.

Figure 5.1 illustrates the potential of alternatives within the DWP to address regional damages throughout the watershed, ordered by increasing existing conditions damages. A logarithmic scale is used so that the wide range of estimated damages, ranging from $116,000 for Weller Creek to $200,000,000 for Addison Creek, can be displayed on a single graph. The columns indicate the extent to which recommended alternatives address estimated damages, while the purple B/C symbols indicate the B/C ratio. As an example, the recommended Buffalo Creek alternatives address approximately 12 percent of estimated damages (indicated by the column), which corresponds to a benefit of $8,405,029. In contrast, 100 percent of the damages along Feehanville Ditch are addressed, but this results in $537,242 of benefit, or approximately 6 percent of benefits of recommended Addison Creek alternatives.

Recommended alternatives are estimated to reduce regional damages by $390,000,000 over a 50-year period, at an estimated cost of $1,490,000,000. Estimated damage reductions result from proposed stormwater improvements that protect areas with floodwalls, increase storage in the watershed, thereby reducing peak flows and stage, increasing conveyance to receiving systems (only if increased flows do not cause downstream damages), or channel protection measures to reduce erosion damages. Floodproofing alternatives, though feasible for addressing isolated shallow flooding issues, are not included in the summary statistics below due to the individualized way in which such measures would be implemented.

The percent damages addressed are at or near 100% throughout the Lower Des Plaines Watershed, except for the Buffalo Creek subwatershed. This waterway runs through an urban area with significant shallow flooding. This results in high damages with low benefits. Projects which provide significant benefits, such as floodwalls, are not feasible through flat urban areas.

FIGURE 5.1
Lower Des Plaines River Watershed Alternative Summary



Stormwater problems, whether identified by stakeholders or identified by modeling of intercommunity waterways, indicate a need for regional stormwater management solutions throughout the Lower Des Plaines River Watershed.

The recommended alternatives have a significant impact on the Lower Des Plaines watershed. All of the watersheds but two see over 80% of the damages addressed, with eight of the 13 watersheds at or very near 100% damages addressed.

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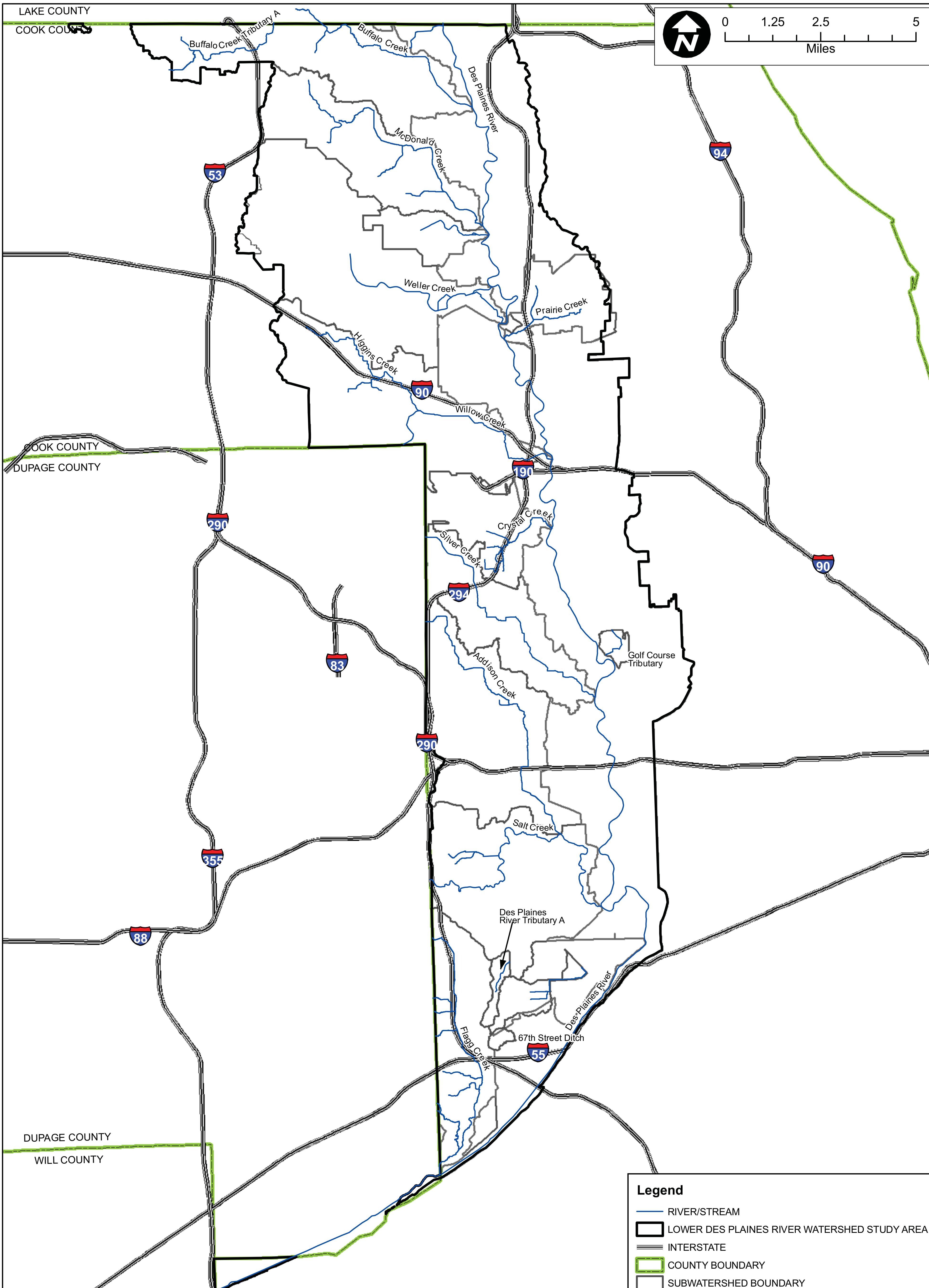

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METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:

LOWER DES PLAINES RIVER WATERSHED OVERVIEW

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FIGURE 1.1

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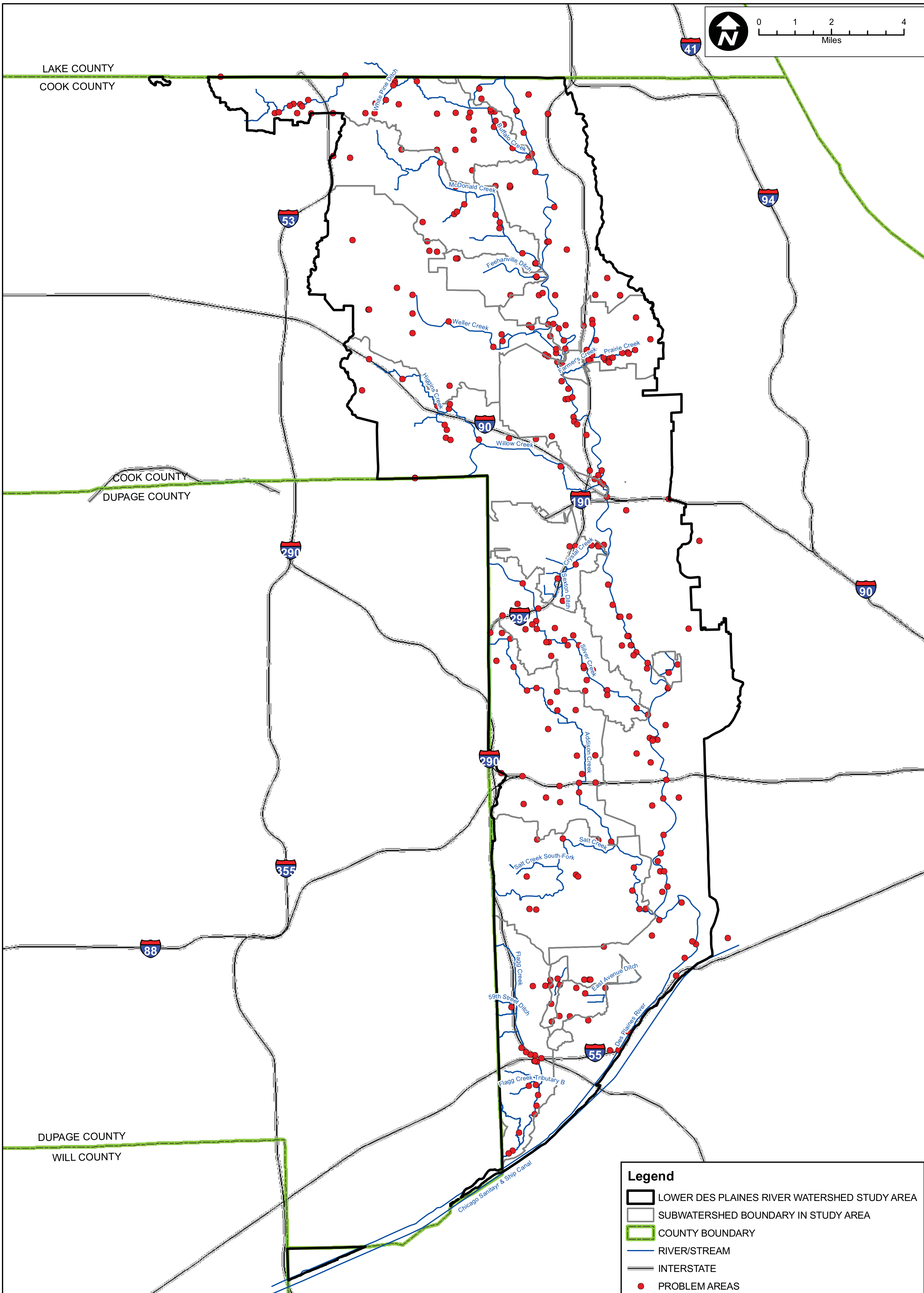

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LOWER DES PLAINES RIVER WATERSHED PROBLEM AREA LOCATIONS

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FIGURE 2.2.1

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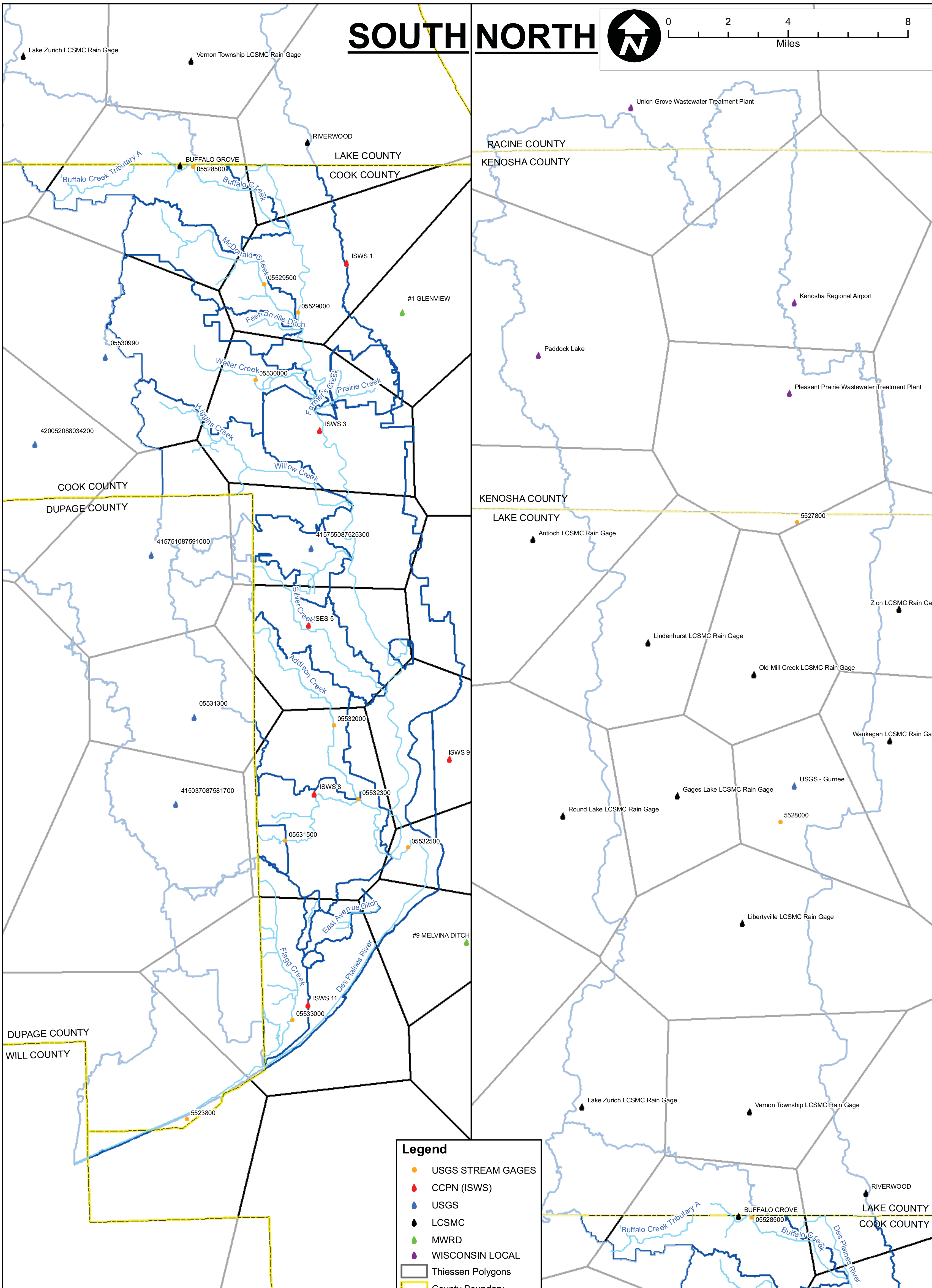

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LOWER DES PLAINES RIVER WATERSHED MONITORING LOCATIONS

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FIGURE 2.3.1

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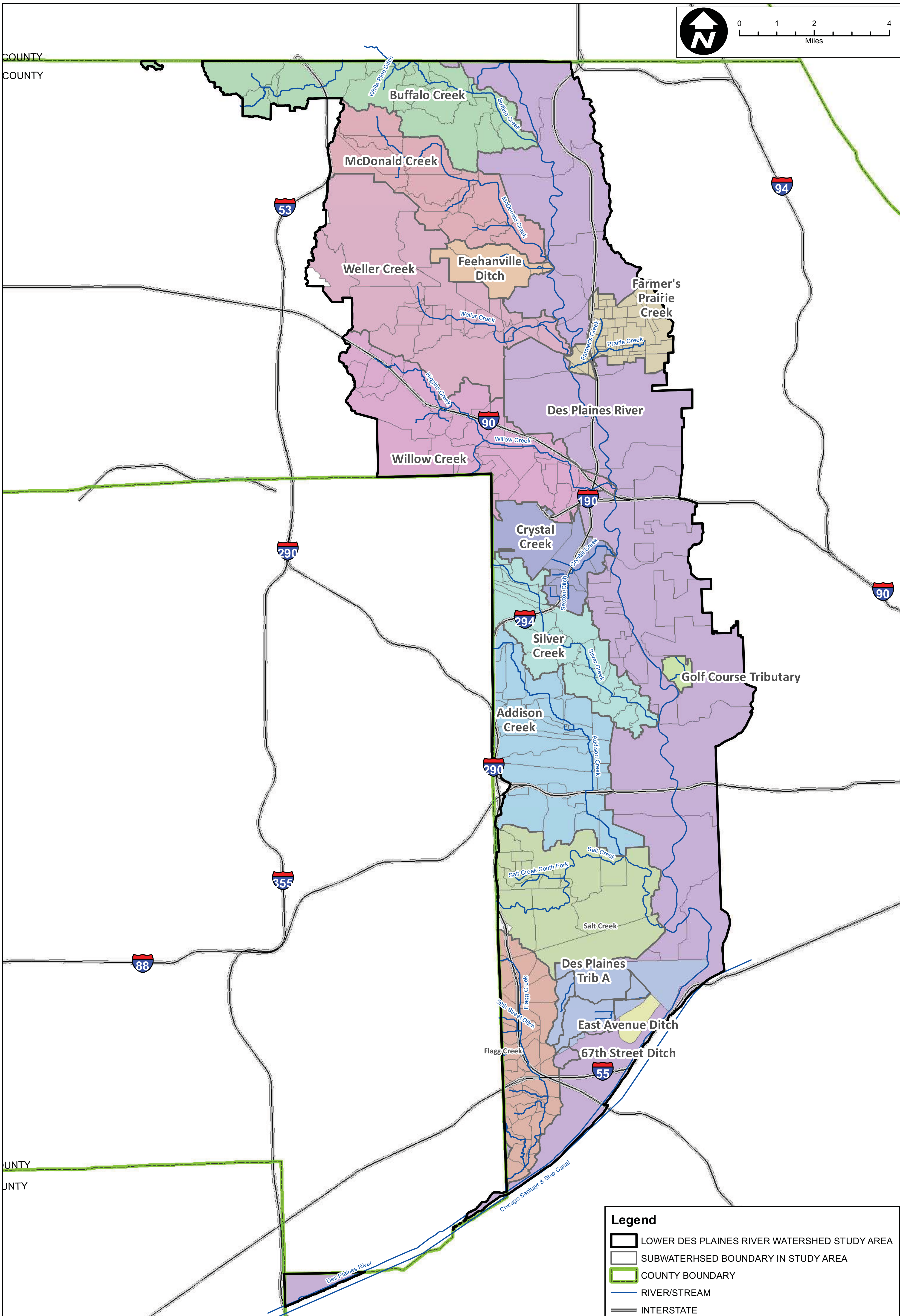

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LOWER DES PLAINES RIVER WATERSHED SUBWATERSHED DELINEATION

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FIGURE 2.3.2

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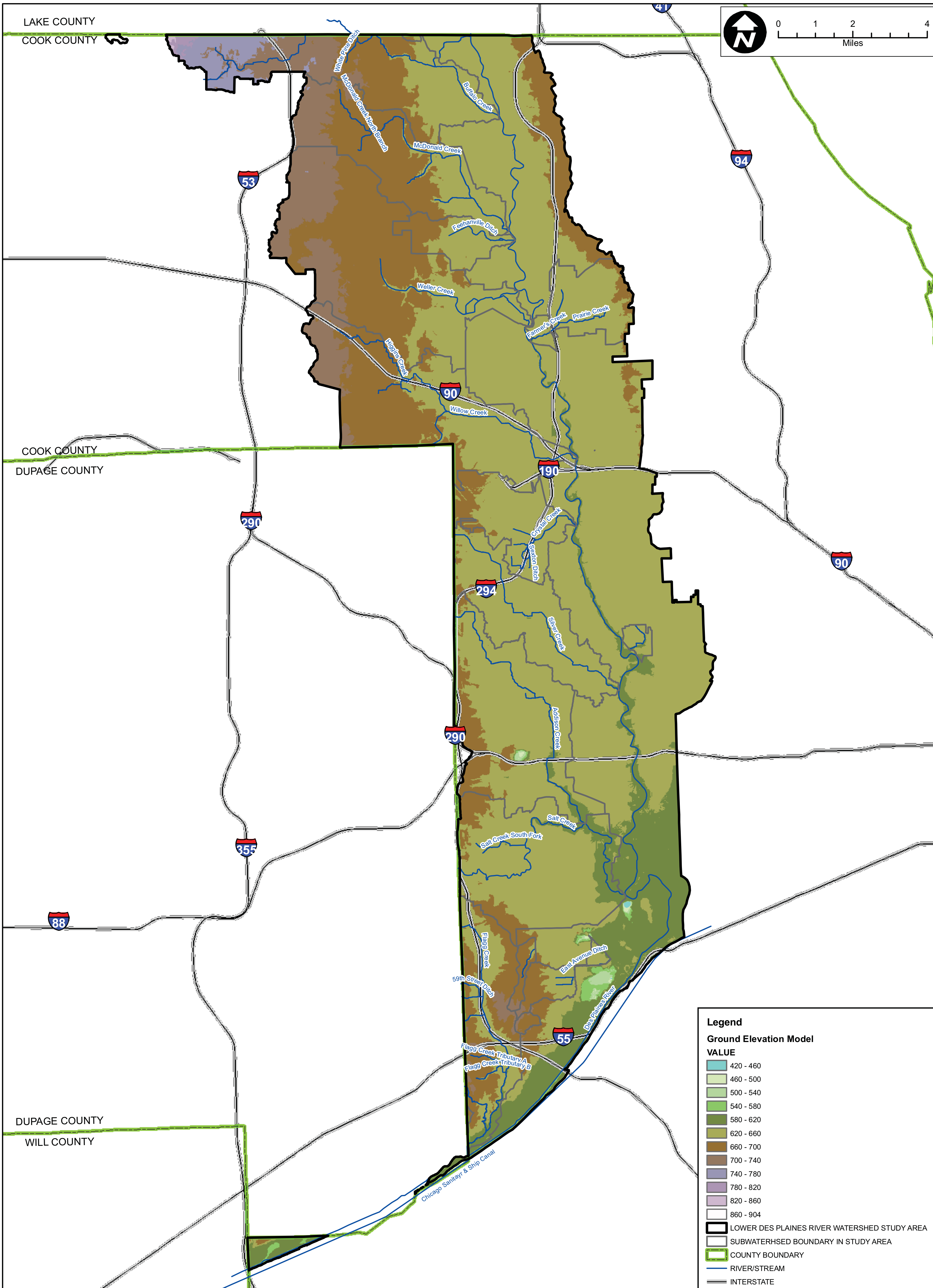

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FIGURE 2.3.3

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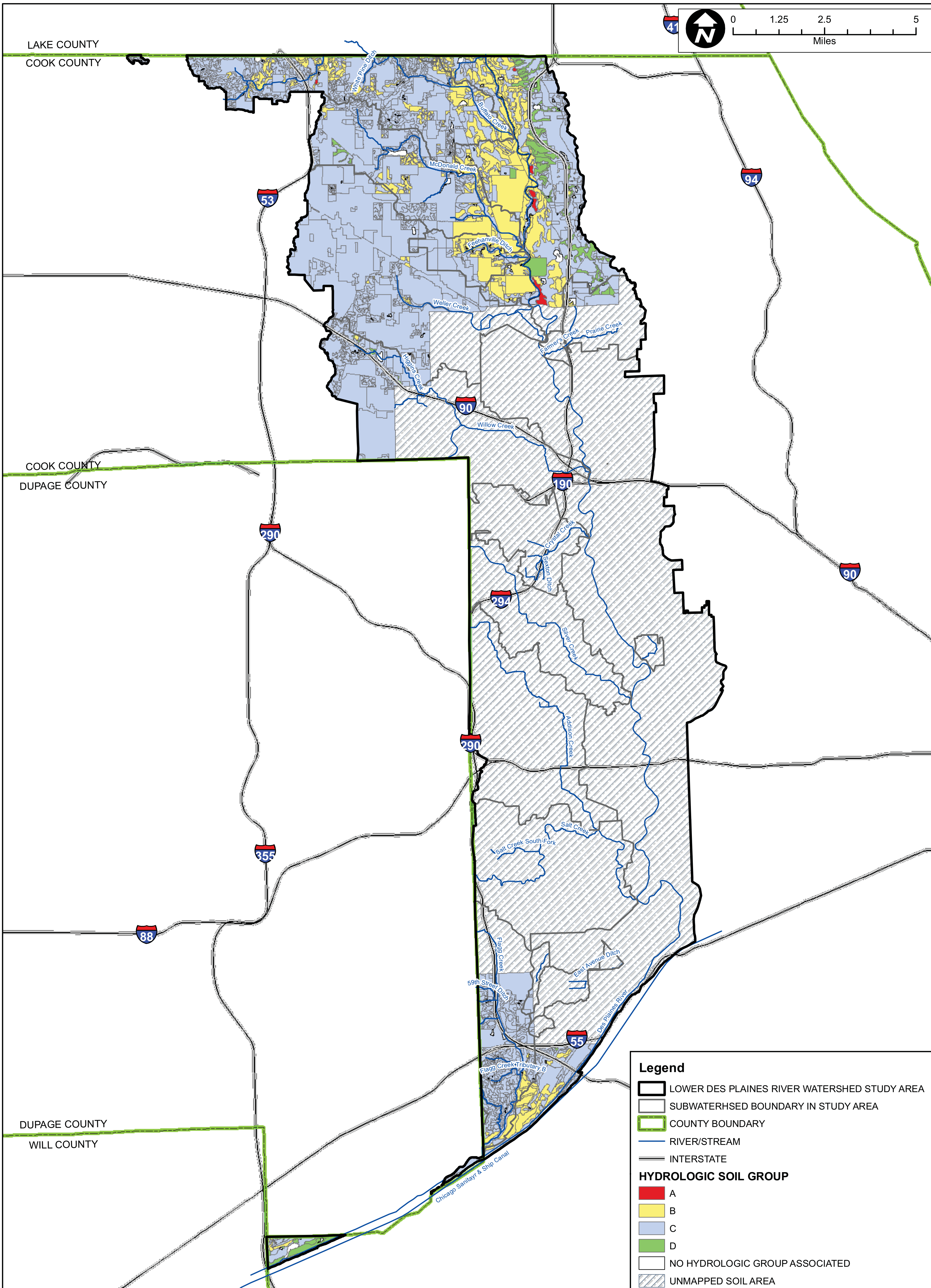

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FIGURE 2.3.4

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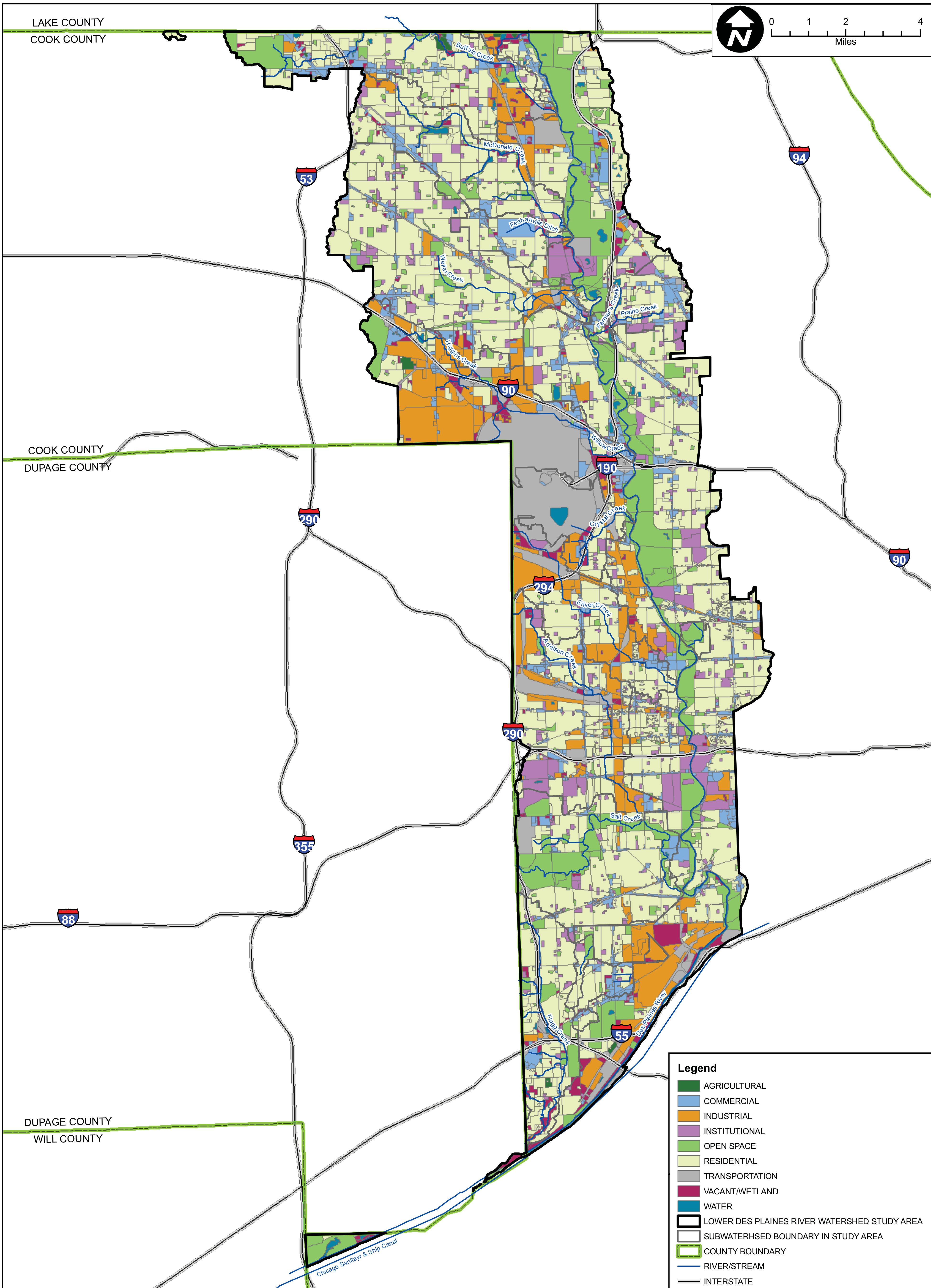

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FIGURE 2.3.5

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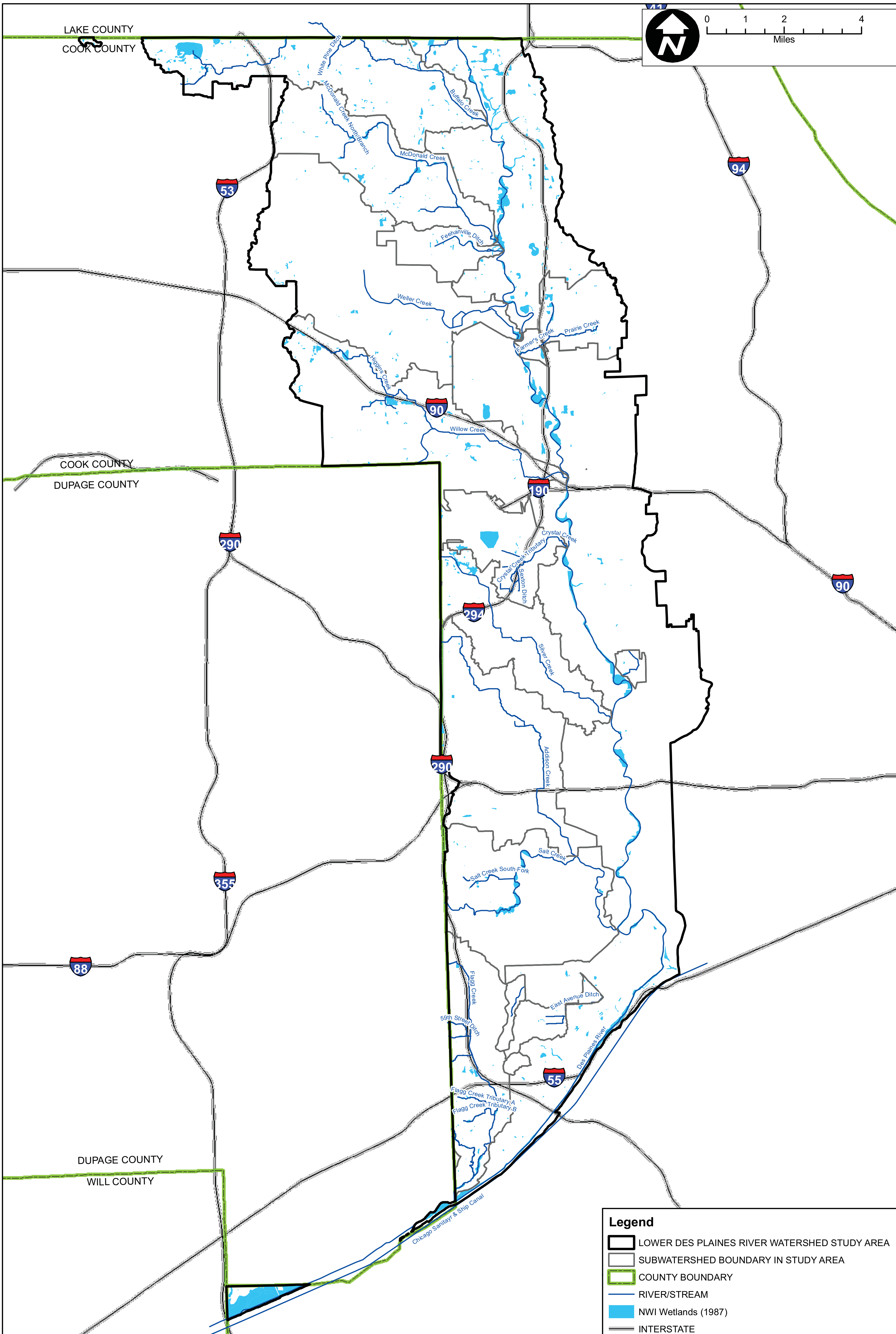

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LOWER DES PLAINES RIVER WATERSHED NATIONAL WETLAND INVENTORY

PROJ. NO. 080043

DATE: 09-13-2009

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FIGURE 2.3.6

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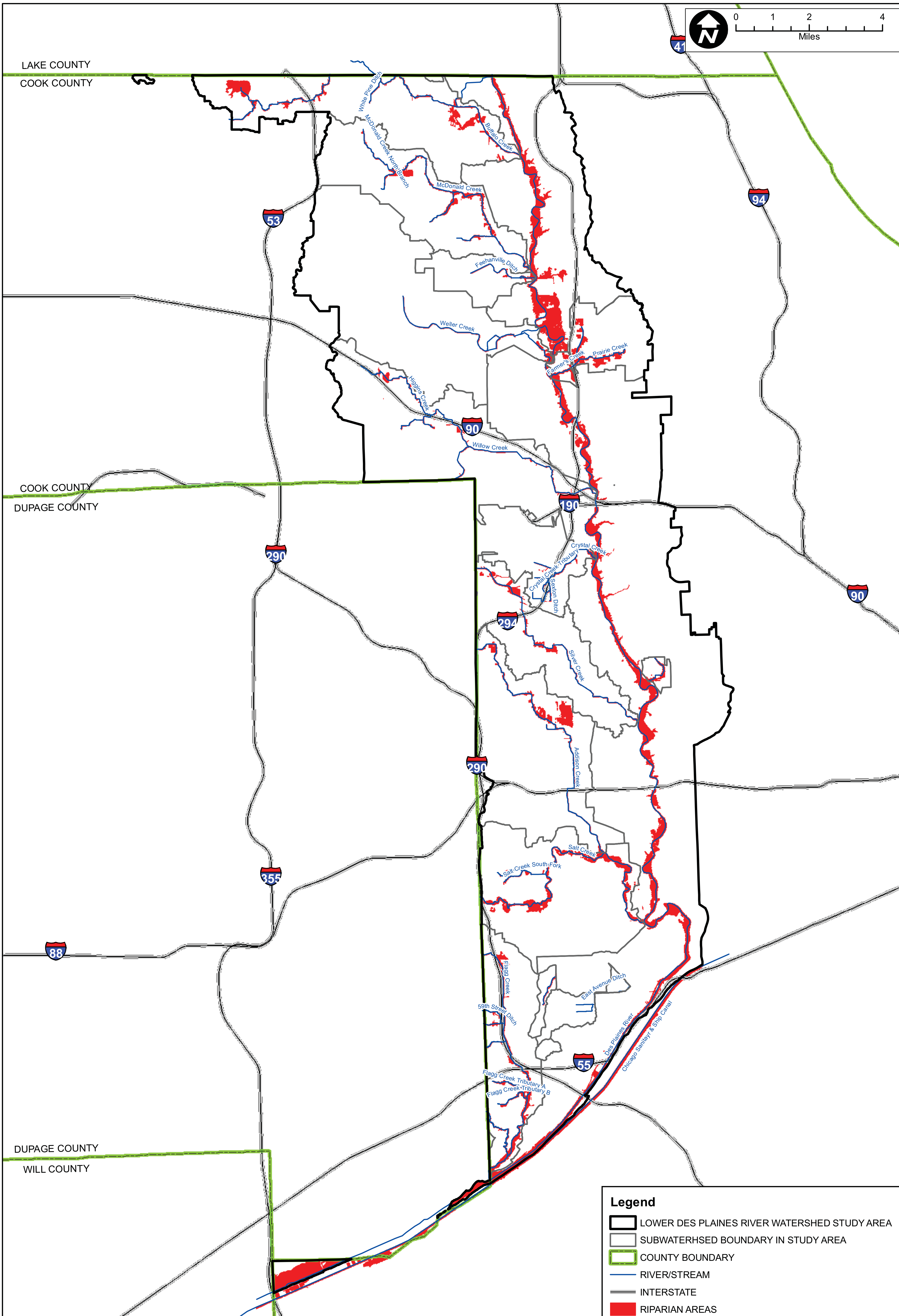

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METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO	**LOWER DES PLAINES RIVER WATERSHED RIPARIAN AREAS**	DATE: 09-13-2009
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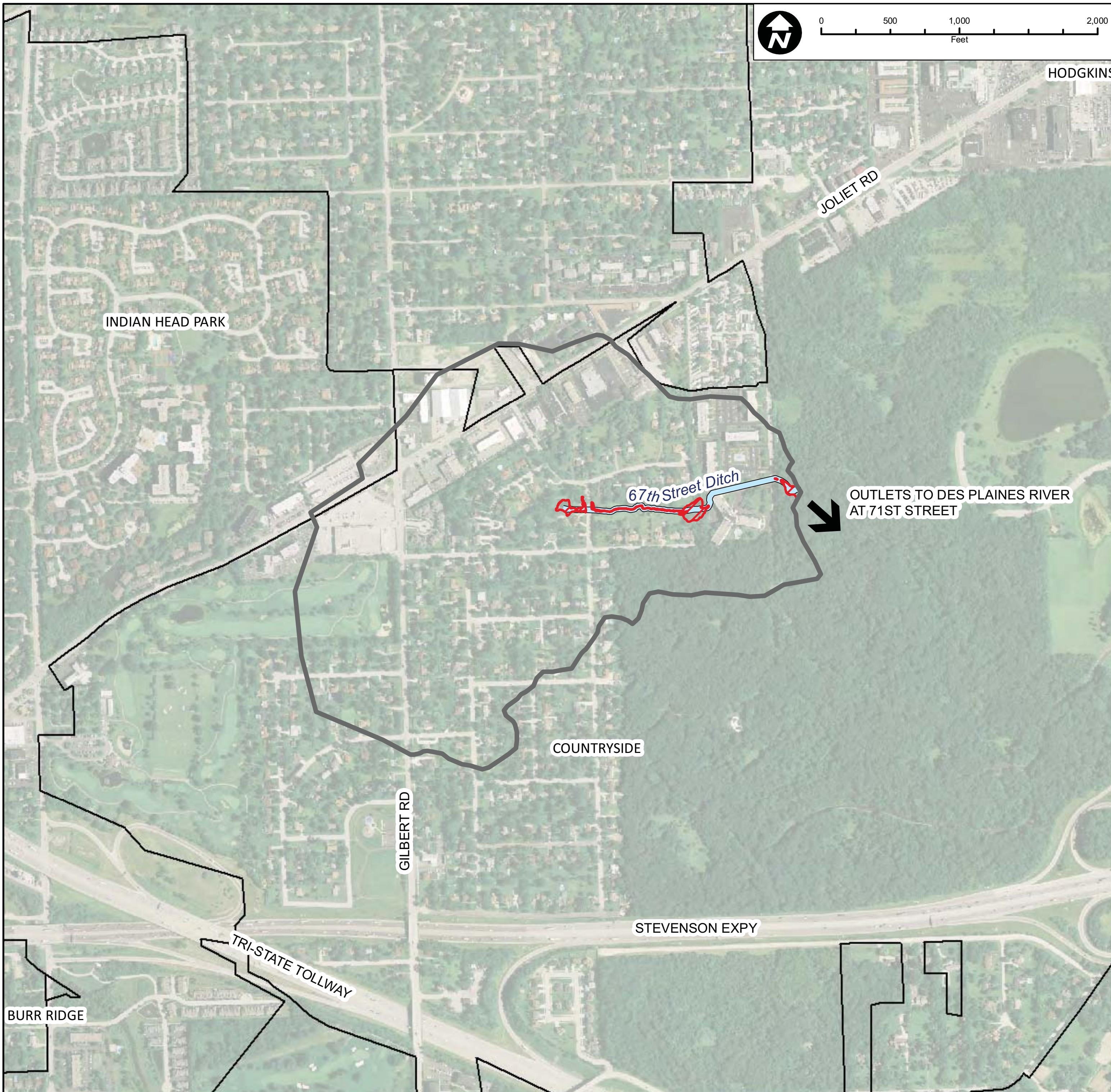
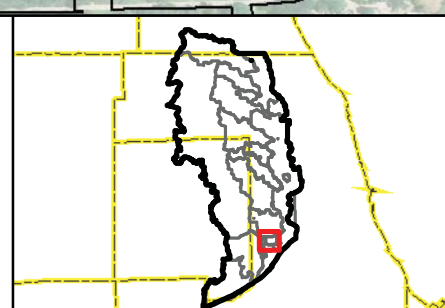


100-Year Storm Event Flood Inundation Without Project
Reservoir
Channel Improvements
Culvert/Bridge Modification
Levee/Floodwall
Approximate Creek Channel Location
Municipal Boundary
Watershed Boundary

Problem Areas

M Modeled
R Regional



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METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:

LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN
67TH STREET DITCH WATERSHED
TRIBUTARY OVERVIEW

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DSGN.	DRW	4-10	SCALE:	
DWN.			GIS USER	DRW
CHKD.			PLOT DATE	
FILE:				

FIGURE 3.1.1

Map Document: (Z:\MWRDGC\08-0043 Phase B\GIS\Exhibits\Meeting Maps\East Ave 67th Street DesPlaines Trib\67th Street Ditch Overall.mxd)
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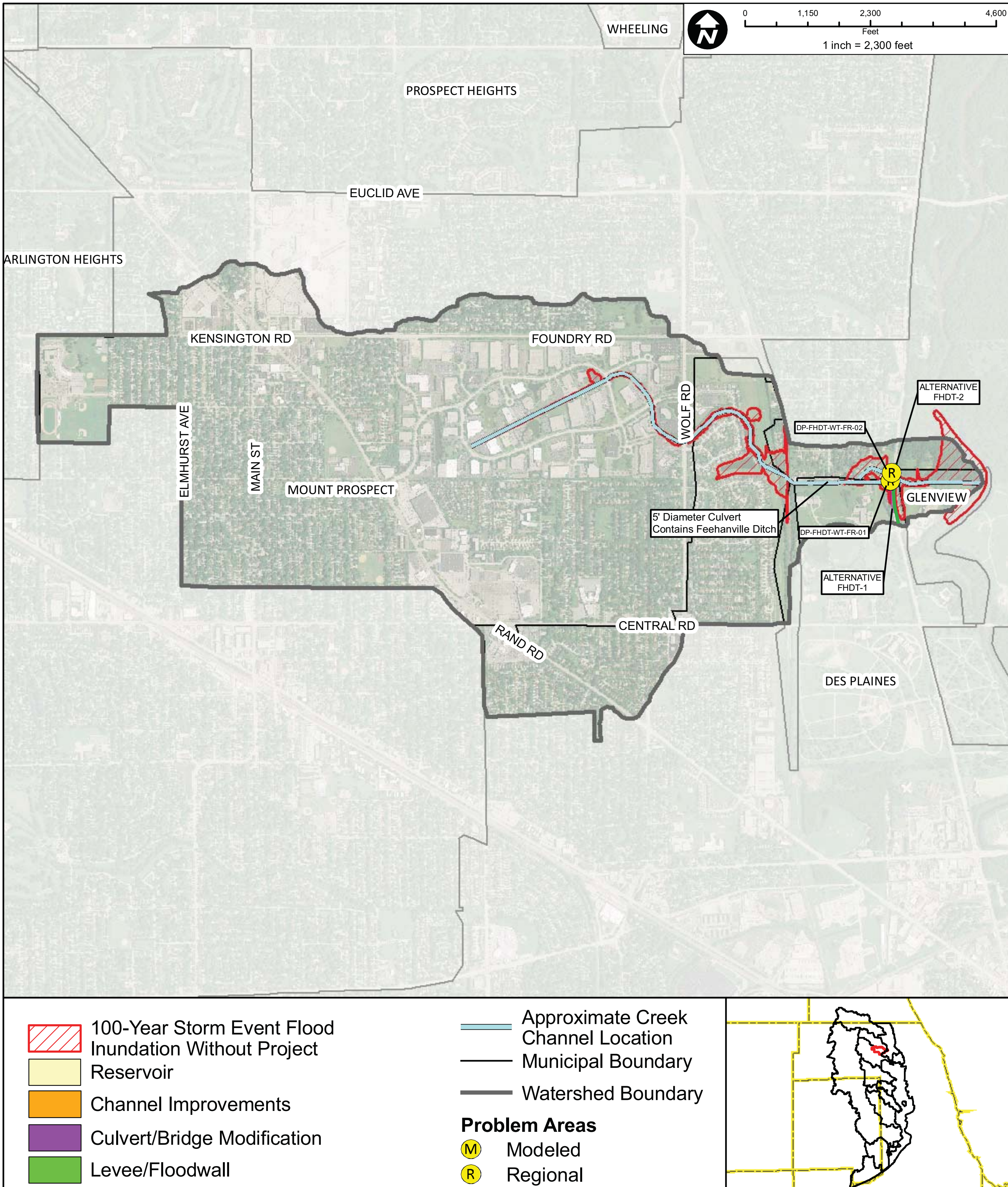

CLIENT:

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:

LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN FEEHANVILLE DITCH WATERSHED TRIBUTARY OVERVIEW

PROJ. NO.	08-0043
DATE:	03-23-2010
SHEET 1 OF 1	
DRAWING NO.	

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DSGN.	DRW	4-10	SCALE:	1"=2,300'
DWN.			GIS USER	DRW
CHKD.			PLOT DATE	
FILE:				

FIGURE 3.10.1

Map Document: (Z:\MWRDGC\08-0043 Phase B\GIS\Exhibits\Meeting Maps\Feehanville Willow McDonald Creeks\Feehandville Creek Overall.mxd)
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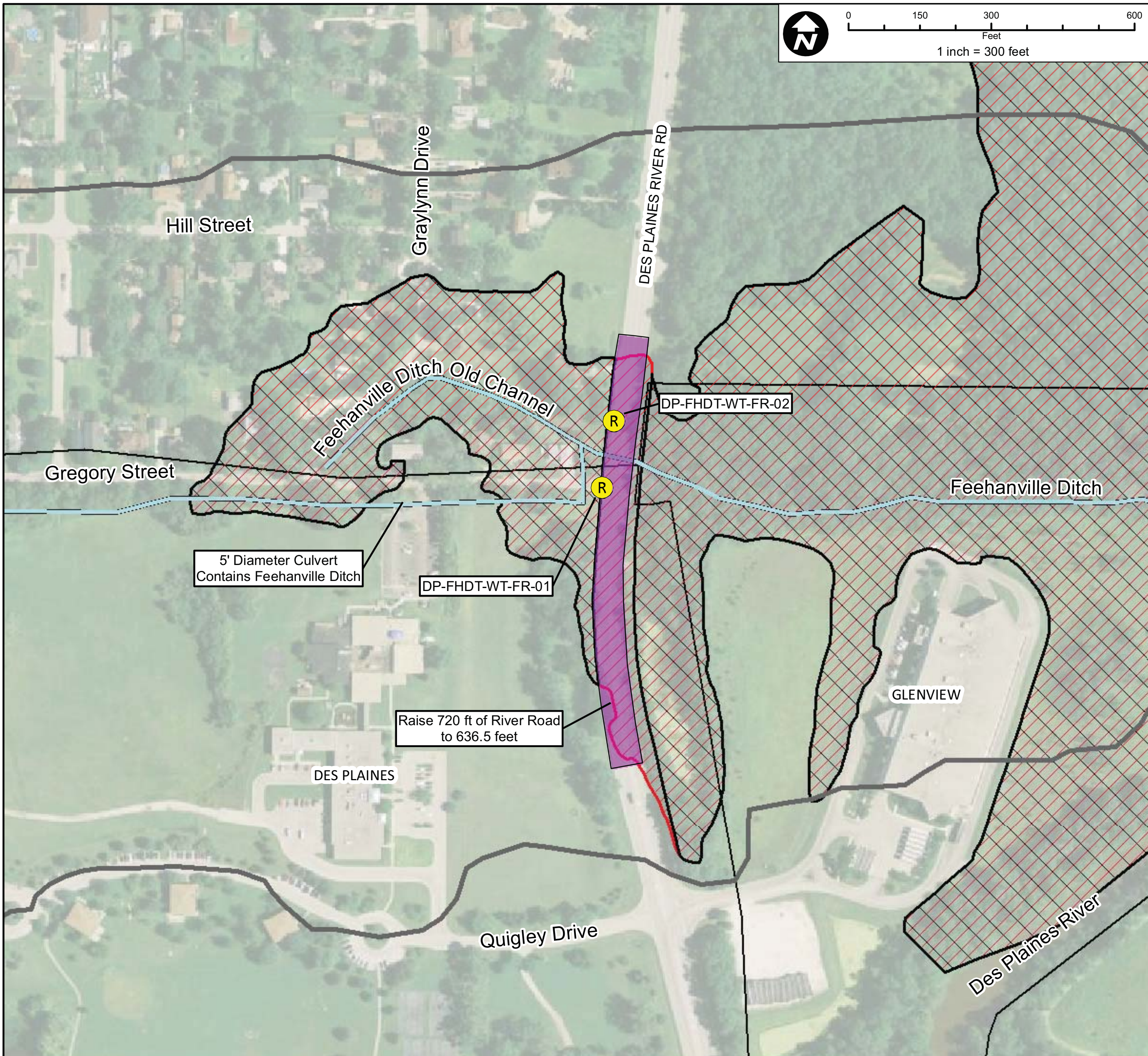


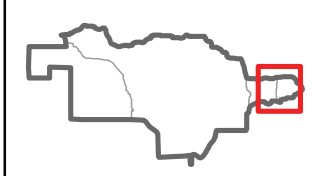
Subwatershed: Feehanville Ditch
Alternative: FHDT-1
Alternatives Description: Raise approximately 720 feet of Des Plaines River Road to 636.5 feet.

Concept Level Cost: $3,678,786
Benefits: $356,629
B/C Ratio: 0.1

Legend

- 100-Year Storm Event Flood Inundation Without Project
- 100-Year Storm Event Flood Inundation With Project
- Reservoir
- Culvert/Bridge Modification
- Channel Improvements
- Levee/Floodwall
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas
- M Modeled
- R Regional



CLIENT:
METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:
LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN
FEEHANVILLE DITCH WATERSHED
PROPOSED ALTERNATIVE FHDT-1

PROJ. NO. 08-0043
DATE: 07-15-2010
SHEET 1 OF 1
DRAWING NO.

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DSGN.	DRW	4-10	SCALE:	1"=300'
DWN.			GIS USER	DRW
CHKD.			PLOT DATE	
FILE:				

FIGURE 3.10.2

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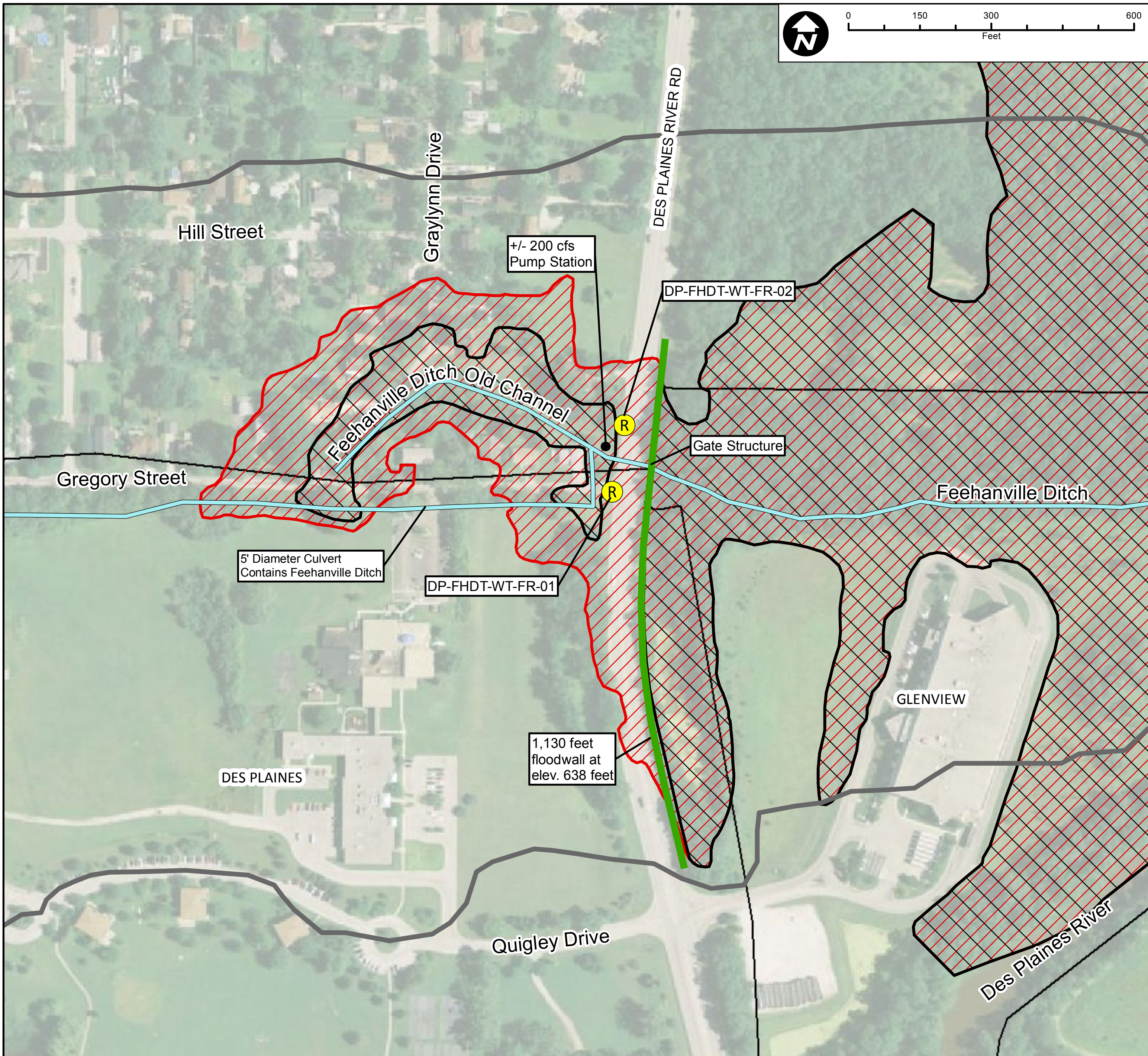

Subwatershed: Feehanville Ditch
Alternative: FHDT-2
Alternatives Description: Approximately 1,130 feet of Floodwall. Top of wall at elevation 638.0 feet. Includes 2 feet freeboard. Pump station required.

Concept Level Cost: $8,570,197
Benefits: $537,242
B/C Ratio: 0.06

Legend

- 100-Year Storm Event Flood Inundation Without Project
- 100-Year Storm Event Flood Inundation With Project
- Reservoir
- Culvert/Bridge Modification
- Channel Improvements
- Levee/Floodwall
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas

- M Modeled
- R Regional

CLIENT:
METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:
LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN
FEEHANVILLE DITCH WATERSHED
RECOMMENDED ALTERNATIVE FHDT-2

PROJ. NO.	08-0043				
DATE:	03-23-2010				
SHEET 1 OF 1					
DRAWING NO.					
DSGN.	DRW	4-10	SCALE:		
DWN.			GIS USER	DRW	
CHKD.			PLOT DATE		
FILE:					

FIGURE 3.10.3

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Map Document: (Z:\MWRDGC\08-0043 Phase B\Water\Feehanville\exhibits\FHDT-2.mxd)
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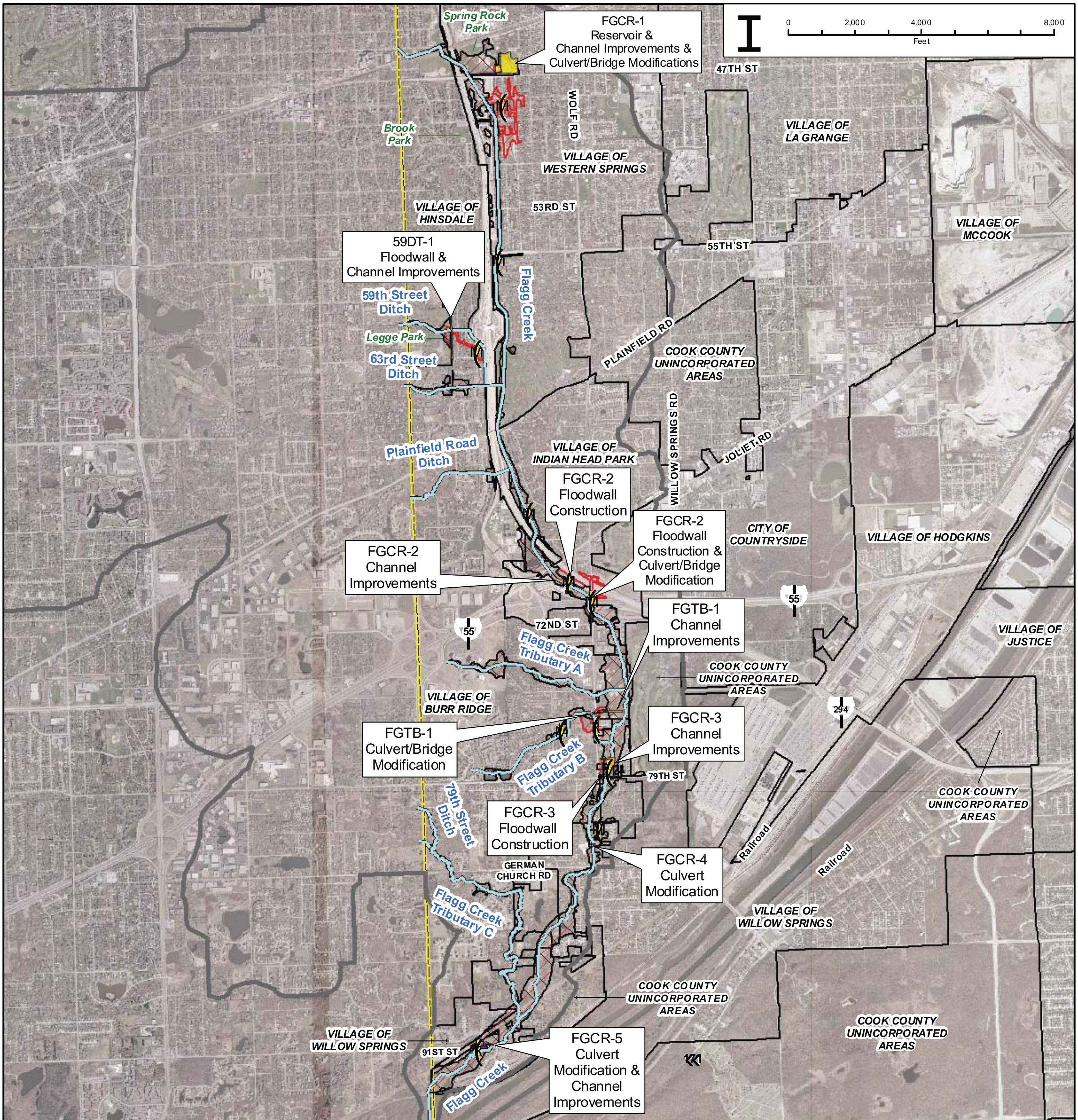
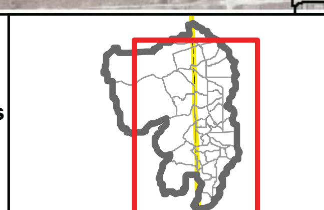


Legend

- 100-Year Storm Event Flood Inundation Without Project
- 100-Year Storm Event Flood Inundation With Project
- Reservoir
- Levee/Floodwall
- Culvert/Bridge Modification
- Channel Improvements
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas

- Modeled
- Regional



CLIENT:

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:

FLAGG CREEK WATERSHED PROPOSED ALTERNATIVE OVERALL

PROJ. NO.			
DATE:	09-08-2010		
SHEET	1	OF	1
DRAWING NO.			

DSGN.		SCALE	
DWN.		GIS USER	
CHKD.		PLOT DATE	
FILE:			

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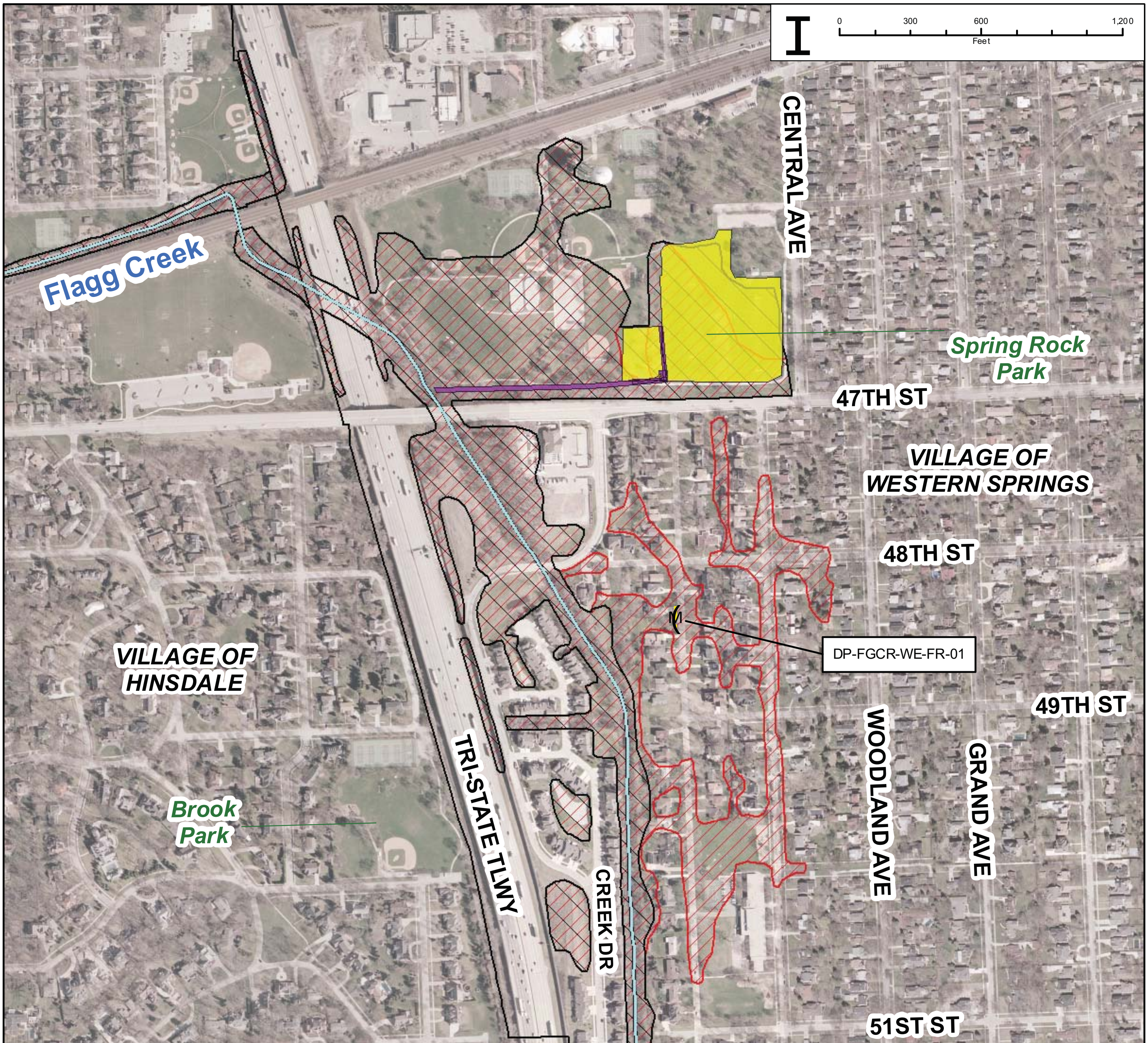
FIGURE 3.11.1



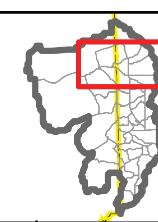
Subwatershed: Flagg Creek
Alternative: FGCR-1
Alternatives Description:
- Add and optimize storage in Spring Rock Park by lowering soccer fields appx. 8 ft. to 633
- Lower high spots to 641 in area to west of soccer fields to allow water to flow freely
- Add gravity outlet with flap gate
- Tie in to existing swale
- Appx. 32 A-F additional storage

Concept Level Cost: $6,229,554
Benefits: $290,306
B/C Ratio: 0.05

Legend

- 100-Year Storm Event Flood Inundation Without Project
- 100-Year Storm Event Flood Inundation With Project
- Reservoir
- Levee/Floodwall
- Culvert/Bridge Modification
- Channel Improvements
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas
- Modeled
- Regional



CLIENT:

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:

LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN FLAGG CREEK WATERSHED RECOMMENDED ALTERNATIVE FGCR-1

PROJ. NO.
DATE: 09-08-2010
SHEET 1 OF 1
DRAWING NO.

FIGURE 3.11.9

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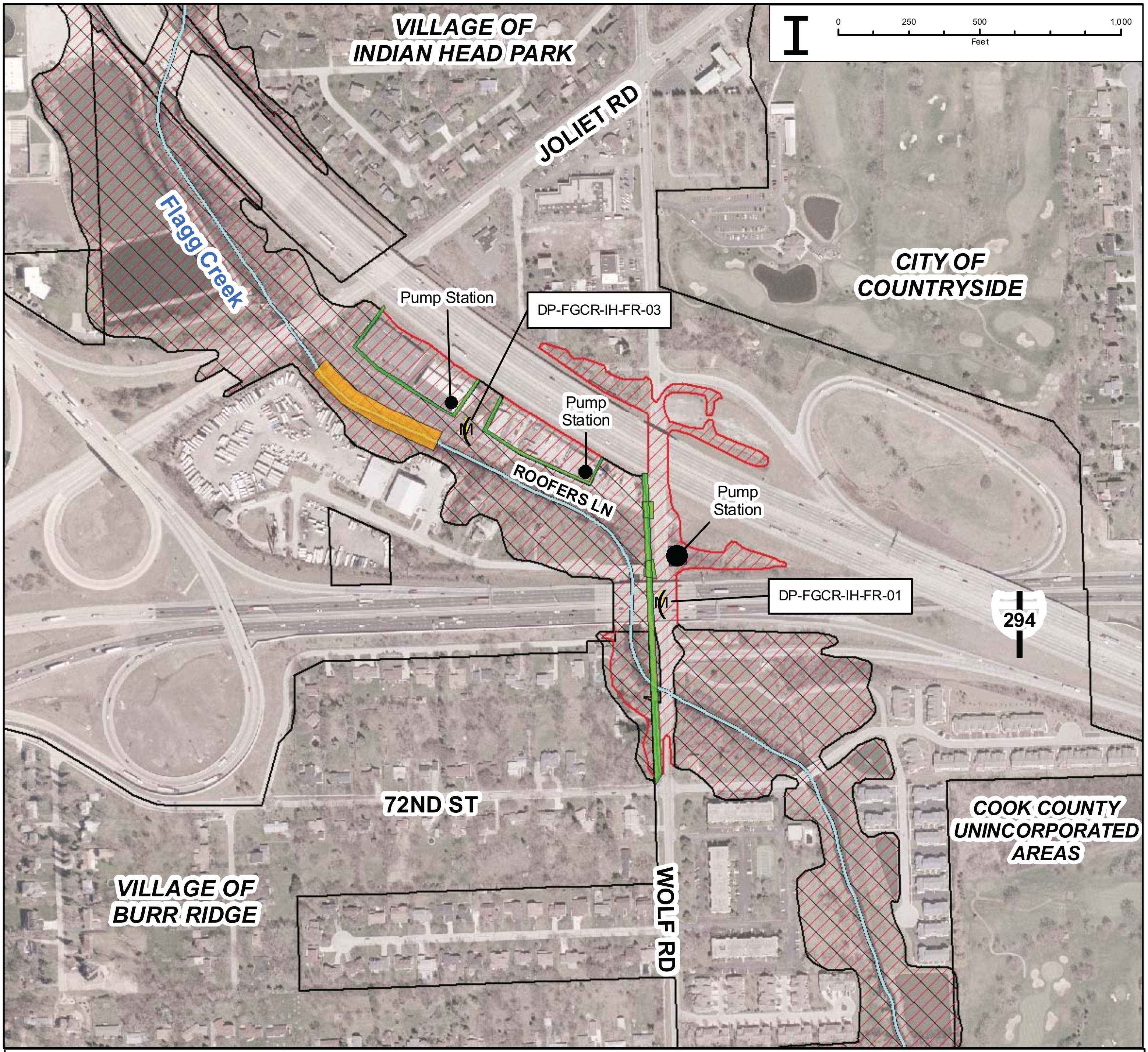
CHKD.			PLOT DATE	
FILE:				



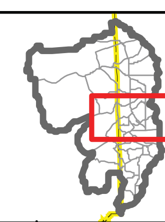
Subwatershed: Flagg Creek
Alternative: FGCR-2
Alternatives Description:
- Floodwall to 638.4 (3ft freeboard)
- Floodwall to 638.6 (3ft freeboard)
- Channel Improvements (not needed if FGCR-1 & 59DT-1 are selected)
- 1840 gpm pump at east building
- 1840 gpm pump at west building
- Wolf Floodwall. 1ft freeboard= 634.8 to 635.7
- Pump Station for 0.2 square mile drainage area (Q100=85cfs)
- Raise Roofers Lane Entrance appx 2 ft.
- Raise 71st Pl. appx. 2.5 ft.

Concept Level Cost: $10,563,338
Benefits: $183,916
B/C Ratio: 0.02

Legend

- 100-Year Storm Event Flood Inundation Without Project
- 100-Year Storm Event Flood Inundation With Project
- Reservoir
- Levee/Floodwall
- Culvert/Bridge Modification
- Channel Improvements
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas
- Modeled
- Regional



CLIENT: **METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO**	TITLE: **LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN FLAGG CREEK WATERSHED RECOMMENDED ALTERNATIVE FGCR-2**	PROJ. NO. / DATE: 09-08-2010 / SHEET 1 OF 1 / DRAWING NO.

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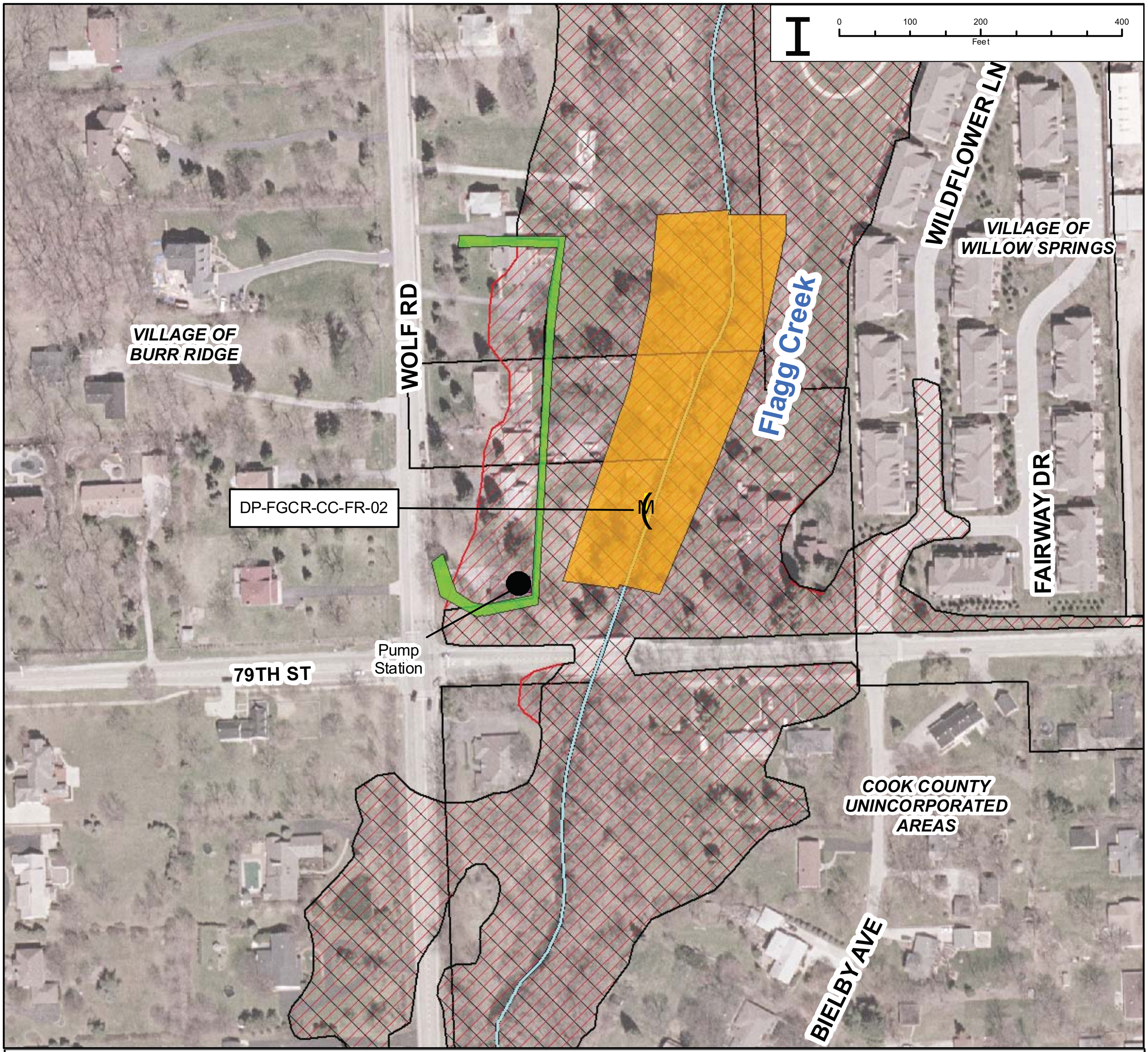
DWN.			GIS USER	
CHKD.			PLOT DATE	
FILE:				

FIGURE 3.11.10



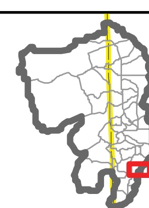
Subwatershed: Flagg Creek
Alternative: FGCR-3
Alternatives Description:
- Floodwall and pump station on west side of the channel
- Channel improvements including approximately 6 M-F mitigation storage

Concept Level Cost: $3,689,102
Benefits: $222,718
B/C Ratio: 0.06

Legend

- 100-Year Storm Event Flood Inundation Without Project
- 100-Year Storm Event Flood Inundation With Project
- Reservoir
- Levee/Floodwall
- Culvert/Bridge Modification
- Channel Improvements
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas
- Modeled
- Regional



CLIENT:

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:

LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN FLAGG CREEK WATERSHED RECOMMENDED ALTERNATIVE FGCR-3

PROJ. NO.	
DATE:	09-08-2010
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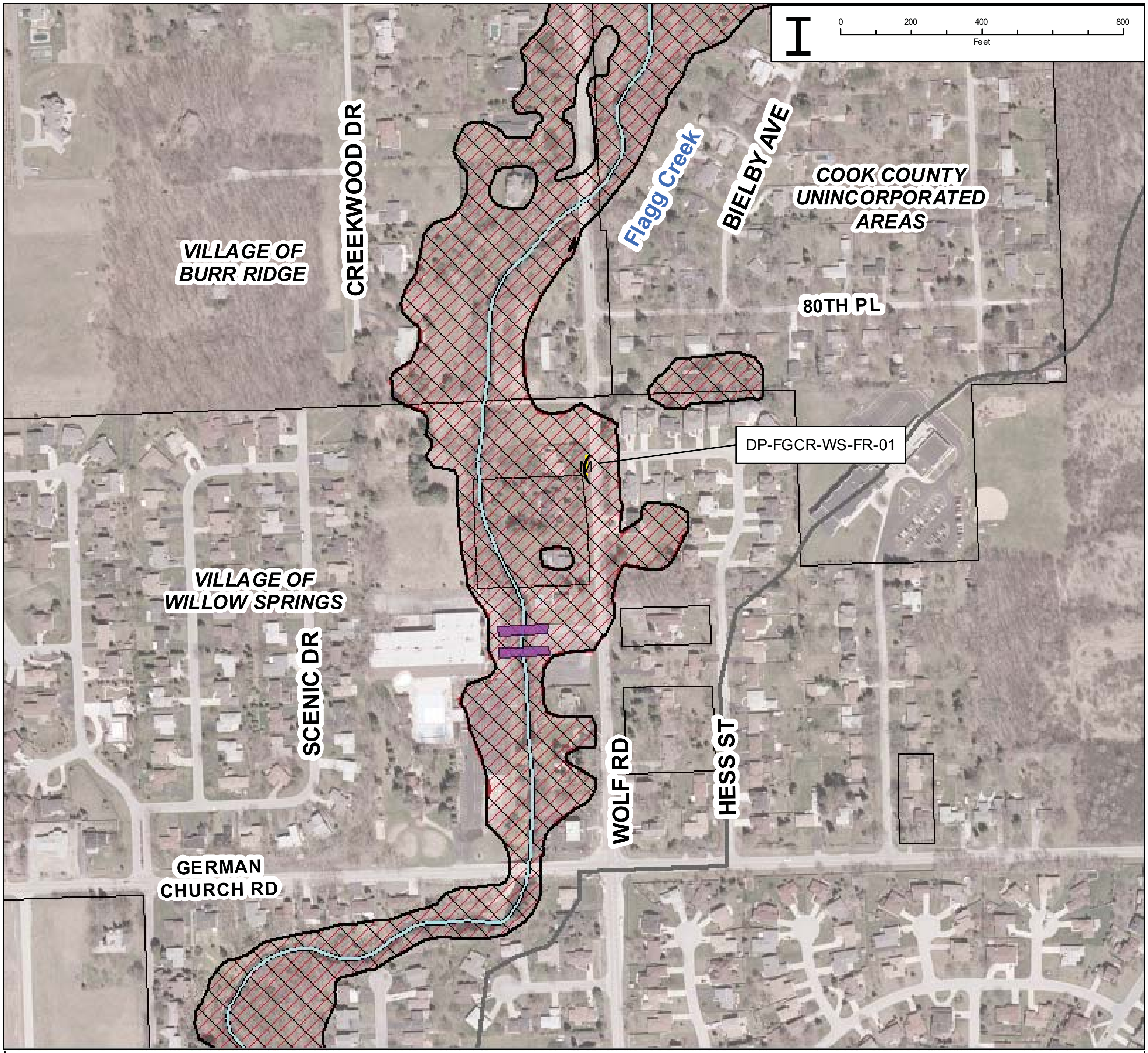
CHKD.			PLOT DATE	
FILE:				

FIGURE 3.11.11



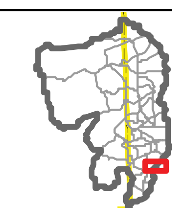
Subwatershed: Flagg Creek
Alternative: FGCR-4
Alternatives Description: - Remove/replace pedestrian and vehicle entrance bridges over Flagg Creek
- Replace auto entrance

Concept Level Cost: $668,351
Benefits: $489,707
B/C Ratio: 0.7

Legend

- 100-Year Storm Event Flood Inundation Without Project
- 100-Year Storm Event Flood Inundation With Project
- Reservoir
- Levee/Floodwall
- Culvert/Bridge Modification
- Channel Improvements
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas
- Modeled
- Regional



CLIENT: **METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO**	TITLE: **LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN FLAGG CREEK WATERSHED RECOMMENDED ALTERNATIVE FGCR-4**	PROJ. NO. / DATE: 02-17-2011 / SHEET 1 OF 1 / DRAWING NO.

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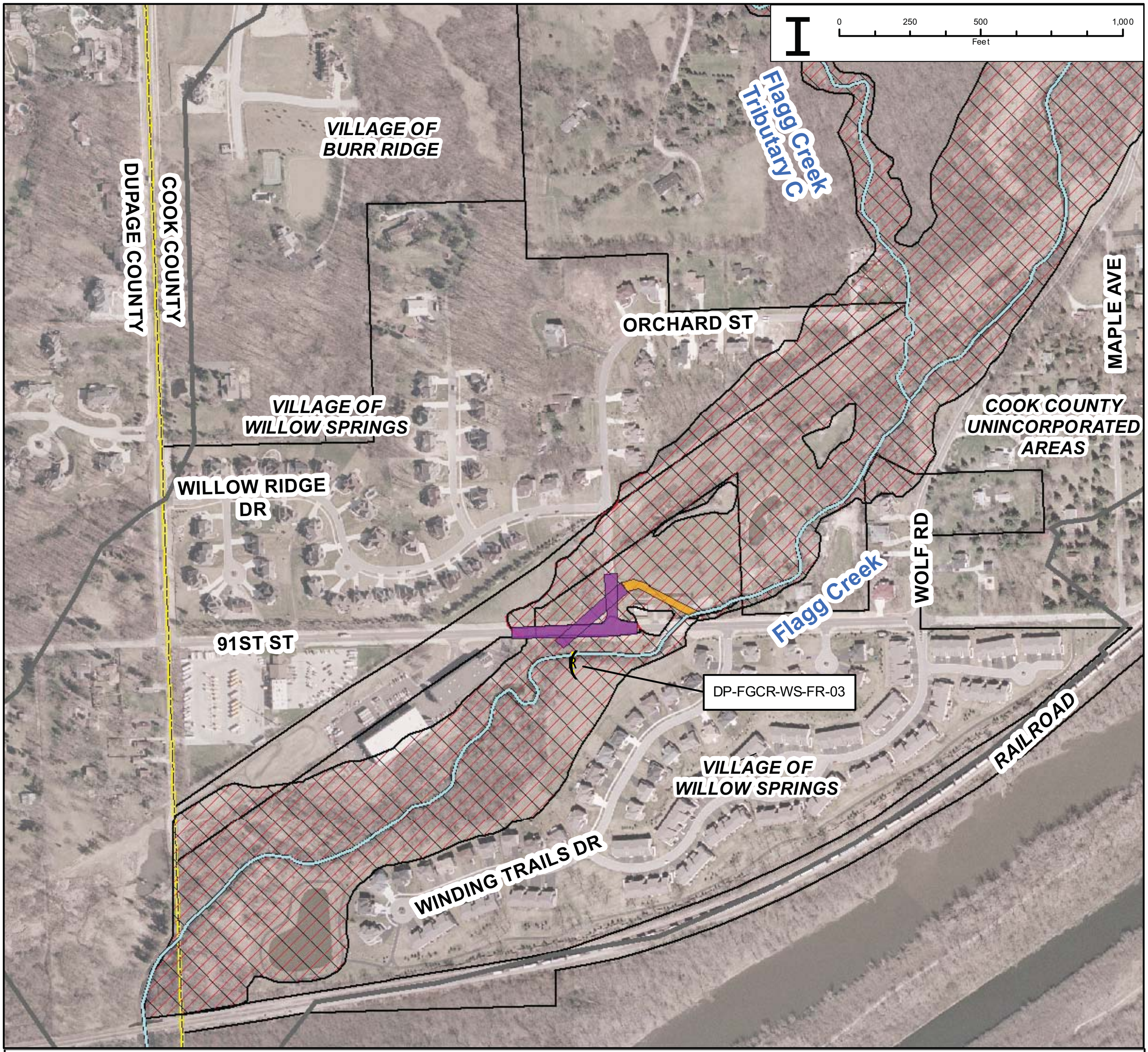
DWN.		GIS USER	
CHKD.		PLOT DATE	
FILE:			

FIGURE 3.11.12



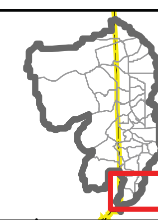
Subwatershed: Flagg Creek
Alternative: FGCR-5
Alternatives Description: - Raise roadway west of structure to 602.1 for 0.5ft freeboard above the 100-year flood inundation
- 2 - 10x8 Box Culverts under 91st Street and Orchard Street

Concept Level Cost: $2,455,384
Benefits: $26,676
B/C Ratio: 0.01

Legend

- 100-Year Storm Event Flood Inundation Without Project
- 100-Year Storm Event Flood Inundation With Project
- Reservoir
- Levee/Floodwall
- Culvert/Bridge Modification
- Channel Improvements
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas
- Modeled
- Regional



CLIENT:

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:

LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN FLAGG CREEK WATERSHED RECOMMENDED ALTERNATIVE FGCR-5

PROJ. NO.
DATE: 09-08-2010
SHEET 1 OF 1
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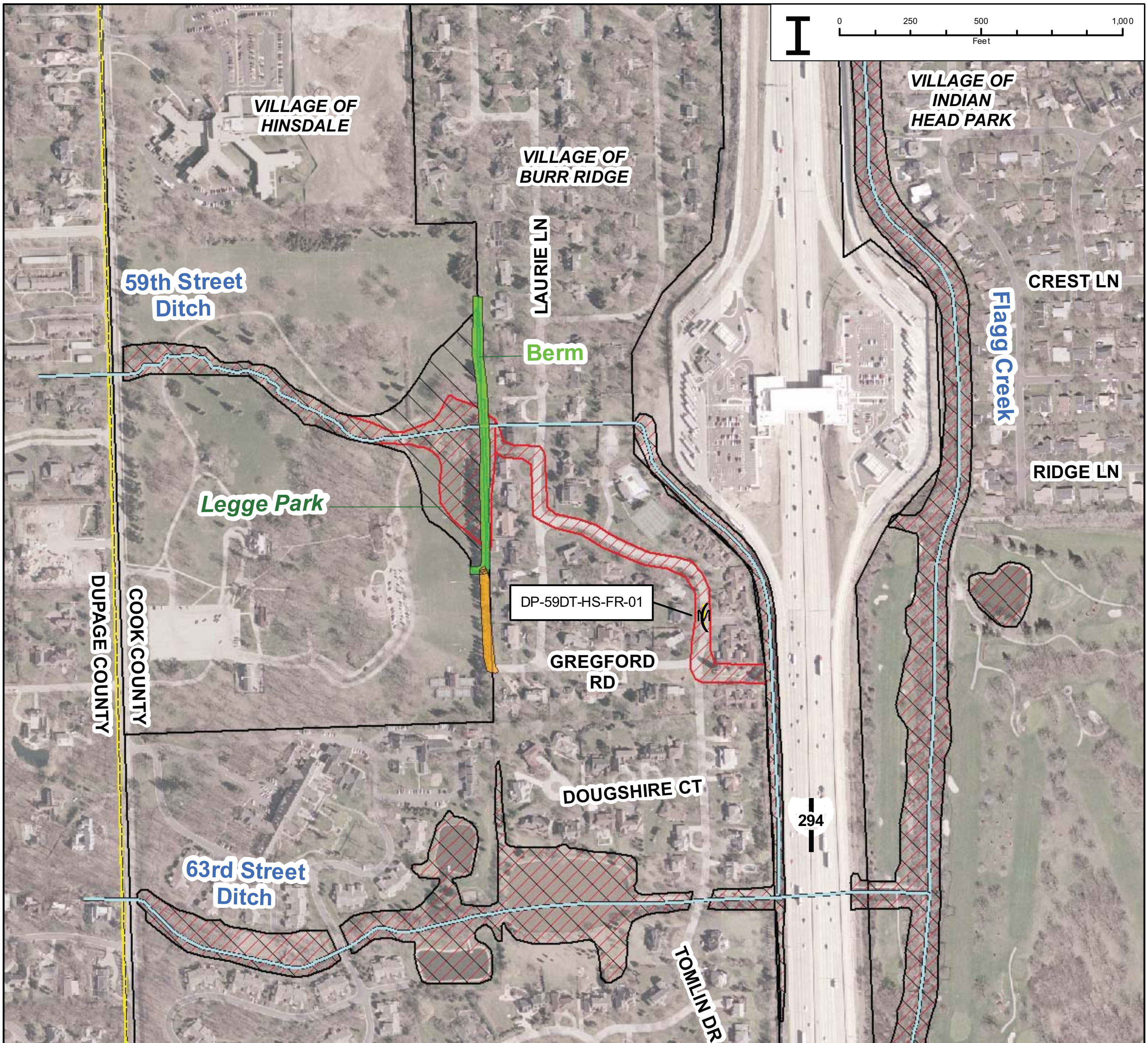
DWN.			GIS USER	
CHKD.			PLOT DATE	
FILE:				

FIGURE 3.11.13



Subwatershed: Flagg Creek
Alternative: 59DT-1
Alternatives Description: - Earthen Berm to 659.6: 3ft freeboard (WSEL=656.6)
- Tie in to existing drainage to street
- Emergency spillway to existing swale
- 2 AC of Flood Easement required in Legge Park

Concept Level Cost: $969,361
Benefits: $126,823
B/C Ratio: 0.1

Legend

- 100-Year Storm Event Flood Inundation Without Project
- 100-Year Storm Event Flood Inundation With Project
- Reservoir
- Levee/Floodwall
- Culvert/Bridge Modification
- Channel Improvements
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas
- Modeled
- Regional

CLIENT:	TITLE:	
METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO	LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN FLAGG CREEK WATERSHED RECOMMENDED ALTERNATIVE 59DT-1	PROJ. NO. DATE: 09-08-2010 SHEET 1 OF 1 DRAWING NO.

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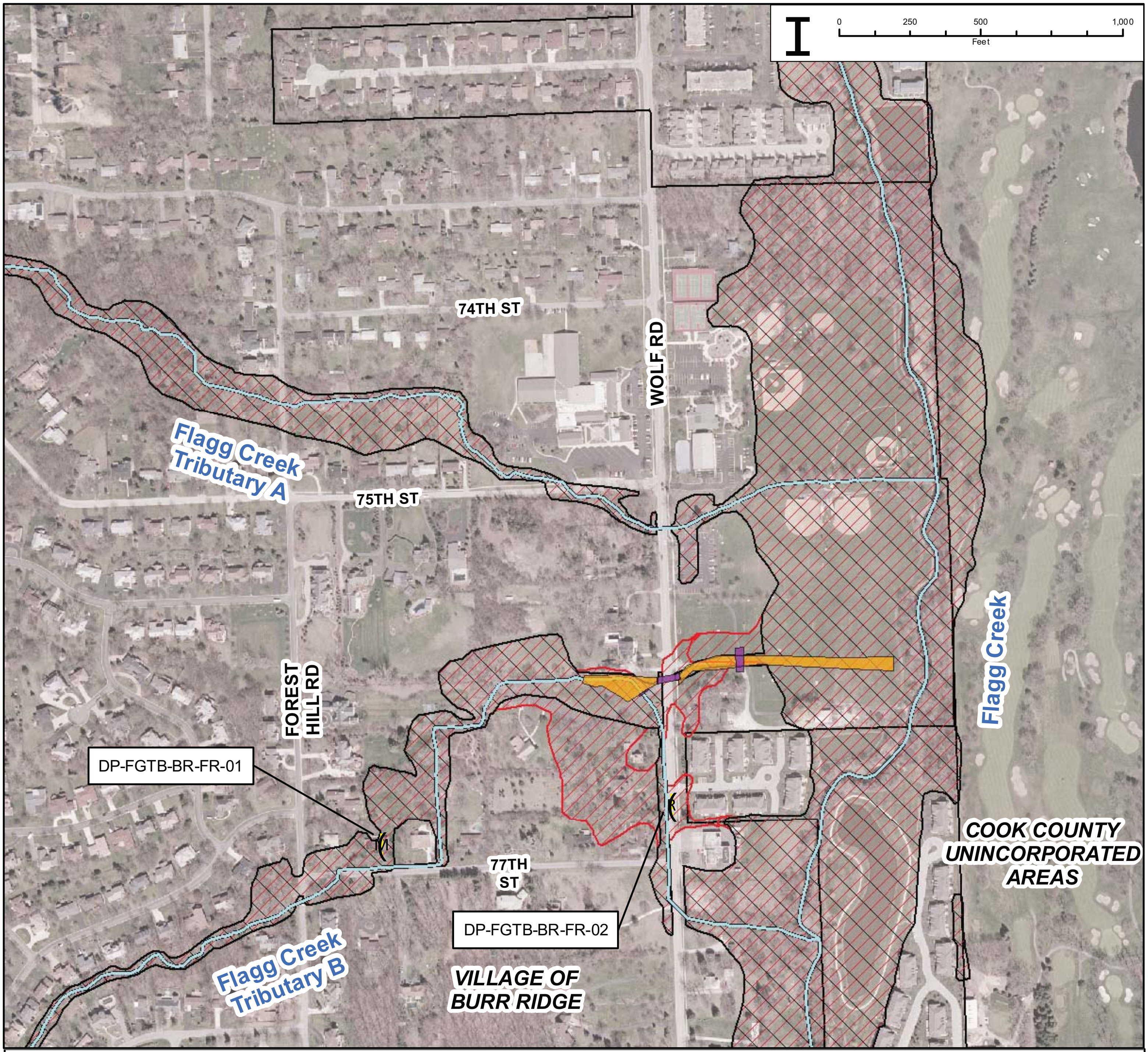
DWN.			GIS USER	
CHKD.			PLOT DATE	
FILE:				

FIGURE 3.11.14



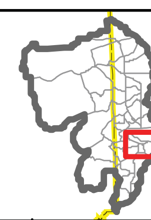
Subwatershed: Flagg Creek
Alternative: FGTB-1
Alternatives Description:
- New outfall channel for Flagg Trib B 3ft excavated, 15ft BW, 27ft TW
- Channel improvements and mitigation storage
- Inline concrete weir
- Two 4ft diameter culverts
- New park district maintenance & pedestrian bridge

Concept Level Cost: $815,713
Benefits: $1,831,974
B/C Ratio: 2.2

Legend

- 100-Year Storm Event Flood Inundation Without Project
- 100-Year Storm Event Flood Inundation With Project
- Reservoir
- Levee/Floodwall
- Culvert/Bridge Modification
- Channel Improvements
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas
- Modeled
- Regional



CLIENT:

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:

LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN FLAGG CREEK WATERSHED RECOMMENDED ALTERNATIVE FGTB-1

PROJ. NO.
DATE: 09-08-2010
SHEET 1 OF 1
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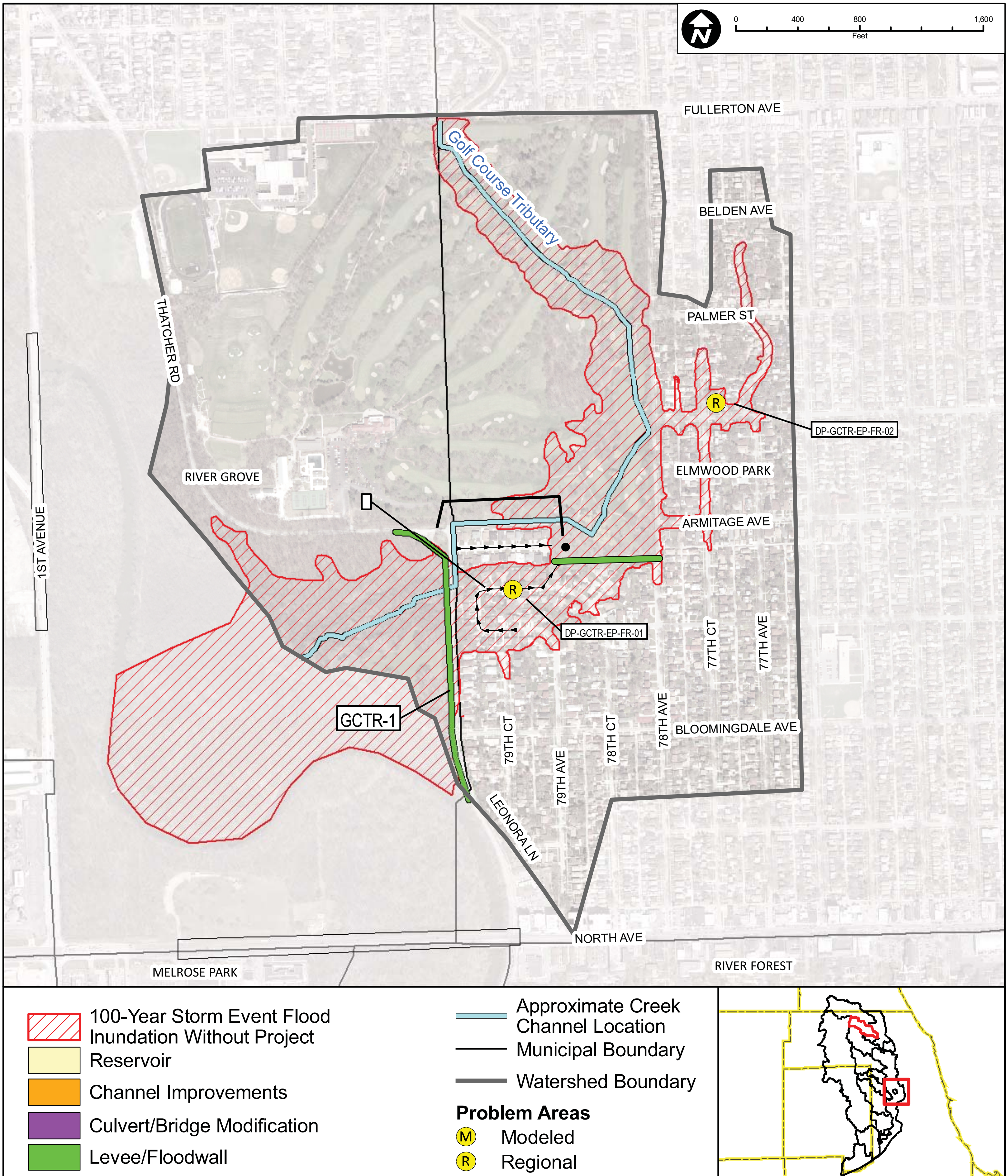
DWN.			GIS USER	
CHKD.			PLOT DATE	
FILE:				

FIGURE 3.11.15



CLIENT:

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:

LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN
GOLF COURSE TRIBUTARY WATERSHED
TRIBUTARY OVERVIEW

PROJ. NO.	08-0043
DATE:	05-10-2010
SHEET	1 OF 1
DRAWING NO.	

FIGURE 3.12.1

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DWN.			GIS USER	DRW
CHKD.			PLOT DATE	
FILE:				

Map Document: (Z:\MWRDGC\08-0043 Phase B\GIS\Exhibits\Meeting Maps\Crystal Silver Golf\Golf Overall.mxd)
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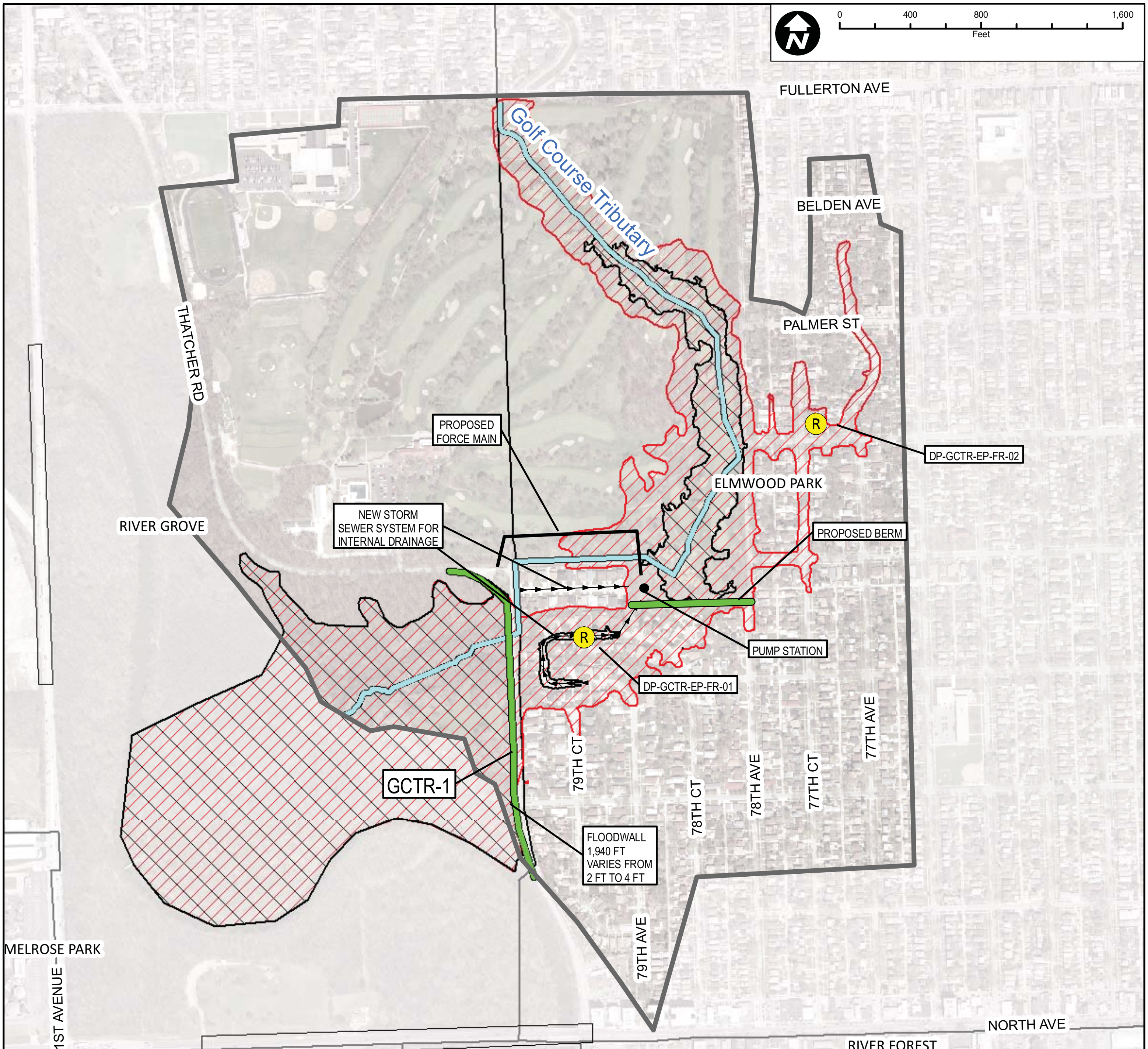

Subwatershed: Golf Course Tributary

Alternative: GCTR-1

Alternatives Description:

1,940 ft long floodwall.
300 cfs pump will address interior drainage.
new storm sewer sytem on Courtland Drive and Country Club Lane to convey flow to pump.

Concept Level Cost: $15,486,491
Benefits: $5,170,087
B/C Ratio: 0.33

Legend

- 100-Year Storm Event Flood Inundation Without Project
- Reservoir
- 100-Year Storm Event Flood Inundation With Project
- Culvert/Bridge Modification
- Channel Improvements
- Levee/Floodwall
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas

- M Modeled
- R Regional

CLIENT:

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:

LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN
GOLF COURSE TRIBUTARY WATERSHED
RECOMMENDED ALTERNATIVE GTCR-1

PROJ. NO.	08-0043
DATE:	05-07-2010
SHEET	1 OF 1
DRAWING NO.	

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DSGN.	DRW	4-10	SCALE	
DWN.			GIS USER	DRW
CHKD.			PLOT DATE	
FILE:				

FIGURE 3.12.2

Map Document: (Z:\MWRDGC\08-0043 Phase B\GIS\Exhibits\Meeting Maps\Crystal Silver Golf\Golf Detailed Sheets.mxd)
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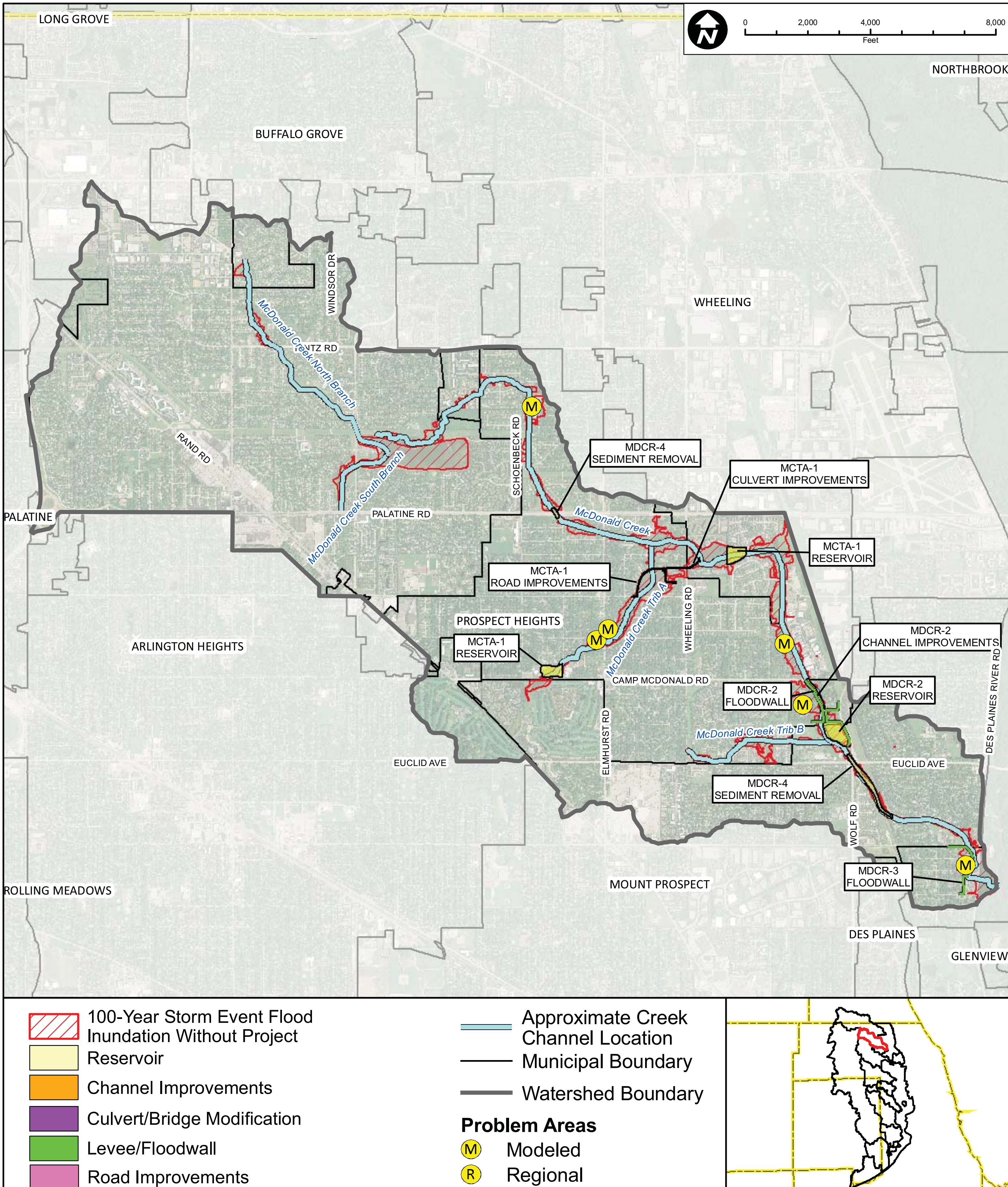

CLIENT:

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:

LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN MCDONALD CREEK WATERSHED TRIBUTARY OVERVIEW

PROJ. NO.	08-0043
DATE:	04-29-2010
SHEET 1 OF 1	
DRAWING NO.	

FIGURE 3.13.1

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DSGN.	DRW	4-10	SCALE:	
DWN.			GIS USER	DRW
CHKD.			PLOT DATE	
FILE:				

Map Document: (Z:\MWRDGC\08-0043 Phase B\GIS\Exhibits\Meeting Maps\Feehanville Willow McDonald Creeks\McDonald Creek Overall.mxd)
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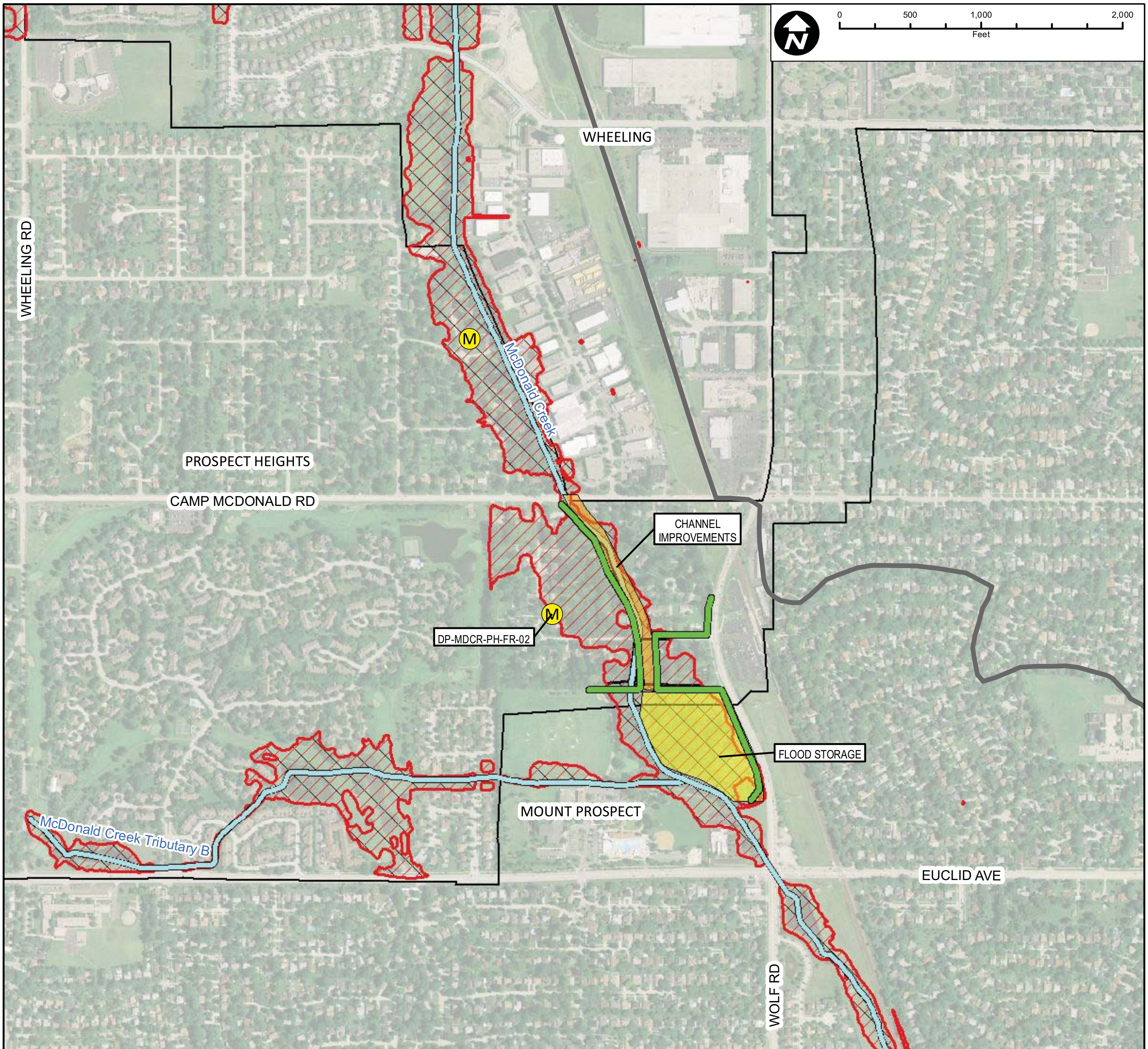


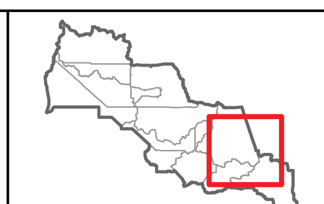
Subwatershed: McDonald Creek
Alternative: MDCR-2
Alternatives Description: Construct approximately 4,100 feet of Floodwall along McDonald Creek.
Channel improvements south of Camp McDonald Road.
Provide 20 acre-feet of flood storage on non-developed private property in Mount Prospect.

Concept Level Cost: $15,625,015
Benefits: $1,841,550
B/C Ratio: 0.1

Legend

- 100-Year Storm Event Flood Inundation Without Project
- Reservoir
- Levee/Floodwall
- 100-Year Storm Event Flood Inundation With Project
- Culvert/Bridge Modification
- Channel Improvements
- Road Improvement
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas
- M Modeled
- R Regional



CLIENT: METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO	TITLE: LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN MCDONALD CREEK WATERSHED RECOMMENDED ALTERNATIVE MDCR-2	PROJ. NO. 08-0043	
		DATE: 03-23-2010	
		SHEET 1 OF 1	
		DRAWING NO.	

CHRISTOPHER B. BURKE ENGINEERING, LTD. 9575 W. Higgins Road, Suite 600 · Rosemont, Illinois 60018 · (847) 823-0500	DSGN.	DRW	4-10	SCALE	
	DWN.			GIS USER	DRW
	CHKD.			PLOT DATE	
	FILE:				

FIGURE 3.13.8

Map Document: (Z:\MWRDGC\08-0043 Phase B\GIS\Exhibits\Meeting Maps\Feehanville Willow McDonald Creeks\McDonald Creek Detailed Sheets.mxd)
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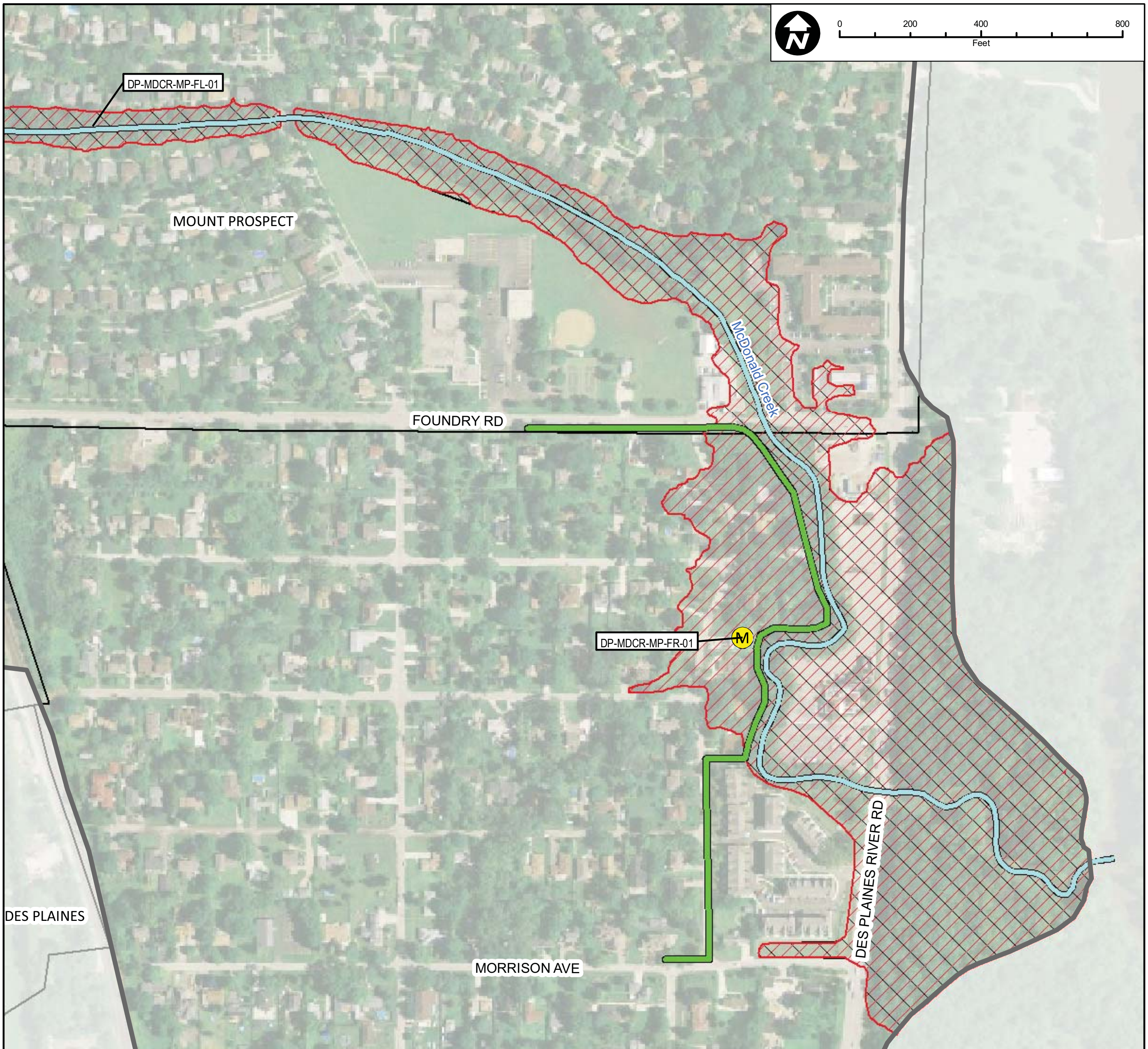


Subwatershed: McDonald Creek
Alternative: MDCR-3
Alternatives Description: Construct approximately 2,200 feet of Floodwall to remove 8 structures from 100-year backwater of Des Plaines River.

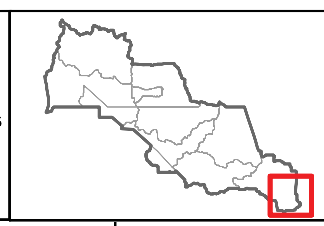
Concept Level Cost: $10,368,339
Benefits: $2,438,071
B/C Ratio: 0.2

Legend

- 100-Year Storm Event Flood Inundation Without Project
- Reservoir
- Levee/Floodwall
- 100-Year Storm Event Flood Inundation With Project
- Culvert/Bridge Modification
- Channel Improvements
- Road Improvement
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas

- M Modeled
- R Regional



CLIENT: **METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO**	TITLE: **LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN MCDONALD CREEK WATERSHED RECOMMENDED ALTERNATIVE MDCR-3**	PROJ. NO. 08-0043	
		DATE: 03-23-2010	
		SHEET 1 OF 1	
		DRAWING NO.	

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DSGN.	DRW	4-10	SCALE	
DWN.			GIS USER	DRW
CHKD.			PLOT DATE	
FILE:				

FIGURE 3.13.9

Map Document: (Z:\MWRDGC\08-0043 Phase B\GIS\Exhibits\Meeting Maps\Feehanville Willow McDonald Creeks\McDonald Creek Detailed Sheets.mxd)
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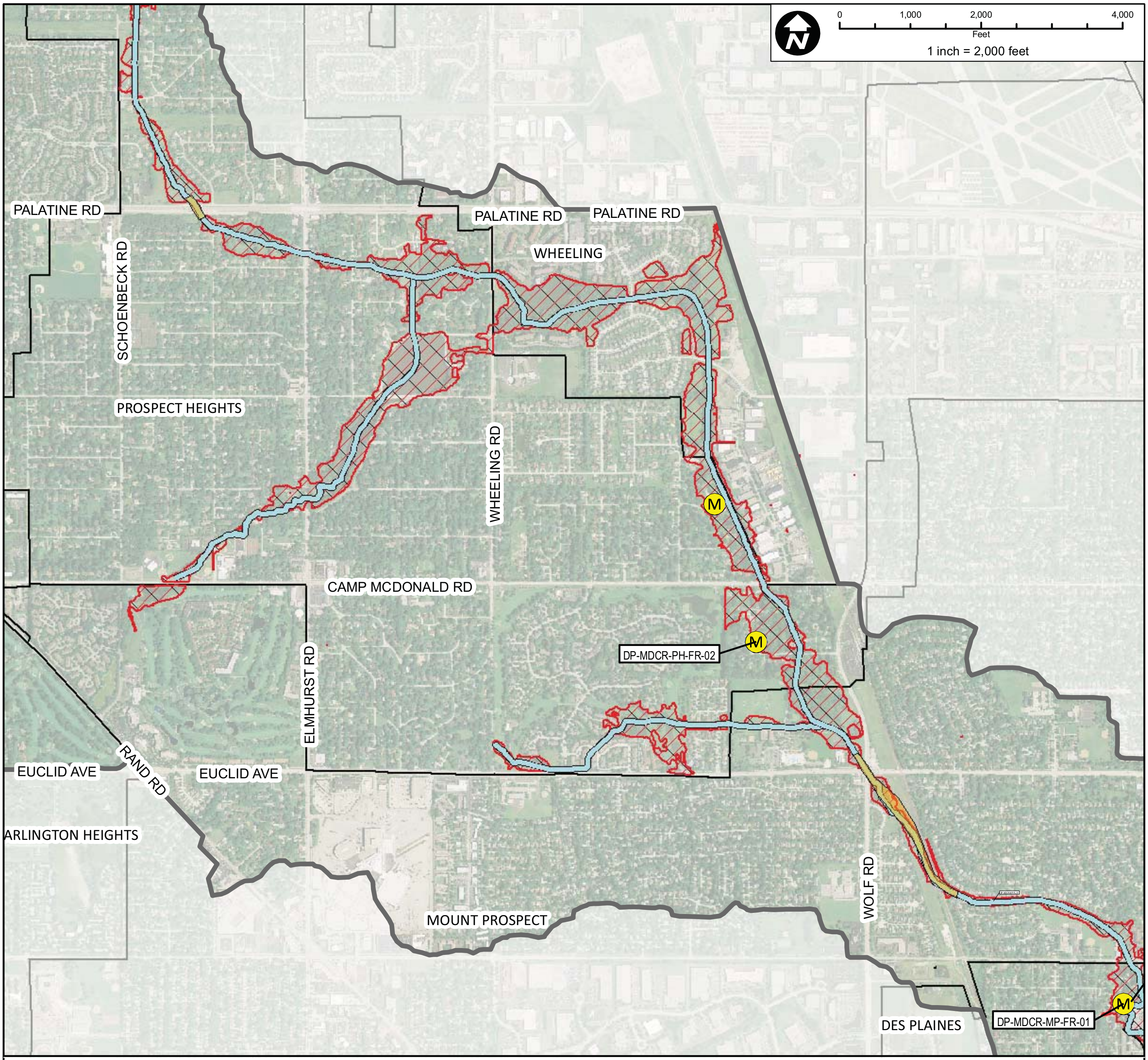


Subwatershed: McDonald Creek
Alternative: MDCR-4
Alternatives Description:

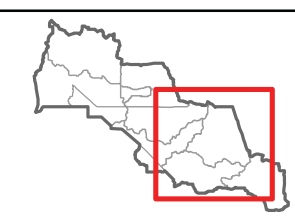
Sediment removal on McDonald Creek at Palatine Road culvert and between Euclid Avenue and Kensington Road.

Concept Level Cost: $89,757
Benefits: $880
B/C Ratio: 0.01

Legend

- 100-Year Storm Event Flood Inundation Without Project
- Reservoir
- Levee/Floodwall
- 100-Year Storm Event Flood Inundation With Project
- Culvert/Bridge Modification
- Channel Improvements
- Road Improvement
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas
- L Local
- M Modeled
- R Regional



CLIENT:
METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:
LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN
MCDONALD CREEK WATERSHED
PROPOSED ALTERNATIVE MDCR-4

PROJ. NO.	08-0043
DATE:	03-23-2010
SHEET	1 OF 1
DRAWING NO.	

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DSGN.	DRW	4-10	SCALE	1' = 2,400'
DWN.			GIS USER	DRW
CHKD.			PLOT DATE	
FILE:				

FIGURE 3.13.10

Map Document: (Z:\MWRDGC\08-0043 Phase B\GIS\Exhibits\Meeting Maps\Feehanville Willow McDonald Creeks\McDonald Creek Detailed Sheets.mxd)
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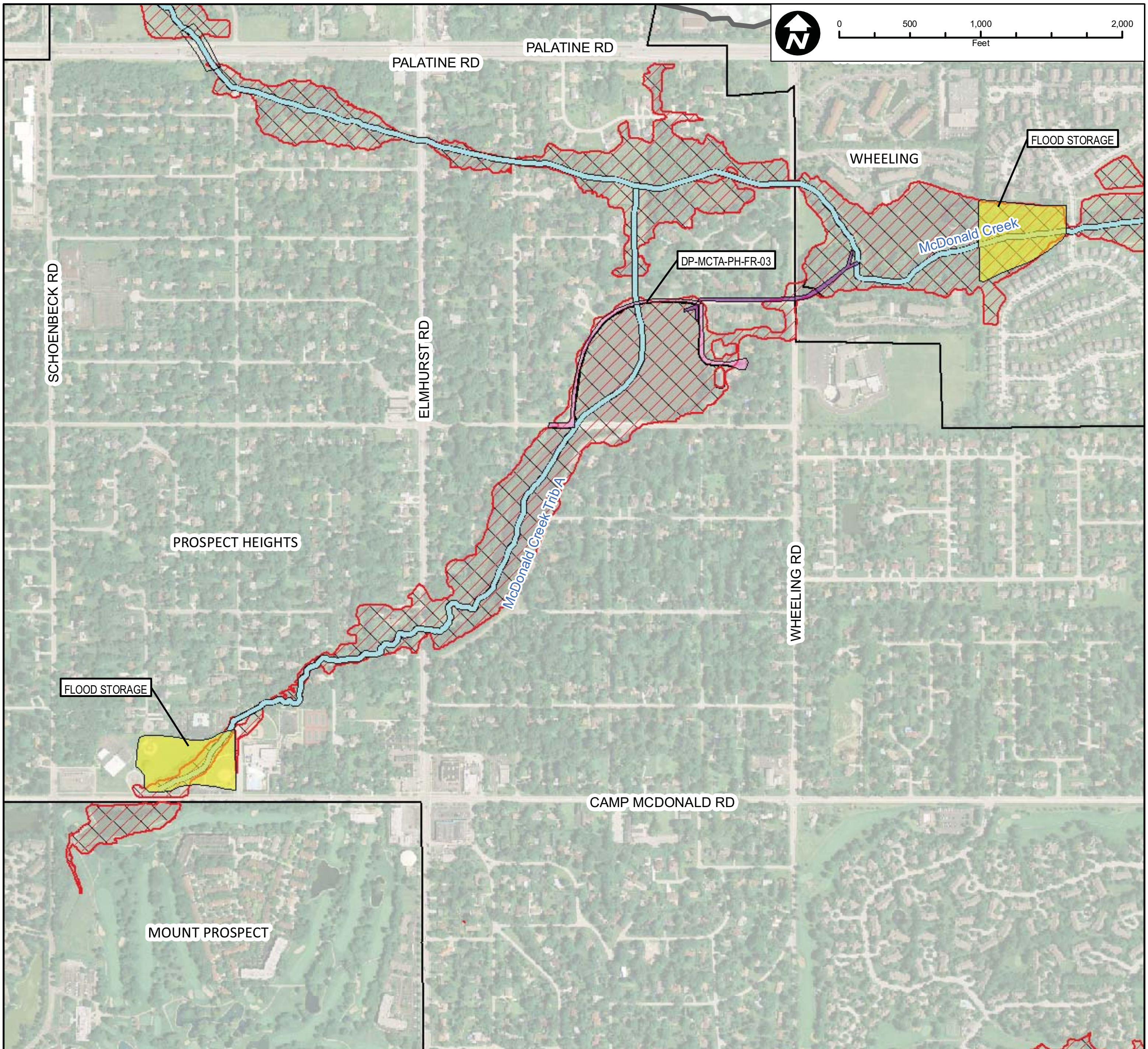


Subwatershed: McDonald Creek
Alternative: MCTA-1
Alternatives Description: Provide 20 acre-feet of flood storage on park (Prospect Heights). Culvert Improvements at Hillcrest Drive.
Provide 20 acre-feet of storage on non-developed parcels in Wheeling.
Road Improvements at Hillcrest Drive/Owen Court.

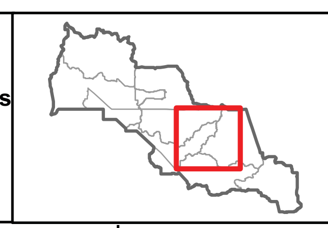
Concept Level Cost: $9,430,341
Benefits: $314,091
B/C Ratio: 0.03

Legend

- 100-Year Storm Event Flood Inundation Without Project
- Reservoir
- Levee/Floodwall
- 100-Year Storm Event Flood Inundation With Project
- Culvert/Bridge Modification
- Channel Improvements
- Road Improvement
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas

- L Local
- M Modeled
- R Regional



CLIENT:
METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:
LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN
MCDONALD CREEK WATERSHED
RECOMMENDED ALTERNATIVE MCTA-1

PROJ. NO.	08-0043
DATE:	03-23-2010
SHEET	1 OF 1
DRAWING NO.	

FIGURE 3.13.11

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DSGN.	DRW	4-10	SCALE	
DWN.			GIS USER	DRW
CHKD.			PLOT DATE	
FILE:				

Map Document: (Z:\MWRDGC\08-0043 Phase B\GIS\Exhibits\Meeting Maps\Feehanville Willow McDonald Creeks\McDonald Creek Detailed Sheets.mxd)
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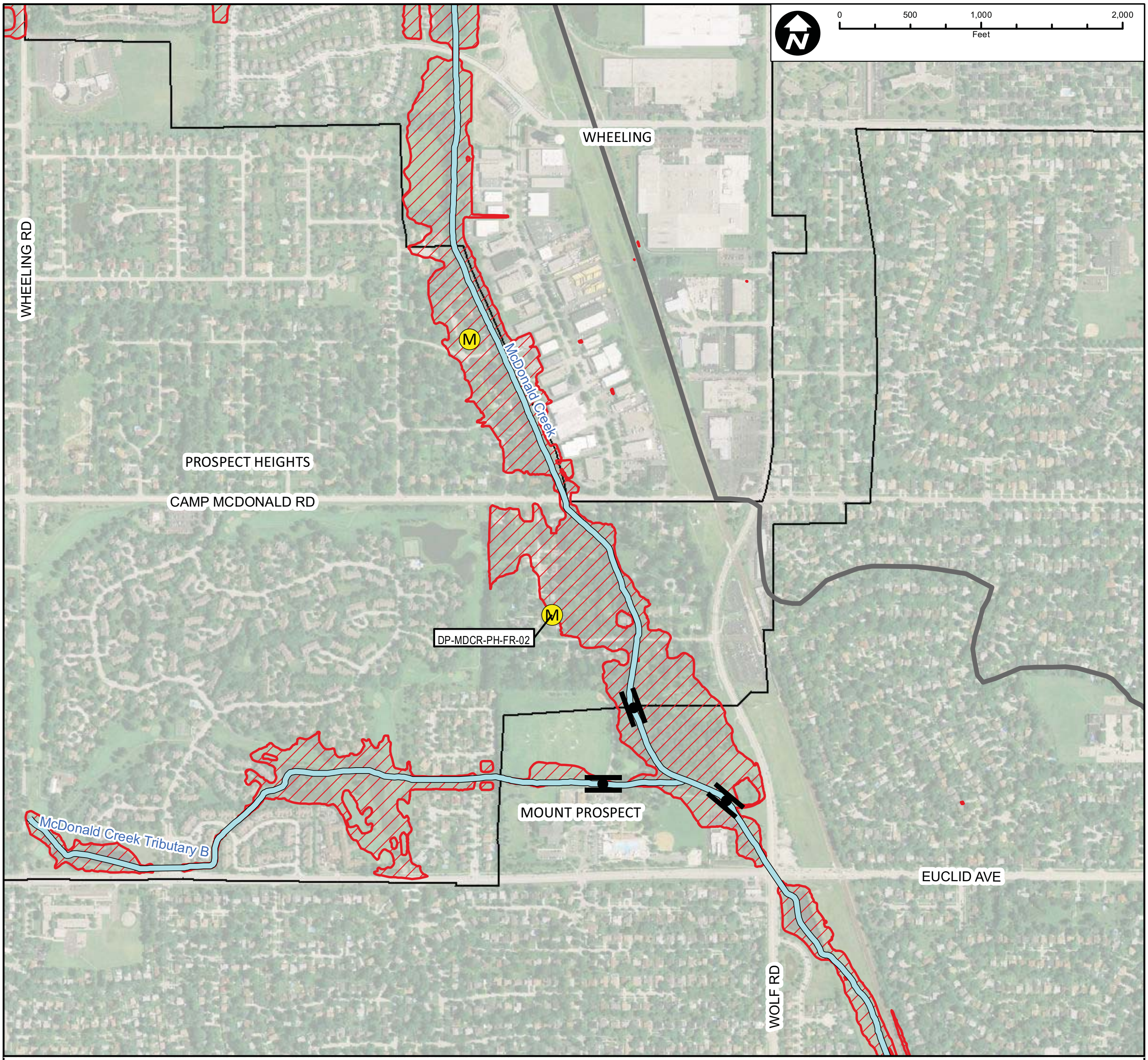


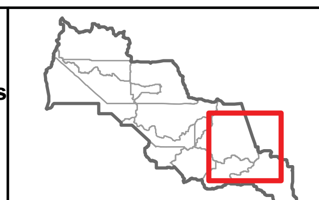
Subwatershed: McDonald Creek
Alternative: MDCR-5
Alternatives Description: Stabilize streambank erosion adjacent to pedestrian bridges on McDonald Creek and Tributary B.

Concept Level Cost: $797,625
Benefits: $204,000
B/C Ratio: 0.3

Legend

- 100-Year Storm Event Flood Inundation Without Project
- Reservoir
- Levee/Floodwall
- Streambank Stabilization
- Culvert/Bridge Modification
- Channel Improvements
- Road Improvement
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas
- M Modeled
- R Regional



CLIENT:
METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:
LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN
MCDONALD CREEK WATERSHED
RECOMMENDED ALTERNATIVE MDCR-5

PROJ. NO.	08-0043
DATE:	03-23-2010
SHEET	1 OF 1
DRAWING NO.	

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DSGN.	DRW	4-10	SCALE	
DWN.			GIS USER	DRW
CHKD.			PLOT DATE	
FILE:				

FIGURE 3.13.12

Map Document: (Z:\MWRDGC\08-0043 Phase B\GIS\Exhibits\Meeting Maps\Feehanville Willow McDonald Creeks\McDonald Creek Detailed Sheets.mxd)
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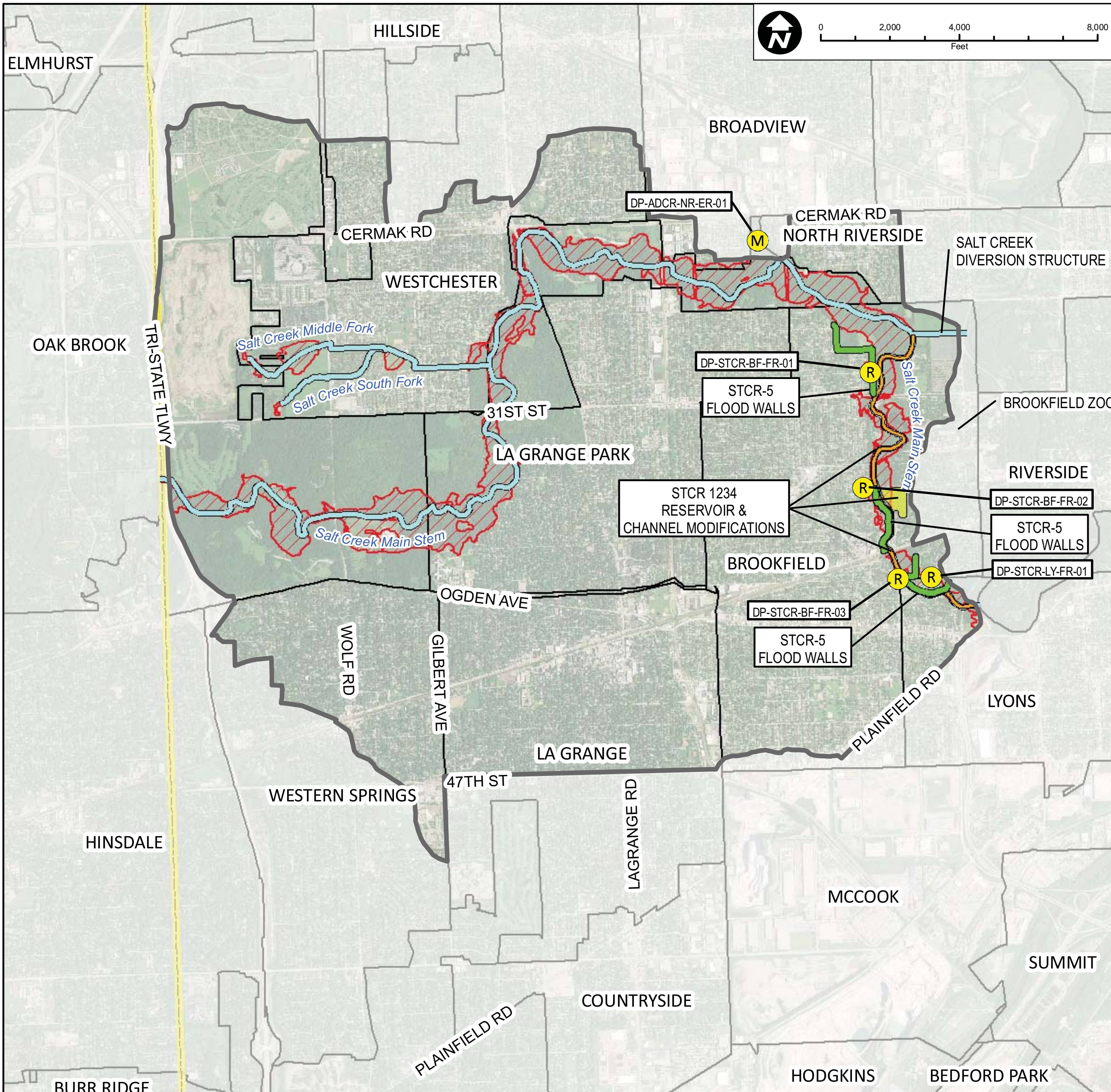


100-Year Storm Event Flood Inundation Without Project

Reservoir

Channel Improvements

Culvert/Bridge Modification

Floodwall

Approximate Creek Channel Location

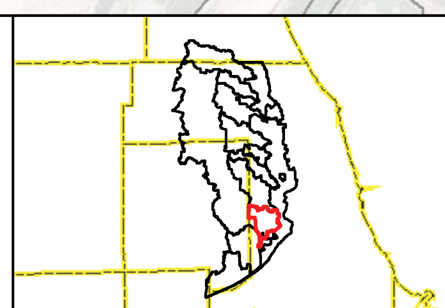
Municipal Boundary

Watershed Boundary

Problem Areas

M Modeled

R Regional



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11/22/2010 -- 9:43:46 AM

CLIENT:	TITLE:	
METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO	**LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN SALT CREEK WATERSHED TRIBUTARY OVERVIEW**	PROJ. NO. 08-0043 DATE: 04-29-2010 SHEET 1 OF 1 DRAWING NO.

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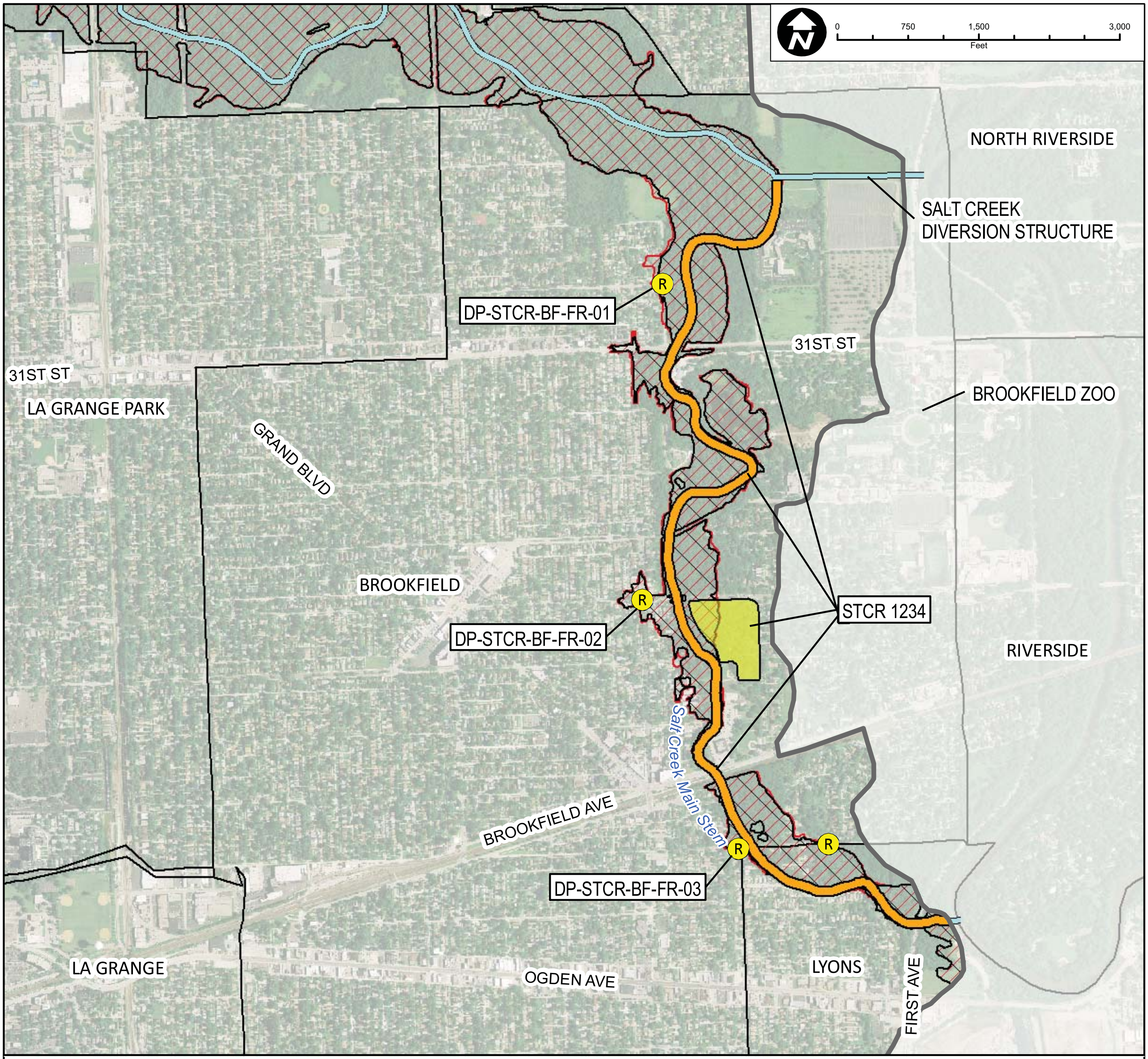
DSGN.	DRW	4-10	SCALE:	
DWN.			GIS USER	DRW
CHKD.			PLOT DATE	
FILE:				

FIGURE 3.14.1

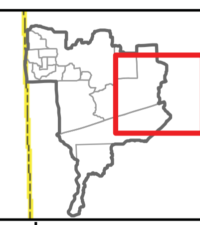


Subwatershed: Salt Creek
Alternative: STCR 1234
Alternatives Description:
85 A-F Reservoir north of Brookfield Village Hall, along with Channel Improvements from Salt Creek Diversion Structure to confluence with Des Plaines River

Concept Level Cost: $11,864,497
Benefits: $1,525,502
B/C Ratio: 0.1

Legend
- 100-Year Storm Event Flood Inundation With Project
- 100-Year Storm Event Flood Inundation Without Project
- Reservoir
- Culvert/Bridge Modification
- Channel Improvements
- Floodwall
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas
- M Modeled
- R Regional



CLIENT:
METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:
LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN
SALT CREEK WATERSHED
PROPOSED ALTERNATIVE STCR-1234

PROJ. NO.	08-0043
DATE:	04-29-2010
SHEET 1 OF 1	
DRAWING NO.	

FIGURE 3.14.9

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DSGN.	DRW	4-10	SCALE	
DWN.			GIS USER	DRW
CHKD.			PLOT DATE	
FILE:				

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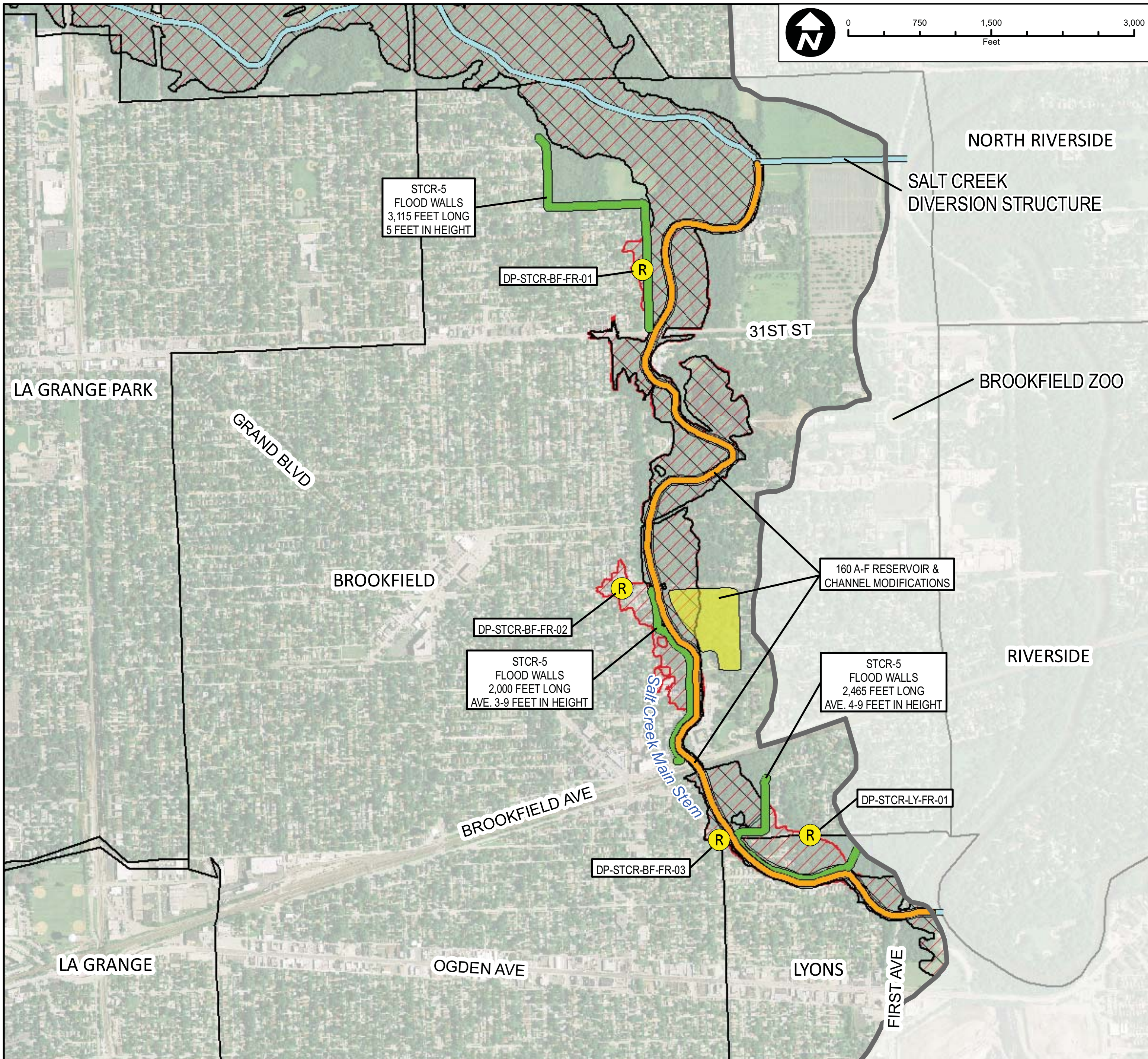


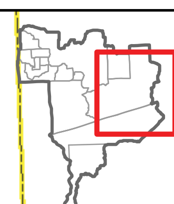
Subwatershed: Salt Creek
Alternative: STCR 5
Alternatives Description: Floodwall north of 31st Street, north of Brookfield Avenue, and south of Brookfield Aveune. Also includes Alternative 1234 with a 160 A-F reservoir.

Concept Level Cost: $39,964,011
Benefits: $7,179,906
B/C Ratio: 0.2

Legend

- 100-Year Storm Event Flood Inundation With Project
- 100-Year Storm Event Flood Inundation Without Project
- Reservoir
- Culvert/Bridge Modification
- Channel Improvements
- Floodwall
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas
- M Modeled
- R Regional



CLIENT:
METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:
LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN SALT CREEK WATERSHED PROPOSED ALTERNATIVE STCR-5

PROJ. NO.	08-0043			
DATE:	04-29-2010			
SHEET 1 OF 1				
DRAWING NO.				
DSGN.	DRW	4-10	SCALE	
DWN.			GIS USER	DRW
CHKD.			PLOT DATE	
FILE:				

FIGURE 3.14.10

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Map Document: (Z:\MWRDGC\08-0043 Phase B\GIS\Exhibits\Meeting Maps\Addison Salt Creek\Salt Creek Detailed Sheets 1.mxd)
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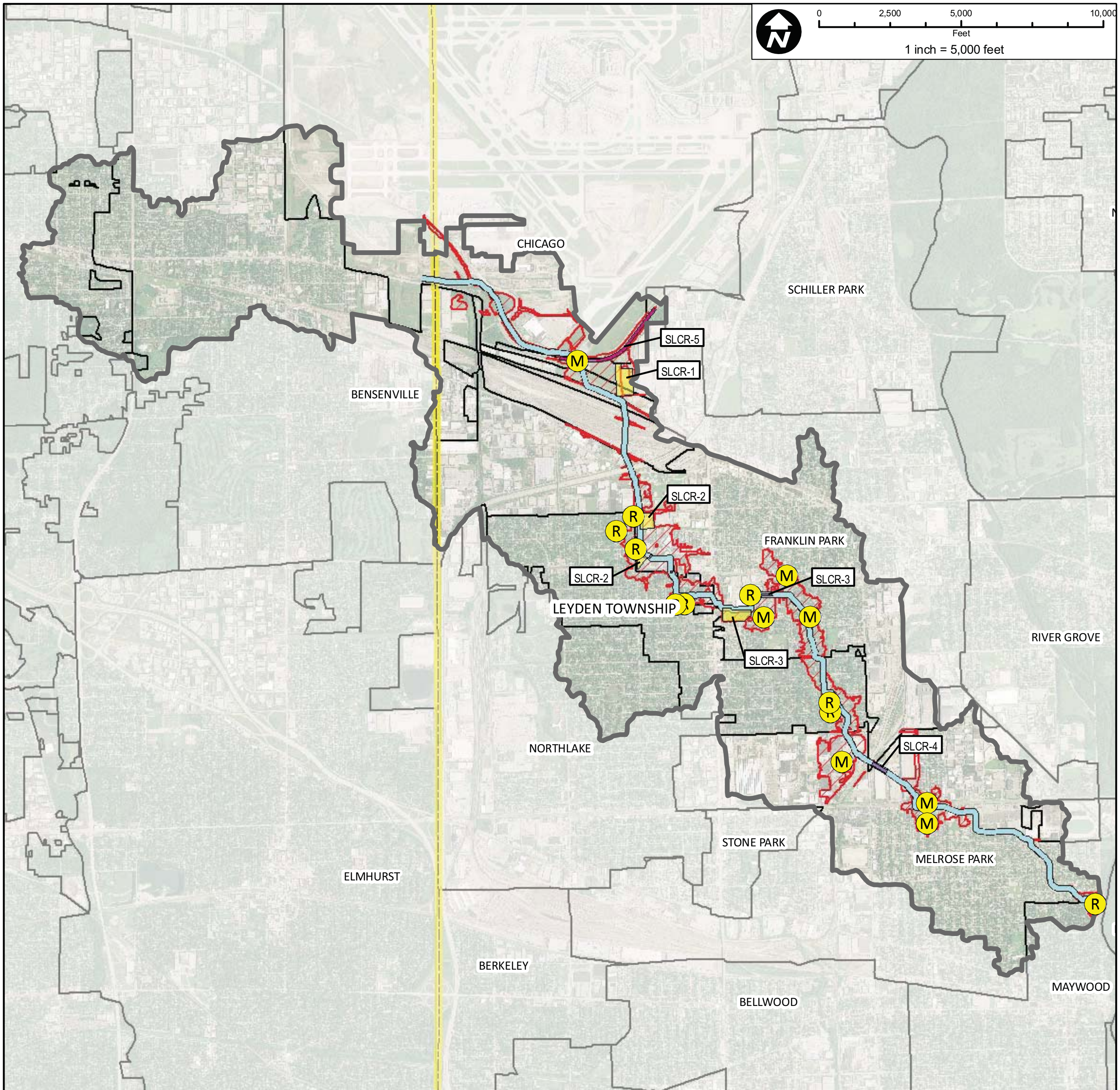
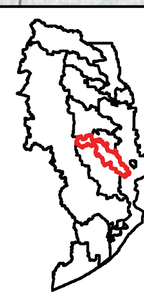


100-Year Storm Event Flood Inundation Without Project
Reservoir
Channel Improvements
Culvert/Bridge Modification
Levee/Floodwall

Approximate Creek Channel Location
Municipal Boundary
Watershed Boundary

Problem Areas
M Modeled
R Regional



CLIENT:
METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:
**LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN
SILVER CREEK WATERSHED
TRIBUTARY OVERVIEW**

PROJ. NO.	08-0043
DATE:	05-05-2010
SHEET 1 OF 1	
DRAWING NO.	

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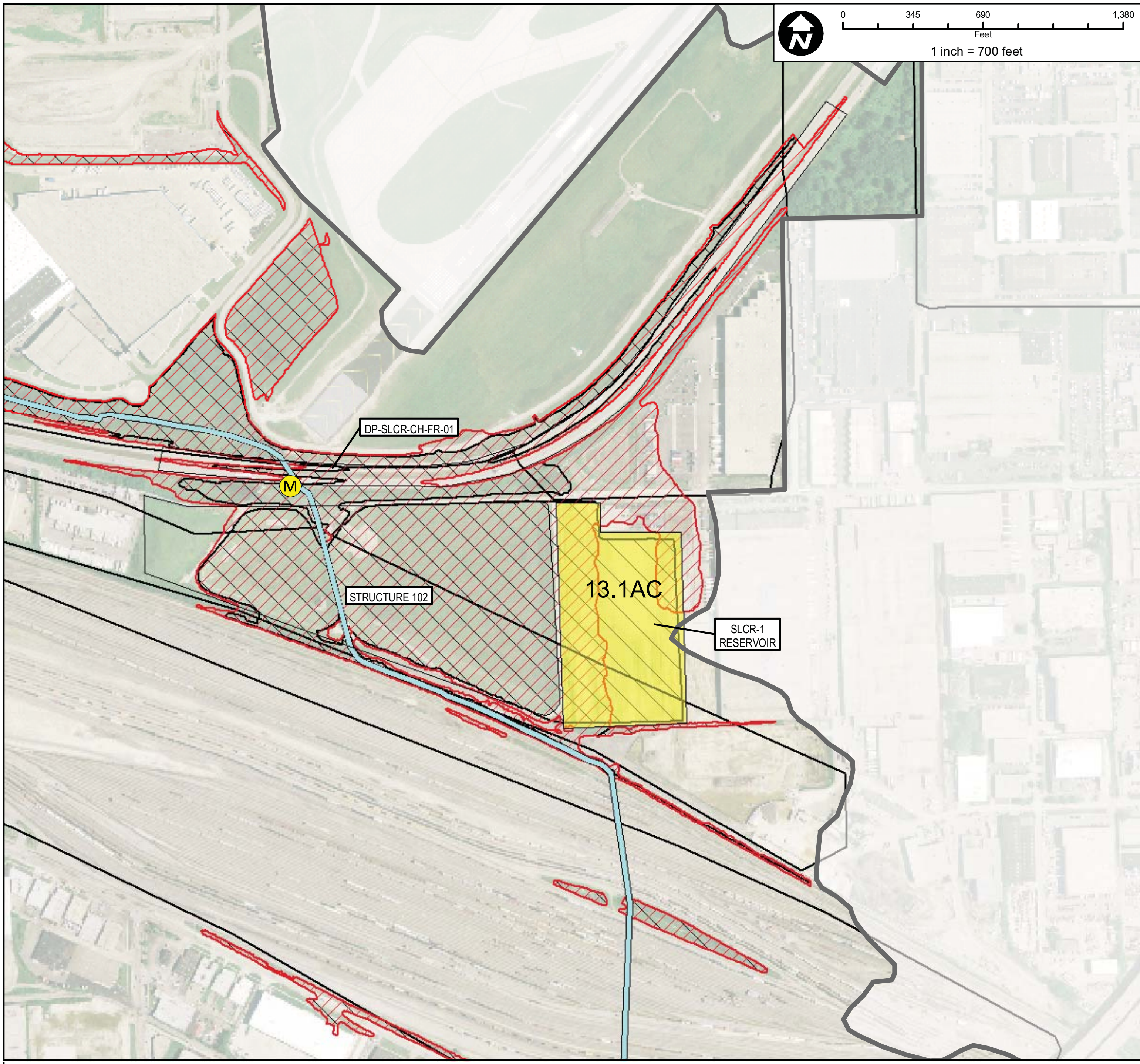
DSGN.	DRW	4-10	SCALE:	1"=5,000'
DWN.			GIS USER	DRW
CHKD.			PLOT DATE	
FILE:				

FIGURE 3.15.1

Map Document: (Z:\MWRDGC\08-0043 Phase B\GIS\Exhibits\Meeting Maps\Crystal Silver Golf\Silver Creek Overall.mxd)
8/24/2010 -- 2:27:07 PM



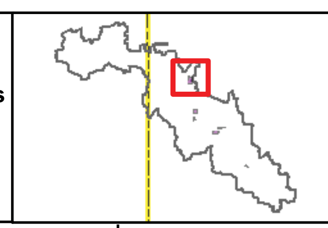
Subwatershed: Silver Creek
Alternative: SLCR-1
Alternatives Description: Expand Structure 102 by adding approximately 250 A-F of storage volume, 3:1 side slopes, approximately 25 feet deep.

Concept Level Cost: $21,171,664
Benefits: $2,053,569
B/C Ratio: 0.1

Legend

100-Year Storm Event Flood Inundation Without Project
100-Year Storm Event Flood Inundation With Project
Reservoir
Culvert/Bridge Modification
Channel Improvements
Levee/Floodwall
Approximate Creek Channel Location
Municipal Boundary
Watershed Boundary

Problem Areas
M Modeled
R Regional



CLIENT:
METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:
LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN
SILVER CREEK WATERSHED
PROPOSED ALTERNATIVE SLCR-1

PROJ. NO.	08-0043
DATE:	05-06-2010
SHEET	1 OF 1
DRAWING NO.	

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DSGN.	DRW	4-10	SCALE	1' = 700'
DWN.			GIS USER	DRW
CHKD.			PLOT DATE	
FILE:				

FIGURE 3.15.2

Map Document: (Z:\MWRDGC\08-0043 Phase B\GIS\Exhibits\Meeting Maps\Crystal Silver Golf\Silver Creek Detailed Sheets.mxd)
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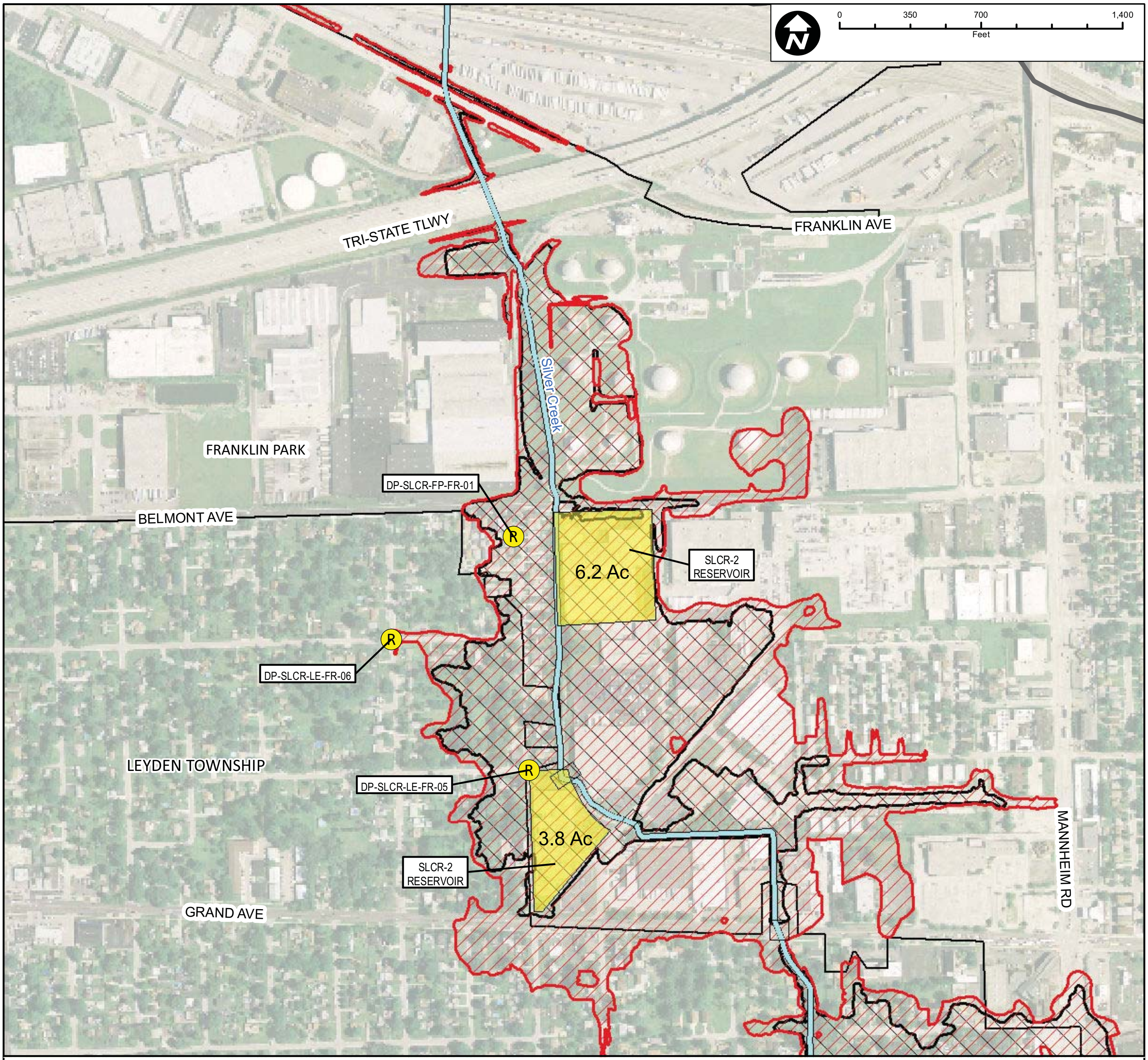


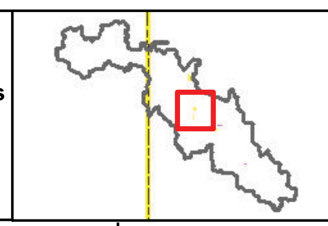
Subwatershed: Silver Creek
Alternative: SLCR-2
Alternatives Description: Alternative SLCR-1 with approximately 230 A-F (6.2AC-150A-F, 3.8AC-80A-F) on two "For-Sale" industrial parcels. Pump outlet, 40 feet deep, 3:1 side slopes.

Concept Level Cost: $51,501,231
Benefits: $10,415,557
B/C Ratio: 0.2

Legend

- 100-Year Storm Event Flood Inundation Without Project
- 100-Year Storm Event Flood Inundation With Project
- Reservoir
- Culvert/Bridge Modification
- Channel Improvements
- Levee/Floodwall
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas
- M Modeled
- R Regional



CLIENT:
METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:
LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN SILVER CREEK WATERSHED RECOMMENDED ALTERNATIVE SLCR-2

PROJ. NO.	08-0043			
DATE:	05-06-2010			
SHEET 1 OF 1				
DRAWING NO.				
DSGN.	DRW	4-10	SCALE	
DWN.			GIS USER	DRW
CHKD.			PLOT DATE	
FILE:				

FIGURE 3.15.3

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Map Document: (Z:\MWRDGC\08-0043 Phase B\GIS\Exhibits\Meeting Maps\Crystal Silver Golf\Silver Creek Detailed Sheets.mxd)
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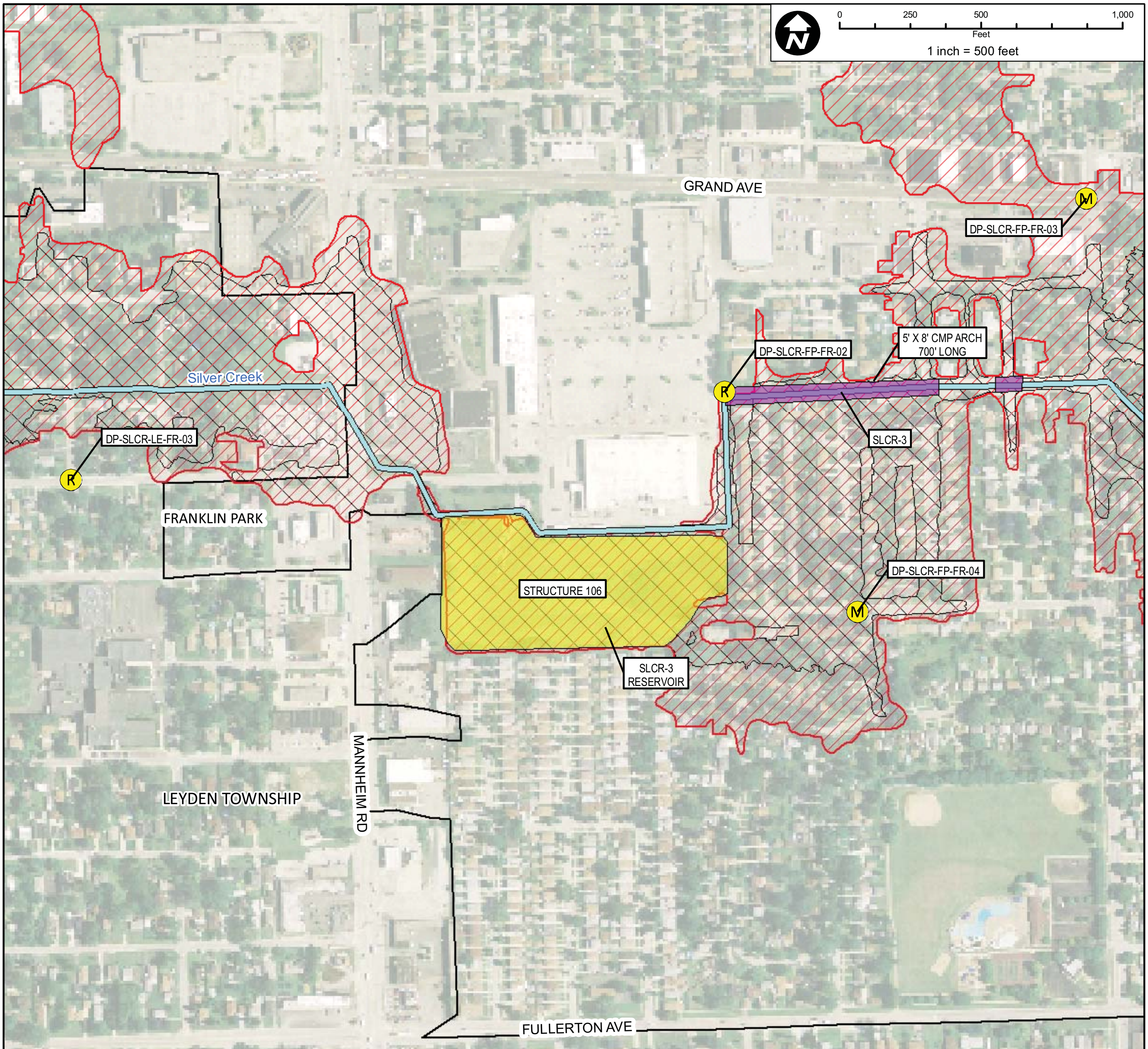


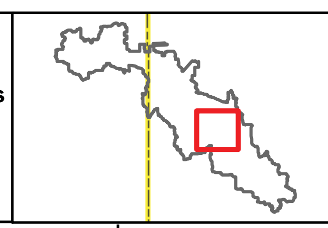
Subwatershed: Silver Creek
Alternative: SLCR-3
Alternatives Description: With alternatives SLCR-1 and SLCR-2, Expand Structure 106 by approximately 200 A-F by utilizing vertical walls, maintain depth, raise southeast corner to 640 feet.
Replace Riverside Drive and Louis Street Culverts, with 730 feet of 10 feet X 5 feet reinforced concrete box culvert.

Concept Level Cost: $116,511,266
Benefits: $11,168,866
B/C Ratio: 0.1

Legend

- 100-Year Storm Event Flood Inundation Without Project
- 100-Year Storm Event Flood Inundation With Project
- Reservoir
- Culvert/Bridge Modification
- Channel Improvements
- Levee/Floodwall
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas
- M Modeled
- R Regional



CLIENT:
METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:
LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN
SILVER CREEK WATERSHED
PROPOSED ALTERNATIVE SLCR-3

PROJ. NO. 08-0043
DATE: 05-06-2010
SHEET 1 OF 1
DRAWING NO.

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DSGN.	DRW	4-10	SCALE	1' = 500'
DWN.			GIS USER	DRW
CHKD.			PLOT DATE	
FILE:				

FIGURE 3.15.4

Map Document: (Z:\MWRDGC\08-0043 Phase B\GIS\Exhibits\Meeting Maps\Crystal Silver Golf\Silver Creek Detailed Sheets.mxd)
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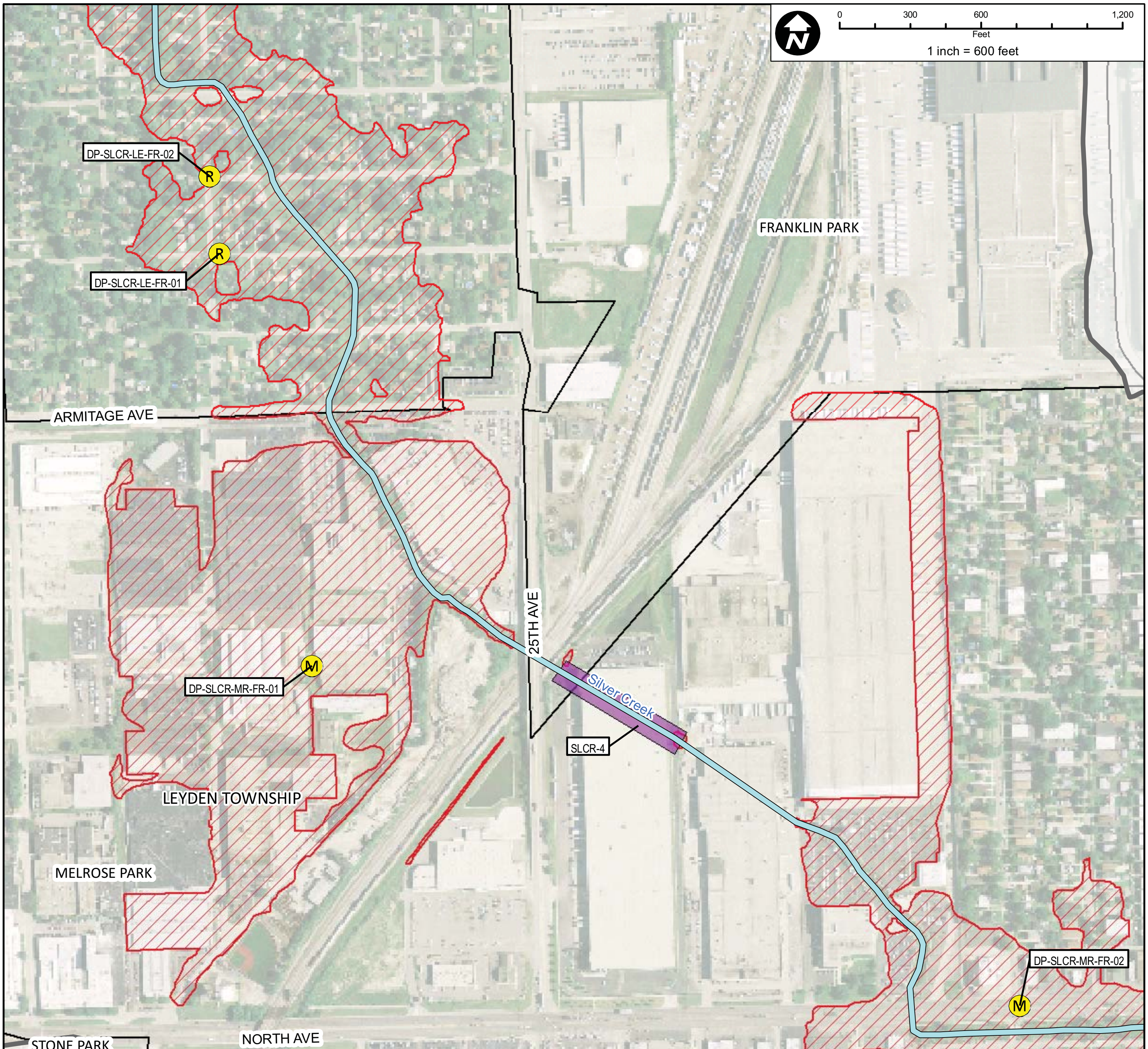


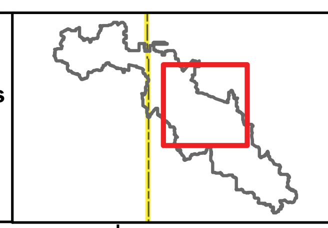
Subwatershed: Silver Creek
Alternative: SLCR-4
Alternatives Description: Remove silt down stream of 3 - 12 feet X 12 feet reinforced concrete box culverts.

Concept Level Cost: N/A
Benefits: N/A, Temporarily reduce up stream water surface elevation by 0.2 feet - 0.5 feet
B/C Ratio: N/A

Legend

- 100-Year Storm Event Flood Inundation Without Project
- 100-Year Storm Event Flood Inundation With Project
- Reservoir
- Culvert/Bridge Modification
- Channel Improvements
- Levee/Floodwall
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas
- M Modeled
- R Regional



CLIENT:
METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:
LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN
SILVER CREEK WATERSHED
PROPOSED ALTERNATIVE SLCR-4

PROJ. NO. 08-0043
DATE: 05-06-2010
SHEET 1 OF 1
DRAWING NO.

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DSGN.	DRW	4-10	SCALE	1' =1,500'
DWN.			GIS USER	DRW
CHKD.			PLOT DATE	
FILE:				

FIGURE 3.15.5

Map Document: (Z:\MWRDGC\08-0043 Phase B\GIS\Exhibits\Meeting Maps\Crystal Silver Golf\Silver Creek Detailed Sheets.mxd)
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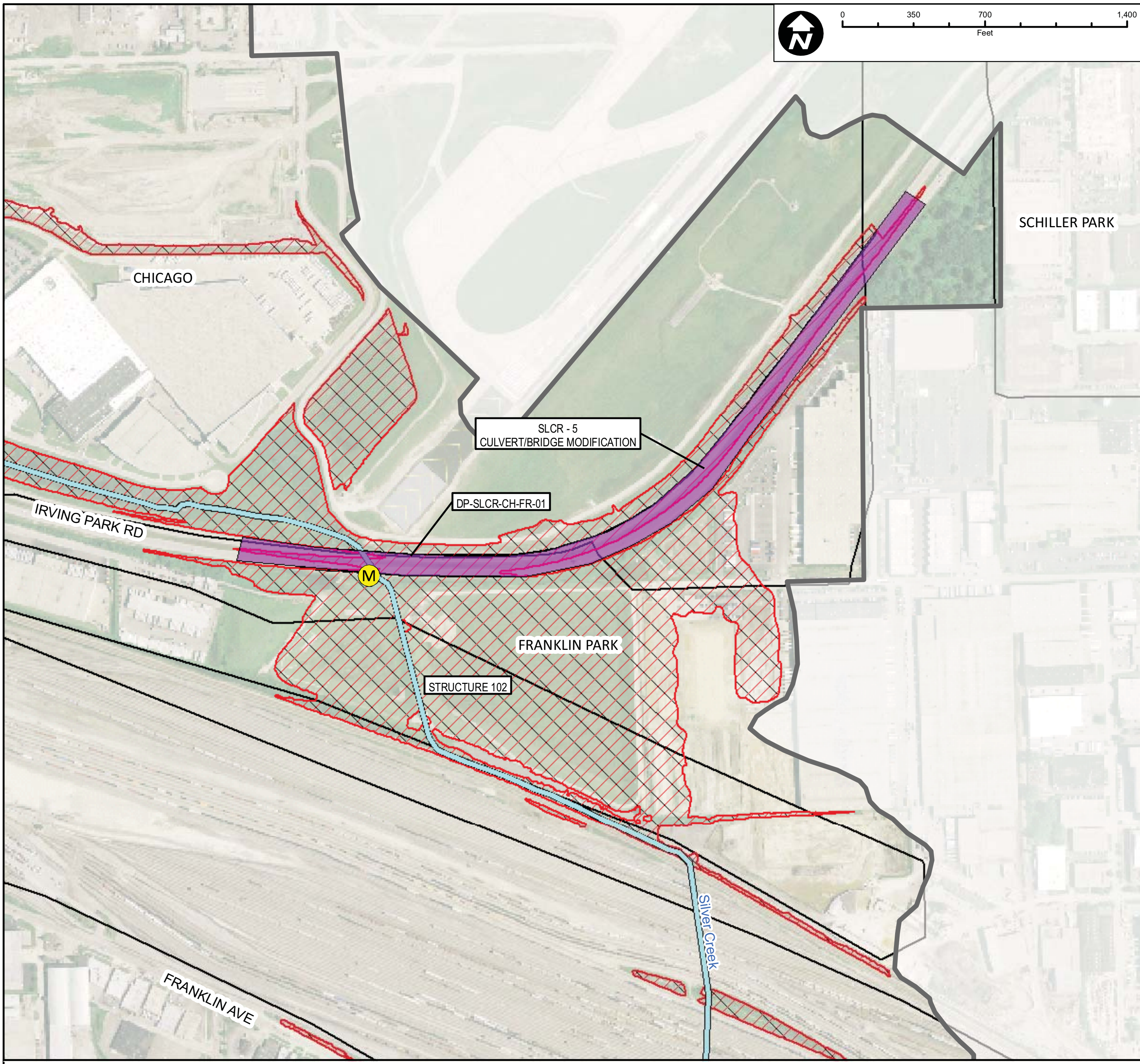


Subwatershed: Silver Creek
Alternative: SLCR-5
Alternatives Description: Raise Irving Park Road above 100-year floodplain and replace existing culvert with triple 11 feet X 5 feet reinforced concrete box culvert.

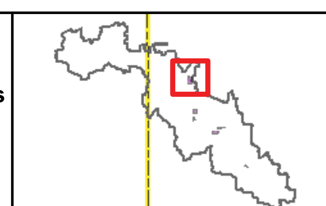
Concept Level Cost: $3,944,629
Benefits: $239,448
B/C Ratio: 0.06

Legend

- 100-Year Storm Event Flood Inundation Without Project
- 100-Year Storm Event Flood Inundation With Project
- Reservoir
- Culvert/Bridge Modification
- Channel Improvements
- Levee/Floodwall
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas

- M Modeled
- R Regional



CLIENT:

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:

LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN
SILVER CREEK WATERSHED
RECOMMENDED ALTERNATIVE SLCR-5

PROJ. NO.	08-0043
DATE:	05-06-2010
SHEET	1 OF 1
DRAWING NO.	

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DSGN.	DRW	4-10	SCALE	
DWN.			GIS USER	DRW
CHKD.			PLOT DATE	
FILE:				

FIGURE 3.15.6

Map Document: (Z:\MWRDGC\08-0043 Phase B\GIS\Exhibits\Meeting Maps\Crystal Silver Golf\Silver Creek Detailed Sheets.mxd)
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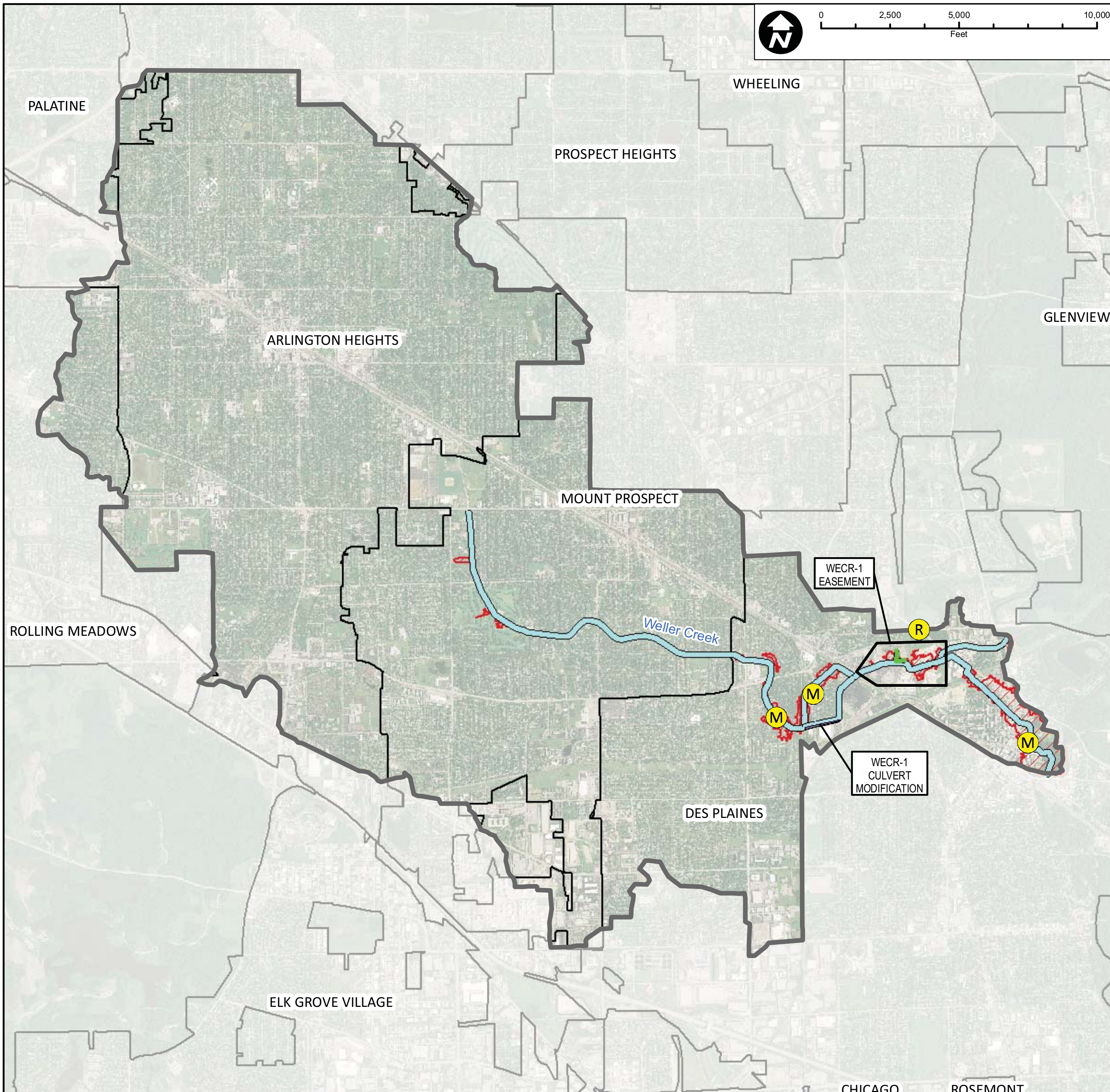


100-Year Storm Event Flood Inundation Without Project

Reservoir

Channel Improvements

Culvert/Bridge Modification

Levee/Floodwall

Approximate Creek Channel Location

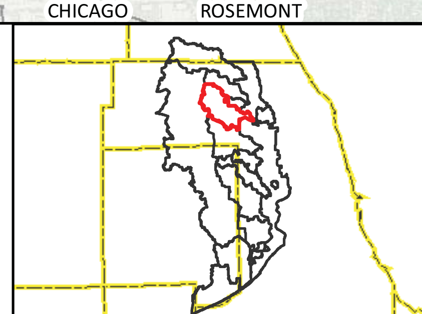
Municipal Boundary

Watershed Boundary

Problem Areas

M Modeled

R Regional



CLIENT:

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:

LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN
WELLER CREEK WATERSHED
TRIBUTARY OVERVIEW

PROJ. NO. 08-0043

DATE: 04-29-2010

SHEET 1 OF 1

DRAWING NO.

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DSGN.	DRW	4-10	SCALE:	
DWN.			GIS USER	DRW
CHKD.			PLOT DATE	
FILE:				

FIGURE 3.16.1

Map Document: (Z:\MWRDGC\08-0043 Phase B\GIS\Exhibits\Meeting Maps\Feehanville Willow McDonald Creeks\Weller Creek Overall.mxd)
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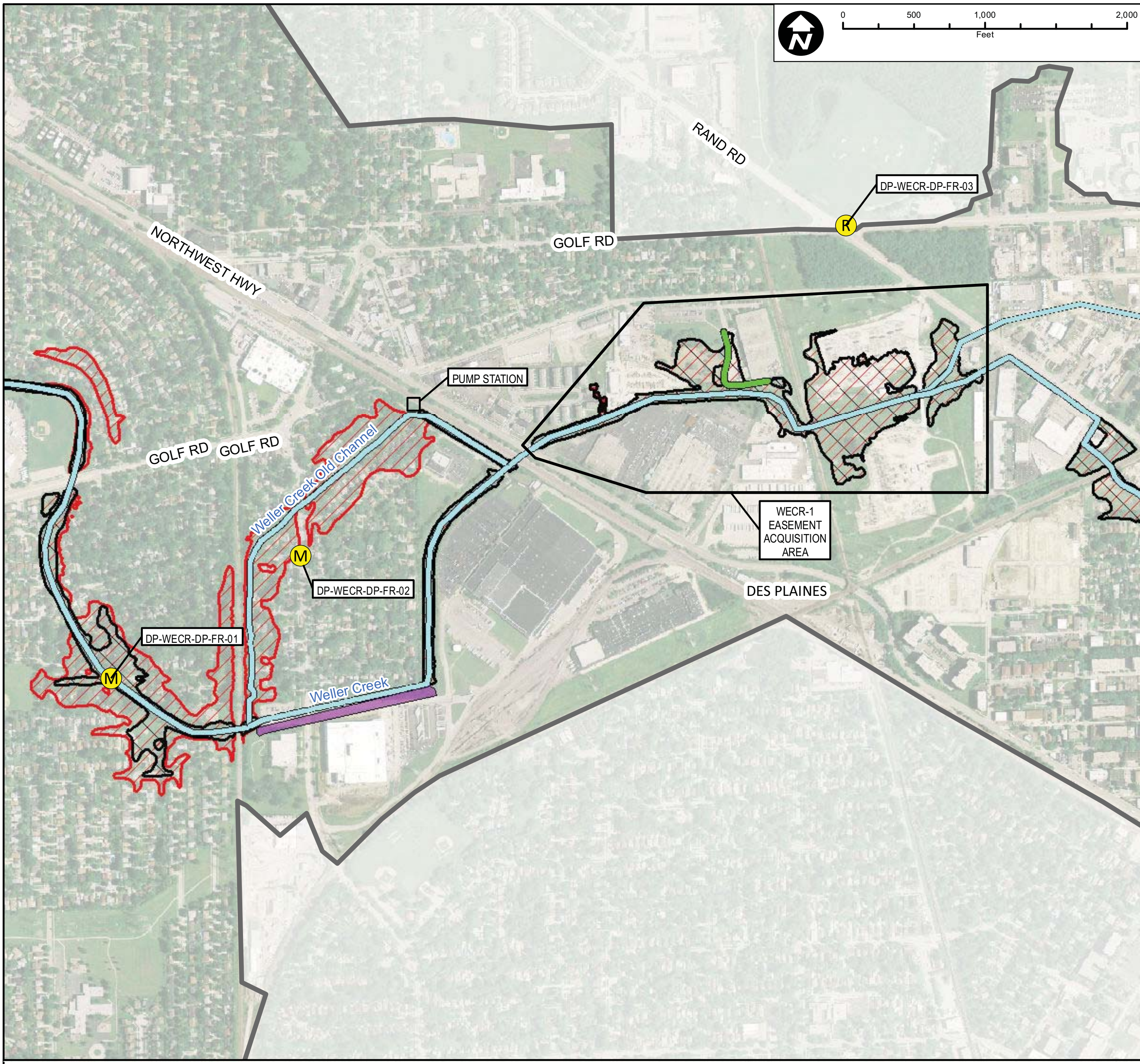


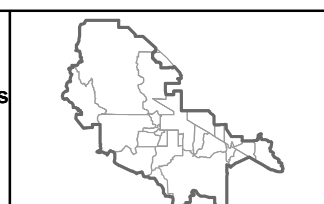
Subwatershed: Weller Creek
Alternative: WECR-1
Alternatives Description: Addition of 1300 linear feet of 15' W by 10' H Box Culvert, 40 cfs internal drainage pump station and 750 feet of floodwall at elevation +/- 740 feet which includes approximately 2 feet of freeboard and pump station.

Concept Level Cost: $10,659,963
Benefits: $115,918
B/C Ratio: 0.01

Legend

- 100-Year Storm Event Flood Inundation Without Project
- 100-Year Storm Event Flood Inundation With Project
- Reservoir
- Culvert/Bridge Modification
- Channel Improvements
- Levee/Floodwall
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas
- M Modeled
- R Regional



CLIENT:
METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:
LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN
WELLER CREEK WATERSHED
RECOMMENDED ALTERNATIVE WECR-1

PROJ. NO. 08-0043				
DATE: 04-30-2010				
SHEET 1 OF 1				
DRAWING NO.				
DSGN.	DRW	4-10	SCALE	
DWN.			GIS USER	DRW
CHKD.			PLOT DATE	
FILE:				

FIGURE 3.16.4

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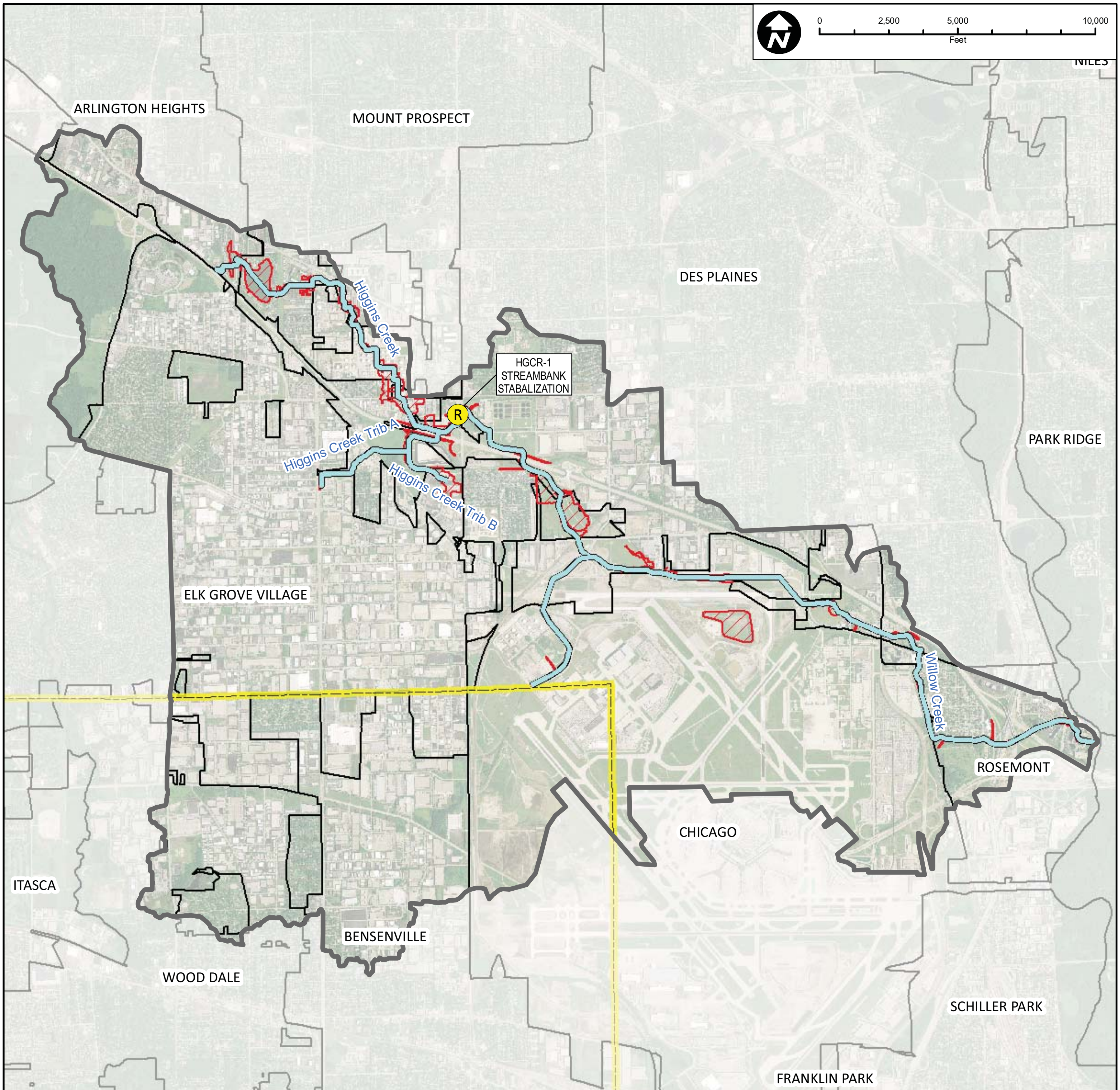
Map Document: (Z:\MWRDGC\08-0043 Phase B\GIS\Exhibits\Meeting Maps\Feehanville Willow McDonald Creeks\Weller Creek Detailed Sheets.mxd)
9/8/2010 -- 3:30:54 PM

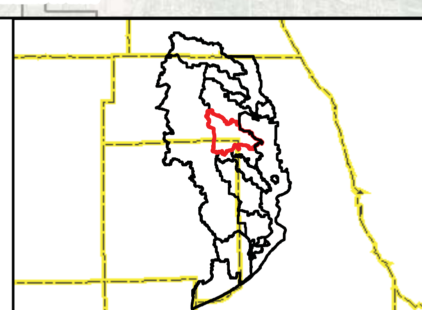


100-Year Storm Event Flood Inundation Without Project
Reservoir
Channel Improvements
Culvert/Bridge Modification
Levee/Floodwall
Streambank Stabilization

Approximate Creek Channel Location
Municipal Boundary
Watershed Boundary

Problem Areas

M Modeled
R Regional



CLIENT:

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:

LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN
WILLOW CREEK WATERSHED
TRIBUTARY OVERVIEW

PROJ. NO.	08-0043
DATE:	04-29-2010
SHEET 1 OF 1	
DRAWING NO.	

FIGURE 3.17.1

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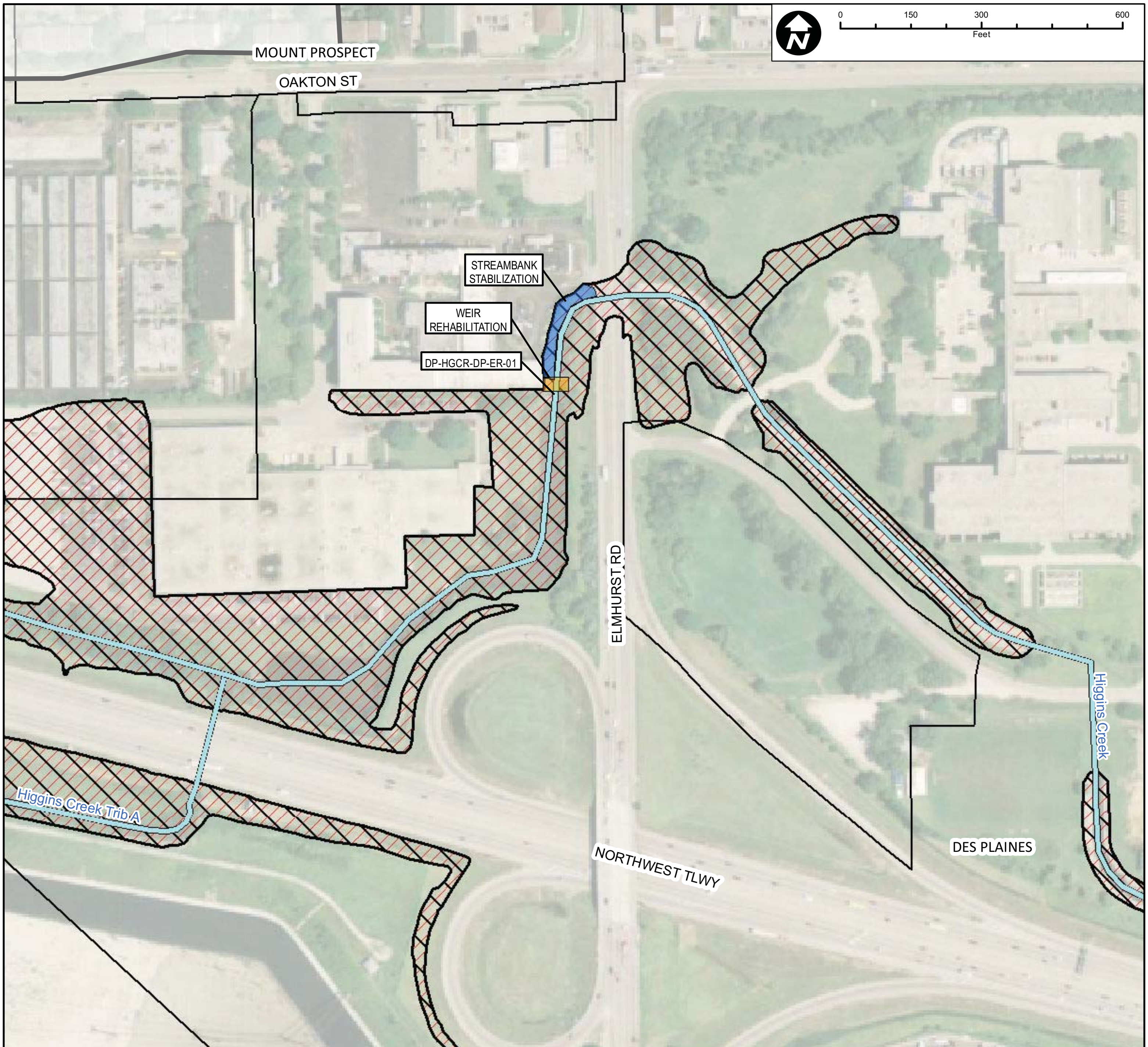
DSGN.	DRW	4-10	SCALE:	
DWN.			GIS USER	DRW
CHKD.			PLOT DATE	
FILE:				

Map Document: (Z:\MWRDGC\08-0043 Phase B\GIS\Exhibits\Meeting Maps\Feehanville Willow McDonald Creeks\Willow Creek Overall.mxd)
11/19/2010 -- 9:00:39 AM



Subwatershed: Willow Creek
Alternative: HGCR-1
Alternatives Description: Weir rehabilitation.
Streambank stabilization on west bank of creek between weir and Elmhurst Road.

Concept Level Cost: $762,604
Benefits: $246,547
B/C Ratio: 0.3

Legend

- 100-Year Storm Event Flood Inundation Without Project
- 100-Year Storm Event Flood Inundation With Project
- Reservoir
- Culvert/Bridge Modification
- Channel Improvements
- Streambank Stabilization
- Levee/Floodwall
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas
- M Modeled
- R Regional

CLIENT:
METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:
LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN
WILLOW CREEK WATERSHED
RECOMMENDED ALTERNATIVE HGCR-1

PROJ. NO. 08-0043
DATE: 04-29-2010
SHEET 1 OF 1
DRAWING NO.

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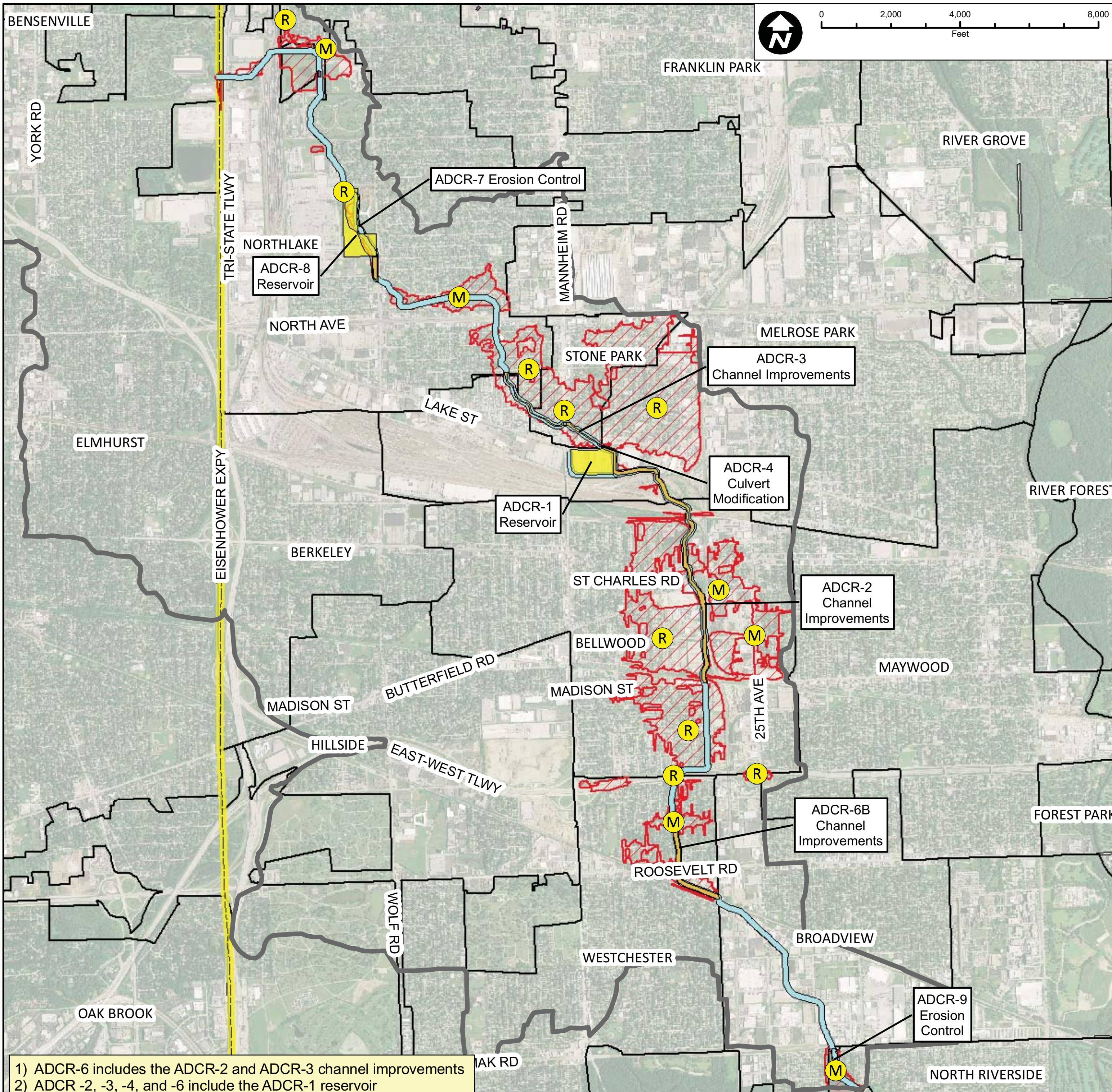
DSGN.	DRW	4-10	SCALE	
DWN.			GIS USER	DRW
CHKD.			PLOT DATE	
FILE:				

FIGURE 3.17.2

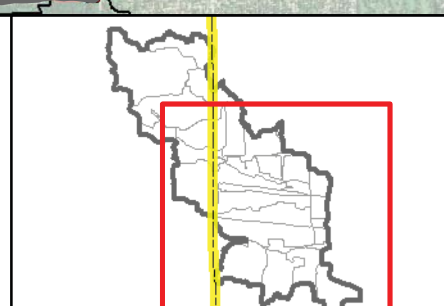
Map Document: (Z:\MWRDGC\08-0043 Phase B\GIS\Exhibits\Meeting Maps\Feehanville Willow McDonald Creeks\Willow Creek Detailed Sheets.mxd)
8/17/2010 -- 2:04:34 PM



100-Year Storm Event Flood Inundation Without Project
Reservoir
Channel Improvements
Culvert/Bridge Modification
Levee/Floodwall

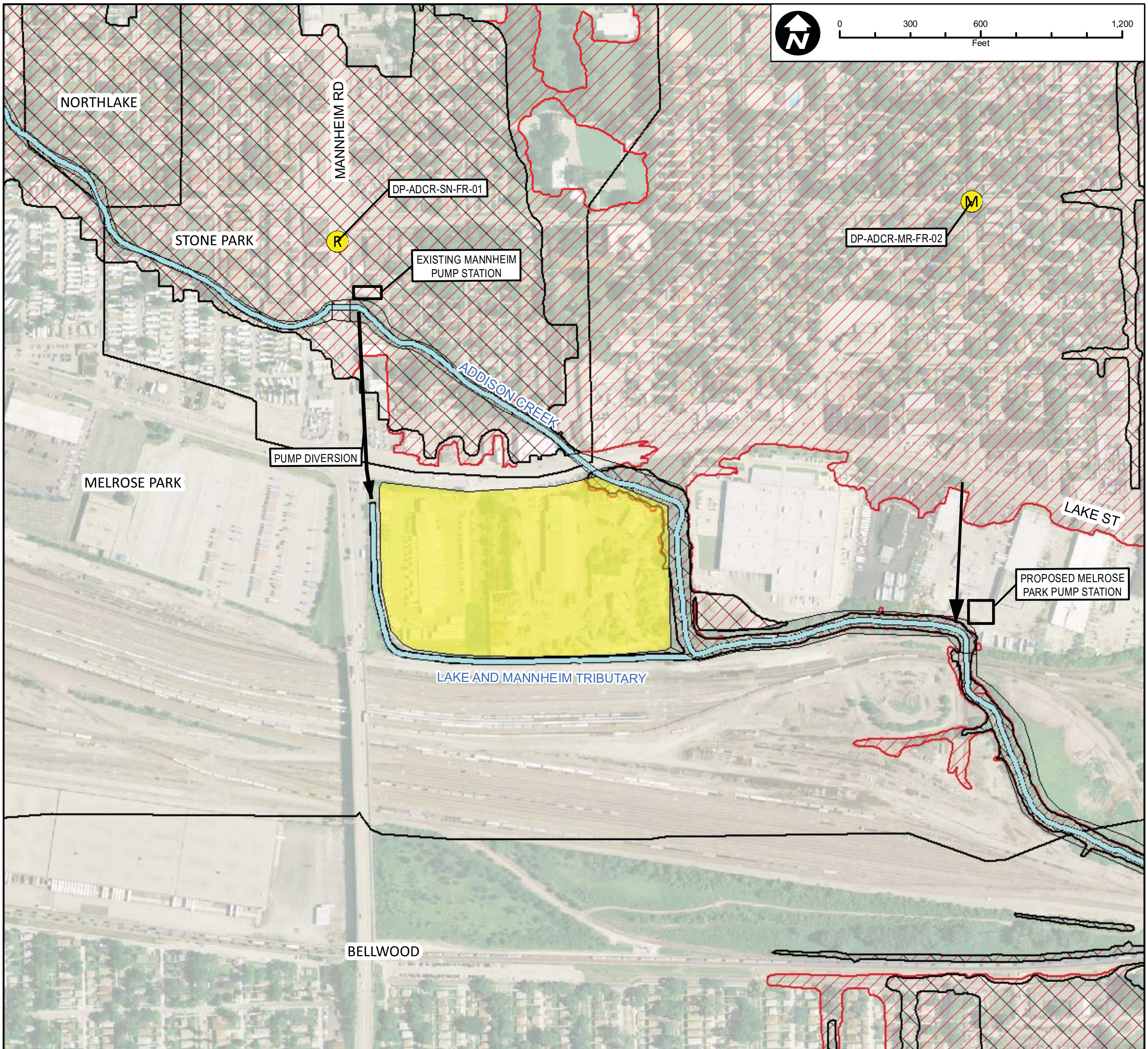
Approximate Creek Channel Location
Municipal Boundary
Watershed Boundary

Problem Areas
M Modeled
R Regional



CLIENT: METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO	TITLE: LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN ADDISON CREEK WATERSHED TRIBUTARY OVERVIEW				PROJ. NO. 08-0043 DATE: 04-26-2010 SHEET 1 OF 1 DRAWING NO.
CHRISTOPHER B. BURKE ENGINEERING, LTD. 9575 W. Higgins Road, Suite 600 · Rosemont, Illinois 60018 · (847) 823-0500	DSGN.	DRW	4-10	SCALE:	FIGURE 3.2.1
	DWN.			GIS USER DRW	
	CHKD.			PLOT DATE	
	FILE:				

Map Document: (Z:\MWRDGC\08-0043 Phase B\GIS\Exhibits\Meeting Maps\Addison Salt Creek\Addison Creek Overall Sheet 1.mxd)
8/17/2010 -- 2:25:40 PM



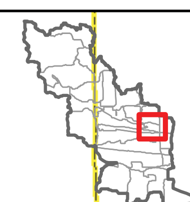
Subwatershed: Addison Creek
Alternative: ADCR-1a
Alternatives Description: 480 A-F Reservoir southeast of Lake Street and Mannheim Road.
Mannheim Pump Station modification - force main extended to the Lake and Mannheim Tributary.
New Melrose Park Pump Station with 3-20 cfs pumps following existing storm sewer alignment south of 33rd Avenue to Addison Creek.

Concept Level Cost: $51,665,694
Benefits: $171,743,547
B/C Ratio: 3.3

Legend

- 100-Year Storm Event Flood Inundation Without Project
- 100-Year Storm Event Flood Inundation With Project
- Reservoir
- Culvert/Bridge Modification
- Channel Improvements
- Levee/Floodwall
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas
- M Modeled
- R Regional



CLIENT:
METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:
**LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN
ADDISON CREEK WATERSHED
RECOMMENDED ALTERNATIVE ADCR-1A**

PROJ. NO. 08-0043
DATE: 03-23-2010
SHEET 1 OF 1
DRAWING NO.
FIGURE 3.2.11

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DWN.			GIS USER	DRW
CHKD.			PLOT DATE	
FILE:				

Map Document: (Z:\MWRDGC\08-0043 Phase B\GIS\Exhibits\Meeting Maps\Addison Salt Creek\Addison Creek Detailed Sheets.mxd)
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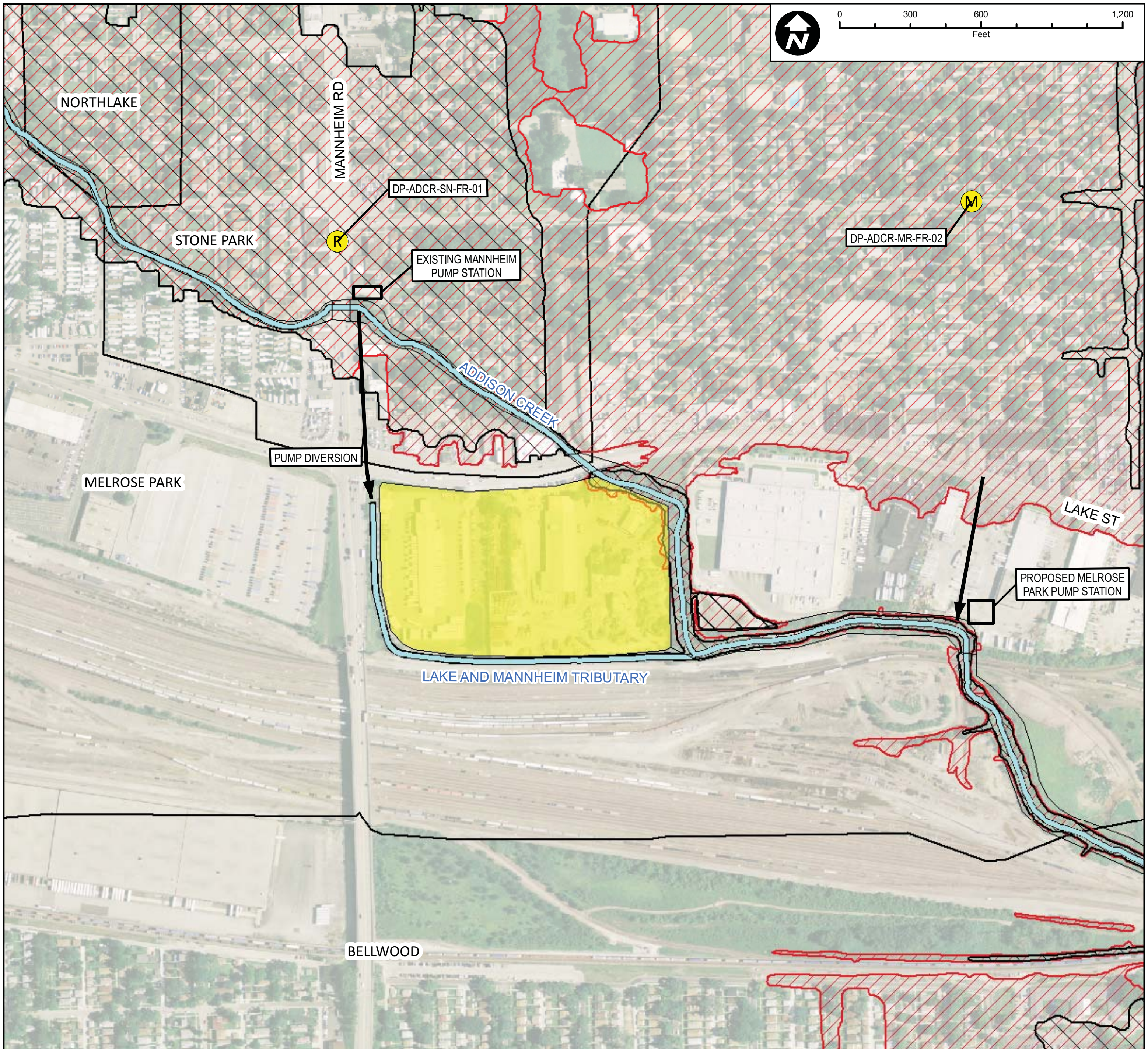


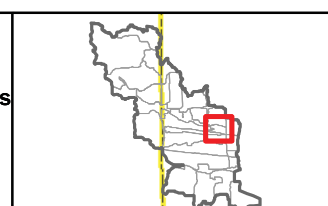
Subwatershed: Addison Creek
Alternative: ADCR-1b
Alternatives Description: 960 A-F Reservoir southeast of Lake Street and Mannheim Road.
Mannheim Pump Station modification force main extended to the Lake and Mannheim Tributary.
New Melrose Park Pump Station with 3-20 cfs pumps following existing storm sewer alignment south of 33rd Avenue to Addison Creek.

Concept Level Cost: $98,853,311
Benefits: $186,954,960
B/C Ratio: 1.9

Legend

- 100-Year Storm Event Flood Inundation Without Project
- 100-Year Storm Event Flood Inundation With Project
- Reservoir
- Culvert/Bridge Modification
- Channel Improvements
- Levee/Floodwall
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas
- M Modeled
- R Regional



CLIENT:
METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:
LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN
ADDISON CREEK WATERSHED
PROPOSED ALTERNATIVE ADCR-1B

PROJ. NO. 08-0043
DATE: 03-23-2010
SHEET 1 OF 1
DRAWING NO.

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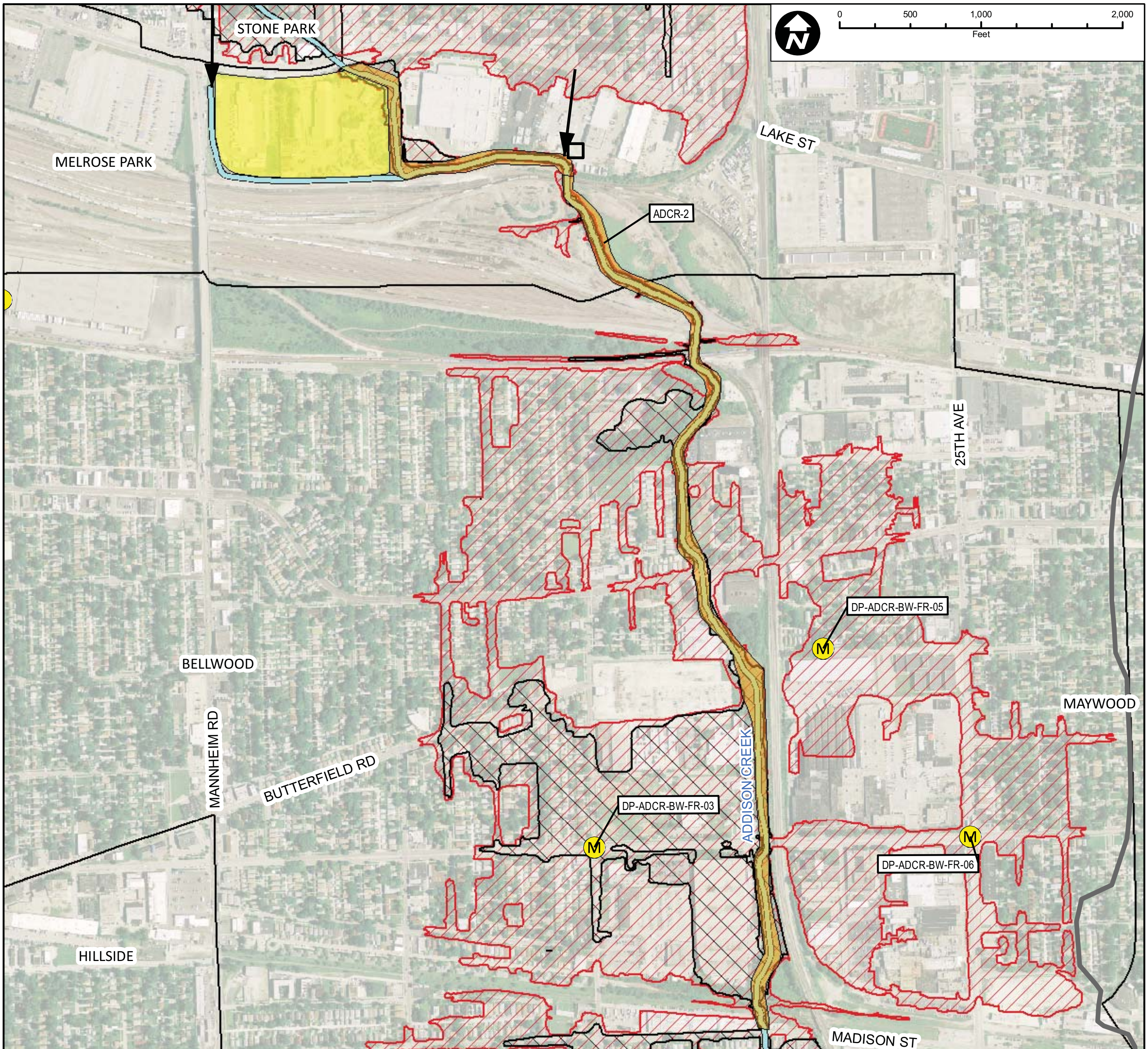
DSGN.	DRW	4-10	SCALE	
DWN.			GIS USER	DRW
CHKD.			PLOT DATE	
FILE:				

FIGURE 3.2.12

Map Document: (Z:\MWRDGC\08-0043 Phase B\GIS\Exhibits\Meeting Maps\Addison Salt Creek\Addison Creek Detailed Sheets.mxd)
8/17/2010 -- 2:30:15 PM



Subwatershed: Addison Creek

Alternative: ADCR-2a

Alternatives Description: 480 A-F Reservoir southeast of Lake and Mannheim, New Melrose Park Pump Station with 3-20 cfs pumps following existing storm sewer alignment south of 33rd Avenue. Mannheim Pump Station modification - force main extended to the Lake and Mannheim Tributary. Channel Improvements from Lake Street to Madison Street.

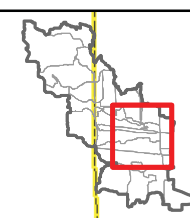
Concept Level Cost: $70,824,229
Benefits: $187,948,782
B/C Ratio: 2.7

Legend

- 100-Year Storm Event Flood Inundation Without Project
- 100-Year Storm Event Flood Inundation With Project
- Reservoir
- Culvert/Bridge Modification
- Channel Improvements
- Levee/Floodwall
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas

- M Modeled
- R Regional



CLIENT:	TITLE:	
METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO	**LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN ADDISON CREEK WATERSHED PROPOSED ALTERNATIVE ADCR-2A**	PROJ. NO. 08-0043 DATE: 03-23-2010 SHEET 1 OF 1 DRAWING NO.

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DSGN.	DRW	4-10	SCALE	
DWN.			GIS USER	DRW
CHKD.			PLOT DATE	
FILE:				

FIGURE 3.2.13

Map Document: (Z:\MWRDGC\08-0043 Phase B\GIS\Exhibits\Meeting Maps\Addison Salt Creek\Addison Creek Detailed Sheets.mxd)
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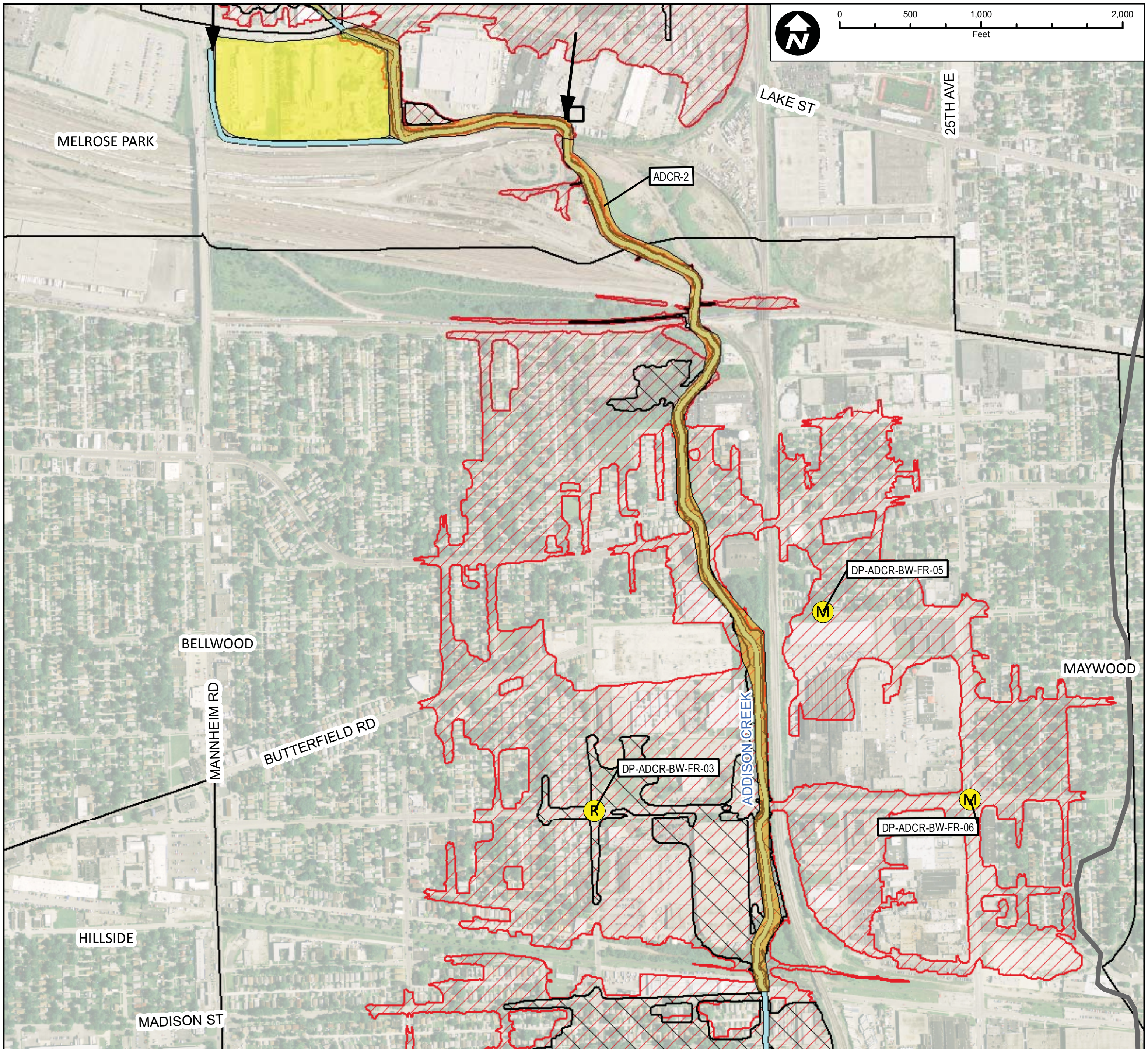


Subwatershed: Addison Creek
Alternative: ADCR-2b
Alternatives Description: 960 A-F Reservoir southeast of Lake and Mannheim, New Melrose Park Pump Station addition with 3-20 cfs pumps following existing storm sewer alignment south of 33rd Avenue. Mannheim Pump Station modification - force main extended to the Lake and Mannheim Tributary. Channel Improvements from Lake Street to Madison Street.

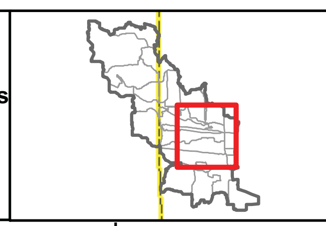
Concept Level Cost: $118,575,416
Benefits: $188,404,195
B/C Ratio: 1.6

Legend

- 100-Year Storm Event Flood Inundation Without Project
- 100-Year Storm Event Flood Inundation With Project
- Reservoir
- Culvert/Bridge Modification
- Channel Improvements
- Levee/Floodwall
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas

- M Modeled
- R Regional



CLIENT:

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:

LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN ADDISON CREEK WATERSHED PROPOSED ALTERNATIVE ADCR-2B

PROJ. NO.	08-0043
DATE:	03-23-2010
SHEET	1 OF 1
DRAWING NO.	

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DSGN.	DRW	4-10	SCALE	
DWN.			GIS USER	DRW
CHKD.			PLOT DATE	
FILE:				

FIGURE 3.2.14

Map Document: (Z:\MWRDGC\08-0043 Phase B\GIS\Exhibits\Meeting Maps\Addison Salt Creek\Addison Creek Detailed Sheets.mxd)
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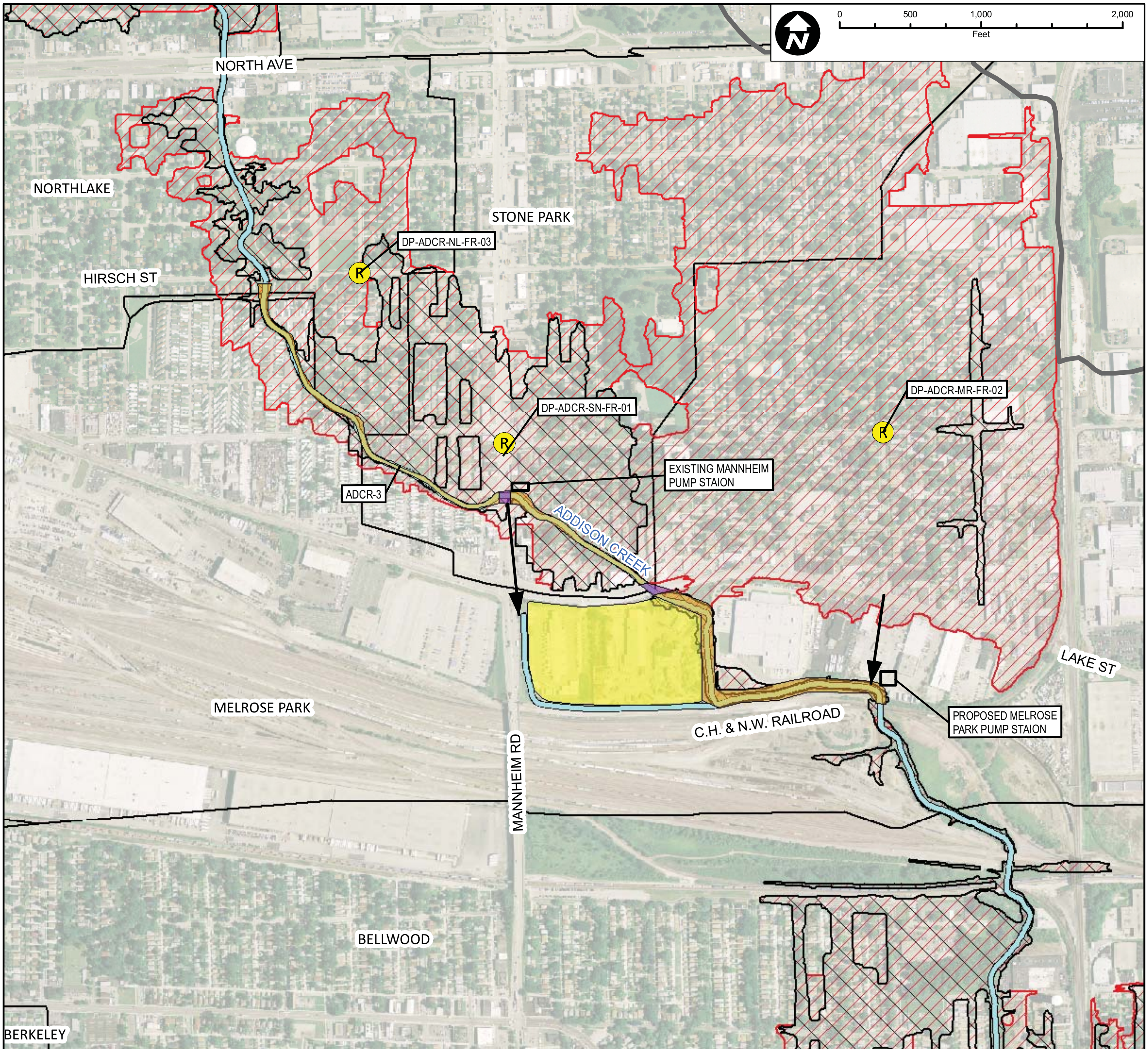


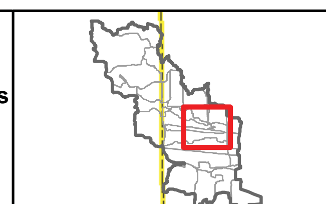
Subwatershed: Addison Creek
Alternative: ADCR-3a
Alternatives Description: 480 A-F Reservoir southeast of Lake and Mannheim, Mannheim Pump Station modification force main extended to the Lake and Mannheim Tributary. New Melrose Park Pump Station with 3-20 cfs pumps following existing storm sewer alignment south of 33rd Avenue. Channel Improvements from Hirsch Street to the C.H. & N.W. Railroad. Lake Street sediment removal. Mannheim Road culvert modification.

Concept Level Cost: $62,412,920
Benefits: $185,891,645
B/C Ratio: 3.0

Legend

- 100-Year Storm Event Flood Inundation Without Project
- 100-Year Storm Event Flood Inundation With Project
- Reservoir
- Culvert/Bridge Modification
- Channel Improvements
- Levee/Floodwall
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas
- M Modeled
- R Regional



CLIENT:
METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:
LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN
ADDISON CREEK WATERSHED
PROPOSED ALTERNATIVE ADCR-3A

PROJ. NO. 08-0043
DATE: 03-23-2010
SHEET 1 OF 1
DRAWING NO.

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DSGN.	DRW	4-10	SCALE	
DWN.			GIS USER	DRW
CHKD.			PLOT DATE	
FILE:				

FIGURE 3.2.15

Map Document: (Z:\MWRDGC\08-0043 Phase B\GIS\Exhibits\Meeting Maps\Addison Salt Creek\Addison Creek Detailed Sheets.mxd)
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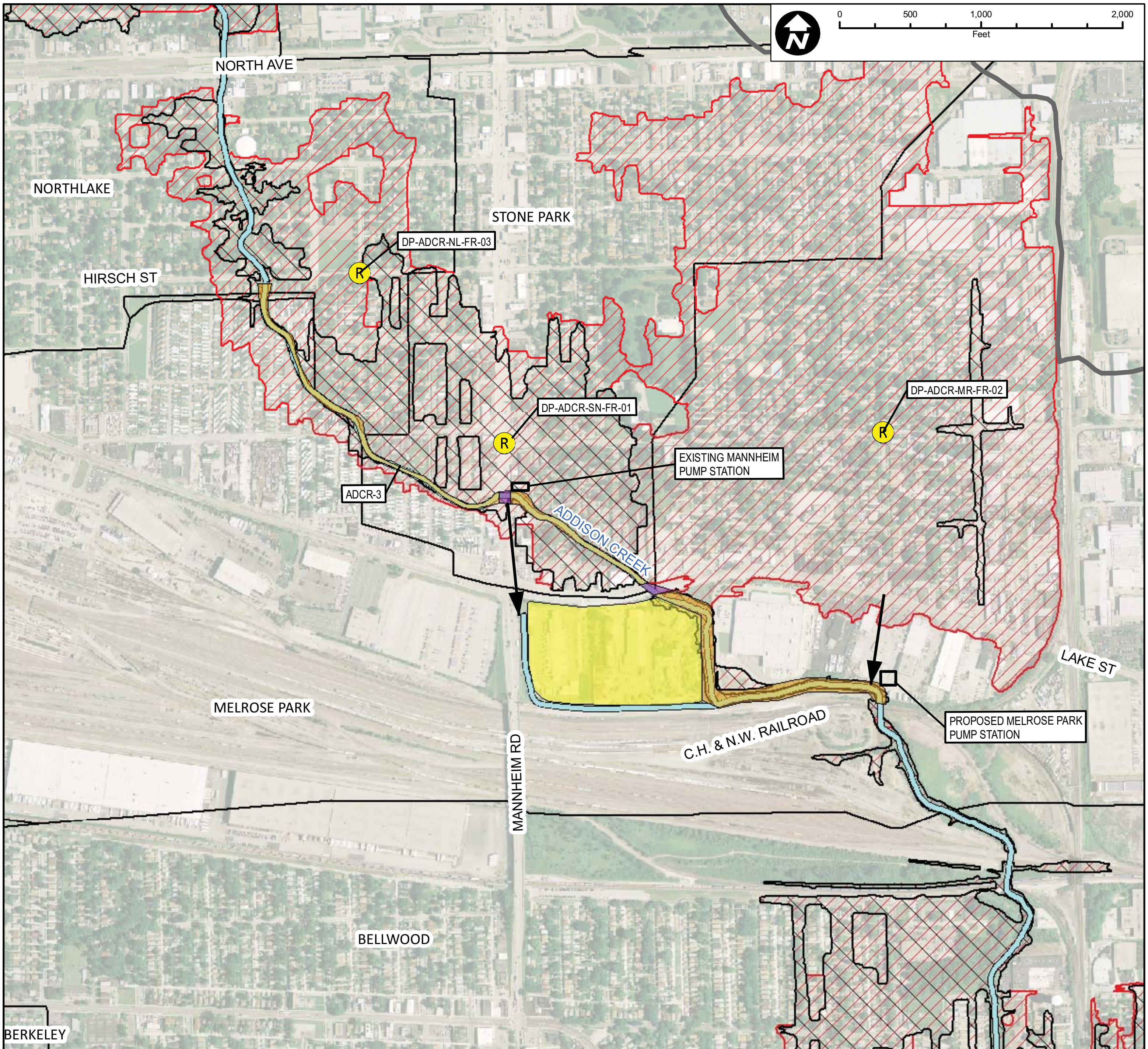
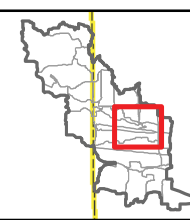


Subwatershed: Addison Creek
Alternative: ADCR-3b
Alternatives Description: 960 A-F Reservoir southeast of Lake and Mannheim, Mannheim Pump Station modification force main extended to the Lake and Mannheim Tributary. New Melrose Park Pump Station with 3-20 cfs pumps following existing storm sewer alignment south of 33rd Avenue. Channel Improvements from Hirsch Street to the C.H. & N.W. Railroad. Lake Street sediment removal. Mannheim Road culvert modification.
Concept Level Cost: $110,164.107
Benefits: $188,940,063
B/C Ratio: 1.7

Legend

- 100-Year Storm Event Flood Inundation Without Project
- 100-Year Storm Event Flood Inundation With Project
- Reservoir
- Culvert/Bridge Modification
- Channel Improvements
- Levee/Floodwall
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas
- M Modeled
- R Regional



CLIENT:
METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:
LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN
ADDISON CREEK WATERSHED
PROPOSED ALTERNATIVE ADCR-3B

PROJ. NO.	08-0043
DATE:	03-23-2010
SHEET	1 OF 1
DRAWING NO.	

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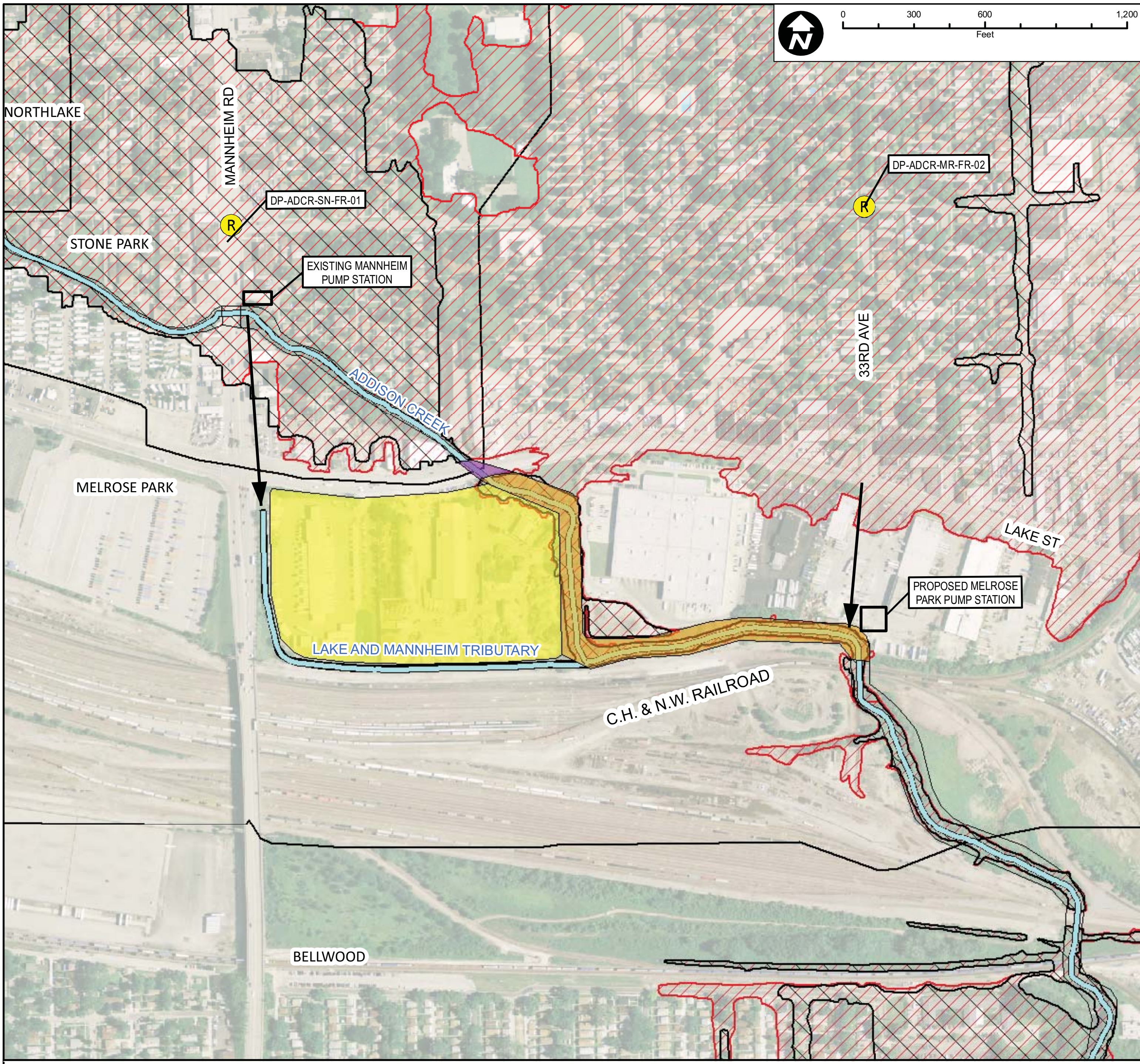
DSGN.	DRW	4-10	SCALE	
DWN.			GIS USER	DRW
CHKD.			PLOT DATE	
FILE:				

FIGURE 3.2.16

Map Document: (Z:\MWRDGC\08-0043 Phase B\GIS\Exhibits\Meeting Maps\Addison Salt Creek\Addison Creek Detailed Sheets.mxd)
8/17/2010 -- 2:33:22 PM



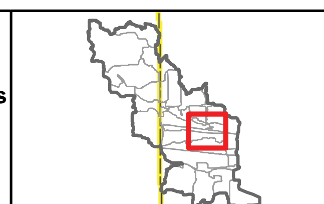
Subwatershed: Addison Creek
Alternative: ADCR-4a
Alternatives Description: 480 A-F Reservoir southeast of Lake and Mannheim. Mannheim Pump Station modification force main extended to the Lake and Mannheim Tributary.
Sediment Removal from the Lake Street Culvert to the CH & NW Railroad.
New Melrose Park Pump Station with 3-20 cfs pumps following existing storm sewer alignment south of 33rd Avenue.

Concept Level Cost: $54,178,622
Benefits: $161,356,819
B/C Ratio: 3.0

Legend

- 100-Year Storm Event Flood Inundation Without Project
- 100-Year Storm Event Flood Inundation With Project
- Reservoir
- Culvert/Bridge Modification
- Channel Improvements
- Levee/Floodwall
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas
- M Modeled
- R Regional



CLIENT:
METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:
LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN
ADDISON CREEK WATERSHED
PROPOSED ALTERNATIVE ADCR-4A

PROJ. NO. 08-0043				
DATE: 03-23-2010				
SHEET 1 OF 1				
DRAWING NO.				
DSGN.	DRW	4-10	SCALE	
DWN.			GIS USER	DRW
CHKD.			PLOT DATE	
FILE:				

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FIGURE 3.2.17

Map Document: (Z:\MWRDGC\08-0043 Phase B\GIS\Exhibits\Meeting Maps\Addison Salt Creek\Addison Creek Detailed Sheets.mxd)
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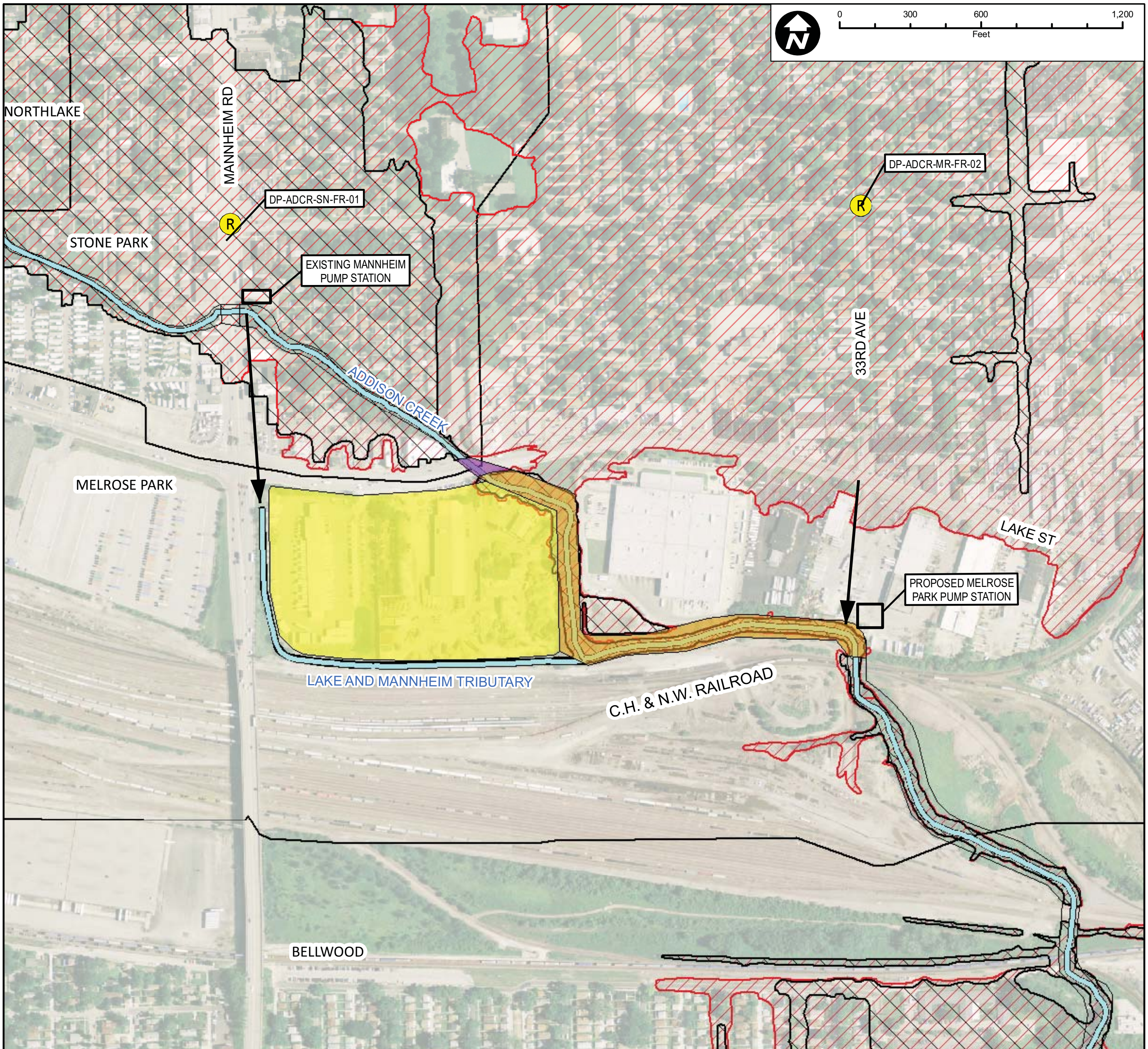

Subwatershed: Addison Creek
Alternative: ADCR-4b
Alternatives Description: 960 A-F Reservoir southeast of Lake and Mannheim. Mannheim Pump Station modification force main extended to the Lake and Mannheim Tributary.
Sediment Removal from the Lake Street Culvert to the CH & NW Railroad.
New Melrose Park Pump Station with 3-20 cfs pumps following existing storm sewer alignment south of 33rd Avenue.

Concept Level Cost: $101,929,809
Benefits: $176,742,100
B/C Ratio: 1.7

Legend

- 100-Year Storm Event Flood Inundation Without Project
- 100-Year Storm Event Flood Inundation With Project
- Reservoir
- Culvert/Bridge Modification
- Channel Improvements
- Levee/Floodwall
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas
- M Modeled
- R Regional

CLIENT:
METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:
LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN
ADDISON CREEK WATERSHED
PROPOSED ALTERNATIVE ADCR-4B

PROJ. NO.	08-0043
DATE:	03-23-2010
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DWN.			GIS USER	DRW
CHKD.			PLOT DATE	
FILE:				

FIGURE 3.2.18

Map Document: (Z:\MWRDGC\08-0043 Phase B\GIS\Exhibits\Meeting Maps\Addison Salt Creek\Addison Creek Detailed Sheets.mxd)
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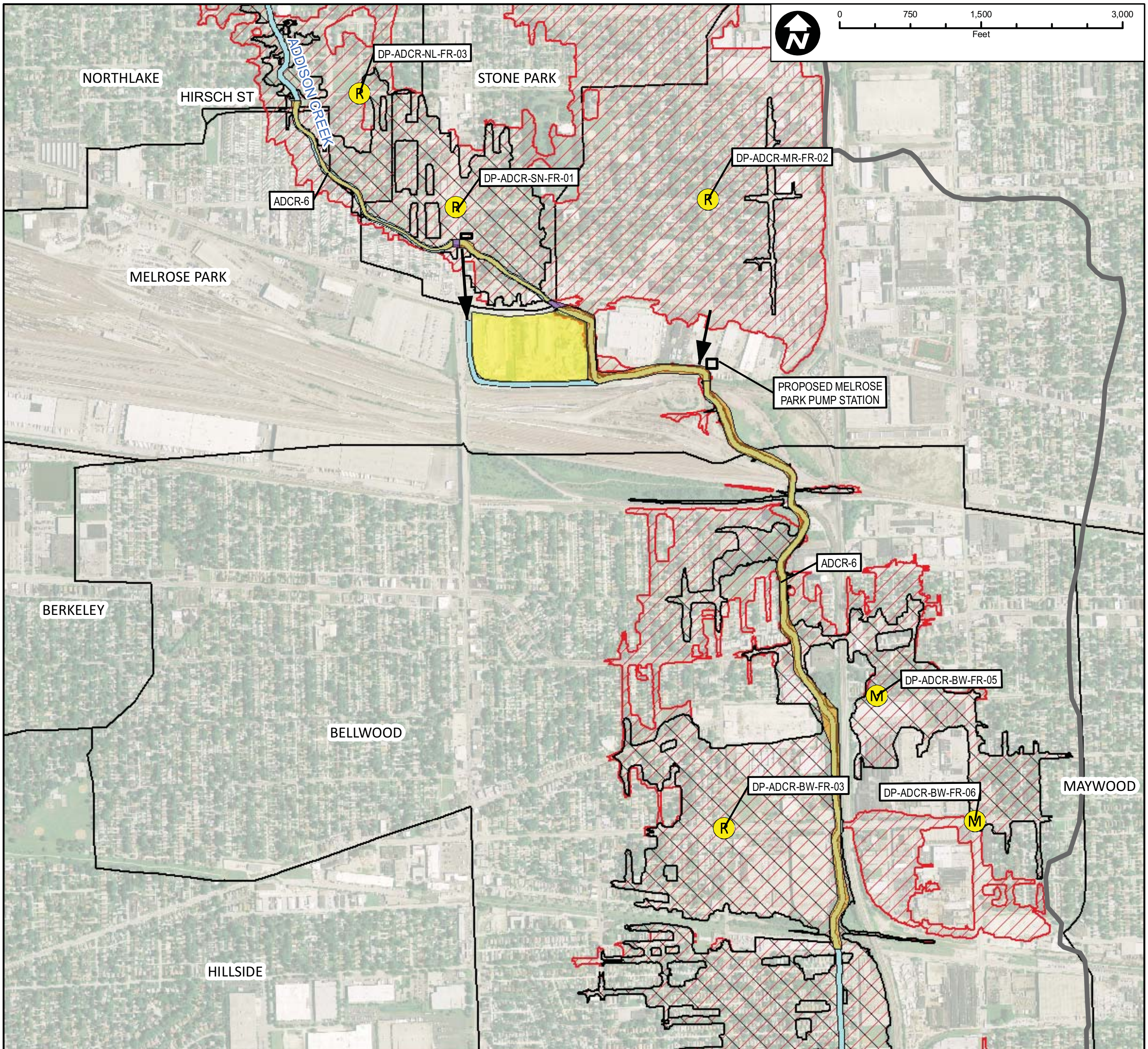


Subwatershed: Addison Creek
Alternative: ADCR-6a
Alternatives Description: 480 A-F or Reservoir southeast of Lake Street and Mannheim Road. Mannheim Pump Station modification force main extended to the Lake and Mannheim Tributary. New Melrose Park Pump Station with 3-20 cfs pumps following existing storm sewer alignment south of 33rd Avenue. Channel improvements from Hirsch Street to Madison Street. Mannheim Road culvert modification. Lake Street sediment removal.

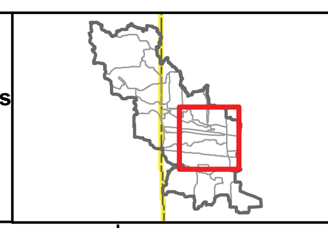
Concept Level Cost: $79,058,527
Benefits: $191,169,717
B/C Ratio: 2.4

Legend

- 100-Year Storm Event Flood Inundation Without Project
- 100-Year Storm Event Flood Inundation With Project
- Reservoir
- Culvert/Bridge Modification
- Channel Improvements
- Levee/Floodwall
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas

- M Modeled
- R Regional



CLIENT: **METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO**	TITLE: **LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN ADDISON CREEK WATERSHED PROPOSED ALTERNATIVE ADCR-6A**	PROJ. NO. 08-0043	
		DATE: 03-23-2010	
		SHEET 1 OF 1	
		DRAWING NO.	

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DWN.			GIS USER	DRW
CHKD.			PLOT DATE	
FILE:				

FIGURE 3.2.19

Map Document: (Z:\MWRDGC\08-0043 Phase B\GIS\Exhibits\Meeting Maps\Addison Salt Creek\Addison Creek Detailed Sheets.mxd)
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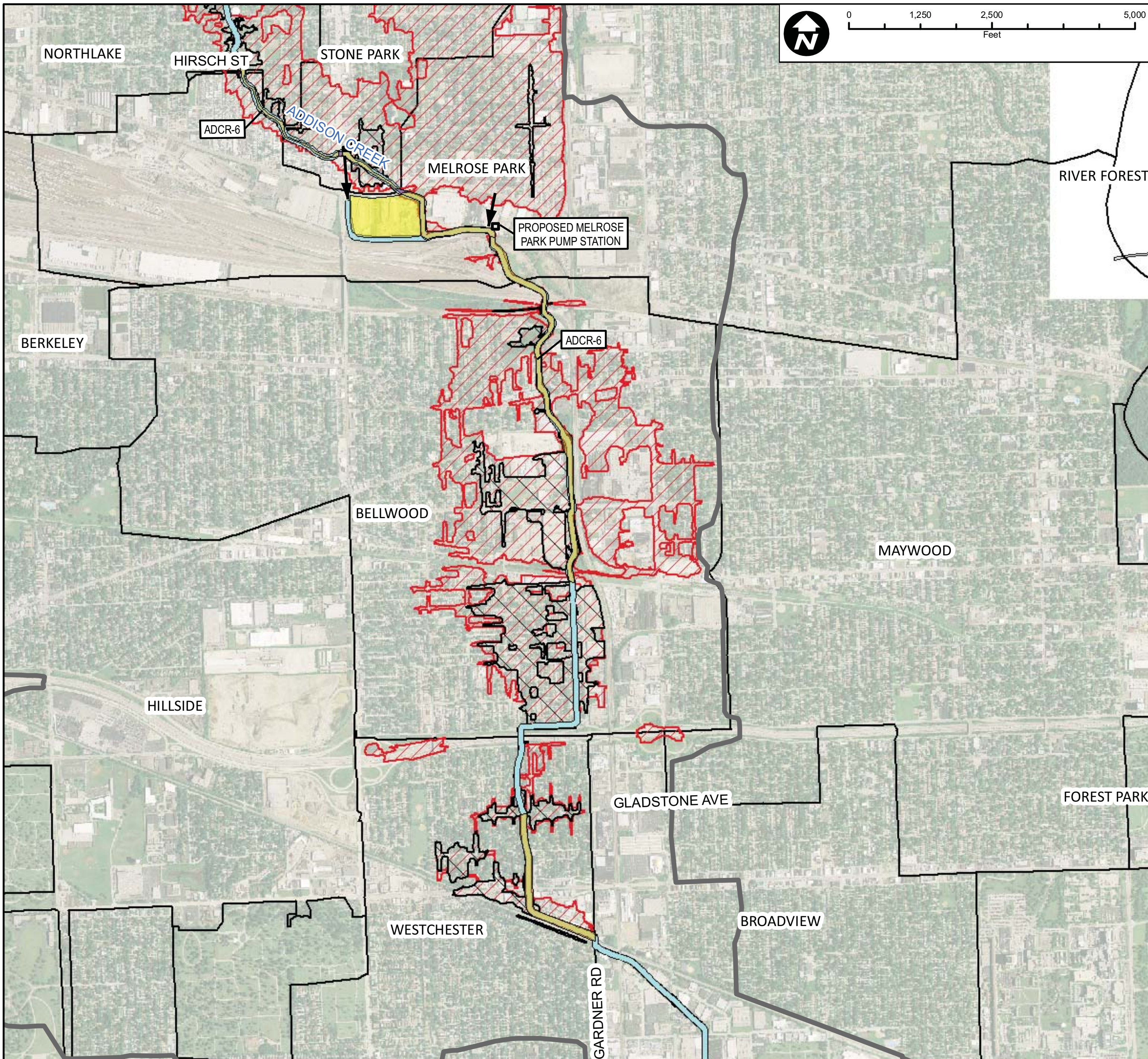


Subwatershed: Addison Creek

Alternative: ADCR-6b

Alternatives Description: 960 A-F Reservoir southeast of Lake Street and Mannheim Road. Mannheim Pump Station modification force main extended to the Lake and Mannheim Tributary. New Melrose Park Pump Station with 3-20 cfs pumps following existing storm sewer alignment south of 33rd Avenue. Channel improvements from Hirsch Street to Madison Street and Gladstone to Gardner Road. Mannheim Road culvert modification. Lake Street sediment removal.

Concept Level Cost: $133,921,295

Benefits: $196,463,022

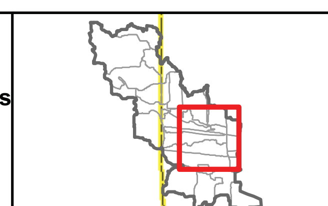
B/C Ratio: 1.5

Legend

- 100-Year Storm Event Flood Inundation Without Project
- 100-Year Storm Event Flood Inundation With Project
- Reservoir
- Culvert/Bridge Modification
- Channel Improvements
- Levee/Floodwall
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas

- M Modeled
- R Regional



CLIENT:

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:

LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN
ADDISON CREEK WATERSHED
RECOMMENDED ALTERNATIVE ADCR-6B

PROJ. NO.	08-0043
DATE:	03-23-2010
SHEET	1 OF 1
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DSGN.	DRW	4-10	SCALE	
DWN.			GIS USER	DRW
CHKD.			PLOT DATE	
FILE:				

FIGURE 3.2.20

Map Document: (Z:\MWRDGC\08-0043 Phase B\GIS\Exhibits\Meeting Maps\Addison Salt Creek\Addison Creek Detailed Sheets.mxd)
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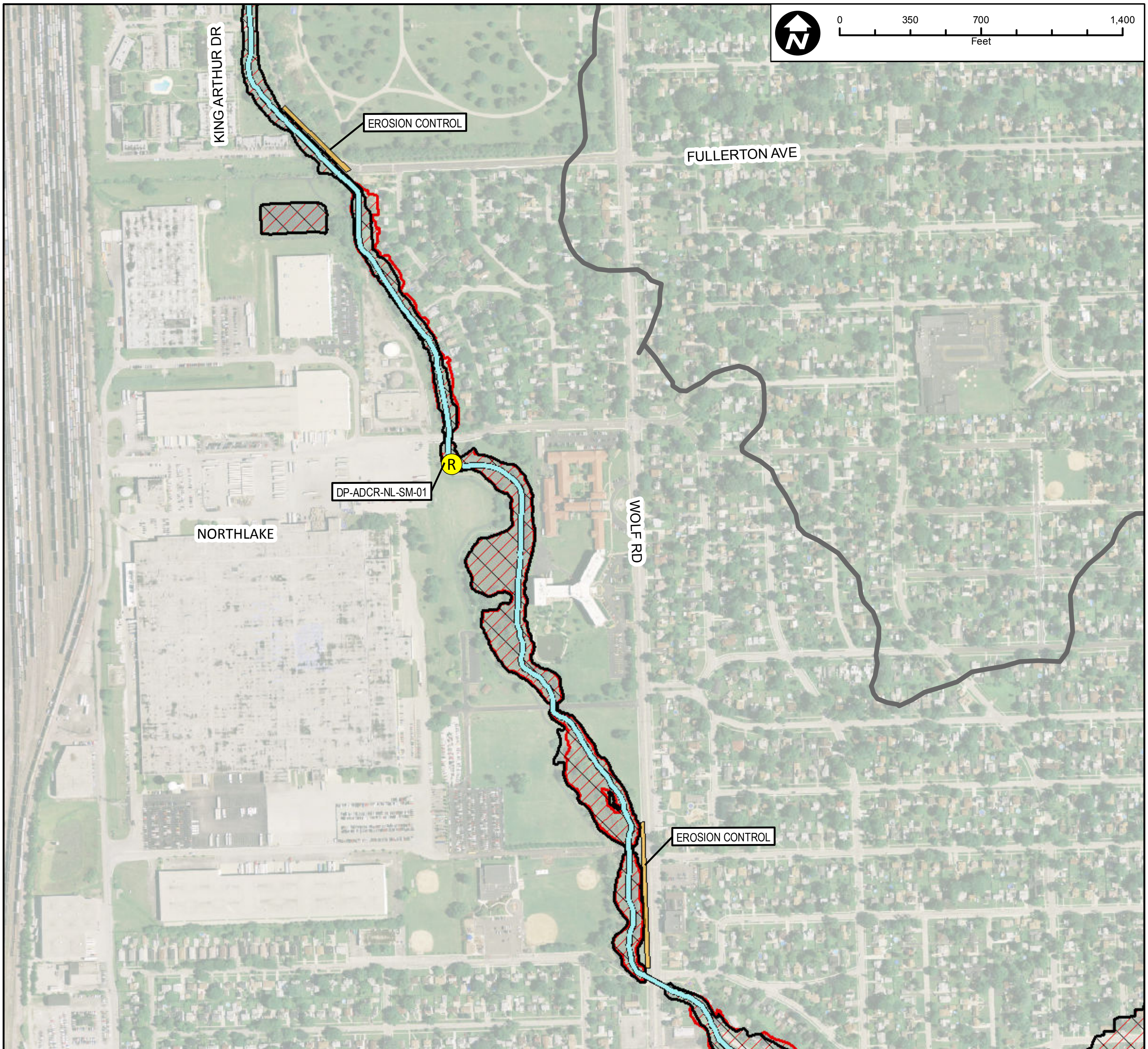


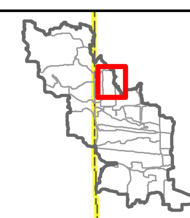
Subwatershed: Addison Creek
Alternative: ADCR-7
Alternatives Description: 720 feet of stream bank stabalization at Centerpoint Preserve adjacent to Wolf Road, and 500 feet of streambank stabalization adjacent to Fullerton Avenue/King Arthur Drive.

Concept Level Cost: $809,039
Benefits: $1,896,358
B/C Ratio: 2.3

Legend

- 100-Year Storm Event Flood Inundation Without Project
- 100-Year Storm Event Flood Inundation With Project
- Reservoir
- Culvert/Bridge Modification
- Channel Improvements
- Levee/Floodwall
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas
- M Modeled
- R Regional



CLIENT:
METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:
LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN
ADDISON CREEK WATERSHED
RECOMMEDED ALTERNATIVE ADCR-7

PROJ. NO. 08-0043
DATE: 03-23-2010
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DWN.			GIS USER	DRW
CHKD.			PLOT DATE	
FILE:				

FIGURE 3.2.21

Map Document: (Z:\MWRDGC\08-0043 Phase B\GIS\Exhibits\Meeting Maps\Addison Salt Creek\Addison Creek Detailed Sheets.mxd)
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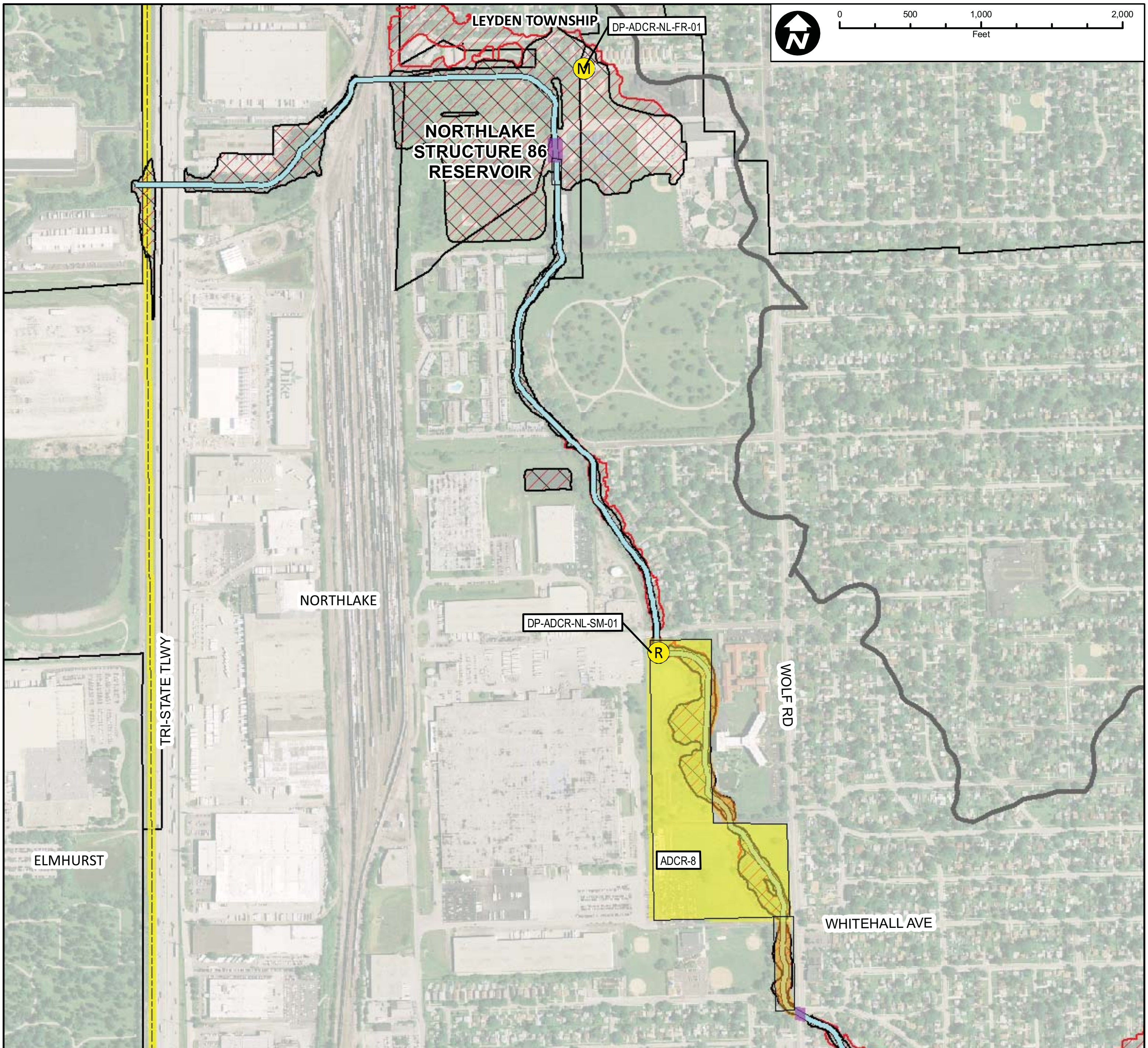
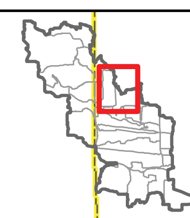


Subwatershed: Addison Creek
Alternative: ADCR-8
Alternatives Description: 200 A-F reservoir at Centerpoint Preserve. Bulkhead Wolf Road for park flood storage.
Dams removed with bypass channel along eastern park boundary.
Structure 86 gate and spillway modification.
Channel Improvements from Whitehall to Wolf Road.
Concept Level Cost: $66,846,104
Benefits: $12,751,807
B/C Ratio: 0.2

Legend

- 100-Year Storm Event Flood Inundation Without Project
- 100-Year Storm Event Flood Inundation With Project
- Reservoir
- Culvert/Bridge Modification
- Channel Improvements
- Levee/Floodwall
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas
- M Modeled
- R Regional



CLIENT:
METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:
LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN
ADDISON CREEK WATERSHED
PROPOSED ALTERNATIVE ADCR-8

PROJ. NO. 08-0043
DATE: 03-23-2010
SHEET 1 OF 1
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DWN.			GIS USER	DRW
CHKD.			PLOT DATE	
FILE:				

FIGURE 3.2.22

Map Document: (Z:\MWRDGC\08-0043 Phase B\GIS\Exhibits\Meeting Maps\Addison Salt Creek\Addison Creek Detailed Sheets.mxd)
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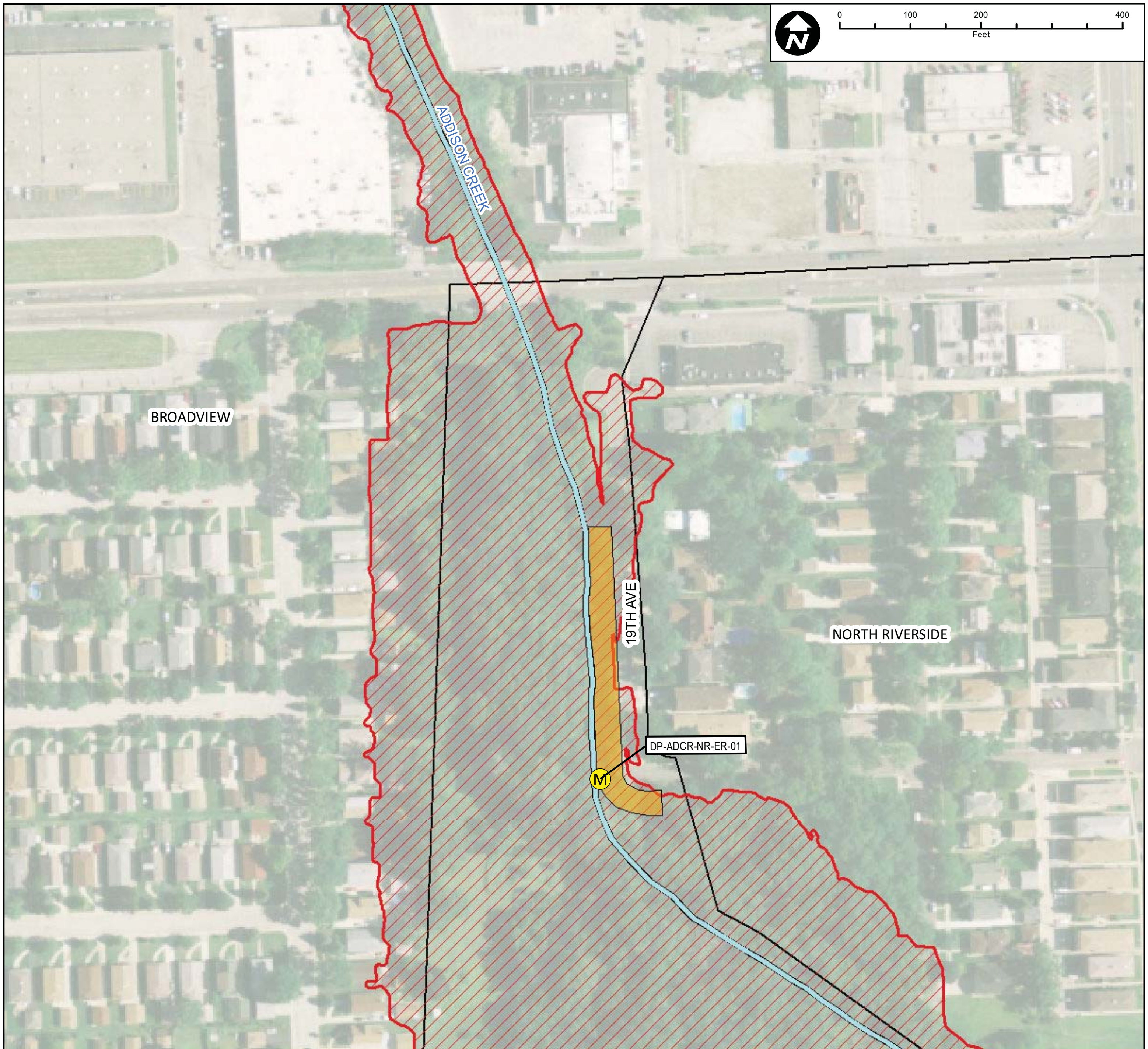


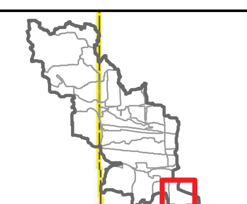
Subwatershed: Addison Creek
Alternative: ADCR-9
Alternatives Description: Stabilize eroded streambank adjacent to 19th Avenue.

Concept Level Cost: $218,819
Benefits: $270,053
B/C Ratio: 1.2

Legend

- 100-Year Storm Event Flood Inundation Without Project
- 100-Year Storm Event Flood Inundation With Project
- Reservoir
- Culvert/Bridge Modification
- Channel Improvements
- Levee/Floodwall
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas
- M Modeled
- R Regional



CLIENT:
METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:
LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN
ADDISON CREEK WATERSHED
RECOMMEDED ALTERNATIVE ADCR-9

PROJ. NO.	08-0043			
DATE:	03-23-2010			
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DWN.			GIS USER	DRW
CHKD.			PLOT DATE	
FILE:				

FIGURE 3.2.23

Map Document: (Z:\MWRDGC\08-0043 Phase B\GIS\Exhibits\Meeting Maps\Addison Salt Creek\Addison Creek Detailed Sheets.mxd)
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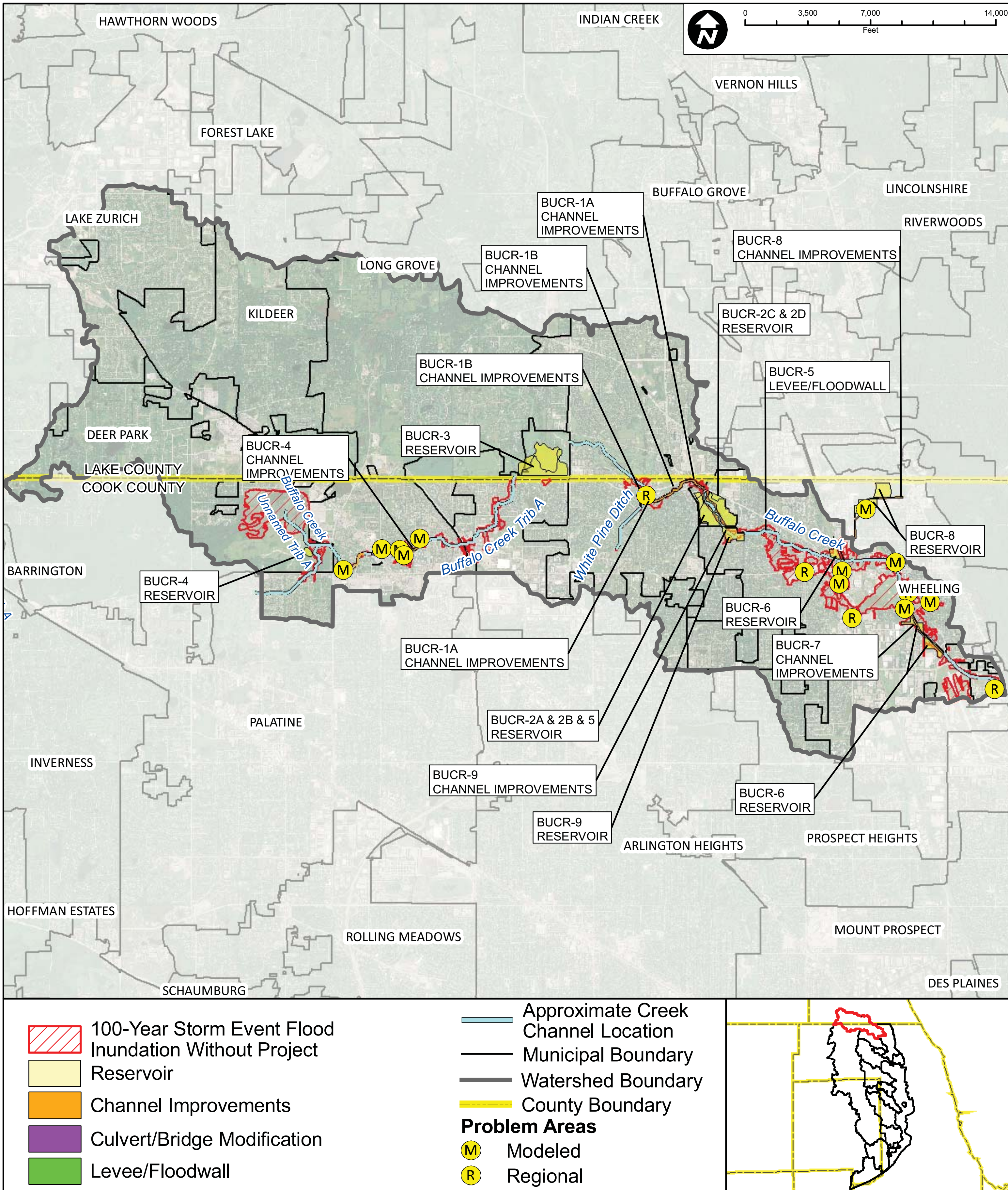

CLIENT:

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:

LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN
BUFFALO CREEK WATERSHED
TRIBUTARY OVERVIEW

PROJ. NO.	08-0043
DATE:	03-23-2010
SHEET 1 OF 1	
DRAWING NO.	**FIGURE 3.3.1**

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CHKD.			PLOT DATE	
FILE:				

Map Document: (Z:\MWRDGC\08-0043 Phase B\Water\Buffalo\exhibits\Buffalo Creek Overview Figure 3.3.1.mxd)
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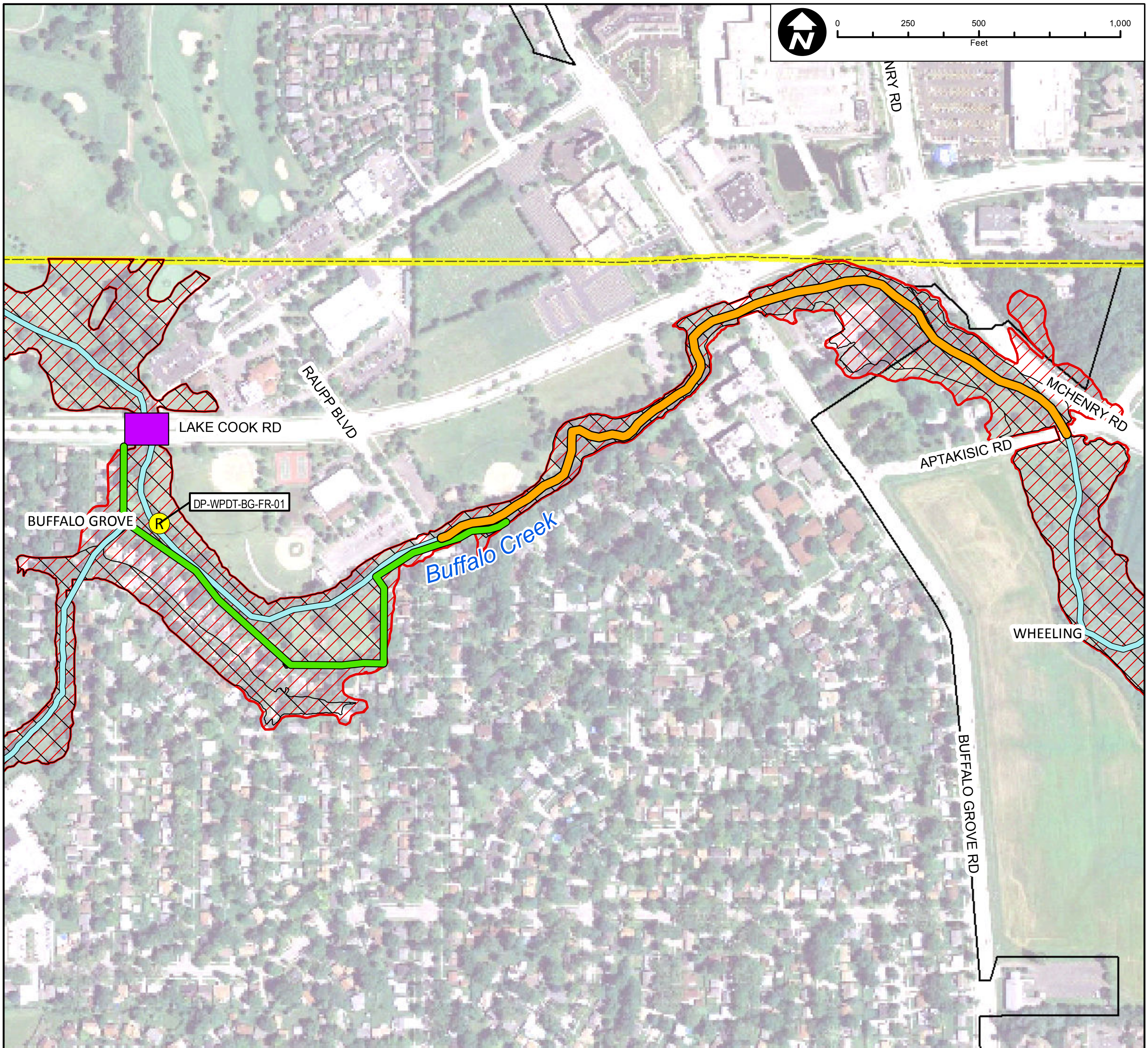


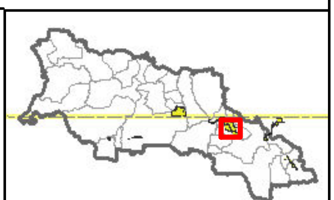
Subwatershed: Buffalo Creek
Alternative: BUCR-1A
Alternatives Description: 2,200 feet of floodwall from Lake-Cook Road to Raupp Blvd.
Channel improvements from Raupp Blvd to Aptakisic Road.
Partially bulkhead Lake-Cook Road to provide flood storage by increasing the flood elevation on the Buffalo Grove Golf Course.

Concept Level Cost: $10,750,201
Benefits: $1,147,163
B/C Ratio: 0.1

Legend

- 100-Year Storm Event Flood Inundation Without Project
- 100-Year Storm Event Flood Inundation With Project
- Reservoir
- Culvert/Bridge Modification
- Channel Improvements
- Levee/Floodwall
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas
- M Modeled
- R Regional



CLIENT:
METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:
LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN
BUFFALO CREEK WATERSHED
PROPOSED ALTERNATIVE BUCR-1A

PROJ. NO.	08-0043			
DATE:	08-12-10			
SHEET 1 OF 1				
DRAWING NO.				
DSGN.	DRW	4-10		
DWN.			GIS USER	DRW
CHKD.			PLOT DATE	
FILE:				

FIGURE 3.3.6

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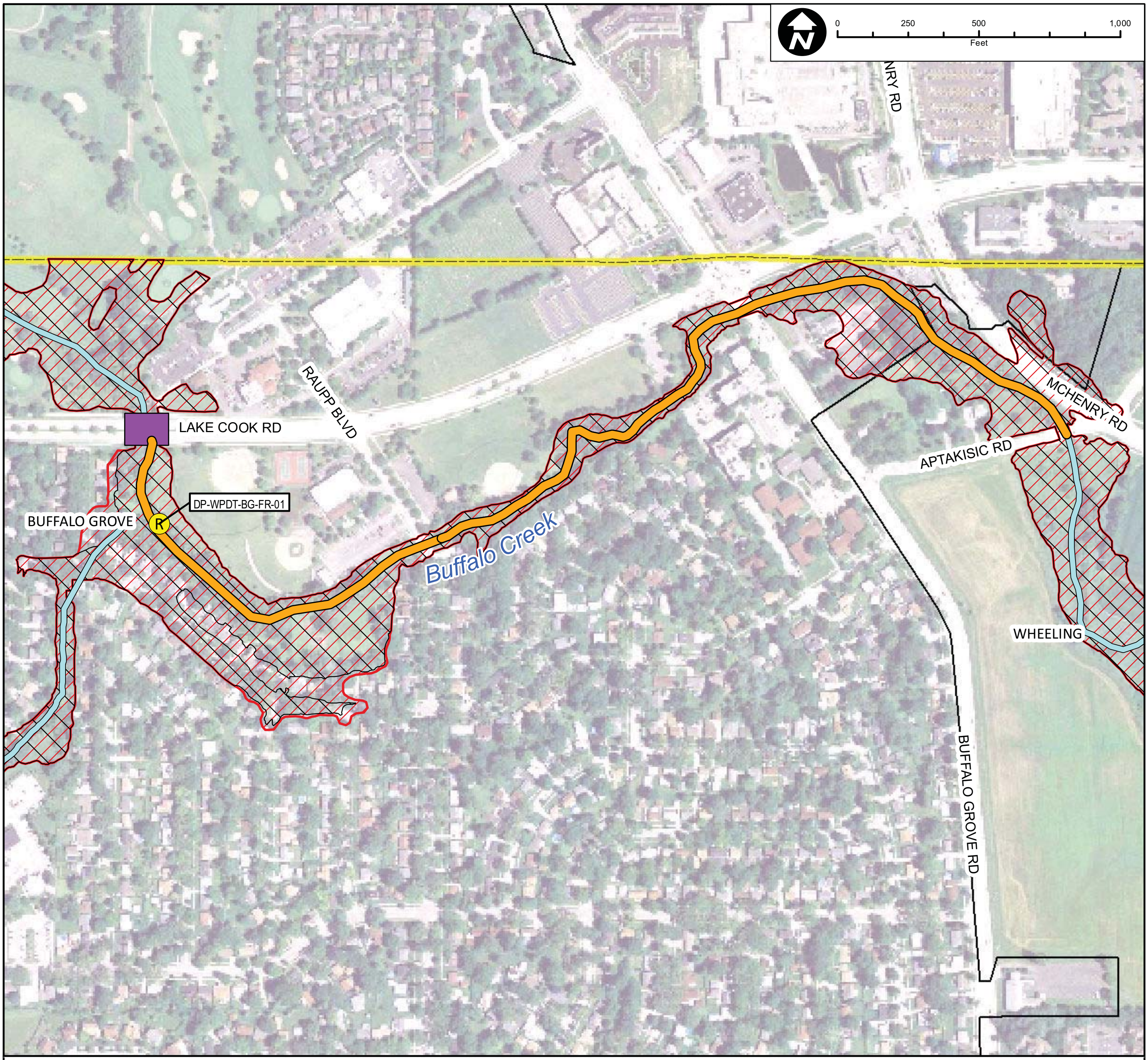

Subwatershed: Buffalo Creek
Alternative: BUCR-1B
Alternatives Description: Channel improvements from Lake-Cook Road to Aptakisic Road.
Partially bulkhead Lake-Cook Road crossing to provide flood storage by increasing the flood elevation on the Buffalo Grove Golf Course.

Concept Level Cost: $613,435
Benefits: $808,186
B/C Ratio: 1.3

Legend

- 100-Year Storm Event Flood Inundation Without Project
- 100-Year Storm Event Flood Inundation With Project
- Reservoir
- Culvert/Bridge Modification
- Channel Improvements
- Levee/Floodwall
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas
- M Modeled
- R Regional

CLIENT:
METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:
**LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN
BUFFALO CREEK WATERSHED
RECOMMENDED ALTERNATIVE BUCR-1B**

PROJ. NO. 08-0043
DATE: 08-12-10
SHEET 1 OF 1
DRAWING NO.
FIGURE 3.3.7

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CHKD.			PLOT DATE	
FILE:				

Map Document: (Z:\MWRDGC\08-0043 Phase B\Water\Buffalo\exhibits\Detailed Watershed Plan Sheets 2.mxd)
11/19/2010 -- 8:19:08 AM

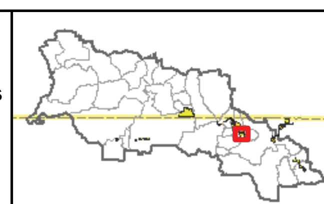
Subwatershed: Buffalo Creek
Alternative: BUCR-2A
Alternatives Description: Provide 310 A-F of flood storage on un-developed private property in Wheeling, and account for a potential Weiland Road Extension.

Concept Level Cost: $47,711,974
Benefits: $1,778,274
B/C Ratio: 0.04

Legend

- 100-Year Storm Event Flood Inundation Without Project
- 100-Year Storm Event Flood Inundation With Project
- Reservoir
- Culvert/Bridge Modification
- Channel Improvements
- Levee/Floodwall
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas
- M Modeled
- R Regional



CLIENT:
METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:
LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN BUFFALO CREEK WATERSHED PROPOSED ALTERNATIVE BUCR-2A

PROJ. NO.	08-0043
DATE:	03-23-2010
SHEET 1 OF 1	
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DSGN.	DRW	4-10	SCALE: 500'	
DWN.			GIS USER	DRW
CHKD.			PLOT DATE	
FILE:				

FIGURE 3.3.8

Map Document: (Z:\MWRDGC\08-0043 Phase B\Water\Buffalo\exhibits\Detailed Watershed Plan Sheets 2.mxd)
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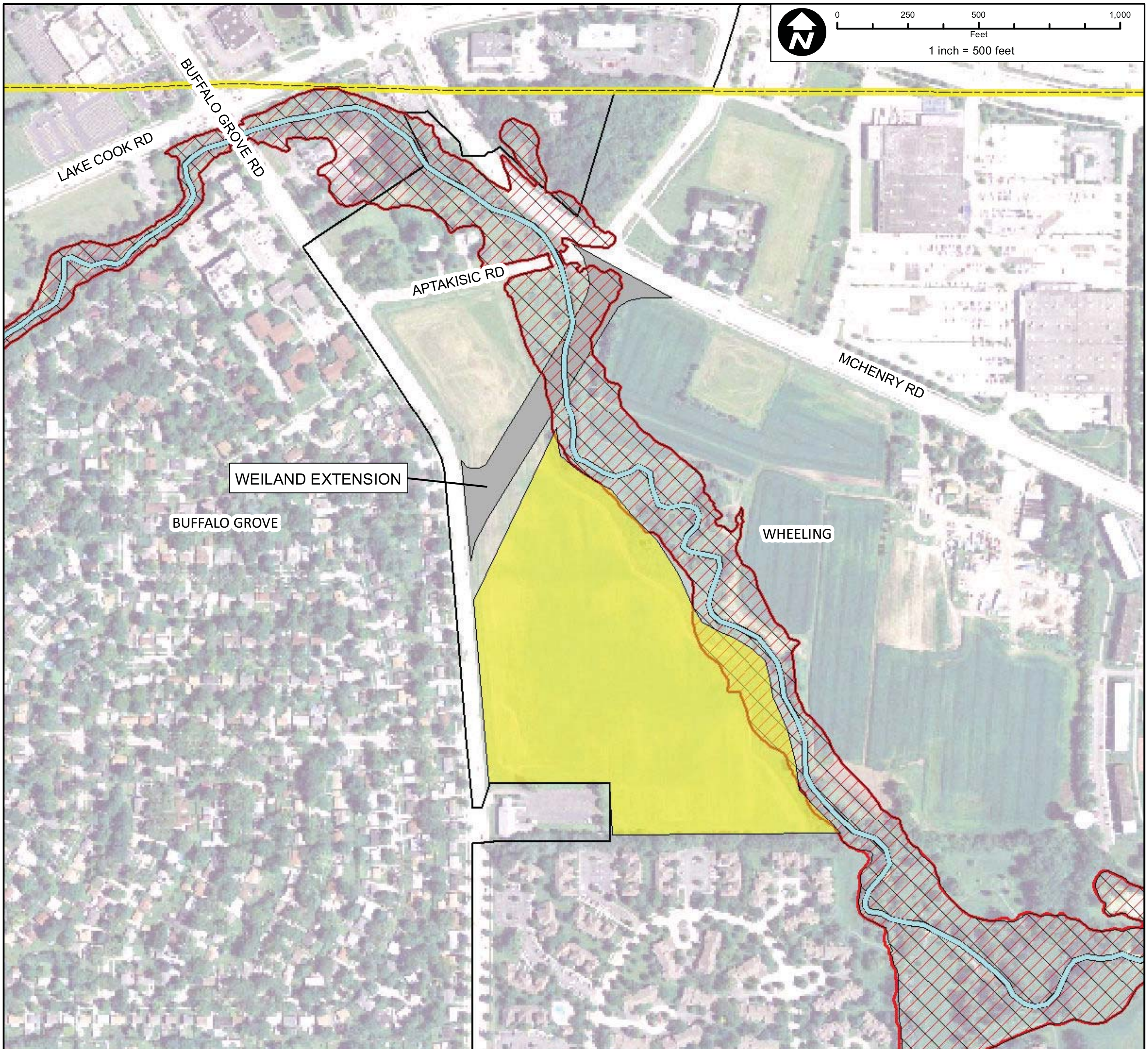


Subwatershed: Buffalo Creek

Alternative: BUCR-2B

Alternatives Description: Provide 300 A-F of flood storage on un-developed private property in Wheeling, and account for a potential Weiland Road Extension.

Concept Level Cost: $40,815,895

Benefits: $1,724,056

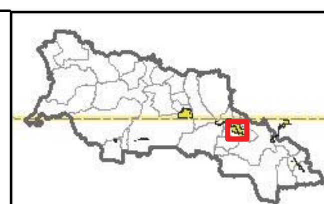
B/C Ratio: 0.04

Legend

- 100-Year Storm Event Flood Inundation Without Project
- 100-Year Storm Event Flood Inundation With Project
- Reservoir
- Culvert/Bridge Modification
- Channel Improvements
- Levee/Floodwall
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas

- M Modeled
- R Regional



CLIENT:

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:

LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN BUFFALO CREEK WATERSHED PROPOSED ALTERNATIVE BUCR-2B

PROJ. NO.	08-0043			
DATE:	03-23-2010			
SHEET 1 OF 1				
DRAWING NO.				
DSGN.	DRW	4-10	SCALE: 500'	
DWN.			GIS USER	DRW
CHKD.			PLOT DATE	
FILE:				

FIGURE 3.3.9

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Map Document: (Z:\MWRDGC\08-0043 Phase B\Water\Buffalo\exhibits\Detailed Watershed Plan Sheets 2.mxd)
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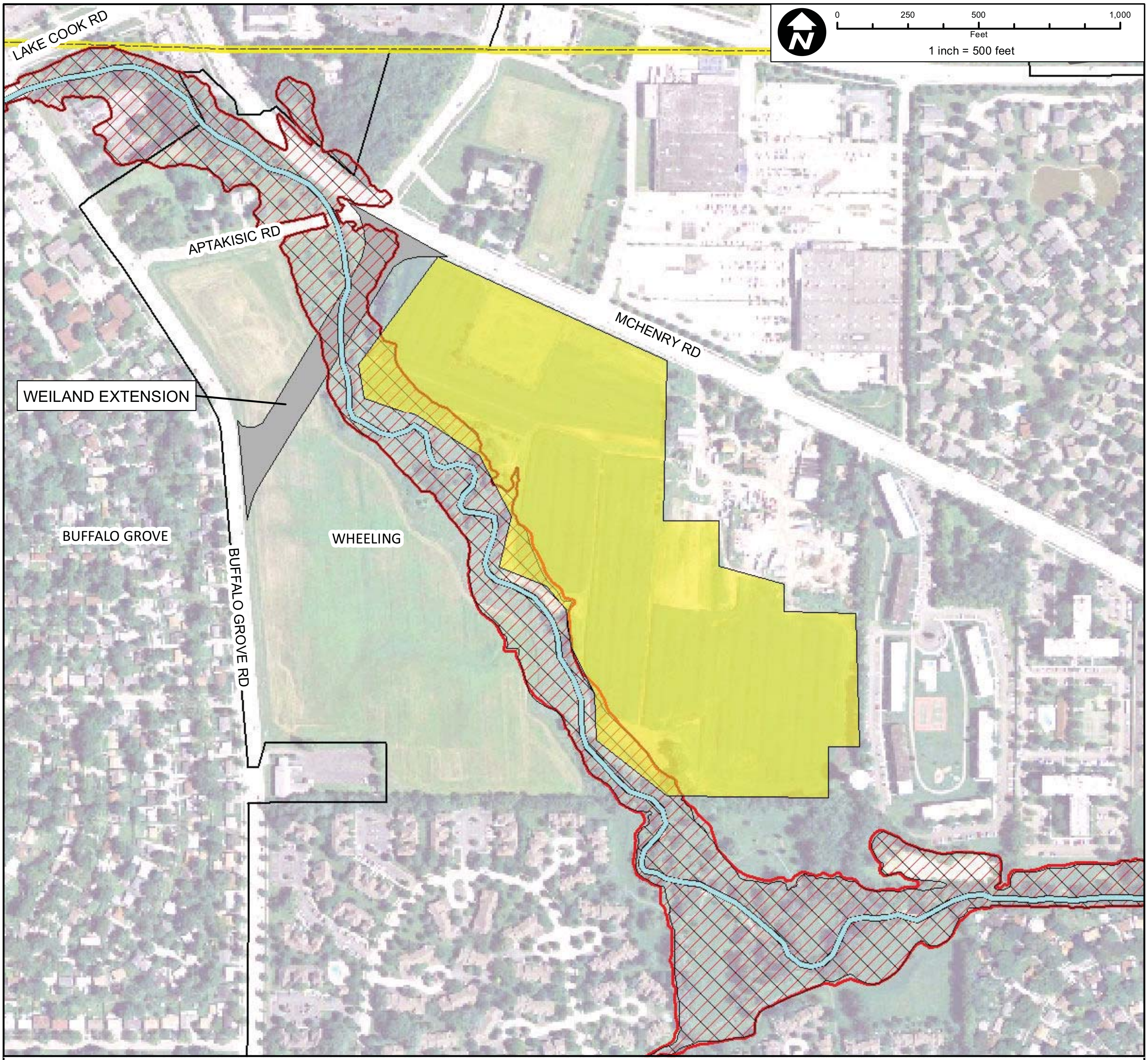


Subwatershed: Buffalo Creek

Alternative: BUCR-2C

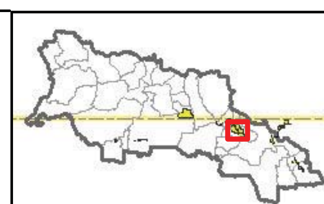
Alternatives Description: Provide 300 A-F of flood storage on un-developed private property in Wheeling, and account for a potential Weiland Road Extension.

Concept Level Cost: $47,971,982
Benefits: $1,747,756
B/C Ratio: 0.04

Legend

- 100-Year Storm Event Flood Inundation Without Project
- 100-Year Storm Event Flood Inundation With Project
- Reservoir
- Culvert/Bridge Modification
- Channel Improvements
- Levee/Floodwall
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas
- M Modeled
- R Regional



CLIENT:
METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:
**LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN
BUFFALO CREEK WATERSHED
PROPOSED ALTERNATIVE BUCR-2C**

PROJ. NO.	08-0043		
DATE:	03-23-2010		
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DSGN.	DRW	4-10	SCALE: 500'	
DWN.			GIS USER	DRW
CHKD.			PLOT DATE	
FILE:				

FIGURE 3.3.10

Map Document: (Z:\MWRDGC\08-0043 Phase B\Water\Buffalo\exhibits\Detailed Watershed Plan Sheets 2.mxd)
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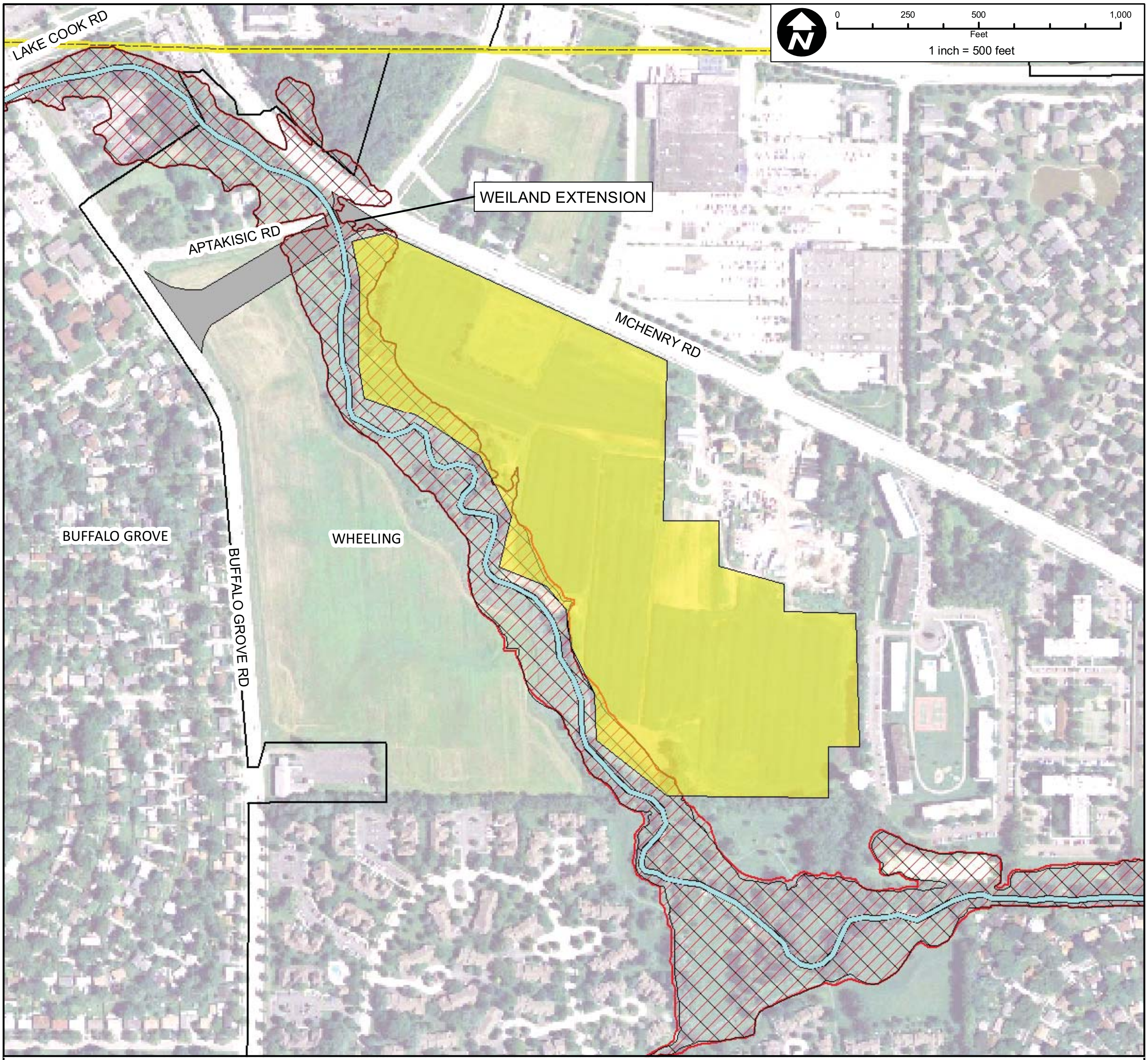


Subwatershed: Buffalo Creek

Alternative: BUCR-2D

Alternatives Description: Provide 305 A-F of flood storage on un-developed private property in Wheeling, and account for a potential Weiland Road Extension.

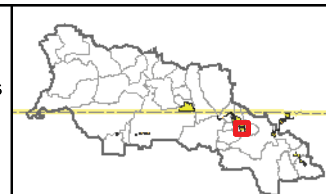
Concept Level Cost: $49,603,841
Benefits: $1,747,756
B/C Ratio: 0.04

Legend

- 100-Year Storm Event Flood Inundation Without Project
- 100-Year Storm Event Flood Inundation With Project
- Reservoir
- Culvert/Bridge Modification
- Channel Improvements
- Levee/Floodwall
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas

- M Modeled
- R Regional



CLIENT:

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:

LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN
BUFFALO CREEK WATERSHED
PROPOSED ALTERNATIVE BUCR-2D

PROJ. NO.	08-0043
DATE:	03-23-2010
SHEET	1 OF 1
DRAWING NO.	

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DSGN.	DRW	4-10	SCALE: 500'	
DWN.			GIS USER	DRW
CHKD.			PLOT DATE	
FILE:				

FIGURE 3.3.11

Map Document: (Z:\MWRDGC\08-0043 Phase B\Water\Buffalo\exhibits\Detailed Watershed Plan Sheets 2.mxd)
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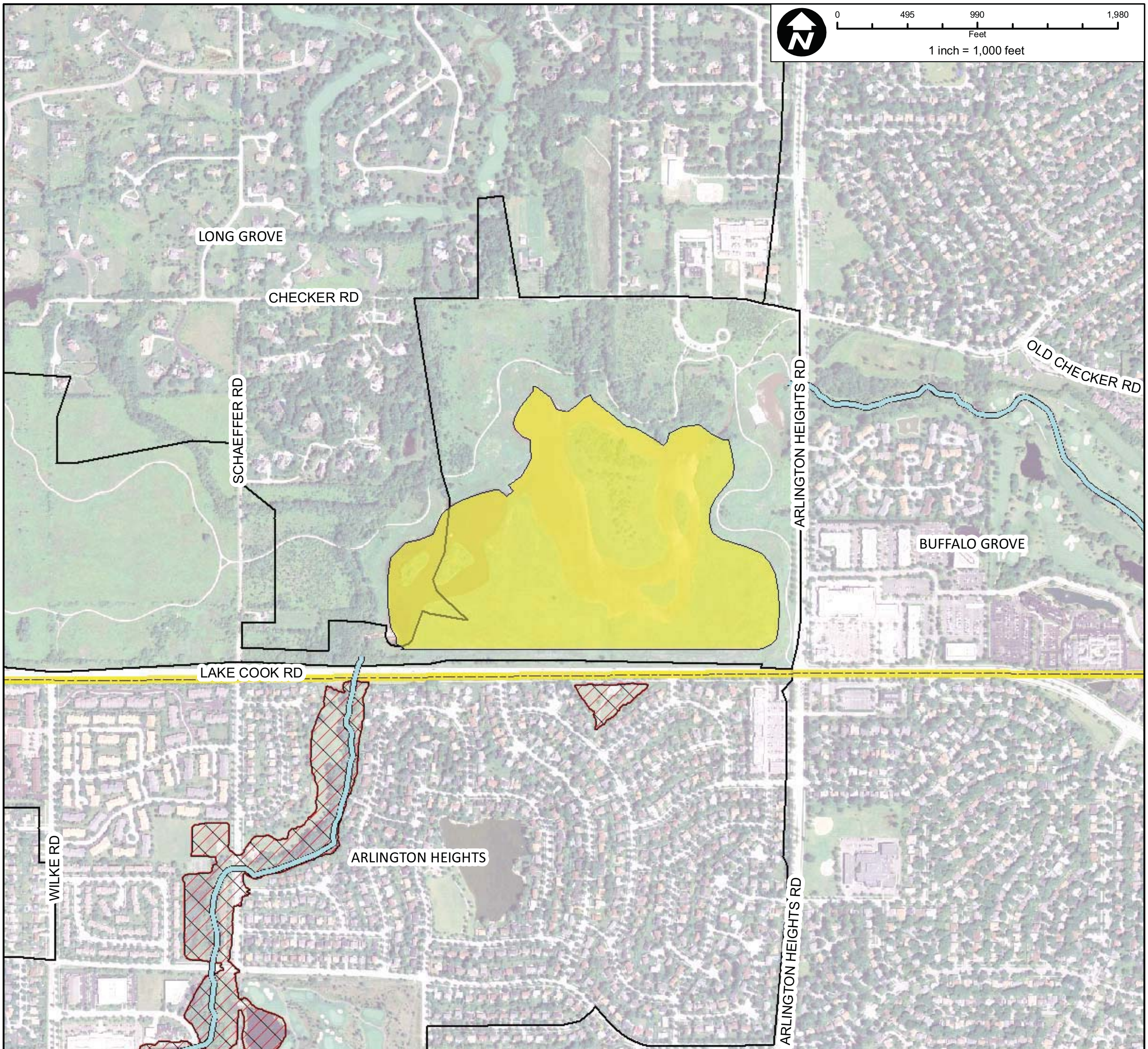

Subwatershed: Buffalo Creek
Alternative: BUCR-3
Alternatives Description: Provide 800 A-F of flood storage by expanding the existing Buffalo Creek Flood Control Reservoir.

Concept Level Cost: $62,642,321
Benefits: $1,962,520
B/C Ratio: 0.03

Legend

- 100-Year Storm Event Flood Inundation Without Project
- 100-Year Storm Event Flood Inundation With Project
- Reservoir
- Culvert/Bridge Modification
- Channel Improvements
- Levee/Floodwall
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas
- M Modeled
- R Regional

CLIENT:
METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:
LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN
BUFFALO CREEK WATERSHED
PROPOSED ALTERNATIVE BUCR-3

PROJ. NO. 08-0043
DATE: 03-23-2010
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DWN.			GIS USER	DRW
CHKD.			PLOT DATE	
FILE:				

FIGURE 3.3.12

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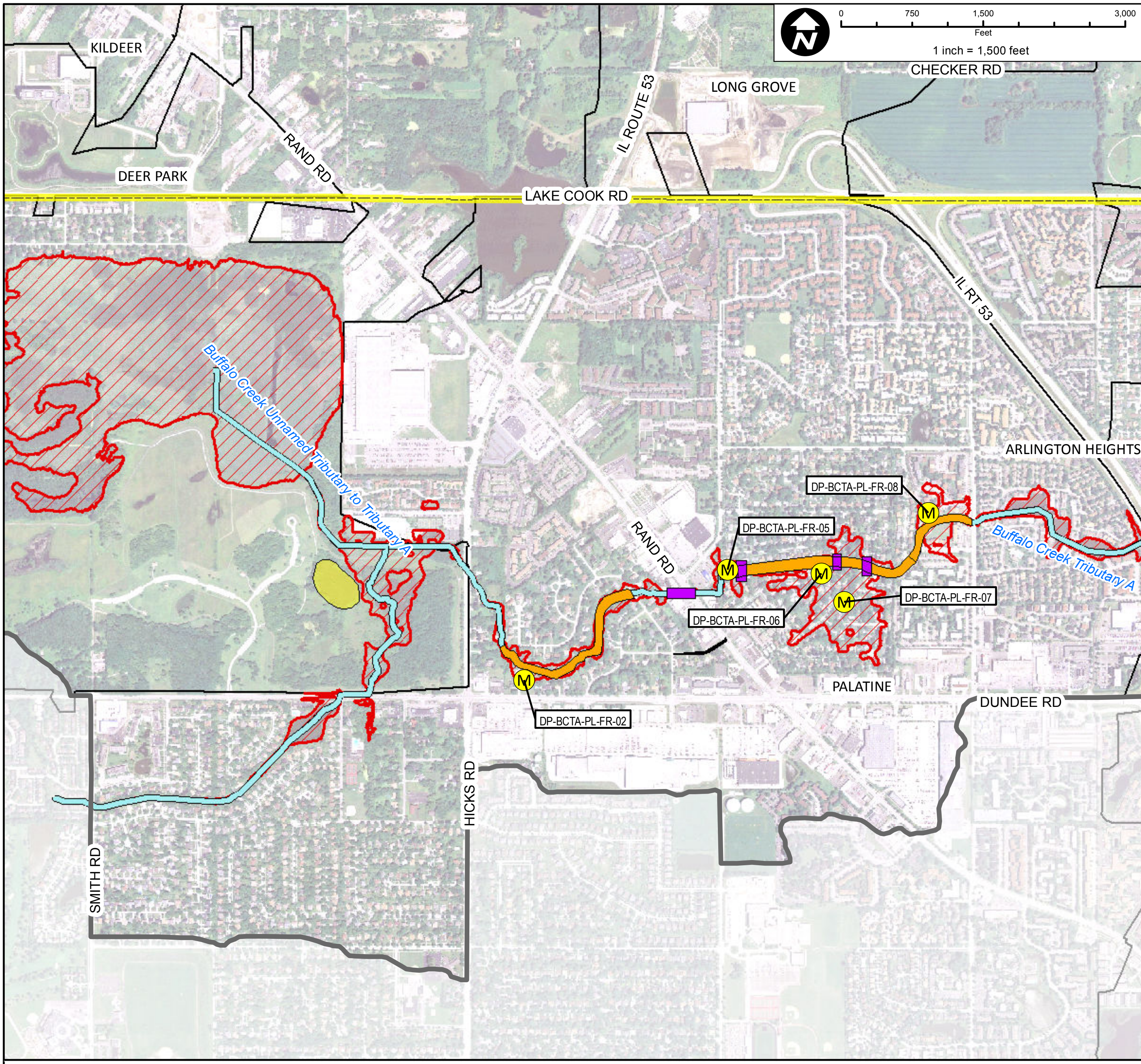


Subwatershed: Buffalo Creek

Alternative: BUCR-4

Alternatives Description: 45 A-F compensatory storage at confluence of Buffalo Creek Tributary A and Unnamed Tributary B in Forest Preserve.
Channel improvements from Hicks Road to Lynda Road, and Laurel Drive to Baldwin Road.
Culvert replacement at Capri, Iris, Laurel Drive, and Rand Road.

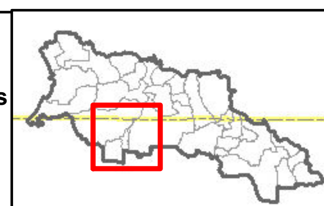
Concept Level Cost: $8,544,202
Benefits: $5,671,193
B/C Ratio: 0.7

Legend

- 100-Year Storm Event Flood Inundation Without Project
- 100-Year Storm Event Flood Inundation With Project
- Reservoir
- Culvert/Bridge Modification
- Channel Improvements
- Levee/Floodwall
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas

- L Local
- M Modeled
- R Regional



CLIENT:

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:

LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN
BUFFALO CREEK WATERSHED
PROPOSED ALTERNATIVE BUCR-4

PROJ. NO. 08-0043				
DATE: 03-23-2010				
SHEET 1 OF 1				
DSGN.	DRW	4-10	SCALE: 1,500'	
DWN.			GIS USER	DRW
CHKD.			PLOT DATE	
FILE:				

DRAWING NO.

FIGURE 3.3.13

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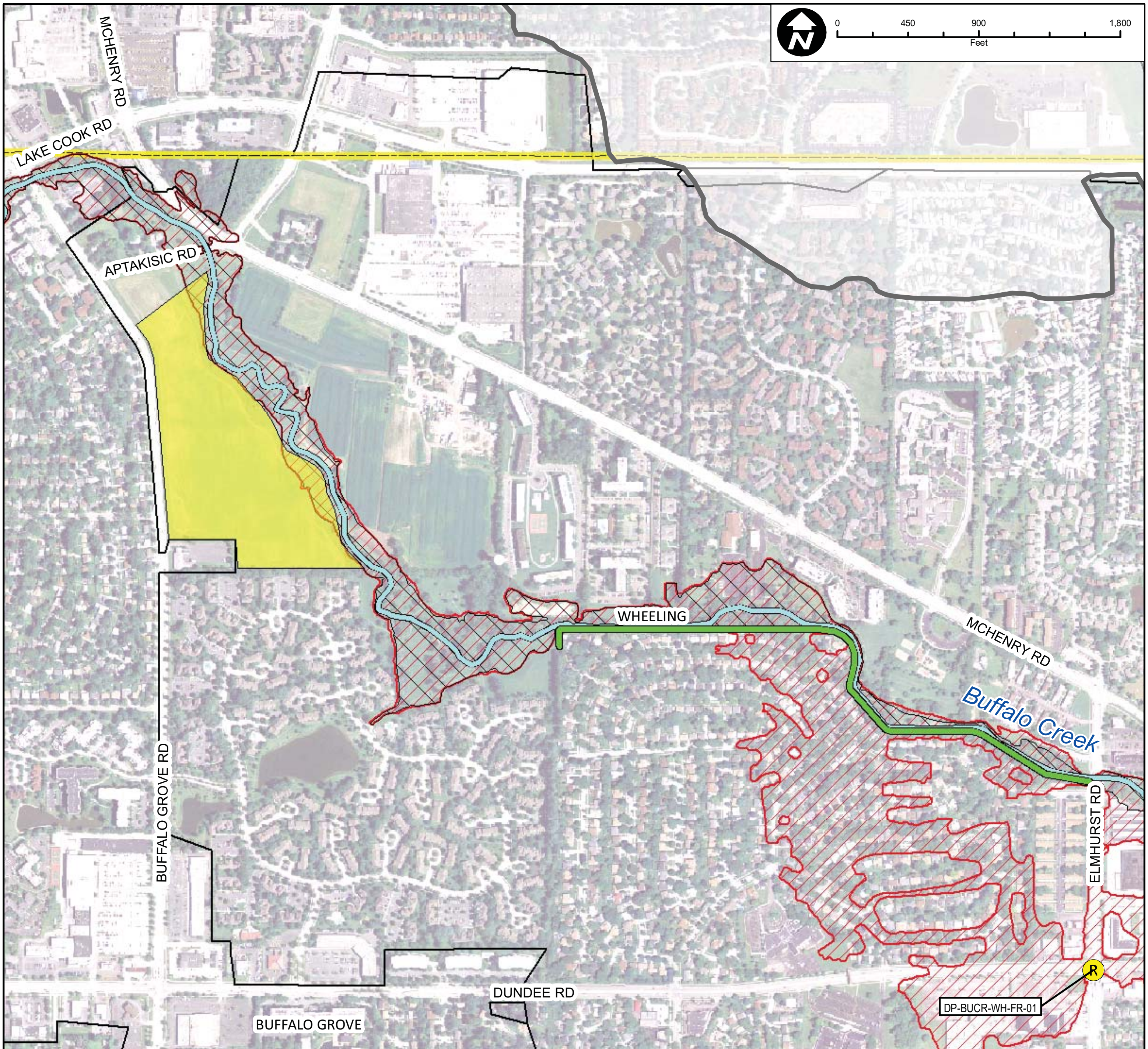
Path: Z:\MWRDGC\08-0043 Phase B\Water\Buffalo\exhibits\BUCR.mxd



Subwatershed: Buffalo Creek

Alternative: BUCR-5

Alternatives Description: 4,125 feet of floodwall from 3,960 feet upstream of Elmhurst Road to the upstream face of Elmhurst Road.
Provide 310 A-F of flood storage on un-developed private property in Wheeling.

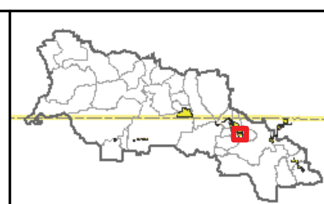
Concept Level Cost: $61,687,084
Benefits: $1,925,650
B/C Ratio: 0.03

Legend

- 100-Year Storm Event Flood Inundation Without Project
- 100-Year Storm Event Flood Inundation With Project
- Reservoir
- Culvert/Bridge Modification
- Channel Improvements
- Levee/Floodwall
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas

- M Modeled
- R Regional



CLIENT: **METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO**	TITLE: **LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN BUFFALO CREEK WATERSHED RECOMMENDED ALTERNATIVE BUCR-5**	PROJ. NO. 08-0043	
		DATE: 03-23-2010	
		SHEET 1 OF 1	
		DRAWING NO.	

CHRISTOPHER B. BURKE ENGINEERING, LTD. 9575 W. Higgins Road, Suite 600 · Rosemont, Illinois 60018 · (847) 823-0500	DSGN.	DRW	4-10		**FIGURE 3.3.14**
	DWN.			GIS USER DRW	
	CHKD.			PLOT DATE	
	FILE:				

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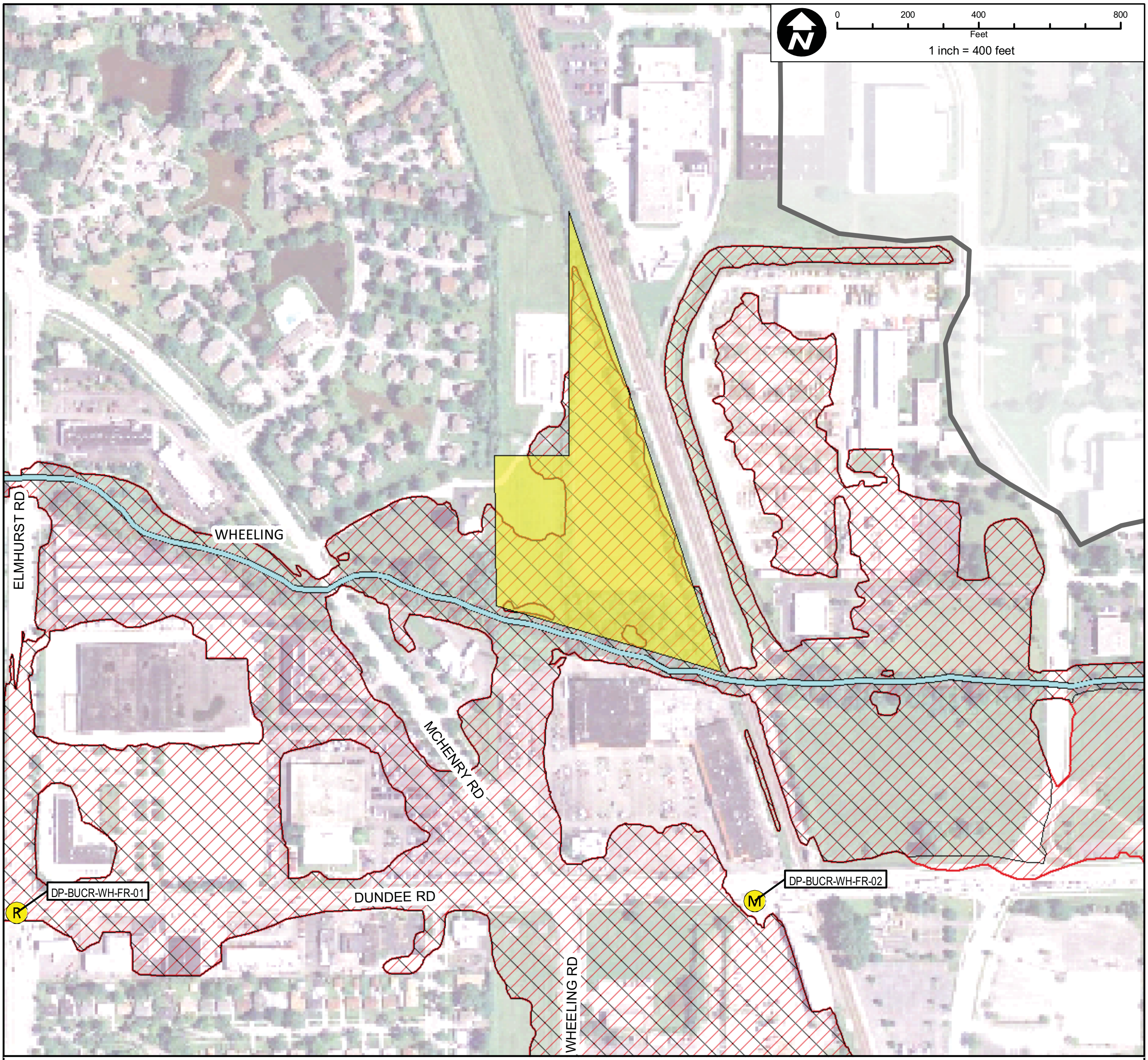


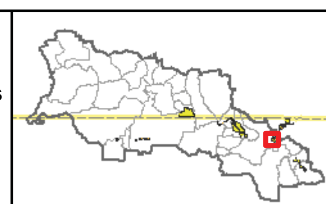
Subwatershed: Buffalo Creek
Alternative: BUCR-6
Alternatives Description: Provide 100 A-F of flood storage by expanding the Village of Wheeling water tower basin.

Concept Level Cost: $9,897,117
Benefits: $785,113
B/C Ratio: 0.08

Legend

100-Year Storm Event Flood Inundation Without Project
100-Year Storm Event Flood Inundation With Project
Reservoir
Culvert/Bridge Modification
Channel Improvements
Levee/Floodwall
Approximate Creek Channel Location
Municipal Boundary
Watershed Boundary

Problem Areas
M Modeled
R Regional



CLIENT:
METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:
LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN
BUFFALO CREEK WATERSHED
PROPOSED ALTERNATIVE BUCR-6

PROJ. NO. 08-0043
DATE: 03-23-2010
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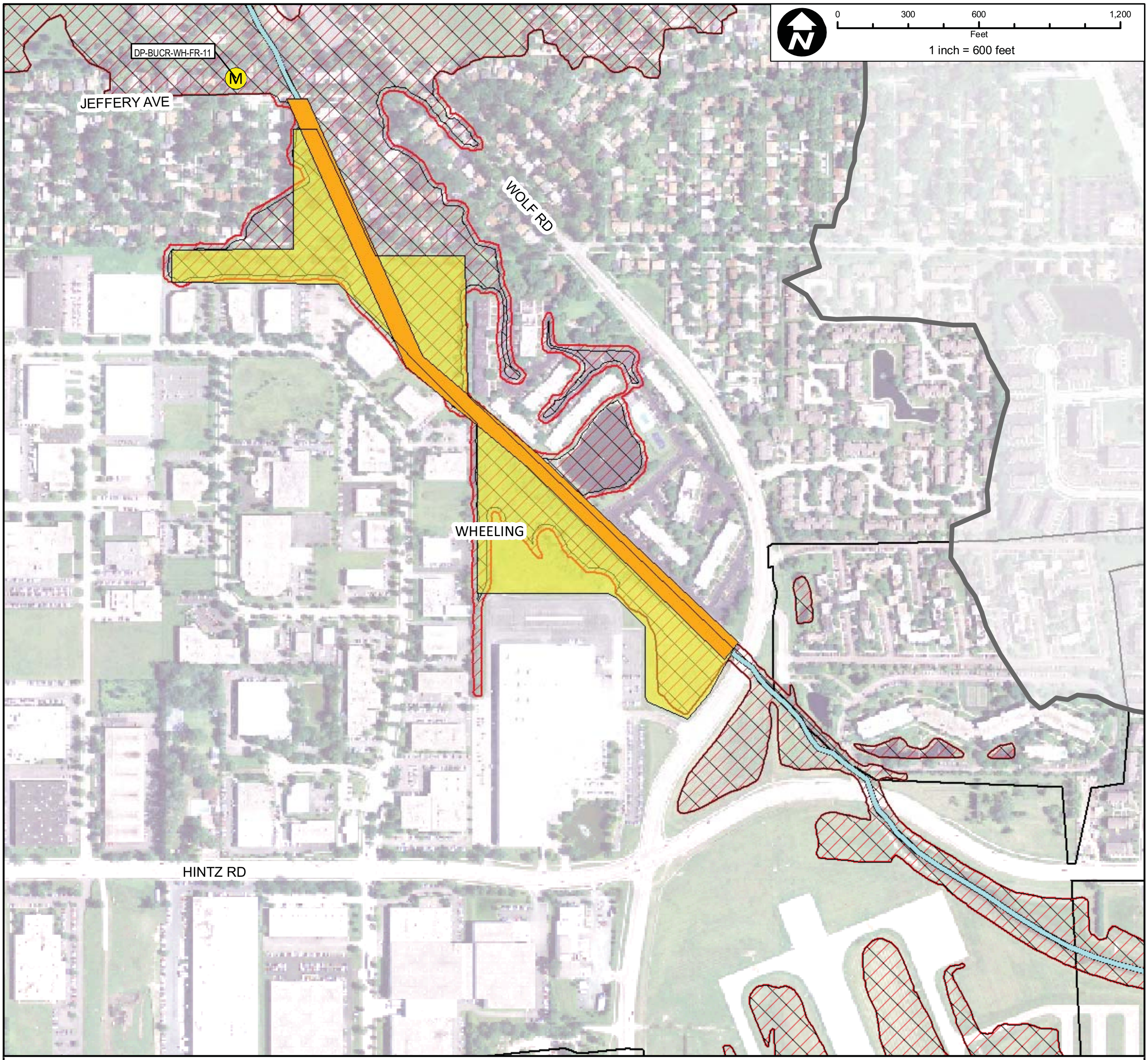
DWN.			GIS USER	DRW
CHKD.			PLOT DATE	
FILE:				

FIGURE 3.3.15

Map Document: (Z:\MWRDGC\08-0043 Phase B\Water\Buffalo\exhibits\Detailed Watershed Plan Sheets 2.mxd)
8/24/2010 -- 2:44:53 PM



Subwatershed: Buffalo Creek
Alternative: BUCR-7
Alternatives Description: Provide 90 A-F storage volume within existing storage areas along Buffalo Creek.

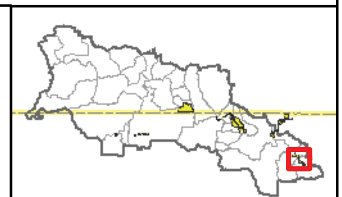
Concept Level Cost: $11,163,497
Benefits: $827,772
B/C Ratio: 0.07

Legend

- 100-Year Storm Event Flood Inundation Without Project
- 100-Year Storm Event Flood Inundation With Project
- Reservoir
- Culvert/Bridge Modification
- Channel Improvements
- Levee/Floodwall
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas

- M Modeled
- R Regional



CLIENT:
METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:
LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN BUFFALO CREEK WATERSHED PROPOSED ALTERNATIVE BUCR-7

PROJ. NO. 08-0043
DATE: 03-23-2010
SHEET 1 OF 1
DRAWING NO.

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DSGN.	DRW	4-10	SCALE: 500'	
DWN.			GIS USER	DRW
CHKD.			PLOT DATE	
FILE:				

FIGURE 3.3.16

Map Document: (Z:\MWRDGC\08-0043 Phase B\Water\Buffalo\exhibits\Detailed Watershed Plan Sheets 2.mxd)
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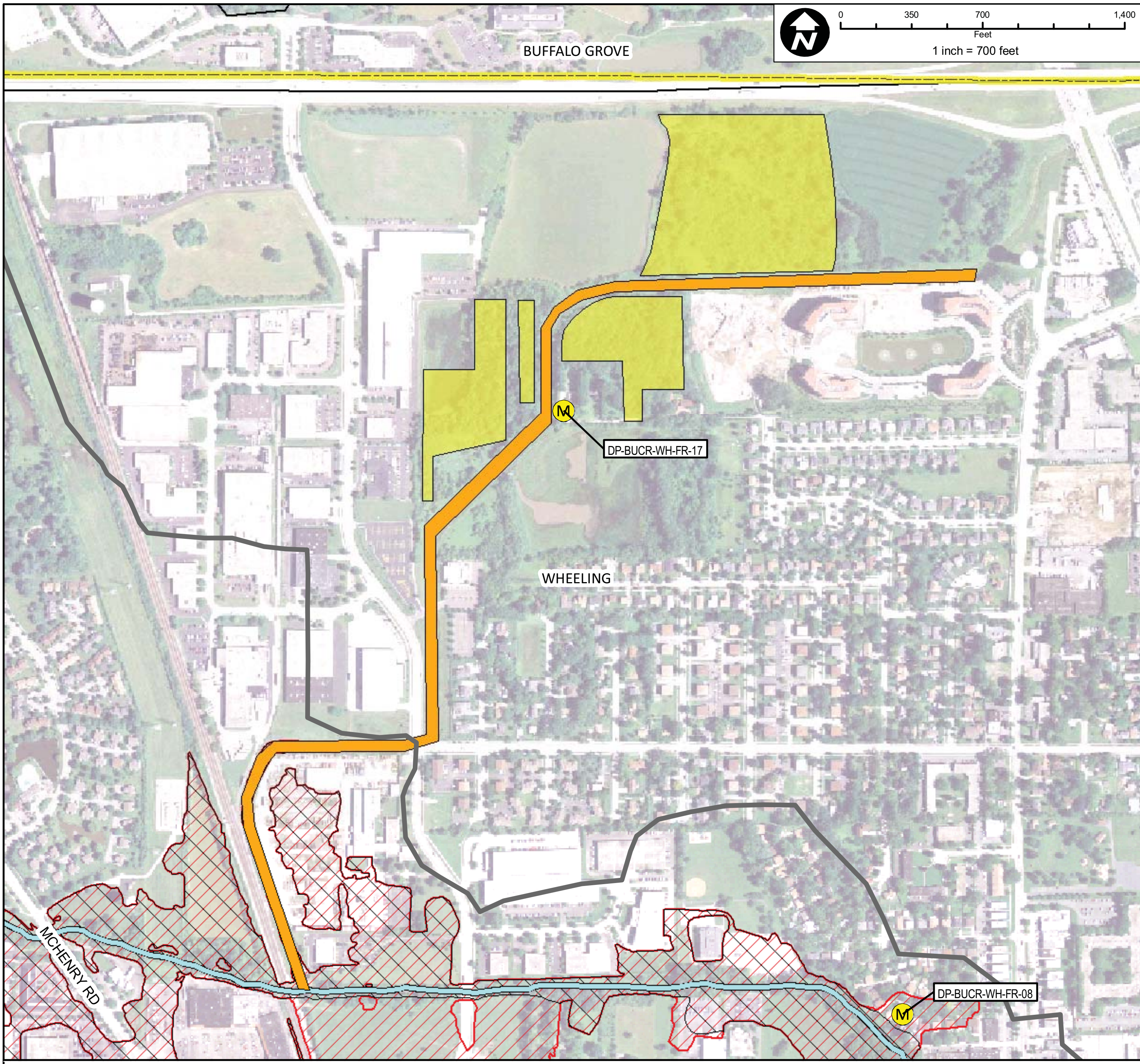


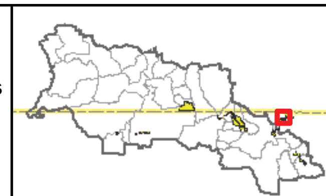
Subwatershed: Buffalo Creek
Alternative: BUCR-8
Alternatives Description: Provide 320 A-F of flood storage on Village of Wheeling and private property.
Channel improvements from the Swaminarayar Temple main entrance to upstream of Milwaukee Avenue.
Widen the diversion channel by approximately 20 feet from the diversion structure to the Swaminarayar Temple

Concept Level Cost: $45,504,471
Benefits: $907,186
B/C Ratio: 0.02

Legend

- 100-Year Storm Event Flood Inundation Without Project
- 100-Year Storm Event Flood Inundation With Project
- Reservoir
- Culvert/Bridge Modification
- Channel Improvements
- Levee/Floodwall
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas
- M Modeled
- R Regional



CLIENT:
METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:
LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN
BUFFALO CREEK WATERSHED
PROPOSED ALTERNATIVE BUCR-8

PROJ. NO. 08-0043
DATE: 03-23-2010
SHEET 1 OF 1
DRAWING NO.

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DSGN.	DRW	4-10	SCALE: 400'	
DWN.			GIS USER	DRW
CHKD.			PLOT DATE	
FILE:				

FIGURE 3.3.17

Map Document: (Z:\MWRDGC\08-0043 Phase B\Water\Buffalo\exhibits\Detailed Watershed Plan Sheets 2.mxd)
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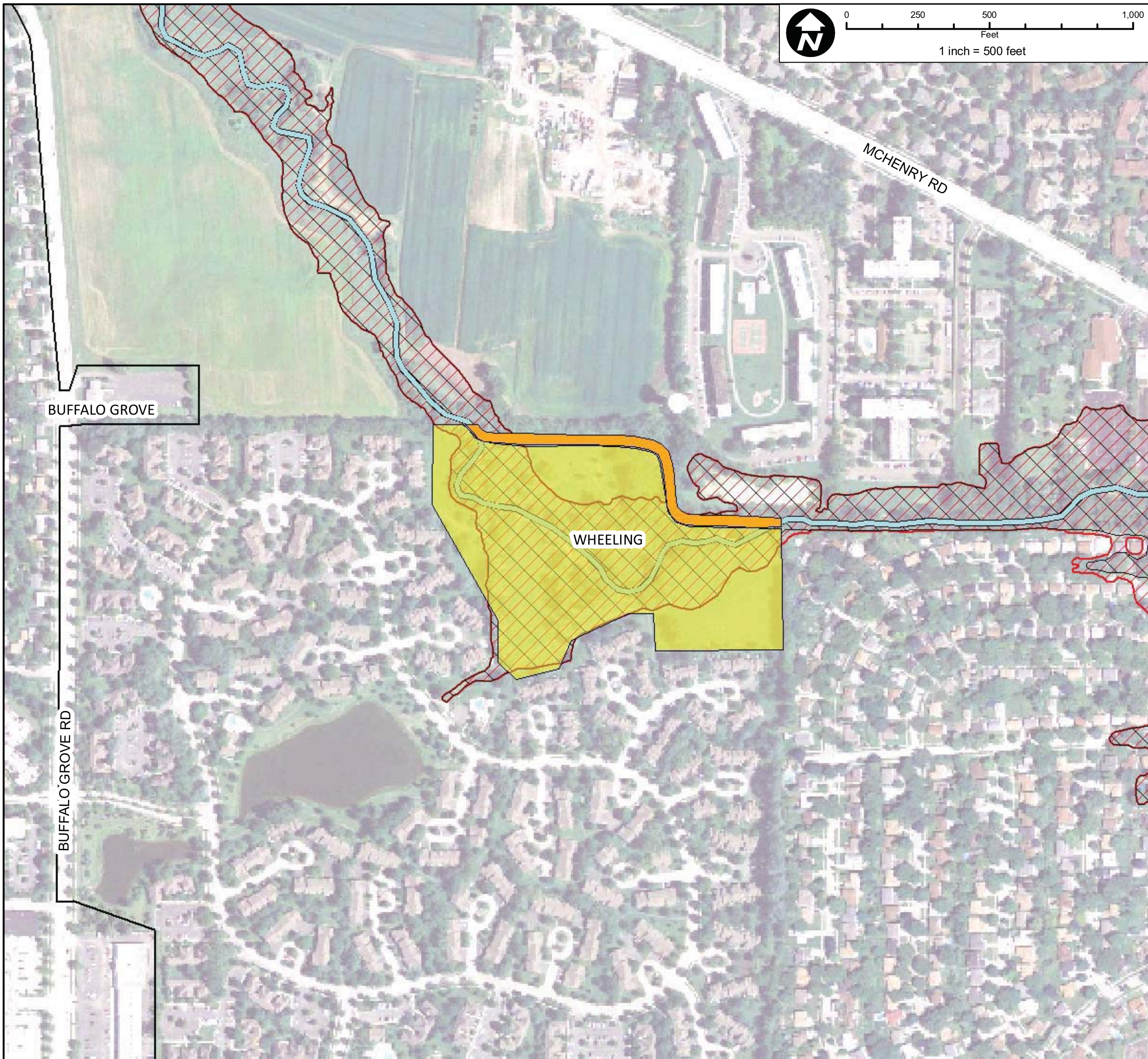


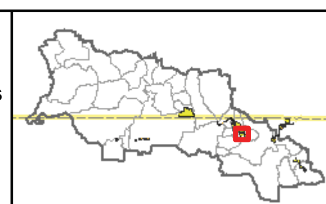
Subwatershed: Buffalo Creek
Alternative: BUCR-9
Alternatives Description: Provide 255 A-F of flood storage on private land in Wheeling.
Channel improvements from 2,800ft downstream of Aptakisic Road to 4,000ft upstream of IL Route 83.

Concept Level Cost: $30,146,042
Benefits: $1,760,381
B/C Ratio: 0.06

Legend

- 100-Year Storm Event Flood Inundation Without Project
- 100-Year Storm Event Flood Inundation With Project
- Reservoir
- Culvert/Bridge Modification
- Channel Improvements
- Levee/Floodwall
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas
- M Modeled
- R Regional



CLIENT:
METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:
LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN
BUFFALO CREEK WATERSHED
PROPOSED ALTERNATIVE BUCR-9

PROJ. NO.	08-0043	
DATE:	03-23-2010	
SHEET	1	OF 1
DRAWING NO.		

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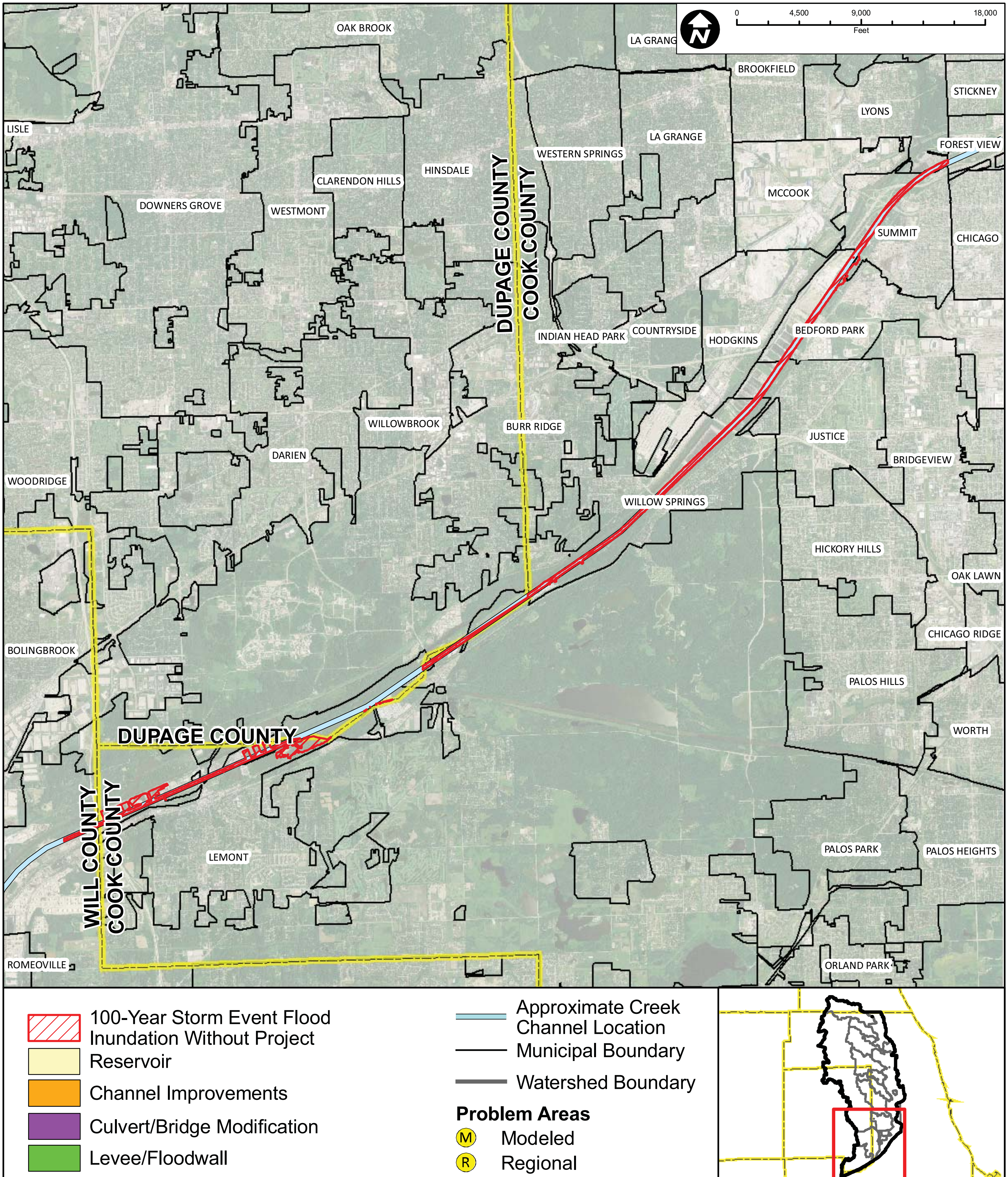
DWN.			GIS USER	DRW
CHKD.			PLOT DATE	
FILE:				

FIGURE 3.3.18

Map Document: (Z:\MWRDGC\08-0043 Phase B\Water\Buffalo\exhibits\Detailed Watershed Plan Sheets 2.mxd)
8/25/2010 -- 7:28:04 AM



CLIENT: **METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO**	TITLE: **LOWER DES PLAINES RIVER WATERSHED CHICAGO SANITARY & SHIP CANAL WATERSHED OVERVIEW**	PROJ. NO. 08-0043	
		DATE: 04-26-2010	
		SHEET 1 OF 1	
		DRAWING NO.	

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DSGN.	DRW	4-10	SCALE:	
DWN.			GIS USER	DRW
CHKD.			PLOT DATE	
FILE:				

FIGURE 3.4.1

Map Document: (Z:\MWRDGC\08-0043 Phase B\GIS\Exhibits\Meeting Maps\East Ave 67th Street DesPlaines Trib\Chicago San and Ship Canal Overall.mxd)
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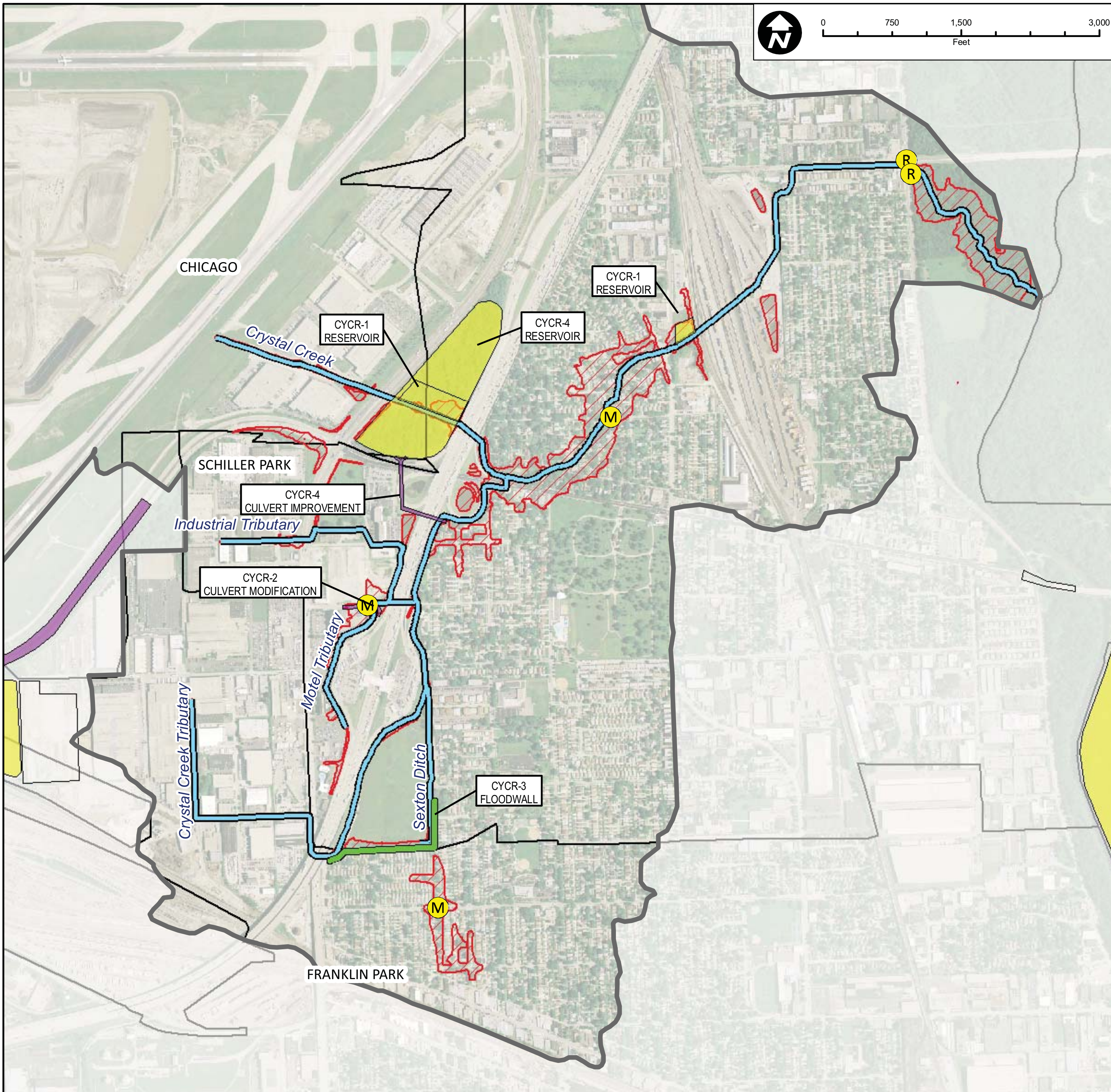


100-Year Storm Event Flood Inundation Without Project

Reservoir

Channel Improvements

Culvert/Bridge Modification

Levee/Floodwall

Approximate Creek Channel Location

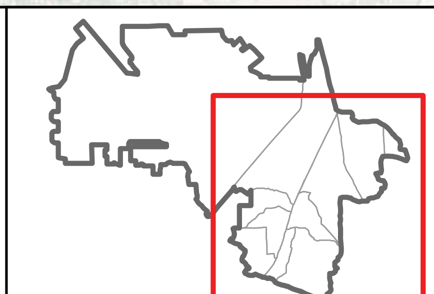
Municipal Boundary

Watershed Boundary

Problem Areas

M Modeled

R Regional



CLIENT:

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:

LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN CRYSTAL CREEK WATERSHED TRIBUTARY OVERVIEW

PROJ. NO.	08-0043				
DATE:	05-10-2010				
SHEET 1 OF 1					
DRAWING NO.					
DSGN.	DRW	4-10	SCALE:		
DWN.			GIS USER	DRW	
CHKD.			PLOT DATE		
FILE:					

FIGURE 3.5.1

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Map Document: (Z:\MWRDGC\08-0043 Phase B\GIS\Exhibits\Meeting Maps\Crystal Silver Golf\Crystal Creek Overall.mxd)
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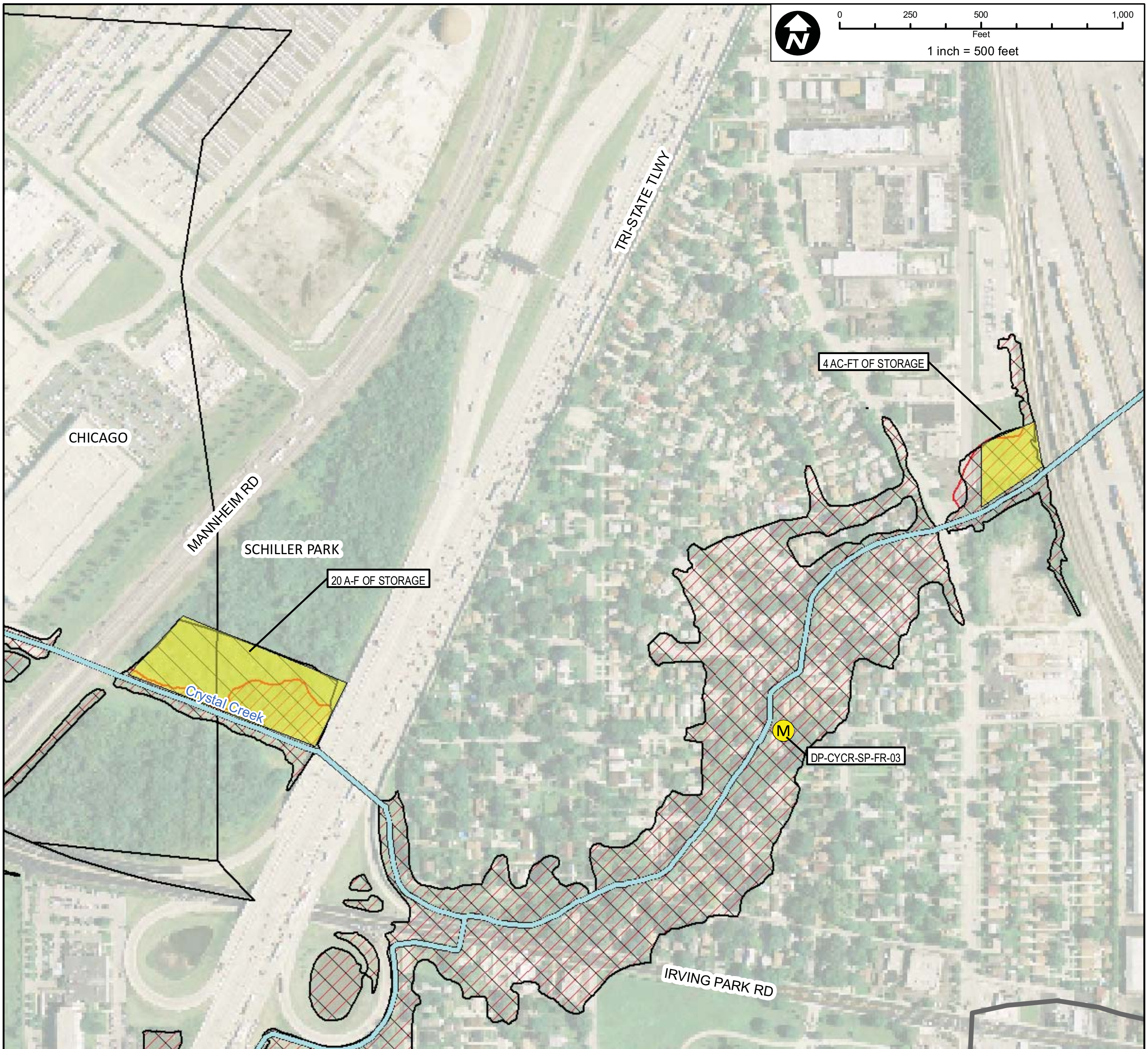


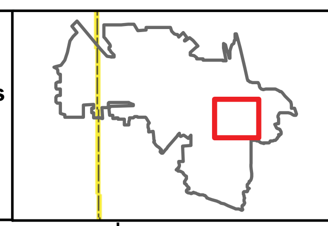
Subwatershed: Crystal Creek
Alternative: CYCR-1
Alternatives Description: Provide storage west of I-294 and east of Mannheim Road and east of the SOO Line Railroad tracks.
Reduce flood profile of Crystal Creek between Irving Park Road and SOO Line Railroad.

Concept Level Cost: $7,425,208
Benefits: $98,760
B/C Ratio: 0.01

Legend

- 100-Year Storm Event Flood Inundation Without Project
- 100-Year Storm Event Flood Inundation With Project
- Reservoir
- Culvert/Bridge Modification
- Channel Improvements
- Levee/Floodwall
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas
- M Modeled
- R Regional



CLIENT:
METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:
LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN
CRYSTAL CREEK WATERSHED
PROPOSED ALTERNATIVE CYCR-1

PROJ. NO.	08-0043
DATE:	04-30-2010
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DRAWING NO.	

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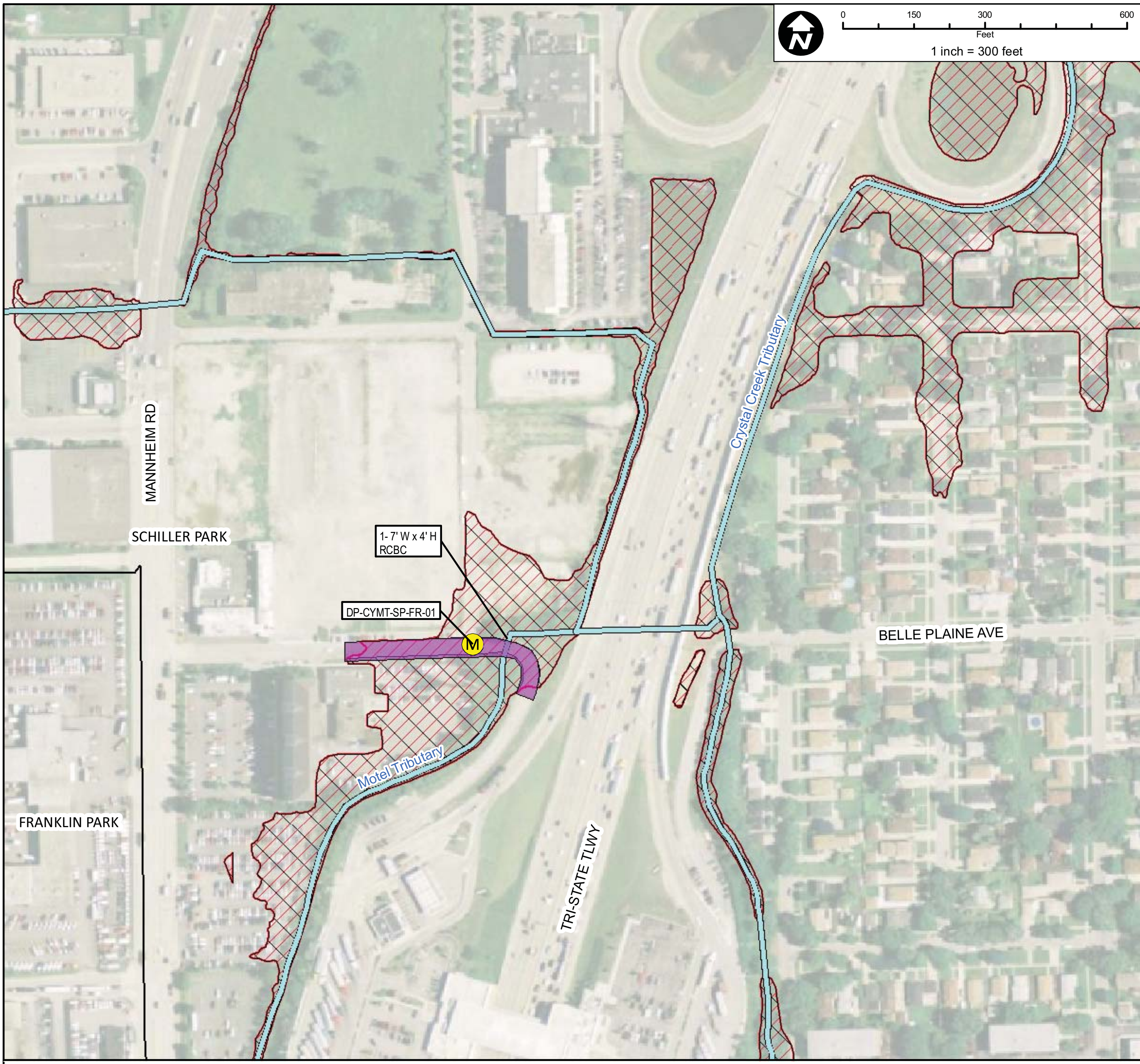
DSGN.	DRW	4-10	SCALE	1' = 500'
DWN.			GIS USER	DRW
CHKD.			PLOT DATE	
FILE:				

FIGURE 3.5.2

Map Document: (Z:\MWRDGC\08-0043 Phase B\GIS\Exhibits\Meeting Maps\Crystal Silver Golf\Crystal Creek Detailed Sheets.mxd)
8/20/2010 -- 8:25:54 AM



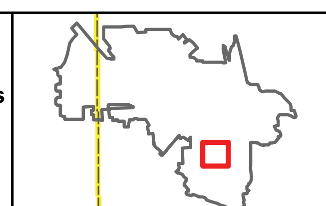
Subwatershed: Crystal Creek
Alternative: CYCR-2
Alternatives Description: Belle Plaine Avenue culvert replacement – increase culvert to a 7' W x 4' H RCBC and raise the road profile of Belle Plaine Avenue to 640.1ft.

Concept Level Cost: $312,086
Benefits: $14
B/C Ratio: <0.01

Legend

- 100-Year Storm Event Flood Inundation Without Project
- 100-Year Storm Event Flood Inundation With Project
- Reservoir
- Culvert/Bridge Modification
- Channel Improvements
- Levee/Floodwall
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas
- M Modeled
- R Regional



CLIENT:
METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:
LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN
CRYSTAL CREEK WATERSHED
PROPOSED ALTERNATIVE CYCR-2

PROJ. NO.	08-0043
DATE:	04-30-2010
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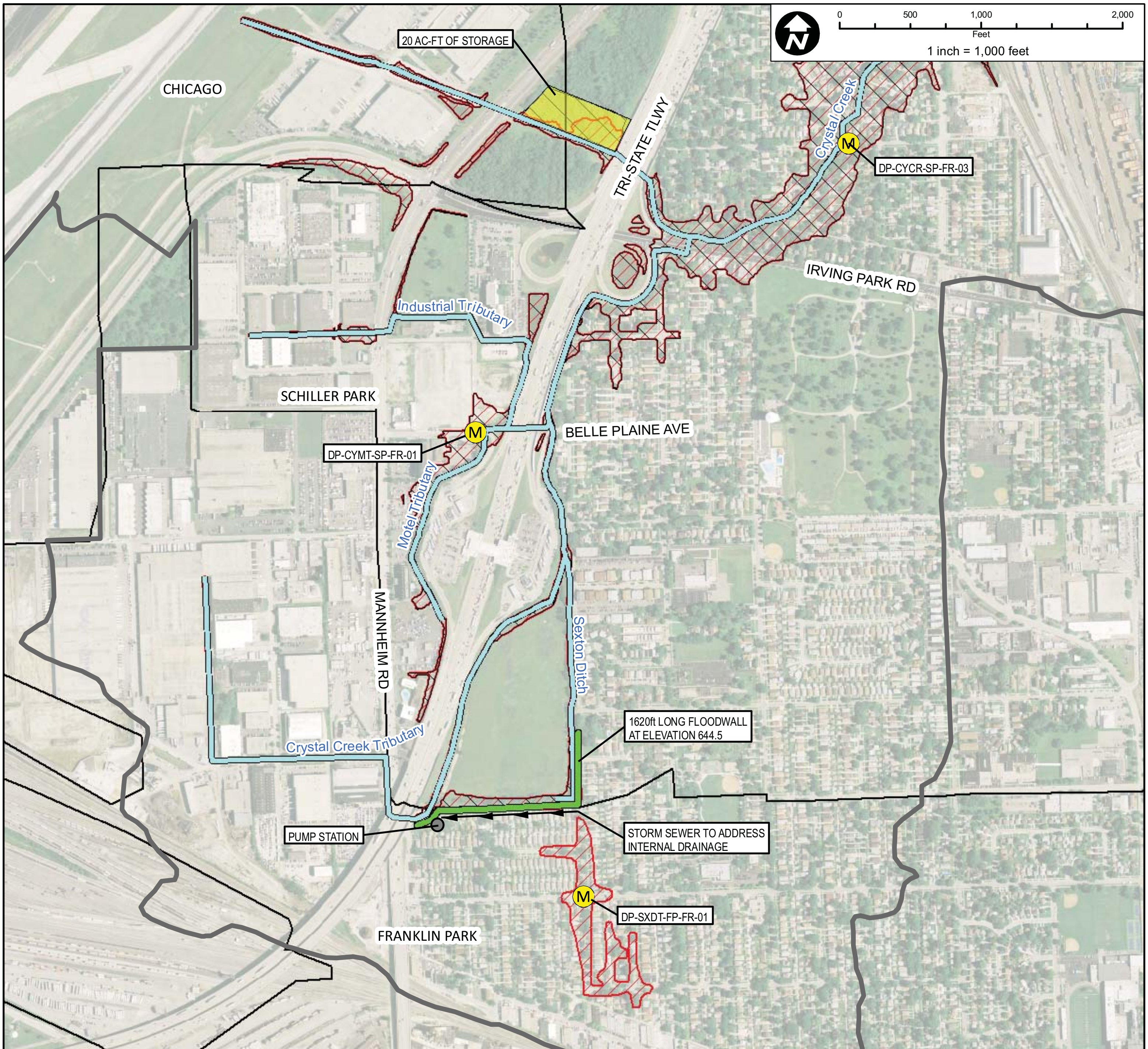
DSGN.	DRW	4-10	SCALE	1' = 500'
DWN.			GIS USER	DRW
CHKD.			PLOT DATE	
FILE:				

FIGURE 3.5.3

Map Document: (Z:\MWRDGC\08-0043 Phase B\GIS\Exhibits\Meeting Maps\Crystal Silver Golf\Crystal Creek Detailed Sheets.mxd)
8/20/2010 -- 8:21:04 AM



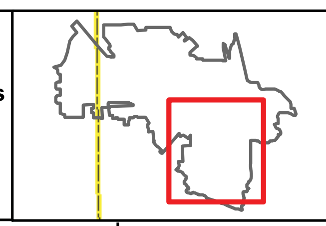
Subwatershed: Crystal Creek
Alternative: CYCR-3
Alternatives Description: Construct a 1620 ft long floodwall north Panoramic Drive and west of Dora Street. Floodwall will be constructed to an elevation of 644.5ft. Flood mitigation storage provided in parcel east of Mannheim Road and west of I-294. Pump station and storm sewer constructed to address internal drainage south of Sexton Ditch.

Concept Level Cost: $13,278,911
Benefits: $294,025
B/C Ratio: 0.02

Legend

- 100-Year Storm Event Flood Inundation Without Project
- 100-Year Storm Event Flood Inundation With Project
- Reservoir
- Culvert/Bridge Modification
- Channel Improvements
- Levee/Floodwall
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas
- M Modeled
- R Regional



CLIENT:
METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:
LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN
CRYSTAL CREEK WATERSHED
PROPOSED ALTERNATIVE CYCR-3

PROJ. NO. 08-0043
DATE: 05-10-2010
SHEET 1 OF 1
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DSGN.	DRW	4-10	SCALE	1' = 1,000'
DWN.			GIS USER	DRW
CHKD.			PLOT DATE	
FILE:				

FIGURE 3.5.4

Map Document: (Z:\MWRDGC\08-0043 Phase B\GIS\Exhibits\Meeting Maps\Crystal Silver Golf\Crystal Creek Detailed Sheets.mxd)
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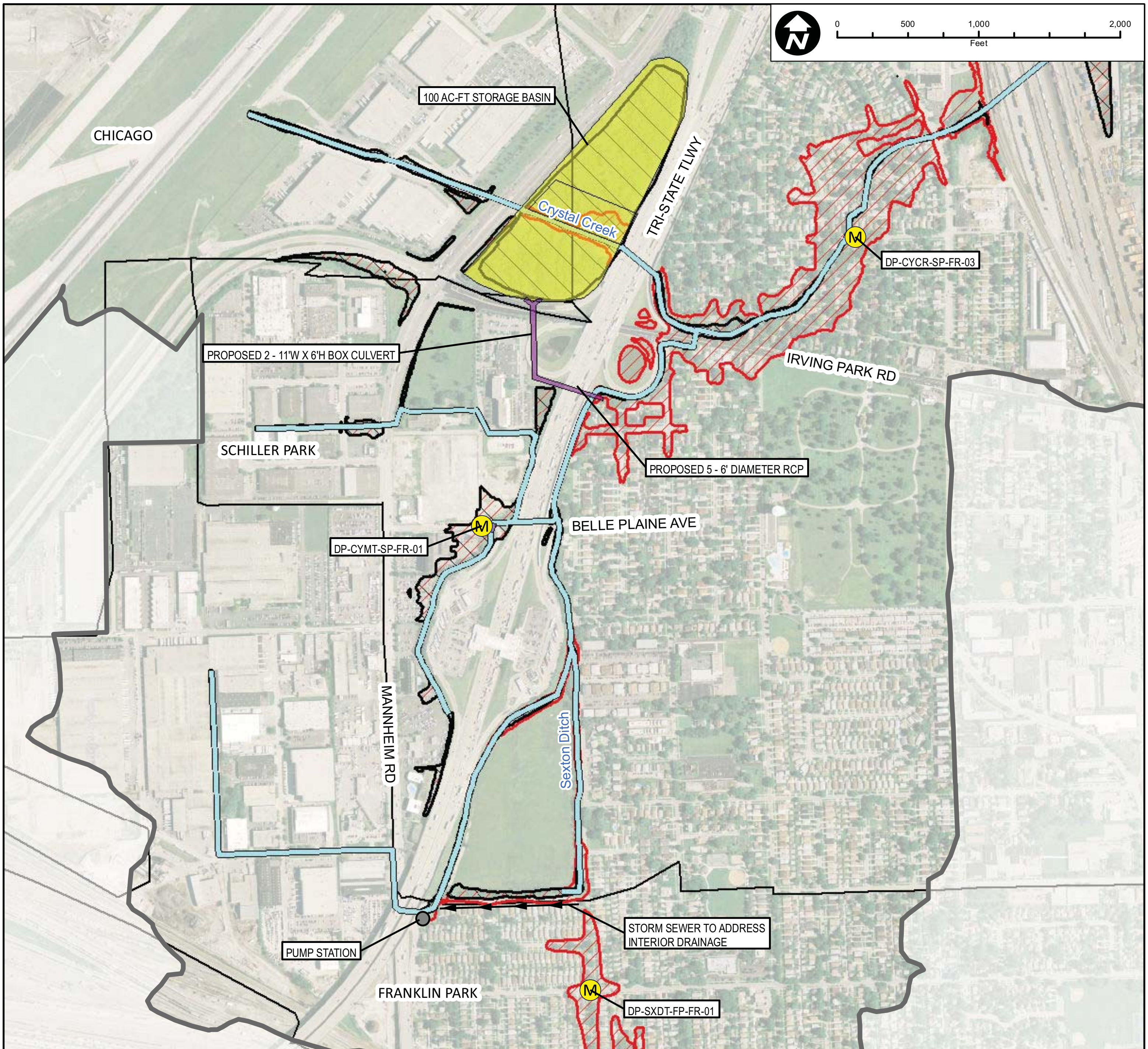


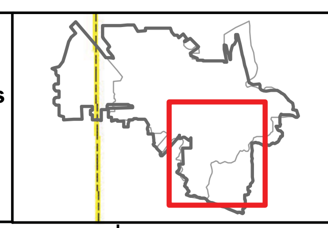
Subwatershed: Crystal Creek
Alternative: CYCR-4
Alternatives Description: Crystal Creek Tributary is diverted west under I-294 downstream of Berteau Avenue through 5 - 6' RCP culverts. Flow is then diverted north under Irving Park Road in 2 - 11' W x 6' H RCBC and into the proposed 100 A-F storage facility. A pump station and storm sewer wil be constructed to address internal drainage associated with Sexton Ditch.

Concept Level Cost: $42,671,156
Benefits: $1,198,534
B/C Ratio: 0.03

Legend

- 100-Year Storm Event Flood Inundation Without Project
- 100-Year Storm Event Flood Inundation With Project
- Reservoir
- Culvert/Bridge Modification
- Channel Improvements
- Levee/Floodwall
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas
- M Modeled
- R Regional



CLIENT:
METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:
LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN CRYSTAL CREEK WATERSHED RECOMMENDED ALTERNATIVE CYCR-4

DSGN.	DRW	4-10	SCALE	
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CHKD.			PLOT DATE	
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FIGURE 3.5.5

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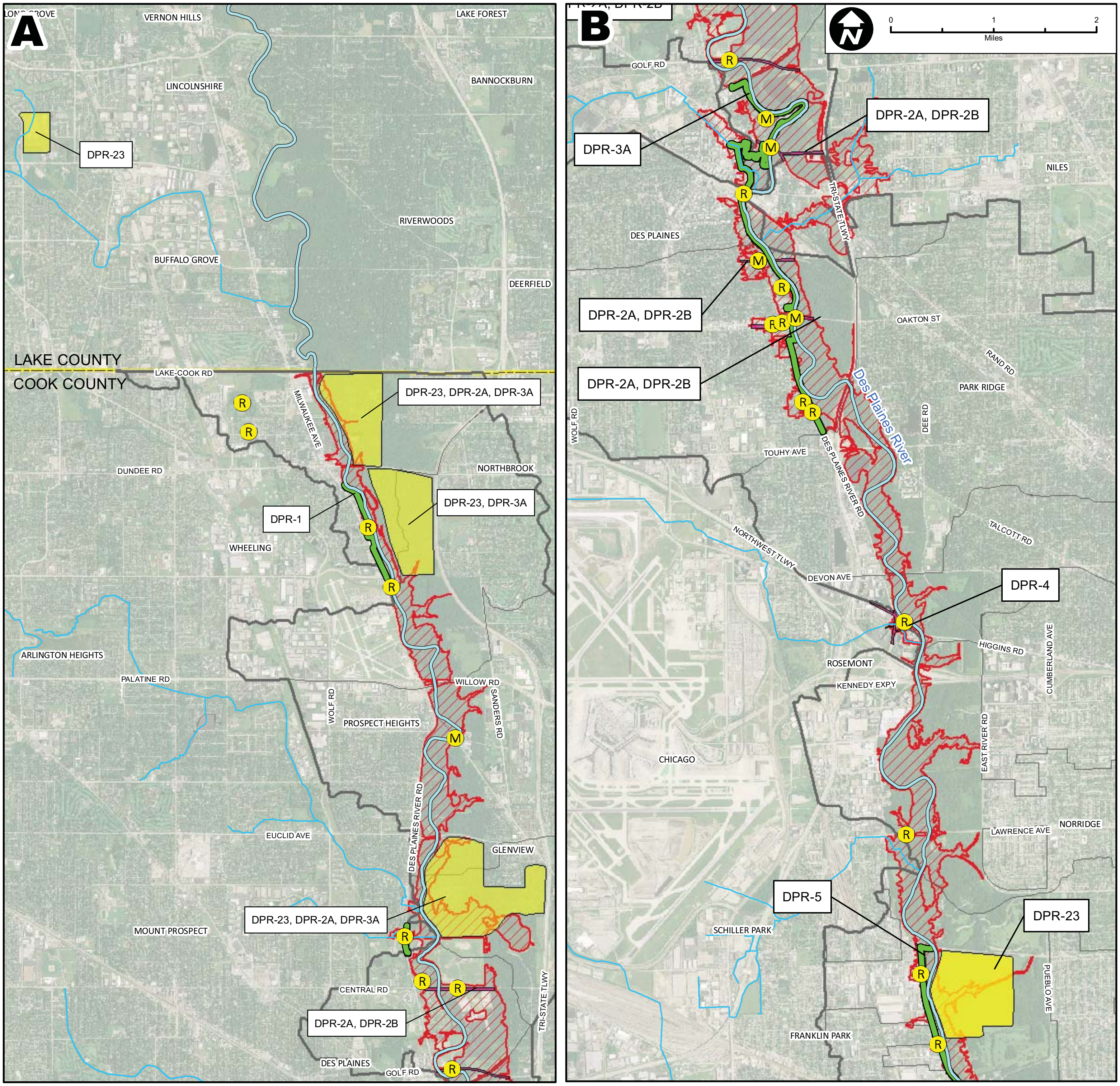
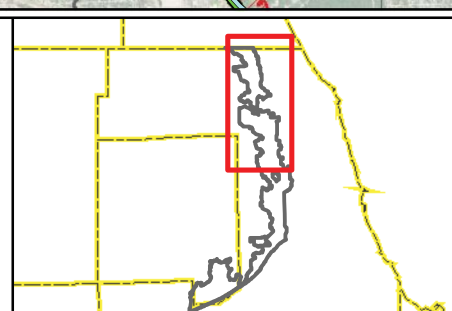


- 100-Year Storm Event Flood Inundation Without Project
- Reservoir
- Channel Improvements
- Culvert/Bridge Modification
- Levee/Floodwall
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas

- M Modeled
- R Regional



CLIENT:

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:

LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN DES PLAINES RIVER WATERSHED NORTH TRIBUTARY OVERVIEW

PROJ. NO.	08-0043				
DATE:	04-26-2010				
SHEET 1 OF 1					
DRAWING NO.					
DSGN.	DRW	4-10	SCALE:		
DWN.			GIS USER	DRW	
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FILE:					

FIGURE 3.6.1A

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Map Document: (Z:\MWRDGC\08-0043 Phase B\GIS\Exhibits\Meeting Maps\DesPlaines\Des Plaines River Overall A-B.mxd)
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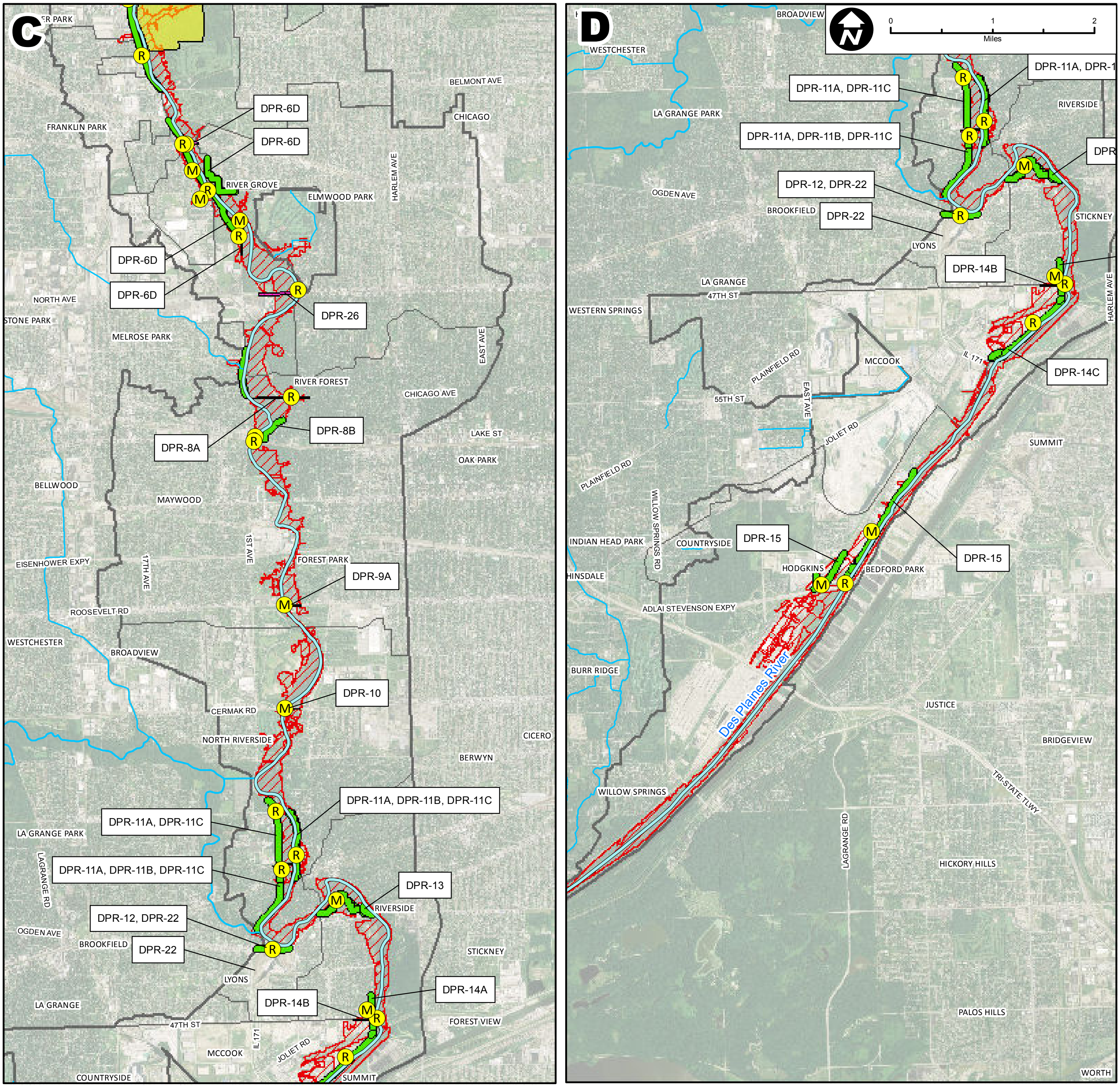
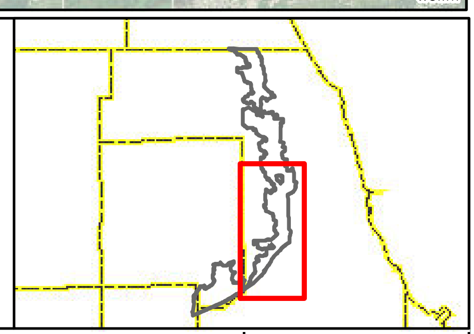


100-Year Storm Event Flood Inundation Without Project
Reservoir
Channel Improvements
Culvert/Bridge Modification
Levee/Floodwall

Approximate Creek Channel Location
Municipal Boundary
Watershed Boundary

Problem Areas
M Modeled
R Regional



CLIENT:
METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:
LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN DES PLAINES RIVER WATERSHED SOUTH TRIBUTARY OVERVIEW

PROJ. NO. 08-0043
DATE: 04-26-2010
SHEET 1 OF 1
DRAWING NO.
FIGURE 3.6.1B

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CHKD.			PLOT DATE	
FILE:				

Map Document: (Z:\MWRDGC\08-0043 Phase B\GIS\Exhibits\Meeting Maps\DesPlaines\Des Plaines River Overall C-D.mxd)
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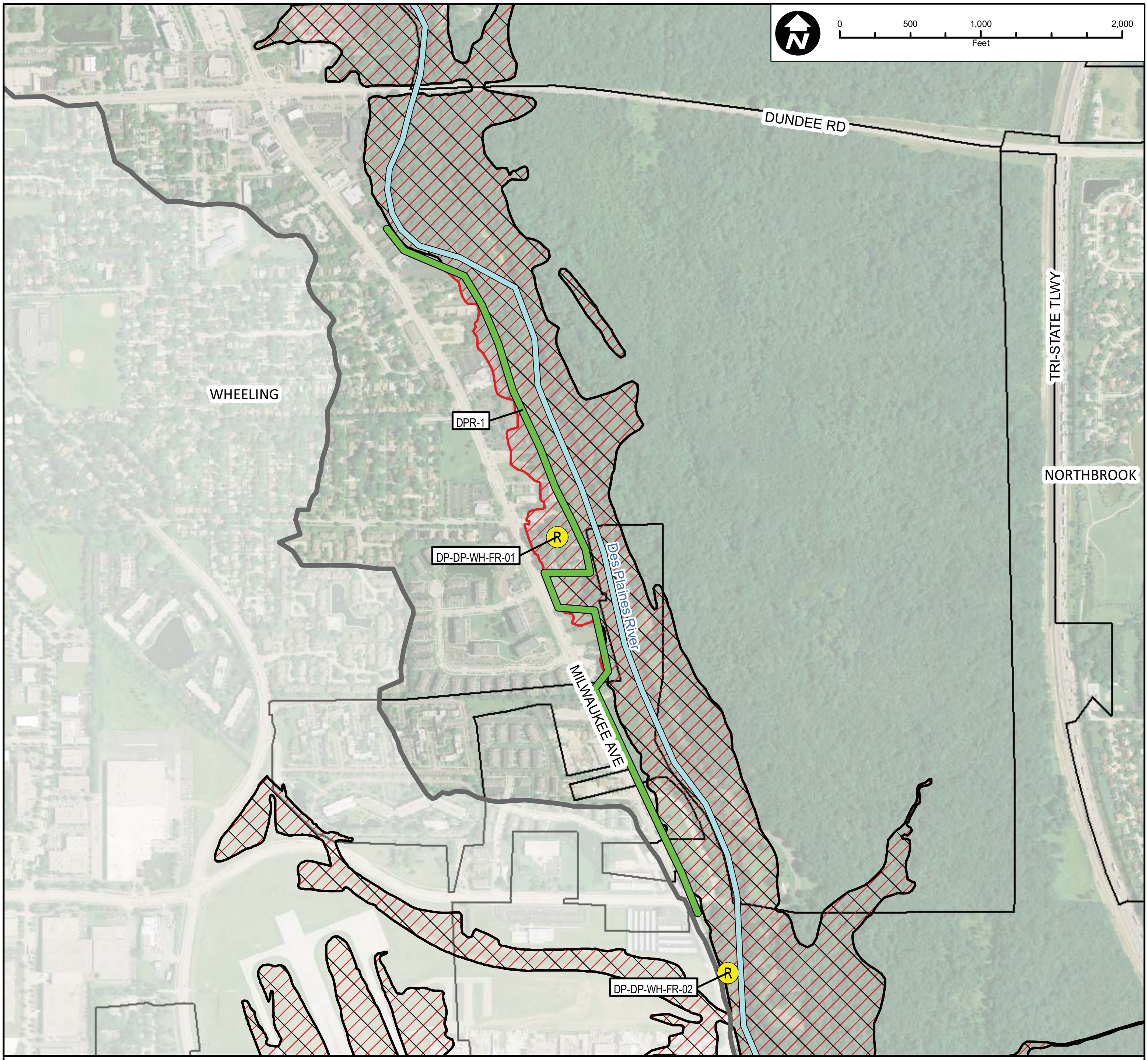


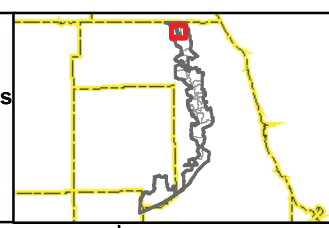
Subwatershed: Des Plaines River
Alternative: DPR-1
Alternatives Description: Construct 6,000 feet of floodwall along Des Plaines River east of Milwaukee Avenue.
Pump stations reqired to address internal drainage.

Concept Level Cost: $17,826,218
Benefits: $258,750
B/C Ratio: 0.01

Legend

- 100-Year Storm Event Flood Inundation Without Project
- 100-Year Storm Event Flood Inundation With Project
- Reservoir
- Road Improvements
- Culvert/Bridge Modification
- Channel Improvements
- Levee/Floodwall
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas
- M Modeled
- R Regional



CLIENT:
METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:
LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN
DES PLAINES RIVER WATERSHED
RECOMMENDED ALTERNATIVE DPR-1

PROJ. NO. 08-0043
DATE: 03-23-2010
SHEET 1 OF 1
DRAWING NO.
FIGURE 3.6.8

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FILE:				

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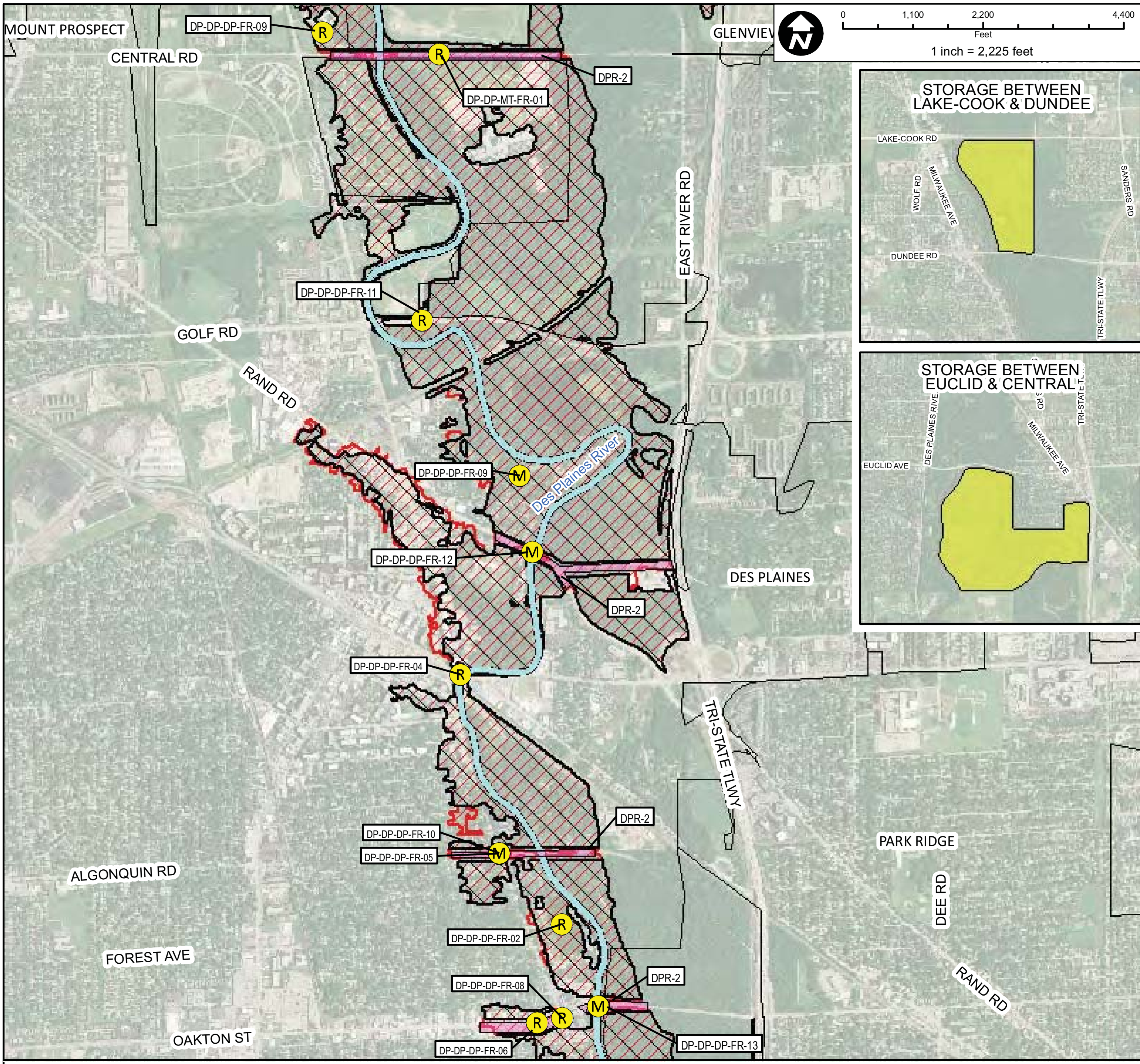


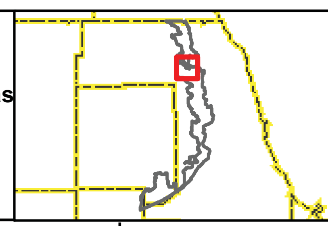
Subwatershed: Des Plaines River
Alternative: DPR-2A
Alternatives Description: Raise approximately 3,200 feet of Central Avenue, approximately 3,500 feet of Rand Road, approximately 1,550 feet of Algonquin Road, and approximately 1,750 feet of Oakton Street to 0.5 feet above 100 year flood.
Include USACE concept reservoirs between Lake-Cook and Dundee Roads and between Euclid and Central Roads.

Concept Level Cost: $200,000,000 to $400,000,000
Benefits: $11,936,692
B/C Ratio: 0.03 to 0.06

Legend

- 100-Year Storm Event Flood Inundation Without Project
- 100-Year Storm Event Flood Inundation With Project
- Reservoir
- Road Improvements
- Culvert/Bridge Modification
- Channel Improvements
- Levee/Floodwall
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas
- M Modeled
- R Regional



CLIENT: **METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO**	TITLE: **LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN DES PLAINES RIVER WATERSHED PROPOSED ALTERNATIVE DPR-2A**		PROJ. NO. 08-0043 / DATE: 05-21-2010 / SHEET 1 OF 1

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DWN.			GIS USER	DRW
CHKD.			PLOT DATE	
FILE:				

DRAWING NO.
FIGURE 3.6.9

Map Document: (Z:\MWRDGC\08-0043 Phase B\GIS\Exhibits\Meeting Maps\DesPlaines\Des Plaines River Detailed Sheets.mxd)
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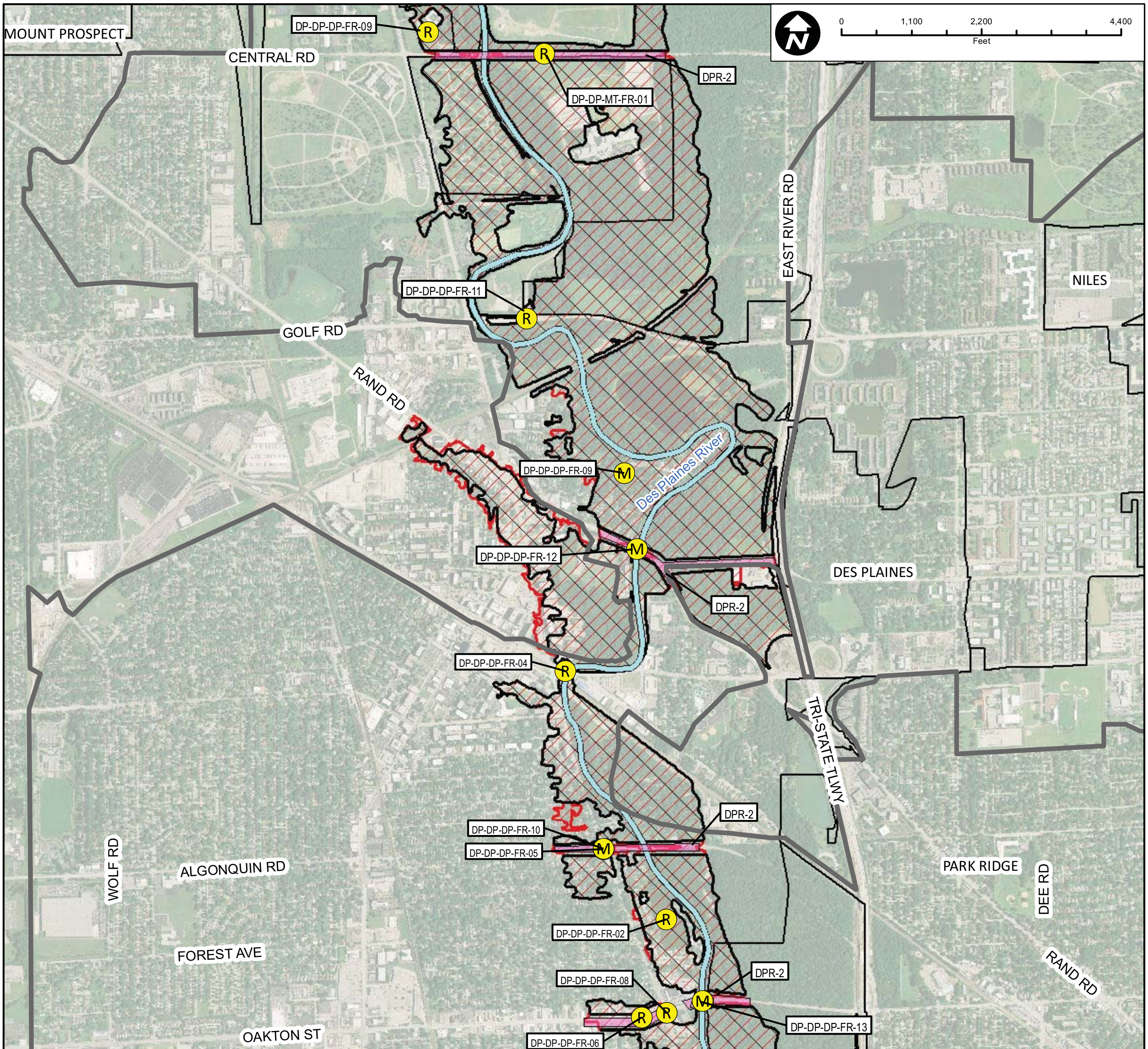


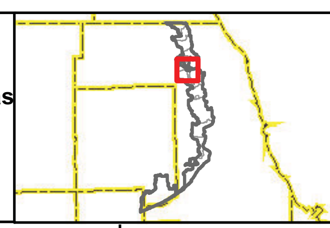
Subwatershed: Des Plaines River
Alternative: DPR-2B
Alternatives Description: Raise approximately 3,200 feet of Central Avenue and enlarge waterway opening, raise approximately 3,500 feet of Rand Road, approximately 1,550 feet of Algonquin Road, and approximately 1,750 feet of Oakton Street to 0.5 feet above 100-year flood inundation.

Concept Level Cost: $18,967,319
Benefits: $7,884,379
B/C Ratio: 0.4

Legend

- 100-Year Storm Event Flood Inundation Without Project
- 100-Year Storm Event Flood Inundation With Project
- Reservoir
- Road Improvements
- Culvert/Bridge Modification
- Channel Improvements
- Levee/Floodwall
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas
- M Modeled
- R Regional



CLIENT:
METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:
LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN
DES PLAINES RIVER WATERSHED
RECOMMENDED ALTERNATIVE DPR-2B

PROJ. NO. 08-0043
DATE: 05-21-2010
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DRAWING NO.
FIGURE 3.6.10

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CHKD.			PLOT DATE	
FILE:				

Map Document: (Z:\MWRDGC\08-0043 Phase B\GIS\Exhibits\Meeting Maps\DesPlaines\Des Plaines River Detailed Sheets.mxd)
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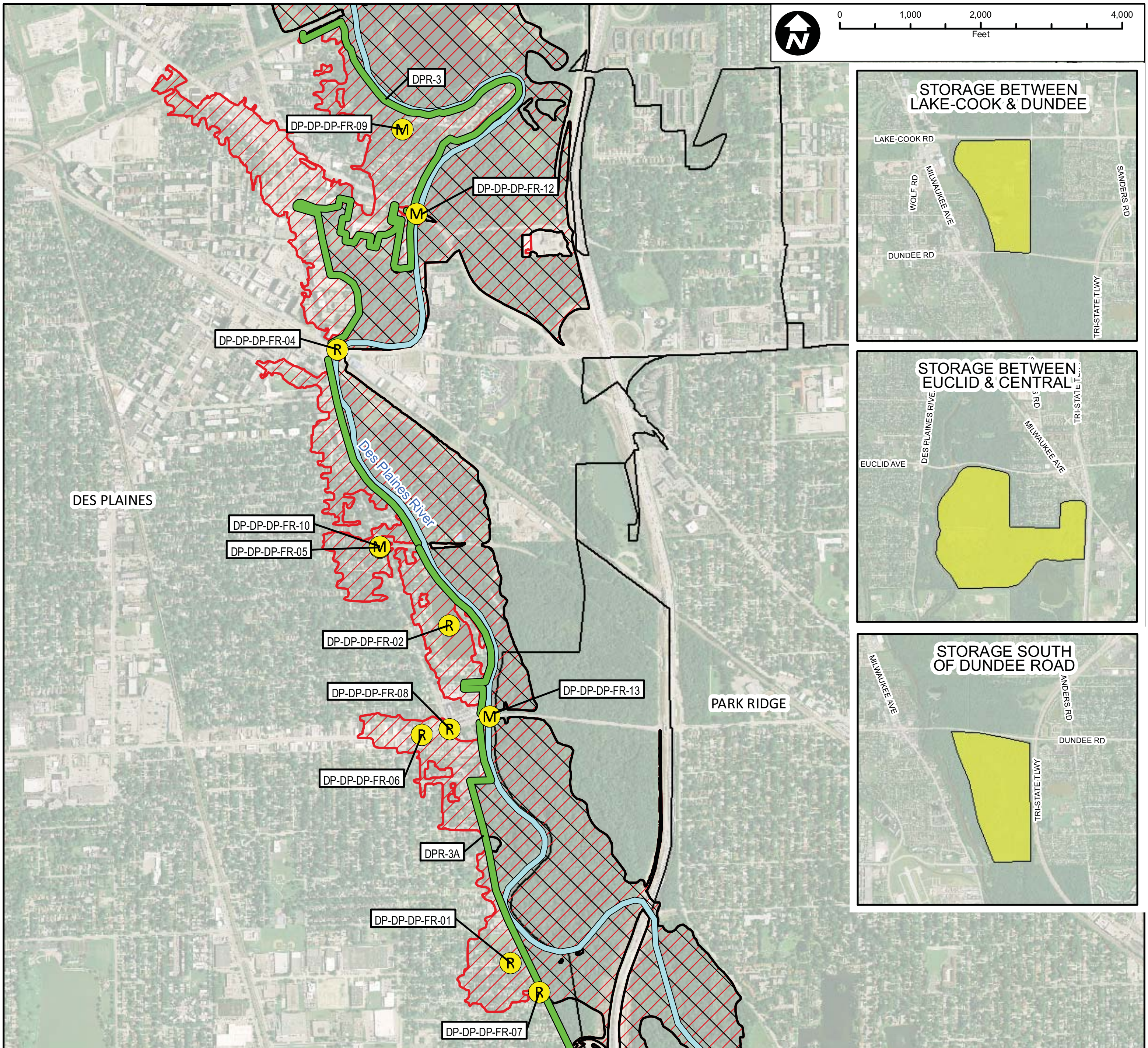


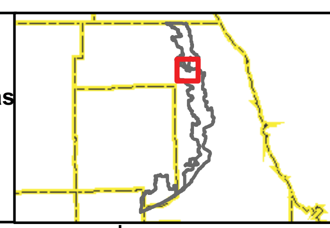
Subwatershed: Des Plaines River
Alternative: DPR-3A
Alternatives Description: City of Des Plaines Regional Floodwall.
Construct 26,500 feet of floodwall along Des Plaines River.
Include USACE concept reservoirs between Lake-Cook and Dundee Roads, south of Dundee Road, and between Euclid and Central Roads.

Concept Level Cost: $523,018,856
Benefits: $52,565,869
B/C Ratio: 0.1

Legend

- 100-Year Storm Event Flood Inundation Without Project
- 100-Year Storm Event Flood Inundation With Project
- Reservoir
- Road Improvements
- Culvert/Bridge Modification
- Channel Improvements
- Levee/Floodwall
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas
- M Modeled
- R Regional



CLIENT:
METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:
LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN
DES PLAINES RIVER WATERSHED
RECOMMENDED ALTERNATIVE DPR-3A

PROJ. NO.	08-0043			
DATE:	05-21-2010			
SHEET 1 OF 1				
DRAWING NO.				
DSGN.	DRW	4-10	SCALE	
DWN.			GIS USER	DRW
CHKD.			PLOT DATE	
FILE:				

FIGURE 3.6.11

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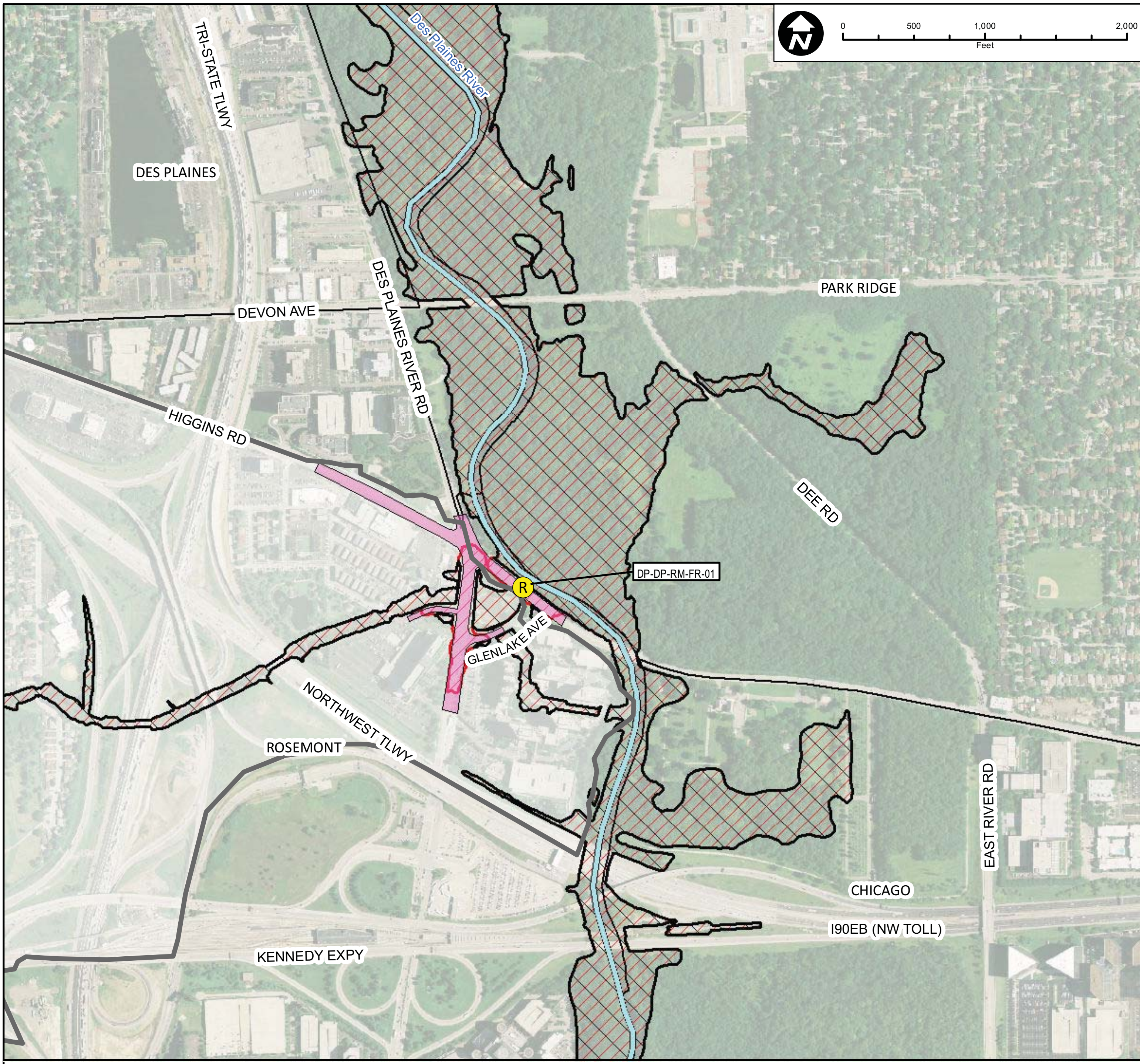


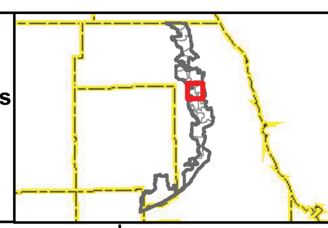
Subwatershed: Des Plaines River
Alternative: DPR-4
Alternatives Description: Raise approximately 2,500 feet of Higgins Road approximately 1,050 feet of River Road, and approximately 300 feet of Glenlake Avenue to 0.5 feet above the 100-year flood inundation.

Concept Level Cost: $9,305,254
Benefits: $1,558,254
B/C Ratio: 0.2

Legend

- 100-Year Storm Event Flood Inundation Without Project
- 100-Year Storm Event Flood Inundation With Project
- Reservoir
- Road Improvements
- Culvert/Bridge Modification
- Channel Improvements
- Levee/Floodwall
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas
- M Modeled
- R Regional



CLIENT:
METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:
LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN
DES PLAINES RIVER WATERSHED
RECOMMENDED ALTERNATIVE DPR-4

PROJ. NO. 08-0043
DATE: 05-21-2010
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FIGURE 3.6.12

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FILE:				

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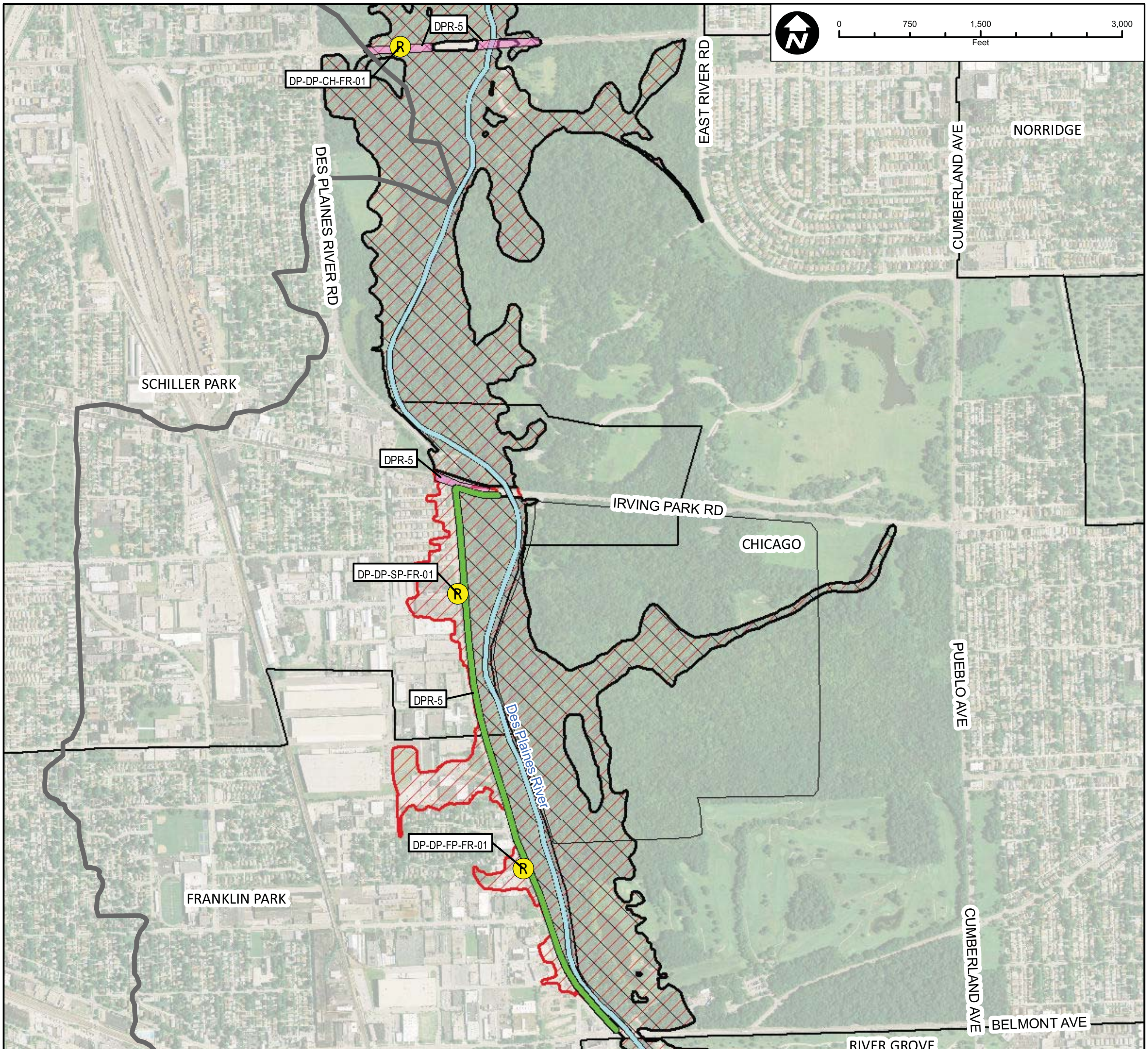


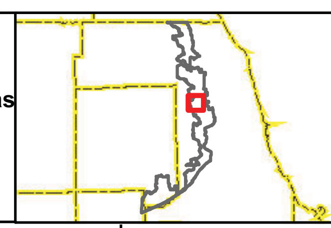
Subwatershed: Des Plaines River
Alternative: DPR-5
Alternatives Description: Construct 6,600 feet of floodwall along East side of River Road.
Raise approximately 520 feet of Irving Park Road
and 1,950 feet of Lawrence Ave 0.5 feet above 100-year flood inundation.

Concept Level Cost: $28,619,651
Benefits: $9,936,443
B/C Ratio: 0.3

Legend

- 100-Year Storm Event Flood Inundation Without Project
- 100-Year Storm Event Flood Inundation With Project
- Reservoir
- Road Improvements
- Culvert/Bridge Modification
- Channel Improvements
- Levee/Floodwall
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas
- M Modeled
- R Regional



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METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:
LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN
DES PLAINES RIVER WATERSHED
RECOMMENDED ALTERNATIVE DPR-5

PROJ. NO.	08-0043			
DATE:	05-21-2010			
SHEET	1 OF 1			
DRAWING NO.	**FIGURE 3.6.13**			
DSGN.	DRW	4-10	SCALE	
DWN.			GIS USER	DRW
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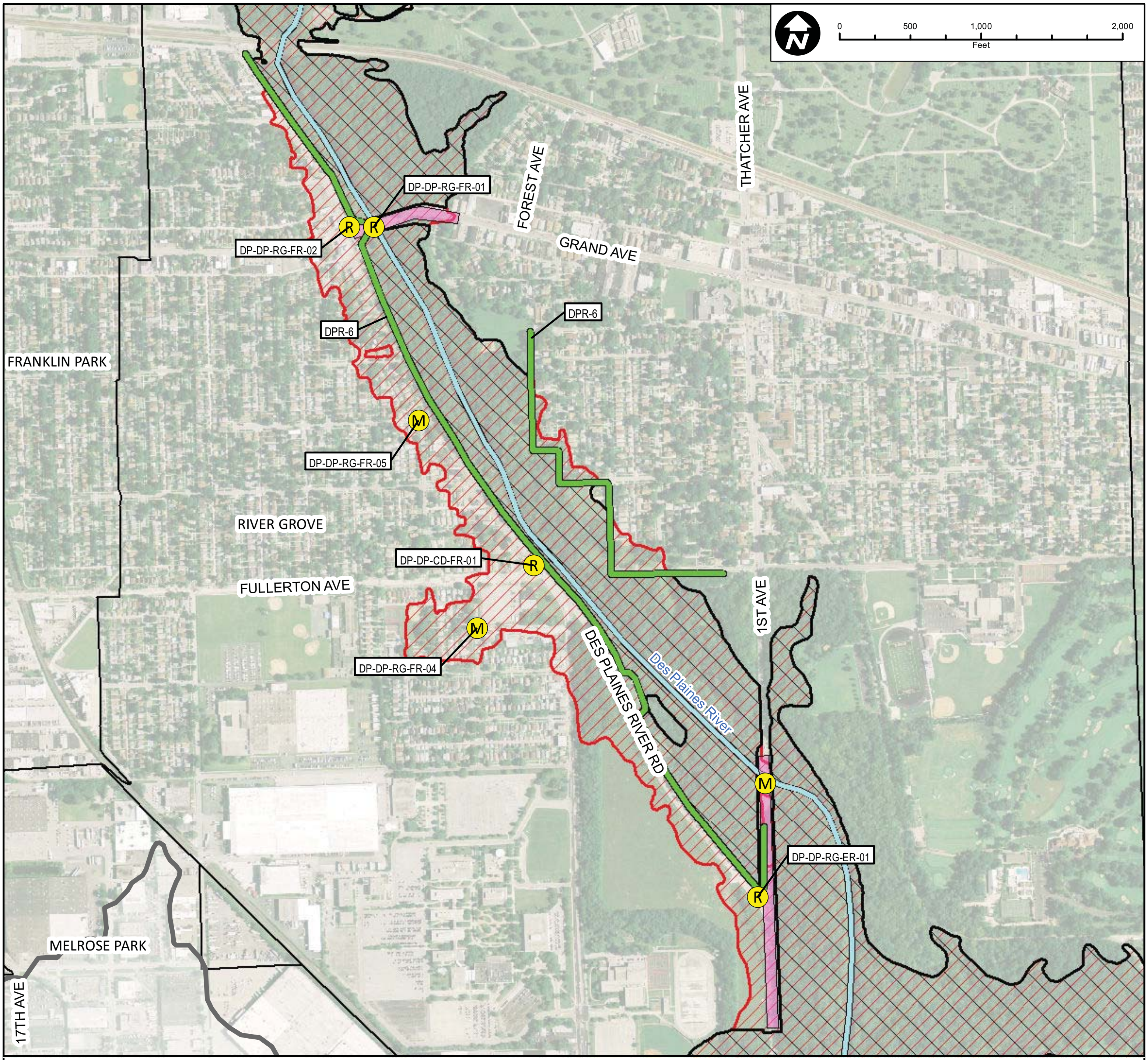


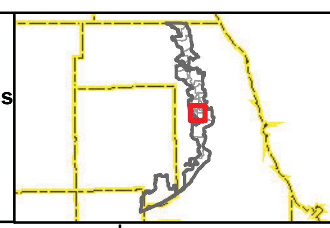
Subwatershed: Des Plaines River
Alternative: DPR-6D
Alternatives Description: Construct approximately 7,500 ft floodwall west of Des Plaines River and approximately 3,000 ft floodwall east of Des Plaines River.
Pump stations required to address internal drainage.
Enlarge waterway opening and raise approximately 1400 feet of Grand and raise approximately 1850 feet of 1st Avenue to 0.5 feet above the 100-year flood inundation.

Concept Level Cost: $45,891,893
Benefits: $19,352,980
B/C Ratio: 0.4

Legend

- 100-Year Storm Event Flood Inundation Without Project
- 100-Year Storm Event Flood Inundation With Project
- Reservoir
- Road Improvements
- Culvert/Bridge Modification
- Channel Improvements
- Levee/Floodwall
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas
- M Modeled
- R Regional



CLIENT: METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO	TITLE: LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN DES PLAINES RIVER WATERSHED RECOMMENDED ALTERNATIVE DPR-6D	PROJ. NO. 08-0043	
		DATE: 05-21-2010	
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		DRAWING NO.	

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DSGN.	DRW	4-10	SCALE	
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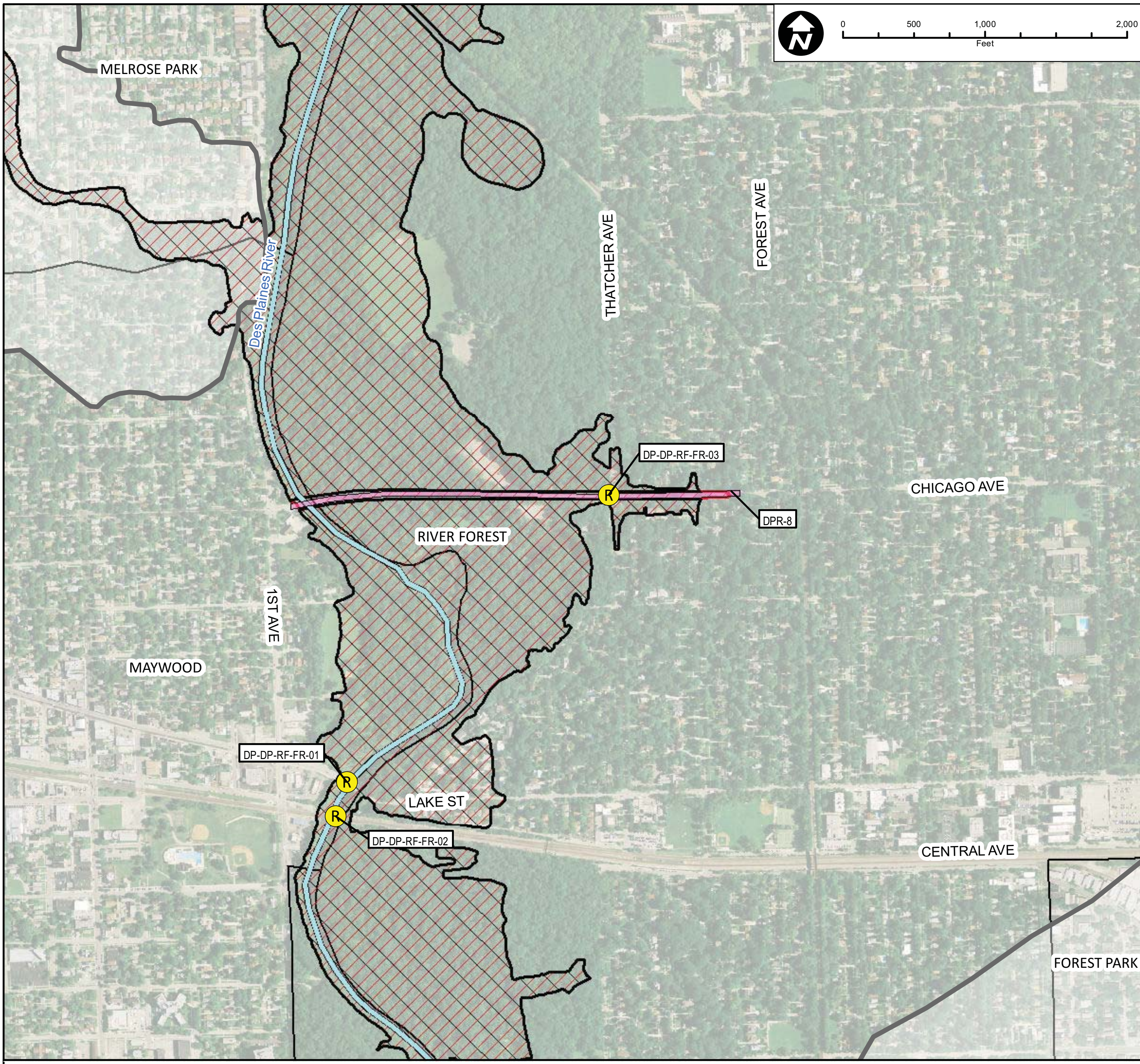
CHKD.			PLOT DATE	
FILE:				

FIGURE 3.6.14

Map Document: (Z:\MWRDGC\08-0043 Phase B\GIS\Exhibits\Meeting Maps\DesPlaines\Des Plaines River Detailed Sheets.mxd)
11/22/2010 -- 11:09:47 AM



Subwatershed: Des Plaines River
Alternative: DPR-8A
Alternatives Description: Raise approximately 3,300 feet of Chicago Avenue to0.5 feet above the 100-year flood inundation.

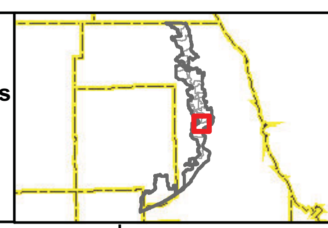
Concept Level Cost: $10,371,259
Benefits: $407,298
B/C Ratio: 0.04

Legend

- 100-Year Storm Event Flood Inundation Without Project
- 100-Year Storm Event Flood Inundation With Project
- Reservoir
- Road Improvements
- Culvert/Bridge Modification
- Channel Improvements
- Levee/Floodwall
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas

- M Modeled
- R Regional



CLIENT:

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:

LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN
DES PLAINES RIVER WATERSHED
RECOMMENDED ALTERNATIVE DPR-8A

PROJ. NO.	08-0043
DATE:	05-21-2010
SHEET	1 OF 1

DRAWING NO.

FIGURE 3.6.15

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DWN.			GIS USER	DRW
CHKD.			PLOT DATE	
FILE:				

Map Document: (Z:\MWRDGC\08-0043 Phase B\GIS\Exhibits\Meeting Maps\DesPlaines\Des Plaines River Detailed Sheets.mxd)
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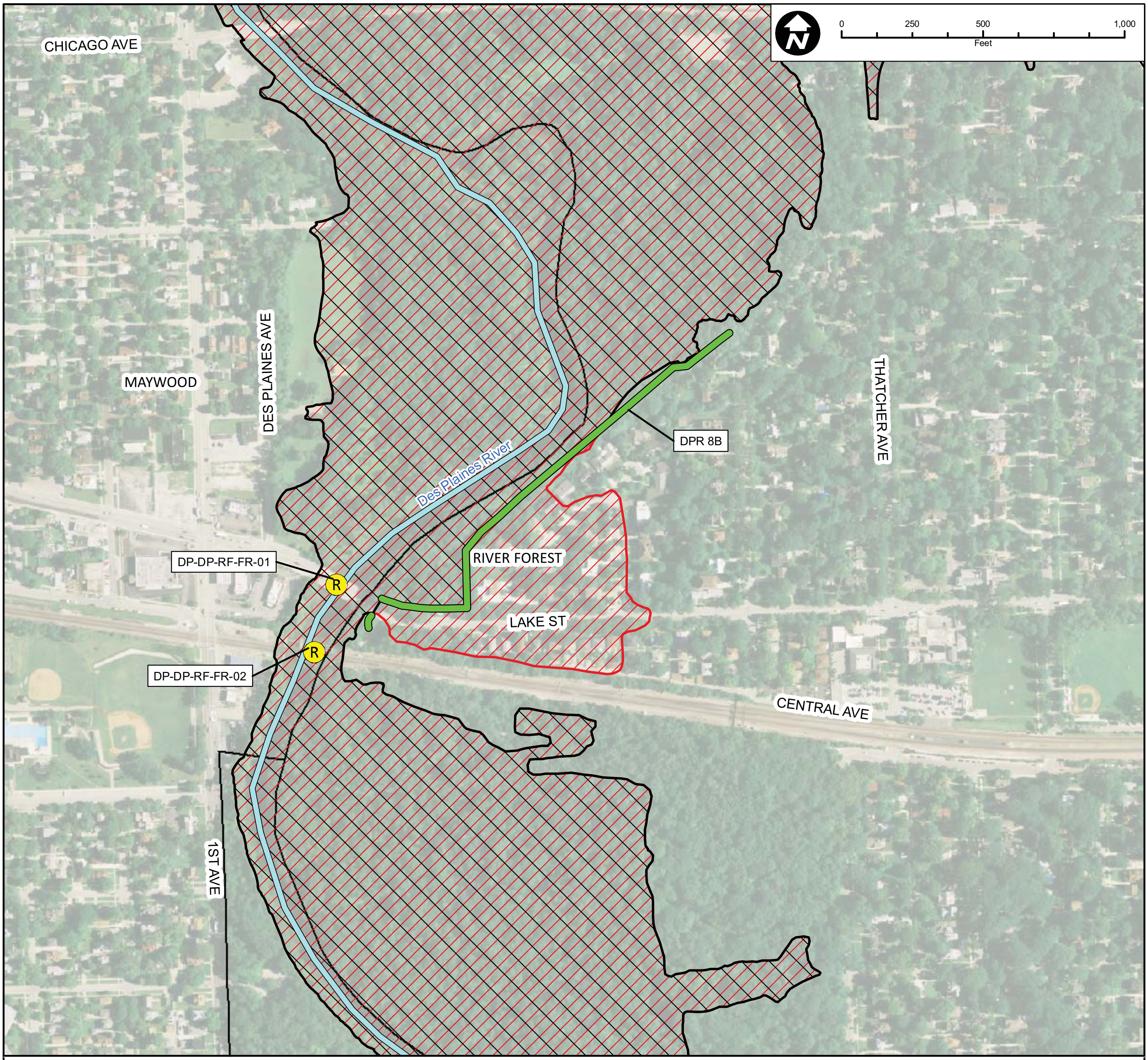


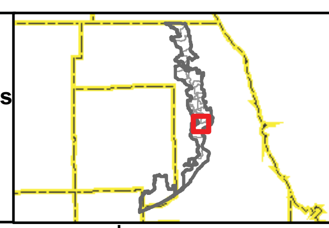
Subwatershed: Des Plaines River
Alternative: DPR-8B
Alternatives Description: Construct 2,150 feet of floodwall along Des Plaines River.
Pump station required to address internal drainage.
Closure structure required at Lake Street.

Concept Level Cost: $6,097,943
Benefits: $985,073
B/C Ratio: 0.2

Legend

- 100-Year Storm Event Flood Inundation Without Project
- 100-Year Storm Event Flood Inundation With Project
- Reservoir
- Road Improvements
- Culvert/Bridge Modification
- Channel Improvements
- Levee/Floodwall
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas
- M Modeled
- R Regional



CLIENT: **METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO**	TITLE: **LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN DES PLAINES RIVER WATERSHED RECOMMENDED ALTERNATIVE DPR-8B**	PROJ. NO. 08-0043	
		DATE: 05-21-2010	
		SHEET 1 OF 1	
		DRAWING NO. **FIGURE 3.6.16**	

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DSGN.	DRW	4-10	SCALE	
DWN.			GIS USER	DRW
CHKD.			PLOT DATE	
FILE:				

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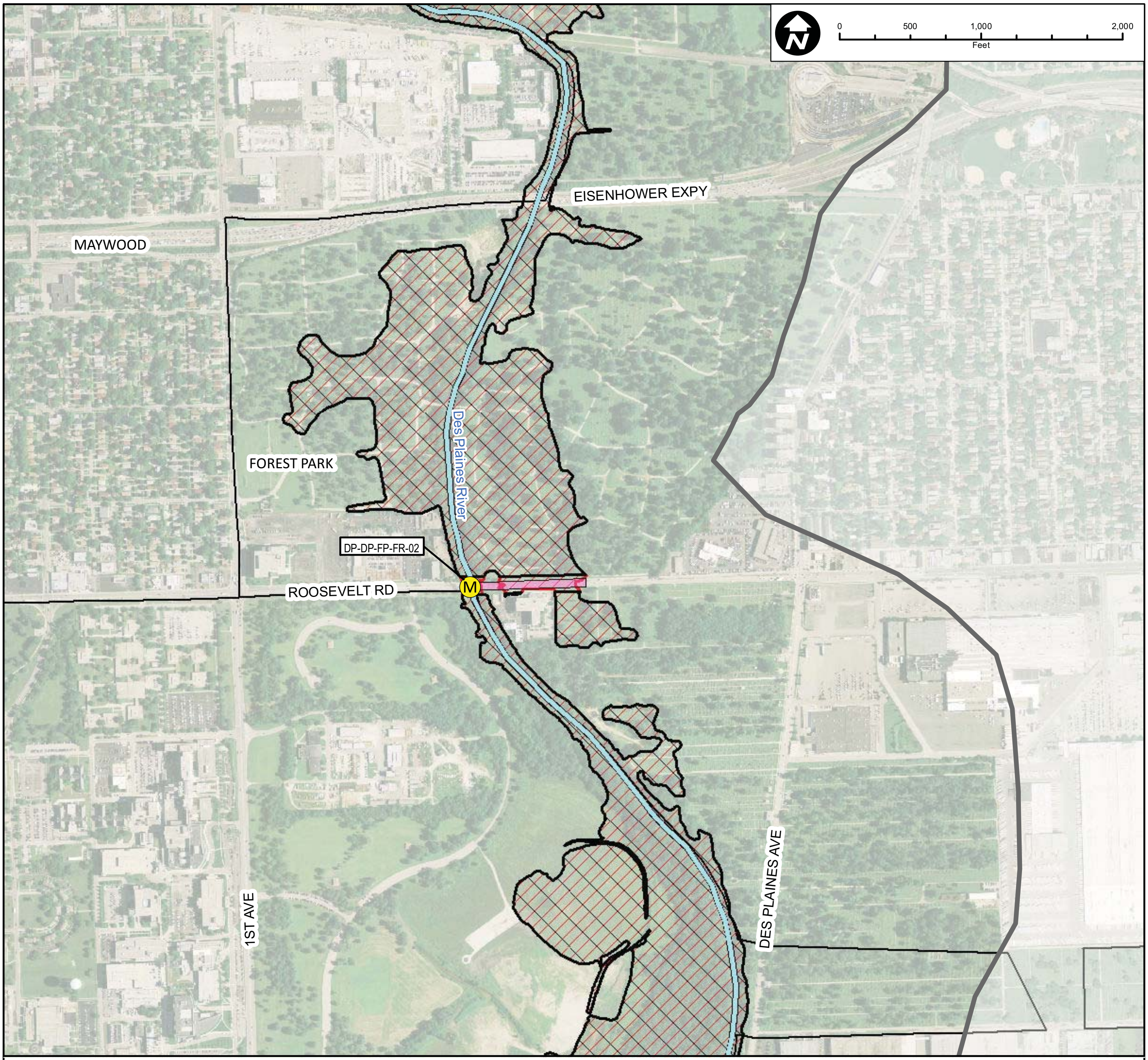


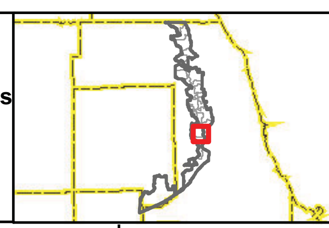
Subwatershed: Des Plaines River
Alternative: DPR-9A
Alternatives Description: Raise approximately 715 feet of Roosevelt Road to 0.5 feet above the 100-year flood inundation and enlarge waterway opening.

Concept Level Cost: $4,596,656
Benefits: $821,943
B/C Ratio: 0.2

Legend

- 100-Year Storm Event Flood Inundation Without Project
- 100-Year Storm Event Flood Inundation With Project
- Reservoir
- Road Improvements
- Culvert/Bridge Modification
- Channel Improvements
- Levee/Floodwall
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas
- M Modeled
- R Regional



CLIENT:
METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:
LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN
DES PLAINES RIVER WATERSHED
RECOMMENDED ALTERNATIVE DPR-9A

PROJ. NO. 08-0043
DATE: 05-21-2010
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DRAWING NO.
FIGURE 3.6.17

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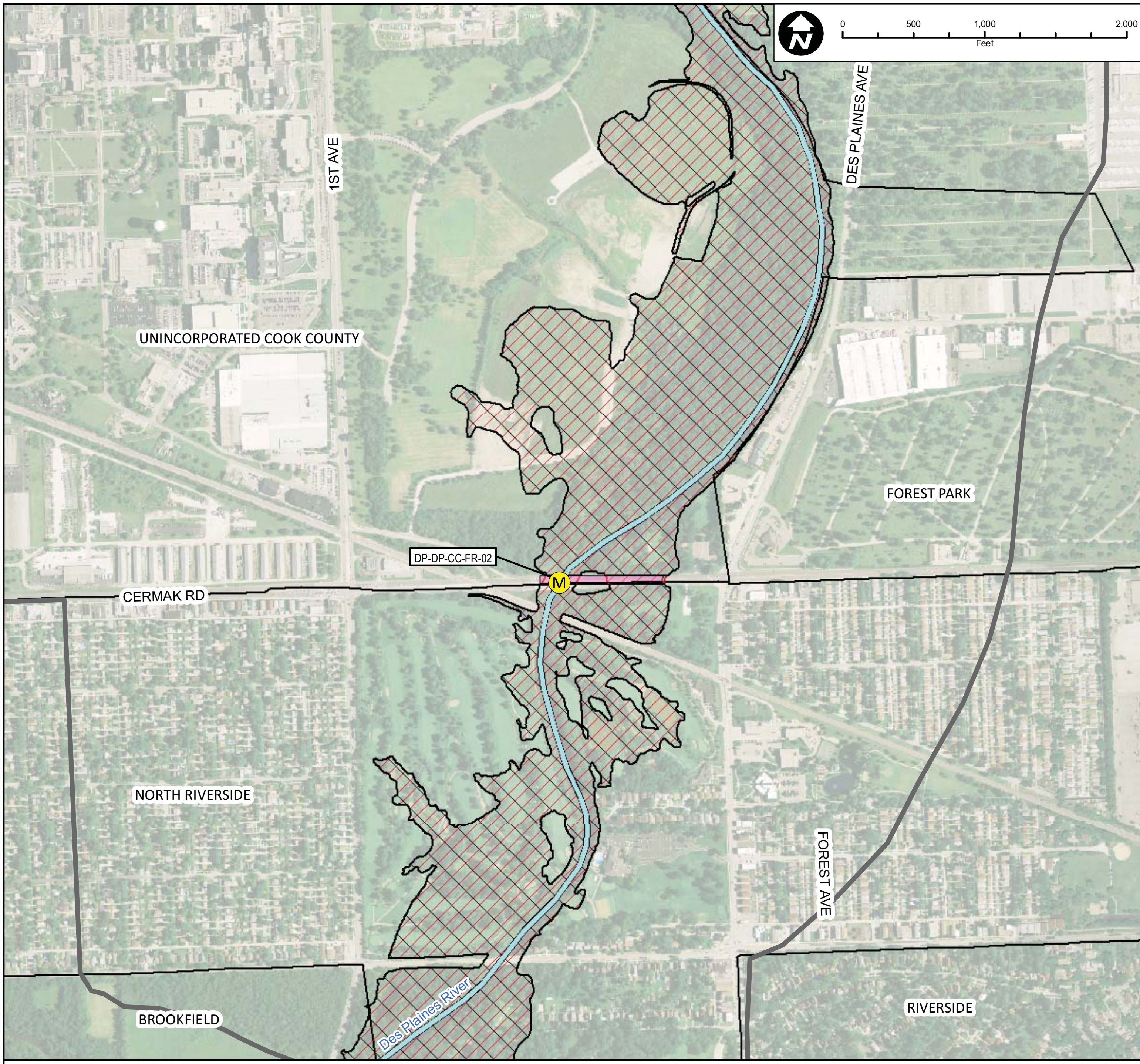


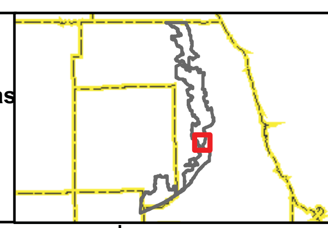
Subwatershed: Des Plaines River
Alternative: DPR-10
Alternatives Description: Raise approximately 450 feet of Cermak Road to 0.5 feet above 100-year flood inundation.

Concept Level Cost: $538,276
Benefits: $126,538
B/C Ratio: 0.2

Legend

- 100-Year Storm Event Flood Inundation Without Project
- 100-Year Storm Event Flood Inundation With Project
- Reservoir
- Road Improvements
- Culvert/Bridge Modification
- Channel Improvements
- Levee/Floodwall
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas
- M Modeled
- R Regional



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LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN
DES PLAINES RIVER WATERSHED
RECOMMENDED ALTERNATIVE DPR-10

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FIGURE 3.6.18

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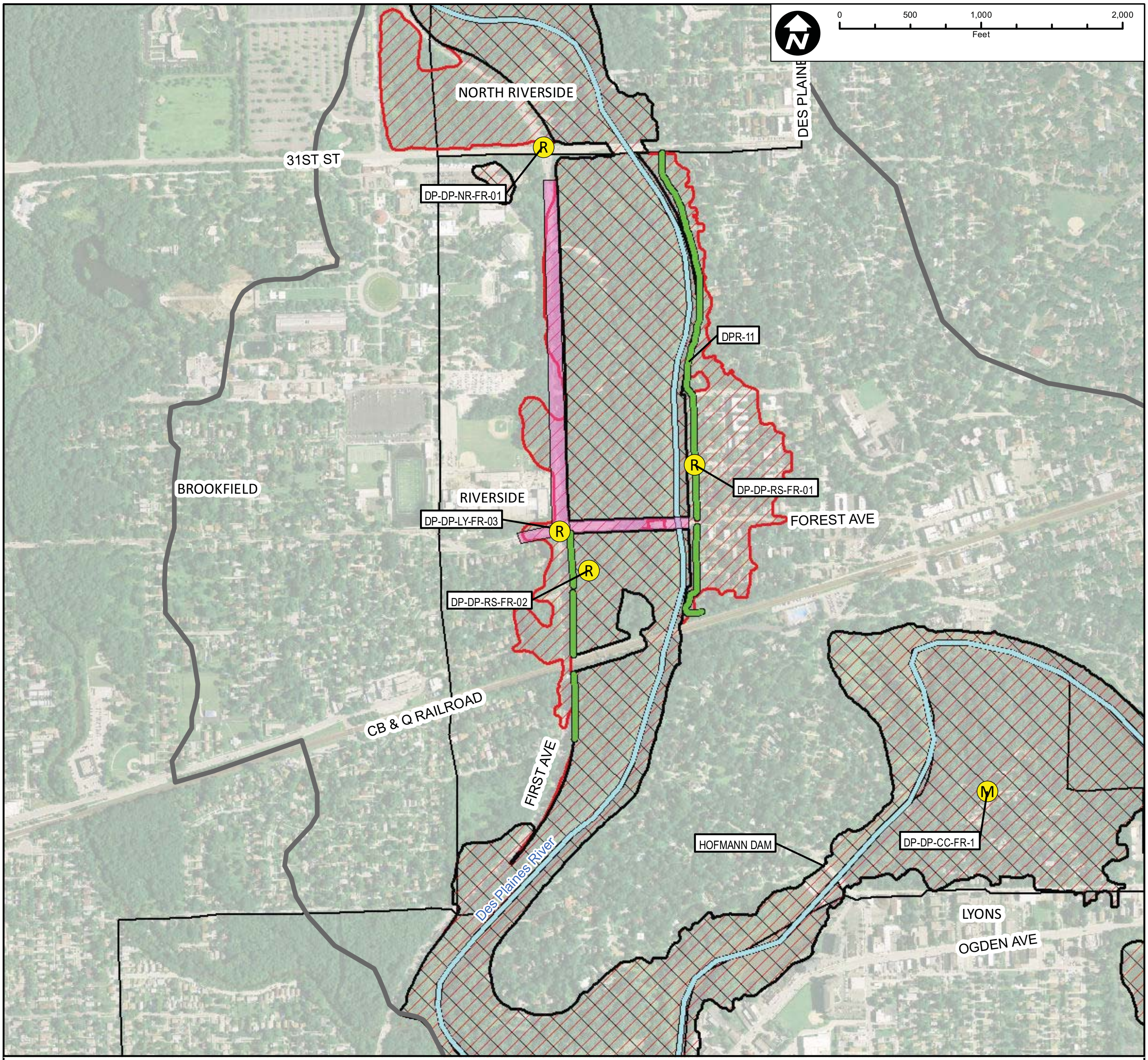


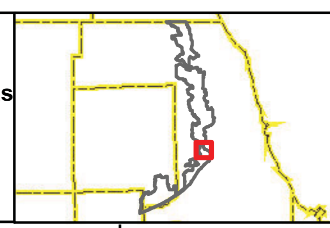
Subwatershed: Des Plaines River
Alternative: DPR-11A
Alternatives Description: Construct 1,300 feet of levee/floodwall along west side of Des Plaines River.
Construct 3,500 feet of levee/floodwall along east side of Des Plaines River.
Pump station required to address internal drainage.
Raise Forest Avenue, and First Avenue to 0.5 feet above 100-year flood inundation.

Concept Level Cost: $29,244,335
Benefits: $11,553,857
B/C Ratio: 0.4

Legend

- 100-Year Storm Event Flood Inundation Without Project
- 100-Year Storm Event Flood Inundation With Project
- Reservoir
- Road Improvements
- Culvert/Bridge Modification
- Channel Improvements
- Levee/Floodwall
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas
- M Modeled
- R Regional



CLIENT:
METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:
LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN
DES PLAINES RIVER WATERSHED
PROPOSED ALTERNATIVE DPR-11A

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DATE: 05-21-2010
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FIGURE 3.6.19

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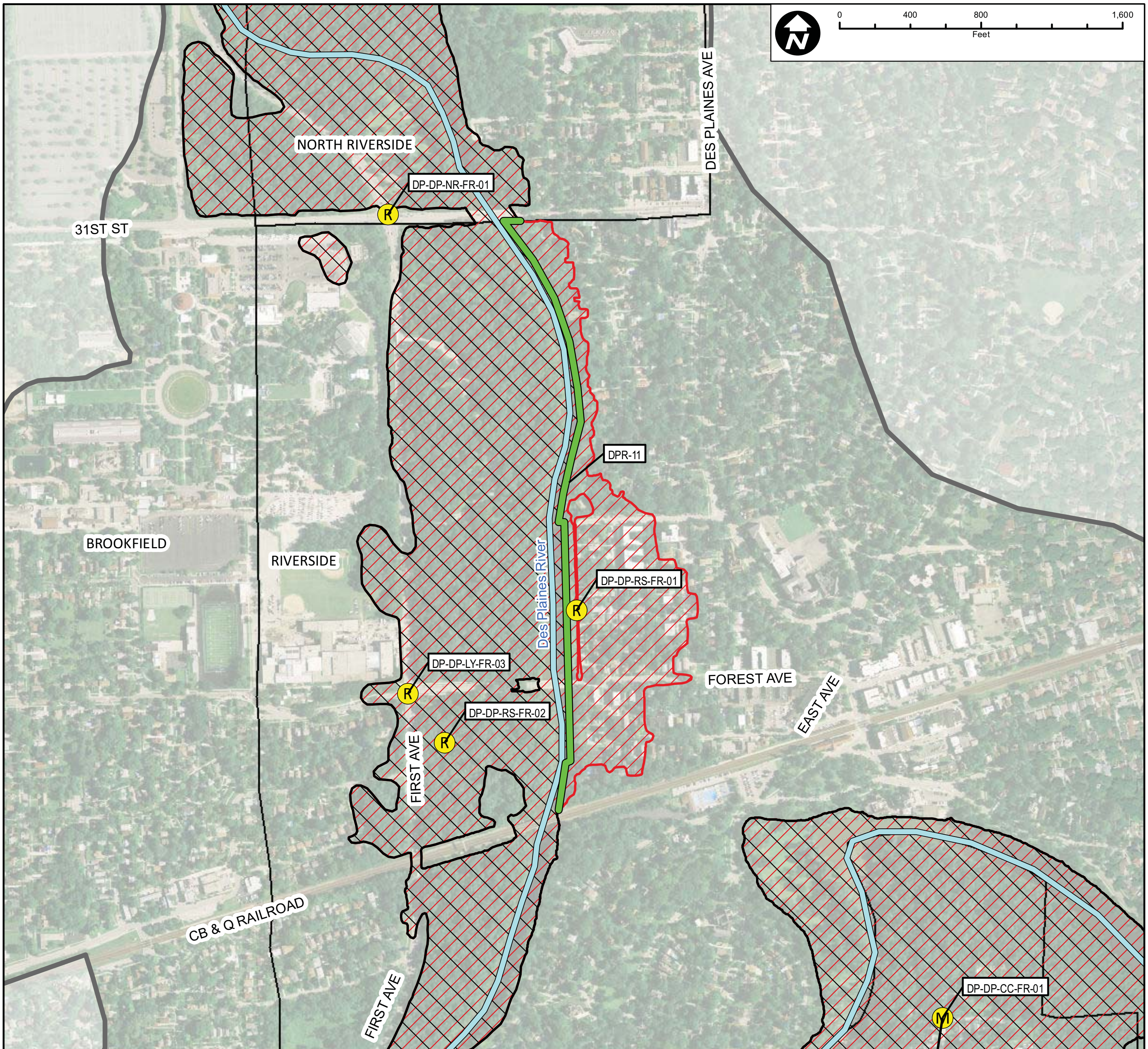


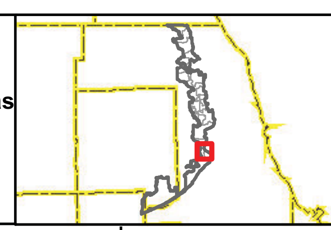
Subwatershed: Des Plaines River
Alternative: DPR-11B
Alternatives Description: Groveland Avenue floodwall.
Construct 3,500 feet of floodwall along Des Plaines River.
Pump stations required to address internal drainage.

Concept Level Cost: $15,930,181
Benefits: $10,083,162
B/C Ratio: 0.6

Legend

- 100-Year Storm Event Flood Inundation Without Project
- 100-Year Storm Event Flood Inundation With Project
- Reservoir
- Road Improvements
- Culvert/Bridge Modification
- Channel Improvements
- Levee/Floodwall
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas
- M Modeled
- R Regional



CLIENT:
METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:
LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN
DES PLAINES RIVER WATERSHED
PROPOSED ALTERNATIVE DPR-11B

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DATE: 05-21-2010
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FIGURE 3.6.20

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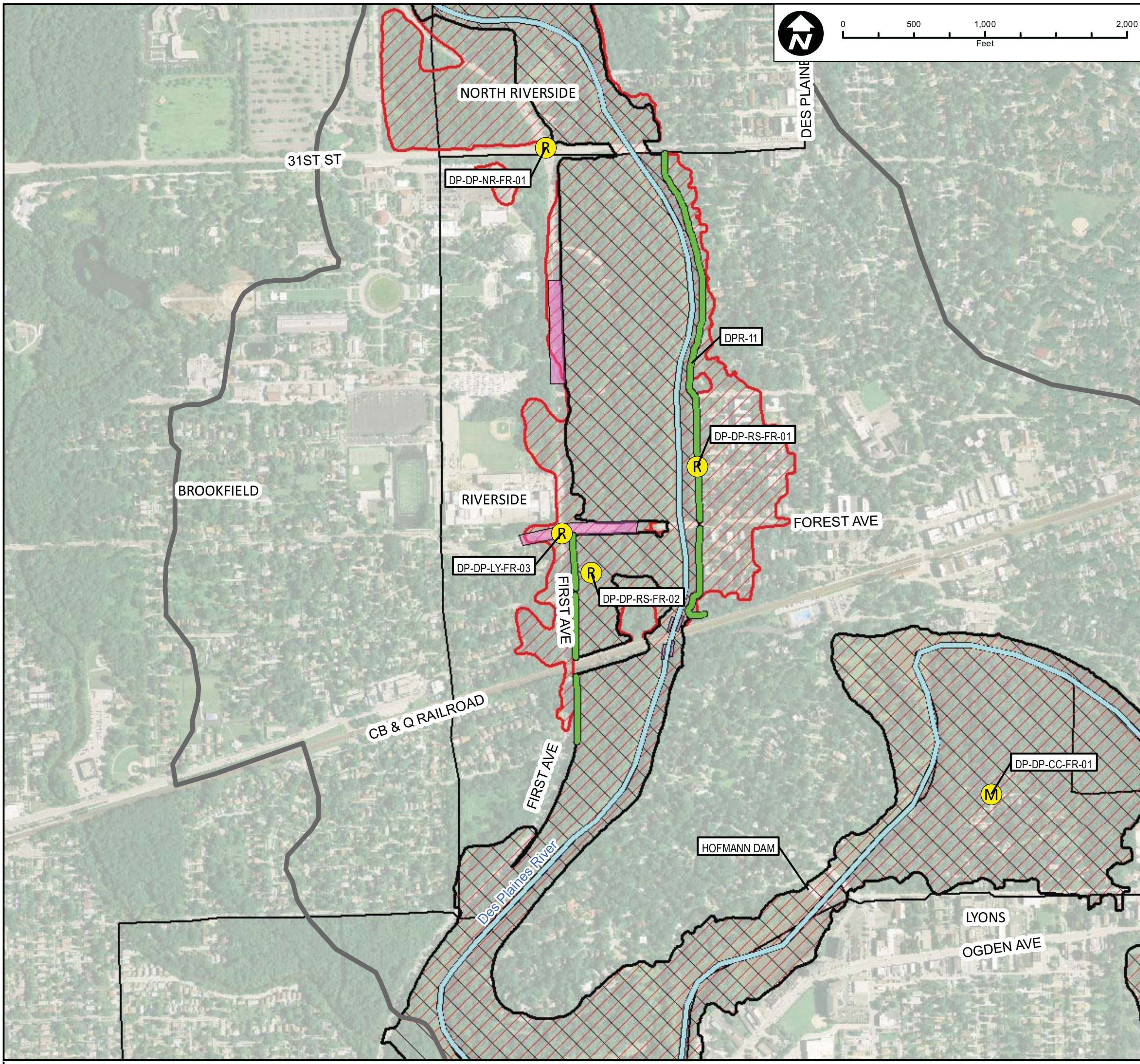


Subwatershed: Des Plaines River

Alternative: DPR-11C

Alternatives Description: Construct 1,300 feet of levee/floodwall along west side of Des Plaines River.
Construct 3,500 feet of levee/floodwall along east side of Des Plaines River. Pump stations required to address internal drainage.
Raise Forest Avenue, and First Avenueto 0.5 feet above 100-year flood inundation. Extend piers at railroad south of Forest Avenue

Concept Level Cost: $28,267,020

Benefits: $11,767,856

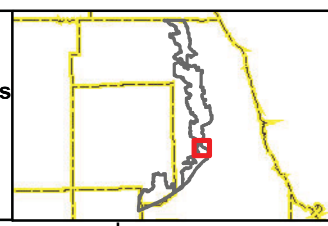
B/C Ratio: 0.4

Legend

- 100-Year Storm Event Flood Inundation Without Project
- 100-Year Storm Event Flood Inundation With Project
- Reservoir
- Road Improvements
- Culvert/Bridge Modification
- Channel Improvements
- Levee/Floodwall
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas

- M Modeled
- R Regional



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LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN
DES PLAINES RIVER WATERSHED
RECOMMENDED ALTERNATIVE DPR-11C

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DATE:	05-21-2010			
SHEET 1 OF 1				
DRAWING NO.				
DSGN.	DRW	4-10	SCALE	
DWN.			GIS USER	DRW
CHKD.			PLOT DATE	
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FIGURE 3.6.21

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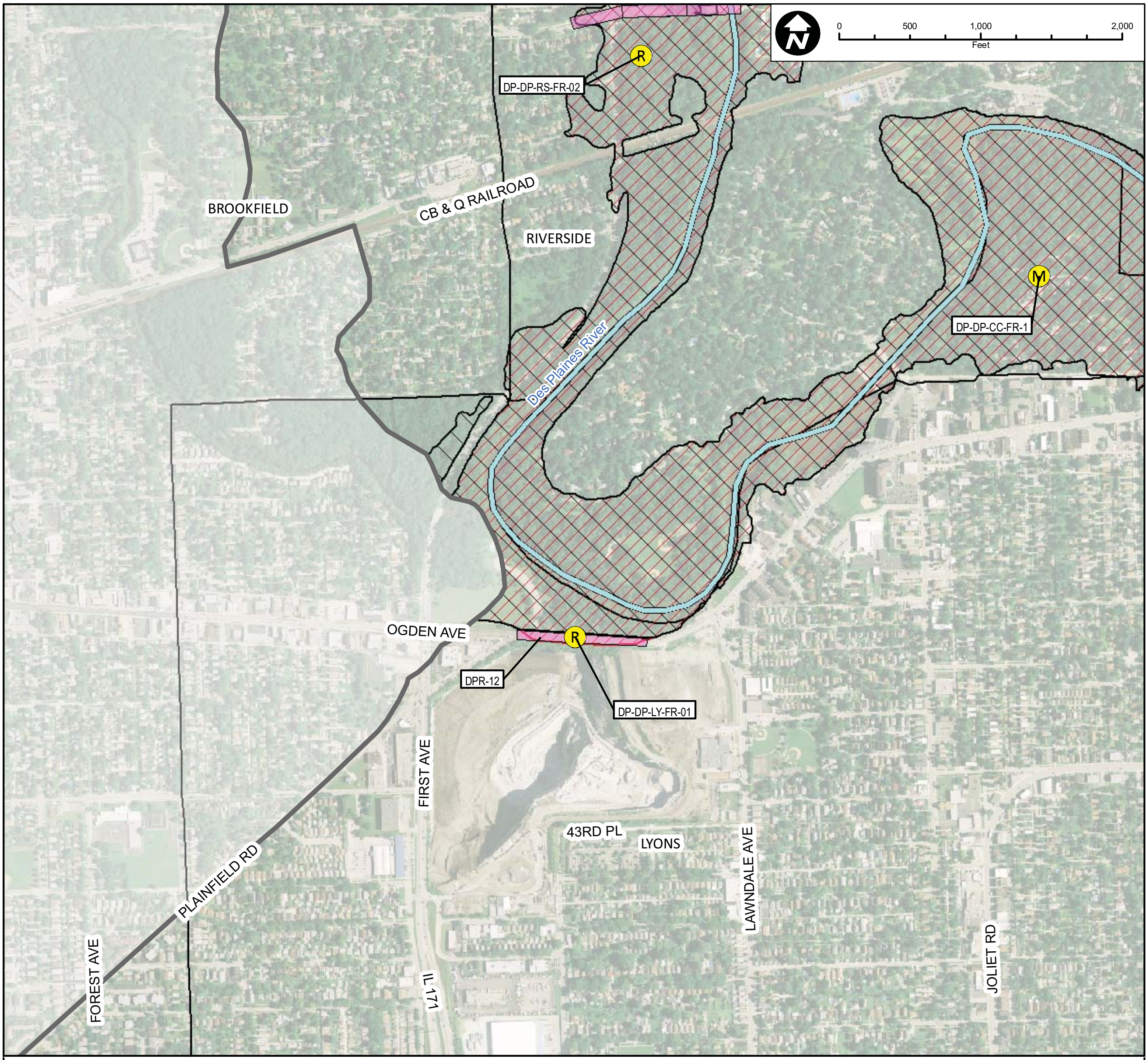


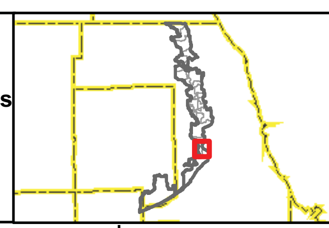
Subwatershed: Des Plaines River
Alternative: DPR-12
Alternatives Description: Raise approximately 900 feet of Ogden Avenue to 0.5 feet above the 100-year flood inundation.

Concept Level Cost: $1,029,060
Benefits: $51,782
B/C Ratio: 0.05

Legend

- 100-Year Storm Event Flood Inundation Without Project
- 100-Year Storm Event Flood Inundation With Project
- Reservoir
- Road Improvements
- Culvert/Bridge Modification
- Channel Improvements
- Levee/Floodwall
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas
- M Modeled
- R Regional



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METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:
LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN
DES PLAINES RIVER WATERSHED
RECOMMENDED ALTERNATIVE DPR-12

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DATE: 05-21-2010
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FIGURE 3.6.22

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CHKD.			PLOT DATE	
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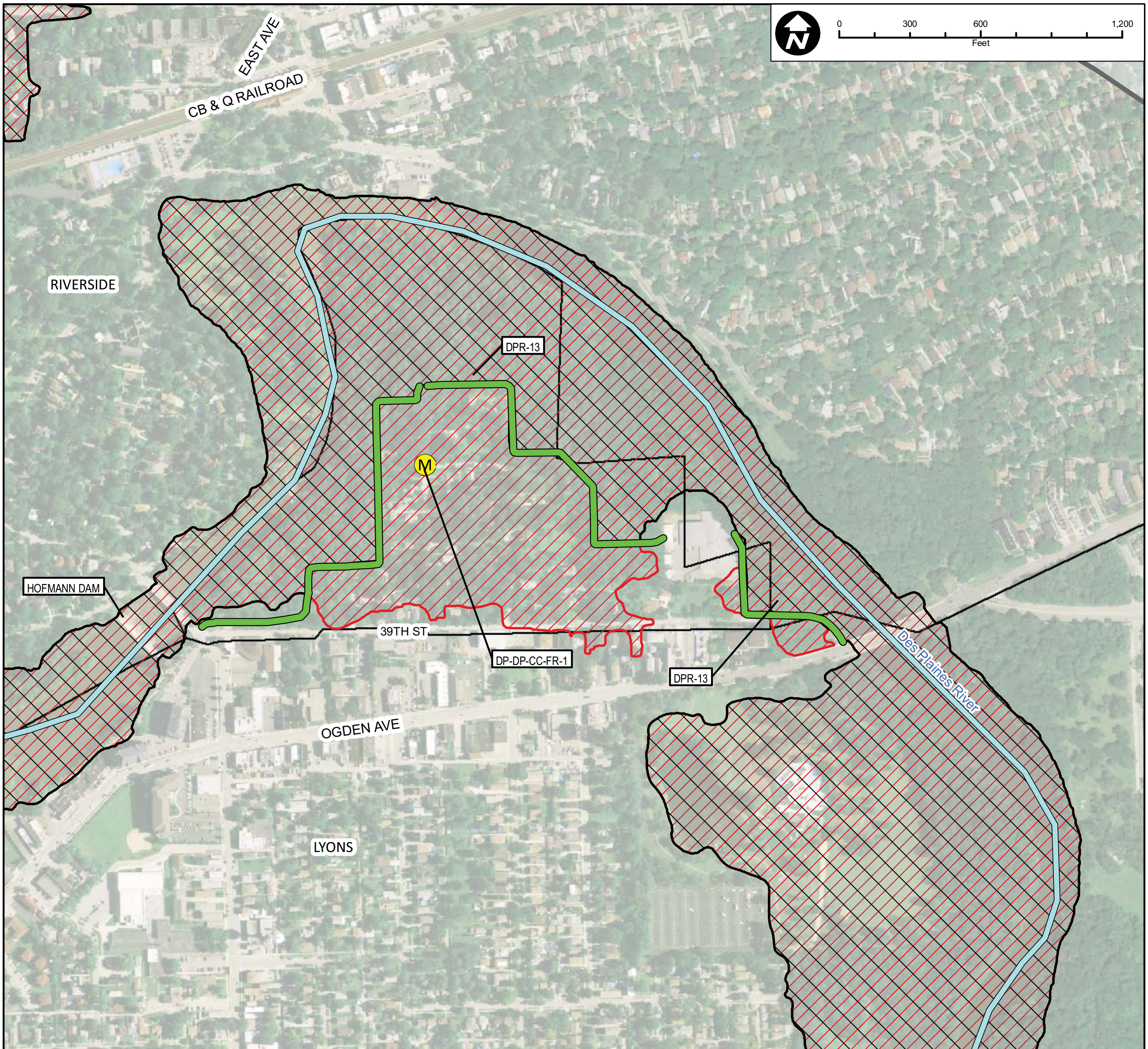


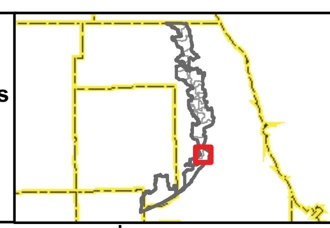
Subwatershed: Des Plaines River
Alternative: DPR-13
Alternatives Description: Construct 2,400 feet of floodwall along Des Plaines River.

Concept Level Cost: $9,880,904
Benefits: $14,100,116
B/C Ratio: 1.4

Legend

- 100-Year Storm Event Flood Inundation Without Project
- 100-Year Storm Event Flood Inundation With Project
- Reservoir
- Road Improvements
- Culvert/Bridge Modification
- Channel Improvements
- Levee/Floodwall
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas
- M Modeled
- R Regional



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METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

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LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN
DES PLAINES RIVER WATERSHED
RECOMMENDED ALTERNATIVE DPR-13

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DATE: 05-21-2010
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DRAWING NO.
FIGURE 3.6.23

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CHKD.			PLOT DATE	
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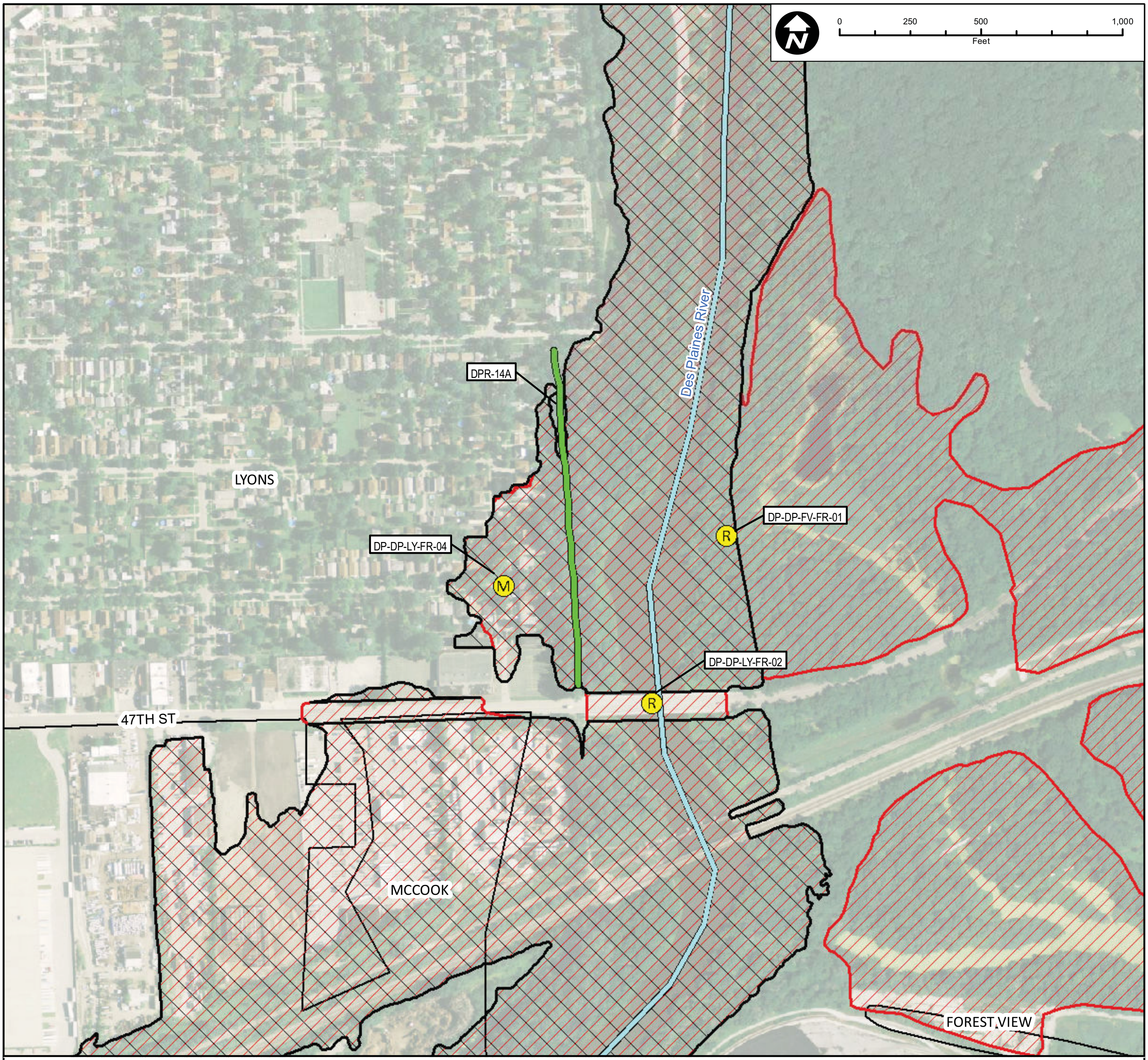


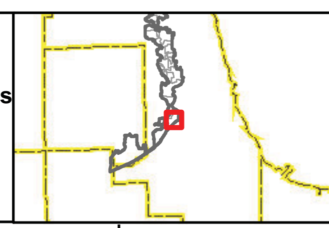
Subwatershed: Des Plaines River
Alternative: DPR-14A
Alternatives Description: Construct 1,200 feet of floodwall along Des Plaines River.
Pump station required to address internal drainage.

Concept Level Cost: $4,594,661
Benefits: $370,987
B/C Ratio: 0.08

Legend

- 100-Year Storm Event Flood Inundation Without Project
- 100-Year Storm Event Flood Inundation With Project
- Reservoir
- Road Improvements
- Culvert/Bridge Modification
- Channel Improvements
- Levee/Floodwall
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas
- M Modeled
- R Regional



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METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:
**LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN
DES PLAINES RIVER WATERSHED
RECOMMENDED ALTERNATIVE DPR-14A**

PROJ. NO.	08-0043
DATE:	05-21-2010
SHEET	1 OF 1
DRAWING NO.	**FIGURE 3.6.24**

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CHKD.			PLOT DATE	
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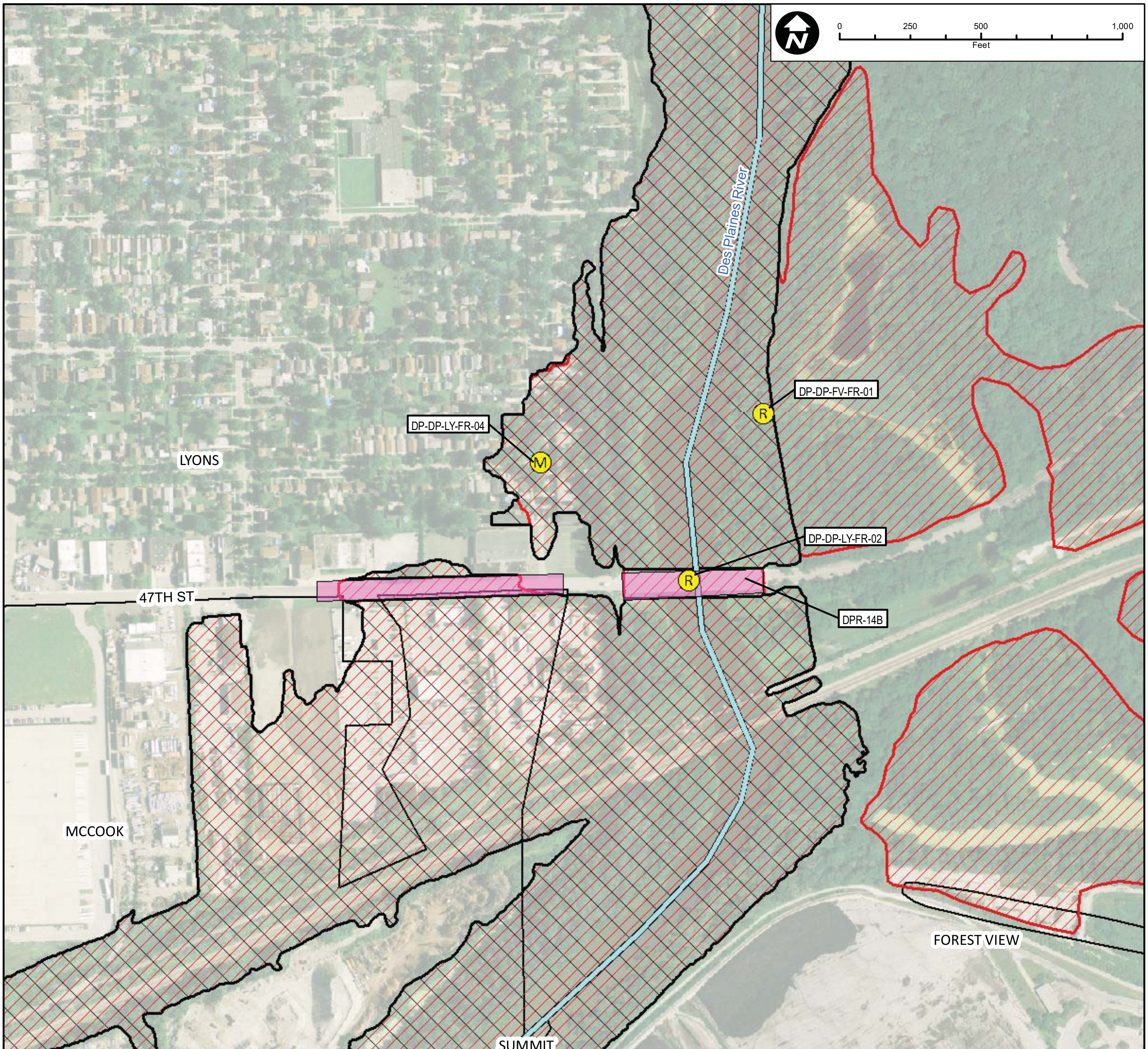


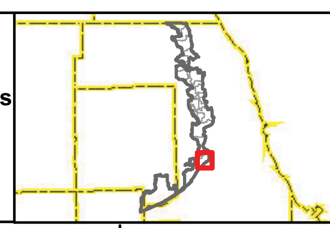
Subwatershed: Des Plaines River
Alternative: DPR-14B
Alternatives Description: Raise 47th Street to 0.5 feet above 100-year flood inundation.

Concept Level Cost: $18,200,778
Benefits: $269,713
B/C Ratio: 0.01

Legend

- 100-Year Storm Event Flood Inundation Without Project
- 100-Year Storm Event Flood Inundation With Project
- Reservoir
- Road Improvements
- Culvert/Bridge Modification
- Channel Improvements
- Levee/Floodwall
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas
- M Modeled
- R Regional



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LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN
DES PLAINES RIVER WATERSHED
RECOMMENDED ALTERNATIVE DPR-14B

PROJ. NO. 08-0043
DATE: 05-21-2010
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FIGURE 3.6.25

DSGN.	DRW	4-10	SCALE	
DWN.			GIS USER	DRW
CHKD.			PLOT DATE	
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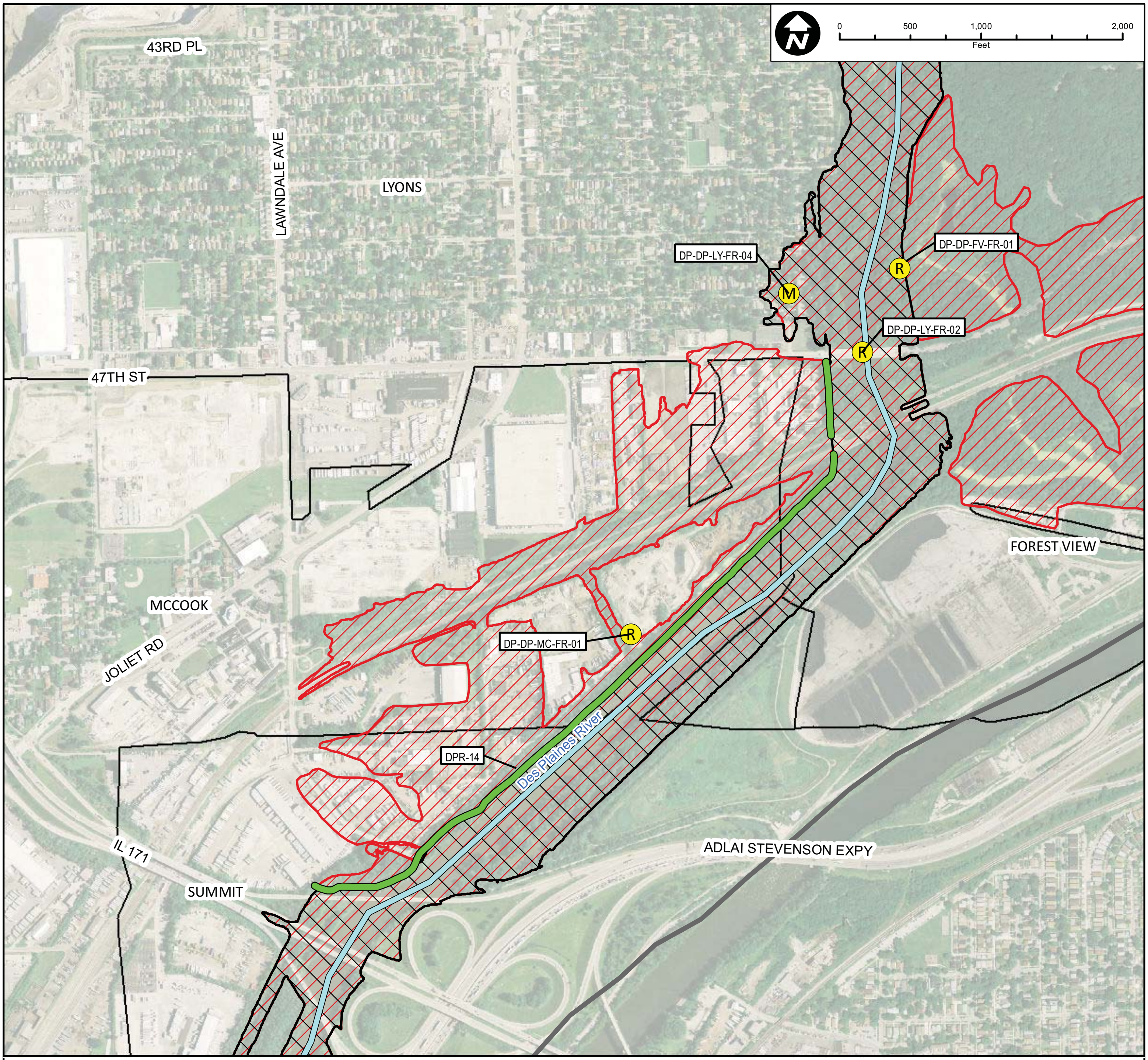


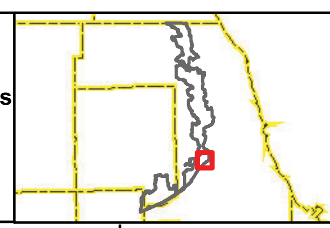
Subwatershed: Des Plaines River
Alternative: DPR-14C
Alternatives Description: McCook levee enhancement.
Construct 5,000 feet of sheet piling floodwall along Des Plaines River to bring existing McCook levee to 3 feet above 100-year flood inundation.

Concept Level Cost: $8,265,570
Benefits: $1,350,067
B/C Ratio: 0.2

Legend

- 100-Year Storm Event Flood Inundation Without Project
- 100-Year Storm Event Flood Inundation With Project
- Reservoir
- Road Improvements
- Culvert/Bridge Modification
- Channel Improvements
- Levee/Floodwall
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas
- M Modeled
- R Regional



CLIENT:
METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:
LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN
DES PLAINES RIVER WATERSHED
RECOMMENDED ALTERNATIVE DPR-14C

PROJ. NO. 08-0043
DATE: 05-21-2010
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FIGURE 3.6.26

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CHKD.			PLOT DATE	
FILE:				

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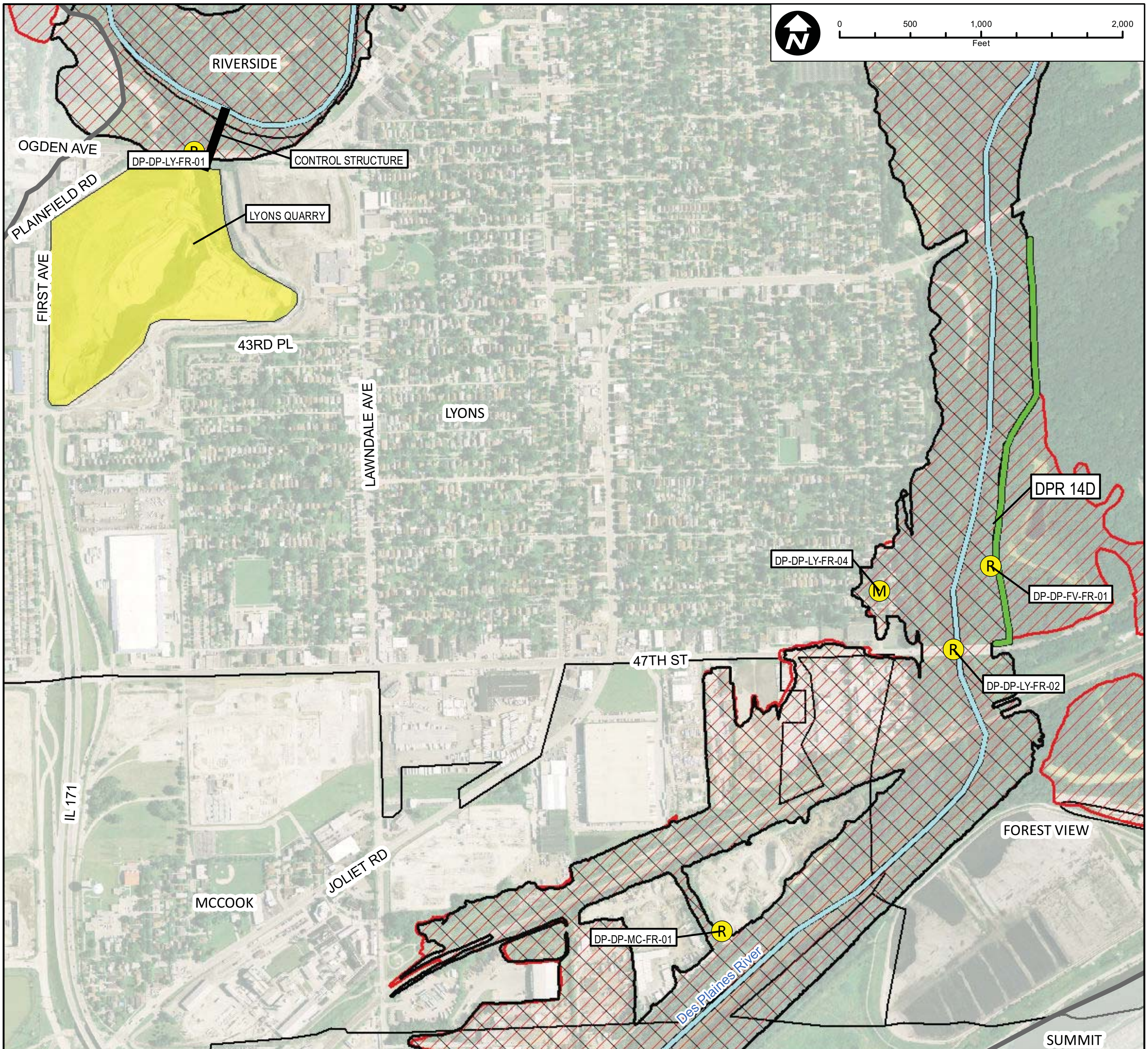

Subwatershed: Des Plaines River
Alternative: DPR-14D
Alternatives Description: Construct 3,000 feet of floodwall east of Des Plaines River north of 47th Street. Pump stations required to address internal drainage.

Concept Level Cost: $260,991,361
Benefits: $8,621,560
B/C Ratio: 0.03

Legend

- 100-Year Storm Event Flood Inundation Without Project
- 100-Year Storm Event Flood Inundation With Project
- Reservoir
- Road Improvements
- Culvert/Bridge Modification
- Channel Improvements
- Levee/Floodwall
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas
- M Modeled
- R Regional

CLIENT:
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TITLE:
LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN DES PLAINES RIVER WATERSHED RECOMMENDED ALTERNATIVE DPR-14D

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FIGURE 3.6.27

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FILE:				

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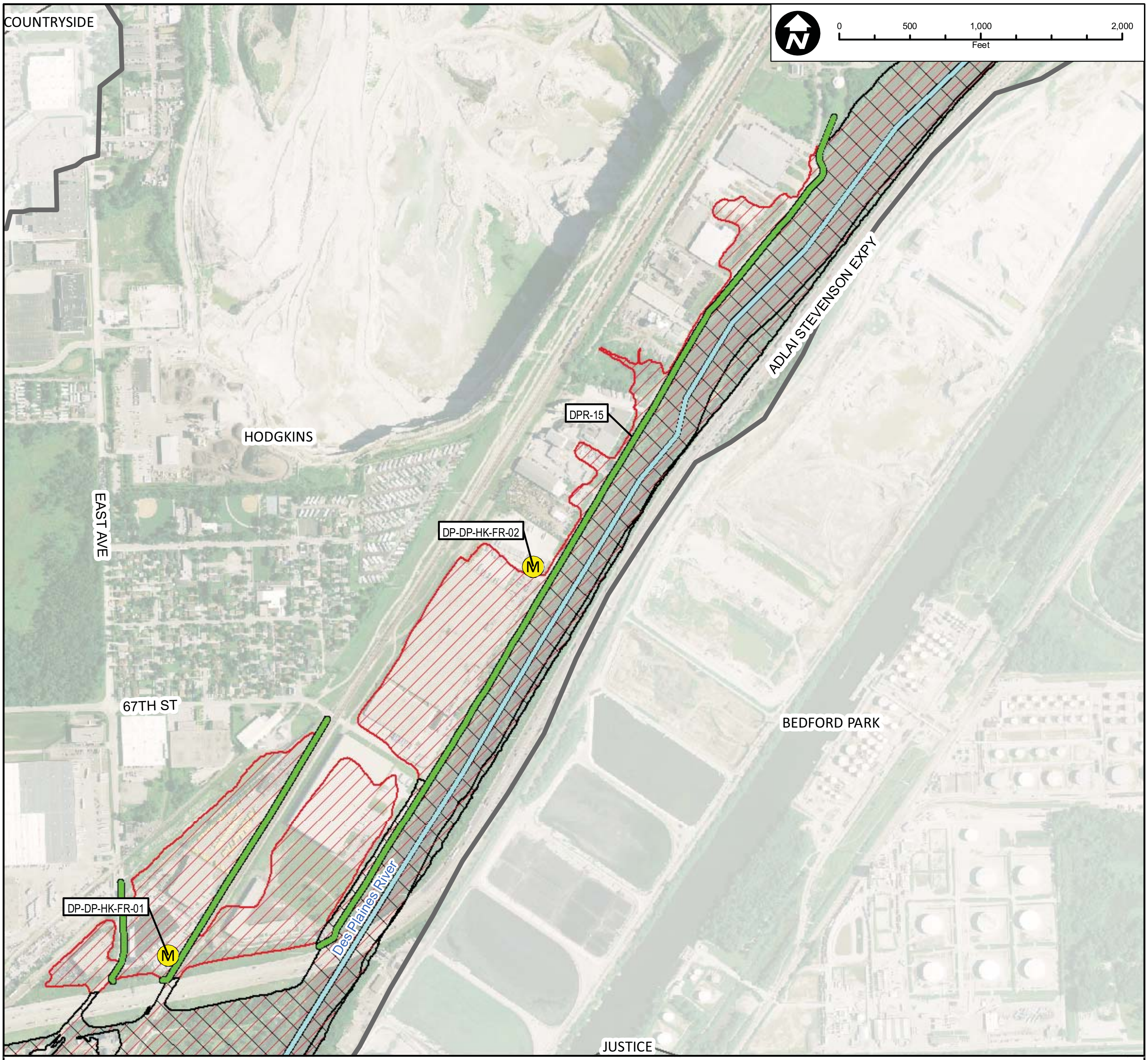


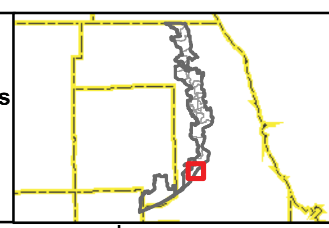
Subwatershed: Des Plaines River
Alternative: DPR-15
Alternatives Description: Construct 6,500 feet of levee/floodwall along Des Plaines River.
Pump stations required to address internal drainage.

Concept Level Cost: $25,785,787
Benefits: $194,043
B/C Ratio: <0.01

Legend

- 100-Year Storm Event Flood Inundation Without Project
- 100-Year Storm Event Flood Inundation With Project
- Reservoir
- Road Improvements
- Culvert/Bridge Modification
- Channel Improvements
- Levee/Floodwall
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas
- M Modeled
- R Regional



CLIENT:
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TITLE:
LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN
DES PLAINES RIVER WATERSHED
RECOMMENDED ALTERNATIVE DPR-15

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FIGURE 3.6.28

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CHKD.			PLOT DATE	
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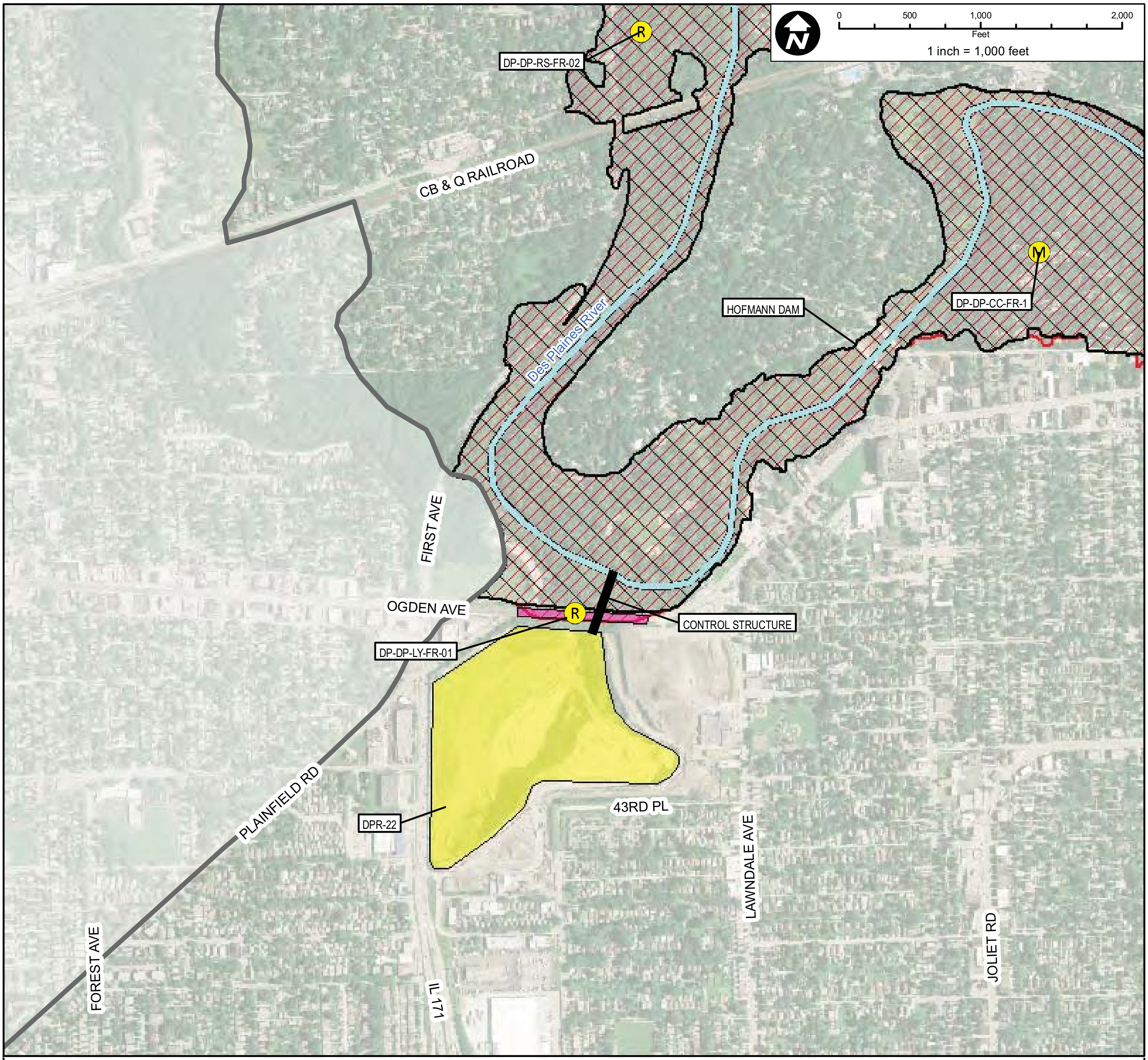


Subwatershed: Des Plaines River

Alternative: DPR-22

Alternatives Description: Storage in Lyons Quarry with control structure at the Des Plaines River. Raise Ogden Avenue.

Concept Level Cost: $251,163,010

Benefits: $648,217

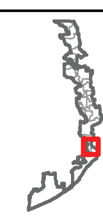
B/C Ratio: <0.01

Legend

- 100-Year Storm Event Flood Inundation Without Project
- 100-Year Storm Event Flood Inundation With Project
- Reservoir
- Road Improvements
- Culvert/Bridge Modification
- Channel Improvements
- Levee/Floodwall
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas

- M Modeled
- R Regional



CLIENT:

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:

LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN DES PLAINES RIVER WATERSHED PROPOSED ALTERNATIVE DPR-22

PROJ. NO. 08-0043

DATE: 05-21-2010

SHEET 1 OF 1

DRAWING NO.

FIGURE 3.6.29

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DSGN.	DRW	4-10	SCALE	1' = 1,000'
DWN.			GIS USER	DRW
CHKD.			PLOT DATE	
FILE:				

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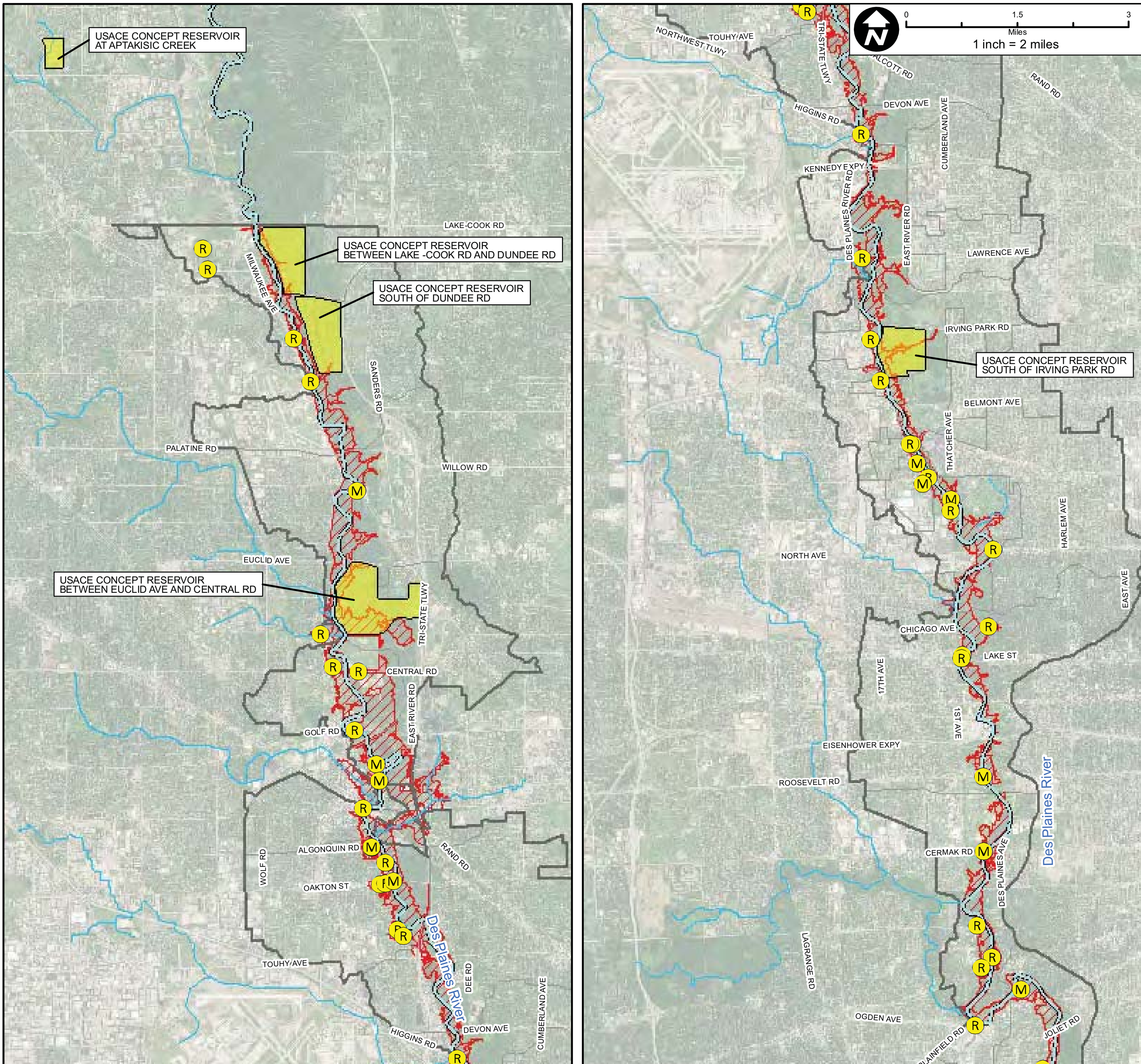


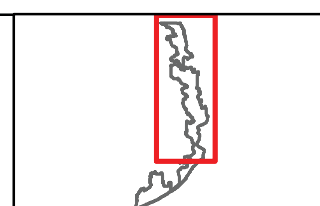
Subwatershed: Des Plaines River
Alternative: DPR-23
Alternatives Description: 5 USACE Concept Reservoirs

Concept Level Cost: > $600,000,000
Benefits: $5,000,000
B/C Ratio: < 0.01

Legend

- 100-Year Storm Event Flood Inundation Without Project
- 100-Year Storm Event Flood Inundation With Project
- Reservoir
- Road Improvements
- Culvert/Bridge Modification
- Channel Improvements
- Levee/Floodwall
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas
- M Modeled
- R Regional



CLIENT:
METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:
LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN
DES PLAINES RIVER WATERSHED
PROPOSED ALTERNATIVE DPR 23

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DWN.			GIS USER	DRW
CHKD.			PLOT DATE	
FILE:				

PROJ. NO. 08-0043
DATE: 04-26-2010
SHEET 1 OF 1
DRAWING NO.
FIGURE 3.6.30

Map Document: (Z:\MWRDGC\08-0043 Phase B\GIS\Exhibits\Meeting Maps\DesPlaines\Des Plaines River Revervoir 1.mxd)
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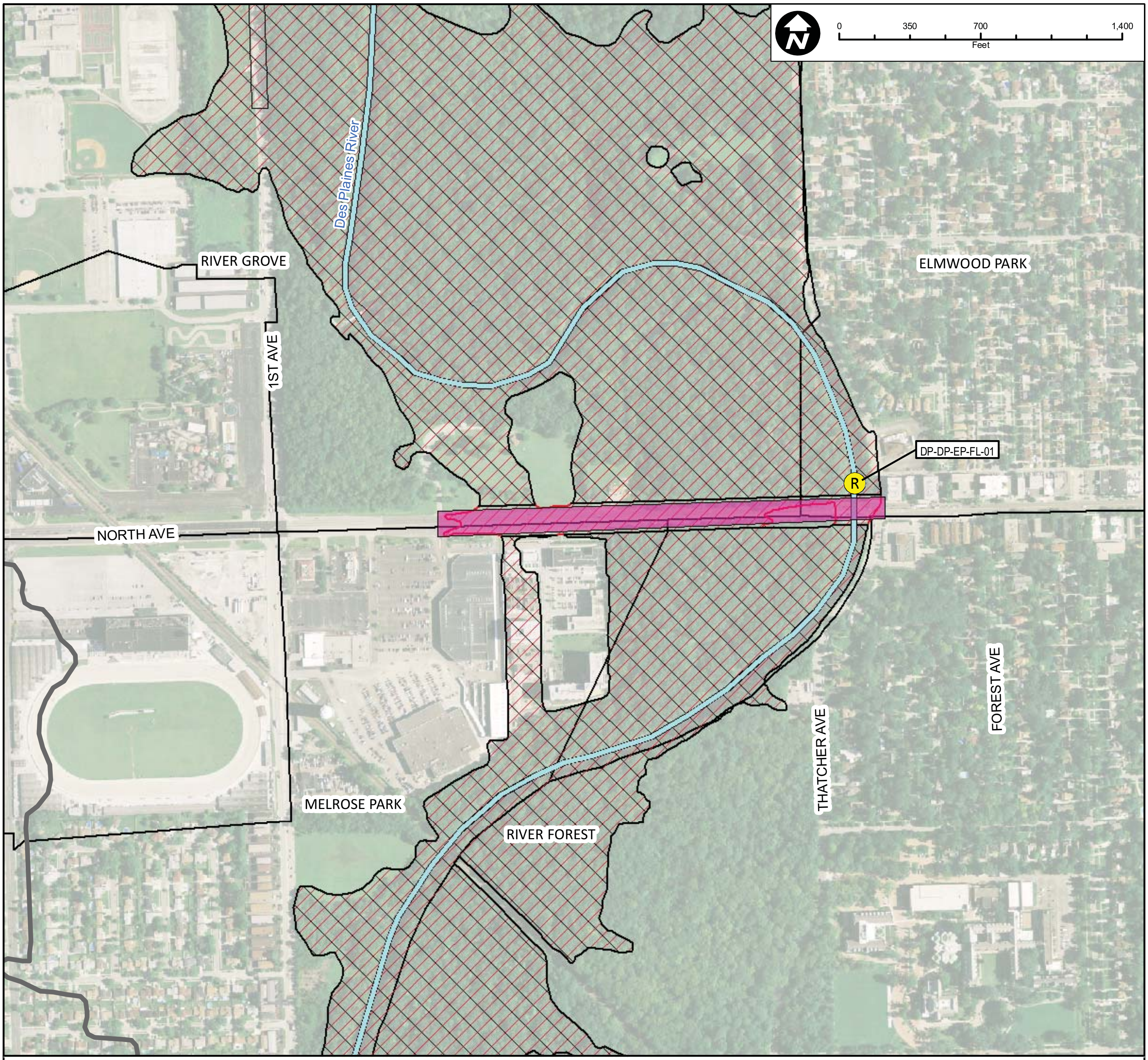


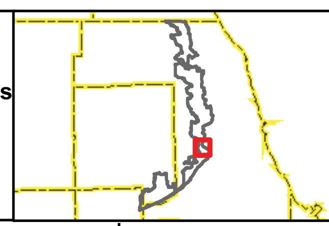
Subwatershed: Des Plaines River
Alternative: DPR-26
Alternatives Description: Raise approximately 2,000 feet of North Avenue to 0.5 feet above 100-year flood inundation.

Concept Level Cost: $4,243,200
Benefits: $322,411
B/C Ratio: 0.08

Legend

- 100-Year Storm Event Flood Inundation Without Project
- 100-Year Storm Event Flood Inundation With Project
- Reservoir
- Road Improvements
- Culvert/Bridge Modification
- Channel Improvements
- Levee/Floodwall
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas
- M Modeled
- R Regional



CLIENT:
METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:
LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN
DES PLAINES RIVER WATERSHED
RECOMMENDED ALTERNATIVE DPR-26

PROJ. NO.	08-0043
DATE:	05-21-2010
SHEET 1 OF 1	
DRAWING NO.	

FIGURE 3.6.31

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CHKD.			PLOT DATE	
FILE:				

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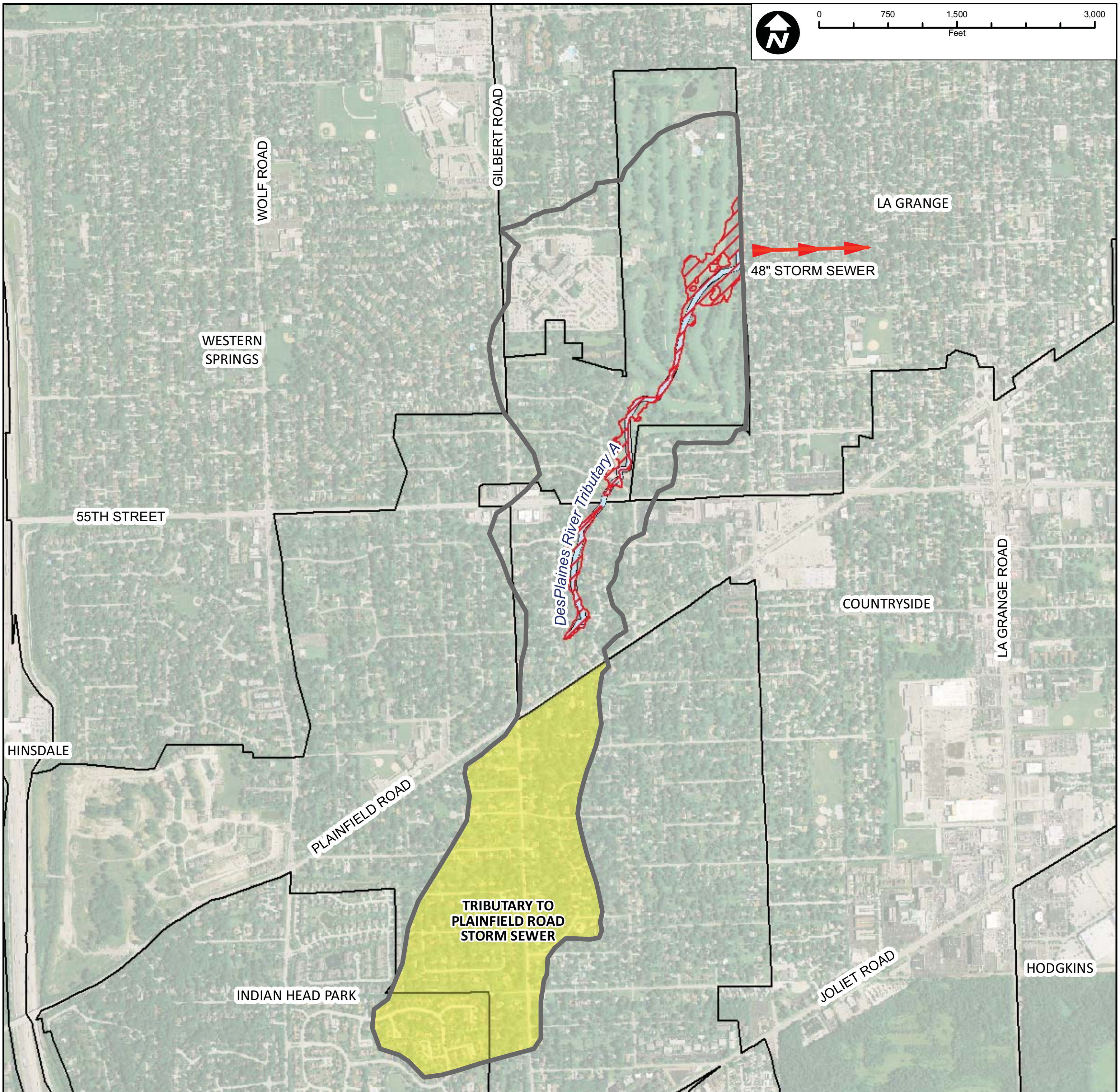
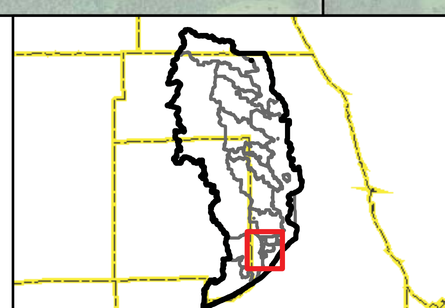


100-Year Storm Event Flood Inundation Without Project
Reservoir
Channel Improvements
Culvert/Bridge Modification
Levee/Floodwall

Approximate Creek Channel Location
Municipal Boundary
Watershed Boundary

Problem Areas
M Modeled
R Regional



CLIENT:
METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:
LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN
DES PLAINES RIVER TRIBUTARY A WATERSHED TRIBUTARY OVERVIEW

PROJ. NO.	08-0043
DATE:	04-26-2010
SHEET 1 OF 1	
DRAWING NO.	

FIGURE 3.7.1

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DWN.			GIS USER	DRW
CHKD.			PLOT DATE	
FILE:				

Map Document: (Z:\MWRDGC\08-0043 Phase B\GIS\Exhibits\Meeting Maps\East Ave 67th Street DesPlaines Trib\DesPlaines River Trib A Overall.mxd)
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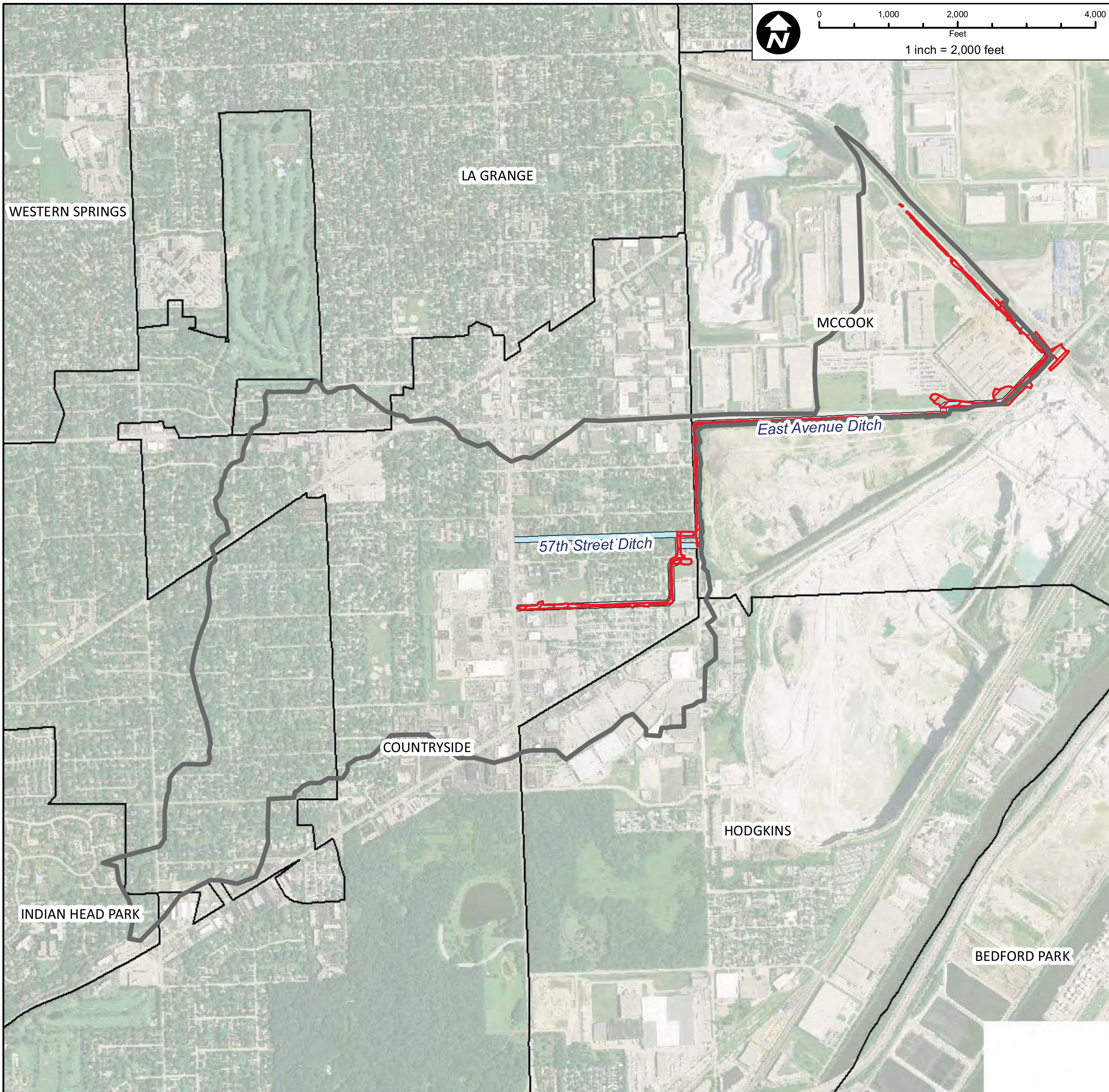
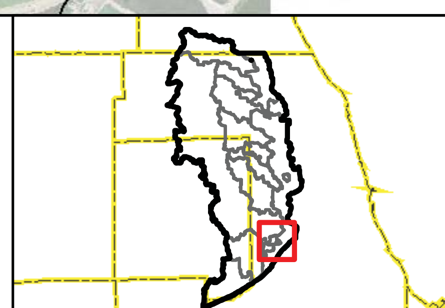


100-Year Storm Event Flood Inundation Without Project
Reservoir
Channel Improvements
Culvert/Bridge Modification
Levee/Floodwall
Approximate Creek Channel Location
Municipal Boundary
Watershed Boundary

Problem Areas

M Modeled

R Regional



CLIENT:

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:

LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN EAST AVENUE DITCH WATERSHED TRIBUTARY OVERVIEW

PROJ. NO.	08-0043
DATE:	04-26-2010
SHEET	1 OF 1
DRAWING NO.	

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DSGN.	DRW	4-10	SCALE:	1"=4,000'
DWN.			GIS USER	DRW
CHKD.			PLOT DATE	
FILE:				

FIGURE 3.8.1

Map Document: (Z:\MWRDGC\08-0043 Phase B\GIS\Exhibits\Meeting Maps\East Ave 67th Street DesPlaines Trib\East Avenue Ditch Overall.mxd)
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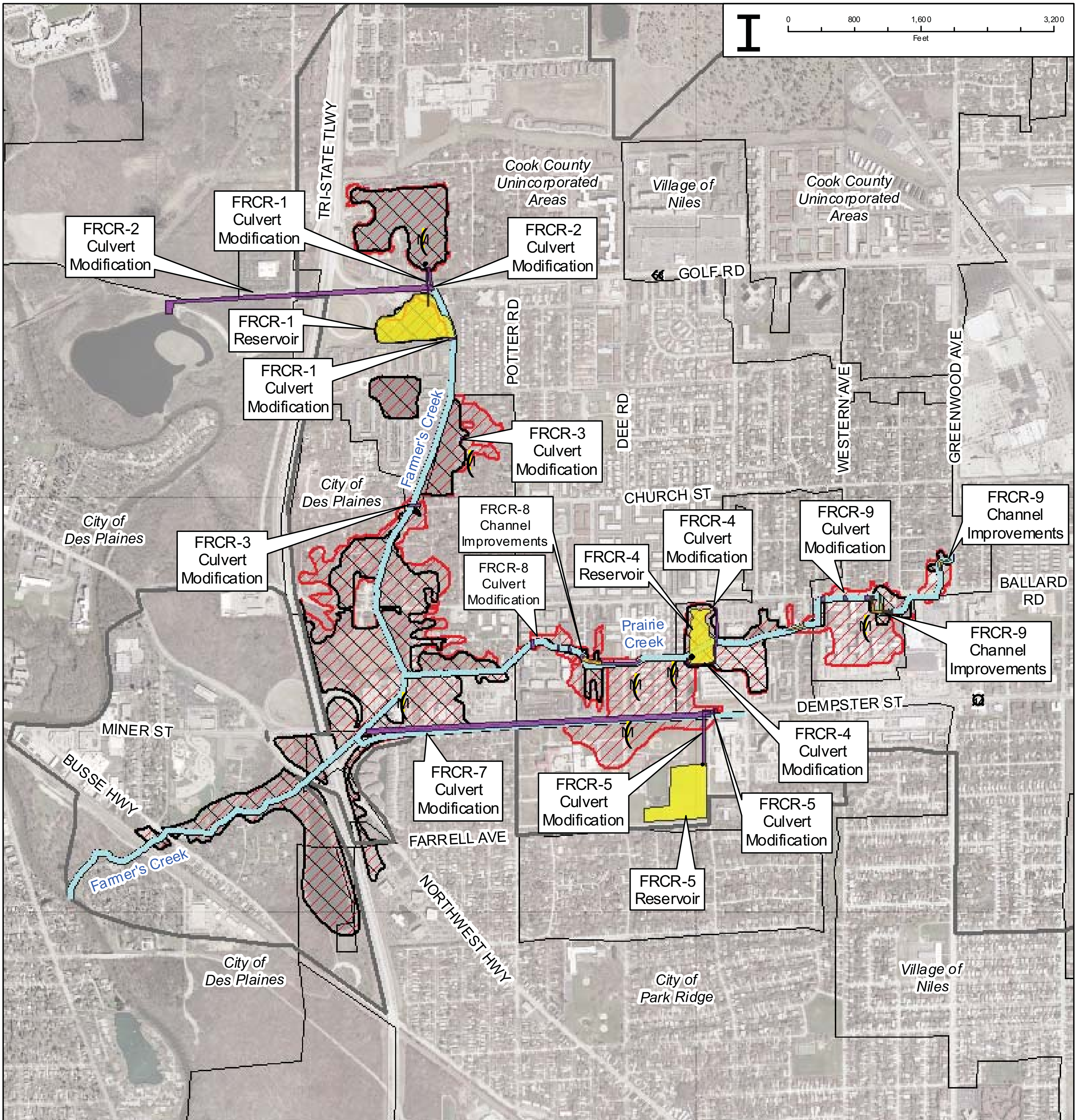
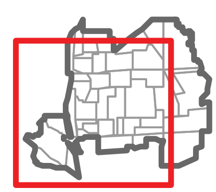


Legend

- 100-Year Storm Event Flood Inundation Without Project
- 100-Year Storm Event Flood Inundation With Project
- Reservoir
- Levee/Floodwall
- Culvert/Bridge Modification
- Channel Improvements
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas
- Modeled
- Regional



CLIENT:

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:

LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN FARMERS PRAIRIE CREEK WATERSHED PROPOSED OVERALL

PROJ. NO.	
DATE:	02-17-2011
SHEET	1 OF 1
DRAWING NO.	

FIGURE 3.9.1

DSGN.			SCALE	
DWN.			GIS USER	
CHKD.			PLOT DATE	
FILE:				

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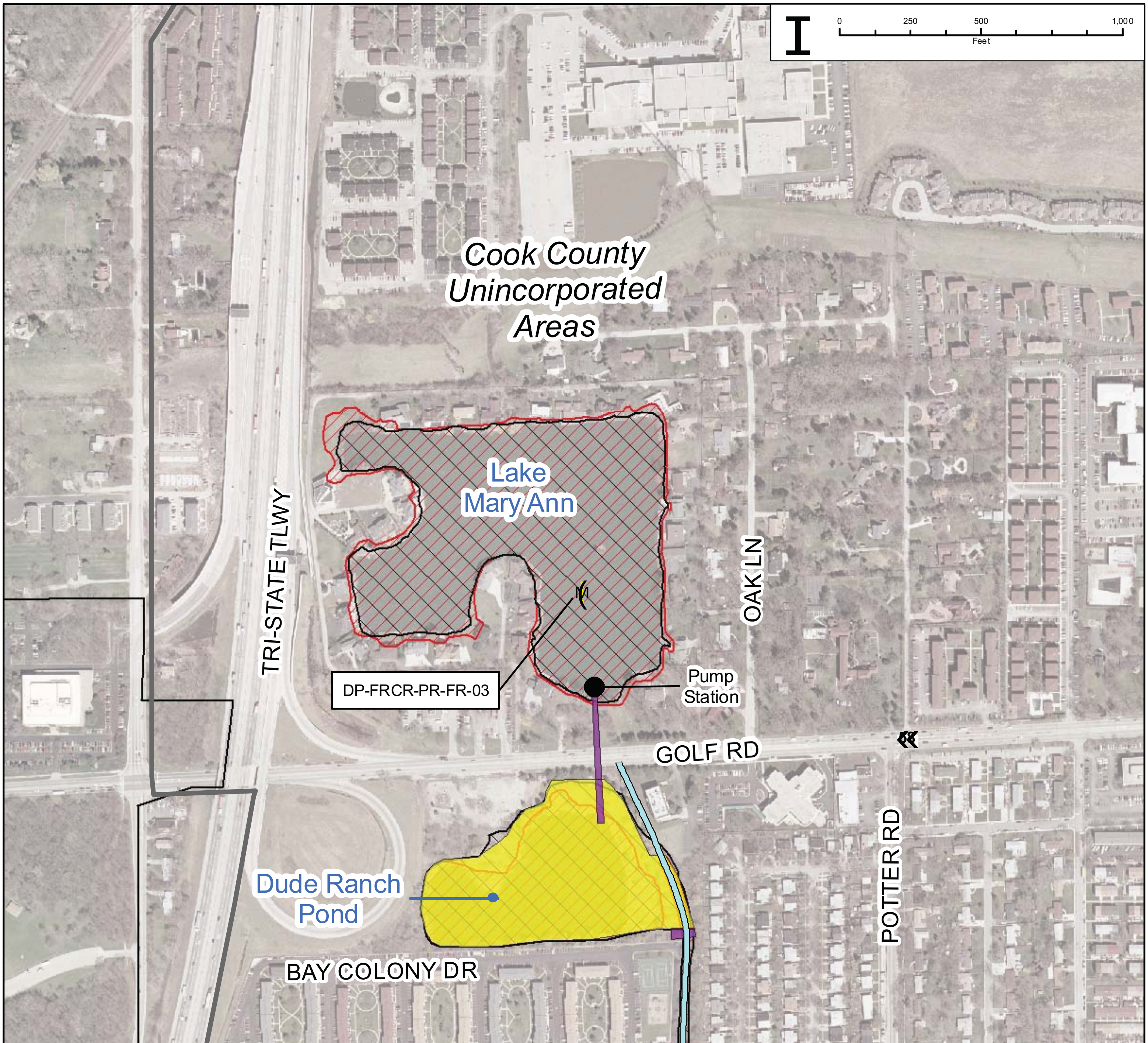
MOLLY O'TOOLE & ASSOCIATES LTD.



Subwatershed: Farmers Prairie Creek
Alternative: FRCR-1
Alternatives Description: - Force Main outlet for Lake Mary Ann
- Farmers Creek Passive Control Structure
- Add 10 A-F to Dude Ranch Pond

Concept Level Cost: $3,077,059
Benefits: $2,179,672
B/C Ratio: 0.7

Legend

- 100-Year Storm Event Flood Inundation Without Project
- 100-Year Storm Event Flood Inundation With Project
- Reservoir
- Levee/Floodwall
- Culvert/Bridge Modification
- Channel Improvements
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas
- Modeled
- Regional

CLIENT:

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:

LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN FARMERS PRAIRIE CREEK WATERSHED PROPOSED ALTERNATIVE FRCR-1

PROJ. NO.
DATE: 09-08-2010
SHEET 1 OF 1
DRAWING NO.

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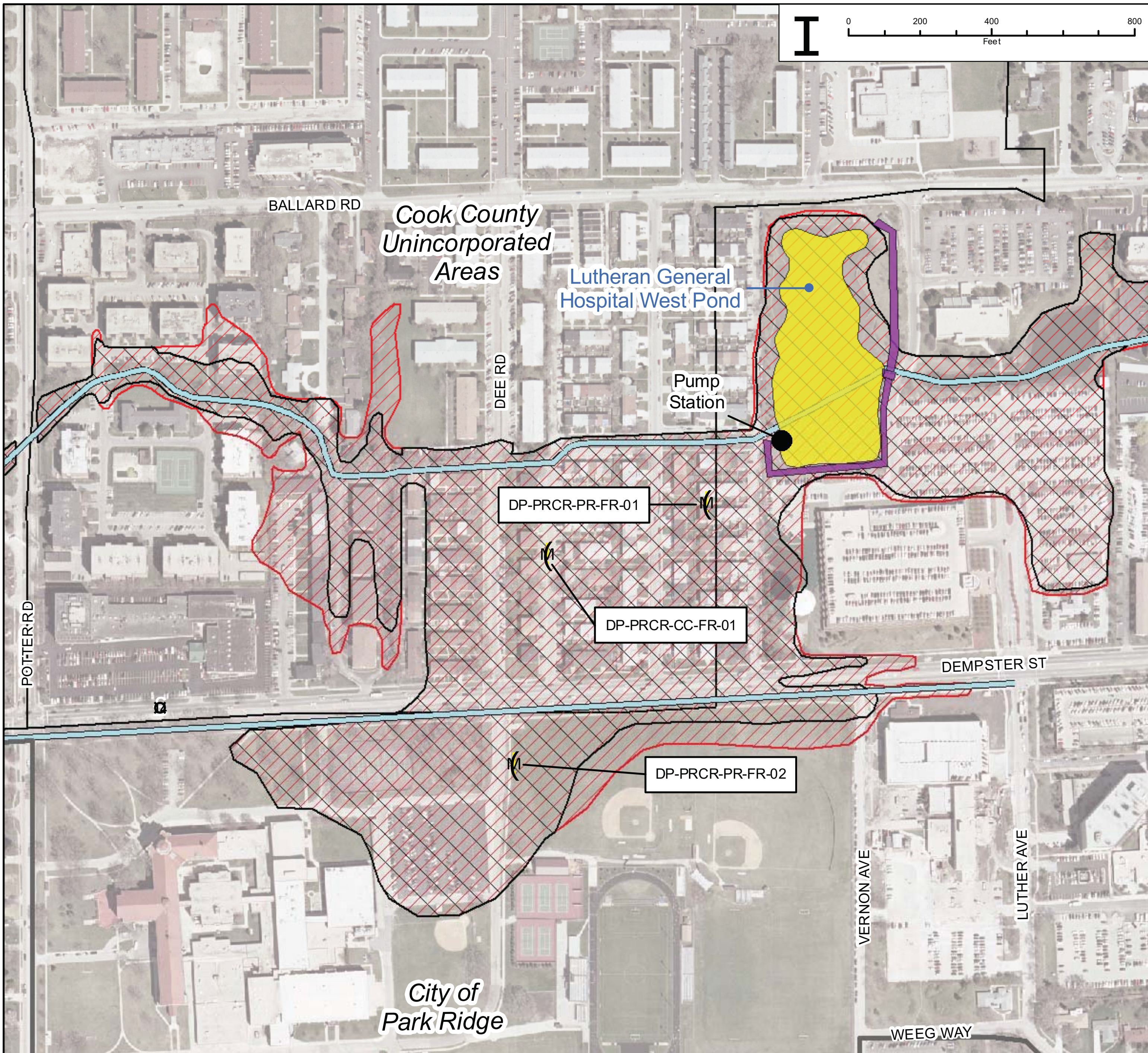
DWN.			GIS USER	
CHKD.			PLOT DATE	
FILE:				

FIGURE 3.9.2



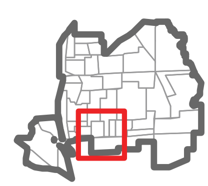
Subwatershed: Farmers Prairie Creek
Alternative: FRCR-4
Alternatives Description:
- Pump Station
- 2 - 60 inch Bypass Pipes
- 24 inch Bypass for Ballard subwatershed
- Lutheran General Hospital West Pond lowered 6ft to 627
- Add a junction Box

Concept Level Cost: $6,635,011
Benefits: $7,918,847
B/C Ratio: 1.2

Legend

- 100-Year Storm Event Flood Inundation Without Project
- 100-Year Storm Event Flood Inundation With Project
- Reservoir
- Levee/Floodwall
- Culvert/Bridge Modification
- Channel Improvements
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas
- Modeled
- Regional



CLIENT:

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:

LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN FARMERS PRAIRIE CREEK WATERSHED PROPOSED ALTERNATIVE FRCR-4

PROJ. NO.
DATE: 09-08-2010
SHEET 1 OF 1
DRAWING NO.

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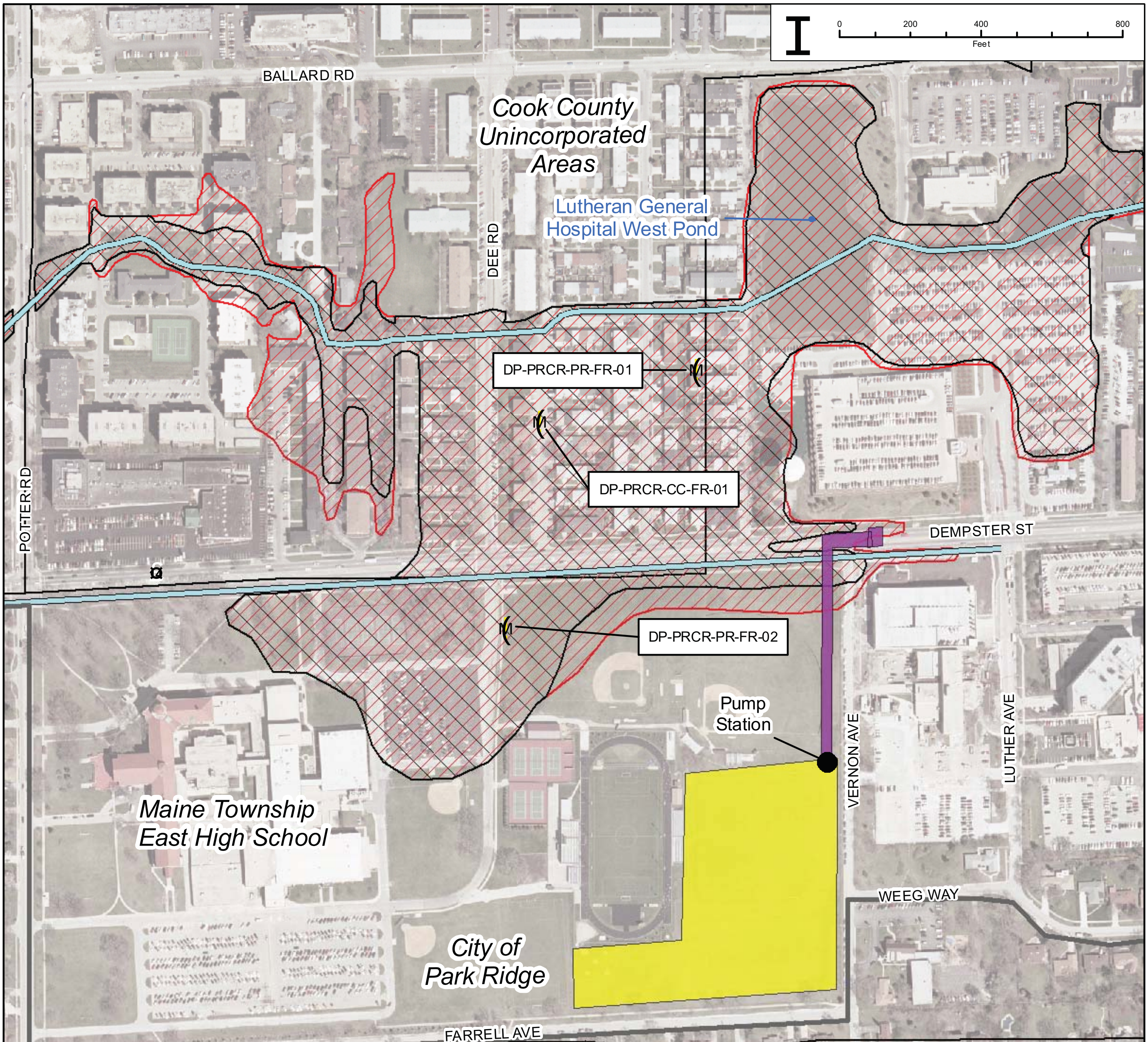
DWN.			GIS USER	
CHKD.			PLOT DATE	
FILE:				

FIGURE 3.9.3



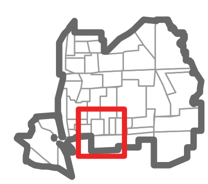
Subwatershed: Farmers Prairie Creek
Alternative: FRCR-5
Alternatives Description:
- High School Reservoir
- Junction Box connecting to existing drainage
- Box culvert

Concept Level Cost: $7,614,226
Benefits: $4,679,253
B/C Ratio: 0.6

Legend

- 100-Year Storm Event Flood Inundation Without Project
- 100-Year Storm Event Flood Inundation With Project
- Reservoir
- Levee/Floodwall
- Culvert/Bridge Modification
- Channel Improvements
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas
- Modeled
- Regional



CLIENT:

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:

LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN FARMERS PRAIRIE CREEK WATERSHED PROPOSED ALTERNATIVE FRCR-5

PROJ. NO.
DATE: 09-08-2010
SHEET 1 OF 1
DRAWING NO.

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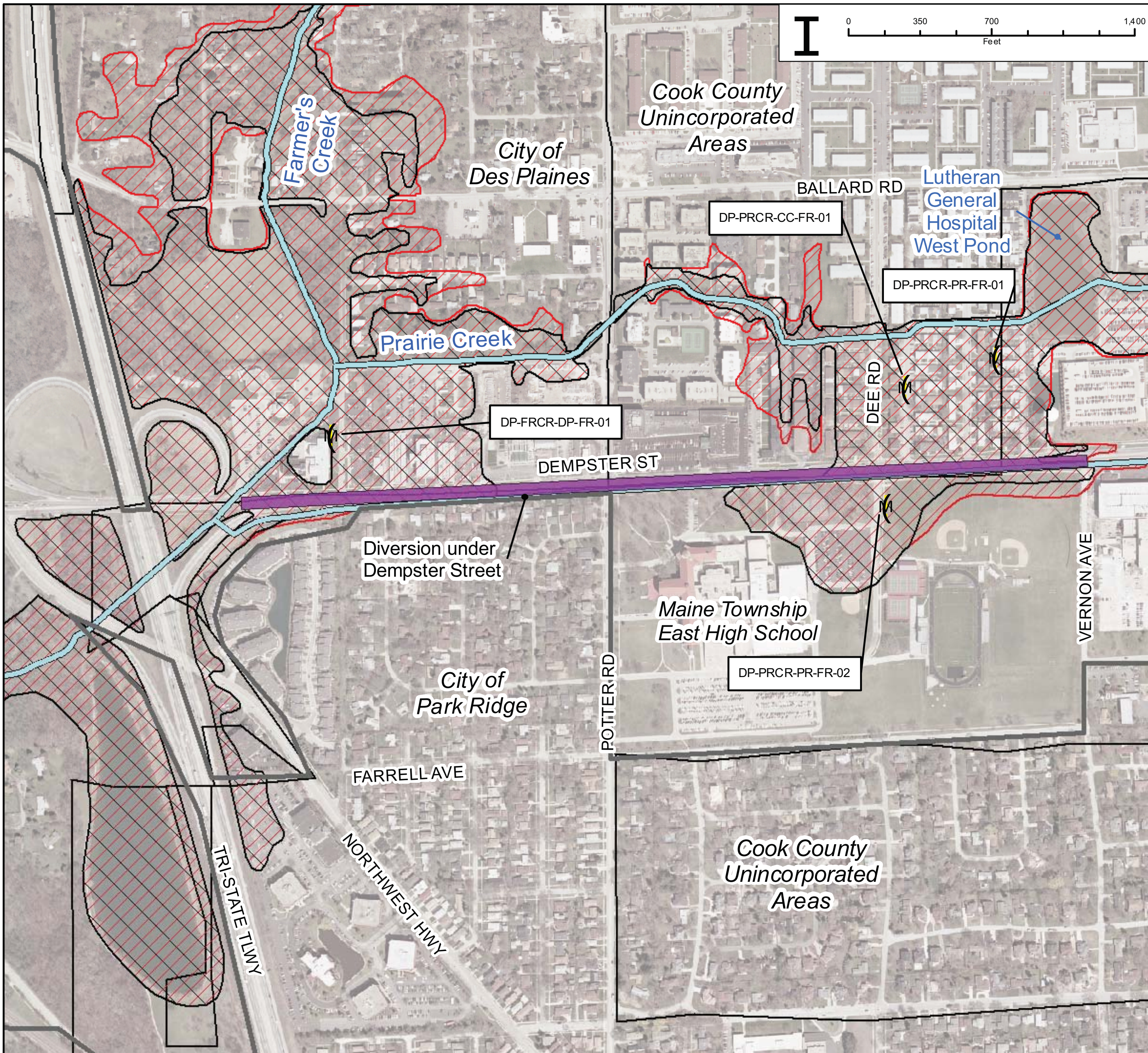
DWN.			GIS USER	
CHKD.			PLOT DATE	
FILE:				

FIGURE 3.9.4



Subwatershed: Farmers Prairie Creek
Alternative: FRCR-7
Alternatives Description: Add 72 inch pipe from Farmers Creek to Dee Road & 60 inch pipe from Dee Road to Vernon Avenue under Dempster Street

Concept Level Cost: $6,650,095
Benefits: $8,681,568
B/C Ratio: 1.3

Legend

- 100-Year Storm Event Flood Inundation Without Project
- 100-Year Storm Event Flood Inundation With Project
- Reservoir
- Levee/Floodwall
- Culvert/Bridge Modification
- Channel Improvements
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas
- Modeled
- Regional

CLIENT:

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:

LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN FARMERS PRAIRIE CREEK WATERSHED PROPOSED ALTERNATIVE FRCR-7

PROJ. NO.
DATE: 09-08-2010
SHEET 1 OF 1
DRAWING NO.

FIGURE 3.9.5

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CHKD.			PLOT DATE	
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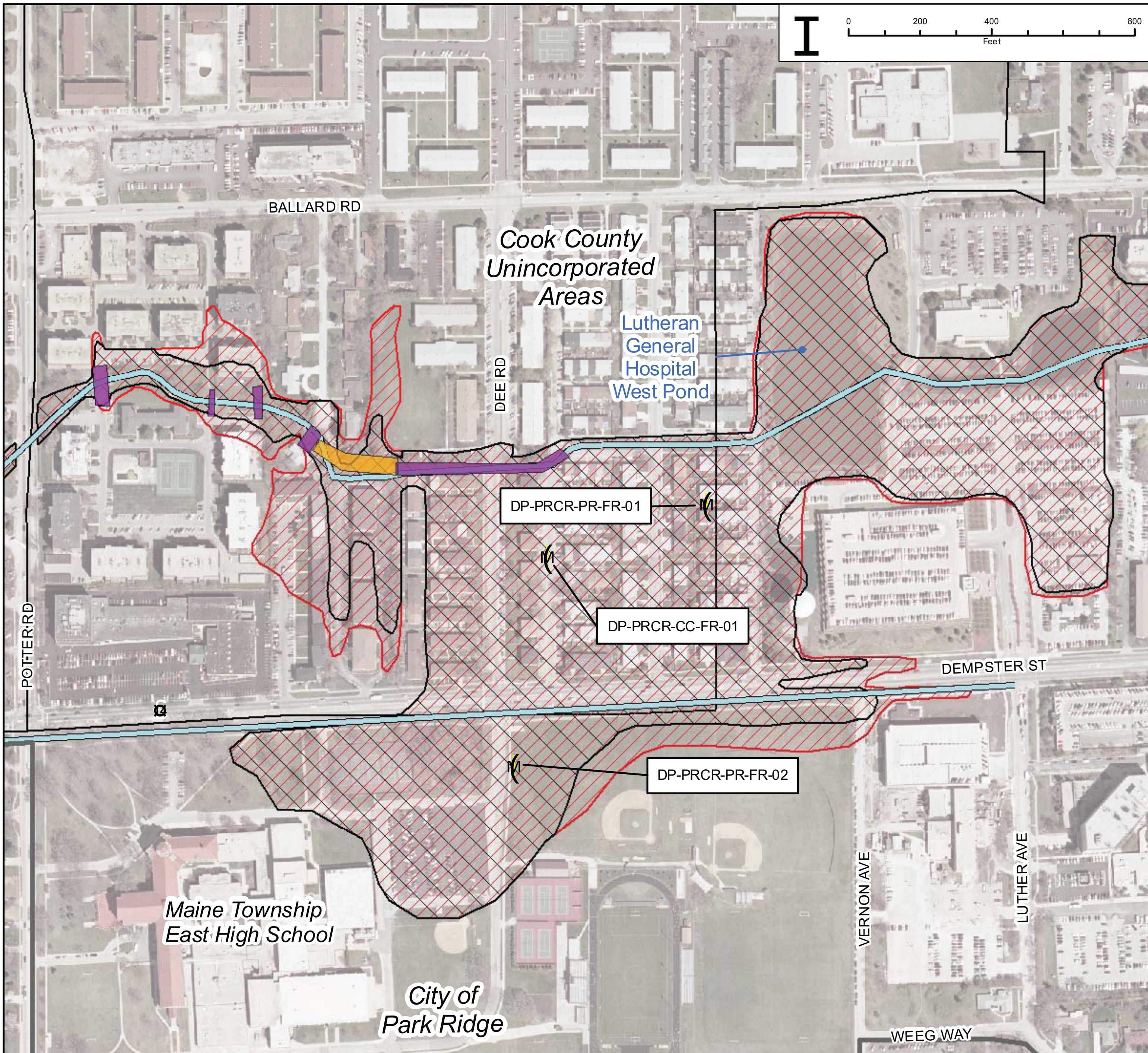


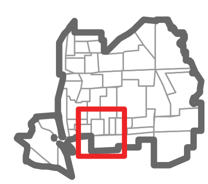
Subwatershed: Farmers Prairie Creek
Alternative: FRCR-8
Alternatives Description:
- Channel Improvements
- Replace Driveway with 9W x 4.5H Concrete Box
- Replace Landings with Double 7.5W x 6H Concrete Boxes
- Replace FootBridge
- Remove fence
- Replace 60 inch pipe with 11.5X8.5 Box

Concept Level Cost: $2,389,090
Benefits: $12,317,274
B/C Ratio: 5.2

Legend

- 100-Year Storm Event Flood Inundation Without Project
- 100-Year Storm Event Flood Inundation With Project
- Reservoir
- Levee/Floodwall
- Culvert/Bridge Modification
- Channel Improvements
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas
- Modeled
- Regional



CLIENT:
METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:
LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN FARMERS PRAIRIE CREEK WATERSHED PROPOSED ALTERNATIVE FRCR-8

PROJ. NO.	
DATE:	09-08-2010
SHEET	1 OF 1
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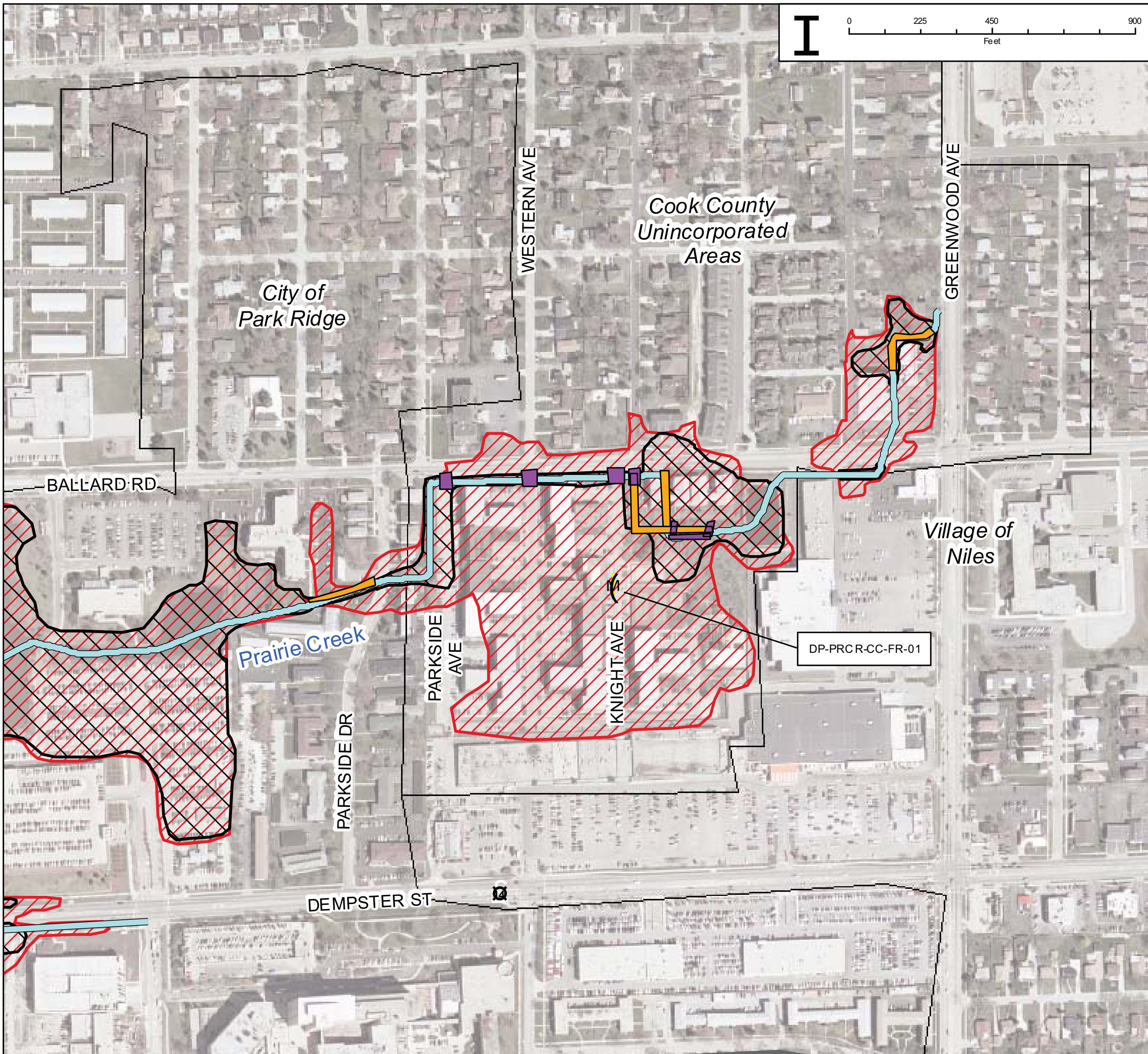
CHKD.			PLOT DATE	
FILE:				

FIGURE 3.9.6



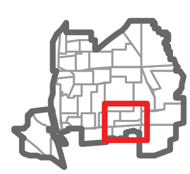
Subwatershed: Farmers Prairie Creek
Alternative: FRCR-9
Alternatives Description:
- Daylight Channel (Remove 48 inch pipe)
- Remove Restrictor at Parkside
- Remove Restrictor at Western
- Remove Restrictor at Knight
- Remove Entrance Culvert
- Remove Channel beneath apartment
- Remove two footbridges
- New Channel along west side of apartment
- Install footpath along south side of new channel
- Streambank stabilization west of Greenwood Avenue

Concept Level Cost: $7,671,620
Benefits: $8,123,019
B/C Ratio: 1.1

Legend

- 100-Year Storm Event Flood Inundation Without Project
- 100-Year Storm Event Flood Inundation With Project
- Reservoir
- Levee/Floodwall
- Culvert/Bridge Modification
- Channel Improvements
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas
- Modeled
- Regional



CLIENT: **METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO**	TITLE: **LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN FARMERS PRAIRIE CREEK WATERSHED PROPOSED ALTERNATIVE FRCR-9**		PROJ. NO.
			DATE: 02-17-2011
			SHEET 1 OF 1
			DRAWING NO.
CHRISTOPHER B. BURKE ENGINEERING, LTD. 9575 W. Higgins Road, Suite 600 · Rosemont, Illinois 60018 · (847) 823-0500	DSGN.	SCALE	**FIGURE 3.9.7**
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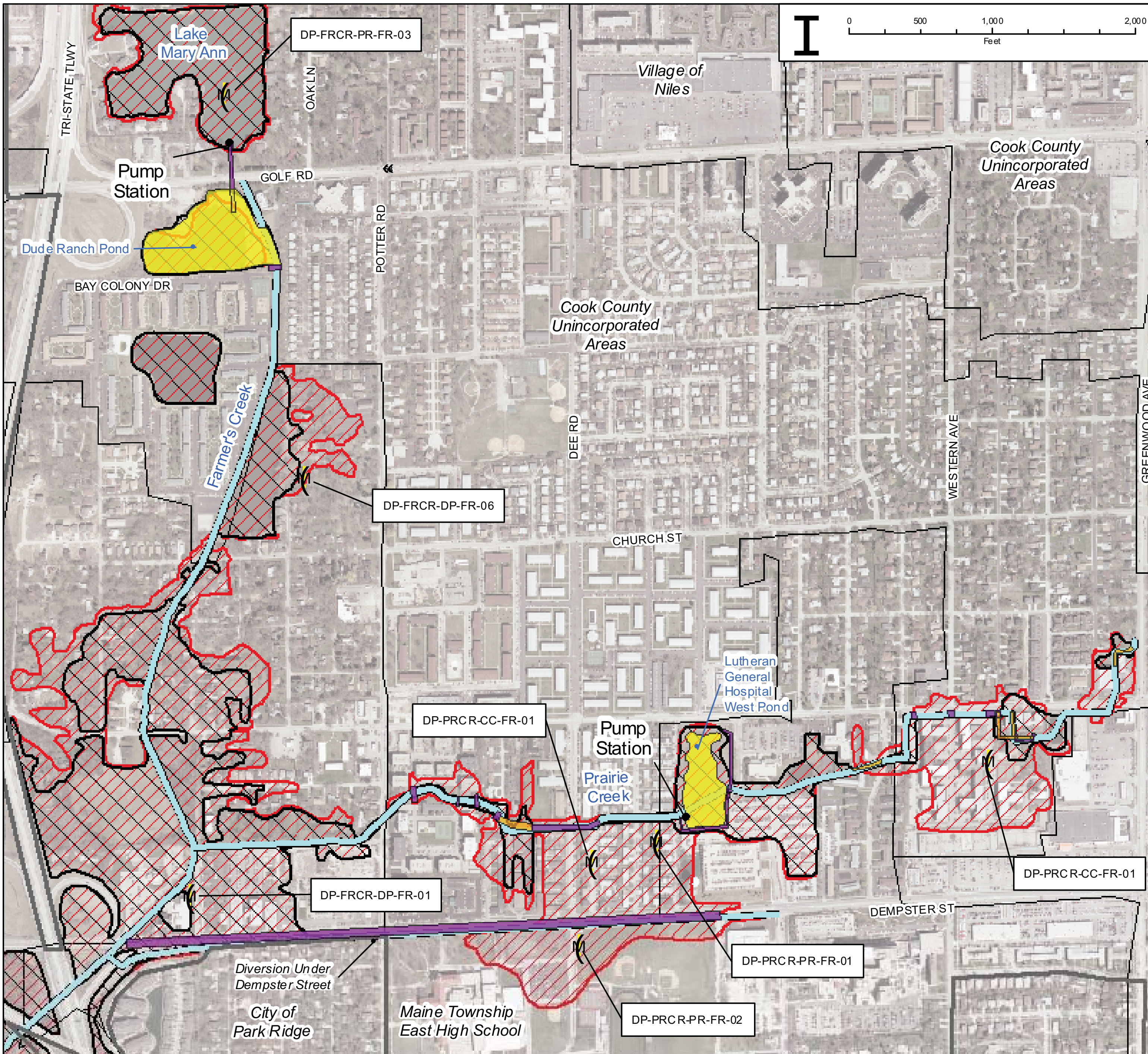
	CHKD.	PLOT DATE	
	FILE:		



Subwatershed: Farmers Prairie Creek
Alternative: FRCR-12
Alternatives Description:

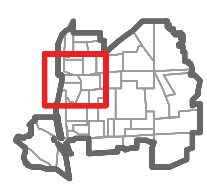
FRCR-1: Force Main outlet for Lake Mary Ann; Farmers Creek Passive Control Structure; Add 10 A-F to Dude Ranch Pond
FRCR 4: Pump Station; 2 - 60 inch Bypass Pipes; 24 inch Bypass for Ballard subwatershed; Lutheran General Hospital West Pond lowered 6ft to 627; Add a junction Box
FRCR 7: Add 72 inch pipe from Farmers Creek to Dee Road & 60 inch pipe from Dee Road to Vernon Avenue under Dempster Street
FRCR 8: Channel Improvements; Replace Driveway with 9W x 4.5H Concrete Box; Replace Landings with Double 7.5W x 6H Concrete Boxes; Replace FootBridge; Remove fence; Replace 60 inch pipe with 11.5X8.5 Box
FRCR 9: Daylight Channel (Remove 48 inch pipe); Remove Restrictor at Simmons; Remove Restrictor at Western; Remove Restrictor at Knight; Remove Entrance Culvert; Remove Channel beneath apartment; Remove two footbridges; New Channel along west side of apartment; Install footpath along south side of new channel; Streambank stabilization west of Greenwood Avenue

Concept Level Cost: $19,787,864
Benefits: $18,876,571
B/C Ratio: 1.0

Legend

- 100-Year Storm Event Flood Inundation Without Project
- 100-Year Storm Event Flood Inundation With Project
- Reservoir
- Levee/Floodwall
- Culvert/Bridge Modification
- Channel Improvements
- Approximate Creek Channel Location
- Municipal Boundary
- Watershed Boundary

Problem Areas
- Modeled
- Regional



CLIENT:

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:

LOWER DES PLAINES RIVER DETAILED WATERSHED PLAN FARMERS PRAIRIE CREEK WATERSHED RECOMMENDED ALTERNATIVE FRCR-12

PROJ. NO.
DATE: 02-17-2011
SHEET 1 OF 1
DRAWING NO.

FIGURE 3.9.8

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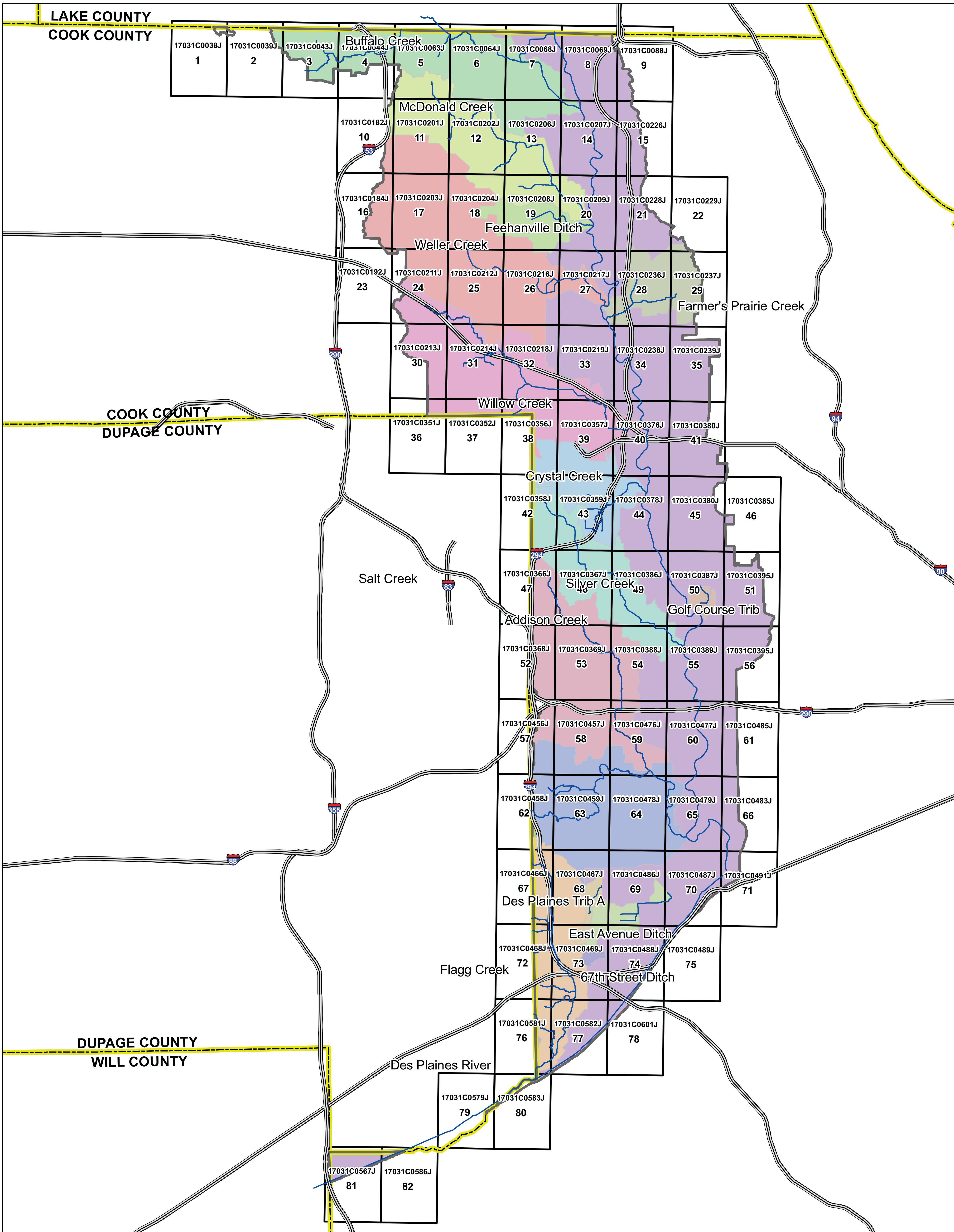
DWN.		GIS USER	
CHKD.		PLOT DATE	
FILE:			



Legend

- Lower Des Plaines River Watershed Study Area
- County Boundary
- FIRM Panel Sheet Index

NOT TO SCALE

CLIENT:

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

CHRISTOPHER B. BURKE ENGINEERING, LTD.
9575 W. Higgins Road, Suite 600 Rosemont, Illinois 60018 (847) 823-0500

TITLE:

COMPARISON OF DWP 100-YR INUNDATION MAPPING AND FEMA EFFECTIVE FIRM LOWER DES PLAINES RIVER WATERSHED

PROJ. 080043

FILE NAME	Map Document: (Z:\MWRDGC\08-0043 Phase B\Water\Des Plaines\exhibits\FIRM Panels Index.mxd)				
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				GIS USER:	DWALTERS

DRAWING NO.
INDEX

Introduction

As part of the Lower Des Plaines 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 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 SFHA are included in the comparison.

Caution should be exercised when evaluating the numbers in Table A1 and Table 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 TARP areas; the application of the depth-area method in HEC-HMS for the MLDPR Watershed; inclusion of flood control projects not previously modeled; 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 CNs 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 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 5.7 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 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. Additionally, TARP subareas were incorporated into the DWP modeling where applicable. Some of the earlier modeling of the LDPR Subwatersheds used for DFIRM mapping did not include the TARP areas as contributing runoff to the watershed.

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. Cross-sections of the channel developed under this DWP were obtained from previous hydraulic studies or field survey. The channel geometry data was incorporated with overbank data obtained using HEC-GeoRAS cross-sections extracted from the TIN created in GIS from the 2003 Cook County LiDAR topographic data. The difference between the composite cross-sections and the cross-sections in the previous hydraulic studies may contribute to discrepancies between flood surface profiles. The overbank 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.

Hydraulic model calibration differences may also contribute to discrepancies in flood surface profiles between this DWP and DFIRM mapping. This DWP was calibrated to the September 2008 storm event that occurred since the development of DFIRM modeling. The calibration differences may contribute to discrepancies between flood surface profiles.

Table A1 below depicts the floodplain area within each subwatershed as determined by the Lower Des Plaines 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[3]	DWP Inundation Area[1] (acres)	FEMA Zone AE Area[2] (acres)	FEMA Zone A Area[2] (acres)
67th Street Ditch	1	2	0
Addison Creek	915	1,047	0
Buffalo Creek	732	869	123
Crystal Creek	91	229	4
Mainstem Lower Des Plaines River	5,951	5,352	733
Des Plaines River Tributary A	17	35	0
East Avenue Ditch	13	4	0
Farmers Prairie Creek	71	315	0
Feehanville Ditch	63	66	0
Flagg Creek	410	366	12
Golf Course Tributary	77	80	0
McDonald Creek	376	466	19

Subwatershed[3]	DWP Inundation Area[1] (acres)	FEMA Zone AE Area[2] (acres)	FEMA Zone A Area[2] (acres)
Salt Creek	700	582	176
Silver Creek	521	573	86
Weller Creek	185	225	0
Willow Creek	234	251	94
Totals	**10,357**	**10,462**	**1,248**

[1]Existing conditions 100-year inundation boundary. [2]FEMA FIRM for Cook County and Incorporated Areas. [3]Chicago Sanitary and Ship Canal not included.

Table A2 below lists for comparison the floodplain area within each community within the Lower Des Plaines River Watershed as determined by the Lower Des Plaines River DWP and the DFIRM mapping (for both FEMA Zone AE, and FEMA Zone A).

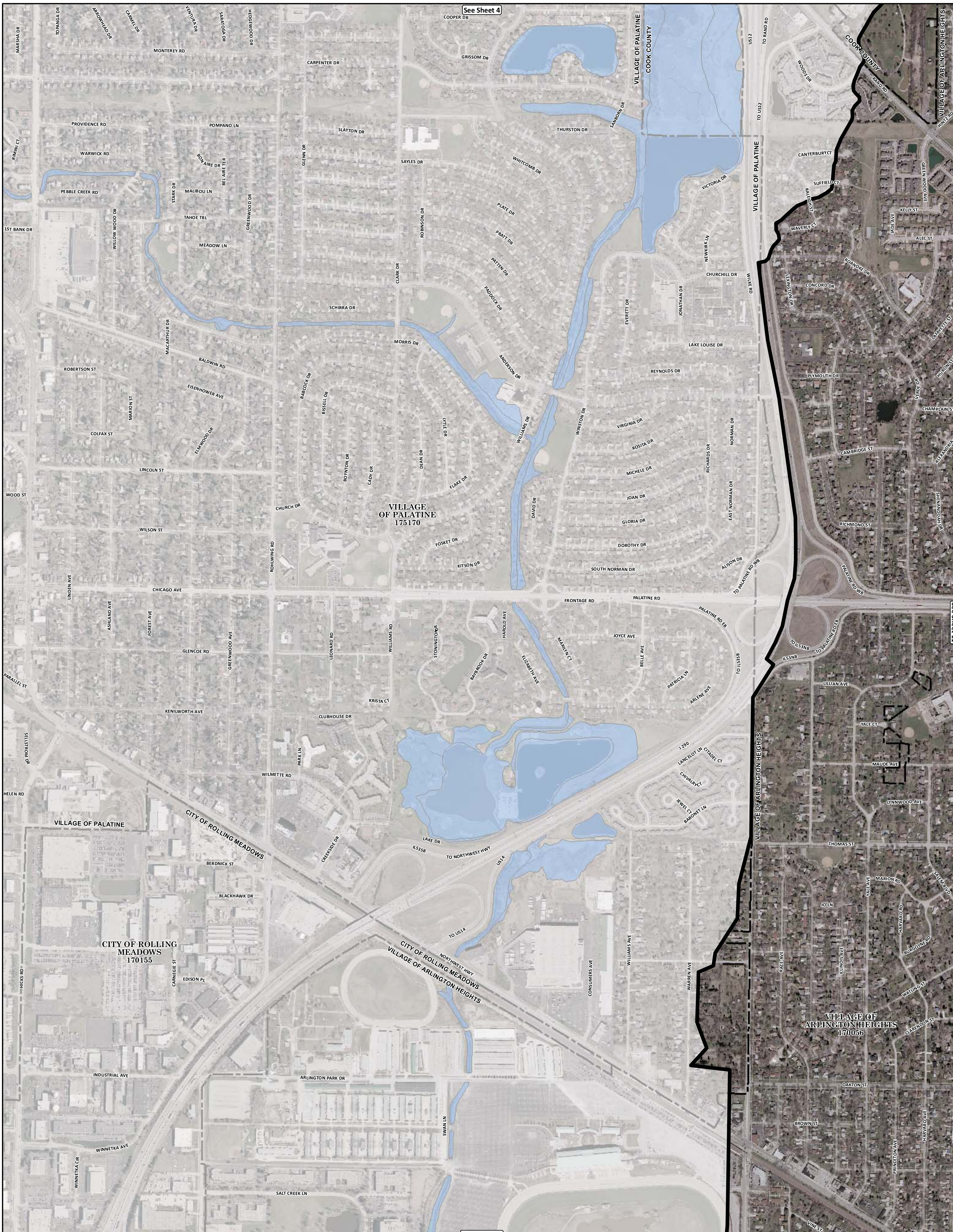
TABLE A2
Comparison of DWP Inundation Area and FEMA Floodplain by Community

Community	DWP Inundation Area[1,3] (acres)	FEMA Zone AE Area[2,3] (acres)	FEMA Zone A Area[2,3] (acres)
Arlington Heights	138	156	8
Bedford Park	22	21	2
Bellwood	353	306	0
Bensenville	4	7	0
Broadview	18	52	0
Brookfield	145	144	0
Buffalo Grove	34	40	8
Burr Ridge	93	94	0
Chicago	450	442	90
Countryside	8	19	0
Des Plaines	965	1,222	0
Elk Grove Village	9	20	0
Elmhurst	1	1	0
Elmwood Park	60	63	0
Forest Park	109	94	0
Forest View[4]	137	0	0
Franklin Park	254	342	0
Hillside	0	9	0
Hinsdale	10	8	10
Hodgkins	288	74	17
Indian Head Park	41	34	0
Justice	15	14	0
La Grange	0	0	0
La Grange Park	92	95	0
Lemont	58	17	54
Lyons[4]	281	130	38

Community	DWP Inundation Area[1,3] (acres)	FEMA Zone AE Area[2,3] (acres)	FEMA Zone A Area[2,3] (acres)
Maywood	41	45	0
McCook	99	1	106
Melrose Park	331	349	0
Mount Prospect	112	162	76
North Riverside	114	123	0
Northlake	143	172	0
Park Ridge	154	174	0
Prospect Heights	235	449	2
River Forest	225	218	0
River Grove	325	329	0
Riverside	200	219	0
Rosemont	61	73	0
Schiller Park	220	324	0
Stickney[4]	44	0	0
Stone Park	125	95	0
Summit	112	0	102
Unincorporated Cook County[4]	3,006	2,615	663
Westchester	88	260	4
Western Springs	70	40	1
Wheeling	737	1,088	48
Willow Springs	334	322	20
Totals	**10,357**	**10,462**	**1,248**

Note: This table and DWP and FEMA areas listed are not intended to be used for design or regulatory purposes. The DWP areas are not regulatory.

[1]Existing conditions 100-year inundation boundary. [2]FEMA FIRM for Cook County and Incorporated Areas. [3]Chicago Sanitary and Ship Canal not included. [4]Includes area to the east of the study area south of 43rd Street



Legend

DWP 100-yr Inundation Area

FEMA Floodplain

Zone A, AH and AO

Zone AE

Lower Des Plaines River Watershed Study Area

DWP River/Streams

Municipal Boundary

County Boundary

0 500 1,000 2,000

Feet

CLIENT:

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

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9575 W. Higgins Road, Suite 600 Rosemont, Illinois 60018 (847) 823-0500

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COMPARISON OF DWP 100-YR INUNDATION MAPPING AND FEMA EFFECTIVE FIRM LOWER DES PLAINES RIVER WATERSHED

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PROJ. 080043

FIRM PANEL 17031C0182J

SHEET 10 OF 82

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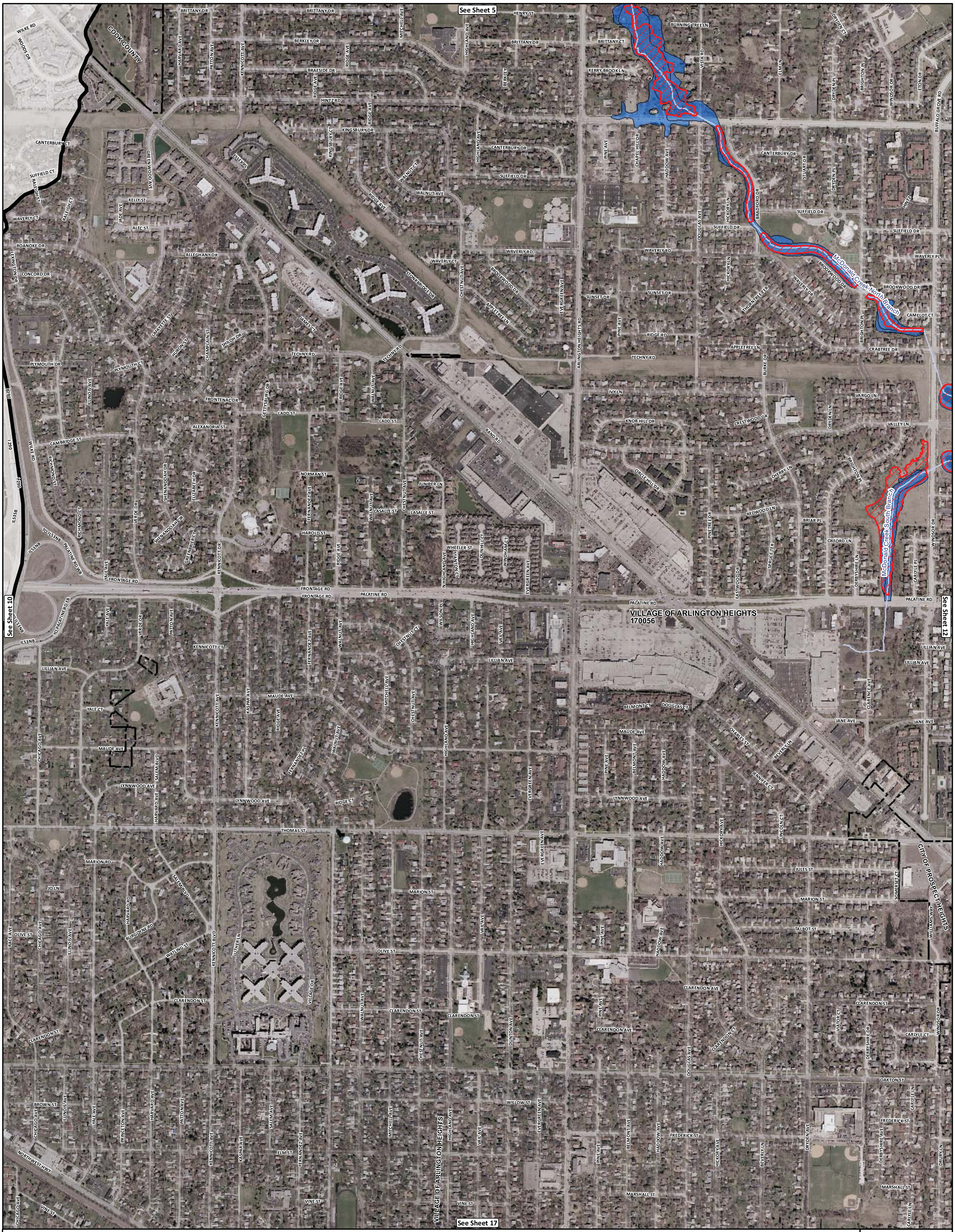
APPENDIX A



Legend

FEMA Floodplain

- Zone A, AH and AO
- Zone AE
- Lower Des Plaines River Watershed Study Area
- DWP River/Streams
- Municipal Boundary
- County Boundary

0 500 1,000 2,000
Feet

CLIENT:

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FIRM PANEL
17031C0201J

SHEET 11 OF 82

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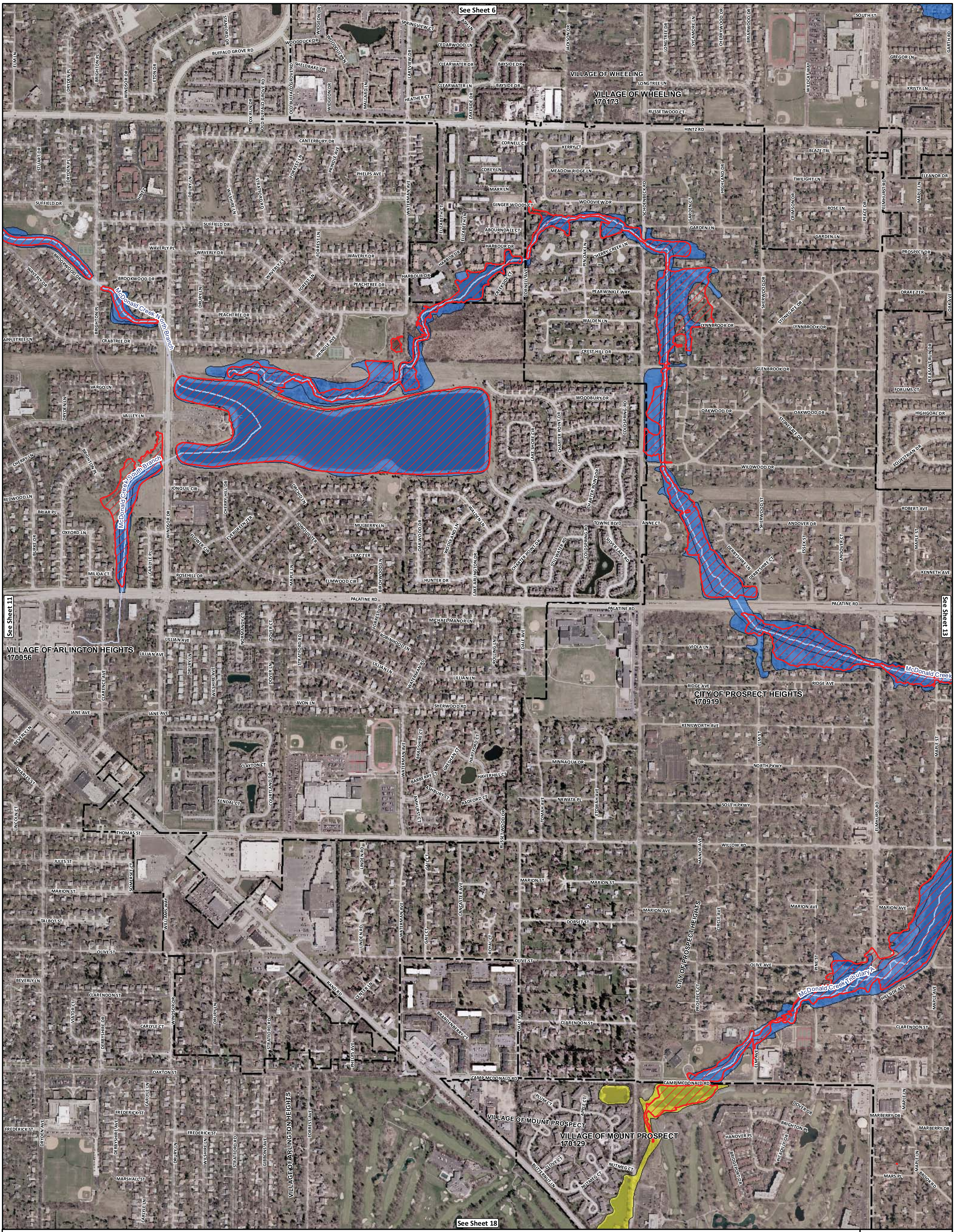


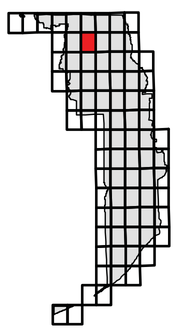
Legend

FEMA Floodplain

- Zone A, AH and AO
- Zone AE
- Lower Des Plaines River Watershed Study Area
- DWP River/Streams
- Municipal Boundary
- County Boundary

N

0 500 1,000 2,000
Feet



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CHRISTOPHER B. BURKE ENGINEERING, LTD. 9575 W. Higgins Road, Suite 600 Rosemont, Illinois 60018 (847) 823-0500	FILE NAME: Map Document: (Z:\MWRDGC\08-0043 Phase B\Water\Des Plaines\exhibits\FIRM Panels.mxd)
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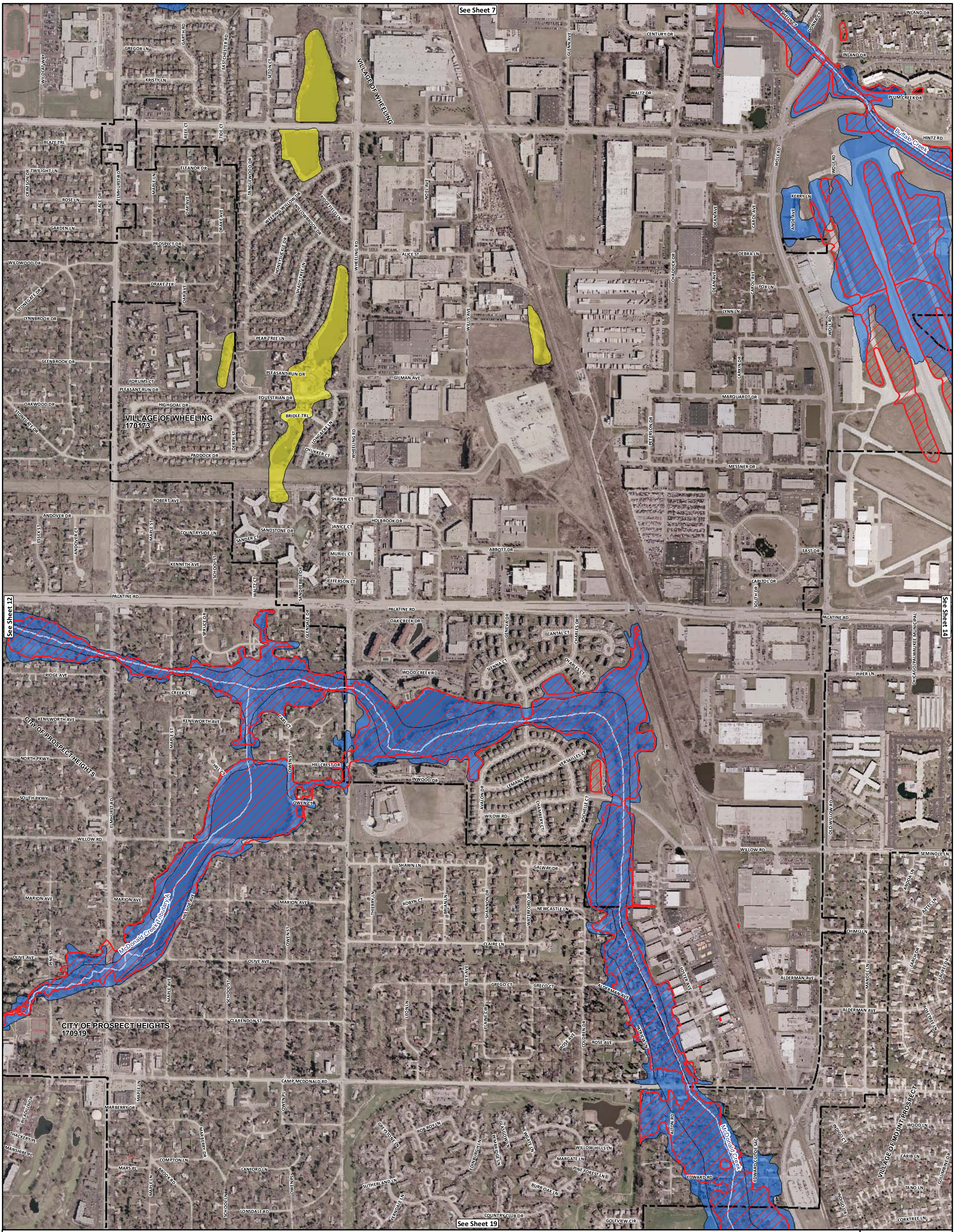
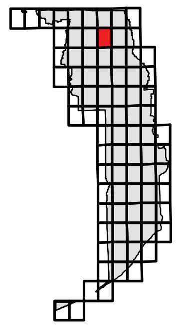


Legend

FEMA Floodplain

- Zone A, AH and AO
- Zone AE
- Lower Des Plaines River Watershed Study Area
- DWP River/Streams
- Municipal Boundary
- County Boundary

0 500 1,000 2,000
Feet



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PROJ. 080043

FIRM PANEL
17031C0206J

SHEET 13 OF 82

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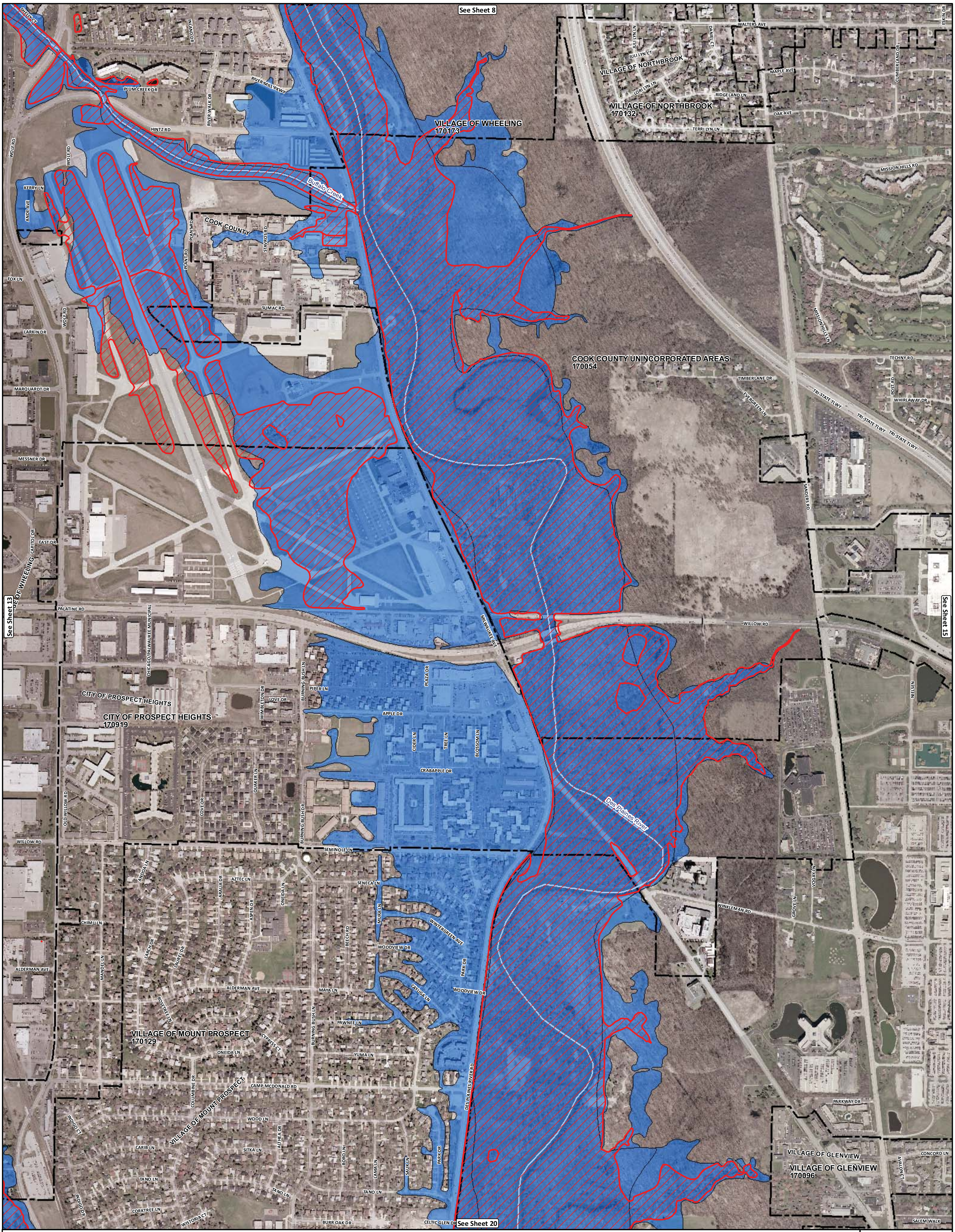


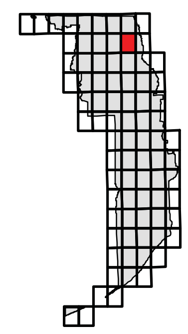
Legend

FEMA Floodplain

- Zone A, AH and AO
- Zone AE

- Lower Des Plaines River Watershed Study Area
- DWP River/Streams
- Municipal Boundary
- County Boundary

0 500 1,000 2,000
Feet



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PROJ. 080043

FIRM PANEL
17031C0207J

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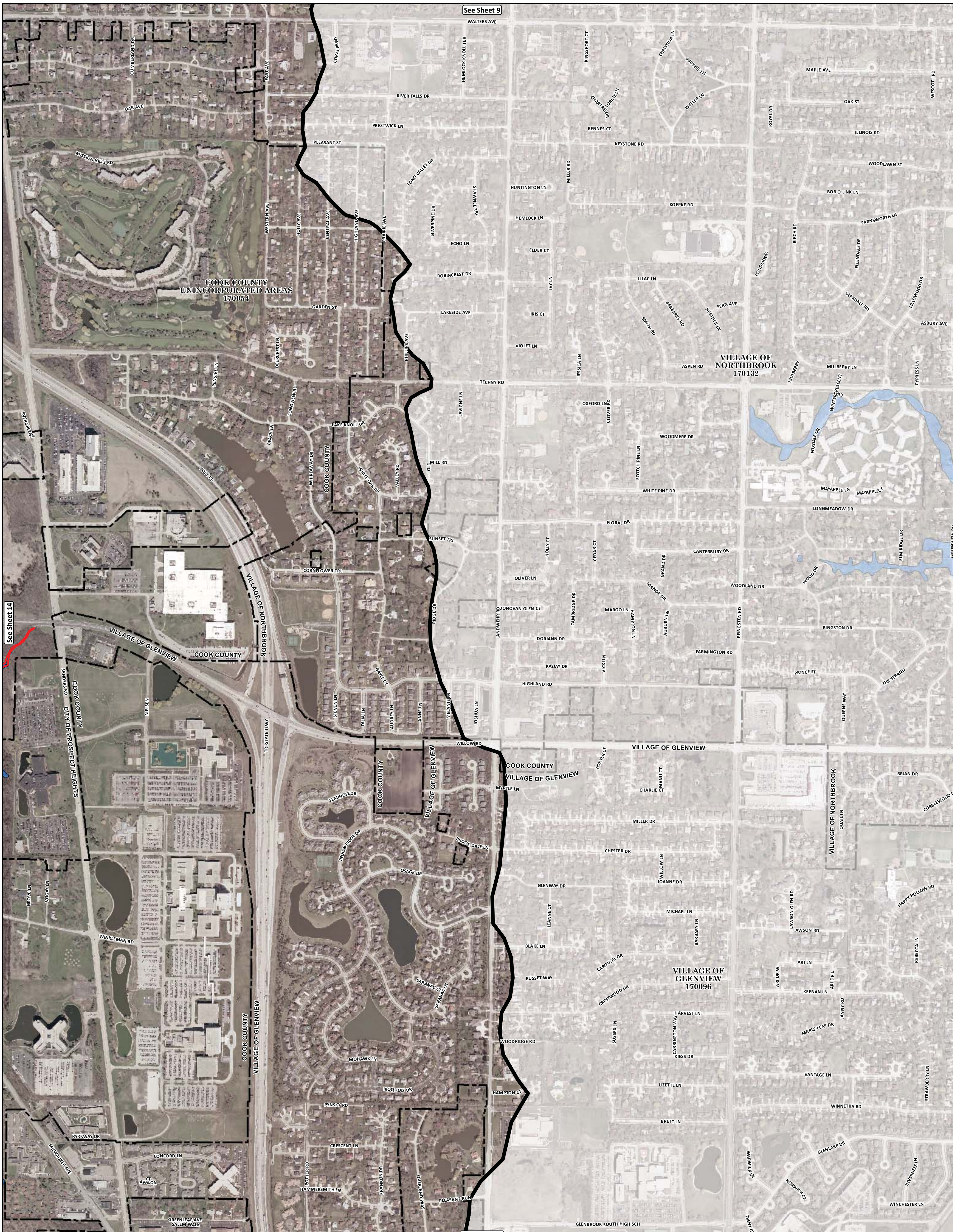


Legend

DWP 100-yr Inundation Area

FEMA Floodplain

Zone A, AH and AO

Zone AE

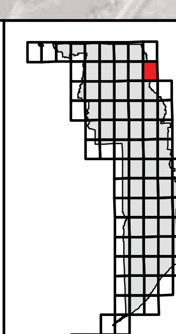
Lower Des Plaines River Watershed Study Area

DWP River/Streams

Municipal Boundary

County Boundary

0 500 1,000 2,000
Feet



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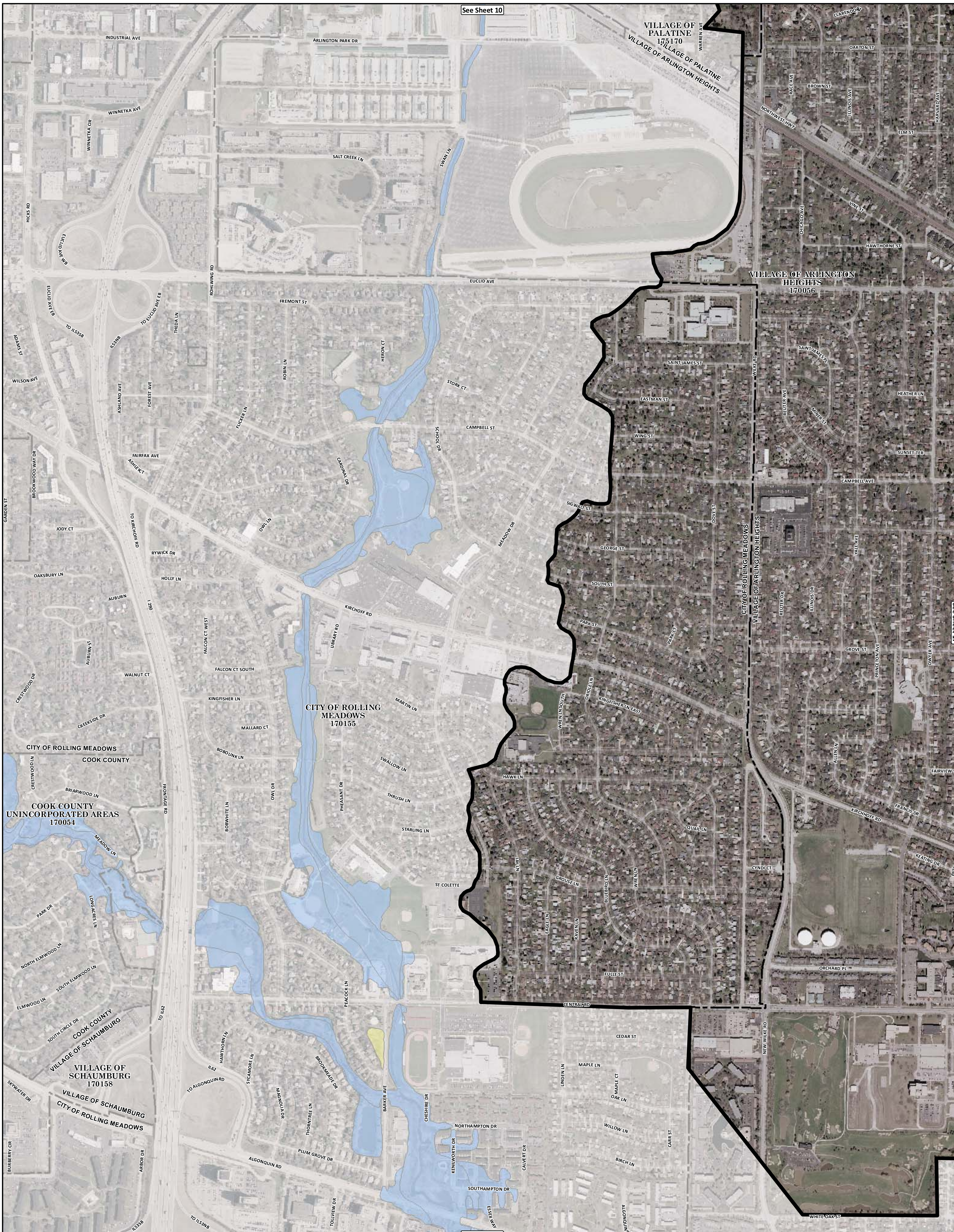

Legend

- DWP 100-yr Inundation Area
- Lower Des Plaines River Watershed Study Area

FEMA Floodplain

- Zone A, AH and AO
- Zone AE
- DWP River/Streams
- Municipal Boundary
- County Boundary

0 500 1,000 2,000
Feet

CLIENT:	**METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO**
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SHEET	16 OF 82
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Legend

DWP 100-yr Inundation Area

Lower Des Plaines River Watershed Study Area

FEMA Floodplain

DWP River/Streams

Zone A, AH and AO

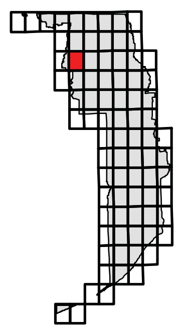
Municipal Boundary

Zone AE

County Boundary

0 500 1,000 2,000

Feet



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COMPARISON OF DWP 100-YR INUNDATION MAPPING AND FEMA EFFECTIVE FIRM LOWER DES PLAINES RIVER WATERSHED

PROJ. 080043

FIRM PANEL

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SHEET 17 OF 82

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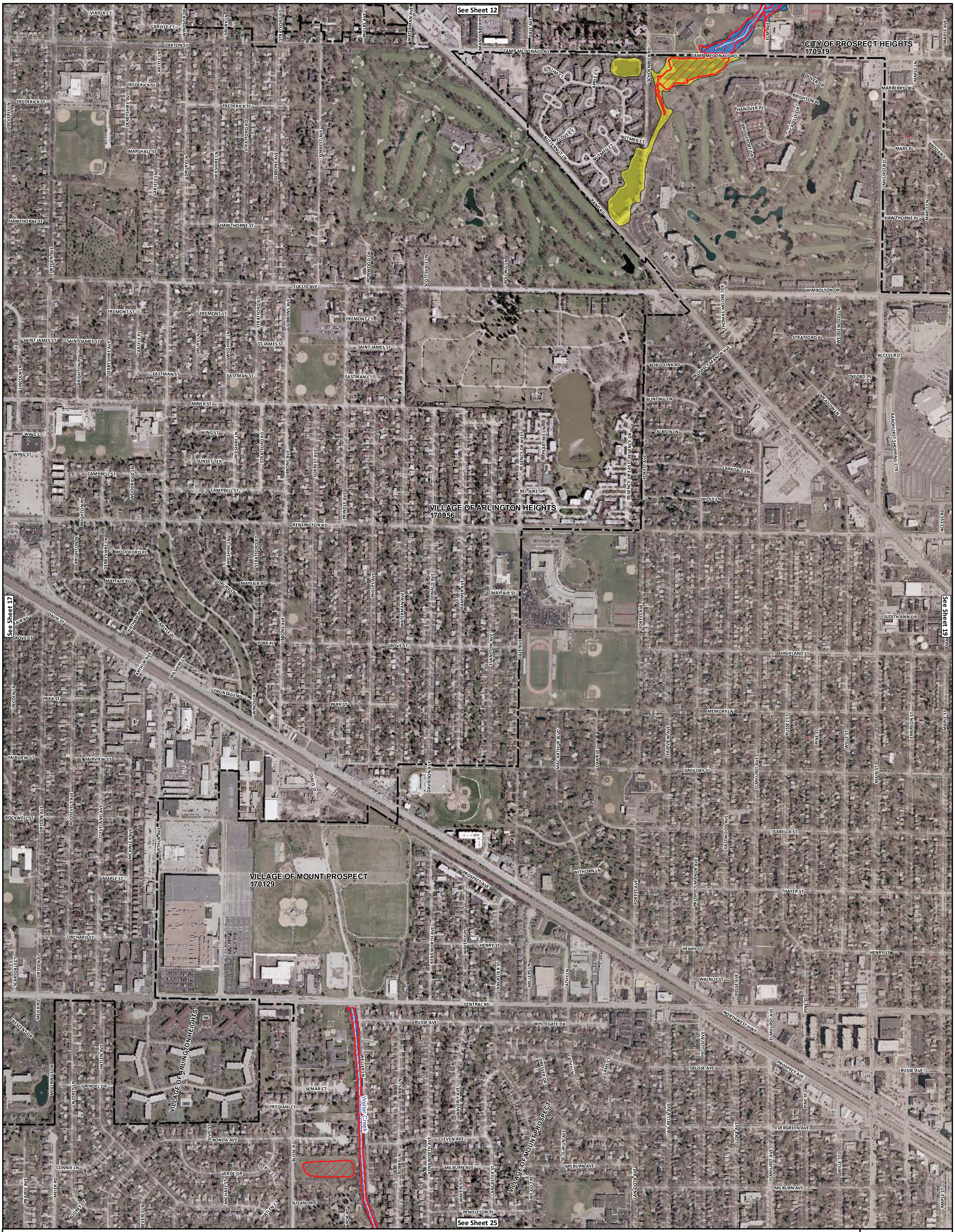


Legend

FEMA Floodplain

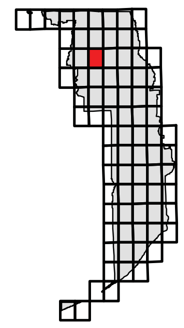
- Zone A, AH and AO
- Zone AE

- Lower Des Plaines River Watershed Study Area
- DWP River/Streams
- Municipal Boundary
- County Boundary

N

0 500 1,000 2,000

Feet



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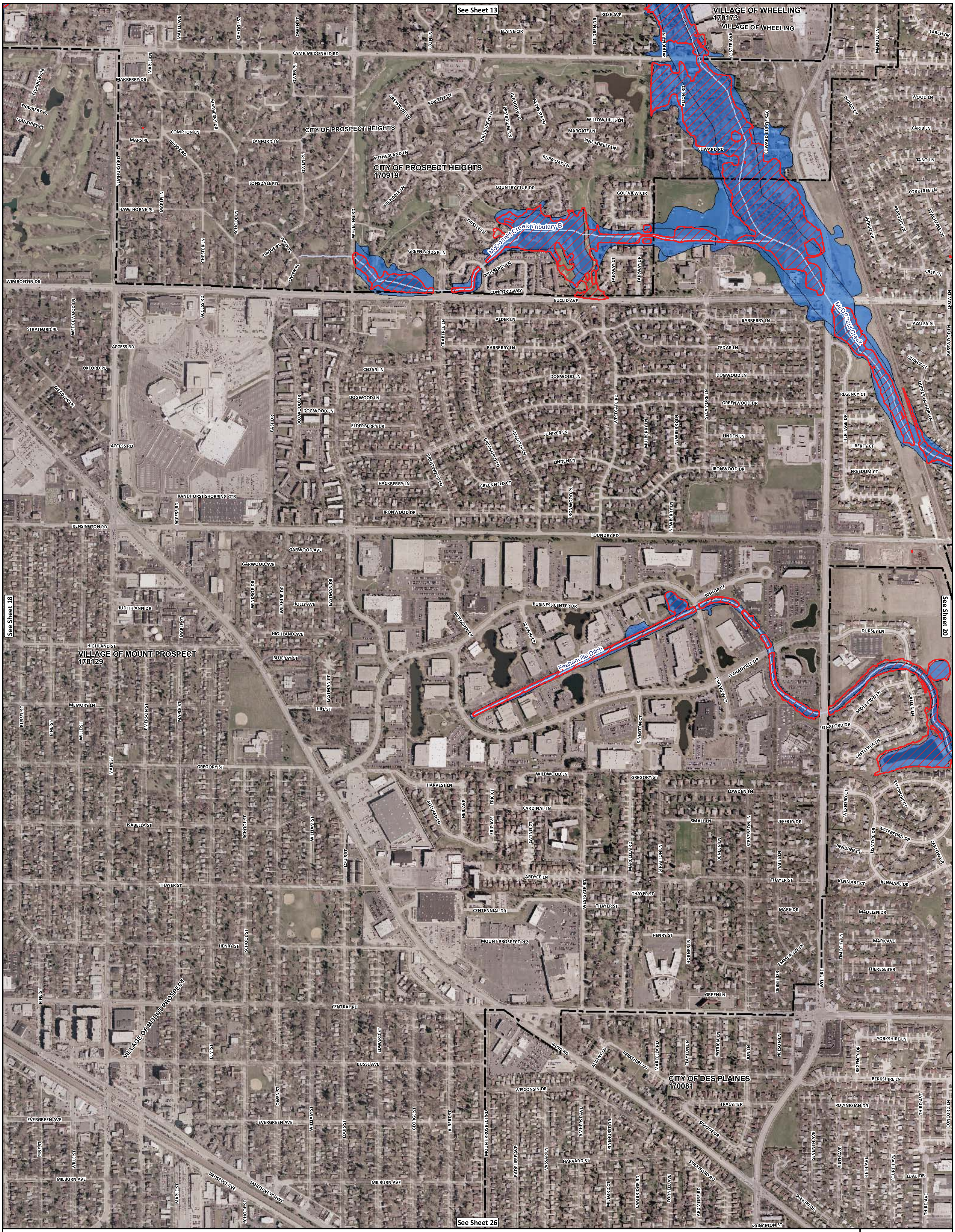
PROJ. 080043

FIRM PANEL
17031C0204J

SHEET 18 OF 82

DRAWING NO.
APPENDIX A



Legend

FEMA Floodplain

- Zone A, AH and AO
- Zone AE
- Lower Des Plaines River Watershed Study Area
- DWP River/Streams
- Municipal Boundary
- County Boundary

0 500 1,000 2,000
Feet

CLIENT:	TITLE:
METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO	**COMPARISON OF DWP 100-YR INUNDATION MAPPING AND FEMA EFFECTIVE FIRM LOWER DES PLAINES RIVER WATERSHED**
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FIRM PANEL
17031C0208J
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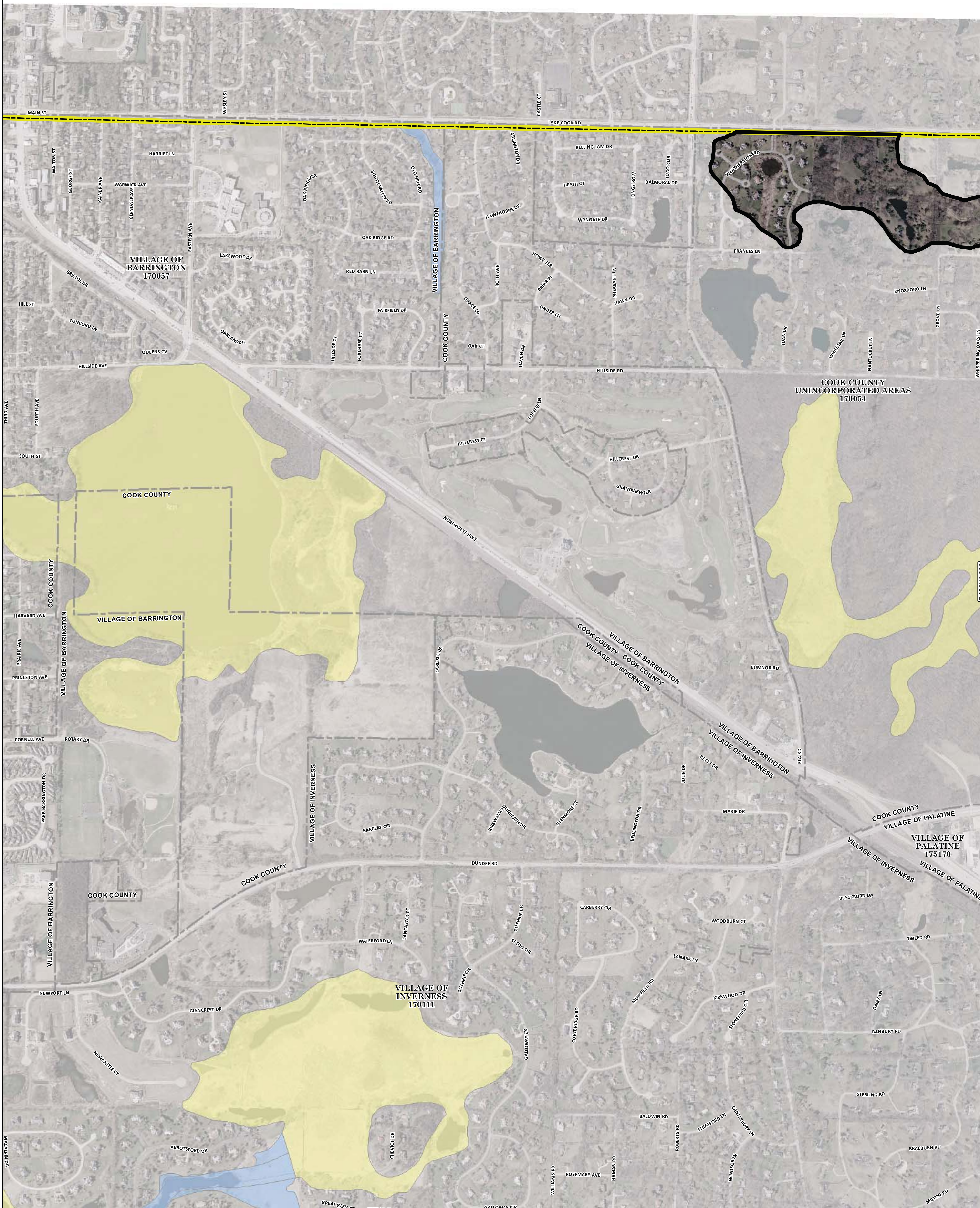
APPENDIX A



Legend

DWP 100-yr Inundation Area

Lower Des Plaines River Watershed Study Area

FEMA Floodplain

DWP River/Streams

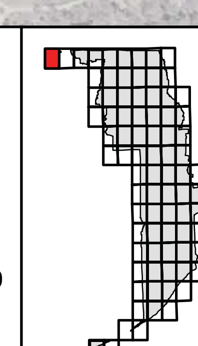
Zone A, AH and AO

Municipal Boundary

Zone AE

County Boundary

0 500 1,000 2,000
Feet



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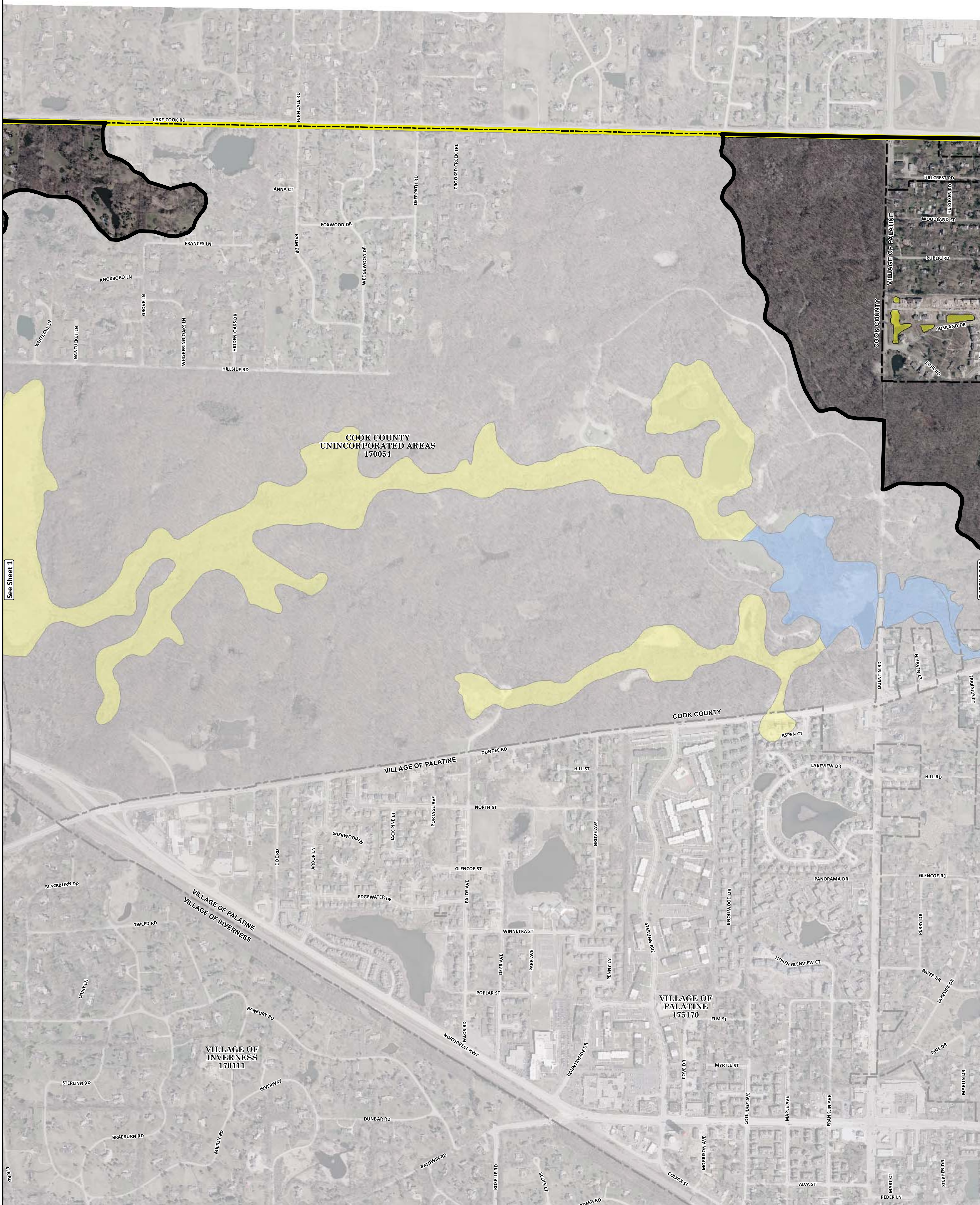
PROJ. 080043

FIRM PANEL
17031C0038J

SHEET 1 OF 82

DRAWING NO.
APPENDIX A



Legend

DWP 100-yr Inundation Area

Lower Des Plaines River Watershed Study Area

FEMA Floodplain

DWP River/Streams

Zone A, AH and AO

Municipal Boundary

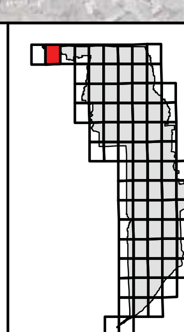
Zone AE

County Boundary

N

0 500 1,000 2,000

Feet



CLIENT:

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

CHRISTOPHER B. BURKE ENGINEERING, LTD.

9575 W. Higgins Road, Suite 600 Rosemont, Illinois 60018 (847) 823-0500

TITLE:

COMPARISON OF DWP 100-YR INUNDATION MAPPING AND FEMA EFFECTIVE FIRM LOWER DES PLAINES RIVER WATERSHED

FILE NAME	Map Document: (Z:\MWRDGC\08-0043 Phase B\Water\Des Plaines\exhibits\FIRM Panels.mxd)		
DATE -- TIME	11/23/2010 -- 12:58:15 PM	DWN.	DRW
	MODEL: ArcGIS 9.3	SCALE:	1"= 1,000'
		GIS USER:	DWALTERS

PROJ. 080043

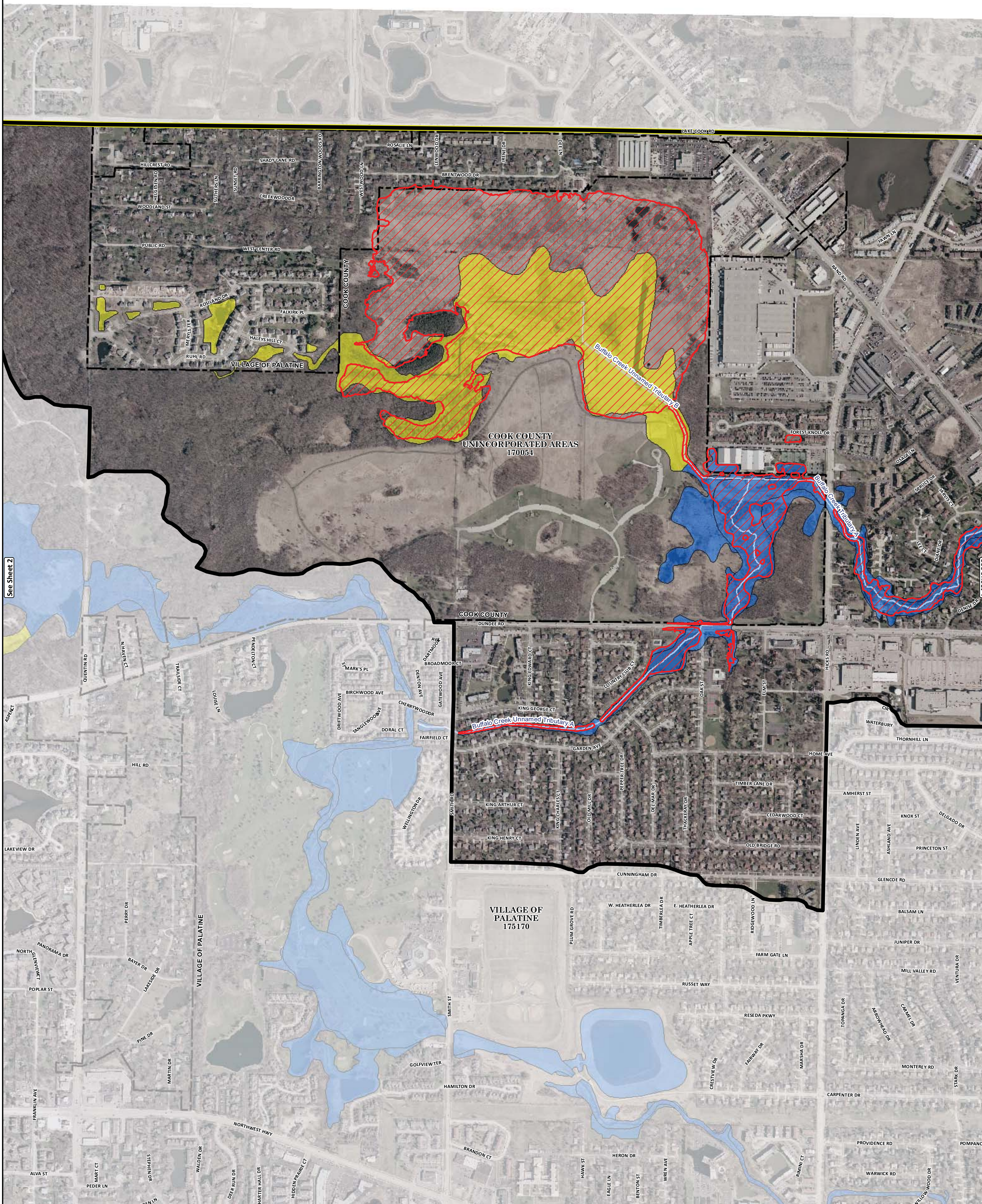
FIRM PANEL

17031C0039J

SHEET 2 OF 82

DRAWING NO.

APPENDIX A



Legend

DWP 100-yr Inundation Area

Lower Des Plaines River Watershed Study Area

FEMA Floodplain

DWP River/Streams

Zone A, AH and AO

Municipal Boundary

Zone AE

County Boundary

0 500 1,000 2,000
Feet

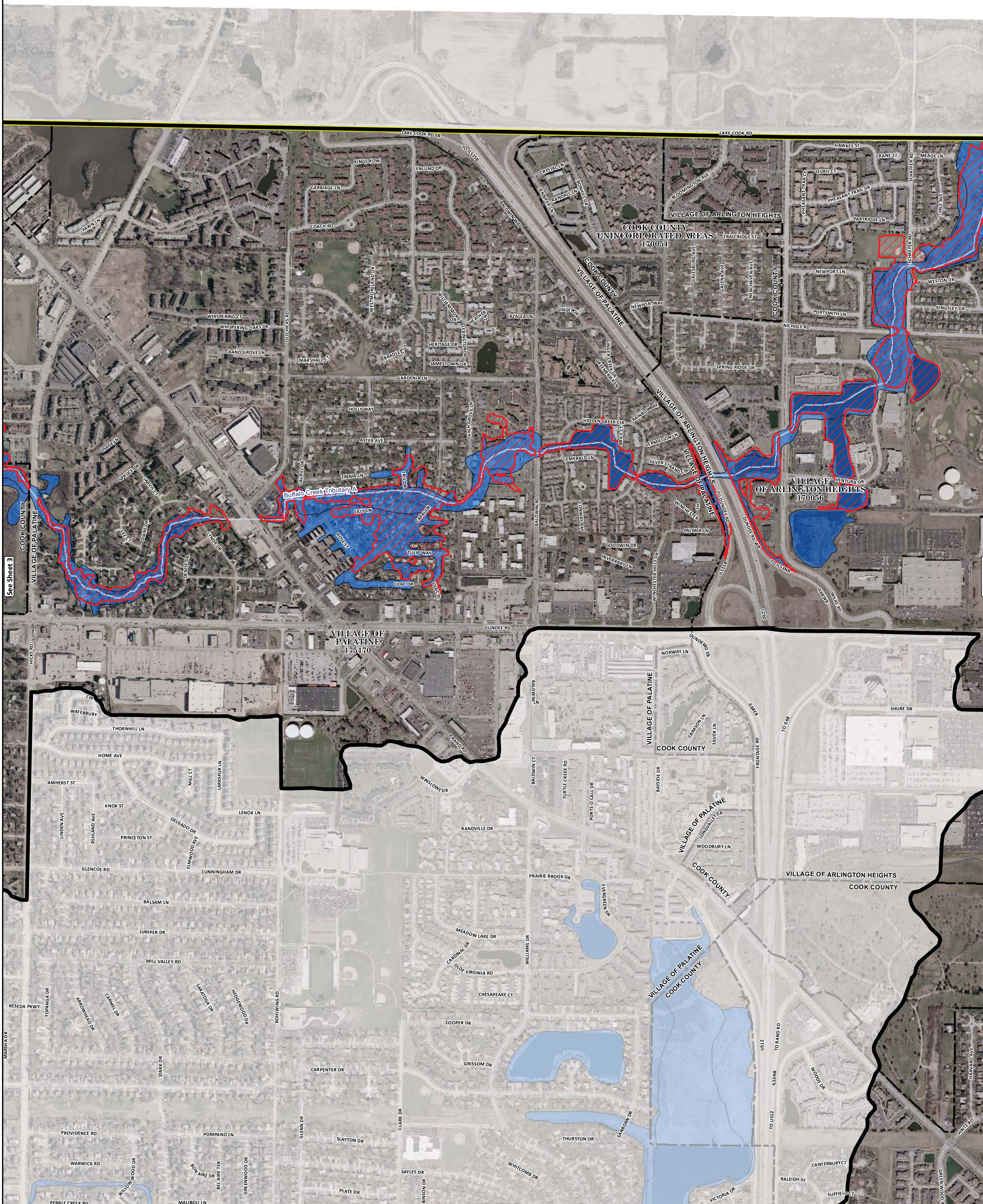
CLIENT: **METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO**	TITLE: **COMPARISON OF DWP 100-YR INUNDATION MAPPING AND FEMA EFFECTIVE FIRM LOWER DES PLAINES RIVER WATERSHED**
CHRISTOPHER B. BURKE ENGINEERING, LTD. 9575 W. Higgins Road, Suite 600 Rosemont, Illinois 60018 (847) 823-0500	FILE NAME: Map Document: (Z:\MWRDGC\08-0043 Phase B\Water\Des Plaines\exhibits\FIRM Panels.mxd) DATE -- TIME: 11/23/2010 -- 12:58:15 PM; MODEL: ArcGIS 9.3; DWN.: DRW; SCALE: 1"= 1,000'; GIS USER: DWALTERS

PROJ. 080043

FIRM PANEL
17031C0043J

SHEET 3 OF 82

DRAWING NO.
APPENDIX A



Legend

DWP 100-yr Inundation Area

FEMA Floodplain

Zone A, AH and AO

Zone AE

Lower Des Plaines River Watershed Study Area

DWP River/Streams

Municipal Boundary

County Boundary

0 500 1,000 2,000

Feet

CLIENT:

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

CHRISTOPHER B. BURKE ENGINEERING, LTD.

9575 W. Higgins Road, Suite 600 Rosemont, Illinois 60018 (847) 823-0500

TITLE:

COMPARISON OF DWP 100-YR INUNDATION MAPPING AND FEMA EFFECTIVE FIRM LOWER DES PLAINES RIVER WATERSHED

FILE NAME	Map Document: (Z:\MWRDGC\08-0043 Phase B\Water\Des Plaines\exhibits\FIRM Panels.mxd)		
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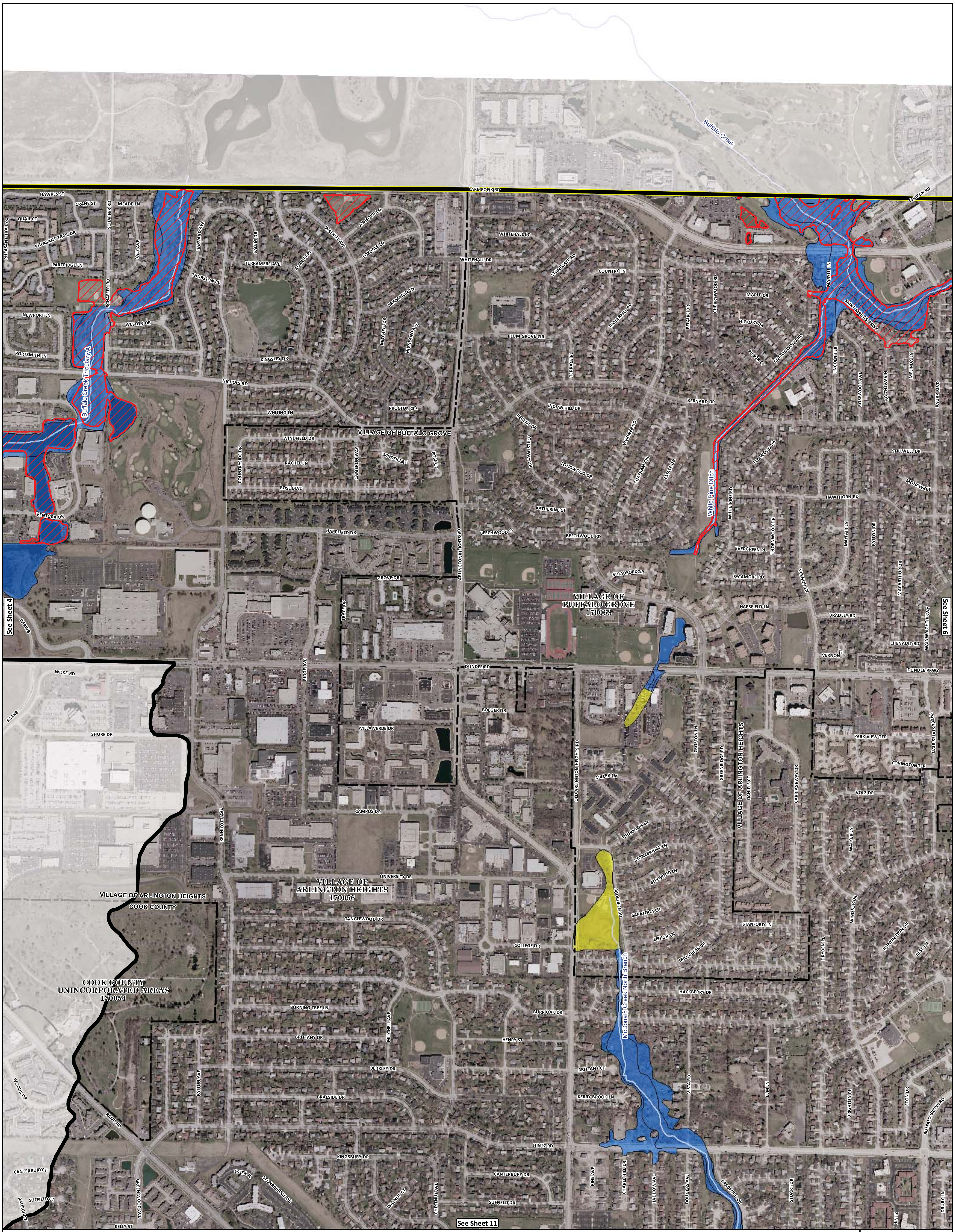
PROJ. 080043

FIRM PANEL 17031C0044J

SHEET 4 OF 82

DRAWING NO.

APPENDIX A



Legend

DWP 100-yr Inundation Area

Lower Des Plaines River Watershed Study Area

FEME Floodplain

Zone A, AH and AO

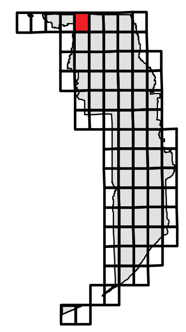
Zone AE

DWP River/Streams

Municipal Boundary

County Boundary

0 500 1,000 2,000
Feet



CLIENT:

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:

COMPARISON OF DWP 100-YR INUNDATION MAPPING AND FEMA EFFECTIVE FIRM LOWER DES PLAINES RIVER WATERSHED

PROJ. 080043

FIRM PANEL 17031C0063J

SHEET 5 OF 82

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FILE NAME	Map Document: (Z:\MWRDGC\08-0043 Phase B\Water\Des Plaines\exhibits\FIRM Panels.mxd)				
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DRAWING NO.

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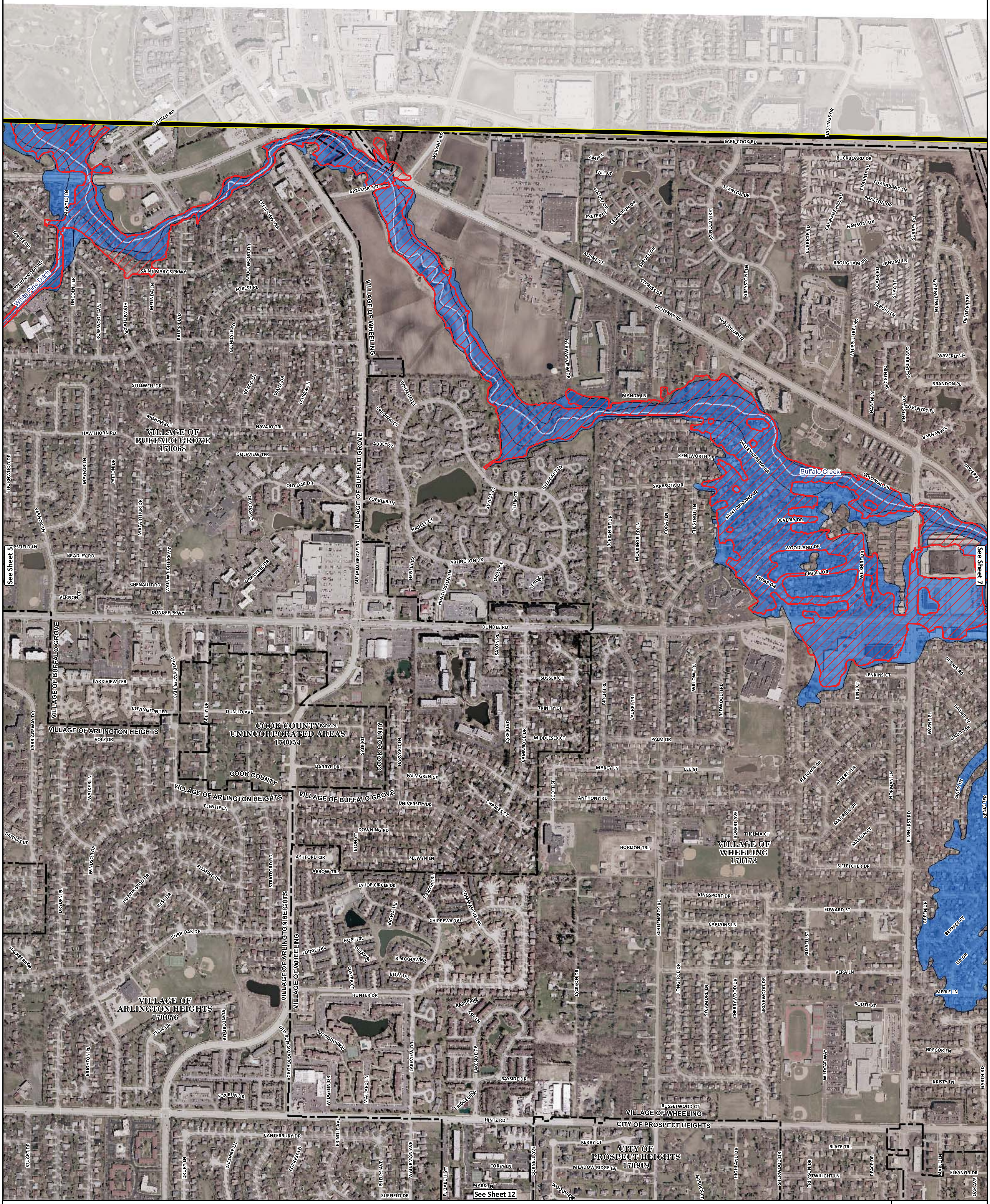


Legend

DWP 100-yr Inundation Area

FEMA Floodplain

Zone A, AH and AO

Zone AE

Lower Des Plaines River Watershed Study Area

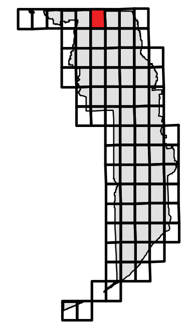
DWP River/Streams

Municipal Boundary

County Boundary

0 500 1,000 2,000

Feet



CLIENT:

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CHRISTOPHER B. BURKE ENGINEERING, LTD.

9575 W. Higgins Road, Suite 600 Rosemont, Illinois 60018 (847) 823-0500

TITLE:

COMPARISON OF DWP 100-YR INUNDATION MAPPING AND FEMA EFFECTIVE FIRM LOWER DES PLAINES RIVER WATERSHED

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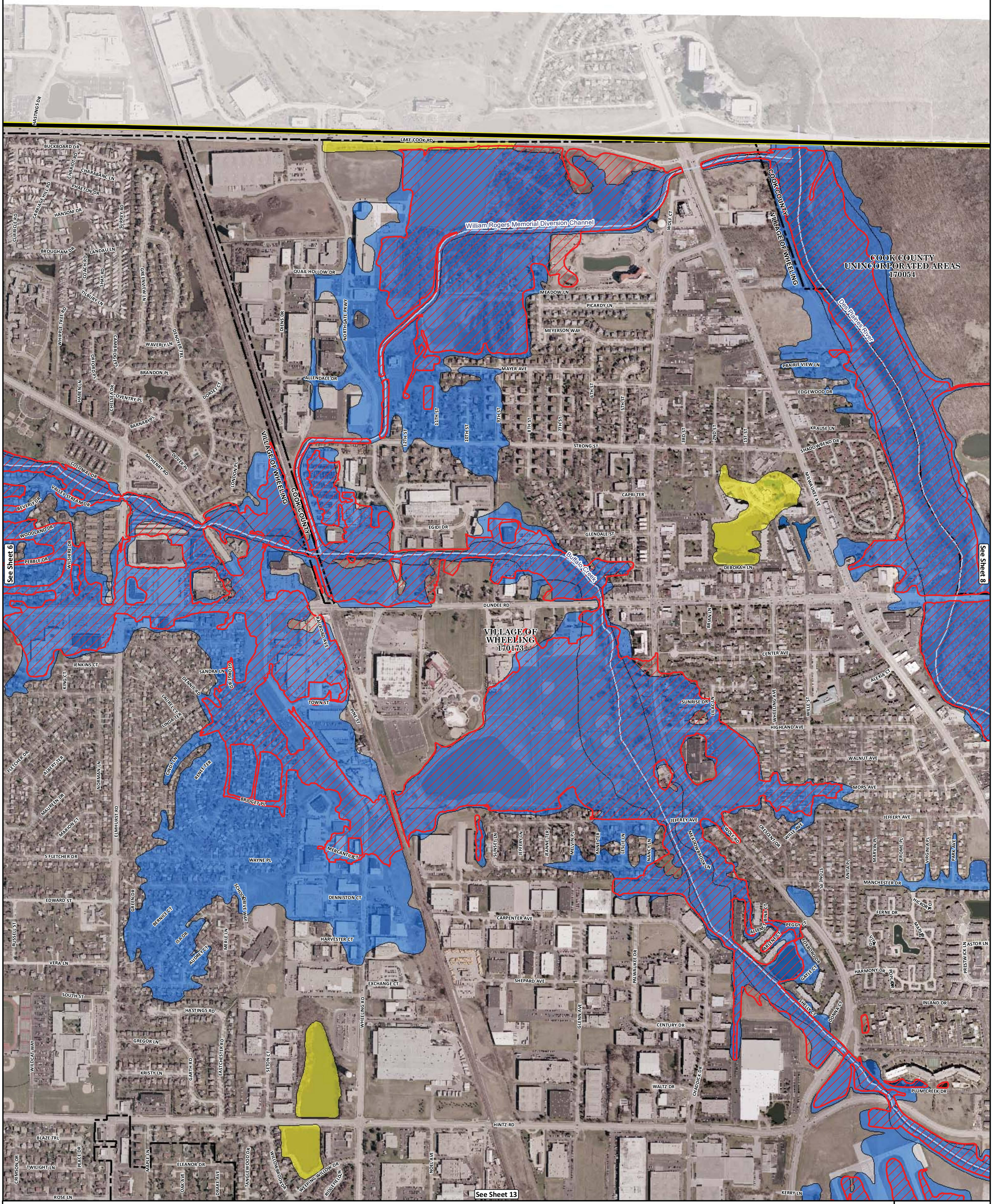
PROJ. 080043

FIRM PANEL
17031C0064J

SHEET 6 OF 82

DRAWING NO.
APPENDIX A



Legend

DWP 100-yr Inundation Area

FEMA Floodplain

Zone A, AH and AO

Zone AE

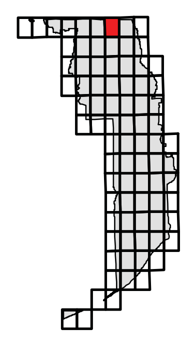
Lower Des Plaines River Watershed Study Area

DWP River/Streams

Municipal Boundary

County Boundary

0 500 1,000 2,000
Feet



CLIENT:

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

CHRISTOPHER B. BURKE ENGINEERING, LTD.
9575 W. Higgins Road, Suite 600 Rosemont, Illinois 60018 (847) 823-0500

TITLE:

COMPARISON OF DWP 100-YR INUNDATION MAPPING AND FEMA EFFECTIVE FIRM LOWER DES PLAINES RIVER WATERSHED

PROJ. 080043

FIRM PANEL
17031C0068J

SHEET 7 OF 82

DRAWING NO.
APPENDIX A

FILE NAME	Map Document: (Z:\MWRDGC\08-0043 Phase B\Water\Des Plaines\exhibits\FIRM Panels.mxd)		
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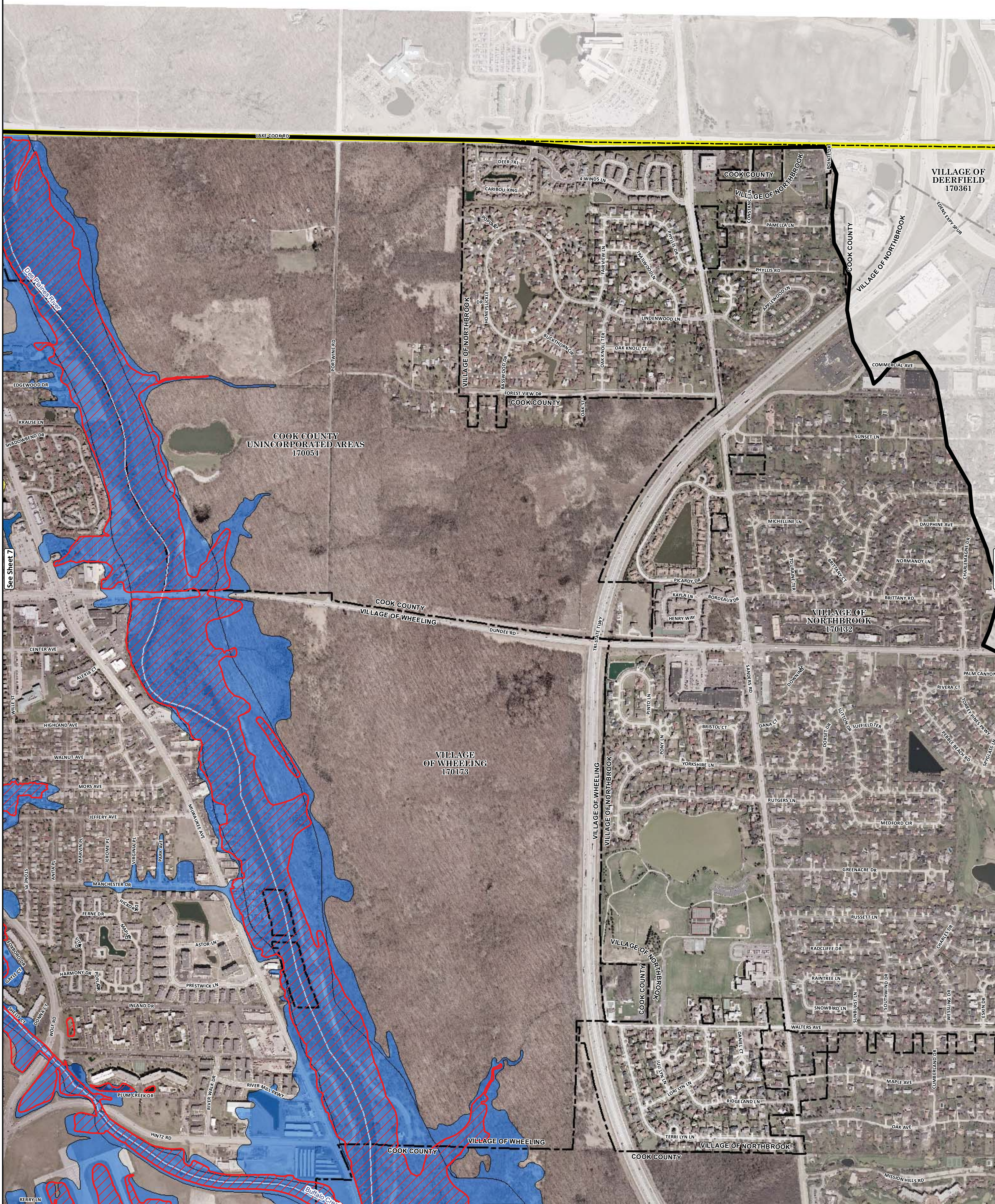


Legend

- DWP 100-yr Inundation Area

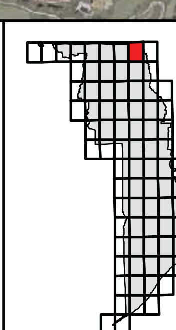
FEMA Floodplain

- Zone A, AH and AO
- Zone AE
- Lower Des Plaines River Watershed Study Area
- DWP River/Streams
- Municipal Boundary
- County Boundary

N

0 500 1,000 2,000

Feet



CLIENT:

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

CBB

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TITLE:

COMPARISON OF DWP 100-YR INUNDATION MAPPING AND FEMA EFFECTIVE FIRM LOWER DES PLAINES RIVER WATERSHED

FILE NAME	Map Document: (Z:\MWRDGC\08-0043 Phase B\Water\Des Plaines\exhibits\FIRM Panels.mxd)		
DATE -- TIME	11/23/2010 -- 12:58:15 PM	DWN.	DRW
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PROJ. 080043

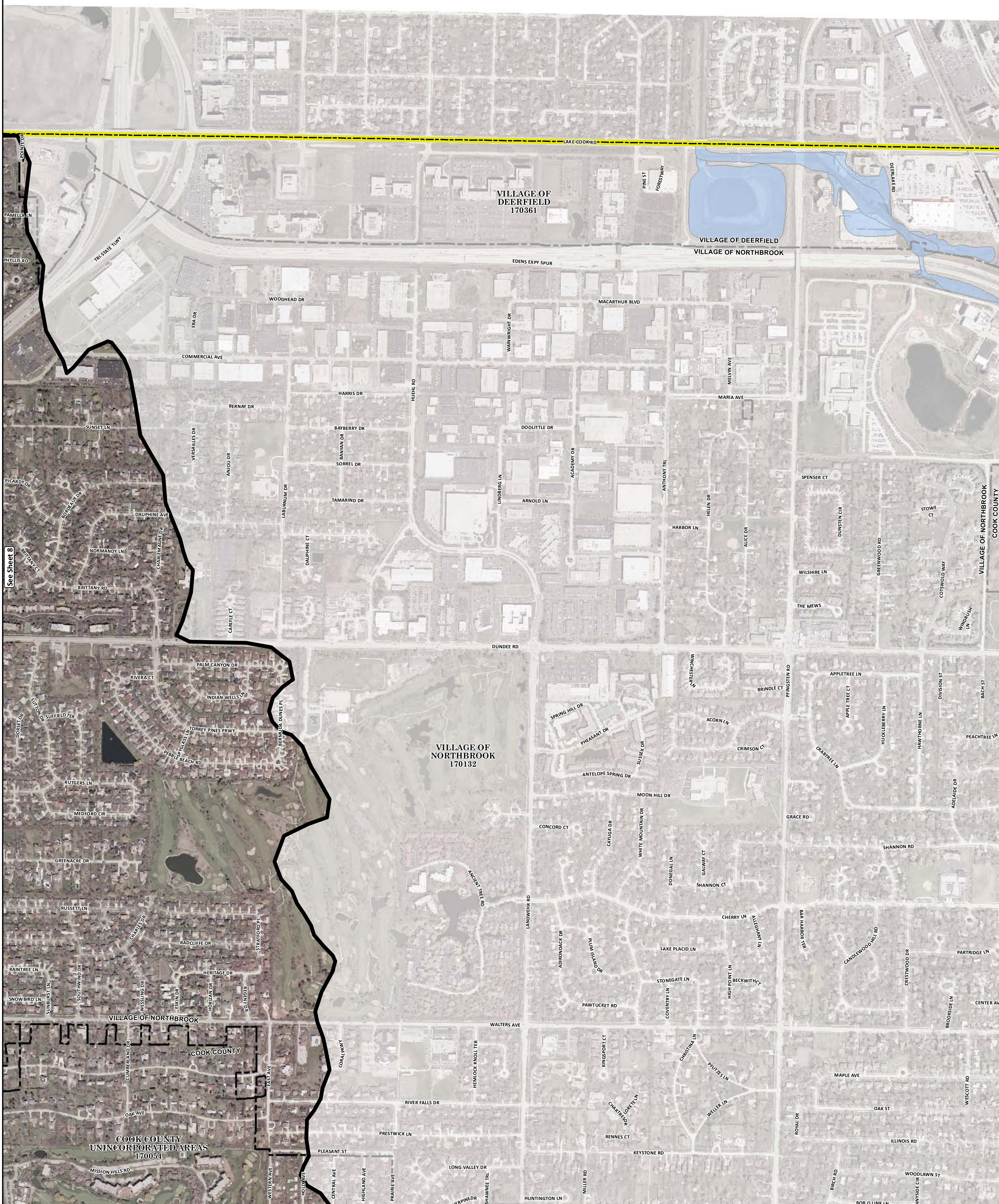
FIRM PANEL

17031C0069J

SHEET 8 OF 82

DRAWING NO.

APPENDIX A



Legend

DWP 100-yr Inundation Area

Lower Des Plaines River Watershed Study Area

FEMA Floodplain

DWP River/Streams

Zone A, AH and AO

Municipal Boundary

Zone AE

County Boundary

0 500 1,000 2,000
Feet

CLIENT:

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

CHRISTOPHER B. BURKE ENGINEERING, LTD.
9575 W. Higgins Road, Suite 600 Rosemont, Illinois 60018 (847) 823-0500

TITLE:

COMPARISON OF DWP 100-YR INUNDATION MAPPING AND FEMA EFFECTIVE FIRM LOWER DES PLAINES RIVER WATERSHED

FILE NAME: Map Document: (Z:\MWRDGC\08-0043 Phase B\Water\Des Plaines\exhibits\FIRM Panels.mxd)
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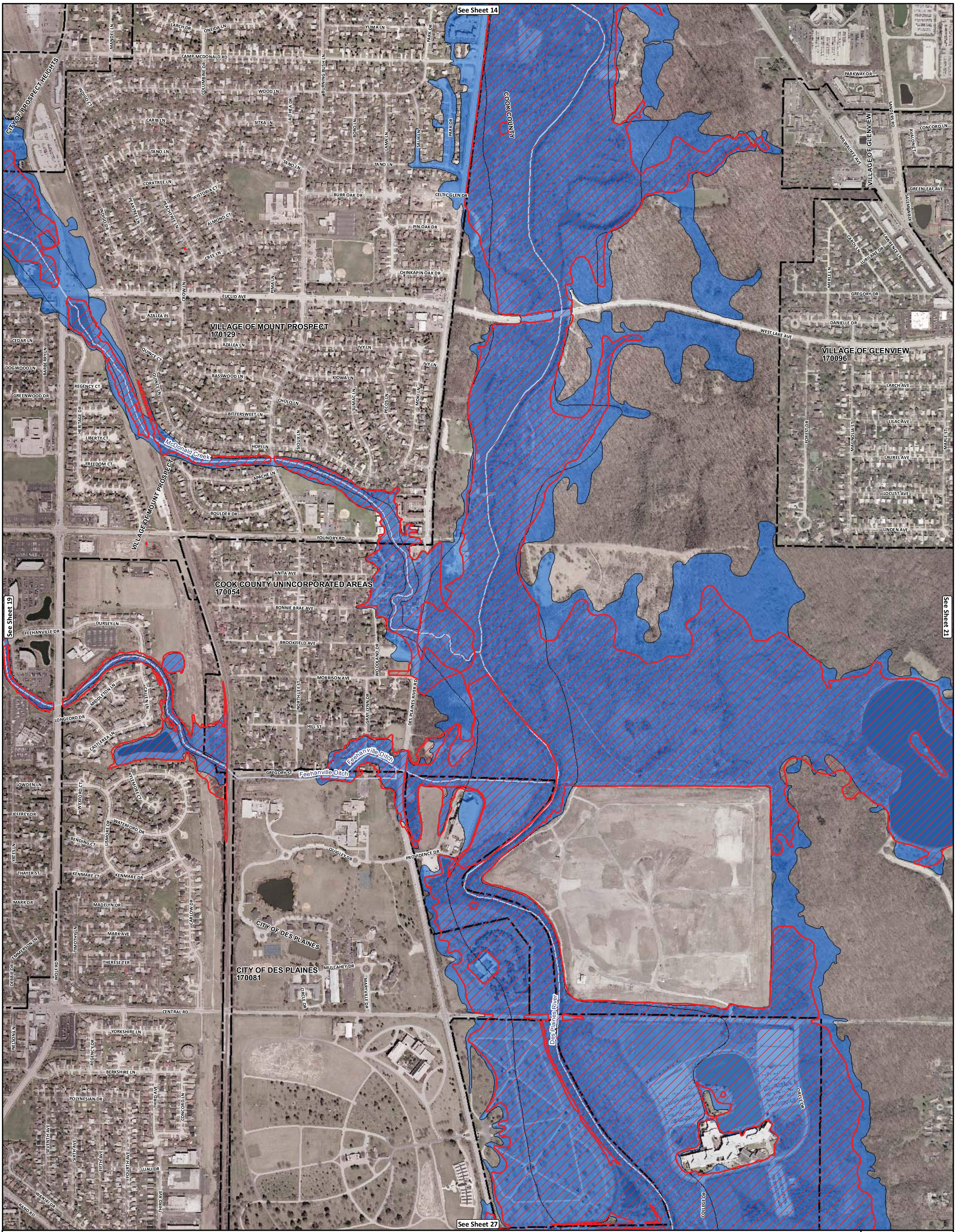
GIS USER: DWALTERS

PROJ. 080043

FIRM PANEL
17031C0088J

SHEET 9 OF 82

DRAWING NO.
APPENDIX A



Legend

FEMA Floodplain

Zone A, AH and AO

Zone AE

Lower Des Plaines River Watershed Study Area

DWP River/Streams

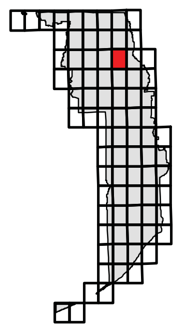
Municipal Boundary

County Boundary

N

0 500 1,000 2,000

Feet



CLIENT:

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

CBB

CHRISTOPHER B. BURKE ENGINEERING, LTD.

9575 W. Higgins Road, Suite 600 Rosemont, Illinois 60018 (847) 823-0500

TITLE:

COMPARISON OF DWP 100-YR INUNDATION MAPPING AND FEMA EFFECTIVE FIRM LOWER DES PLAINES RIVER WATERSHED

FILE NAME	Map Document: (Z:\MWRDGC\08-0043 Phase B\Water\Des Plaines\exhibits\FIRM Panels.mxd)				
DATE -- TIME	11/23/2010 -- 12:58:15 PM			DWN.	DRW
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PROJ. 080043

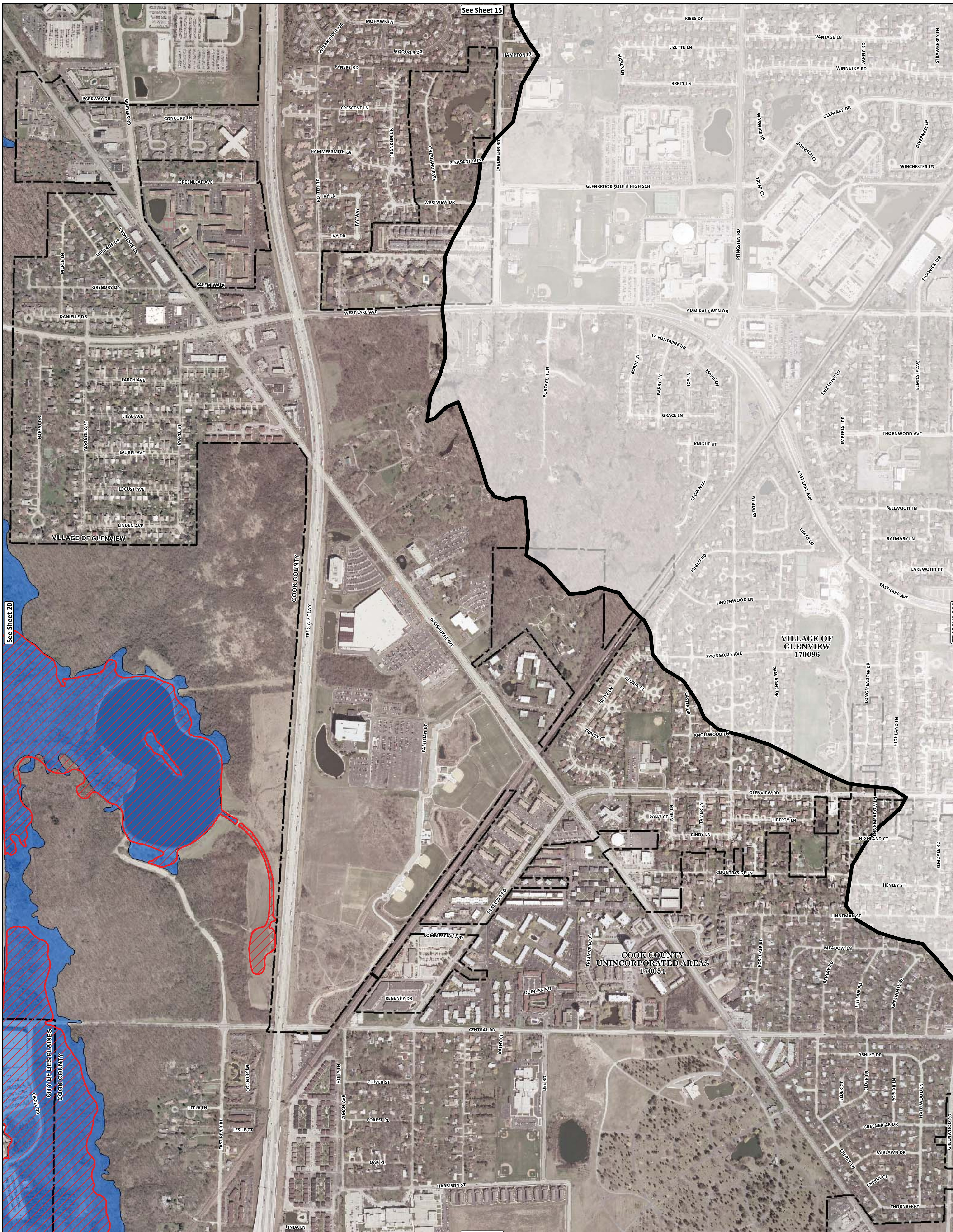
FIRM PANEL

17031C0209J

SHEET 20 OF 82

DRAWING NO.

APPENDIX A



Legend

- DWP 100-yr Inundation Area
- Lower Des Plaines River Watershed Study Area

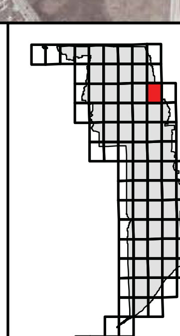
FEMA Floodplain

- Zone A, AH and AO
- Zone AE
- DWP River/Streams
- Municipal Boundary
- County Boundary

N

0 500 1,000 2,000

Feet



CLIENT:

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

CBB

CHRISTOPHER B. BURKE ENGINEERING, LTD.
9575 W. Higgins Road, Suite 600 Rosemont, Illinois 60018 (847) 823-0500

TITLE:

COMPARISON OF DWP 100-YR INUNDATION MAPPING AND FEMA EFFECTIVE FIRM LOWER DES PLAINES RIVER WATERSHED

FILE NAME	Map Document: (Z:\MWRDGC\08-0043 Phase B\Water\Des Plaines\exhibits\FIRM Panels.mxd)				
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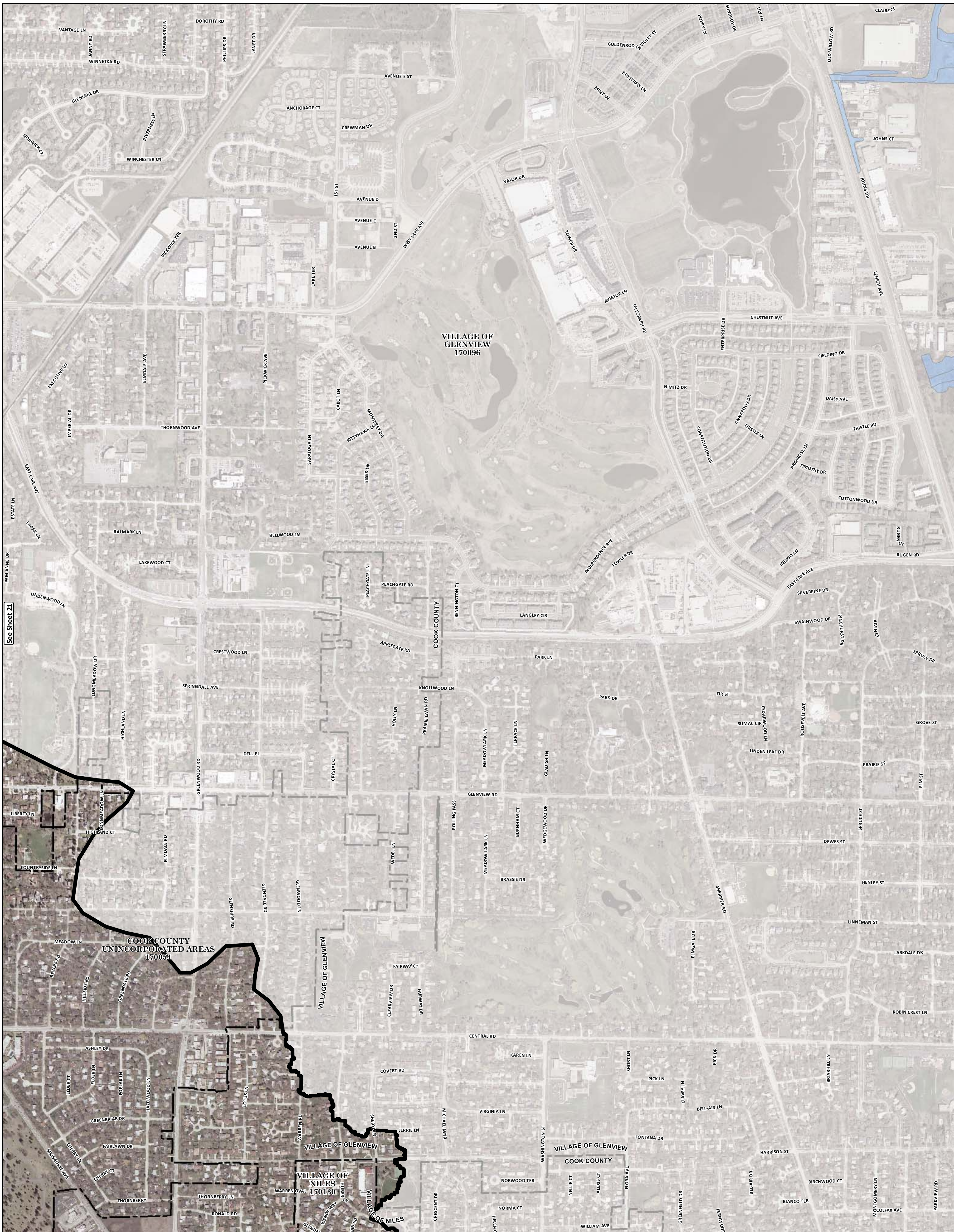
PROJ. 080043

FIRM PANEL
17031C0228J

SHEET 21 OF 82

DRAWING NO.
APPENDIX A



Legend

DWP 100-yr Inundation Area

Lower Des Plaines River Watershed Study Area

FEMA Floodplain

DWP River/Streams

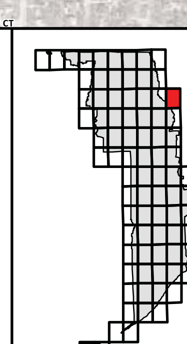
Zone A, AH and AO

Municipal Boundary

Zone AE

County Boundary

0 500 1,000 2,000
Feet



CLIENT:

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

CHRISTOPHER B. BURKE ENGINEERING, LTD.
9575 W. Higgins Road, Suite 600 Rosemont, Illinois 60018 (847) 823-0500

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COMPARISON OF DWP 100-YR INUNDATION MAPPING AND FEMA EFFECTIVE FIRM LOWER DES PLAINES RIVER WATERSHED

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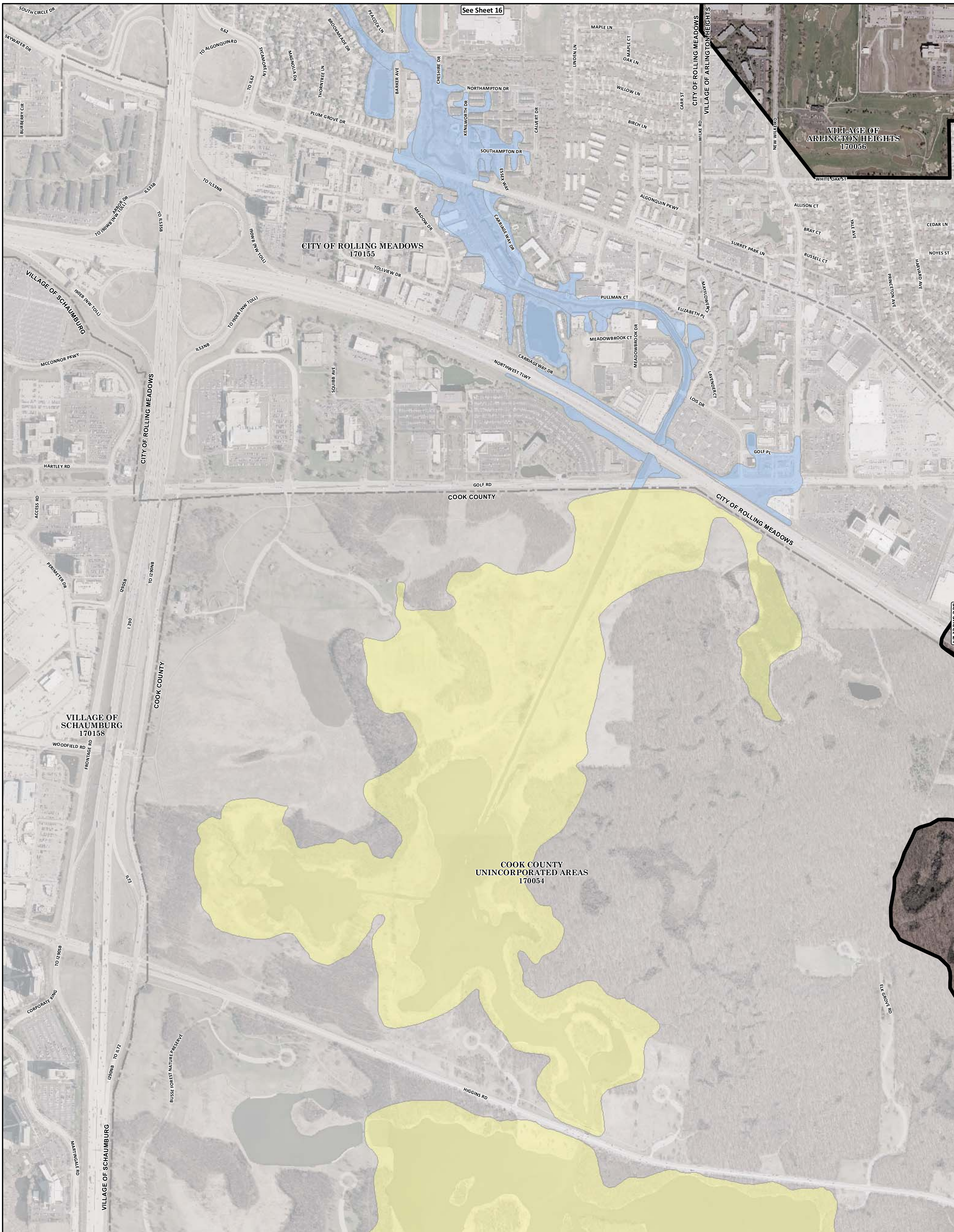
PROJ. 080043

FIRM PANEL
17031C0229J

SHEET 22 OF 82

DRAWING NO.
APPENDIX A



Legend

- DWP 100-yr Inundation Area
- Lower Des Plaines River Watershed Study Area
- DWP River/Streams
- Municipal Boundary
- County Boundary

FEMA Floodplain

- Zone A, AH and AO
- Zone AE

0 500 1,000 2,000
Feet

CLIENT:

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

CHRISTOPHER B. BURKE ENGINEERING, LTD.
9575 W. Higgins Road, Suite 600 Rosemont, Illinois 60018 (847) 823-0500

TITLE:

COMPARISON OF DWP 100-YR INUNDATION MAPPING AND FEMA EFFECTIVE FIRM LOWER DES PLAINES RIVER WATERSHED

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		GIS USER:	DWALTERS

PROJ. 080043
FIRM PANEL
17031C0192J
SHEET 23 OF 82
DRAWING NO.
APPENDIX A

Legend

DWP 100-yr Inundation Area

FEMA Floodplain

Zone A, AH and AO

Zone AE

Lower Des Plaines River Watershed Study Area

DWP River/Streams

Municipal Boundary

County Boundary

0 500 1,000 2,000
Feet

CLIENT:

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

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9575 W. Higgins Road, Suite 600 Rosemont, Illinois 60018 (847) 823-0500

TITLE:

COMPARISON OF DWP 100-YR INUNDATION MAPPING AND FEMA EFFECTIVE FIRM LOWER DES PLAINES RIVER WATERSHED

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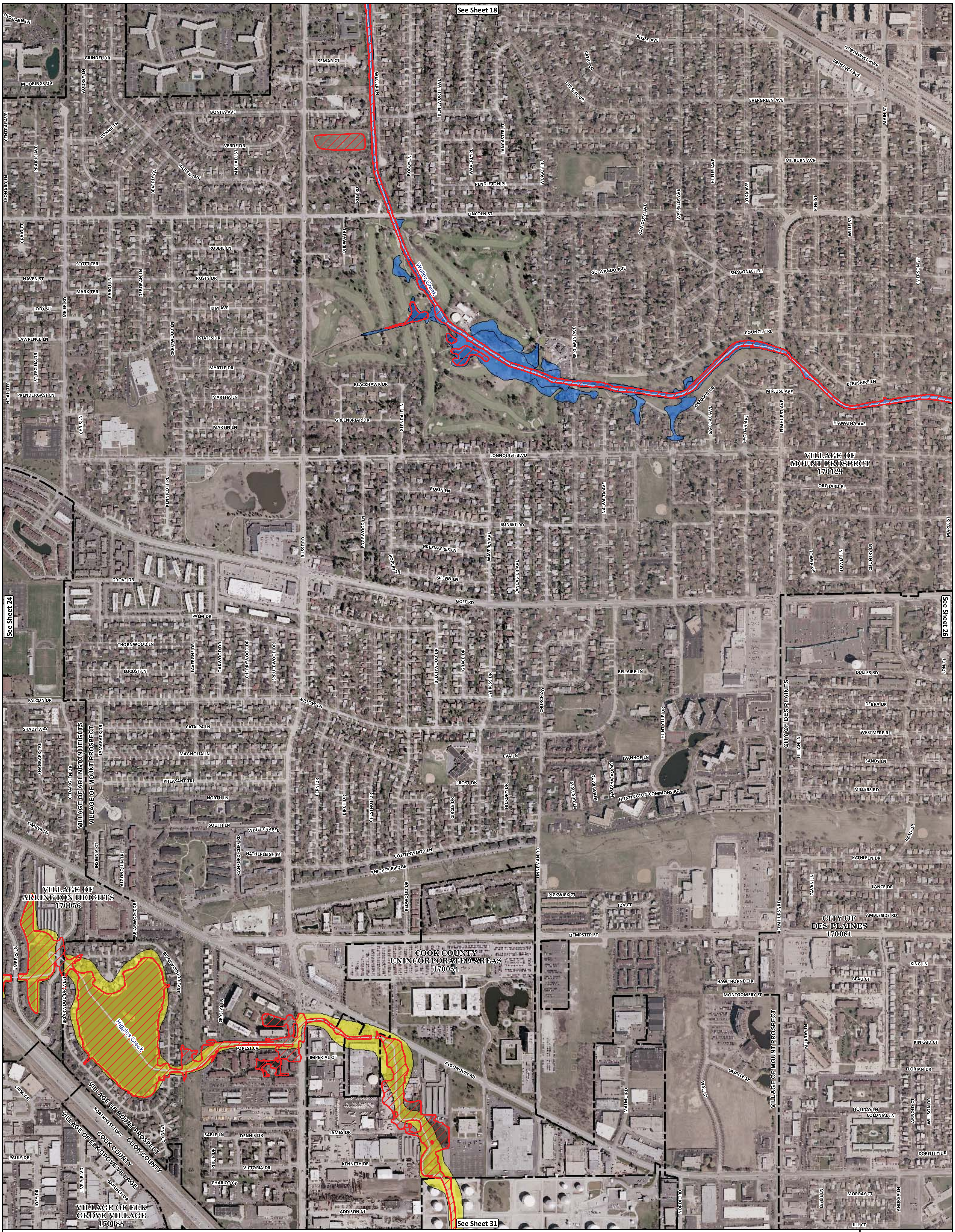
PROJ. 080043

FIRM PANEL
17031C0211J

SHEET 24 OF 82

DRAWING NO.
APPENDIX A



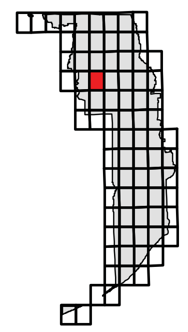
Legend

- DWP 100-yr Inundation Area
- Lower Des Plaines River Watershed Study Area
- DWP River/Streams
- Municipal Boundary
- County Boundary

FEMA Floodplain

- Zone A, AH and AO
- Zone AE

0 500 1,000 2,000
Feet



CLIENT:

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

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TITLE:

COMPARISON OF DWP 100-YR INUNDATION MAPPING AND FEMA EFFECTIVE FIRM LOWER DES PLAINES RIVER WATERSHED

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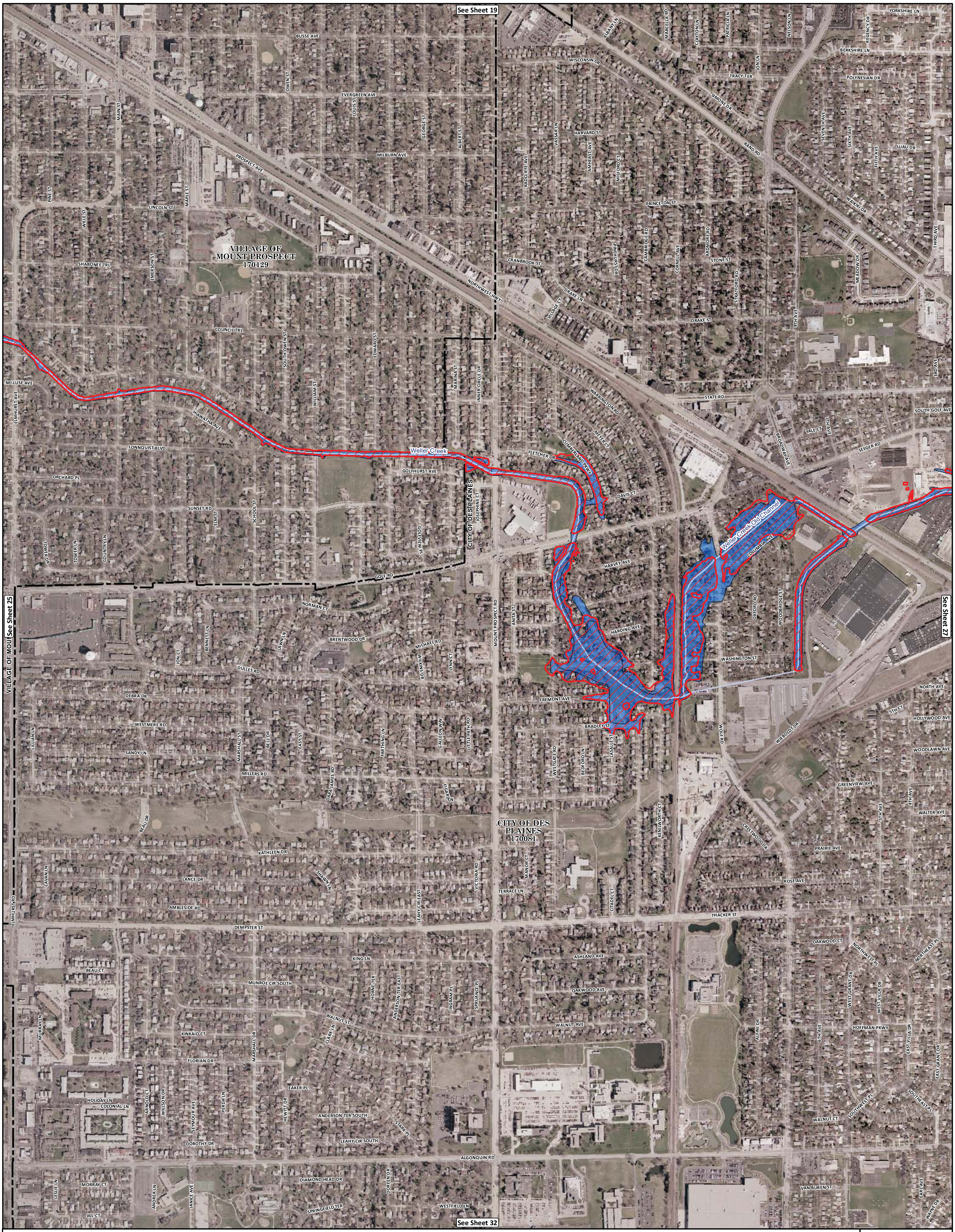
		GIS USER:	DWALTERS

PROJ. 080043

FIRM PANEL
17031C0212J

SHEET 25 OF 82

DRAWING NO.
APPENDIX A



Legend

DWP 100-yr Inundation Area

FEMA Floodplain

Zone A, AH and AO

Zone AE

Lower Des Plaines River Watershed Study Area

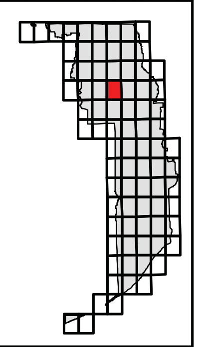
DWP River/Streams

Municipal Boundary

County Boundary

0 500 1,000 2,000

Feet



CLIENT:

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		GIS USER:	DWALTERS

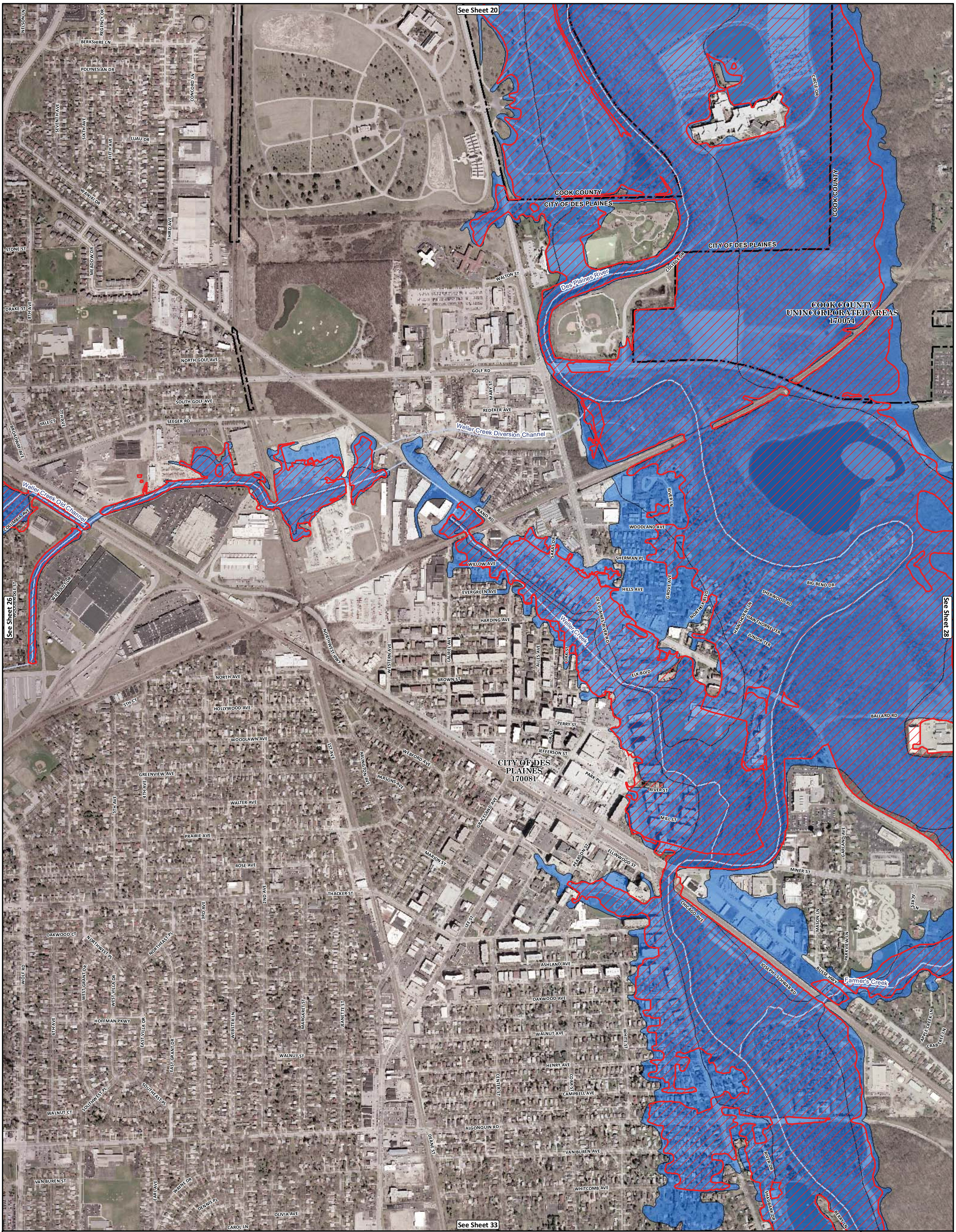
PROJ. 080043

FIRM PANEL 17031C0216J

SHEET 26 OF 82

DRAWING NO.

APPENDIX A



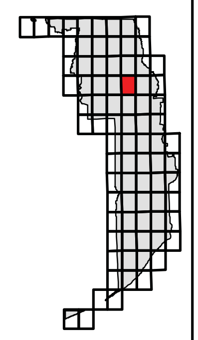
Legend

- DWP 100-yr Inundation Area
- Lower Des Plaines River Watershed Study Area

FEMA Floodplain

- Zone A, AH and AO
- Zone AE
- DWP River/Streams
- Municipal Boundary
- County Boundary

0 500 1,000 2,000
Feet



CLIENT:

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

CHRISTOPHER B. BURKE ENGINEERING, LTD.
9575 W. Higgins Road, Suite 600 Rosemont, Illinois 60018 (847) 823-0500

TITLE:

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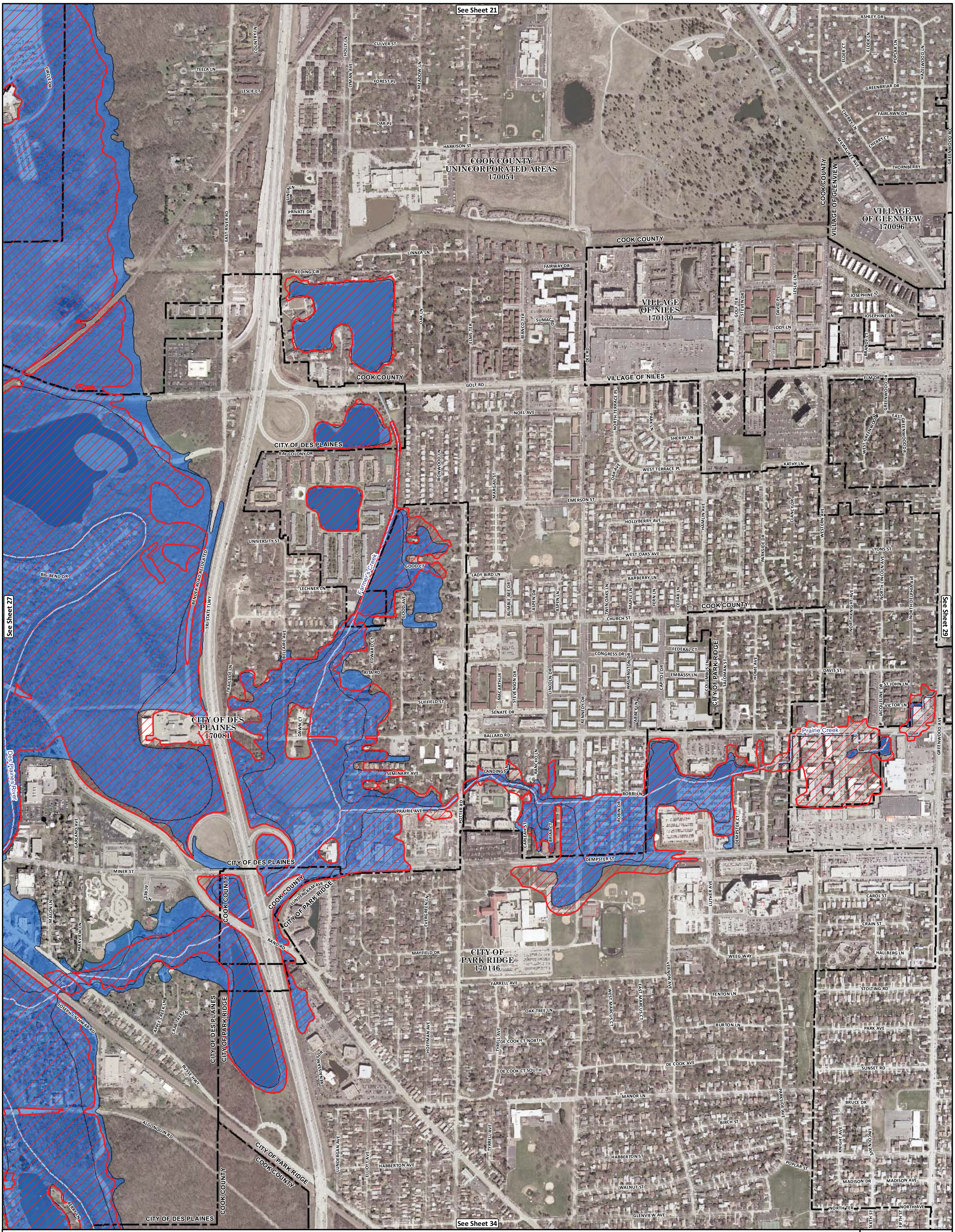
				GIS USER:	DWALTERS

PROJ. 080043

FIRM PANEL
17031C0217J

SHEET 27 OF 82

DRAWING NO.
APPENDIX A



Legend

DWP 100-yr Inundation Area

FEMA Floodplain

Zone A, AH and AO

Zone AE

Lower Des Plaines River Watershed Study Area

DWP River/Streams

Municipal Boundary

County Boundary

N

0 500 1,000 2,000

Feet

CLIENT:

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

CBB

CHRISTOPHER B. BURKE ENGINEERING, LTD.

9575 W. Higgins Road, Suite 600 Rosemont, Illinois 60018 (847) 823-0500

TITLE:

COMPARISON OF DWP 100-YR INUNDATION MAPPING AND FEMA EFFECTIVE FIRM LOWER DES PLAINES RIVER WATERSHED

FILE NAME	Map Document: (Z:\MWRDGC\08-0043 Phase B\Water\Des Plaines\exhibits\FIRM Panels.mxd)				
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PROJ. 080043

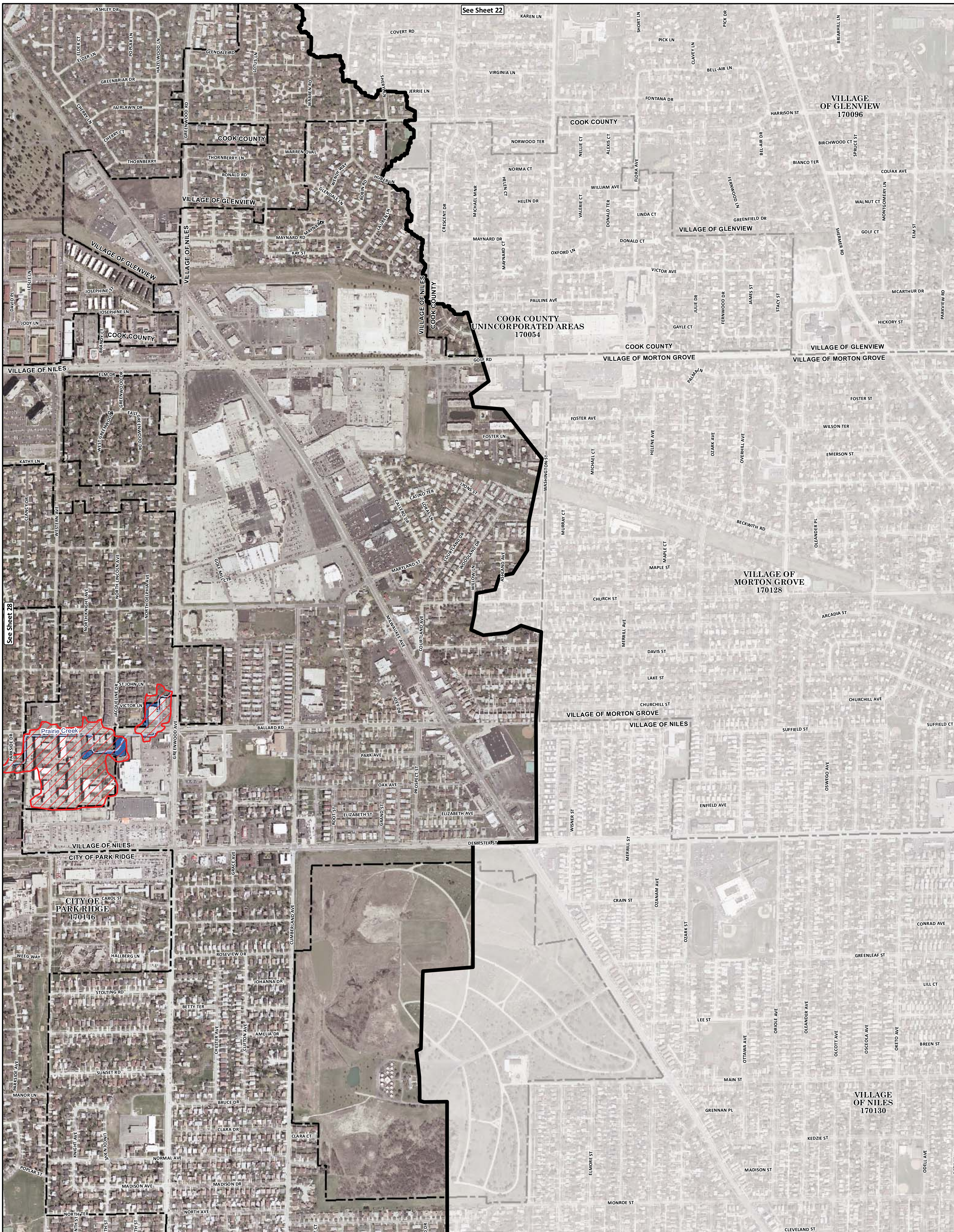
FIRM PANEL

17031C0236J

SHEET 28 OF 82

DRAWING NO.

APPENDIX A



Legend

DWP 100-yr Inundation Area

FEMA Floodplain

Zone A, AH and AO

Zone AE

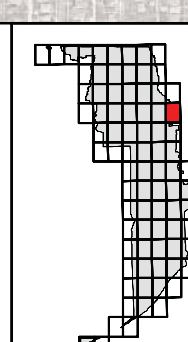
Lower Des Plaines River Watershed Study Area

DWP River/Streams

Municipal Boundary

County Boundary

0 500 1,000 2,000
Feet



CLIENT:

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

CHRISTOPHER B. BURKE ENGINEERING, LTD.
9575 W. Higgins Road, Suite 600 Rosemont, Illinois 60018 (847) 823-0500

TITLE:

COMPARISON OF DWP 100-YR INUNDATION MAPPING AND FEMA EFFECTIVE FIRM LOWER DES PLAINES RIVER WATERSHED

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DATE -- TIME	11/23/2010 -- 12:58:15 PM	DWN.	DRW
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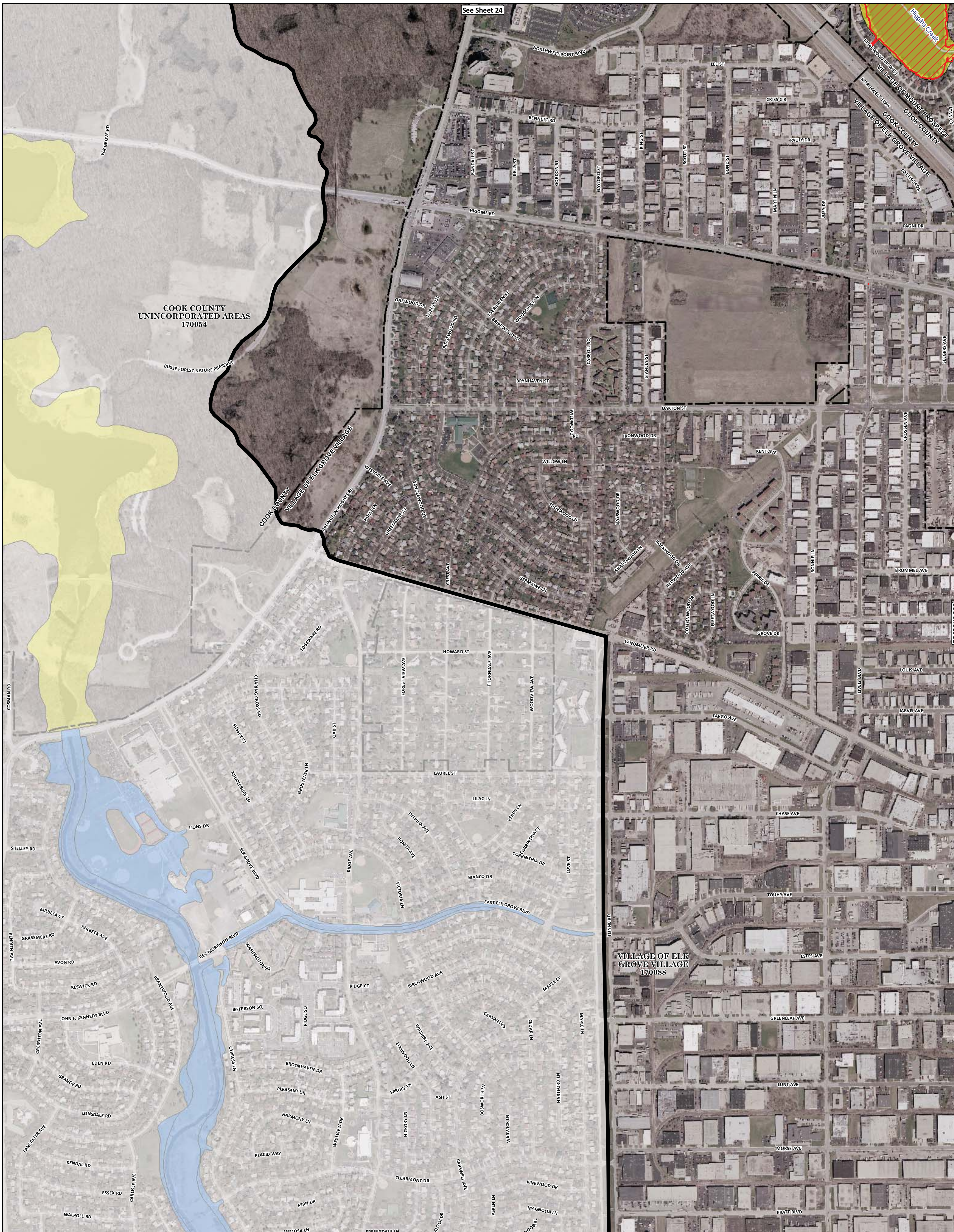
PROJ. 080043

FIRM PANEL
17031C0237J

SHEET 29 OF 82

DRAWING NO.
APPENDIX A



Legend

DWP 100-yr Inundation Area

Lower Des Plaines River Watershed Study Area

FEMA Floodplain

Zone A, AH and AO

Zone AE

DWP River/Streams

Municipal Boundary

County Boundary

0 500 1,000 2,000

Feet

PROJ. 080043

FIRM PANEL 17031C0213J

SHEET 30 OF 82

CLIENT:

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

CHRISTOPHER B. BURKE ENGINEERING, LTD.

9575 W. Higgins Road, Suite 600 Rosemont, Illinois 60018 (847) 823-0500

TITLE:

COMPARISON OF DWP 100-YR INUNDATION MAPPING AND FEMA EFFECTIVE FIRM LOWER DES PLAINES RIVER WATERSHED

FILE NAME	Map Document: (Z:\MWRDGC\08-0043 Phase B\Water\Des Plaines\exhibits\FIRM Panels.mxd)		
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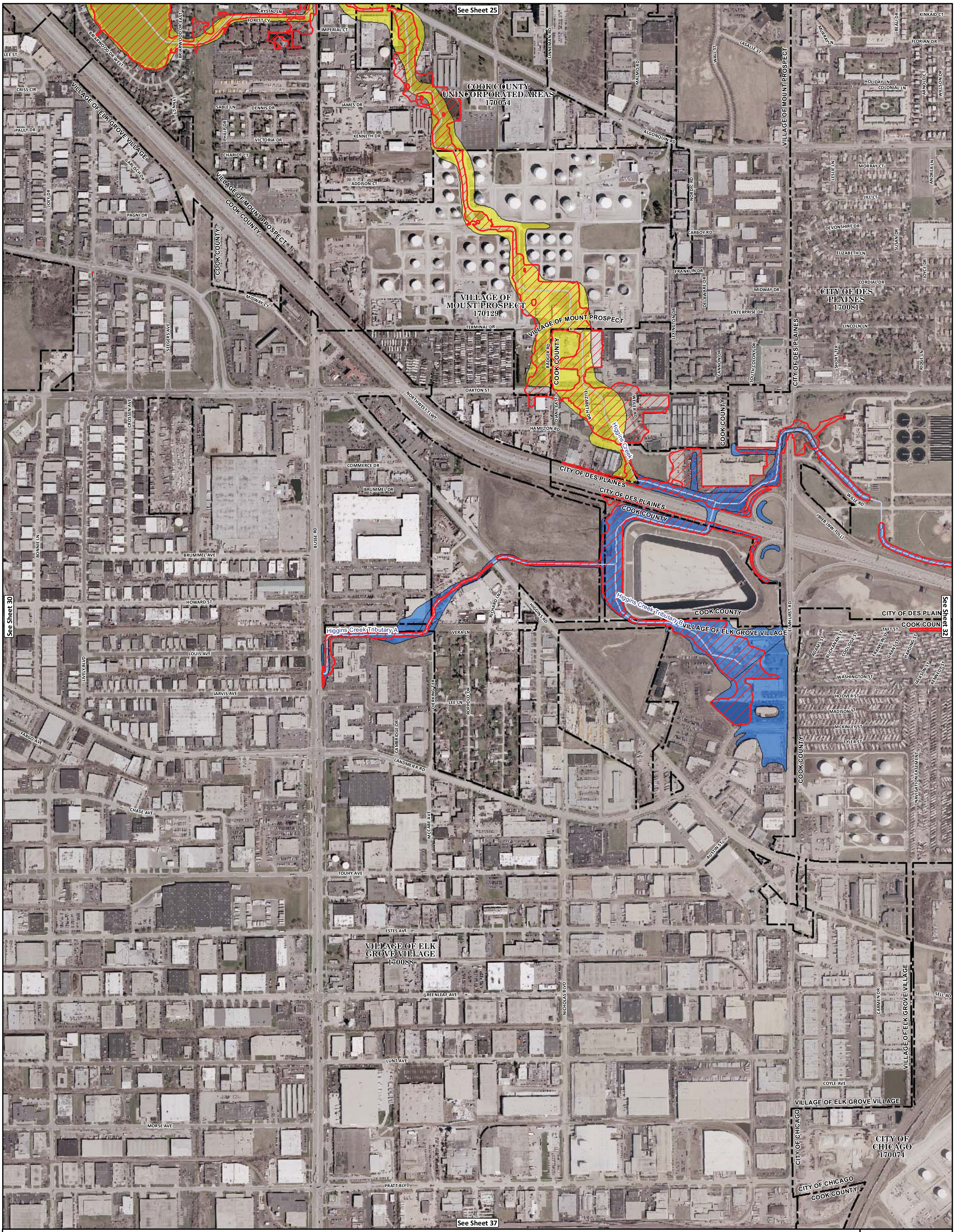
DRAWING NO.

APPENDIX A



Legend

DWP 100-yr Inundation Area

FEMA Floodplain

Zone A, AH and AO

Zone AE

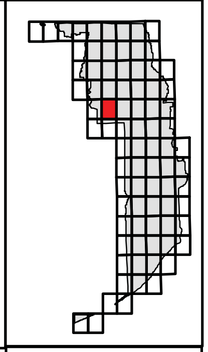
Lower Des Plaines River Watershed Study Area

DWP River/Streams

Municipal Boundary

County Boundary

0 500 1,000 2,000
Feet



CLIENT:

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

CHRISTOPHER B. BURKE ENGINEERING, LTD.
9575 W. Higgins Road, Suite 600 Rosemont, Illinois 60018 (847) 823-0500

TITLE:

COMPARISON OF DWP 100-YR INUNDATION MAPPING AND FEMA EFFECTIVE FIRM LOWER DES PLAINES RIVER WATERSHED

FILE NAME	Map Document: (Z:\MWRDGC\08-0043 Phase B\Water\Des Plaines\exhibits\FIRM Panels.mxd)				
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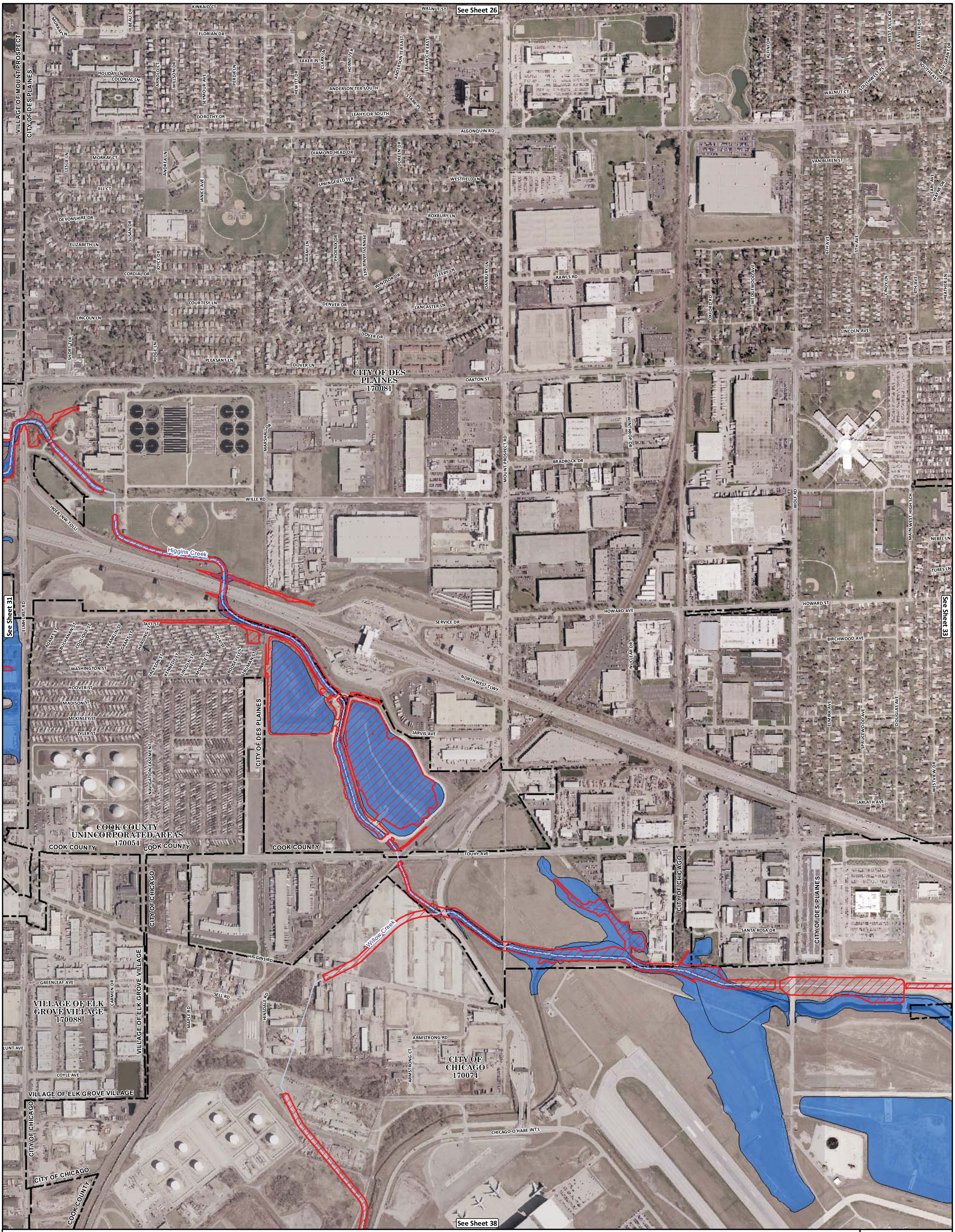
PROJ. 080043

FIRM PANEL
17031C0214J

SHEET 31 OF 82

DRAWING NO.
APPENDIX A



Legend

DWP 100-yr Inundation Area

FEMA Floodplain

Zone A, AH and AO

Zone AE

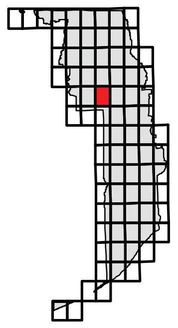
Lower Des Plaines River Watershed Study Area

DWP River/Streams

Municipal Boundary

County Boundary

0 500 1,000 2,000
Feet



CLIENT:

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:

COMPARISON OF DWP 100-YR INUNDATION MAPPING AND FEMA EFFECTIVE FIRM LOWER DES PLAINES RIVER WATERSHED

PROJ. 080043

FIRM PANEL
17031C0218J

SHEET 32 OF 82

CBB

CHRISTOPHER B. BURKE ENGINEERING, LTD.
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FILE NAME	Map Document: (Z:\MWRDGC\08-0043 Phase B\Water\Des Plaines\exhibits\FIRM Panels.mxd)				
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DRAWING NO.
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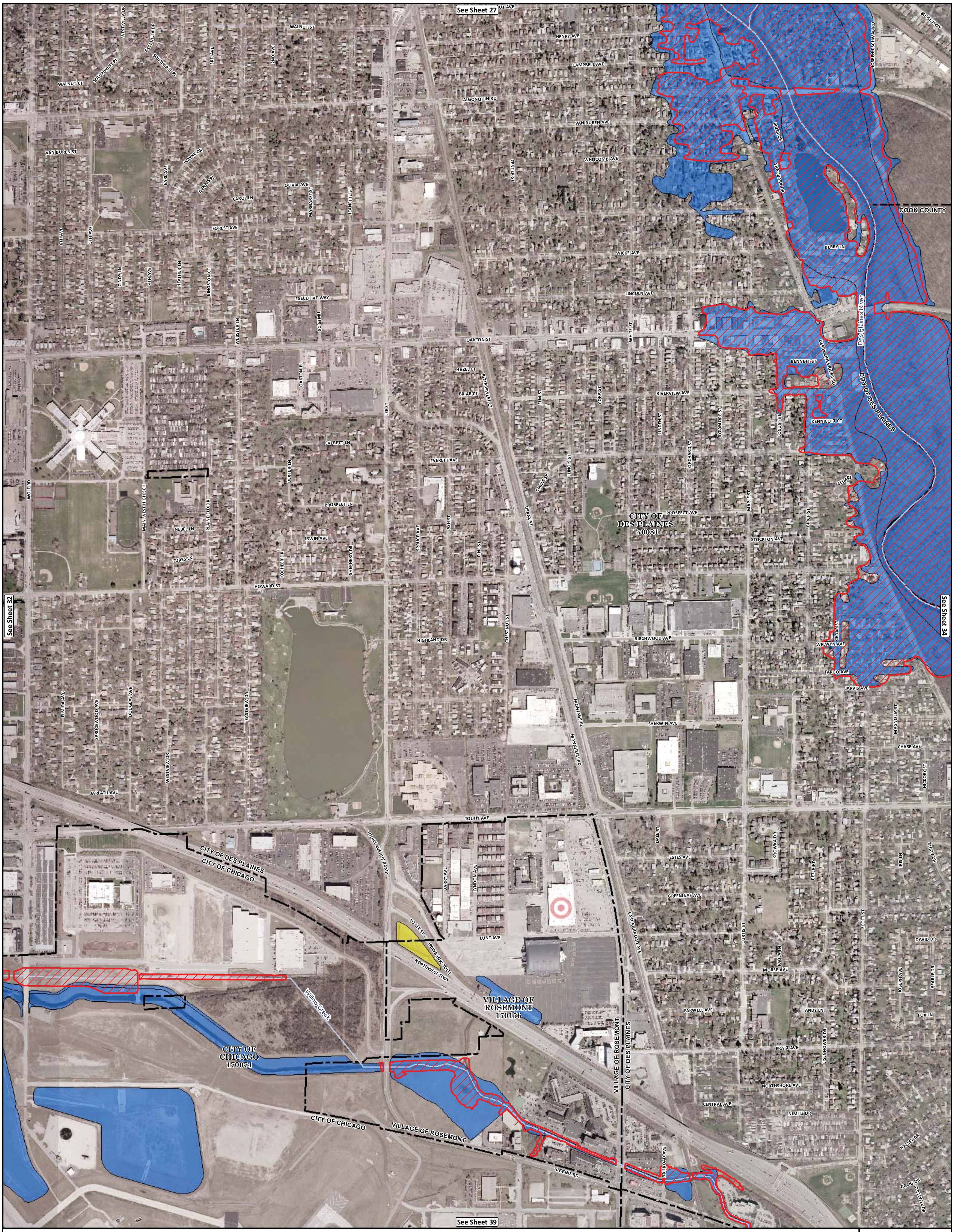

Legend

- DWP 100-yr Inundation Area
- Lower Des Plaines River Watershed Study Area

FEMA Floodplain

- Zone A, AH and AO
- Zone AE
- DWP River/Streams
- Municipal Boundary
- County Boundary

0 500 1,000 2,000
Feet

CLIENT: METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO	TITLE: COMPARISON OF DWP 100-YR INUNDATION MAPPING AND FEMA EFFECTIVE FIRM LOWER DES PLAINES RIVER WATERSHED
CHRISTOPHER B. BURKE ENGINEERING, LTD. 9575 W. Higgins Road, Suite 600 Rosemont, Illinois 60018 (847) 823-0500	FILE NAME: Map Document: (Z:\MWRDGC\08-0043 Phase B\Water\Des Plaines\exhibits\FIRM Panels.mxd)
	DATE -- TIME: 11/23/2010 -- 12:58:15 PM
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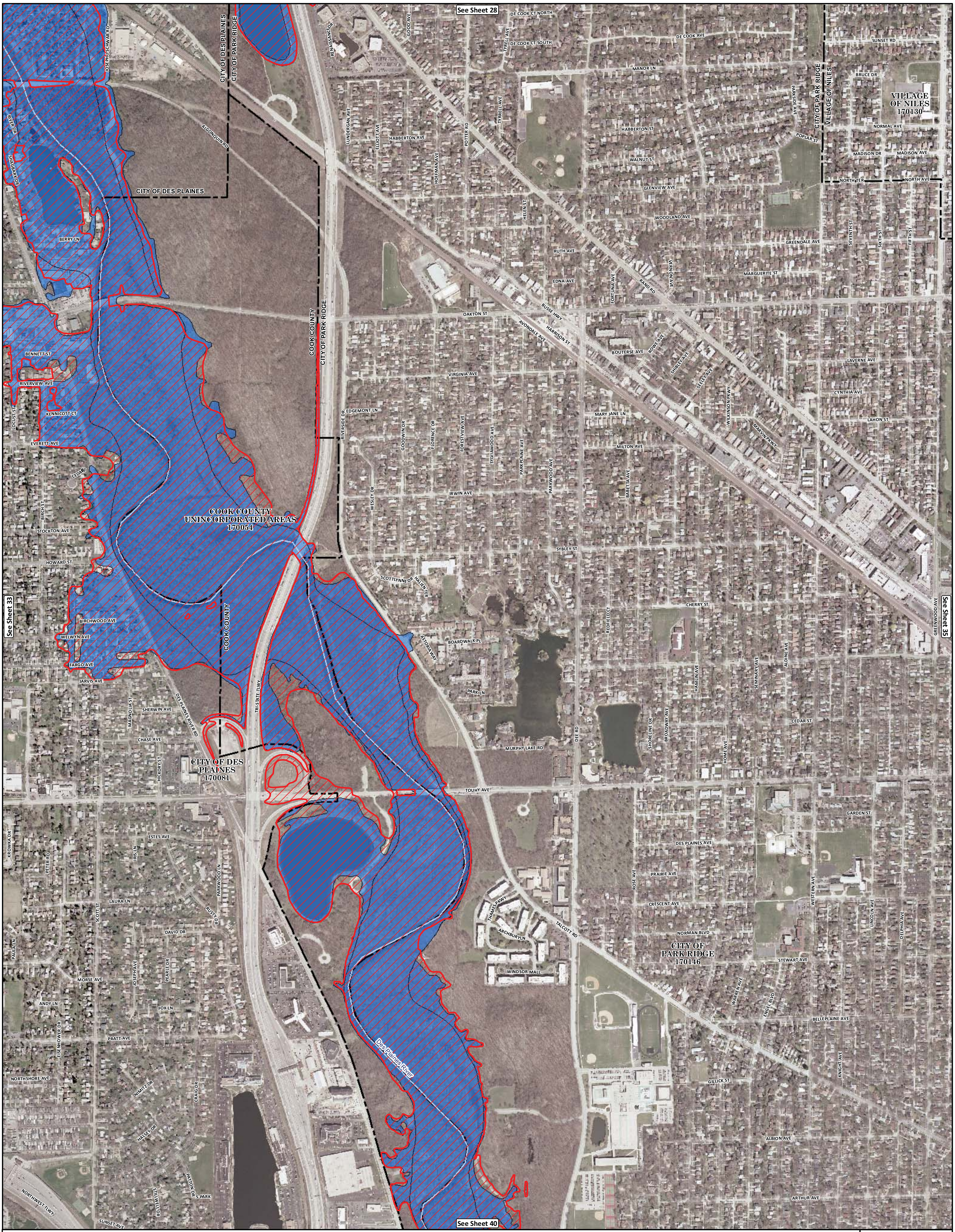
	SCALE: 1"= 1,000'
	GIS USER: DWALTERS

PROJ. 080043
FIRM PANEL 17031C0219J
SHEET 33 OF 82
DRAWING NO. APPENDIX A



Legend

DWP 100-yr Inundation Area

FEMA Floodplain

Zone A, AH and AO

Zone AE

Lower Des Plaines River Watershed Study Area

DWP River/Streams

Municipal Boundary

County Boundary

0 500 1,000 2,000
Feet

CLIENT:

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

CHRISTOPHER B. BURKE ENGINEERING, LTD.
9575 W. Higgins Road, Suite 600 Rosemont, Illinois 60018 (847) 823-0500

TITLE:

COMPARISON OF DWP 100-YR INUNDATION MAPPING AND FEMA EFFECTIVE FIRM LOWER DES PLAINES RIVER WATERSHED

FILE NAME	Map Document: (Z:\MWRDGC\08-0043 Phase B\Water\Des Plaines\exhibits\FIRM Panels.mxd)				
DATE -- TIME	11/23/2010 -- 12:58:15 PM			DWN.	DRW
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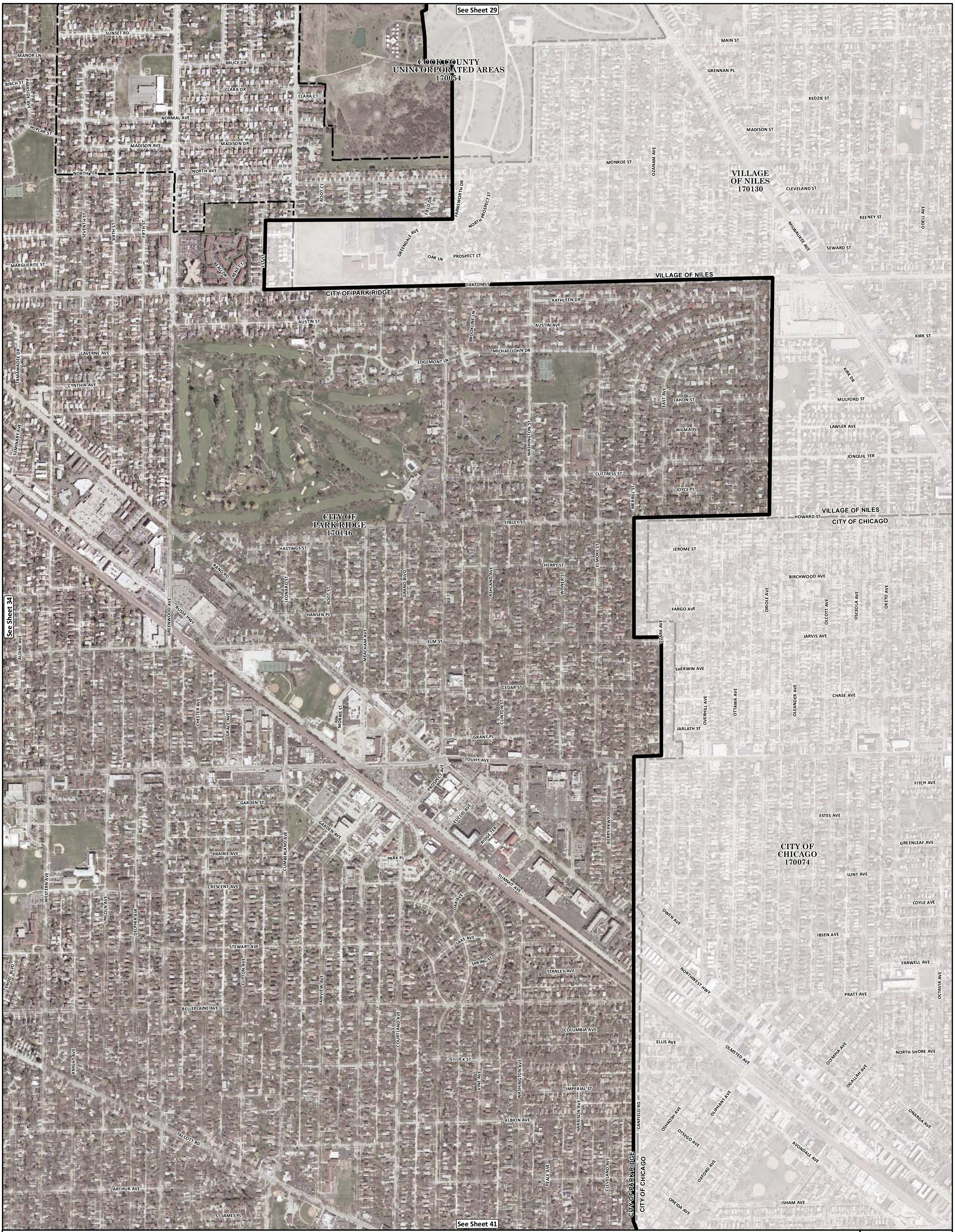
PROJ. 080043

FIRM PANEL
17031C0238J

SHEET 34 OF 82

DRAWING NO.
APPENDIX A



Legend

DWP 100-yr Inundation Area

Lower Des Plaines River Watershed Study Area

FEMA Floodplain

DWP River/Streams

Zone A, AH and AO

Municipal Boundary

Zone AE

County Boundary

0 500 1,000 2,000
Feet

CLIENT:

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

CHRISTOPHER B. BURKE ENGINEERING, LTD.
9575 W. Higgins Road, Suite 600 Rosemont, Illinois 60018 (847) 823-0500

TITLE:

COMPARISON OF DWP 100-YR INUNDATION MAPPING AND FEMA EFFECTIVE FIRM LOWER DES PLAINES RIVER WATERSHED

FILE NAME	Map Document: (Z:\MWRDGC\08-0043 Phase B\Water\Des Plaines\exhibits\FIRM Panels.mxd)				
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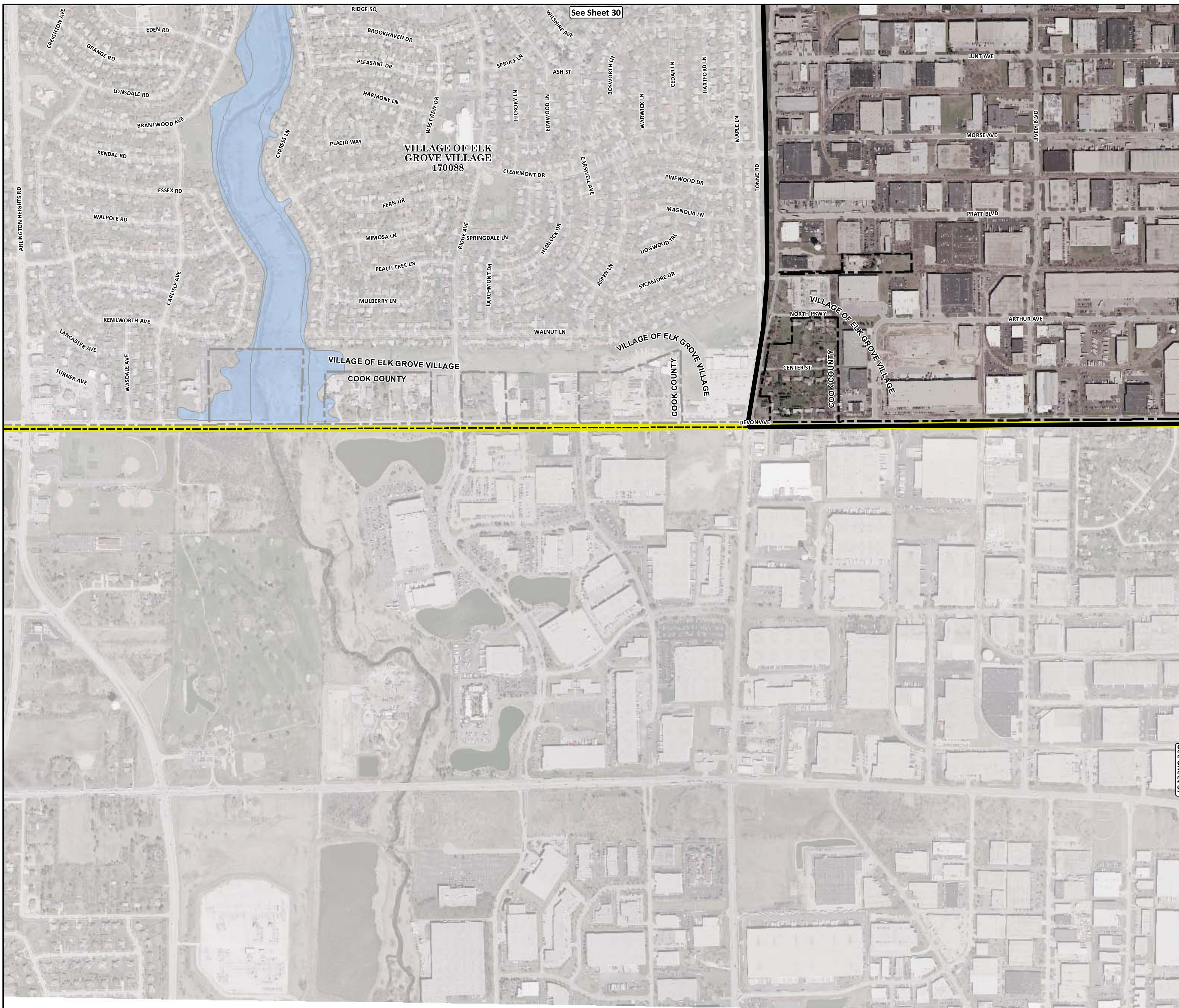
PROJ. 080043

FIRM PANEL
17031C0239J

SHEET 35 OF 82

DRAWING NO.
APPENDIX A



Legend

DWP 100-yr Inundation Area	Lower Des Plaines River Watershed Study Area
FEMA Floodplain	DWP River/Streams
Zone A, AH and AO	Municipal Boundary
Zone AE	County Boundary

0 500 1,000 2,000
Feet

CLIENT:

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

CHRISTOPHER B. BURKE ENGINEERING, LTD.
9575 W. Higgins Road, Suite 600 Rosemont, Illinois 60018 (847) 823-0500

TITLE:

COMPARISON OF DWP 100-YR INUNDATION MAPPING AND FEMA EFFECTIVE FIRM LOWER DES PLAINES RIVER WATERSHED

FILE NAME	Map Document: (Z:\MWRDGC\08-0043 Phase B\Water\Des Plaines\exhibits\FIRM Panels.mxd)
DATE -- TIME	11/23/2010 -- 12:58:15 PM
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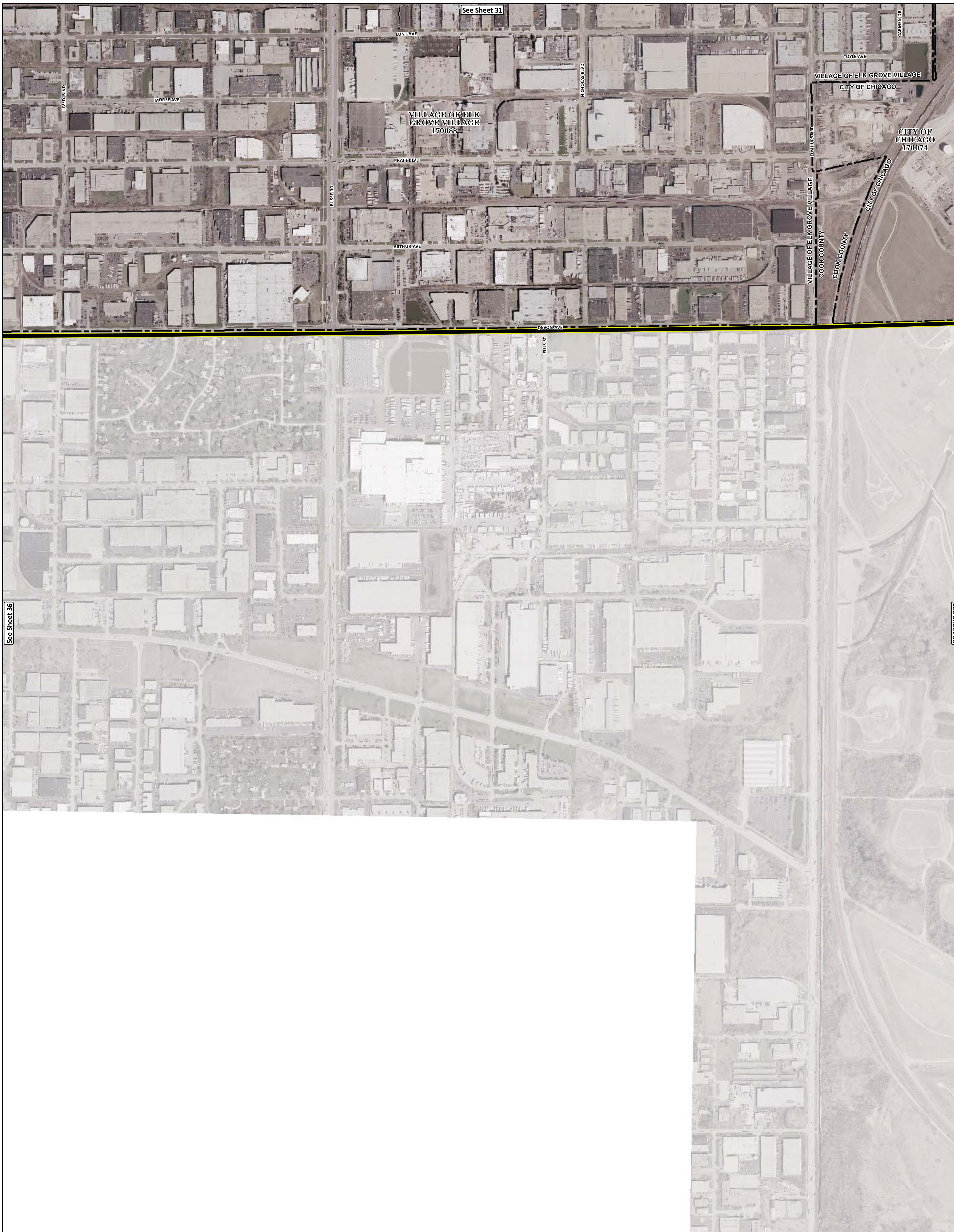
MODEL: ArcGIS 9.3	SCALE: 1"= 1,000'
GIS USER:	DWALTERS

PROJ. 080043

FIRM PANEL
17031C0351J

SHEET 36 OF 82

DRAWING NO.
APPENDIX A



Legend

DWP 100-yr Inundation Area

Lower Des Plaines River Watershed Study Area

FEMA Floodplain

DWP River/Streams

Zone A, AH and AO

Municipal Boundary

Zone AE

County Boundary

0 500 1,000 2,000

Feet

CLIENT:

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

CHRISTOPHER B. BURKE ENGINEERING, LTD.

9575 W. Higgins Road, Suite 600 Rosemont, Illinois 60018 (847) 823-0500

TITLE:

COMPARISON OF DWP 100-YR INUNDATION MAPPING AND FEMA EFFECTIVE FIRM LOWER DES PLAINES RIVER WATERSHED

FILE NAME	Map Document: (Z:\MWRDGC\08-0043 Phase B\Water\Des Plaines\exhibits\FIRM Panels.mxd)				
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				GIS USER:	DWALTERS

PROJ. 080043

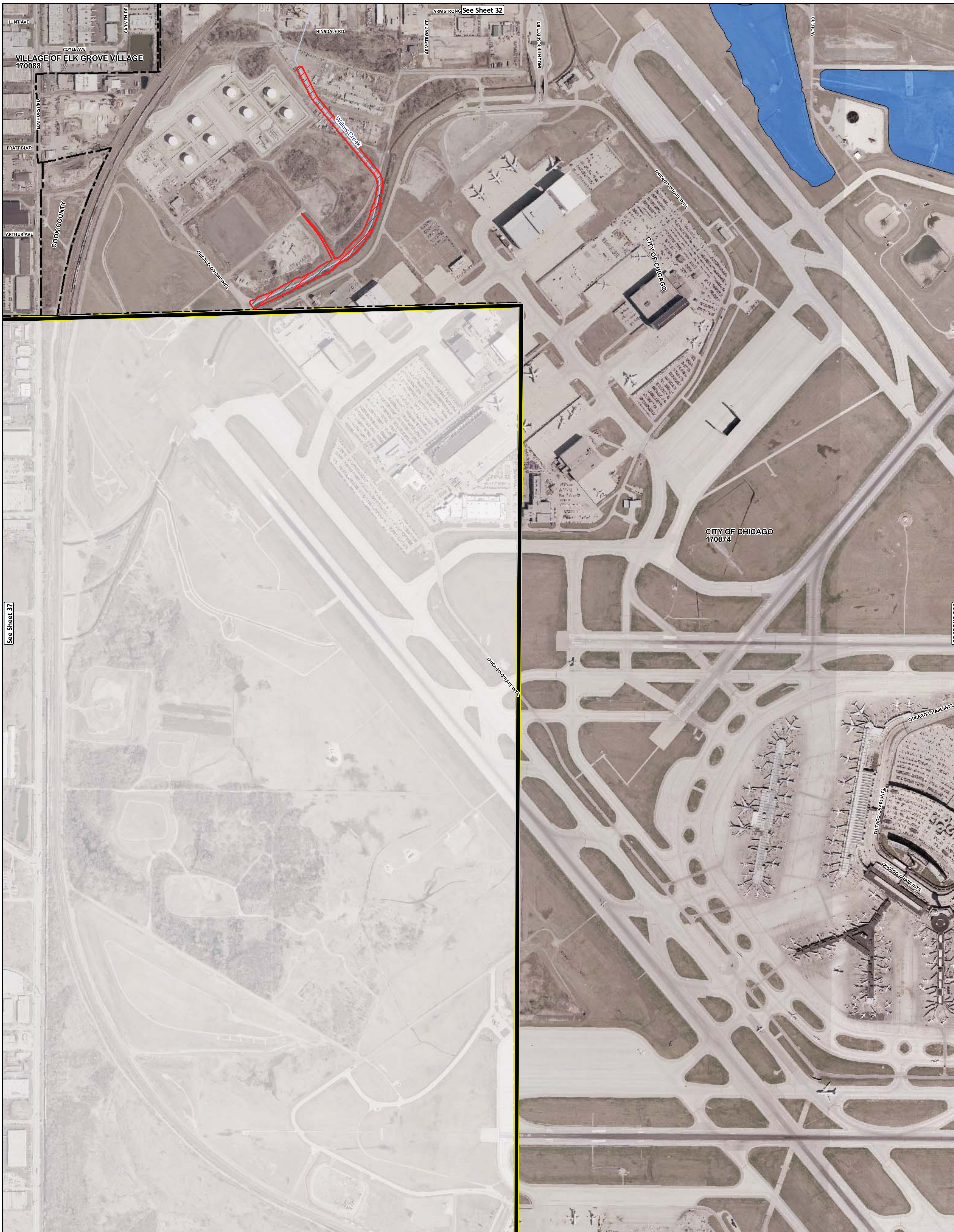
FIRM PANEL

17031C0352J

SHEET 37 OF 82

DRAWING NO.

APPENDIX A



Legend

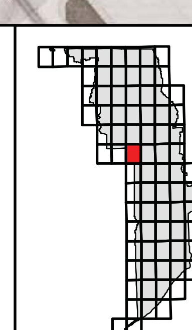
FEMA Floodplain

- Zone A, AH and AO
- Zone AE
- Lower Des Plaines River Watershed Study Area
- DWP River/Streams
- Municipal Boundary
- County Boundary

N

0 500 1,000 2,000

Feet



CLIENT:

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

CHRISTOPHER B. BURKE ENGINEERING, LTD.

9575 W. Higgins Road, Suite 600 Rosemont, Illinois 60018 (847) 823-0500

TITLE:

COMPARISON OF DWP 100-YR INUNDATION MAPPING AND FEMA EFFECTIVE FIRM LOWER DES PLAINES RIVER WATERSHED

FILE NAME	Map Document: (Z:\MWRDGC\08-0043 Phase B\Water\Des Plaines\exhibits\FIRM Panels.mxd)		
DATE -- TIME	11/23/2010 -- 12:58:15 PM	DWN.	DRW
MODEL:	ArcGIS 9.3	SCALE:	1"= 1,000'
		GIS USER:	DWALTERS

PROJ. 080043

FIRM PANEL 17031C0356J

SHEET 38 OF 82

DRAWING NO.

APPENDIX A

Legend

FEMA Floodplain

- Zone A, AH and AO
- Zone AE

- Lower Des Plaines River Watershed Study Area
- DWP River/Streams
- Municipal Boundary
- County Boundary

0 500 1,000 2,000
Feet

CLIENT:
METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

CHRISTOPHER B. BURKE ENGINEERING, LTD.
9575 W. Higgins Road, Suite 600 Rosemont, Illinois 60018 (847) 823-0500

TITLE:
COMPARISON OF DWP 100-YR INUNDATION MAPPING AND FEMA EFFECTIVE FIRM LOWER DES PLAINES RIVER WATERSHED

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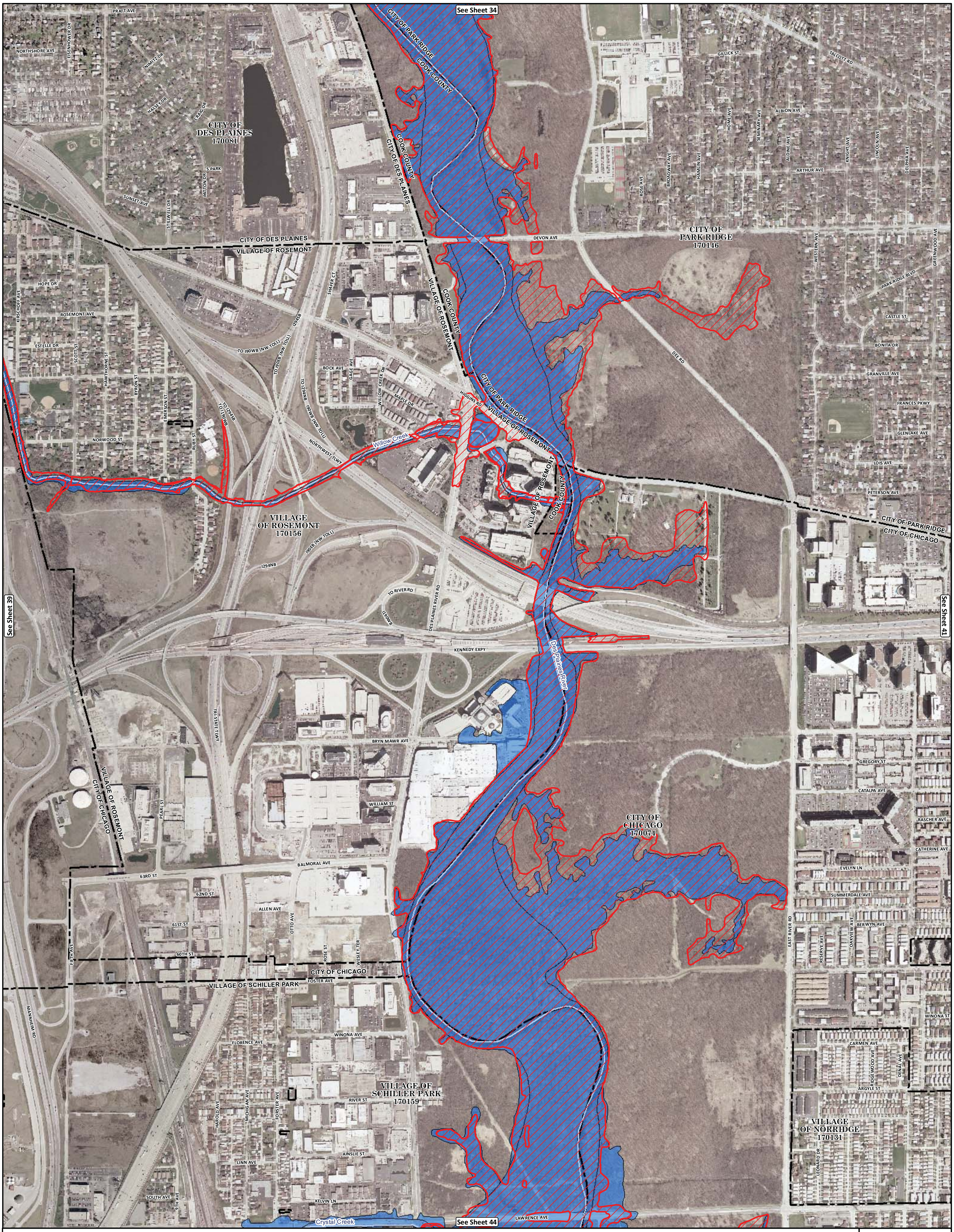
PROJ. 080043
FIRM PANEL
17031C0357J
SHEET 39 OF 82
DRAWING NO.
APPENDIX A



Legend

DWP 100-yr Inundation Area

FEMA Floodplain

Zone A, AH and AO

Zone AE

Lower Des Plaines River Watershed Study Area

DWP River/Streams

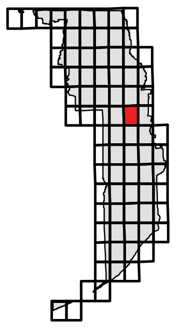
Municipal Boundary

County Boundary

N

0 500 1,000 2,000

Feet



CLIENT:

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

CHRISTOPHER B. BURKE ENGINEERING, LTD.

9575 W. Higgins Road, Suite 600 Rosemont, Illinois 60018 (847) 823-0500

TITLE:

COMPARISON OF DWP 100-YR INUNDATION MAPPING AND FEMA EFFECTIVE FIRM LOWER DES PLAINES RIVER WATERSHED

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	MODEL: ArcGIS 9.3	SCALE:	1"= 1,000'
		GIS USER:	DWALTERS

PROJ. 080043

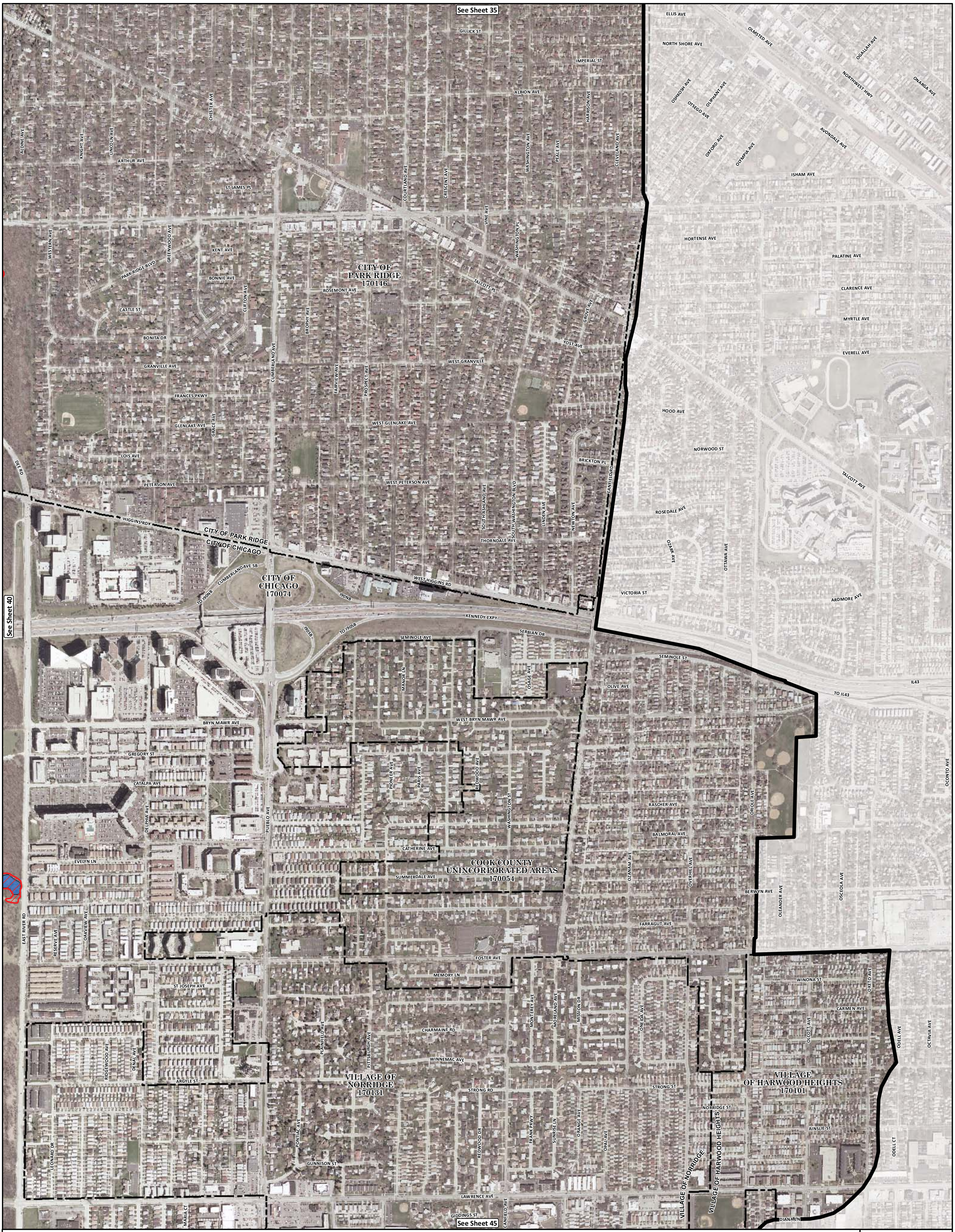
FIRM PANEL

17031C0376J

SHEET 40 OF 82

DRAWING NO.

APPENDIX A



Legend

- DWP 100-yr Inundation Area
- Lower Des Plaines River Watershed Study Area

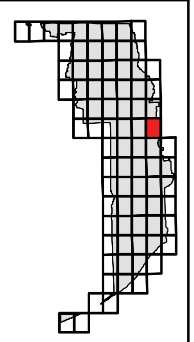
FEMA Floodplain

- Zone A, AH and AO
- Zone AE
- DWP River/Streams
- Municipal Boundary
- County Boundary

N

0 500 1,000 2,000

Feet



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METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

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9575 W. Higgins Road, Suite 600 Rosemont, Illinois 60018 (847) 823-0500

TITLE:

COMPARISON OF DWP 100-YR INUNDATION MAPPING AND FEMA EFFECTIVE FIRM LOWER DES PLAINES RIVER WATERSHED

FILE NAME	Map Document: (Z:\MWRDGC\08-0043 Phase B\Water\Des Plaines\exhibits\FIRM Panels.mxd)		
DATE -- TIME	11/23/2010 -- 12:58:15 PM	DWN	DRW
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PROJ. 080043

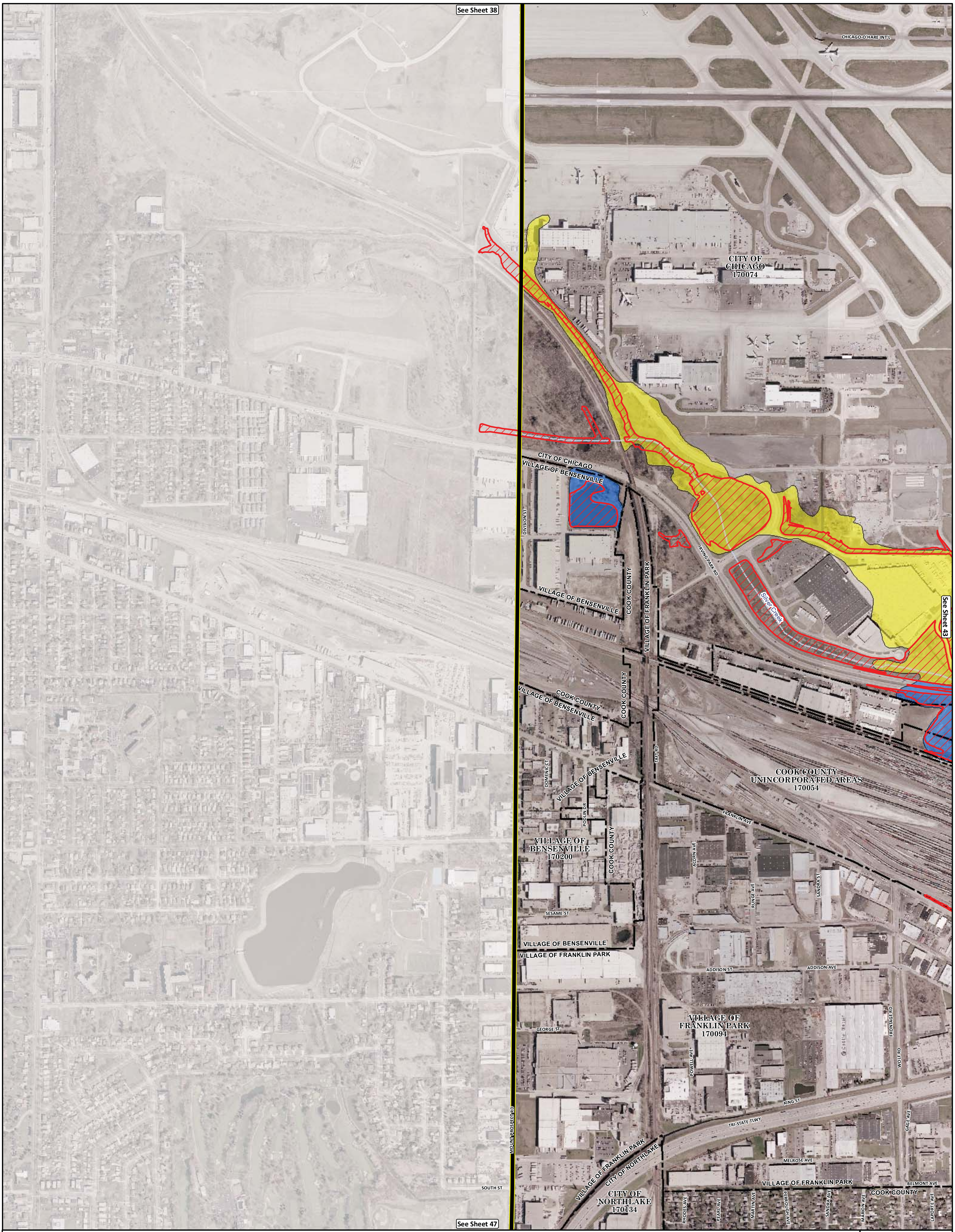
FIRM PANEL

17031C0380J

SHEET 41 OF 82

DRAWING NO.

APPENDIX A



Legend

DWP 100-yr Inundation Area

FEMA Floodplain

Zone A, AH and AO

Zone AE

Lower Des Plaines River Watershed Study Area

DWP River/Streams

Municipal Boundary

County Boundary

0 500 1,000 2,000

Feet

CLIENT:

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

CHRISTOPHER B. BURKE ENGINEERING, LTD.

9575 W. Higgins Road, Suite 600 Rosemont, Illinois 60018 (847) 823-0500

TITLE:

COMPARISON OF DWP 100-YR INUNDATION MAPPING AND FEMA EFFECTIVE FIRM LOWER DES PLAINES RIVER WATERSHED

FILE NAME	Map Document: (Z:\MWRDGC\08-0043 Phase B\Water\Des Plaines\exhibits\FIRM Panels.mxd)
DATE -- TIME	11/23/2010 -- 12:58:15 PM
MODEL:	ArcGIS 9.3
DWN.	DRW
SCALE:	1"= 1,000'
GIS USER:	DWALTERS

PROJ. 080043

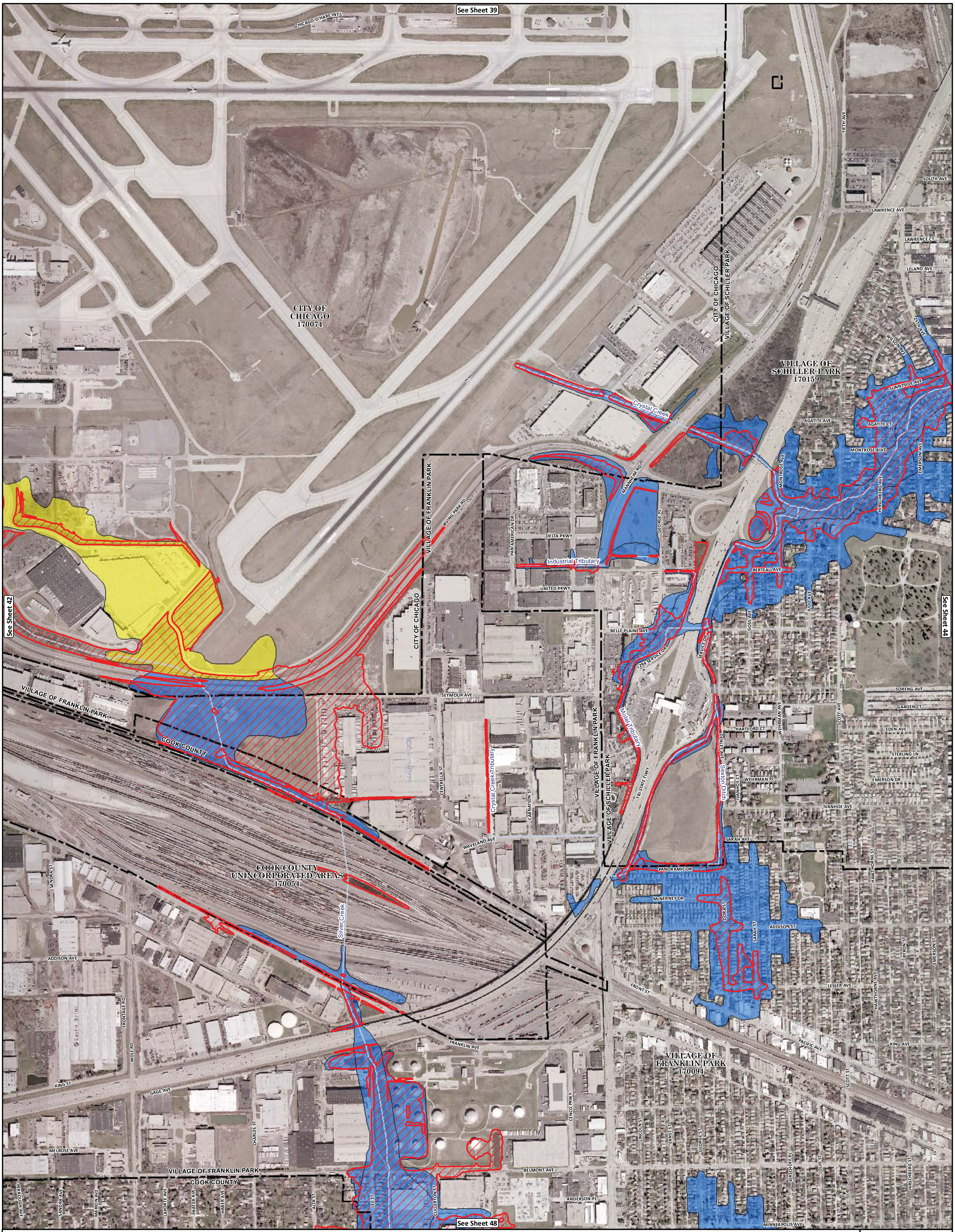
FIRM PANEL

17031C0358J

SHEET 42 OF 82

DRAWING NO.

APPENDIX A



Legend

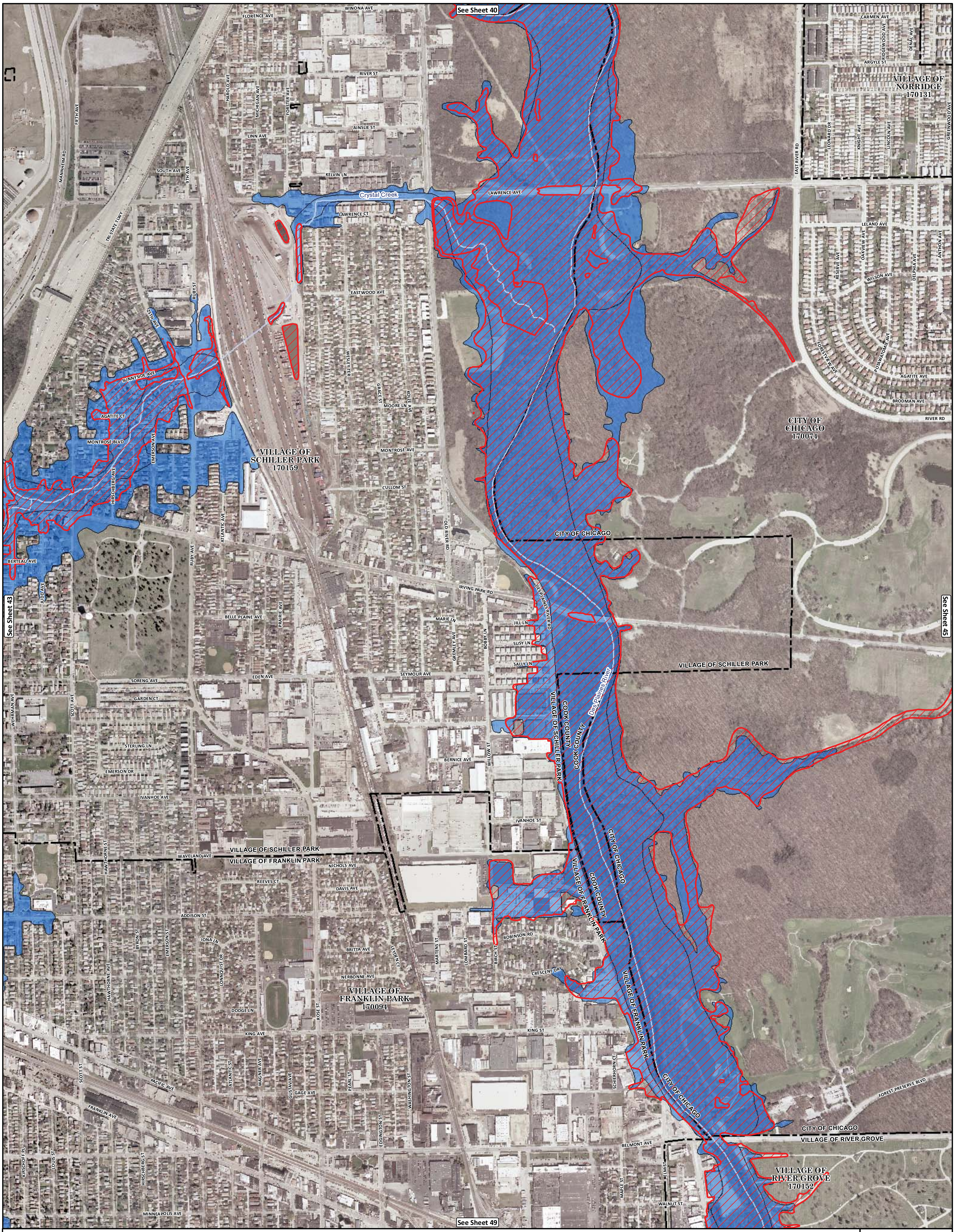
- DWP 100-yr Inundation Area
- Lower Des Plaines River Watershed Study Area

FEMA Floodplain

- Zone A, AH and AO
- Zone AE
- DWP River/Streams
- Municipal Boundary
- County Boundary

0 500 1,000 2,000
Feet

CLIENT: METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO	TITLE: COMPARISON OF DWP 100-YR INUNDATION MAPPING AND FEMA EFFECTIVE FIRM LOWER DES PLAINES RIVER WATERSHED	PROJ. 080043
		FIRM PANEL 17031C0359J
CHRISTOPHER B. BURKE ENGINEERING, LTD. 9575 W. Higgins Road, Suite 600 Rosemont, Illinois 60018 (847) 823-0500	FILE NAME: Map Document: (Z:\MWRDGC\08-0043 Phase B\Water\Des Plaines\exhibits\FIRM Panels.mxd)	SHEET 43 OF 82
	DATE -- TIME: 11/23/2010 -- 12:58:15 PM; MODEL: ArcGIS 9.3; DWN.: DRW; SCALE: 1"= 1,000'; GIS USER: DWALTERS	DRAWING NO. APPENDIX A



Legend

DWP 100-yr Inundation Area

FEMA Floodplain

Zone A, AH and AO

Zone AE

Lower Des Plaines River Watershed Study Area

DWP River/Streams

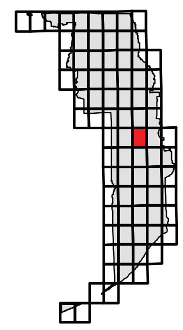
Municipal Boundary

County Boundary

N

0 500 1,000 2,000

Feet



CLIENT:

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

CHRISTOPHER B. BURKE ENGINEERING, LTD.

9575 W. Higgins Road, Suite 600 Rosemont, Illinois 60018 (847) 823-0500

TITLE:

COMPARISON OF DWP 100-YR INUNDATION MAPPING AND FEMA EFFECTIVE FIRM LOWER DES PLAINES RIVER WATERSHED

FILE NAME	Map Document: (Z:\MWRDGC\08-0043 Phase B\Water\Des Plaines\exhibits\FIRM Panels.mxd)				
DATE -- TIME	11/23/2010 -- 12:58:15 PM		DWN.	DRW	
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			GIS USER:	DWALTERS	

PROJ. 080043

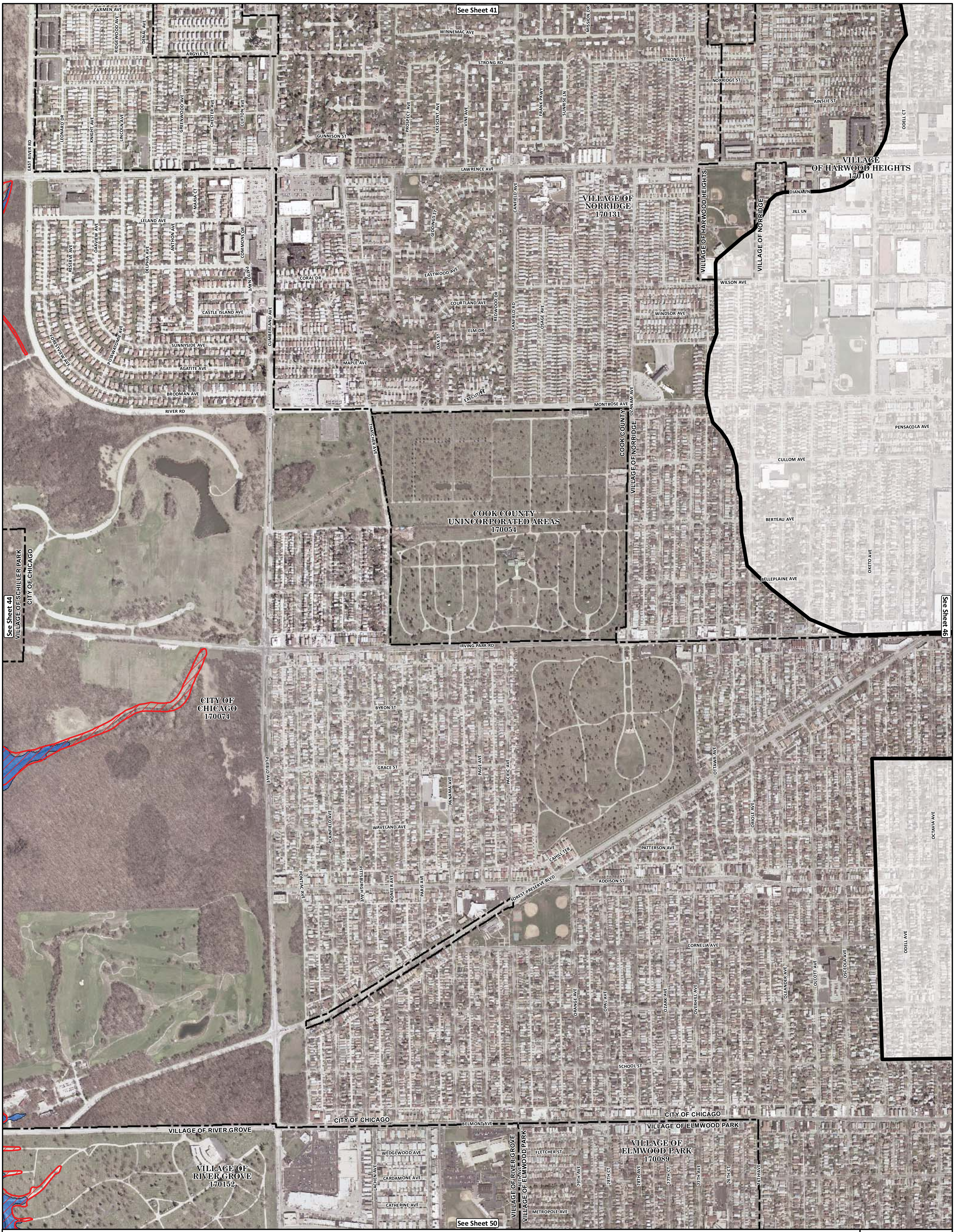
FIRM PANEL

17031C0378J

SHEET 44 OF 82

DRAWING NO.

APPENDIX A



Legend

DWP 100-yr Inundation Area

Lower Des Plaines River Watershed Study Area

FEMA Floodplain

DWP River/Streams

Zone A, AH and AO

Municipal Boundary

Zone AE

County Boundary

0 500 1,000 2,000
Feet

CLIENT:

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

CHRISTOPHER B. BURKE ENGINEERING, LTD.
9575 W. Higgins Road, Suite 600 Rosemont, Illinois 60018 (847) 823-0500

TITLE:

COMPARISON OF DWP 100-YR INUNDATION MAPPING AND FEMA EFFECTIVE FIRM LOWER DES PLAINES RIVER WATERSHED

FILE NAME	Map Document: (Z:\MWRDGC\08-0043 Phase B\Water\Des Plaines\exhibits\FIRM Panels.mxd)				
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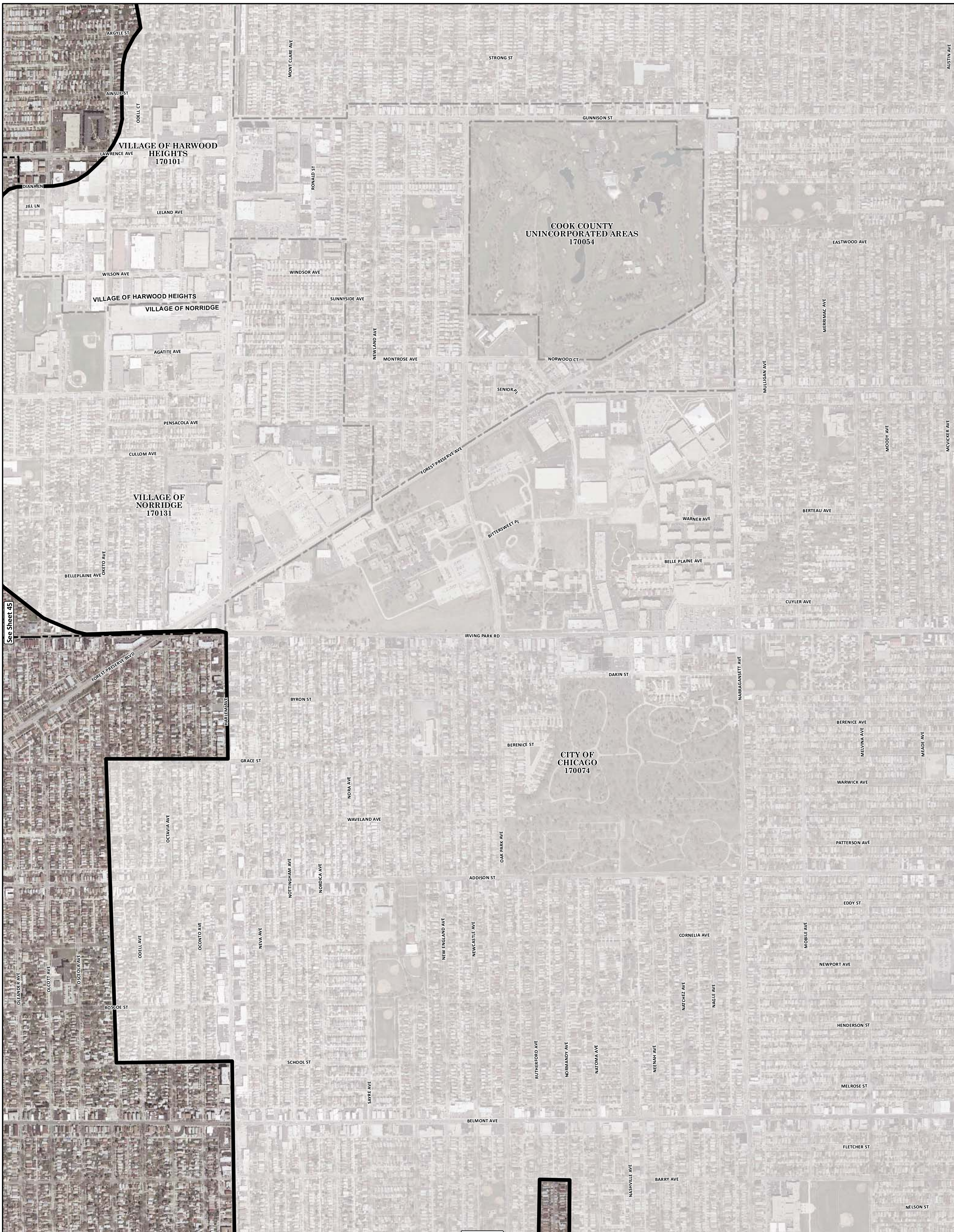
PROJ. 080043

FIRM PANEL
17031C0380J

SHEET 45 OF 82

DRAWING NO.
APPENDIX A



Legend

DWP 100-yr Inundation Area

Lower Des Plaines River Watershed Study Area

FEMA Floodplain

DWP River/Streams

Zone A, AH and AO

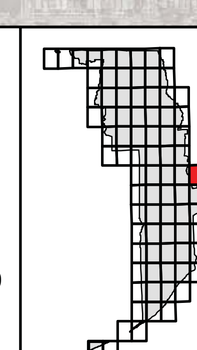
Municipal Boundary

Zone AE

County Boundary

0 500 1,000 2,000

Feet



CLIENT:

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

CHRISTOPHER B. BURKE ENGINEERING, LTD.

9575 W. Higgins Road, Suite 600 Rosemont, Illinois 60018 (847) 823-0500

TITLE:

COMPARISON OF DWP 100-YR INUNDATION MAPPING AND FEMA EFFECTIVE FIRM LOWER DES PLAINES RIVER WATERSHED

FILE NAME	Map Document: (Z:\MWRDGC\08-0043 Phase B\Water\Des Plaines\exhibits\FIRM Panels.mxd)		
DATE -- TIME	11/23/2010 -- 12:58:15 PM	DWN.	DRW
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		GIS USER:	DWALTERS

PROJ. 080043

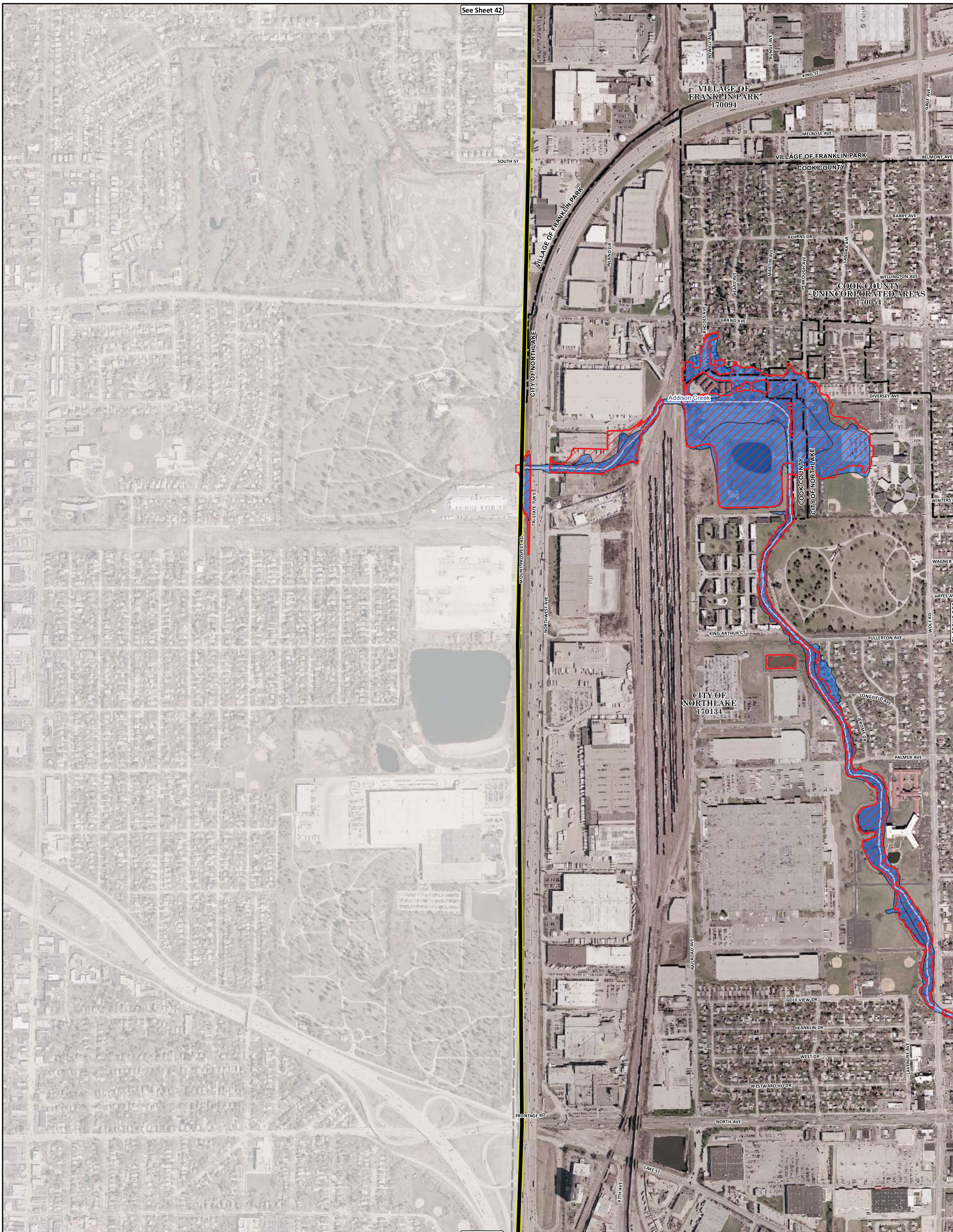
FIRM PANEL

17031C0385J

SHEET 46 OF 82

DRAWING NO.

APPENDIX A



Legend

- DWP 100-yr Inundation Area
- Lower Des Plaines River Watershed Study Area

FEMA Floodplain

- Zone A, AH and AO
- Zone AE
- DWP River/Streams
- Municipal Boundary
- County Boundary

N

0 500 1,000 2,000
Feet

CLIENT:

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

CHRISTOPHER B. BURKE ENGINEERING, LTD.
9575 W. Higgins Road, Suite 600 Rosemont, Illinois 60018 (847) 823-0500

TITLE:

COMPARISON OF DWP 100-YR INUNDATION MAPPING AND FEMA EFFECTIVE FIRM LOWER DES PLAINES RIVER WATERSHED

FILE NAME	Map Document: (Z:\MWRDGC\08-0043 Phase B\Water\Des Plaines\exhibits\FIRM Panels.mxd)			
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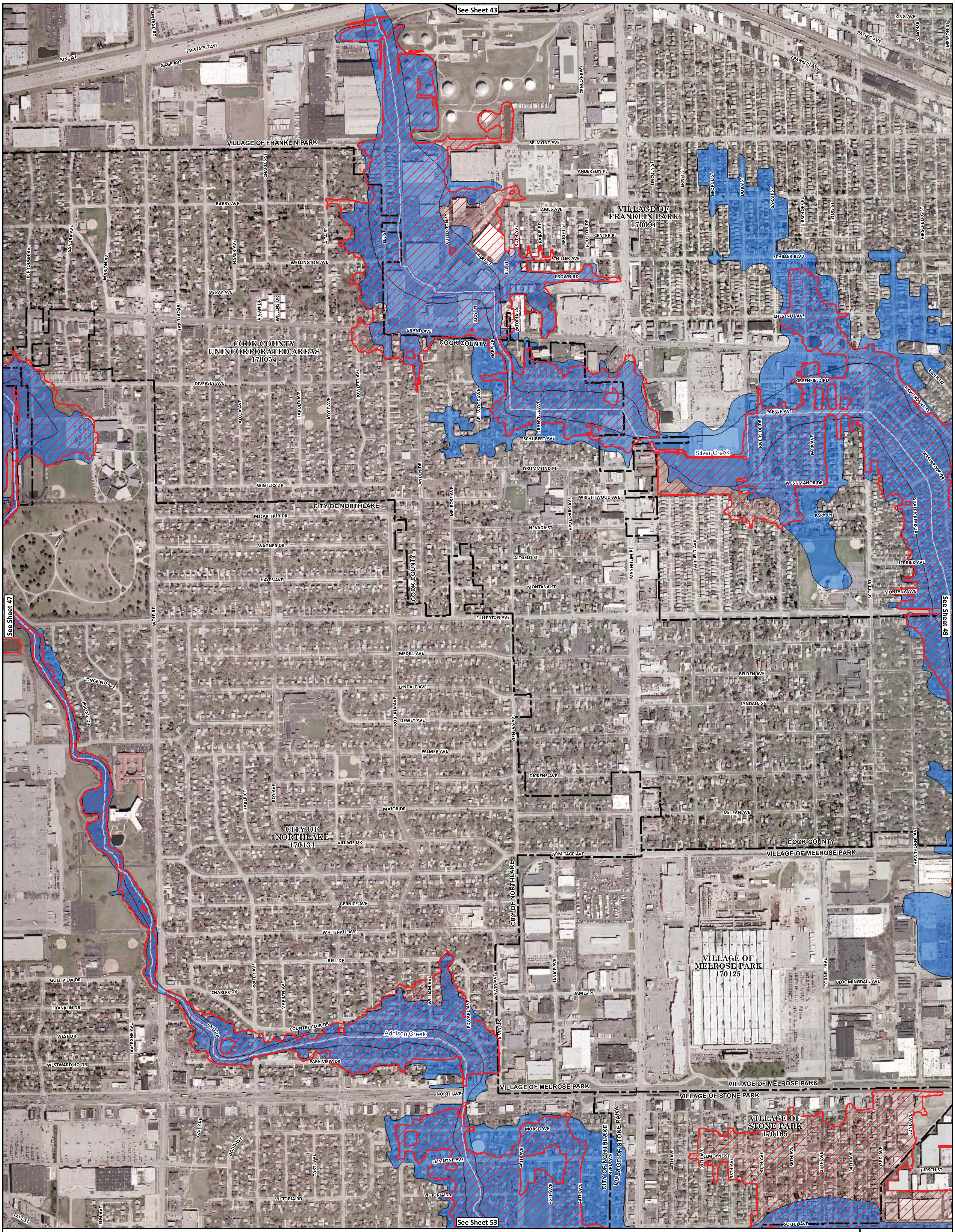
PROJ. 080043

FIRM PANEL
17031C0366J

SHEET 47 OF 82

DRAWING NO.
APPENDIX A



Legend

DWP 100-yr Inundation Area

FEMA Floodplain

Zone A, AH and AO

Zone AE

Lower Des Plaines River Watershed Study Area

DWP River/Streams

Municipal Boundary

County Boundary

0 500 1,000 2,000

Feet

CLIENT:

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

CHRISTOPHER B. BURKE ENGINEERING, LTD.

9575 W. Higgins Road, Suite 600 Rosemont, Illinois 60018 (847) 823-0500

TITLE:

COMPARISON OF DWP 100-YR INUNDATION MAPPING AND FEMA EFFECTIVE FIRM LOWER DES PLAINES RIVER WATERSHED

FILE NAME	Map Document: (Z:\MWRDGC\08-0043 Phase B\Water\Des Plaines\exhibits\FIRM Panels.mxd)		
DATE -- TIME	11/23/2010 -- 12:58:15 PM	DWN:	DRW
MODEL:	ArcGIS 9.3	SCALE:	1"= 1,000'
		GIS USER:	DWALTERS

PROJ. 080043

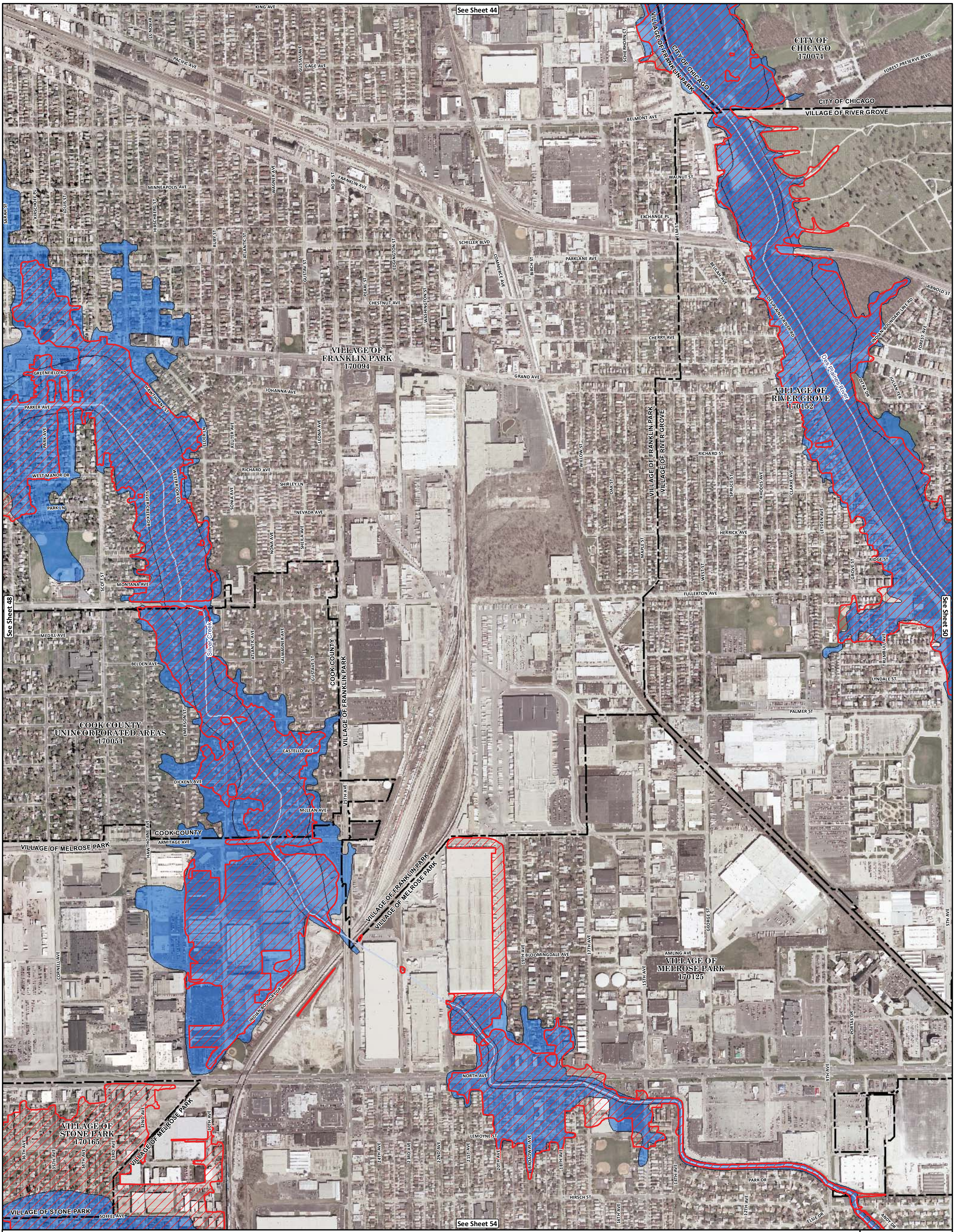
FIRM PANEL

17031C0367J

SHEET 48 OF 82

DRAWING NO.

APPENDIX A



Legend

DWP 100-yr Inundation Area

Lower Des Plaines River Watershed Study Area

DWP River/Streams

Municipal Boundary

County Boundary

FEMA Floodplain

Zone A, AH and AO

Zone AE

0 500 1,000 2,000

Feet

CLIENT:

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

CHRISTOPHER B. BURKE ENGINEERING, LTD.

9575 W. Higgins Road, Suite 600 Rosemont, Illinois 60018 (847) 823-0500

TITLE:

COMPARISON OF DWP 100-YR INUNDATION MAPPING AND FEMA EFFECTIVE FIRM LOWER DES PLAINES RIVER WATERSHED

FILE NAME	Map Document: (Z:\MWRDGC\08-0043 Phase B\Water\Des Plaines\exhibits\FIRM Panels.mxd)		
DATE -- TIME	11/23/2010 -- 12:58:15 PM	DWN.	DRW
	MODEL: ArcGIS 9.3	SCALE:	1"= 1,000'
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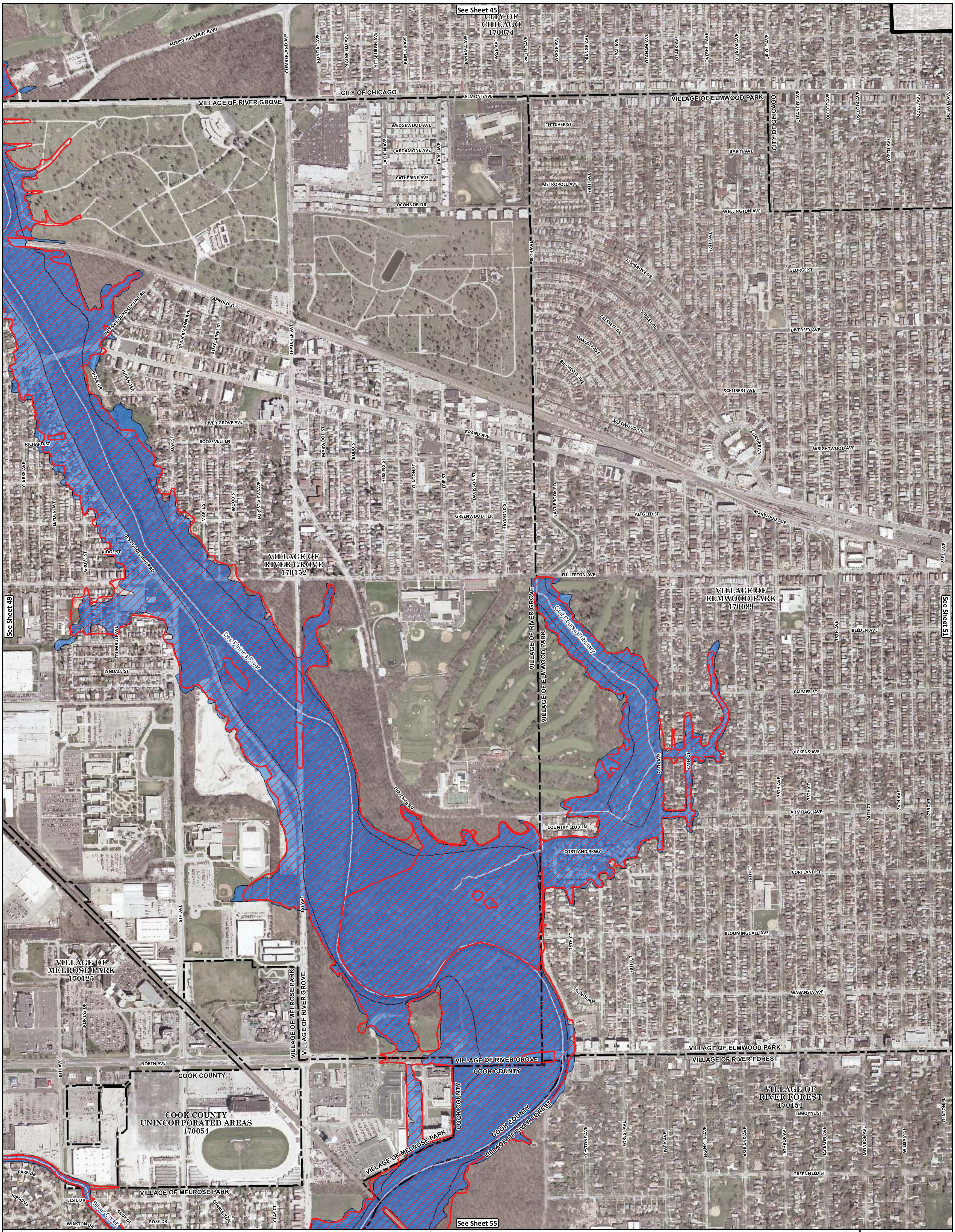
PROJ. 080043

FIRM PANEL 17031C0386J

SHEET 49 OF 82

DRAWING NO.

APPENDIX A



Legend

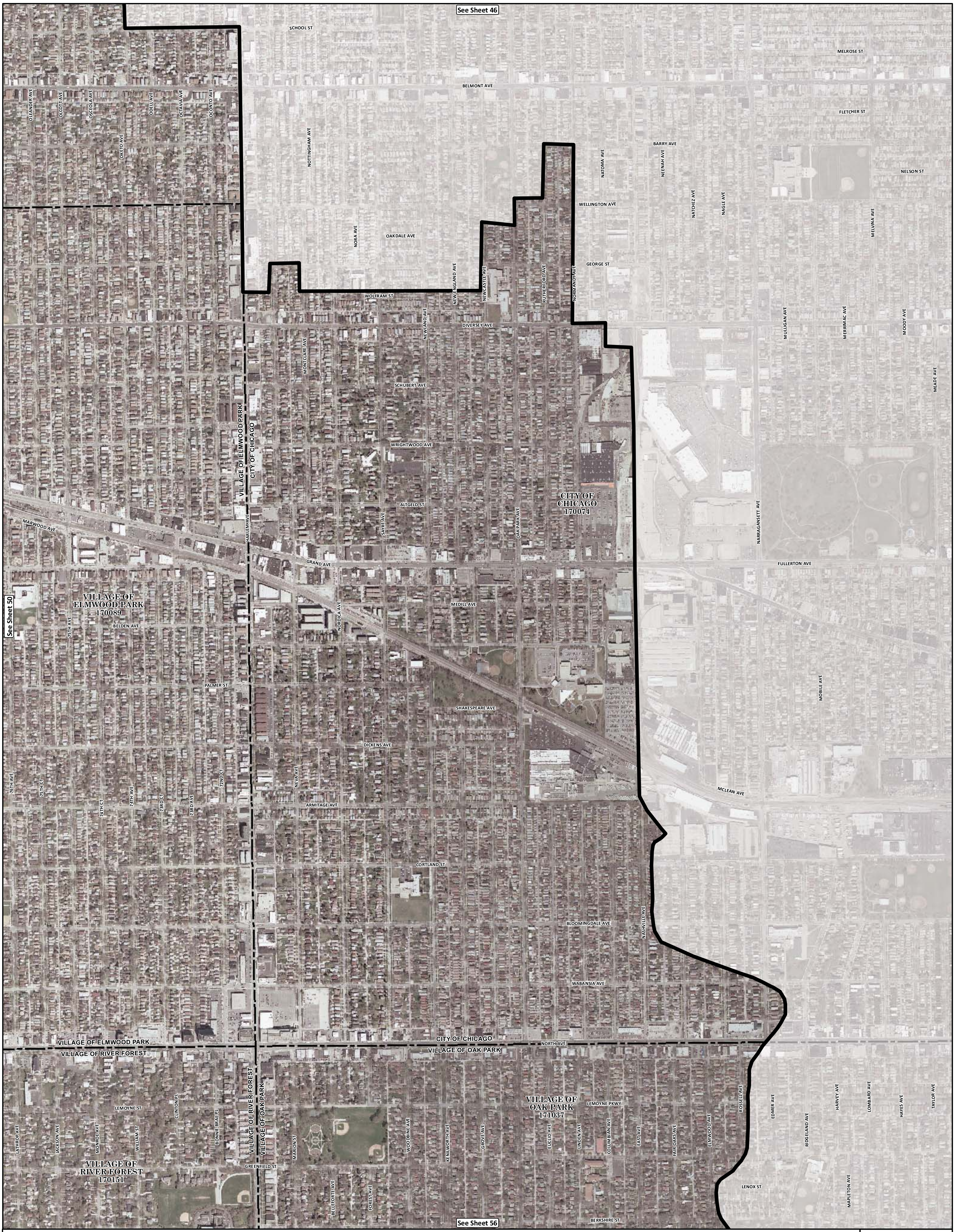
- DWP 100-yr Inundation Area
- Lower Des Plaines River Watershed Study Area
- DWP River/Streams
- Municipal Boundary
- County Boundary

FEMA Floodplain

- Zone A, AH and AO
- Zone AE

0 500 1,000 2,000
Feet

CLIENT: **METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO**	TITLE: **COMPARISON OF DWP 100-YR INUNDATION MAPPING AND FEMA EFFECTIVE FIRM LOWER DES PLAINES RIVER WATERSHED**	PROJ. 080043 FIRM PANEL **17031C0387J** SHEET 50 OF 82
CHRISTOPHER B. BURKE ENGINEERING, LTD. 9575 W. Higgins Road, Suite 600 Rosemont, Illinois 60018 (847) 823-0500	FILE NAME: Map Document: (Z:\MWRDGC\08-0043 Phase B\Water\Des Plaines\exhibits\FIRM Panels.mxd) DATE -- TIME: 11/23/2010 -- 12:58:15 PM DWN. DRW MODEL: ArcGIS 9.3 SCALE: 1"= 1,000' GIS USER: DWALTERS	DRAWING NO. **APPENDIX A**



Legend

DWP 100-yr Inundation Area

FEMA Floodplain

Zone A, AH and AO

Zone AE

Lower Des Plaines River Watershed Study Area

DWP River/Streams

Municipal Boundary

County Boundary

0 500 1,000 2,000
Feet

CLIENT:

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

CHRISTOPHER B. BURKE ENGINEERING, LTD.
9575 W. Higgins Road, Suite 600 Rosemont, Illinois 60018 (847) 823-0500

TITLE:

COMPARISON OF DWP 100-YR INUNDATION MAPPING AND FEMA EFFECTIVE FIRM LOWER DES PLAINES RIVER WATERSHED

FILE NAME	Map Document: (Z:\MWRDGC\08-0043 Phase B\Water\Des Plaines\exhibits\FIRM Panels.mxd)		
DATE -- TIME	11/23/2010 -- 12:58:15 PM	DWN.	DRW
	MODEL: ArcGIS 9.3	SCALE:	1"= 1,000'
		GIS USER:	DWALTERS

PROJ. 080043

FIRM PANEL
17031C0395J

SHEET 51 OF 82

DRAWING NO.
APPENDIX A

Legend

DWP 100-yr Inundation Area

FEMA Floodplain

Zone A, AH and AO

Zone AE

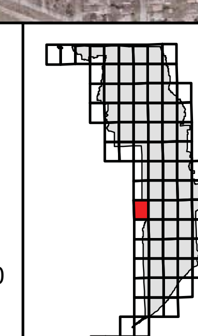
Lower Des Plaines River Watershed Study Area

DWP River/Streams

Municipal Boundary

County Boundary

0 500 1,000 2,000
Feet



CLIENT:

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

CHRISTOPHER B. BURKE ENGINEERING, LTD.
9575 W. Higgins Road, Suite 600 Rosemont, Illinois 60018 (847) 823-0500

TITLE:

COMPARISON OF DWP 100-YR INUNDATION MAPPING AND FEMA EFFECTIVE FIRM LOWER DES PLAINES RIVER WATERSHED

FILE NAME	Map Document: (Z:\MWRDGC\08-0043 Phase B\Water\Des Plaines\exhibits\FIRM Panels.mxd)				
DATE -- TIME	11/23/2010 -- 12:58:15 PM			DWN.	DRW
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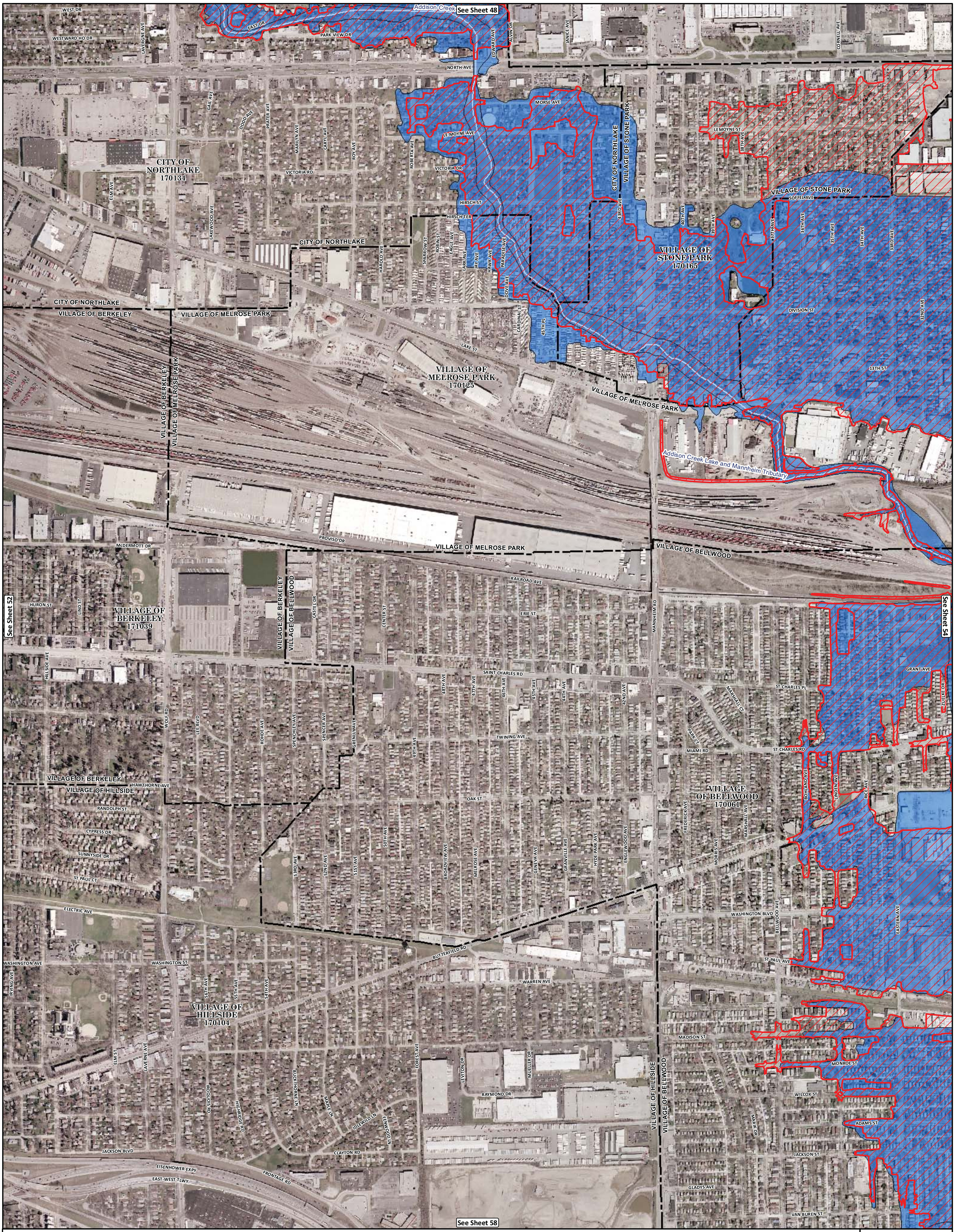
				GIS USER:	DWALTERS

PROJ. 080043

FIRM PANEL
17031C0368J

SHEET 52 OF 82

DRAWING NO.
APPENDIX A



Legend

DWP 100-yr Inundation Area

FEMA Floodplain

Zone A, AH and AO

Zone AE

Lower Des Plaines River Watershed Study Area

DWP River/Streams

Municipal Boundary

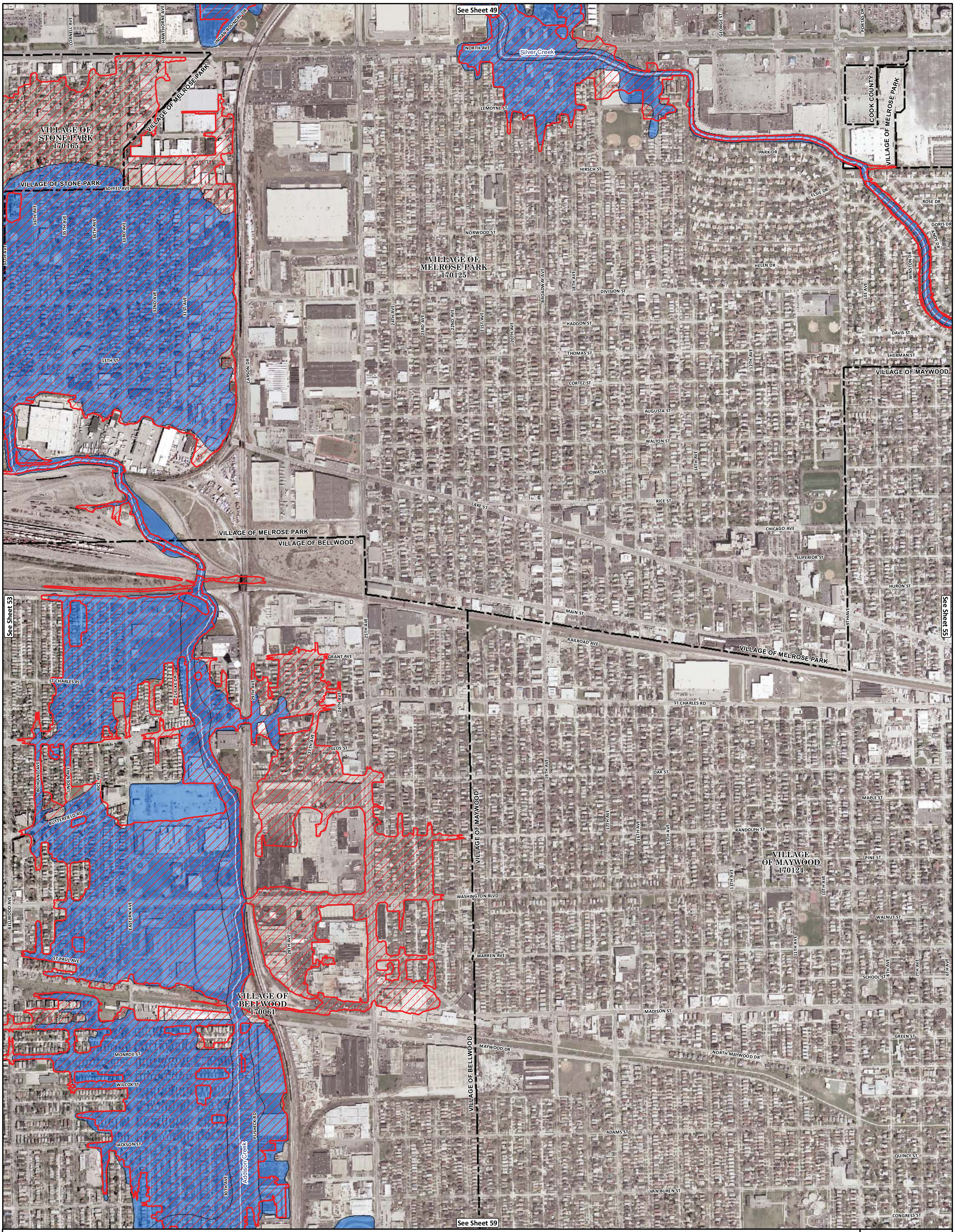
County Boundary

N

0 500 1,000 2,000

Feet

CLIENT:	TITLE:	
METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO	**COMPARISON OF DWP 100-YR INUNDATION MAPPING AND FEMA EFFECTIVE FIRM LOWER DES PLAINES RIVER WATERSHED**	PROJ. 080043 FIRM PANEL 17031C0369J SHEET 53 OF 82
CHRISTOPHER B. BURKE ENGINEERING, LTD. 9575 W. Higgins Road, Suite 600 Rosemont, Illinois 60018 (847) 823-0500	FILE NAME: Map Document: (Z:\MWRDGC\08-0043 Phase B\Water\Des Plaines\exhibits\FIRM Panels.mxd) DATE -- TIME: 11/23/2010 -- 12:58:15 PM DWN. DRW MODEL: ArcGIS 9.3 SCALE: 1" = 1,000' GIS USER: DWALTERS	DRAWING NO. **APPENDIX A**



Legend

DWP 100-yr Inundation Area

FEMA Floodplain

Zone A, AH and AO

Zone AE

Lower Des Plaines River Watershed Study Area

DWP River/Streams

Municipal Boundary

County Boundary

0 500 1,000 2,000
Feet

CLIENT:	TITLE:
METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO	**COMPARISON OF DWP 100-YR INUNDATION MAPPING AND FEMA EFFECTIVE FIRM LOWER DES PLAINES RIVER WATERSHED**

CHRISTOPHER B. BURKE ENGINEERING, LTD.
9575 W. Higgins Road, Suite 600 Rosemont, Illinois 60018 (847) 823-0500

FILE NAME	Map Document: (Z:\MWRDGC\08-0043 Phase B\Water\Des Plaines\exhibits\FIRM Panels.mxd)				
DATE -- TIME	11/23/2010 -- 12:58:15 PM			DWN.	DRW
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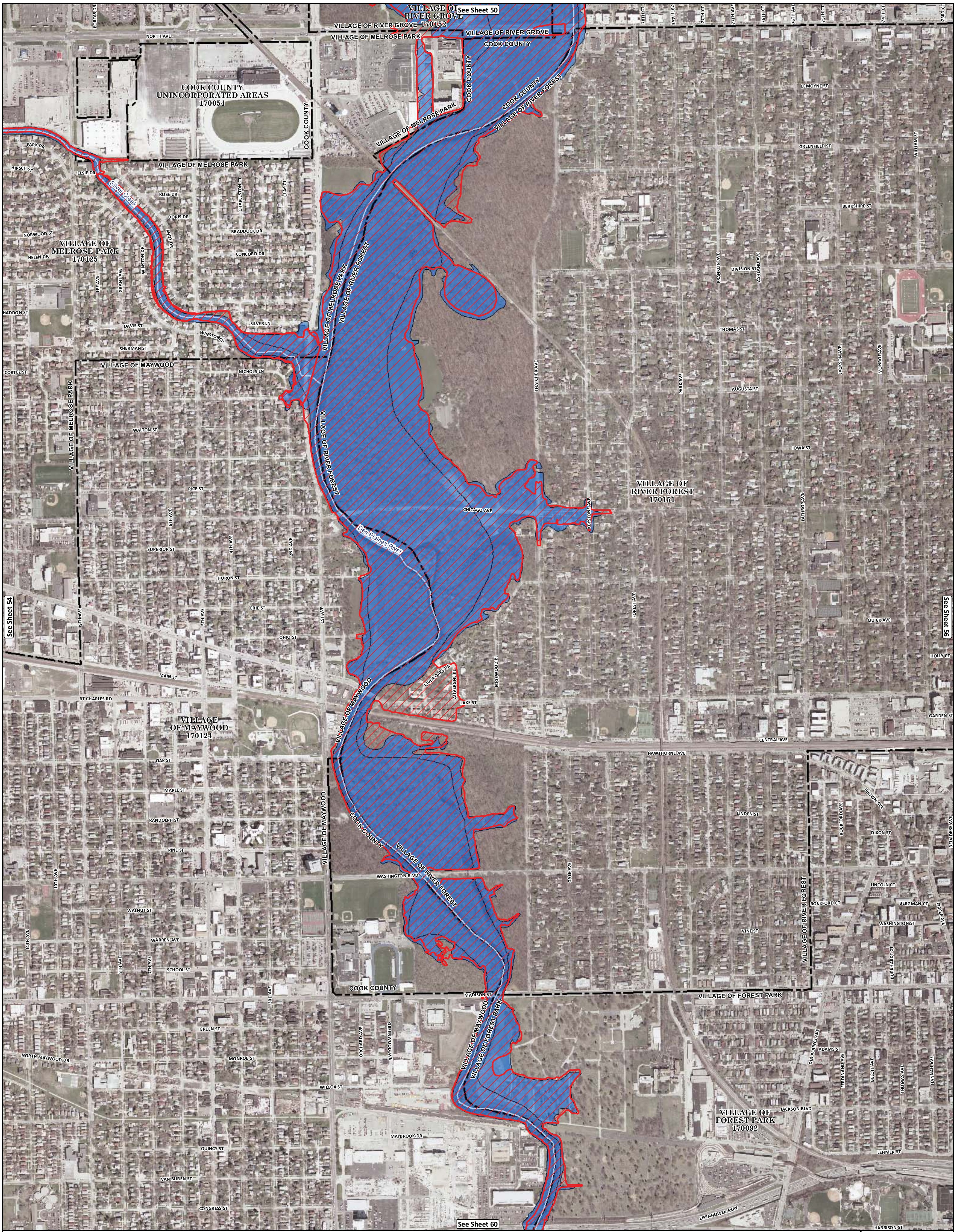
				GIS USER:	DWALTERS

PROJ. 080043
FIRM PANEL
17031C0388J
SHEET 54 OF 82
DRAWING NO.
APPENDIX A



Legend

- DWP 100-yr Inundation Area
- **FEMA Floodplain**
- Zone A, AH and AO
- Zone AE
- Lower Des Plaines River Watershed Study Area
- DWP River/Streams
- Municipal Boundary
- County Boundary

0 500 1,000 2,000
Feet

CLIENT: **METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO**	TITLE: **COMPARISON OF DWP 100-YR INUNDATION MAPPING AND FEMA EFFECTIVE FIRM LOWER DES PLAINES RIVER WATERSHED**	PROJ. 080043
		FIRM PANEL 17031C0389J
		SHEET 55 OF 82
CHRISTOPHER B. BURKE ENGINEERING, LTD. 9575 W. Higgins Road, Suite 600 Rosemont, Illinois 60018 (847) 823-0500	FILE NAME: Map Document: (Z:\MWRDGC\08-0043 Phase B\Water\Des Plaines\exhibits\FIRM Panels.mxd)	DRAWING NO. **APPENDIX A**
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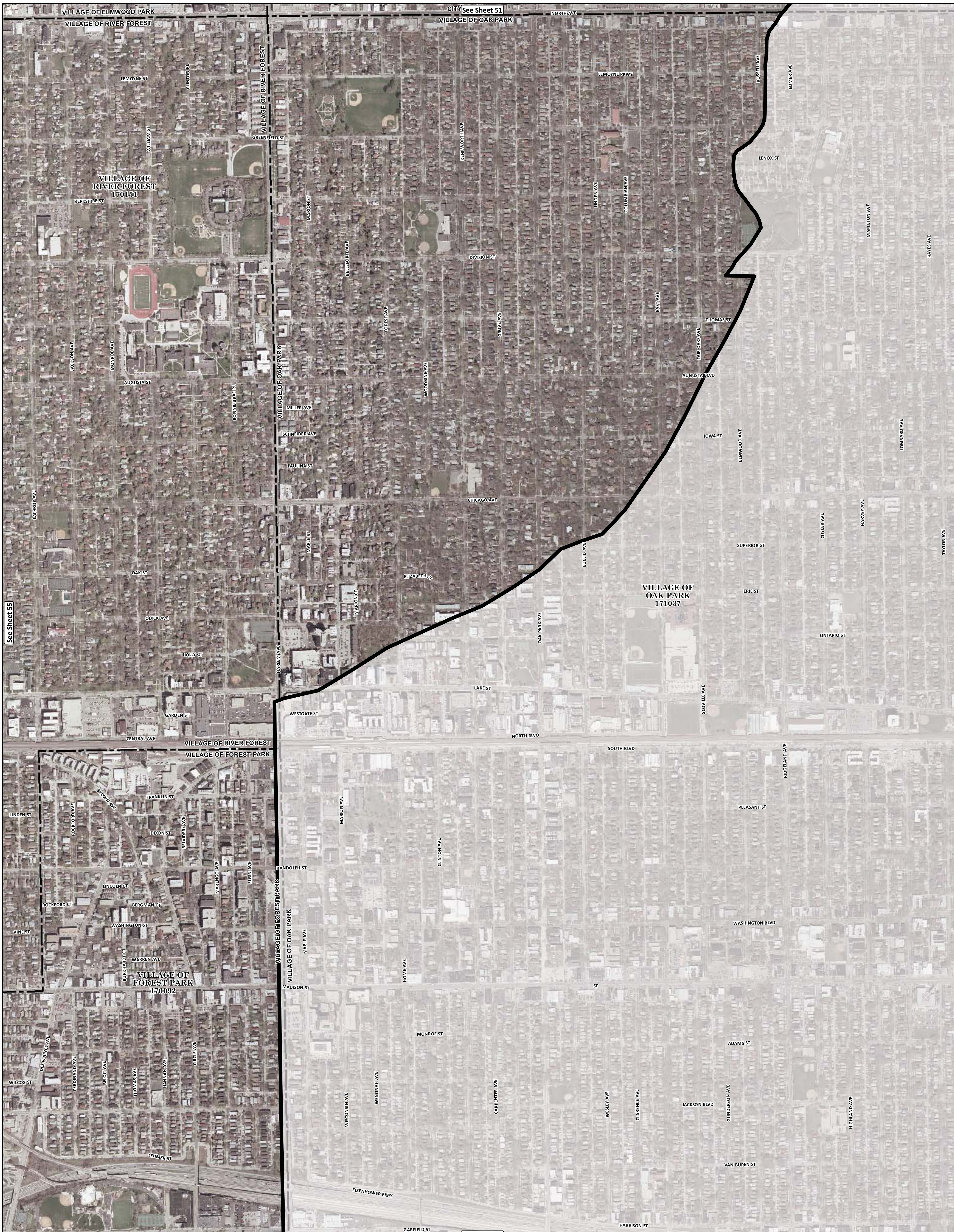

Legend

DWP 100-yr Inundation Area

Lower Des Plaines River Watershed Study Area

FEMA Floodplain

DWP River/Streams

Zone A, AH and AO

Municipal Boundary

Zone AE

County Boundary

0 500 1,000 2,000
Feet

CLIENT:

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

CHRISTOPHER B. BURKE ENGINEERING, LTD.
9575 W. Higgins Road, Suite 600 Rosemont, Illinois 60018 (847) 823-0500

TITLE:

COMPARISON OF DWP 100-YR INUNDATION MAPPING AND FEMA EFFECTIVE FIRM LOWER DES PLAINES RIVER WATERSHED

FILE NAME	Map Document: (Z:\MWRDGC\08-0043 Phase B\Water\Des Plaines\exhibits\FIRM Panels.mxd)				
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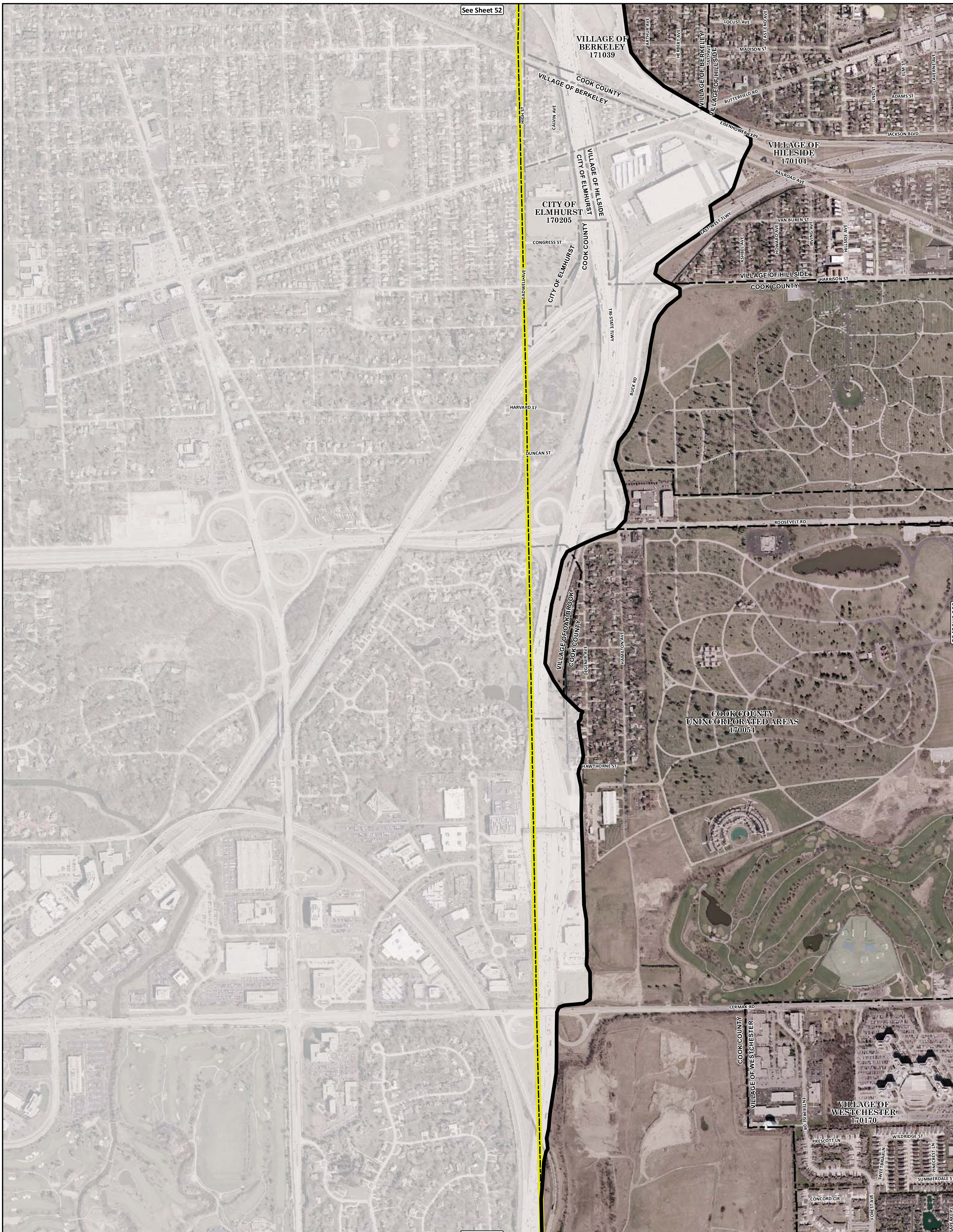
PROJ. 080043

FIRM PANEL
17031C0395J

SHEET 56 OF 82

DRAWING NO.
APPENDIX A



Legend

- DWP 100-yr Inundation Area
- Lower Des Plaines River Watershed Study Area

FEMA Floodplain

- Zone A, AH and AO
- Zone AE
- DWP River/Streams
- Municipal Boundary
- County Boundary

0 500 1,000 2,000
Feet

CLIENT:

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

CHRISTOPHER B. BURKE ENGINEERING, LTD.
9575 W. Higgins Road, Suite 600 Rosemont, Illinois 60018 (847) 823-0500

TITLE:

COMPARISON OF DWP 100-YR INUNDATION MAPPING AND FEMA EFFECTIVE FIRM LOWER DES PLAINES RIVER WATERSHED

FILE NAME	Map Document: (Z:\MWRDGC\08-0043 Phase B\Water\Des Plaines\exhibits\FIRM Panels.mxd)				
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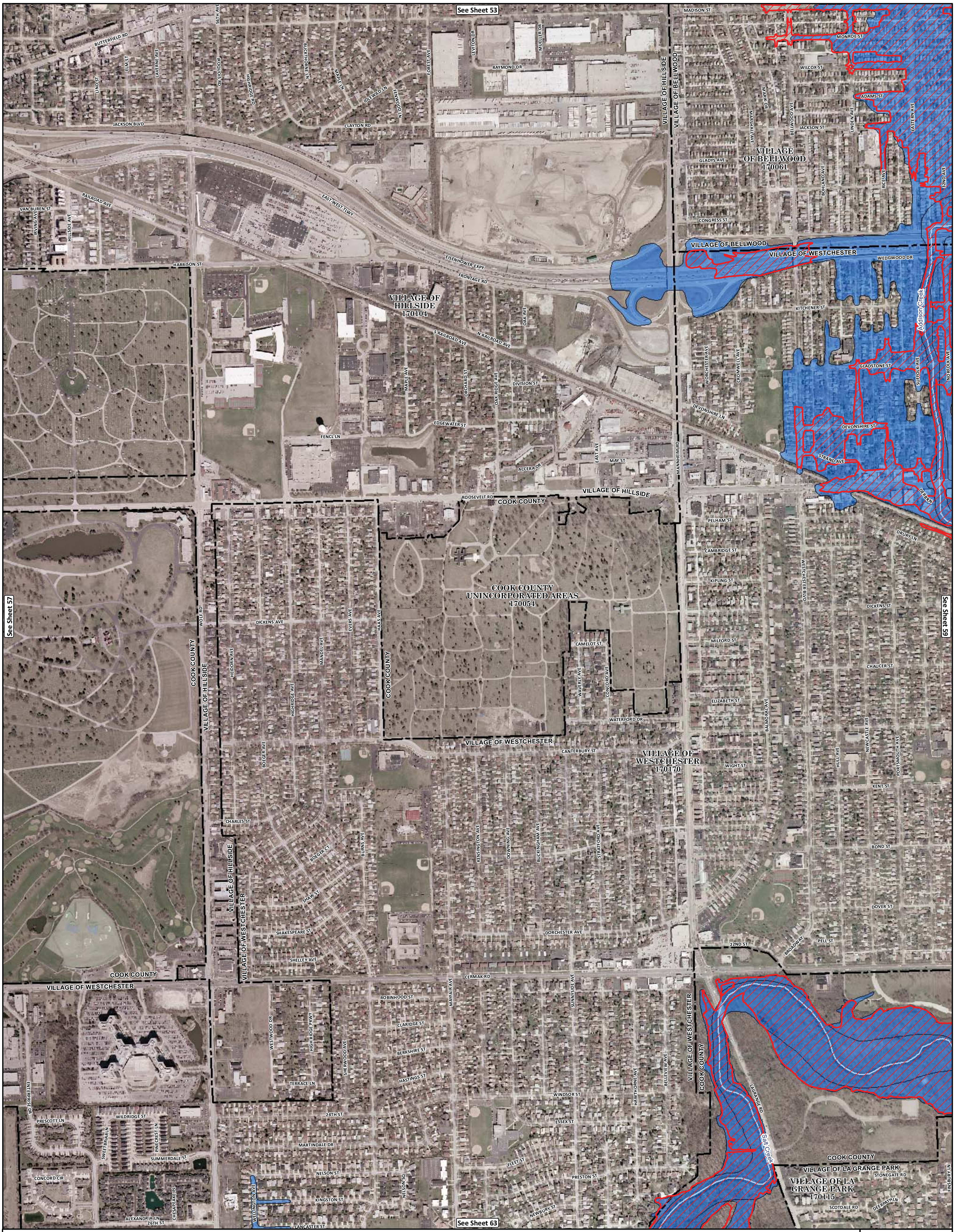
PROJ. 080043

FIRM PANEL
17031C0456J

SHEET 57 OF 82

DRAWING NO.
APPENDIX A



Legend

DWP 100-yr Inundation Area

FEMA Floodplain

Zone A, AH and AO

Zone AE

Lower Des Plaines River Watershed Study Area

DWP River/Streams

Municipal Boundary

County Boundary

N

0 500 1,000 2,000

Feet

CLIENT:

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

CHRISTOPHER B. BURKE ENGINEERING, LTD.

9575 W. Higgins Road, Suite 600 Rosemont, Illinois 60018 (847) 823-0500

TITLE:

COMPARISON OF DWP 100-YR INUNDATION MAPPING AND FEMA EFFECTIVE FIRM LOWER DES PLAINES RIVER WATERSHED

FILE NAME	Map Document: (Z:\MWRDGC\08-0043 Phase B\Water\Des Plaines\exhibits\FIRM Panels.mxd)				
DATE -- TIME	11/23/2010 -- 12:58:15 PM			DWN.	DRW
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PROJ. 080043

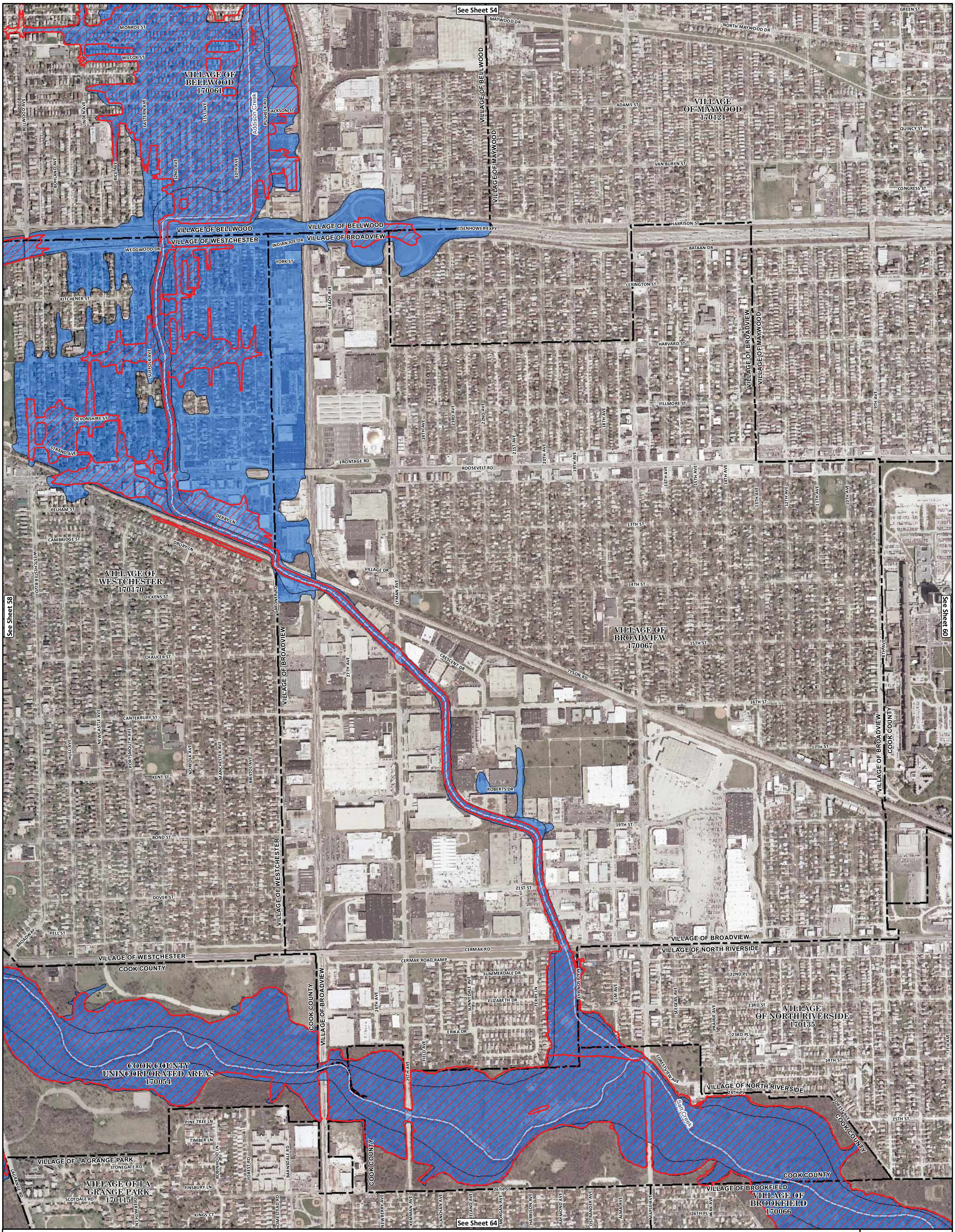
FIRM PANEL

17031C0457J

SHEET 58 OF 82

DRAWING NO.

APPENDIX A



Legend

DWP 100-yr Inundation Area

FEMA Floodplain

Zone A, AH and AO

Zone AE

Lower Des Plaines River Watershed Study Area

DWP River/Streams

Municipal Boundary

County Boundary

0 500 1,000 2,000
Feet

CLIENT:

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

CHRISTOPHER B. BURKE ENGINEERING, LTD.
9575 W. Higgins Road, Suite 600 Rosemont, Illinois 60018 (847) 823-0500

TITLE:

COMPARISON OF DWP 100-YR INUNDATION MAPPING AND FEMA EFFECTIVE FIRM LOWER DES PLAINES RIVER WATERSHED

FILE NAME	Map Document: (Z:\MWRDGC\08-0043 Phase B\Water\Des Plaines\exhibits\FIRM Panels.mxd)		
DATE -- TIME	11/23/2010 -- 12:58:15 PM	DWN.	DRW
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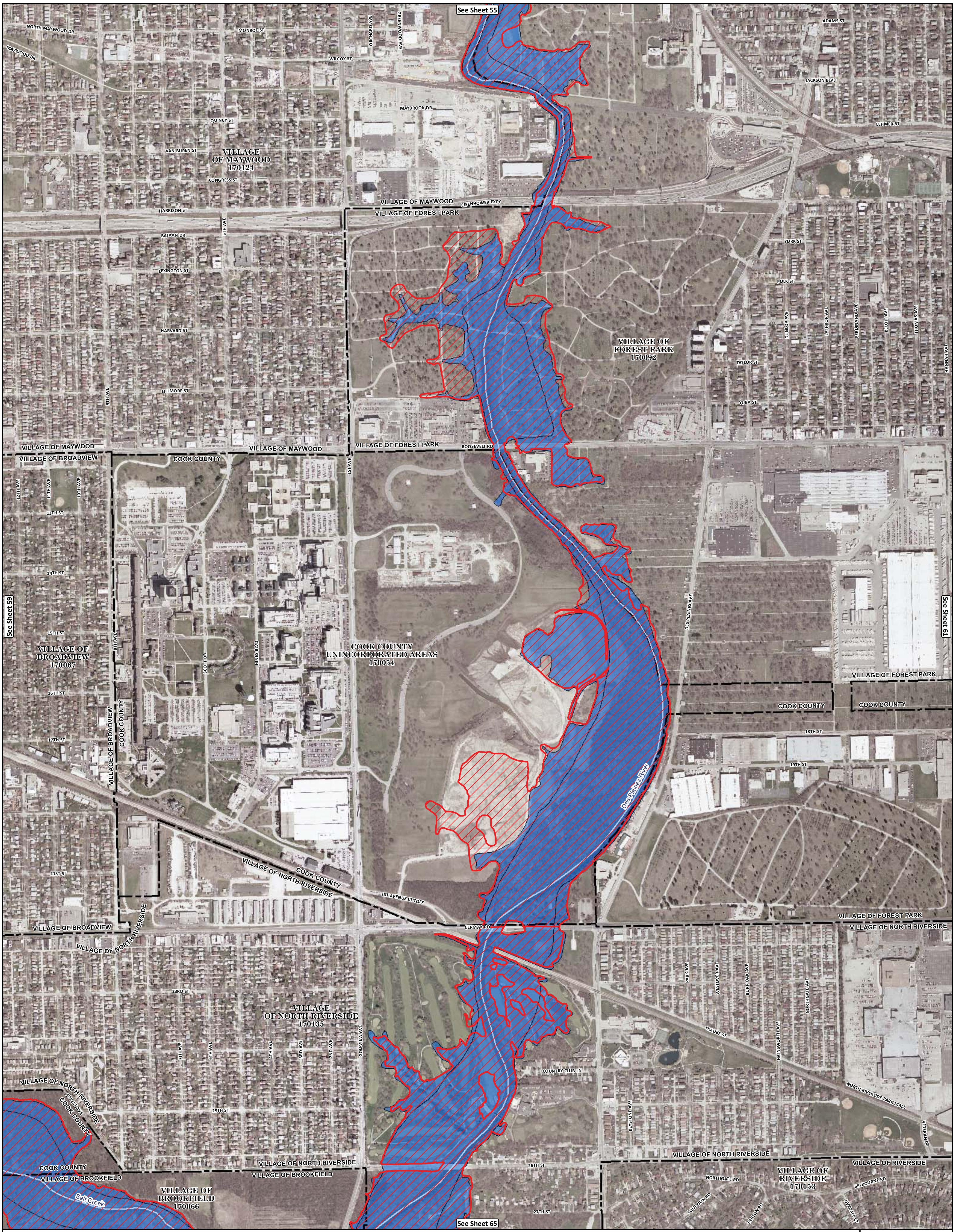
PROJ. 080043

FIRM PANEL 17031C0476J

SHEET 59 OF 82

DRAWING NO.

APPENDIX A



Legend

- DWP 100-yr Inundation Area

FEMA Floodplain

- Zone A, AH and AO
- Zone AE
- Lower Des Plaines River Watershed Study Area
- DWP River/Streams
- Municipal Boundary
- County Boundary

0 500 1,000 2,000
Feet

CLIENT: **METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO**	TITLE: **COMPARISON OF DWP 100-YR INUNDATION MAPPING AND FEMA EFFECTIVE FIRM LOWER DES PLAINES RIVER WATERSHED**	PROJ. 080043
CHRISTOPHER B. BURKE ENGINEERING, LTD. 9575 W. Higgins Road, Suite 600 Rosemont, Illinois 60018 (847) 823-0500	FILE NAME: Map Document: (Z:\MWRDGC\08-0043 Phase B\Water\Des Plaines\exhibits\FIRM Panels.mxd) DATE -- TIME: 11/23/2010 -- 12:58:15 PM MODEL: ArcGIS 9.3 SCALE: 1"= 1,000' DWN. DRW GIS USER: DWALTERS	FIRM PANEL 17031C0477J SHEET 60 OF 82 DRAWING NO. APPENDIX A

Legend

DWP 100-yr Inundation Area

Lower Des Plaines River Watershed Study Area

FEMA Floodplain

Zone A, AH and AO

DWP River/Streams

Municipal Boundary

Zone AE

County Boundary

0 500 1,000 2,000
Feet

CLIENT:

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

CHRISTOPHER B. BURKE ENGINEERING, LTD.
9575 W. Higgins Road, Suite 600 Rosemont, Illinois 60018 (847) 823-0500

TITLE:

COMPARISON OF DWP 100-YR INUNDATION MAPPING AND FEMA EFFECTIVE FIRM LOWER DES PLAINES RIVER WATERSHED

FILE NAME	Map Document: (Z:\MWRDGC\08-0043 Phase B\Water\Des Plaines\exhibits\FIRM Panels.mxd)		
DATE -- TIME	11/23/2010 -- 12:58:15 PM	DWN.	DRW
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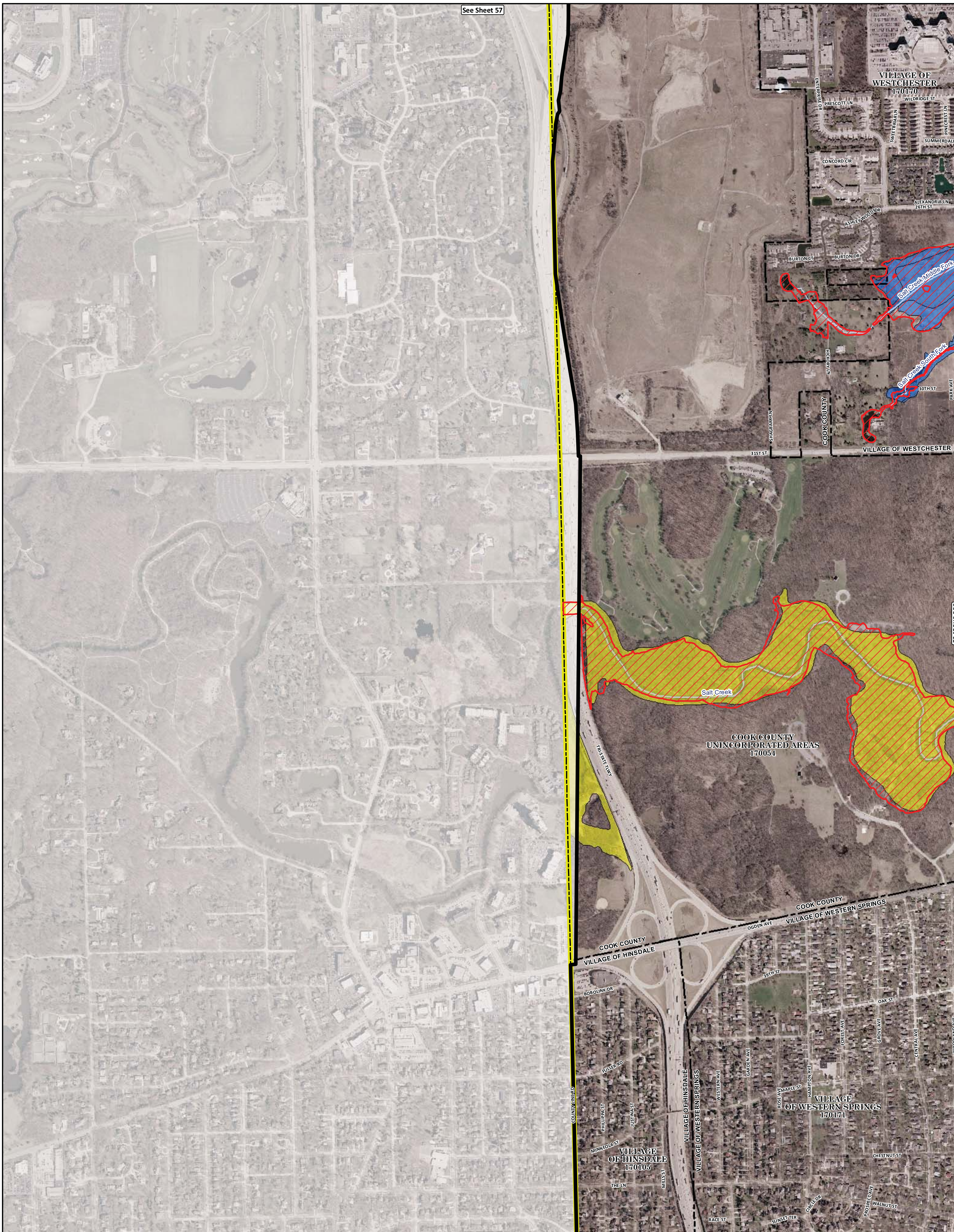
		GIS USER:	DWALTERS

PROJ. 080043

FIRM PANEL
17031C0485J

SHEET 61 OF 82

DRAWING NO.
APPENDIX A



Legend

DWP 100-yr Inundation Area

FEMA Floodplain

Zone A, AH and AO

Zone AE

Lower Des Plaines River Watershed Study Area

DWP River/Streams

Municipal Boundary

County Boundary

0 500 1,000 2,000

Feet

CLIENT:

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

CHRISTOPHER B. BURKE ENGINEERING, LTD.

9575 W. Higgins Road, Suite 600 Rosemont, Illinois 60018 (847) 823-0500

TITLE:

COMPARISON OF DWP 100-YR INUNDATION MAPPING AND FEMA EFFECTIVE FIRM LOWER DES PLAINES RIVER WATERSHED

FILE NAME	Map Document: (Z:\MWRDGC\08-0043 Phase B\Water\Des Plaines\exhibits\FIRM Panels.mxd)				
DATE -- TIME	11/23/2010 -- 12:58:15 PM			DWN.	DRW
		MODEL:	ArcGIS 9.3	SCALE:	1"= 1,000'
				GIS USER:	DWALTERS

PROJ. 080043

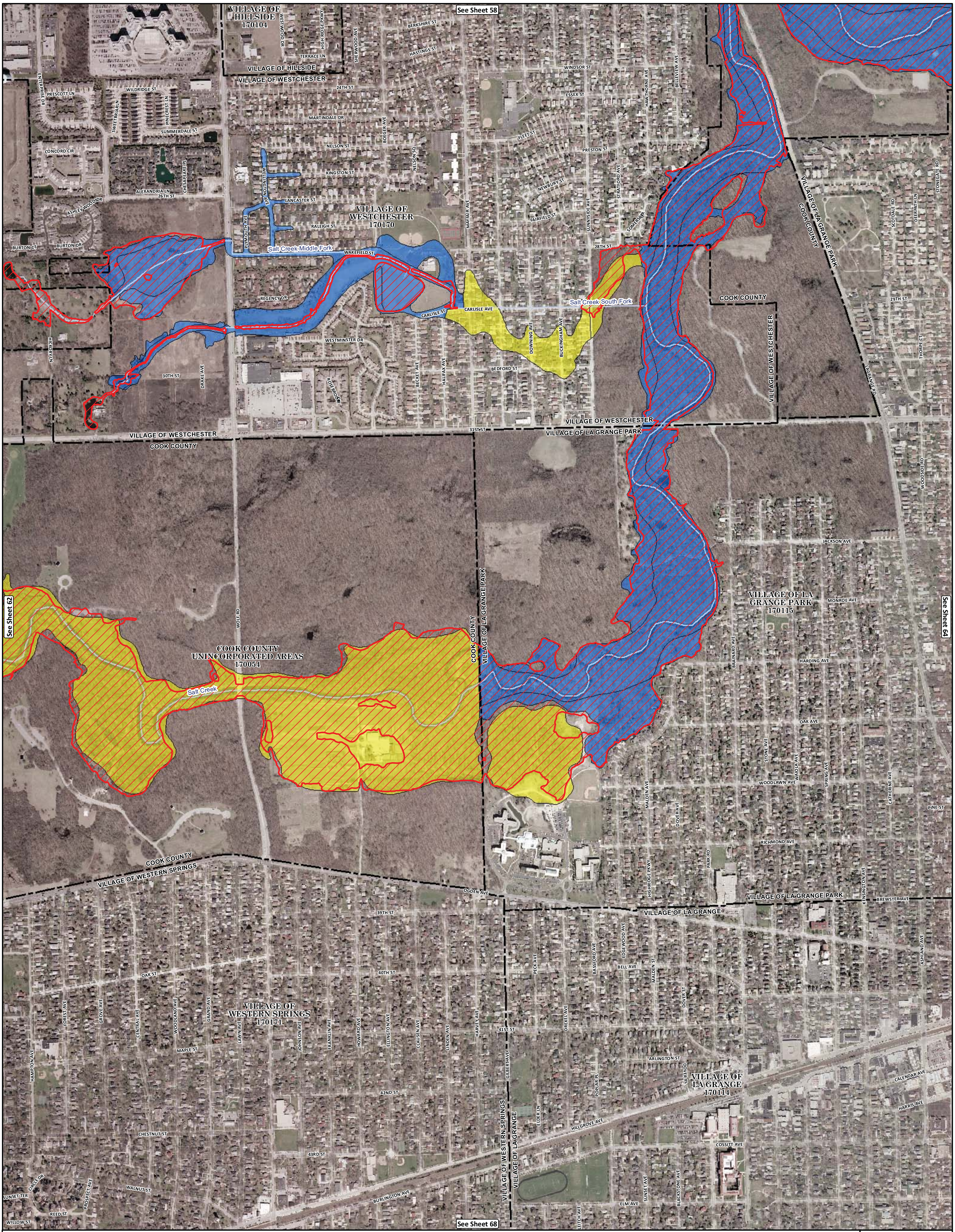
FIRM PANEL

17031C0458J

SHEET 62 OF 82

DRAWING NO.

APPENDIX A



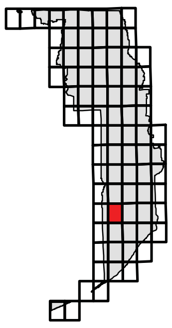
Legend

- DWP 100-yr Inundation Area
- Lower Des Plaines River Watershed Study Area

FEMA Floodplain

- Zone A, AH and AO
- Zone AE
- DWP River/Streams
- Municipal Boundary
- County Boundary

0 500 1,000 2,000
Feet



CLIENT:

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

CHRISTOPHER B. BURKE ENGINEERING, LTD.
9575 W. Higgins Road, Suite 600 Rosemont, Illinois 60018 (847) 823-0500

TITLE:

COMPARISON OF DWP 100-YR INUNDATION MAPPING AND FEMA EFFECTIVE FIRM LOWER DES PLAINES RIVER WATERSHED

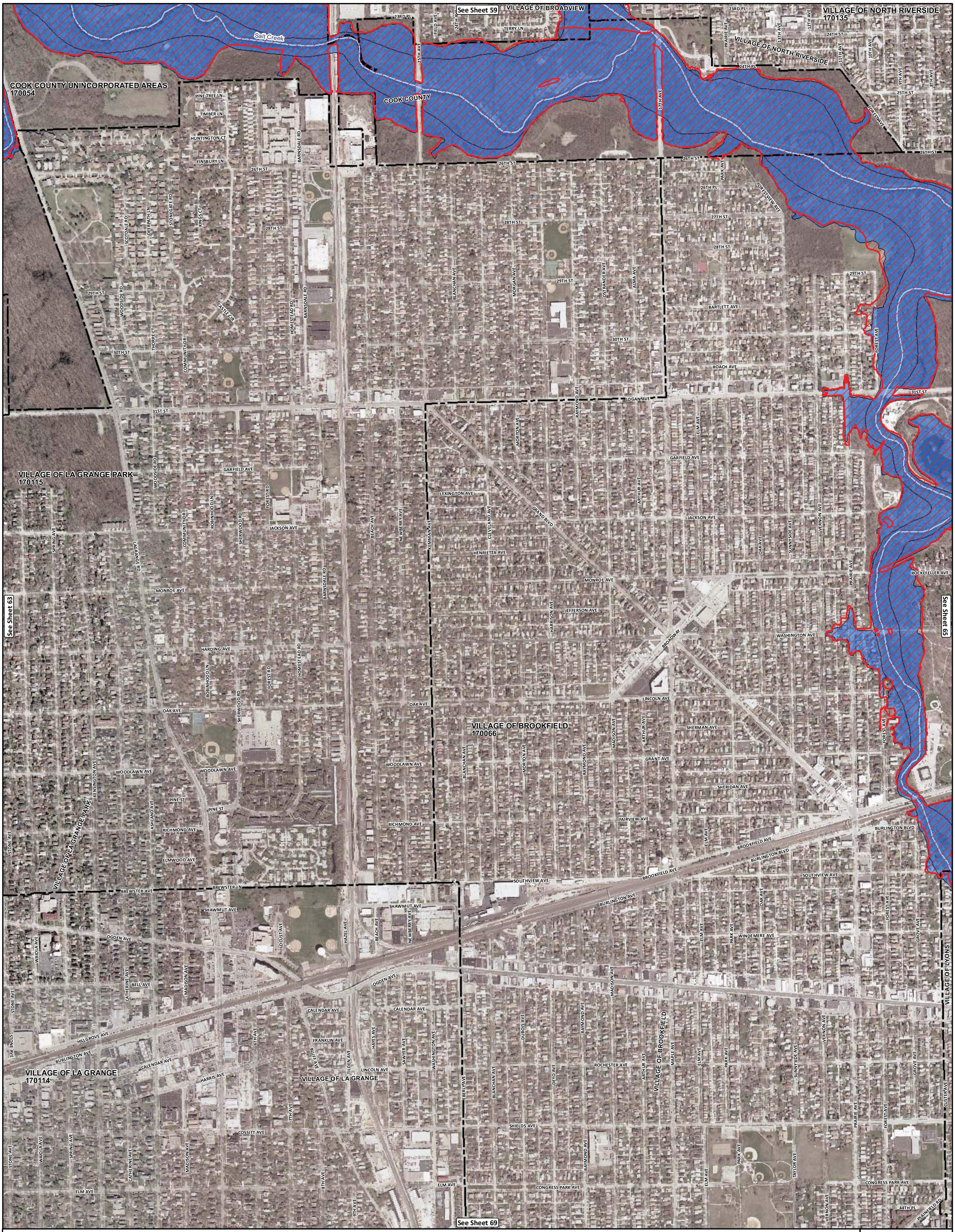
FILE NAME	Map Document: (Z:\MWRDGC\08-0043 Phase B\Water\Des Plaines\exhibits\FIRM Panels.mxd)	DWN.	DRW
DATE -- TIME	11/23/2010 -- 12:58:15 PM		
MODEL:	ArcGIS 9.3	SCALE:	1"= 1,000'
		GIS USER:	DWALTERS

PROJ. 080043

FIRM PANEL
17031C0459J

SHEET 63 OF 82

DRAWING NO.
APPENDIX A



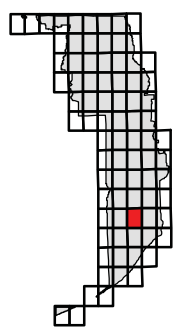
Legend

FEMA Floodplain

- Zone A, AH and AO
- Zone AE

- Lower Des Plaines River Watershed Study Area
- DWP River/Streams
- Municipal Boundary
- County Boundary

0 500 1,000 2,000
Feet



CLIENT:

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

CHRISTOPHER B. BURKE ENGINEERING, LTD.
9575 W. Higgins Road, Suite 600 Rosemont, Illinois 60018 (847) 823-0500

TITLE:

COMPARISON OF DWP 100-YR INUNDATION MAPPING AND FEMA EFFECTIVE FIRM LOWER DES PLAINES RIVER WATERSHED

FILE NAME	Map Document: (Z:\MWRDGC\08-0043 Phase B\Water\Des Plaines\exhibits\FIRM Panels.mxd)		
DATE -- TIME	11/23/2010 -- 12:58:15 PM	DWN.	DRW
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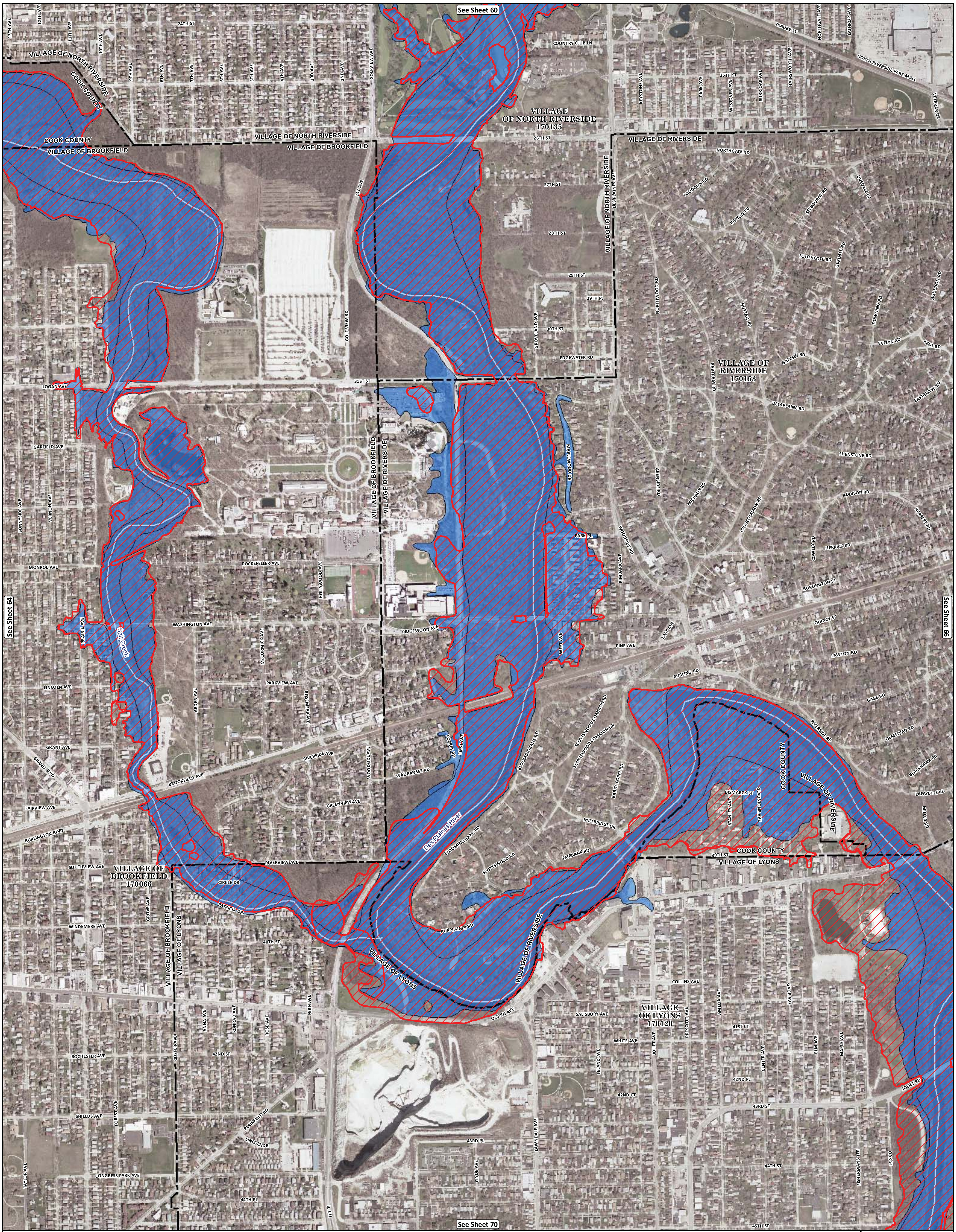
		GIS USER:	DWALTERS

PROJ. 080043

FIRM PANEL
17031C0478J

SHEET 64 OF 82

DRAWING NO.
APPENDIX A



Legend

DWP 100-yr Inundation Area

FEMA Floodplain

Zone A, AH and AO

Zone AE

Lower Des Plaines River Watershed Study Area

DWP River/Streams

Municipal Boundary

County Boundary

0 500 1,000 2,000 Feet

CLIENT:

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

CHRISTOPHER B. BURKE ENGINEERING, LTD.
9575 W. Higgins Road, Suite 600 Rosemont, Illinois 60018 (847) 823-0500

TITLE:

COMPARISON OF DWP 100-YR INUNDATION MAPPING AND FEMA EFFECTIVE FIRM LOWER DES PLAINES RIVER WATERSHED

PROJ. 080043

FIRM PANEL **17031C0479J**

SHEET 65 OF 82

FILE NAME	Map Document: (Z:\MWRDGC\08-0043 Phase B\Water\Des Plaines\exhibits\FIRM Panels.mxd)				
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		MODEL:	ArcGIS 9.3	SCALE:	1"= 1,000'
				GIS USER:	DWALTERS

DRAWING NO.
APPENDIX A

Legend

DWP 100-yr Inundation Area

FEMA Floodplain

Zone A, AH and AO

Zone AE

Lower Des Plaines River Watershed Study Area

DWP River/Streams

Municipal Boundary

County Boundary

0 500 1,000 2,000

Feet

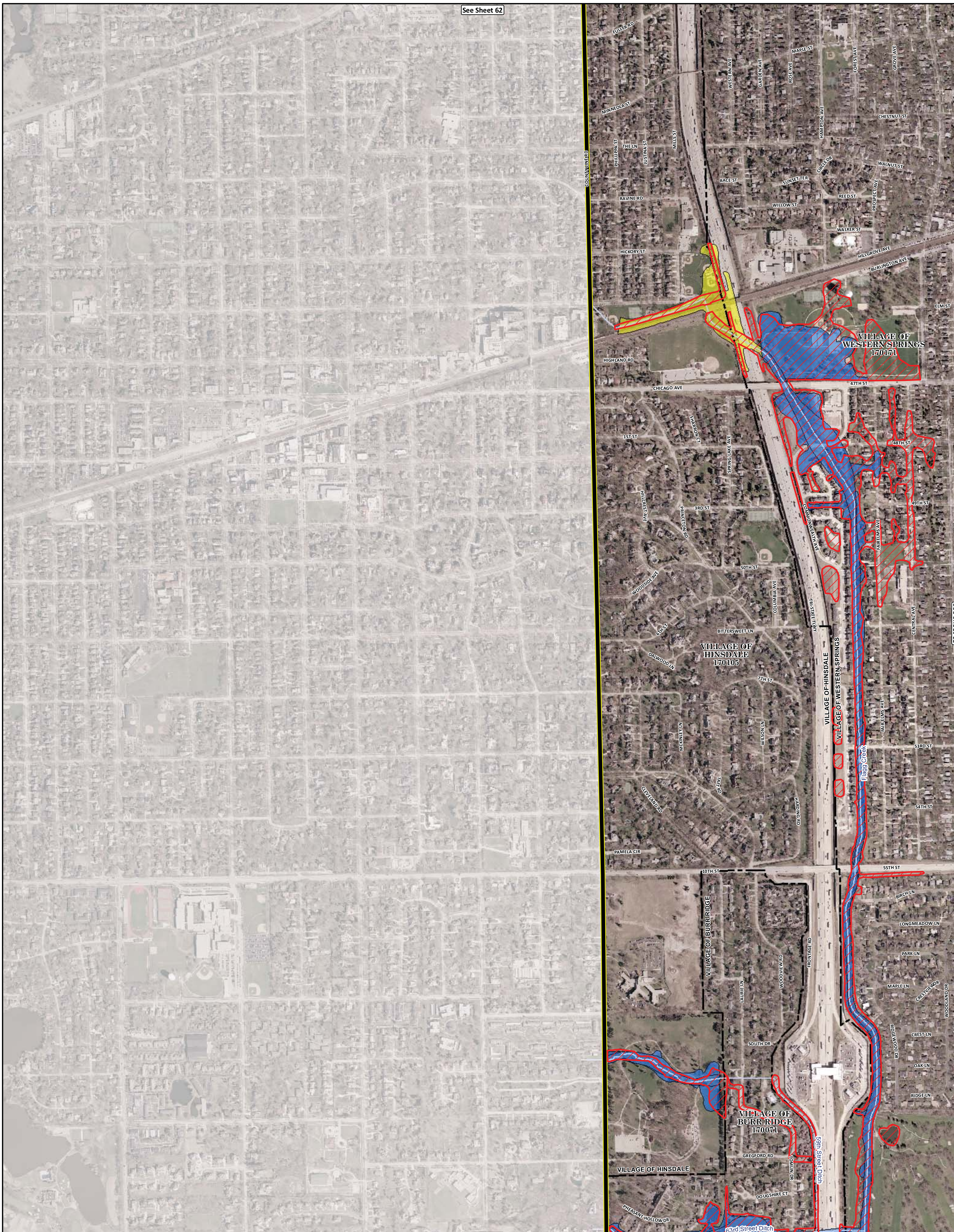
CLIENT: **METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO**	TITLE: **COMPARISON OF DWP 100-YR INUNDATION MAPPING AND FEMA EFFECTIVE FIRM LOWER DES PLAINES RIVER WATERSHED**
CHRISTOPHER B. BURKE ENGINEERING, LTD. 9575 W. Higgins Road, Suite 600 Rosemont, Illinois 60018 (847) 823-0500	FILE NAME: Map Document: (Z:\MWRDGC\08-0043 Phase B\Water\Des Plaines\exhibits\FIRM Panels.mxd) DATE -- TIME: 11/23/2010 -- 12:58:15 PM DWN.: DRW MODEL: ArcGIS 9.3 SCALE: 1"= 1,000' GIS USER: DWALTERS

PROJ. 080043

FIRM PANEL 17031C0483J

SHEET 66 OF 82

DRAWING NO. **APPENDIX A**



Legend

DWP 100-yr Inundation Area

FEMA Floodplain

Zone A, AH and AO

Zone AE

Lower Des Plaines River Watershed Study Area

DWP River/Streams

Municipal Boundary

County Boundary

0 500 1,000 2,000
Feet

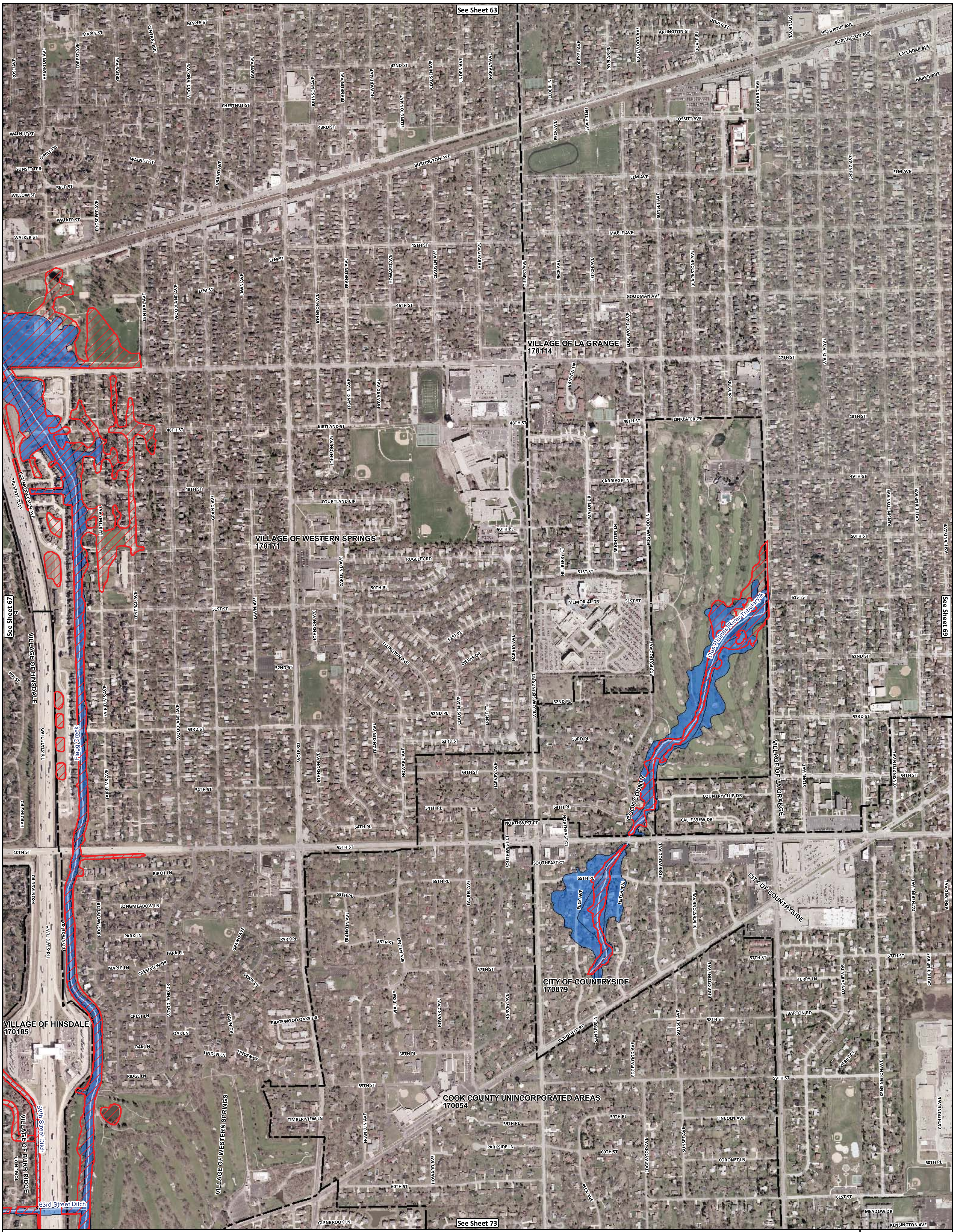
CLIENT: **METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO**	TITLE: **COMPARISON OF DWP 100-YR INUNDATION MAPPING AND FEMA EFFECTIVE FIRM LOWER DES PLAINES RIVER WATERSHED**
CHRISTOPHER B. BURKE ENGINEERING, LTD. 9575 W. Higgins Road, Suite 600 Rosemont, Illinois 60018 (847) 823-0500	FILE NAME: Map Document: (Z:\MWRDGC\08-0043 Phase B\Water\Des Plaines\exhibits\FIRM Panels.mxd); DATE -- TIME: 11/23/2010 -- 12:58:15 PM; DWN.: DRW; MODEL: ArcGIS 9.3; SCALE: 1"= 1,000'; GIS USER: DWALTERS

PROJ. 080043

FIRM PANEL 17031C0466J

SHEET 67 OF 82

DRAWING NO. **APPENDIX A**

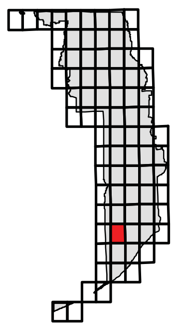


Legend

FEMA Floodplain

- Zone A, AH and AO
- Zone AE
- Lower Des Plaines River Watershed Study Area
- DWP River/Streams
- Municipal Boundary
- County Boundary

0 500 1,000 2,000
Feet



CLIENT: **METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO**	TITLE: **COMPARISON OF DWP 100-YR INUNDATION MAPPING AND FEMA EFFECTIVE FIRM LOWER DES PLAINES RIVER WATERSHED**
CHRISTOPHER B. BURKE ENGINEERING, LTD. 9575 W. Higgins Road, Suite 600 Rosemont, Illinois 60018 (847) 823-0500	FILE NAME: Map Document: (Z:\MWRDGC\08-0043 Phase B\Water\Des Plaines\exhibits\FIRM Panels.mxd)
	DATE -- TIME: 11/23/2010 -- 12:58:15 PM; DWN. DRW; MODEL: ArcGIS 9.3; SCALE: 1"= 1,000'; GIS USER: DWALTERS

PROJ. 080043

FIRM PANEL 17031C0467J

SHEET 68 OF 82

DRAWING NO. **APPENDIX A**

Legend

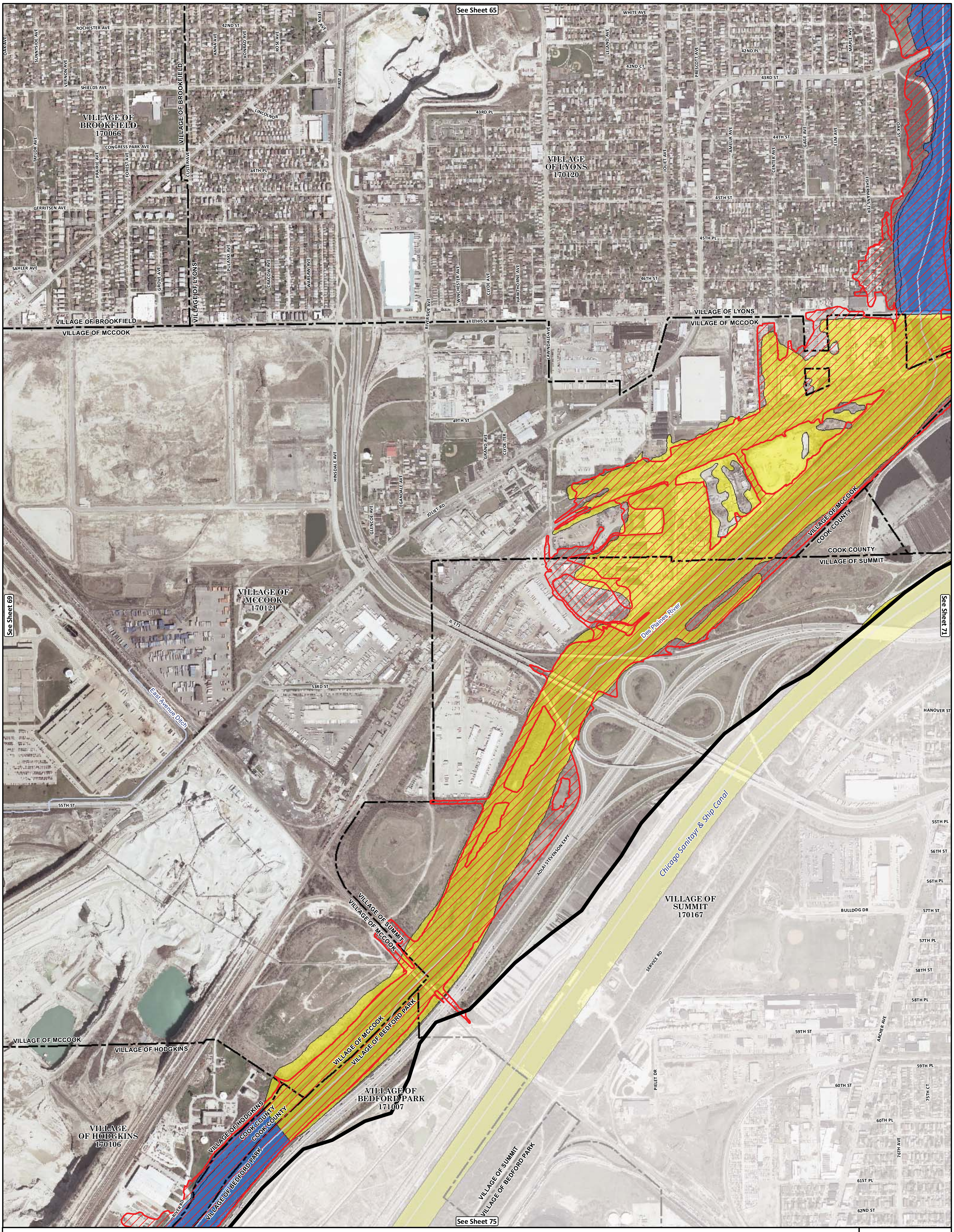
FEMA Floodplain

- Zone A, AH and AO
- Zone AE
- Lower Des Plaines River Watershed Study Area
- DWP River/Streams
- Municipal Boundary
- County Boundary

0 500 1,000 2,000

Feet

CLIENT: METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO	TITLE: COMPARISON OF DWP 100-YR INUNDATION MAPPING AND FEMA EFFECTIVE FIRM LOWER DES PLAINES RIVER WATERSHED	PROJ. 080043	FIRM PANEL 17031C0486J
CHRISTOPHER B. BURKE ENGINEERING, LTD. 9575 W. Higgins Road, Suite 600 Rosemont, Illinois 60018 (847) 823-0500	FILE NAME: Map Document: (Z:\MWRDGC\08-0043 Phase B\Water\Des Plaines\exhibits\FIRM Panels.mxd)	SHEET 69 OF 82	
	DATE -- TIME: 11/23/2010 -- 12:58:15 PM	MODEL: ArcGIS 9.3	DWN.: DRW
	SCALE: 1"= 1,000'	GIS USER: DWALTERS	DRAWING NO. APPENDIX A



Legend

DWP 100-yr Inundation Area

FEMA Floodplain

Zone A, AH and AO

Zone AE

Lower Des Plaines River Watershed Study Area

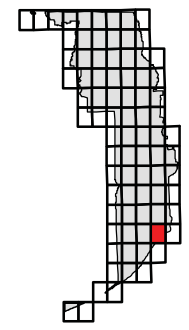
DWP River/Streams

Municipal Boundary

County Boundary

0 500 1,000 2,000

Feet



CLIENT:

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

CHRISTOPHER B. BURKE ENGINEERING, LTD.

9575 W. Higgins Road, Suite 600 Rosemont, Illinois 60018 (847) 823-0500

TITLE:

COMPARISON OF DWP 100-YR INUNDATION MAPPING AND FEMA EFFECTIVE FIRM LOWER DES PLAINES RIVER WATERSHED

FILE NAME	Map Document: (Z:\MWRDGC\08-0043 Phase B\Water\Des Plaines\exhibits\FIRM Panels.mxd)			
DATE -- TIME	11/23/2010 -- 12:58:15 PM		DWN.	DRW
		MODEL: ArcGIS 9.3	SCALE:	1"= 1,000'
			GIS USER:	DWALTERS

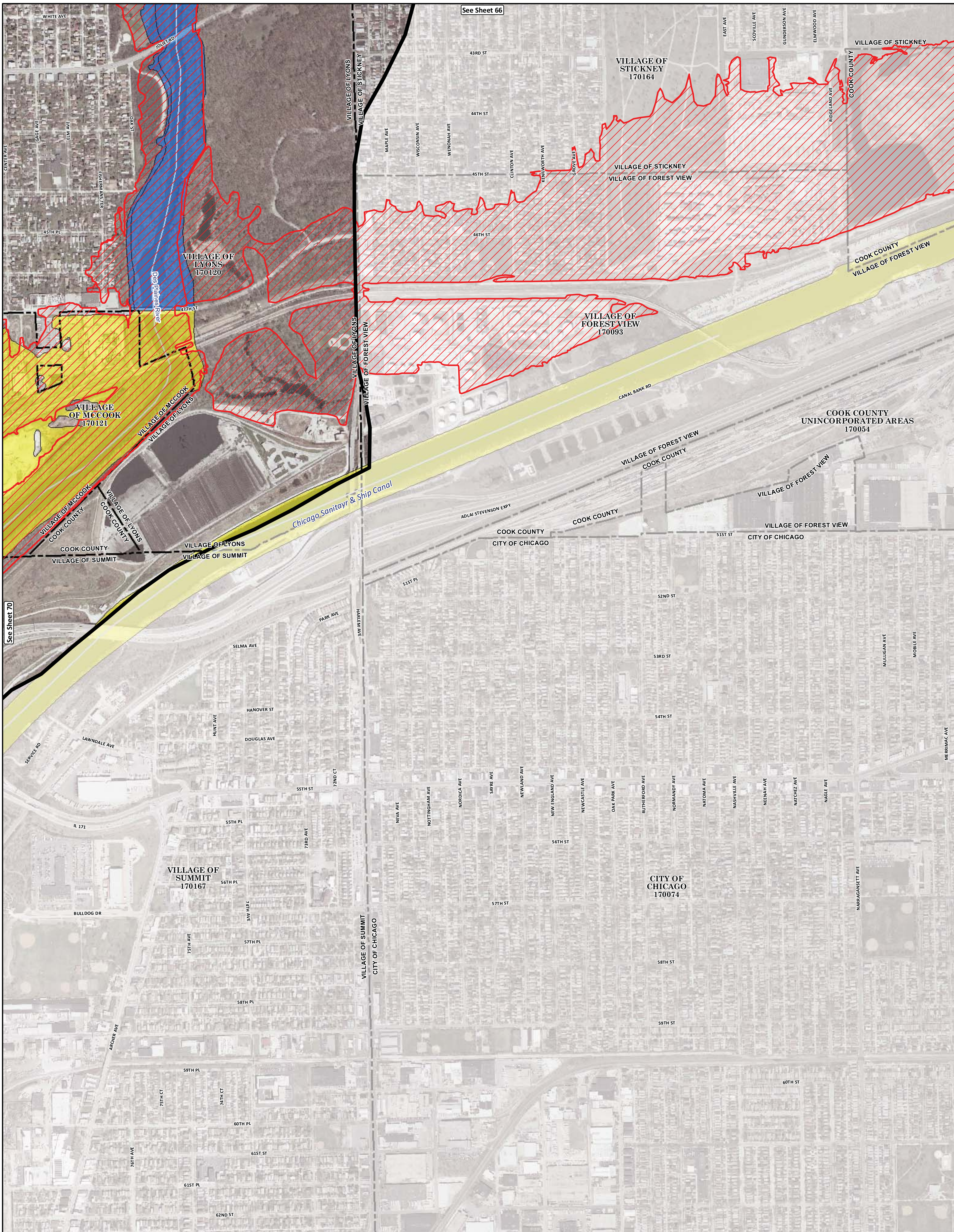
PROJ. 080043

FIRM PANEL 17031C0487J

SHEET 70 OF 82

DRAWING NO.

APPENDIX A



Legend

DWP 100-yr Inundation Area

FEMA Floodplain

Zone A, AH and AO

Zone AE

Lower Des Plaines River Watershed Study Area

DWP River/Streams

Municipal Boundary

County Boundary

0 500 1,000 2,000

Feet

CLIENT:

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

CHRISTOPHER B. BURKE ENGINEERING, LTD.

9575 W. Higgins Road, Suite 600 Rosemont, Illinois 60018 (847) 823-0500

TITLE:

COMPARISON OF DWP 100-YR INUNDATION MAPPING AND FEMA EFFECTIVE FIRM LOWER DES PLAINES RIVER WATERSHED

FILE NAME	Map Document: (Z:\MWRDGC\08-0043 Phase B\Water\Des Plaines\exhibits\FIRM Panels.mxd)		
DATE -- TIME	11/23/2010 -- 12:58:15 PM	DWN.	DRW
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		GIS USER:	DWALTERS

PROJ. 080043

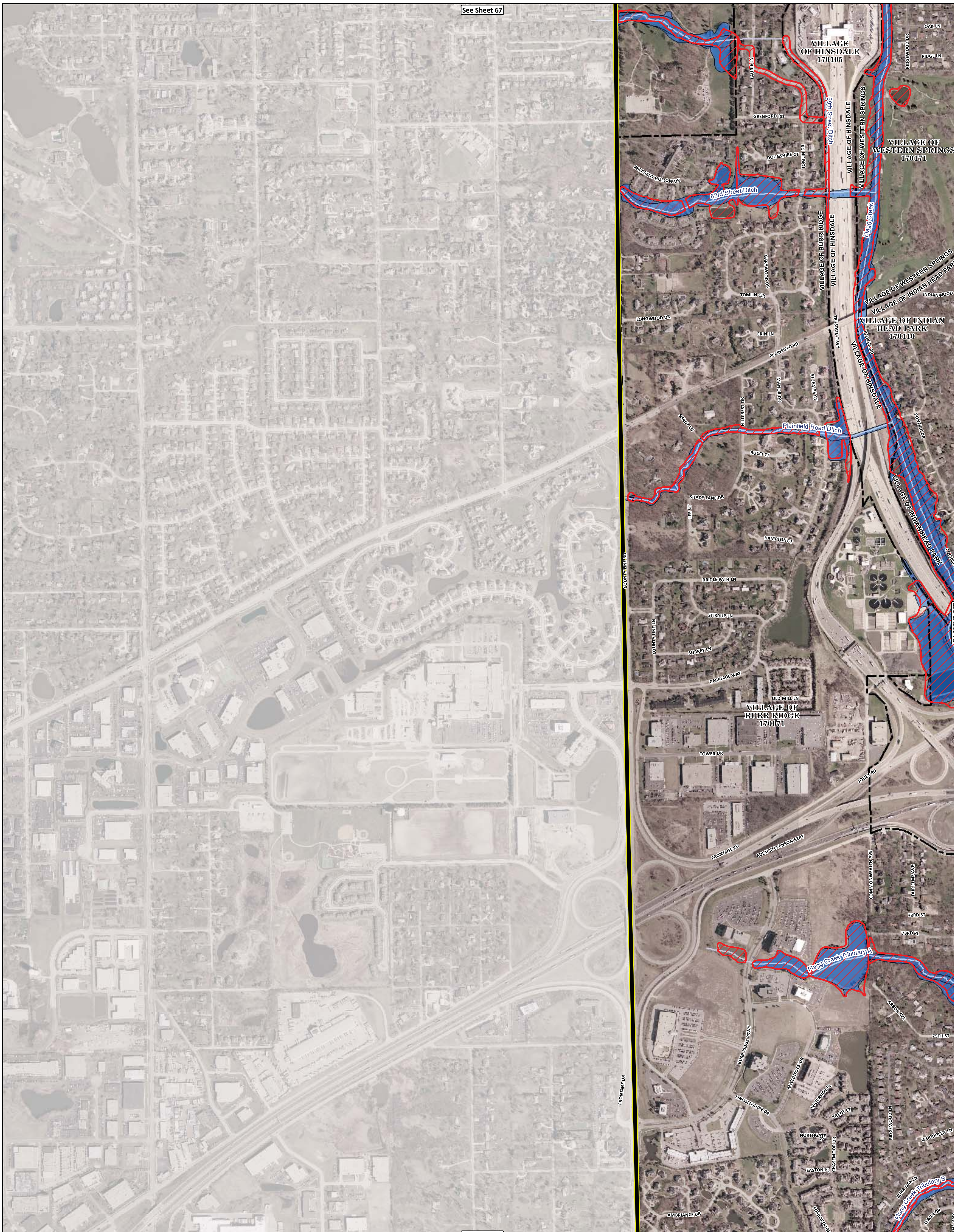
FIRM PANEL

17031C0491J

SHEET 71 OF 82

DRAWING NO.

APPENDIX A



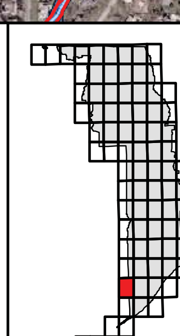
Legend

- DWP 100-yr Inundation Area

FEMA Floodplain

- Zone A, AH and AO
- Zone AE
- Lower Des Plaines River Watershed Study Area
- DWP River/Streams
- Municipal Boundary
- County Boundary

0 500 1,000 2,000
Feet



CLIENT: **METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO**	TITLE: **COMPARISON OF DWP 100-YR INUNDATION MAPPING AND FEMA EFFECTIVE FIRM LOWER DES PLAINES RIVER WATERSHED**

CHRISTOPHER B. BURKE ENGINEERING, LTD.
9575 W. Higgins Road, Suite 600 Rosemont, Illinois 60018 (847) 823-0500

FILE NAME	Map Document: (Z:\MWRDGC\08-0043 Phase B\Water\Des Plaines\exhibits\FIRM Panels.mxd)		
DATE -- TIME	11/23/2010 -- 12:58:15 PM	DWN.	DRW
	MODEL: ArcGIS 9.3	SCALE:	1"= 1,000'
		GIS USER:	DWALTERS

PROJ. 080043
FIRM PANEL 17031C0468J
SHEET 72 OF 82
DRAWING NO. **APPENDIX A**

Legend

FEMA Floodplain

- Zone A, AH and AO
- Zone AE

- Lower Des Plaines River Watershed Study Area
- DWP River/Streams
- Municipal Boundary
- County Boundary

0 500 1,000 2,000
Feet

CLIENT:

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:

COMPARISON OF DWP 100-YR INUNDATION MAPPING AND FEMA EFFECTIVE FIRM LOWER DES PLAINES RIVER WATERSHED

PROJ. 080043

FIRM PANEL 17031C0469J

SHEET 73 OF 82

CHRISTOPHER B. BURKE ENGINEERING, LTD.
9575 W. Higgins Road, Suite 600 Rosemont, Illinois 60018 (847) 823-0500

FILE NAME	Map Document: (Z:\MWRDGC\08-0043 Phase B\Water\Des Plaines\exhibits\FIRM Panels.mxd)		
DATE -- TIME	11/23/2010 -- 12:58:15 PM	DWN.	DRW
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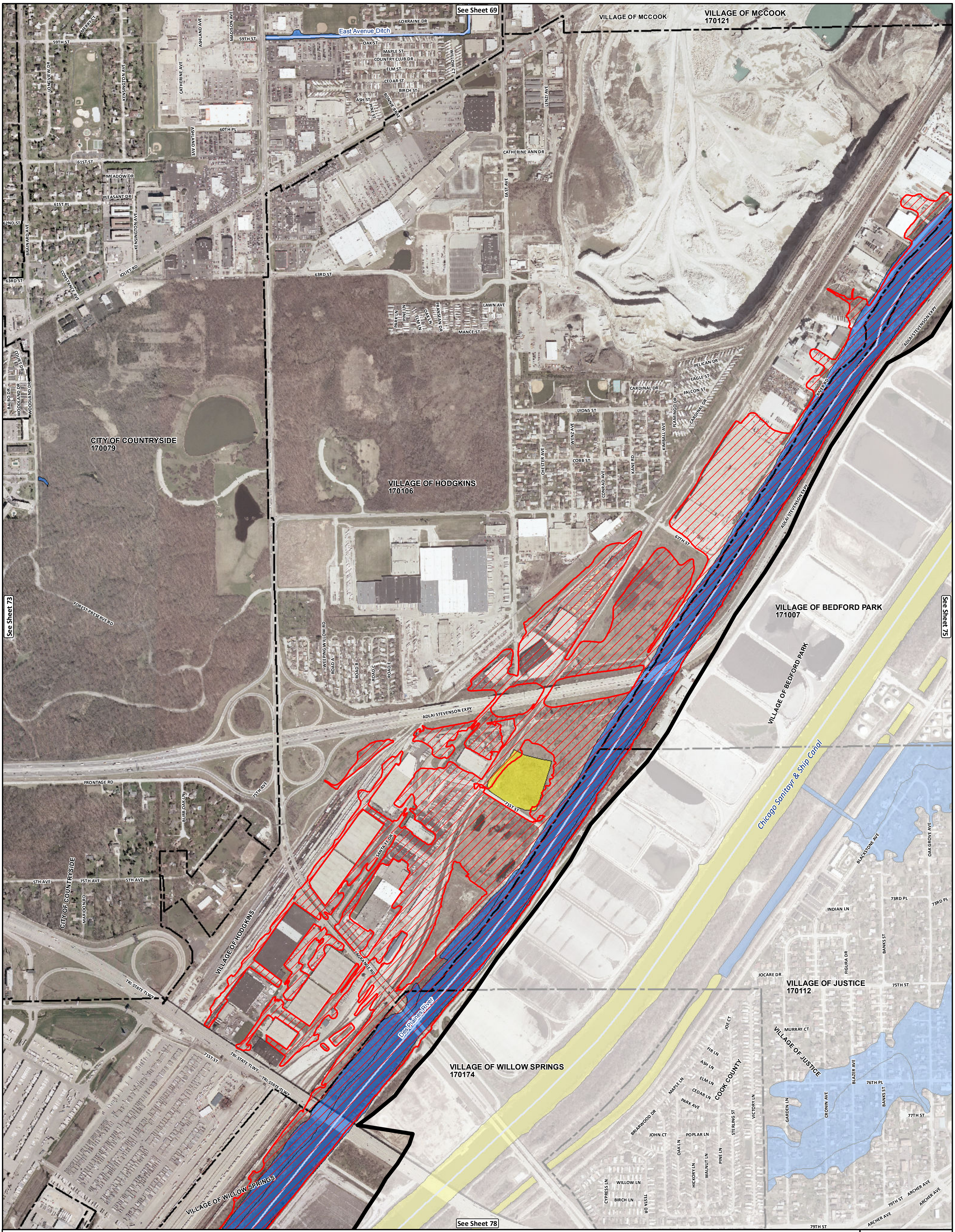
		GIS USER:	DWALTERS

DRAWING NO.

APPENDIX A



Legend

FEMA Floodplain

- Zone A, AH and AO
- Zone AE
- Lower Des Plaines River Watershed Study Area
- DWP River/Streams
- Municipal Boundary
- County Boundary

0 500 1,000 2,000
Feet

N

CLIENT:
METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

TITLE:
COMPARISON OF DWP 100-YR INUNDATION MAPPING AND FEMA EFFECTIVE FIRM LOWER DES PLAINES RIVER WATERSHED

PROJ. 080043
FIRM PANEL
17031C0488J
SHEET 74 OF 82

CHRISTOPHER B. BURKE ENGINEERING, LTD.
9575 W. Higgins Road, Suite 600 Rosemont, Illinois 60018 (847) 823-0500

FILE NAME	Map Document: (Z:\MWRDGC\08-0043 Phase B\Water\Des Plaines\exhibits\FIRM Panels.mxd)				
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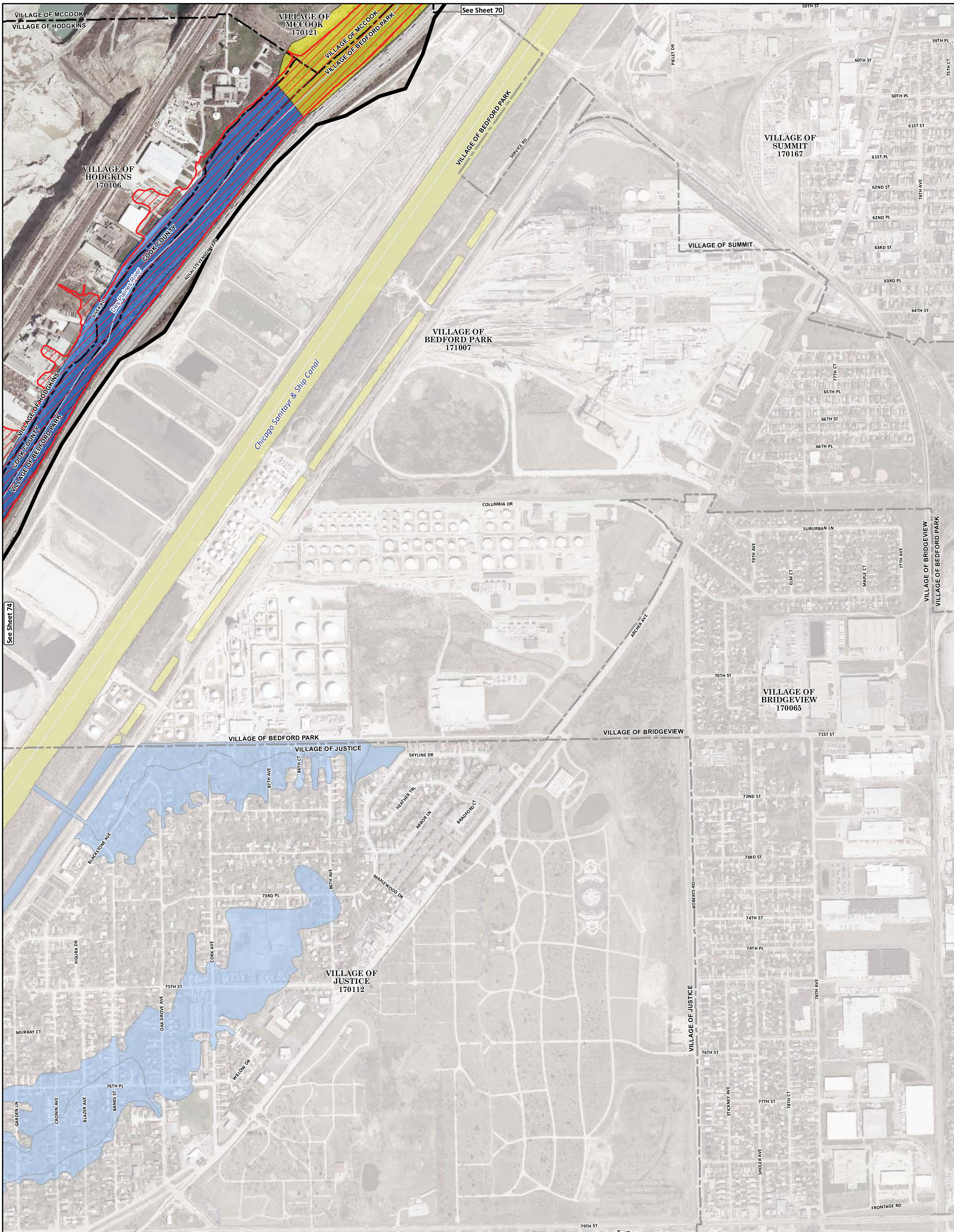
				GIS USER:	DWALTERS

DRAWING NO.
APPENDIX A



Legend

- DWP 100-yr Inundation Area

FEMA Floodplain

- Zone A, AH and AO
- Zone AE
- Lower Des Plaines River Watershed Study Area
- DWP River/Streams
- Municipal Boundary
- County Boundary

0 500 1,000 2,000
Feet

CLIENT:
METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

CHRISTOPHER B. BURKE ENGINEERING, LTD.
9575 W. Higgins Road, Suite 600 Rosemont, Illinois 60018 (847) 823-0500

TITLE:
COMPARISON OF DWP 100-YR INUNDATION MAPPING AND FEMA EFFECTIVE FIRM LOWER DES PLAINES RIVER WATERSHED

FILE NAME	Map Document: (Z:\MWRDGC\08-0043 Phase B\Water\Des Plaines\exhibits\FIRM Panels.mxd)		
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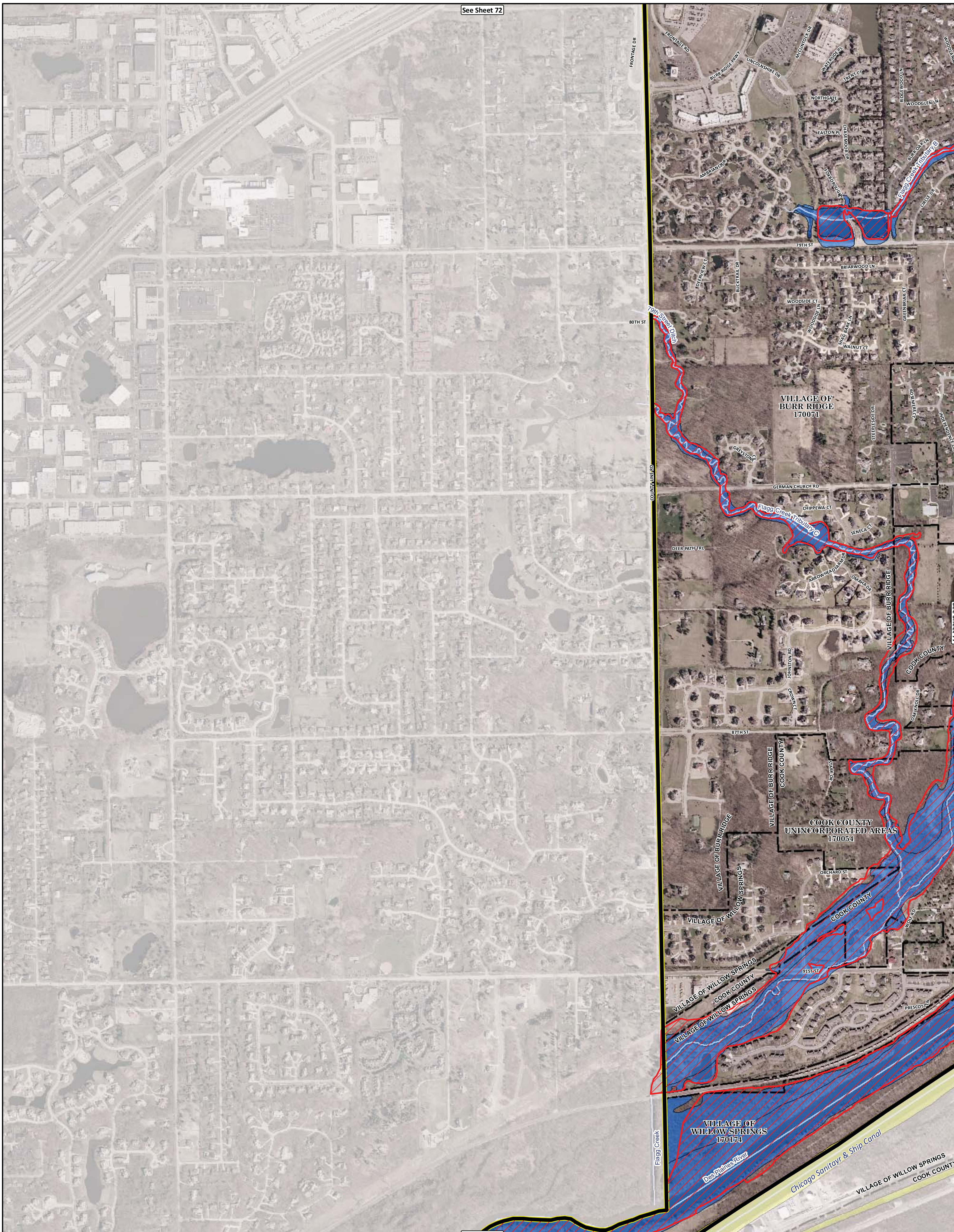
	MODEL: ArcGIS 9.3	SCALE:	1"= 1,000'
		GIS USER:	DWALTERS

PROJ. 080043
FIRM PANEL
17031C0489J
SHEET 75 OF 82
DRAWING NO.
APPENDIX A



Legend

DWP 100-yr Inundation Area

FEMA Floodplain

Zone A, AH and AO

Zone AE

Lower Des Plaines River Watershed Study Area

DWP River/Streams

Municipal Boundary

County Boundary

0 500 1,000 2,000
Feet

CLIENT:

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

CHRISTOPHER B. BURKE ENGINEERING, LTD.
9575 W. Higgins Road, Suite 600 Rosemont, Illinois 60018 (847) 823-0500

TITLE:

COMPARISON OF DWP 100-YR INUNDATION MAPPING AND FEMA EFFECTIVE FIRM LOWER DES PLAINES RIVER WATERSHED

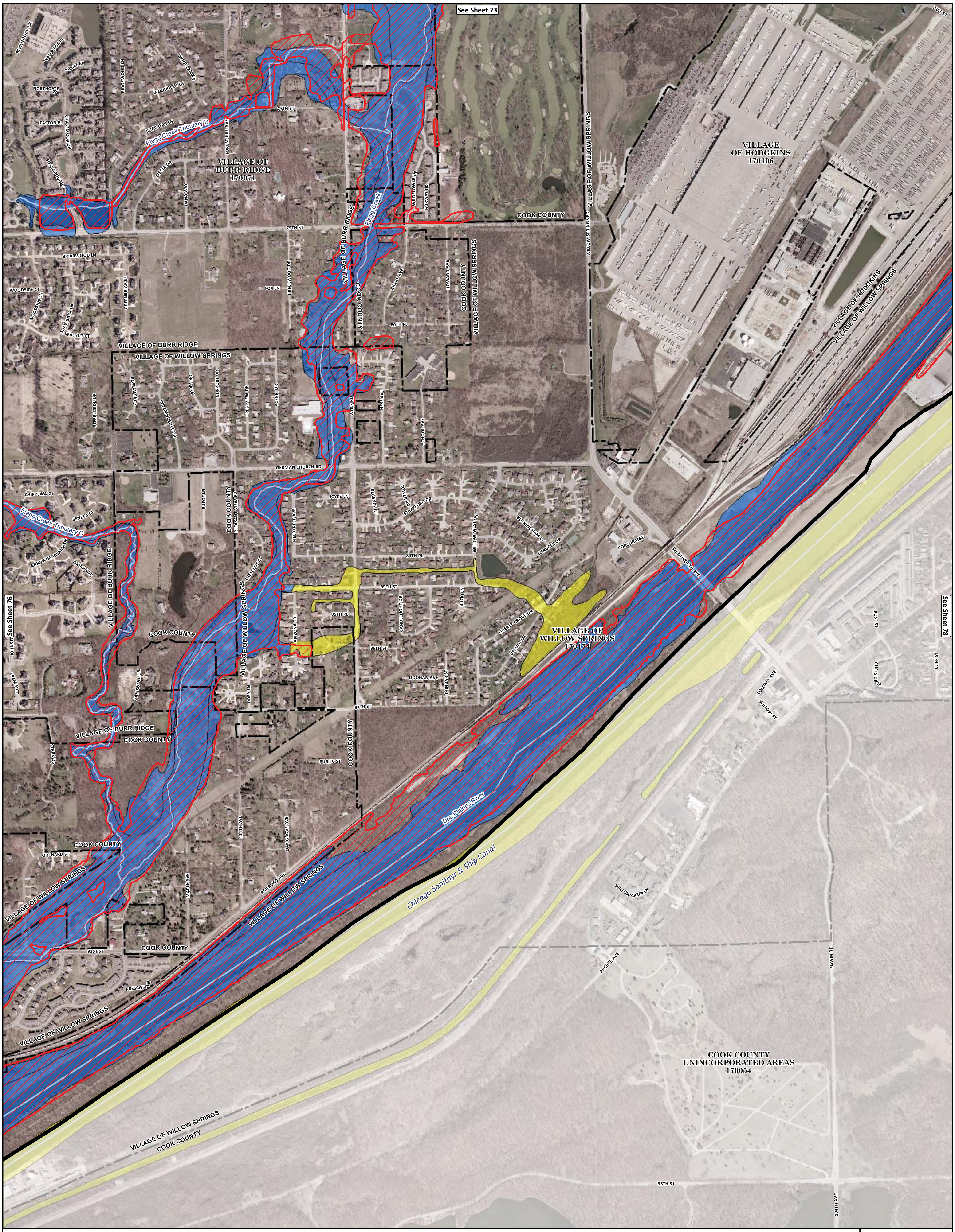
FILE NAME	Map Document: (Z:\MWRDGC\08-0043 Phase B\Water\Des Plaines\exhibits\FIRM Panels.mxd)		
DATE -- TIME	11/23/2010 -- 12:58:15 PM	DWN.	DRW
	MODEL:	ArcGIS 9.3	SCALE: 1"= 1,000'
			GIS USER: DWALTERS

PROJ. 080043

FIRM PANEL
17031C0581J

SHEET 76 OF 82

DRAWING NO.
APPENDIX A



Legend

DWP 100-yr Inundation Area

FEMA Floodplain

Zone A, AH and AO

Zone AE

Lower Des Plaines River Watershed Study Area

DWP River/Streams

Municipal Boundary

County Boundary

0 500 1,000 2,000

Feet

CLIENT: METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO	TITLE: COMPARISON OF DWP 100-YR INUNDATION MAPPING AND FEMA EFFECTIVE FIRM LOWER DES PLAINES RIVER WATERSHED
CHRISTOPHER B. BURKE ENGINEERING, LTD. 9575 W. Higgins Road, Suite 600 Rosemont, Illinois 60018 (847) 823-0500	FILE NAME: Map Document: (Z:\MWRDGC\08-0043 Phase B\Water\Des Plaines\exhibits\FIRM Panels.mxd)
	DATE -- TIME: 11/23/2010 -- 12:58:15 PM
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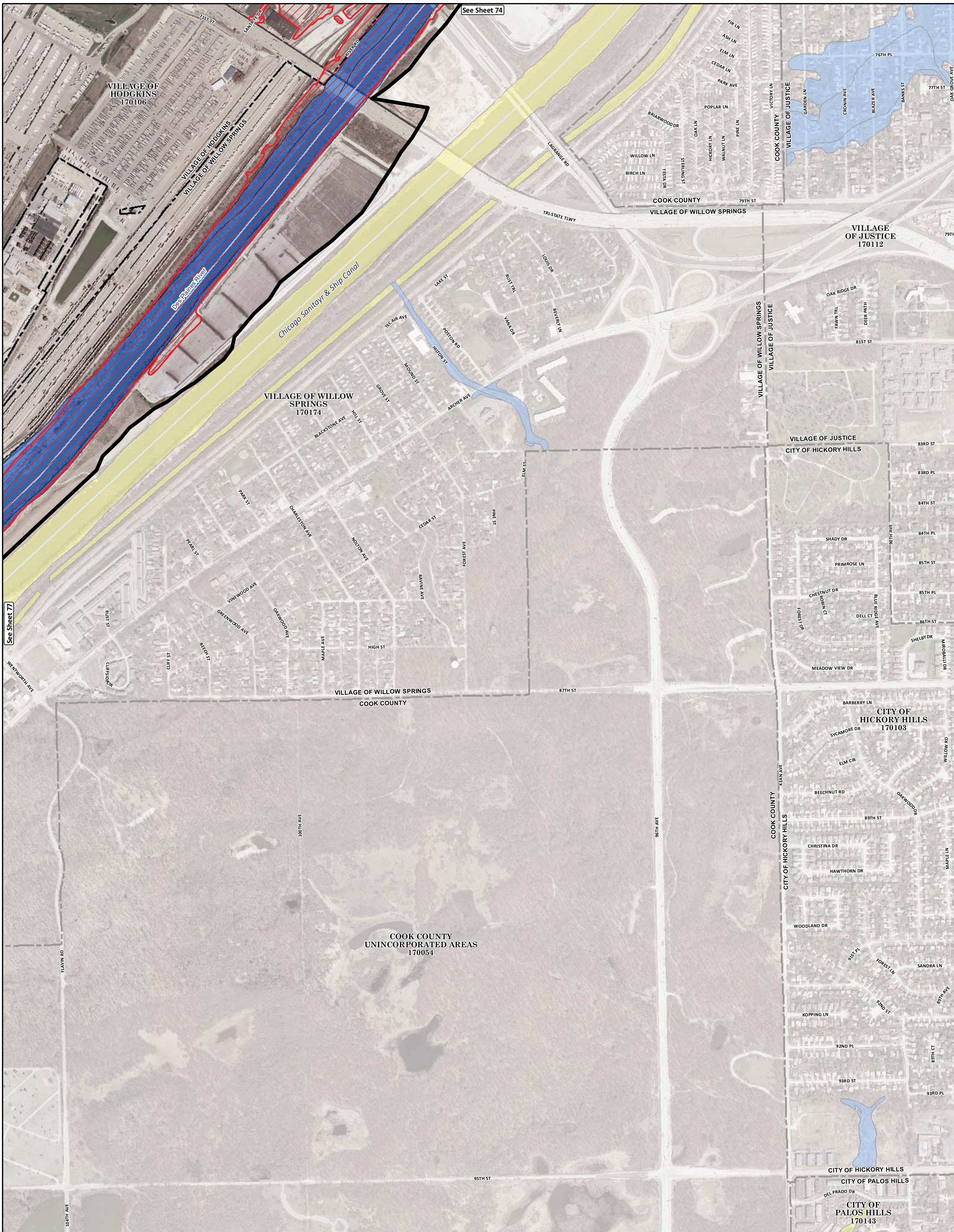
PROJ. 080043

FIRM PANEL 17031C0582J

SHEET 77 OF 82

DRAWING NO. APPENDIX A



Legend

DWP 100-yr Inundation Area

FEMA Floodplain

Zone A, AH and AO

Zone AE

Lower Des Plaines River Watershed Study Area

DWP River/Streams

Municipal Boundary

County Boundary

0 500 1,000 2,000

Feet

CLIENT:

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

CHRISTOPHER B. BURKE ENGINEERING, LTD.

9575 W. Higgins Road, Suite 600 Rosemont, Illinois 60018 (847) 823-0500

TITLE:

COMPARISON OF DWP 100-YR INUNDATION MAPPING AND FEMA EFFECTIVE FIRM LOWER DES PLAINES RIVER WATERSHED

FILE NAME	Map Document: (Z:\MWRDGC\08-0043 Phase B\Water\Des Plaines\exhibits\FIRM Panels.mxd)				
DATE -- TIME	11/23/2010 -- 12:58:15 PM			DWN.	DRW
		MODEL:	ArcGIS 9.3	SCALE:	1"= 1,000'
				GIS USER:	DWALTERS

PROJ. 080043

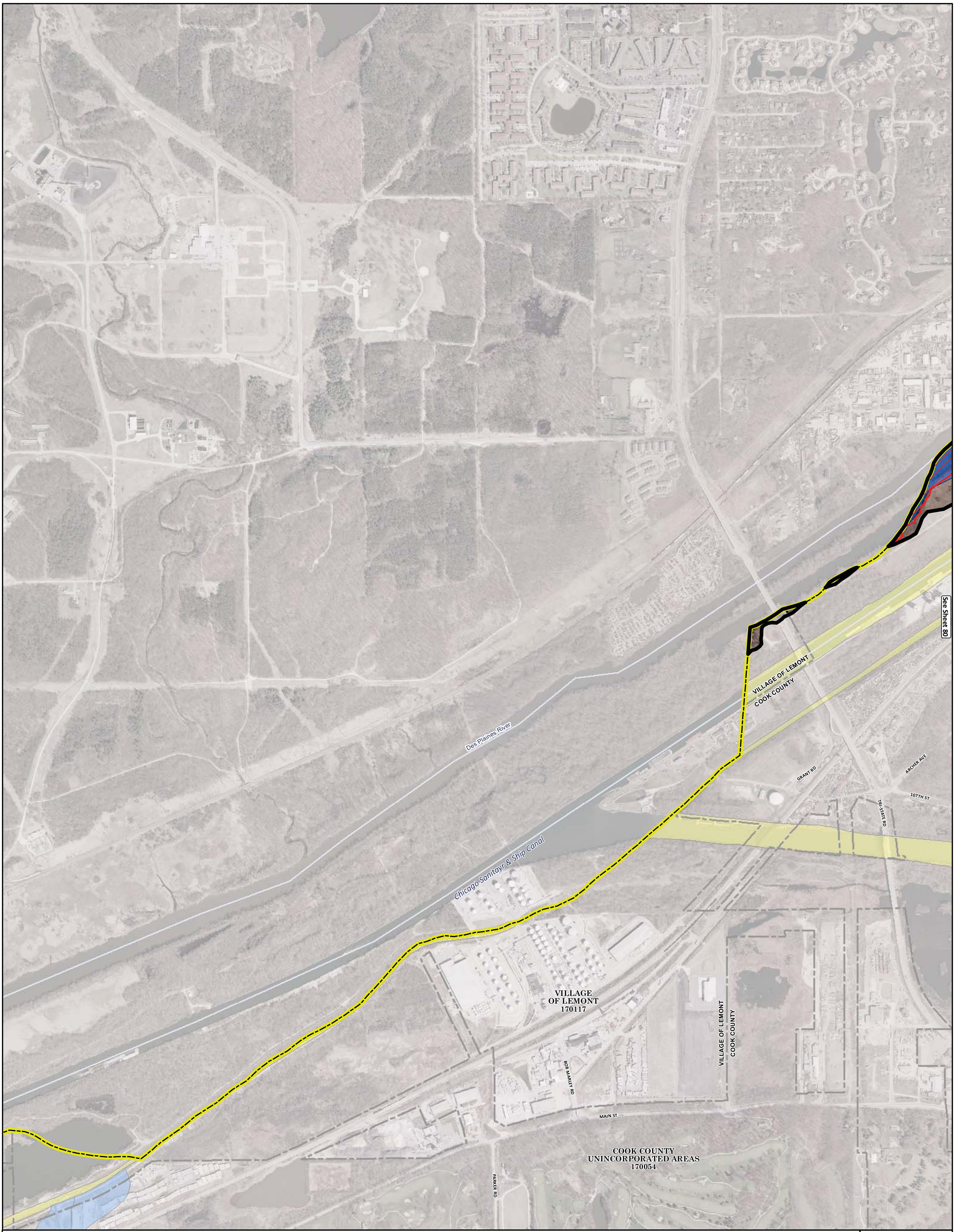
FIRM PANEL

17031C0601J

SHEET 78 OF 82

DRAWING NO.

APPENDIX A



Legend

- DWP 100-yr Inundation Area
- Lower Des Plaines River Watershed Study Area
- DWP River/Streams
- Municipal Boundary
- County Boundary

FEMA Floodplain

- Zone A, AH and AO
- Zone AE

0 500 1,000 2,000
Feet

CLIENT:

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

CHRISTOPHER B. BURKE ENGINEERING, LTD.
9575 W. Higgins Road, Suite 600 Rosemont, Illinois 60018 (847) 823-0500

TITLE:

COMPARISON OF DWP 100-YR INUNDATION MAPPING AND FEMA EFFECTIVE FIRM LOWER DES PLAINES RIVER WATERSHED

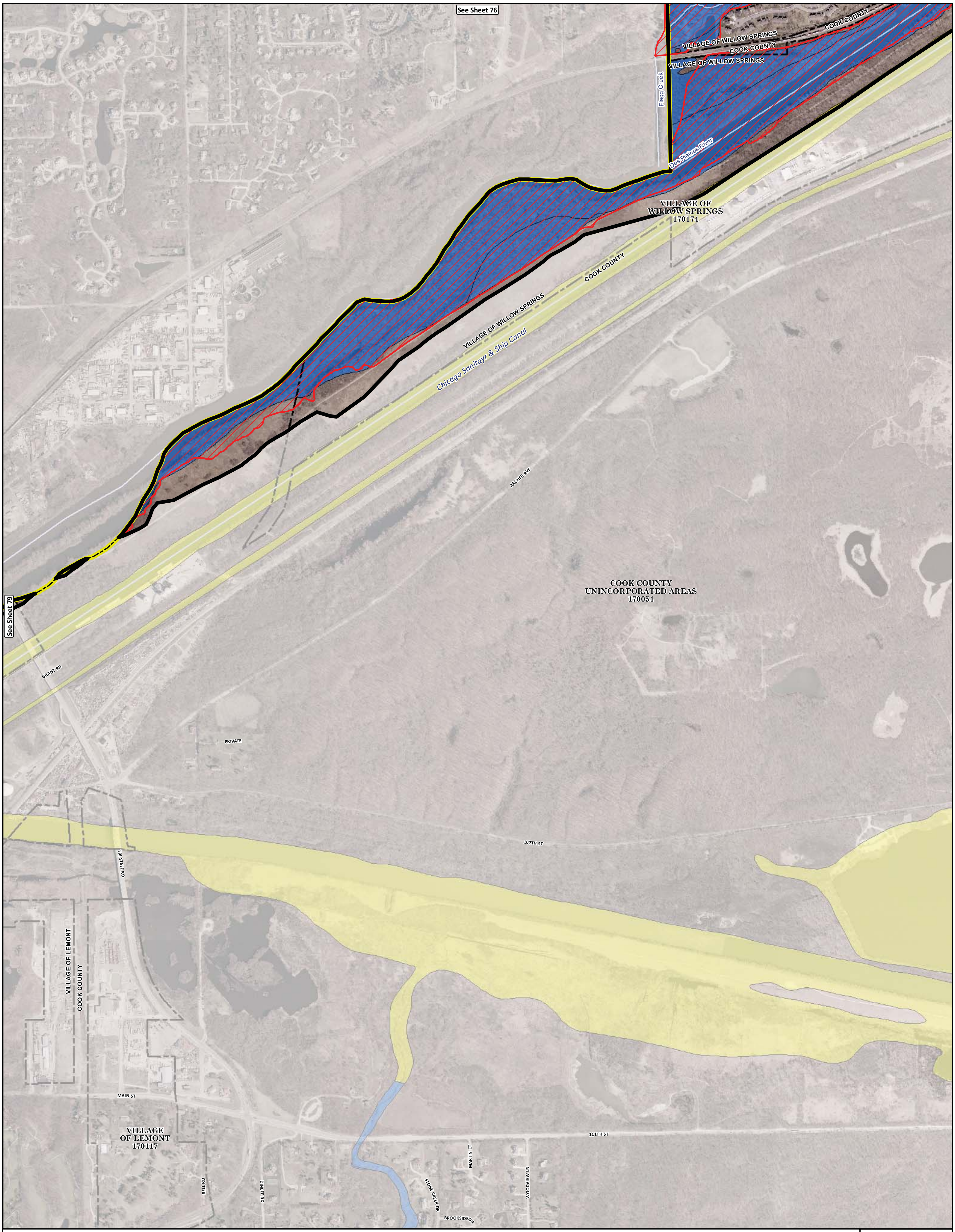
FILE NAME	Map Document: (Z:\MWRDGC\08-0043 Phase B\Water\Des Plaines\exhibits\FIRM Panels.mxd)		
DATE -- TIME	11/23/2010 -- 12:58:15 PM	DWN.	DRW
	MODEL: ArcGIS 9.3	SCALE:	1"= 1,000'
		GIS USER:	DWALTERS

PROJ. 080043

FIRM PANEL
17031C0579J

SHEET 79 OF 82

DRAWING NO.
APPENDIX A



Legend

- DWP 100-yr Inundation Area
- Lower Des Plaines River Watershed Study Area
- DWP River/Streams
- Municipal Boundary
- County Boundary

FEMA Floodplain

- Zone A, AH and AO
- Zone AE

0 500 1,000 2,000
Feet

CLIENT:

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

CHRISTOPHER B. BURKE ENGINEERING, LTD.
9575 W. Higgins Road, Suite 600 Rosemont, Illinois 60018 (847) 823-0500

TITLE:

COMPARISON OF DWP 100-YR INUNDATION MAPPING AND FEMA EFFECTIVE FIRM LOWER DES PLAINES RIVER WATERSHED

FILE NAME	Map Document: (Z:\MWRDGC\08-0043 Phase B\Water\Des Plaines\exhibits\FIRM Panels.mxd)		
DATE -- TIME	11/23/2010 -- 12:58:15 PM	DWN.	DRW
	MODEL: ArcGIS 9.3	SCALE:	1"= 1,000'
		GIS USER:	DWALTERS

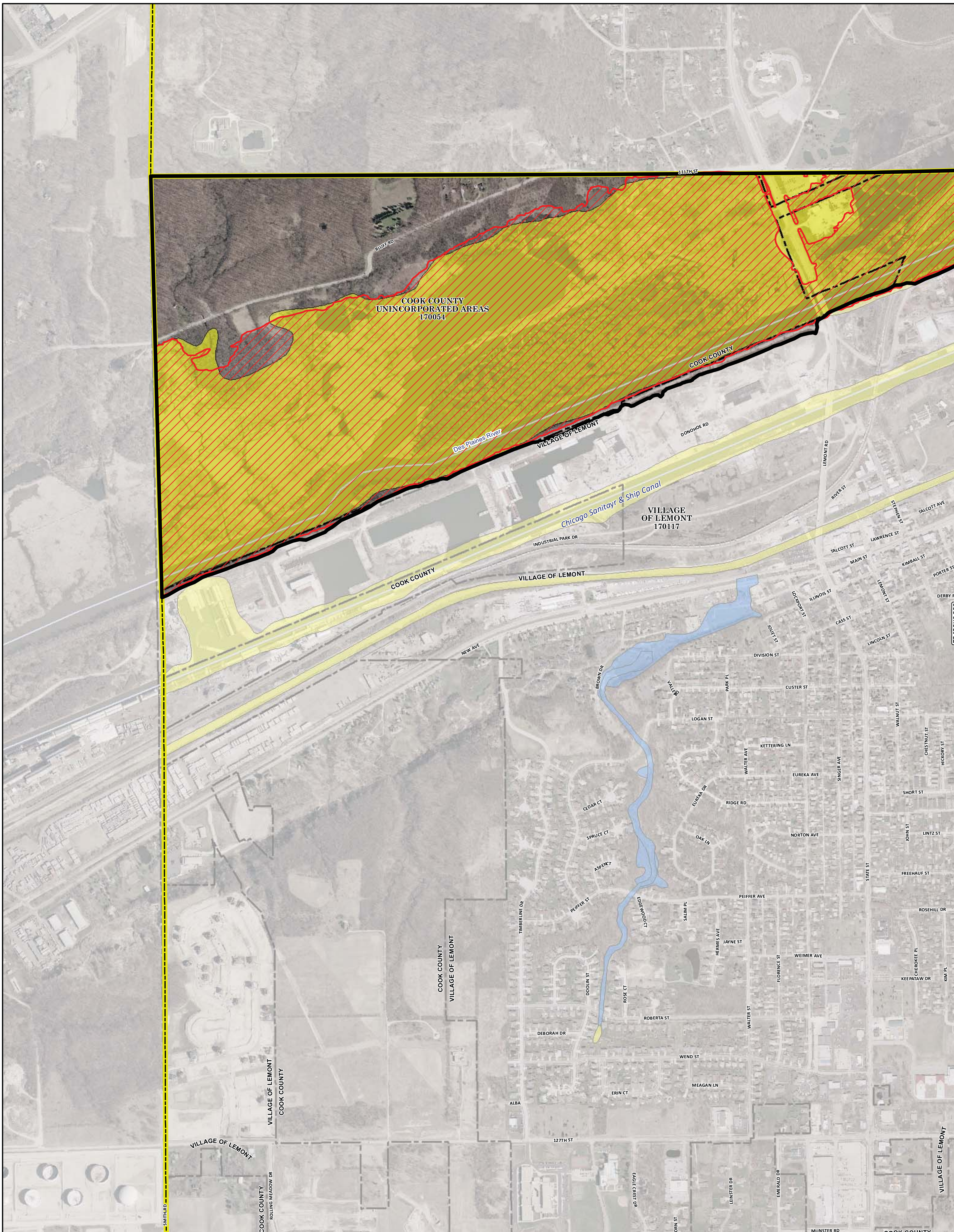
PROJ. 080043

FIRM PANEL 17031C0583J

SHEET 80 OF 82

DRAWING NO.

APPENDIX A



Legend

DWP 100-yr Inundation Area

FEMA Floodplain

Zone A, AH and AO

Zone AE

Lower Des Plaines River Watershed Study Area

DWP River/Streams

Municipal Boundary

County Boundary

N

0 500 1,000 2,000

Feet

CLIENT:

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

CBB

CHRISTOPHER B. BURKE ENGINEERING, LTD.

9575 W. Higgins Road, Suite 600 Rosemont, Illinois 60018 (847) 823-0500

TITLE:

COMPARISON OF DWP 100-YR INUNDATION MAPPING AND FEMA EFFECTIVE FIRM LOWER DES PLAINES RIVER WATERSHED

FILE NAME	Map Document: (Z:\MWRDGC\08-0043 Phase B\Water\Des Plaines\exhibits\FIRM Panels.mxd)		
DATE -- TIME	11/23/2010 -- 12:58:15 PM	DWN.	DRW
	MODEL: ArcGIS 9.3	SCALE:	1"= 1,000'
		GIS USER:	DWALTERS

PROJ. 080043

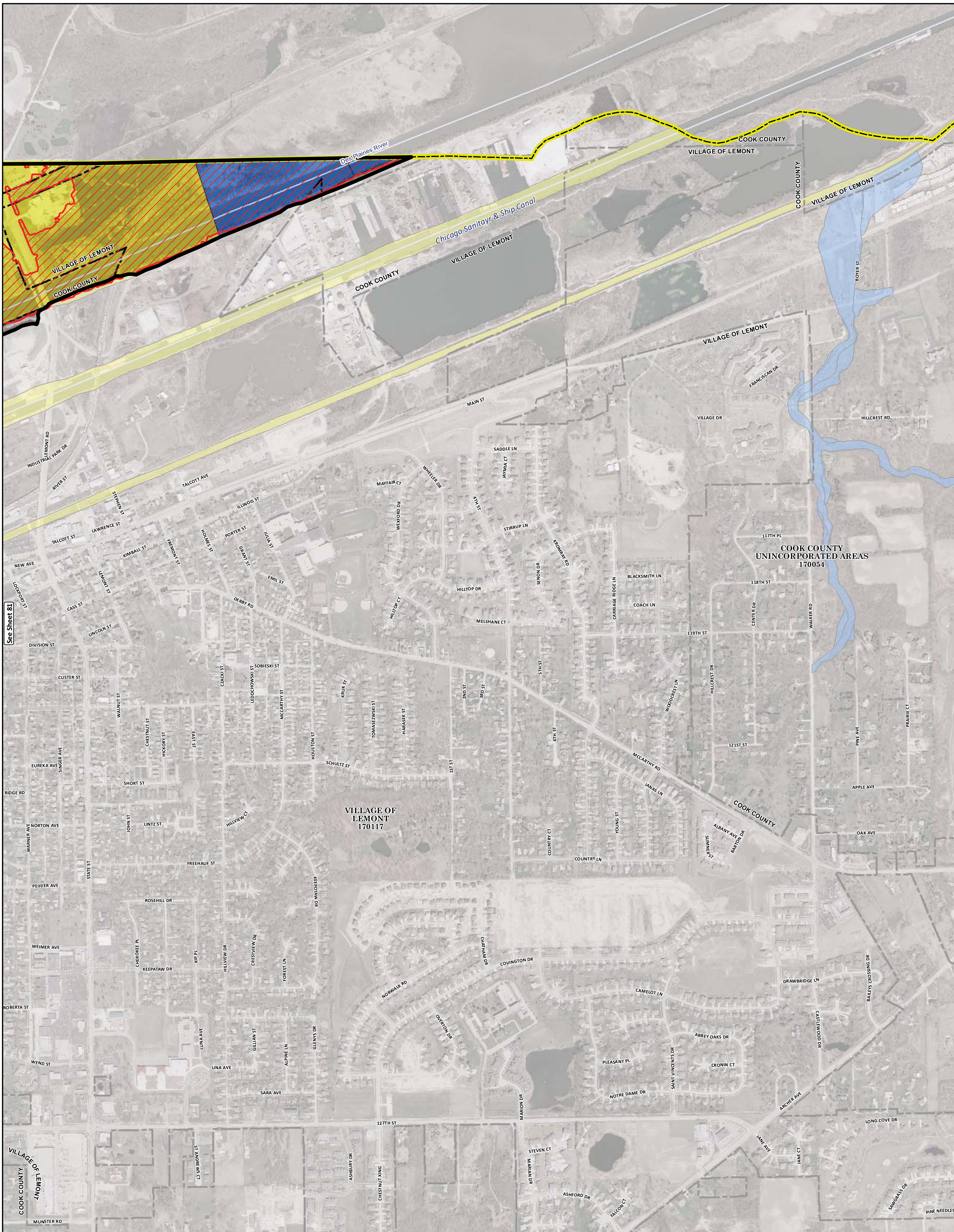
FIRM PANEL

17031C0567J

SHEET 81 OF 82

DRAWING NO.

APPENDIX A



Legend

DWP 100-yr Inundation Area

FEMA Floodplain

Zone A, AH and AO

Zone AE

Lower Des Plaines River Watershed Study Area

DWP River/Streams

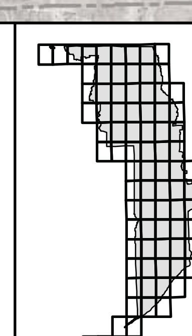
Municipal Boundary

County Boundary

N

0 500 1,000 2,000

Feet



CLIENT:

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APPENDIX A

CHAPTER 6
WATERSHED PLANNING

Acronyms used in Chapter 6:

AA_B	Average Annual Benefits
AA_C	Average Annual Costs
AA_D	Average Annual Damages
ABM	Articulated Block Mat
BC	Benefit-to-Cost
CCSMP	Cook County Stormwater Management Plan
CDSA	Critical Duration Storm Analysis
CIP	Capital Improvement Program
CMAP	Chicago Metropolitan Agency for Planning
CUDD	Calumet Union Drainage District
DTM	Digital Terrain Model
DWP	Detailed Watershed Plan
FDA	Flood Damage Assessment
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
GIS	Geographic Information Systems
HEC	Hydrologic Engineering Center
H&H	Hydrologic and Hydraulic
HSPF	Hydrologic Simulation Program-Fortran
IDNR-OWR	Illinois Department of Natural Resources - Office of Water Resources
IDNR-SWS	Illinois Department of Natural Resources – State Water Survey
IDOT	Illinois Department of Transportation
IEMA	Illinois Emergency Management Agency
IEPA	Illinois Environmental Protection Agency
LCSMC	Lake County Stormwater Management Commission
NB	Net Benefits
NCDC	National Climactic Data Center
NRCS	Natural Resource Conservation Service
NWI	National Wetland Inventory
O&M	Operation and Maintenance
PV	Present Value
PV_B	Present Value of Benefits
PV_C	Present Value of Costs
RAS	River Analysis System
SCS	Soil Conservation Service
UAA	User Attainability Analysis
UDV	Unit Day Value
UNET	Unsteady NETwork Model
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USGS	United States Geological Survey
WPC	Watershed Planning Council

CHAPTER 6
WATERSHED PLANNING

6.1 Introduction

A standardized approach to watershed planning is required throughout Cook County to coordinate the District's efforts to implement its Cook County Stormwater Management Plan (CCSMP). Detailed Watershed Plans (DWPs) will be developed for all major watersheds and will serve as standardized documents to help guide the District as it develops a Capital Improvement Program (CIP). Previous planning efforts have been conducted by various organizations, and will be used in the development of DWPs where applicable. This chapter provides guidance for merging findings from previous flood remediation efforts in Cook County with new data and evaluations done to develop effective and consistent DWPs.

6.2 Status of Watershed Planning in Cook County

Local, state, and federal agencies have conducted comprehensive stormwater planning (Table 6.1) efforts as a part of their watershed planning programs for the following watersheds within Cook County: the North Branch of the Chicago River, Lower Des Plaines Tributaries, Calumet-Sag Channel, Little Calumet River, Poplar Creek and Upper Salt Creek. Where possible, previous planning information should be included and built upon in developing DWPs to take advantage of earlier efforts.

6.3 Planning Methodology

6.3.1 Organization of Detailed Watershed Plans

DWPs will serve as the supporting documentation to the District's Stormwater Management CIP. The watershed planning methodologies and standards described herein will be used to develop a DWP for each major watershed in Cook County. The objective is to supply the District with information on existing conditions, stormwater problems, alternative improvements considered to address stormwater problems, and other relevant information necessary to prioritize projects on a countywide level. Table 6.2 is a standard outline of the content to be provided within DWPs.

6.3.2 Data Collection and Review

The initial step in DWP development is the collection and review of existing data. Data that will be collected and reviewed include stormwater problem data, existing watershed studies and models, monitoring data, geographic information systems (GIS) data and other sources of useful watershed mapping.

6.3.3 Use of Existing Data for Detailed Watershed Studies

The DWP report will include a summary of existing watershed data and information. As a part of DWP development, the District will collect and review watershed data from member communities, Watershed Planning Councils (WPCs), applicable state and federal agencies, available complaint records, and other relevant watershed stakeholders. Relevant stormwater data will be compiled within the DWP report. The following subsections provide means of summarizing data regarding stormwater problems (detailed in Section 6.3.3.1) and available studies that have compiled some of the existing stormwater data (detailed in Section 6.3.3.2).

Table 6.1 Summary of Watershed Planning In Cook County

Agency	Description of Watershed Planning
Illinois Department of Natural Resources, Office of Water Resources (IDNR-OWR)	At the request of local governments, IDNR-OWR performs flood control studies to identify flooding problems, analyze alternative solutions, and determine the economic feasibility of those solutions. Plans developed by IDNR-OWR focus on structural flood control measures, but nonstructural flood mitigation alternatives are also examined. IDNR-OWR administers other funding assistance. It has a small-projects program that is often used to address local drainage problems and can fund flood related improvements up to $100,000. A less rigorous quantification of benefits is allowed under this program. Its flood mitigation program administers funds for the acquisition of flood-prone structures and flood mitigation planning. IDNR-OWR is involved in assisting FEMA with the map modernization for Cook County, as explained further in Section 2.5.1.
Illinois Environmental Protection Agency (IEPA)	IEPA collects water quality and biological data on streams and lakes throughout the state. The data are reported in the biannual *Illinois Water Quality Report,* which documents the level to which water bodies are supporting their designated uses (such as swimming, aquatic life). IEPA also maintains the Illinois Water Quality Management Plan, which offers recommendations for stormwater, soil erosion and sediment control, and stream and wetland best management practices (BMPs). IEPA also provides grants annually for implementation of nonpoint source control plans and demonstration projects. These projects can include BMPs to curtail urban runoff and also instream activities to reduce erosion, sedimentation, and degradation of water quality, as detailed in Section 319 of the Clean Water Act. On the preventive side, activities such as ordinance implementation and workshops on stormwater BMPs have been funded by IEPA. The IEPA Illinois Clean Lakes Program provides annual grants for lake remediation projects where there is a realistic opportunity for restoration and protection for high quality lakes. IEPA encourages a watershed approach in addressing lake remediation and protection.
Federal Emergency Management Agency (FEMA)	FEMA has several flood hazard mitigation funding programs, administered by the Illinois Emergency Management Agency (IEMA) and described in Section 2.5.8. Some FEMA regulatory floodplain maps for Cook County are inadequate. They do not include water surface elevations or they are out of date because of significant land use and other topographic changes. FEMA has initiated a Flood Insurance Rate Map (FIRM) Modernization Program, which compiles hydrologic and hydraulic (H&H) modeling data for selected map panels in Cook County. IDNR-OWR serves as a local sponsor for this project. The data will be included in a countywide modernization of floodplain maps.
Chicago Metropolitan Agency for Planning (CMAP)	CMAP has historically performed watershed planning, including the Area Wide Water Quality Management Plan developed for all the major watersheds in northeastern Illinois under Section 208 of the Clean Water Act. CMAP assists local governments in developing watershed planning. CMAP has produced a watershed inventory (http://www.nipc.org/environment/sustainable/water/watershed/) that includes a list of watershed plans from various sources and active watershed groups.
IDNR, State Water Survey (IDNR-SWS)	IDNR-SWS runs research centers that gather and maintain scientific data resources used in watershed planning. IDNR-SWS is also involved in planning activities for FEMA map modernization.
U.S. Army Corps of Engineers (USACE)	USACE administers a program for cost-sharing funding for the study, design, and construction of flood control projects. These projects generally are limited to structural flood control measures. If a reconnaissance level study shows that a project is likely to be cost-effective, USACE proceeds with a project analysis, which must be funded locally by 50% matching funds. For approved projects, USACE funds up to

Table 6.1 Summary of Watershed Planning In Cook County

Agency	Description of Watershed Planning
	65% of design and construction costs; the remaining costs are funded by a local or nonfederal sponsor. Sponsors must furnish all required lands, easements, rights-of-way and utility relocations, and also operate and maintain the completed project in perpetuity. Cost-sharing agreements must be negotiated individually with USACE on a project-by-project basis. USACE also provides design services for floodproofing of residences as part of an overall flood control project. This work and most USACE studies are performed with in-house staff.
U.S. Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS)	NRCS has planned, designed, and constructed flood control facilities to address overbank flooding in the Chicago metropolitan region with local sponsors, including the District. It also has performed floodplain management studies and updated floodplain mapping for local governments. In an effort partially funded by Section 319 of the Clean Water Act under the IEPA's direction, NRCS developed the *Illinois Urban Manual,* a technical reference for developers, planners, engineers, government officials and others involved in land use planning, building site development, and natural resource conservation. Applicable in rural, urban, and developing areas, the manual includes BMPs for soil erosion and sediment control, stormwater management, and special area protection. The manual was updated in 2002.
The District	The District designed and constructed the Tunnel And Reservoir Plan to address combined sewer overflow in the combined sewer areas of Cook County. The District has also been involved in many federal and state flood control projects, serving as the local sponsor or providing other forms of cost-sharing.
Municipalities and Townships	Most stormwater planning within a municipality is performed by the municipality itself or completed under its direction. Planning assistance on larger waterways may be initiated by state and federal agencies. Capital improvement projects that address local drainage problems are typically implemented by municipalities. Many communities within Cook County have ongoing stormwater planning efforts that could contribute to the development of DWPs.
Soil and Water Conservation Districts (SWCD)	Cook County has two Soil and Water Conservation Districts (SWCDs); the North Cook County Soil and Water Conservation District and the Will-South Cook Soil and Water Conservation District. The purpose of the SWCDs is to provide information, education and guidance on the conservation and wise use of natural resources.
Lake County Stormwater Management Commission (LCSMC)	SMC conducted a watershed assessment in conjunction with the Friends of the Chicago River. The watershed assessment pertains to the North Branch of the Chicago River within Cook County.
U.S. Geological Survey (USGS)	Through a cooperative program, in which the District participates, the USGS (Illinois Water Science Center) maintains a stream gauging network and publishes an annual report containing daily streamflow data and water quality information for selected sites around the state. The USGS administers funding for site-specific hydrologic and water quality data collection and analysis. Additionally, the USGS provides streamflow, stream elevations, and precipitation data in real-time at http://il.water.usgs.gov/nwis-w/IL/. Some mapping efforts may be fundable through the USGS. USGS funds up to 50% of a project's in-house labor and expenses. On this reimbursable basis, USGS provides technical assistance in developing watershed models and other hydrologic and water quality related assistance. In the past, the USGS has researched and completed studies on emerging technologies in the water resources field.
U.S. Environmental Protection Agency (USEPA)	USEPA provides grants for water quality related planning and demonstration projects under Section 319(h) and 104(b)(3) of the Clean Water Act, as discussed under IEPA's roles and resources in Section 2.5.7. USEPA routinely holds national conferences on stormwater-related topics.

Table 6.2 DWP Standard Outline

1. Executive Summary
2. Introduction
    - 2.1 Scope and Approach
    - 2.2 Goals and Objectives
    - 2.3 Jurisdictional Responsibilities
    - 2.4 Organization of Detailed Watershed Study
    - 2.5 Summary of Problem Areas
    - 2.6 Coordination with Watershed Planning Councils
3. Watershed Characteristics
    - 3.1 General Watershed Description
    - 3.2 Sources of Data
        - 3.2.1 Previous Studies
        - 3.2.2 Floodplain Mapping
        - 3.2.3 Wetland and Riparian Areas Data
            - 3.2.3.1 Wetland Areas
            - 3.2.3.2 Riparian Areas
        - 3.2.4 Water Quality Data
            - 3.2.4.1 Monitoring Data
            - 3.2.4.2 National Pollutant Discharge Elimination System (NPDES) Permits
            - 3.2.4.3 Impaired Waterways
            - 3.2.4.4 Nonpoint-Source Pollution
            - 3.2.4.5 Total Maximum Daily Load (TMDLs)
        - 3.2.5 Stormwater Problem Data
            - 3.2.5.1 Problem Data
            - 3.2.5.2 Watershed Planning Council Coordination
        - 3.2.6 Watershed Analysis Data
            - 3.2.6.1 Monitoring Data
            - 3.2.6.2 Sub-watershed Delineation
            - 3.2.6.3 Drainage Network
            - 3.2.6.4 Topography and Benchmarks
            - 3.2.6.5 Soil Classifications
            - 3.2.6.6 Land use
            - 3.2.6.7 Anticipated Development
        - 3.2.7 Model Selection
4. Watershed Analysis
    - 4.1 Hydrologic Model Development
        - 4.1.1 Sub-area Delineation
        - 4.1.2 Hydrologic Parameter Measurements and Calibration
        - 4.1.3 Model Setup and Unit Numbering
    - 4.2 Hydraulic Model Development
        - 4.2.1 Field Data, Investigation and Existing Modeling Data
        - 4.2.2 Physical Modeling Assumptions and Computational Settings
        - 4.2.3 Model Setup and Unit Numbering
    - 4.3 Calibration and Verification
        - 4.3.1 Gauge Data
        - 4.3.2 Modifications to Model Input Data
        - 4.3.3 Calibration Results
    - 4.4 Existing Conditions Evaluation
        - 4.4.1 Floodplain Delineation
        - 4.4.2 Hydraulic Profiles

Table 6.2 DWP Standard Outline

	4.5	Future Conditions Evaluation	
5.	Development and Evaluation of Alternatives		
	5.1	Problem Definition and Damage Assessment	
		5.1.1	Flood Damage Curves
		5.1.2	Erosion Damage Curves
	5.2	Technology Screening	
	5.3	Alternative Development	
		5.3.1	Flood Control Alternatives
		5.3.2	Erosion Control Alternatives
		5.3.3	Water Quality Improvement Alternatives
		5.3.4	Natural Resources and Environment Improvement Alternatives
		5.3.5	Alternative Cost Development Data
	5.4	Alternative Evaluation and Selection	
		5.4.1	Data Required for Countywide Prioritization of Watershed Projects
6.	Action Plan		
	6.1	Recommended Improvements	
	6.2	Implementation Plan	
7.	Summary and Conclusions		

6.3.3.1 Stormwater Problem Data

DWPs will include a comprehensive summary of stormwater problem data within a standardized table. Table 6.3 summarizes the typical fields required within the DWP watershed problem summary table. The watershed problem summary table will include relevant stormwater problem data compiled as part of DWP development, and recommendations on the use of stormwater problem data. Table 6.4 provides descriptions of standard problem categories to be used as a part of the watershed problem summary table. Additional problem categories may arise and will be considered by the District as necessary during the watershed planning process, however problem categories will generally be consistent with those listed in Table 6.4.

Table 6.3 Structure of Watershed Problem Summary Table for DWPs

Table Field	Description
Problem Category	*Refer to Table 6.4 for list of categories.*
Source of Information	Sources of problem information such as member communities, published reports, state and federal agencies, watershed stakeholders, complaints.
Date	Date upon which data were compiled or published.
Project Planned or Underway	In some cases, efforts are planned or underway to address the problem. Identify this in the table as a consideration on the path forward.
Resolution or Action Required	Describe how the data will be acted upon. Describe resolution or planned resolution of problem.

Table 6.4 Problem Category Description

Problem Category	Description
Intercommunity (regional) flooding	Flooding problems that affect more than one community.
Intracommunity (local) flooding	Flooding problems within a community that affect only part of a single community.
Streambank erosion on intercommunity waterways	Streambank erosion along regional waterways that threatens a structure or human health and safety.
Streambank erosion on intra-community (local) waterways	Streambank erosion along local waterways that threatens a structure or human health and safety.
Stream maintenance problems	Debris jams, system failure, restrictions on waterways, etc.
Water quality problems	Observed water quality problems such as odor, spill-related pollution, aesthetically objectionable debris (such as toilet waste), etc.
Environmental degradation issues	Wetland or riparian impacts observed by watershed stakeholders.

6.3.3.2 Existing Watershed Studies

Several local, state, and federal agencies have completed watershed studies and modeling for watersheds within Cook County. Studies and the models used to support them may contain data useful to the development of DWPs. Table 6.5 summarizes some known watershed studies developed by agencies such as IDNR-OWR, USACE, IEPA, or the Illinois Department of Transportation (IDOT). These studies and others will be reviewed as a part of DWP development.

Watershed modeling has been performed for many of the studies listed in Table 6.5. The models may be useful for the development of DWPs or other watershed planning activities to be coordinated by watershed stakeholder groups. Table 6.6 summarizes some of the existing models that were identified for watersheds within Cook County.

IDNR-OWR and IDNR-SWS personnel have identified several other models that have been developed for Cook County watersheds. Many of the models include data that are not fully documented to allow for a complete evaluation of their applicability to DWP development. As a part of developing each DWP, the District will review and discuss the usefulness of existing watershed models for supporting the definition of problem areas, the development and evaluation of improvement projects and possible floodplain mapping revisions. Table 6.7 lists key criteria to be considered in defining the scope of DWP modeling activities.

Table 6.5 Existing Watershed Studies Identified

Watershed	Subwatershed	Title of Study	Agencies	Date	Summary
Calumet-Sag	Stony Creek	Stony Creek, Oak Lawn, Illinois Detailed Project Report	USACE	October 2001	Completed USACE's planning process for a project to reduce overbank flooding along Stony Creek in Oak Lawn. The recommended plan consists of flow diversion, removal of a small weir, and channel clearing downstream.
Calumet-Sag	(Report addresses tributaries)	Calumet-Sag Watershed Floodwater Management Plan Environmental Assessment	The District, NRCS, IDOT (Division of Water Resources)	June 1979	The study estimates floodwater damage in the watershed due to urbanization. It addresses erosion problems, lack of open space and recreational facilities, wetlands, and channel maintenance. Although somewhat dated, the report may be most useful in providing relevant background information.
Chicago River	Chicago River and Waterway System	Draft Use Attainability Analysis (UAA)	IEPA	November 2004	The UAA will help the IEPA understand the changing circumstances of the Chicago River and Waterway System in order to better set water quality standards for the system.
Des Plaines River	Upper Des Plaines River	Final Feasibility Report and Environmental Impact Statement	USACE	June 1999	Evaluated feasibility of, and federal interest in, implementation of a flood damage reduction plan for the Upper Des Plaines watershed located within Lake and Cook Counties. Recommended a plan consisting of the construction of two levee units, expansion of two reservoirs, construction of one lateral storage area, and modification of one earthen dam to add flood storage.
Des Plaines River	Salt Creek TMDLs	Total Maximum Daily Loads for Salt Creek, Illinois	IEPA	October 2004	Describes methods and procedures used to develop chloride and dissolved oxygen TMDLs for Salt Creek. The focus of the report is on water quality, but it contains rainfall, hydrologic, hydraulic, and stream flow information. Salt Creek and its watershed span both Cook and DuPage counties.
Des Plaines River	Farmers/Prairie Creek	Farmers/Prairie Creek Preliminary Strategic Planning Study	IDNR-OWR	October 2005	Studied alternatives for relieving flooding on Farmers/Prairie Creek, a tributary to the Des Plaines River with a watershed in areas of Des Plaines, Park Ridge, Niles, Glenview, and unincorporated Maine Township.
Des Plaines River	Addison Creek	Addison Creek Flood Control Study	IDOT (Division of Water Resources)	1993	Studied existing conditions and alternatives for relieving flooding on Addison Creek, a tributary of Lower Salt Creek. The affected area for the study includes Bellwood, Bensenville, Broadview, Elmhurst, Hillside, Maywood, Melrose Park, North Lake, North Riverside, Stone Park, and Westchester.

Table 6.5 Existing Watershed Studies Identified

Watershed	Subwatershed	Title of Study	Agencies	Date	Summary
Des Plaines River	(Report addresses tributaries)	Des Plaines River Watershed Floodwater Management Plan Environmental Assessment	The District, NRCS, IDOT (Division of Water Resources)	January 1976	The purpose of the study was to reduce flood damage, reduce erosion and sedimentation, protect wildlife habitat, improve water quality, enhance fisheries, provide additional recreation sites and open space. The study includes Lower Salt Creek, located primarily in DuPage County. Recommended flood control facilities, some of which have since been built, are described, as are anticipated impacts. The report contains useful background information.
Little Calumet River	(Report addresses tributaries)	Little Calumet River Watershed Floodwater Management Plan and Environmental Assessment	The District, NRCS, U.S. Forest Service, Illinois Department of Conservation	May 1975	The purpose of the study was to reduce flood damages, provide increased water based recreation, and provide watershed protection and environmental enhancement. Background information may be useful.
Little Calumet River	(Report addresses tributaries)	Little Calumet River Watershed Plan and Environmental Impact Statement	The District, Will-South Cook SWCD, Calumet-Union Drainage District (CUDD), Cook County Board of Commissioners, Villages, Park Districts, IDNR-OWR, NRCS, U.S. Forest Service	November 1978	This study was developed to achieve goals similar to those of the May 1975 study. Planned projects and their impacts are described. Some of the projects have been implemented. Discussion of project impacts is included. Background information is potentially useful.
Lower Des Plaines Tributaries	(Report addresses tributaries)	Lower Des Plaines Tributaries Final Watershed Plan – EIS	The District, SWCDs, NRCS, U.S. Forest Service, Municipalities	September 1987	The purpose of the study was to solve flooding and associated erosion and sedimentation problems, and to address the shortage of water-based recreation. Structural and nonstructural improvement measures are recommended, several of which have been built. Background information may be useful.
North Branch Chicago River	(Report addresses tributaries)	North Branch Chicago River Floodwater Management Plan	The District, NRCS, IDNR-OWR	October 1974	The purpose of the study was to reduce flood damages, provide increased recreational uses, and provide watershed protection and environmental enhancement. The southern limit of the study is Touhy Ave. Alternatives are suggested, including construction of flood control reservoirs that have now been built. The report may be most useful in providing relevant background information.

Table 6.5 Existing Watershed Studies Identified

Watershed	Subwatershed	Title of Study	Agencies	Date	Summary
North Branch Chicago River	(Report addresses tributaries)	North Branch Chicago River Open Space (Green Infrastructure) Plan	LCSMC, Friends of the Chicago River, IDNR-OWR	June 2005	Identifies high quality natural resources recommended for preservation, and open lands suitable for watershed improvement projects. Study is based on analysis of individual parcels. Includes listing of funding sources for land preservation and restoration.
Poplar Creek	(Report addresses tributaries)	Poplar Creek Watershed Floodwater Management Plan Environmental Assessment	The District, NRCS, IDOT (Division of Water Resources)	May 1976	The study estimates floodwater damage in the watershed due to urbanization. It addresses erosion problems, lack of open space and recreational facilities, wetlands, and channel maintenance. Some flood control measures are recommended. Although somewhat dated, the report may be most useful in providing relevant background information.
Upper Salt Creek	(Report addresses tributaries)	Upper Salt Creek Watershed Floodwater Management Plan	The District, North Cook SWCD, Forest Preserve District of Cook County, Villages, Park Districts, IDOT (Division of Water Resources)	May 1973	The purpose of the study was to reduce flood damages and create water related recreation facilities. Five flood control facilities, one multipurpose facility, and channel improvements were recommended and have been implemented. The report contains useful background information.

Table 6.6 Existing Modeling Data For Watersheds Within Cook County

Watershed	Subwatershed	Model Description
Chicago River	Chicago River and Chicago Waterway System	Unsteady flow and water quality model of entire 76-mile navigable waterway system, developed by Marquette University. More information is available at http://www.chicagoareawaterways.org/ Unsteady NETwork Model (UNET) and Hydrologic Simulation Program-Fortran (HSPF) model developed by the USACE.
Des Plaines River	Des Plaines River	Hydrologic Engineering Center-1 (HEC) and HEC-River Analysis System (RAS)
Des Plaines River	Farmers/Prairie Creek	HEC-1 and HEC-RAS
Chicago River	North Branch	HEC-1 and HEC-2
Chicago River	Middle Fork and West Fork	HEC-1 and HEC-2
Little Calumet River	Little Calumet River	HEC-1 and Unsteady-RAS; Illinois Department of Natural Resources-State Water Survey (IDNR-SWS) is updating
Little Calumet River	Stony Creek	HEC-1 and UNET

Table 6.7 Existing Model Use Criteria for DWPs

Category	Criteria for Use in DWPs
Date developed	Model must have been developed reflecting current conditions or have been updated to reflect current conditions unless otherwise accepted by the District to be used for DWPs.
Regulatory acceptance	Model must be the current regulatory model for watershed or otherwise accepted by the District to be used as a part of DWPs.
Data development requirements	Documentation of H&H model data are available and show that the data were developed to be consistent with District and IDNR-OWR minimum standards.
Calibration requirements	Must have been calibrated to a network of rainfall and stream monitoring gauges. Calibration must be documented and show that minimum District standards were met. Alternatively, radar derived precipitation could be used as approved by the District. Exceptions to the calibration requirement must be approved by the District.
Consistency with District modeling application requirements	Must have been developed using a modeling application that meets the District's minimum requirements, or is otherwise approved by the District.

Existing Monitoring Data. Rainfall, stream flow (and stage), and water quality data are available for all the major watersheds within Cook County. Some of the data may be used to support DWP modeling evaluations. Table 6.8 summarizes sources of existing monitoring data. In addition to the data listed, the District collects monitoring data that will be reviewed and utilized as appropriate as a part of DWP development.

Descriptions of USGS stream flowmeters and National Climactic Data Center (NCDC) rain gauge data are provided in Appendixes C and D, respectively.

Geographic Information Systems Data. Several sources of GIS data exist and are available to support watershed planning activities that will occur as a part of DWP development. One primary source of GIS data is Cook County. GIS data from Cook County will be obtained and used as appropriate as a part of DWP development. Section 6.4 identifies several Cook County GIS data sets to be used in DWP development.

Table 6.8 Sources of Existing Monitoring Data

Data	Owning Agency	Description
USGS Stream Flow Data	USGS	USGS stream flow data are available at http://waterdata.usgs.gov/nwis/sw. Appendix C contains a comprehensive list of gauge locations.
IDNR-OWR Stage Data	IDNR-OWR	The IDNR-OWR maintains a network of stage gauges that may have data useful for model calibration.
Rain Gauge Data	IDNR-SWS, NCDC, and USGS	The Cook County Precipitation Network is a dense rain gauge network that the IDNR-SWS has operated in Cook County since the fall of 1989 to provide accurate precipitation data for use in simulating runoff for Lake Michigan diversion accounting. The network consists of 25 rain gauges throughout Cook County, approximately every 5 to 7 miles and representative of the various watersheds within the county. The data are available in digital format at hourly increments from 1989 through 2000, and at 10-minute increments from 2001 to the present. There are 74 locations of rainfall gauges for which data are available within Cook County through the NCDC. Some gauges are no longer active, but past data are available. The time increments of the data vary from gauge to gauge. Table B-1 in Appendix D lists all gauges and information related to the type of data available. Information about obtaining data from all these gauges and associated fees can be found at the NCDC website: http://www.ncdc.noaa.gov. The USGS operates and publishes data from approximately 42 rain gauges in northeastern Illinois, of which 6 are located in Cook County. This data, almost all available in real-time, together with data from other agency rain gauges can be found at http://il.waterdata.usgs.gov/nwis/current/?type=precip&group-key=NONE.
Water Quality Monitoring Data	IEPA	Available from the IEPA Ambient Water Quality Monitoring Network of 213 monitoring sites. More information is available at: http://www.epa.state.il.us/water/surface-water/river-stream-mon.html

6.4 Watershed Data Development

New data developed for DWPs must meet the District standards and specifications described in Table 6.9.

Table 6.9 Watershed Data Development Standards And Specifications

Data Type	Standards Documentation	Summary
GIS Data	District GIS Data Development Standards	Data developed to support DWPs will be consistent with latest available District GIS Standards and Specifications.
Survey Data	District Vertical Datum	Survey data will be developed using the NAD 1983 coordinate system with the Chicago City Datum (CCD) for vertical coordinates (579.48 feet above 1925 mean sea level). DWPs will contain a survey standards document subject to District review prior to initiating any field surveys. If necessary, the District may allow changes to these standards in order to be consistent with unique conditions in watersheds such as those that have upstream or downstream boundary condition models that have been developed in a different coordinate system.
Survey Data	FEMA Guidelines	Survey standards will be consistent with FEMA's *Guidelines and Specifications for Flood Hazard Mapping Partners, Appendix A, "Guidance for Aerial Mapping and Surveying*," available at WWW.FEMA.GOV/FHM/DL_CGS.SHTML
DWP Data	Cook County Stormwater Management Plan	All data developed to support DWPs will be consistent with standards provided as a part of this document, or other scoping documents provided by the District.

6.4.1 Watershed Analysis and Floodplain Mapping

The District has developed the following goals for watershed analysis and floodplain mapping that will be applied to the development of DWPs. It is understood that meeting some of these goals may not be possible as a part of DWP development. These goals will be considered and applied wherever the District deems applicable:

- H&H analyses must be consistent with IDNR-OWR and FEMA map revision requirements.
- Hydrology for watershed plans will be determined by a hydrologic model that, where necessary, considers online and offline storage, infiltration, interflow, depressional storage, overland flow, nonuniform rainfall distribution, evapotranspiration, and soil moisture. The output from the hydrologic model must be compatible with the hydraulic model.
- Hydrologic analyses may require cooperative plans for water bodies that cross the District's corporate boundaries, such as the North Branch Chicago River, Little Calumet River, Des Plaines River, Poplar Creek, and Upper Salt Creek.
- Hydraulic conditions for the major watershed plans will be determined by a model that can, at a minimum, analyze the effects of floodplain encroachment, online and offline storage, diversions, channel improvements, bridges, culverts, dams, weirs, and other impediments to flow. The input to the hydraulic model will be compatible with the output from the hydrologic model. Fully dynamic models will be used when channel conditions are extremely flat (for example, slope is less than 5 feet per 1,000) and subject to backwater conditions that make it difficult to approximate storage accurately.

6.4.2 Watershed Modeling

The object of a DWP is to support the development and documentation of a countywide CIP. Understanding stormwater problems and evaluating scenarios to correct them requires the use of models and other watershed analysis tools. The following includes standards for application selection, data development, and calibration of H&H models.

Several steps are involved in applying models to the development of DWPs. First, a model of existing conditions is developed to support calibration and an understanding of existing problems. Second, a baseline conditions model is developed to reflect the conditions expected to be current when the District begins to implement the countywide CIP. This may include modifications to the existing conditions model that reflect projects that are under way and near completion. Finally, the model is modified to evaluate the effectiveness of alternative improvement projects. The guidance provided in Section 6.4.2 applies to all these steps.

6.4.2.1 Screening Considerations

Several H&H modeling applications in the public and private domain are accepted by FEMA and IDNR-OWR to determine floodplain and floodway areas for the National Flood Insurance Program. The applications are summarized in Tables 6.10 and 6.11. Table 6.12 summarizes considerations in the selection of H&H modeling applications. For DWPs, the District will specify the most appropriate H&H modeling application based on the considerations listed in Table 6.12 and specific watershed modeling requirements. In some cases, it may be acceptable to use two or more separate H&H modeling applications within the same DWP.

6.4.2.2 Hydrologic Model Data Development

Hydrologic model data developed as a part of a DWP will be consistent with minimum District standards. District standards have been developed to be consistent with the countywide stormwater management program needs and wherever possible with IDNR-OWR preferences.

Subarea Delineations. Subarea Delineations will be performed using the best available topographic mapping to a level necessary to accurately simulate hydrologic conditions within the watershed. The best available topographic data are those developed by Cook County. Cook County GIS photogrammetry data includes a digital, geospatial GIS file that depicts (through the use of a digital terrain model (DTM), and modeled by a triangulated irregular network) a general surface description for Cook County with a 300-foot buffer beyond the county boundary. The data have been made available to the District and will be used to support Subarea Delineations.

Table 6.10 Hydrologic Models Accepted by FEMA for the National Flood Insurance Program

Type	Program	Developer	Public Domain?
Single event	HEC-1 4.0.1 and upa (May 1991)	USACE	Yes
	HEC-HMS 1.1 and up (March 1998)	USACE	Yes
	MIKE 11 UHM	DHI Water and Environment	No
	PondPack v.8	Haestad Methods, Inc.	No
	SWMM (RUNOFF) 4.30 (May 1994), and 4.31 (January 1997)	USEPA and Oregon State University	Yes

Table 6.10 Hydrologic Models Accepted by FEMA for the National Flood Insurance Program

Type	Program	Developer	Public Domain?
	SWMM 5 Version 5.0.005 (May 2005)	USEPA	Yes
	TR-20 (February 1992)	USDA NRCS	Yes
	TR-20 Win 1.00.002 (Jan. 2005)	USDA NRCS	Yes
	TR-55 (June 1986)	USDA NRCS	Yes
	WinTR-55 1.0.08, (Jan. 2005)	USDA NRCS	Yes
	XP-SWMM 8.52 and up	XP Software	No
Continuous event	DR3M	USGS	Yes
	HSPF 10.10 and up	USEPA, USGS	Yes
	MIKE 11 RR	DHI Water and Environment	No
	PRMS Version 2.1	USGS	Yes
Interior drainage	HEC-IFH 1.03 and up	USACE	Yes

[a]Enhancement of these programs in editing and graphical presentation can be obtained from several private companies.

Note: FEMA periodically updates its list of approved hydrologic models.

Table 6.11 Hydraulic Modeling Applications Accepted by FEMA for the National Flood Insurance Program

Type	Program	Developer	Public Domain?
One-dimensional steady flow models	Culvert Master v.2.0	Haestad Methods, Inc.	No
	HEC-2 4.6.2a(May 1991)	USACE	Yes
	HEC-RAS 3.1.1 and up	USACE	Yes
	HY8 4.1 and up (November 1992)	U.S. Department of Transportation, Federal Highway Administration	Yes
	PondPack v.8	Haestad Methods, Inc.	No
	QUICK-2 1.0 and up (January 1995)	FEMA	Yes
	StormCAD v.4 and v.5	Haestad Methods, Inc.	No
	WSPGW 12.96 (October 2000)	Los Angeles Flood Control District and Joseph E. Bonadiman & Associates, Inc.	No
	WSPRO (June 1988 and up)	USGS, Federal Highway Administration	Yes
	XP-SWMM 8.52 and up	XP Software	No

Table 6.11 Hydraulic Modeling Applications Accepted by FEMA for the National Flood Insurance Program

Type	Program	Developer	Public Domain?
One-dimensional unsteady flow models	FEQ 9.98 and FEQUTL 5.46 (2005, both), FEQ 8.92 and FEQUTL 4.68 (1999, both)	Delbert D. Franz of Linsley, Kraeger Associates; and Charles S. Melching, USGS	Yes
	FLDWAV (November 1998)	National Weather Service	Yes
	FLO-2D v. 2003.6 (July 2003) and 2004.10 (November 2004)	Jimmy S. O'Brien	No
	HEC-RAS 3.1.1 and up	USACE	Yes
	ICPR 2.20 (October 2000) and 3.02 (November 2002)	Streamline Technologies, Inc.	No
	MIKE 11 HD	DHI Water and Environment	No
	Storm Water Management Model (SWMM) 4.30 and 4.31	USEPA and Oregon State University	Yes
	SWMM 5.0.005 (May 2005)	USEPA	Yes
	UNET 4.0	USACE	Yes
	XP-SWMM 8.52 and up	XP Software	No
Two-dimensional steady/unsteady flow models	FESWMS 2DH 1.1 and up	USGS	Yes
	FLO-2D v. 2003.6 (July 2003) and 2004.10 (November 2004)	Jimmy S. O'Brien	No
	MIKE Flood HD 2002 D and 2004	DHI Water and Environment	No
	TABS RMA2 v.4.3 RMA4 v4.5	USACE	Yes
Floodway analysis	PSUPRO	Pennsylvania State University/USACE/FEMA	Yes
	SFD	USACE/FEMA	Yes

[a] Enhancement of these programs in editing and graphical presentation can be obtained from several private companies.

Note: FEMA periodically updates its list of approved hydraulic models.

Table 6.12 H&H Modeling Application Selection Considerations

Consideration	Description
Familiarity to regulatory community	FEMA requirements for modeling to support regulatory floodplain mapping do not exclude the use of many models, but it is clear that many are more acceptable to regulatory review staff than others. The familiarity of regulatory staff at IDNR-OWR and FEMA will be considered as a part of specific H&H modeling application selection.
User base for consistent type of projects	It is common for modelers to look to a broader community of users for advice and support as a part of modeling projects. For example, a SWMM users' e-mail group is commonly used to troubleshoot problems with the application and draw upon the experience of a broad group of users. SWMM users commonly are focused on the application of SWMM to sewer system evaluations. Similar user groups exist for Hydrologic Engineering Center (HEC) modeling applications. Local, regional, and national training seminars and conferences focus on some applications more than others. The existence of an active user base will be considered in the selection of a modeling application.
History of use on floodplain mapping projects	This will be considered as part of the modeling application selection to project ease of permitting for any regulatory activities. The use of an application for projects similar to those faced by the District likely will lead to tools and support programs developed by others that will benefit the District. HEC is the most commonly used national tool for supporting flood control programs similar to the District.
Number of options for simulating open channel hydraulics	Having several options for modeling open channel hydraulics allows for a more accurate representation of field conditions. HEC applications have extensive bridge and culvert crossing options that allow users to develop confidence in results through the application of alternative hydraulic simulation approaches.
Consistency with data developed for existing regulatory models	It may be important to integrate new modeling with existing models. The ability of model output to be used between models may be important. Conversations with IDNR-OWR and experience in the area confirms that HEC software is the most commonly applied modeling application for flood control projects and regulatory floodplain mapping. This is an important consideration in the selection of any modeling application for the District's Stormwater Management Program.
Ability to perform fully dynamic unsteady flow analysis	This may be an important feature that could affect the model results and magnitude of flood control projects identified as a part of this program. Because of the flat terrain of Cook County and surrounding areas, the regulatory floodplains and floodways contain significant storage volumes. Traditional modeling applications use approaches that simulate this storage in a simplified and typically conservative manner. Fully dynamic unsteady flow modeling applications allow for a more explicit simulation of this storage that often leads to results showing more accurate lower floodway elevations.
Availability of vendor provided proprietary interface applications that enhance usability of product	Some models include proprietary modules to increase the functionality of the model. This may be useful as modeling exercises become more complex.
GIS interface capabilities	An important component of watershed modeling will be to integrate the application with GIS software. Most modeling applications listed in Tables 6.10 and 6.11 have GIS interfaces that have been developed to support data development and visualization.

Subarea boundaries will be developed as closed polygons with attribute data that at a minimum include their watershed designation, model name, total area and source of data used for delineation and any other fields specified by the District. Subarea delineation data will be in a format compatible with the District's stormwater GIS. The overall watershed delineation developed as a part of DWPs will be used as the District's official watershed delineation for administrative as well as technical purposes.

Rainfall Data. Observed and design event rainfall data may be used to support H&H modeling performed as a part of a DWP. Observed rainfall data are used as a part of hydrologic model data calibration. Two approaches are typically used to define observed rainfall data. These are the use of rain gauge data or rainfall data developed using radar technology. Both approaches are acceptable and will be used where appropriate as a part of DWPs developed by the District. Table 6.13 specifies how observed rainfall data will be used. Design event rainfall data are used to define flood damages, evaluate alternative improvement projects, and recommend capital improvements. Observed and design event rainfall data developed and used as a part of a DWP will be organized in a database format. Fields required in the table where rainfall data are stored will include year, month, day, hour, minute, and depth (inches).

GIS applications will be used to determine influence areas for rainfall data. For rain gauges, GIS applications will be used to develop Theissen polygon areas that can be intersected with subarea delineations to assign rainfall data for hydrologic modeling. Theissen polygon areas will be created in a GIS format consistent with District standards. If radar derived rainfall data are used, influence areas of rainfall data sets will be provided to the District in a GIS format consistent with District standards.

Table 6.13 Observed Rainfall Data Utilization Criteria

Source of Observed Rainfall Data	Criteria for Application
Rain gauges	Rain gauges that log rainfall data on a 10- to 15-minute increment will be used to support hydrologic model data calibration during storms where spatial distribution of rainfall appears to be adequately captured by the rain gauge network in place. The Cook County Precipitation Network operated by IDNR-SWS records data at 10-minute increments at 25 rain gauges (see Table 6.8). Research was developed to determine the appropriate minimum spacing and coverage requirements, which determined the locations of the rain gauges.
Radar-derived rainfall data	Radar derived rainfall data may be used in large watersheds where the rain gauge network in place is unlikely to sufficiently define the spatial distribution of rainfall occurring over the watershed. The District will review the existing and proposed rain gauge network and historic spatial rainfall distribution patterns to provide justification for the use of radar derived rainfall data.

Design Event Rainfall Data. Design event rainfall data are used as a part of the H&H modeling that is performed to support the identification of flooding problem areas, flood damage curves and the development and evaluation of alternative improvement projects. The standard source of rainfall depth and distribution data for H&H model evaluations will be the sectional frequency distribution of rainfall for given recurrence intervals as listed in Bulletin 70 or Bulletin 71 with Huff Distribution or the data most recently adopted by IDNR-OWR for use in hydrologic modeling. Bulletin 71 provides guidance on which Huff distribution will be used (1st, 2nd, 3rd, or 4th quartiles) with storms of various durations.

To determine the critical or most extreme duration storm for each recurrence interval storm considered as a part of DWP development, a critical duration analysis will be conducted. To be consistent with IDNR-OWR requirements, the critical duration analysis must include at least the simulations of 1-, 3-, 6-, 12- and 24-hour duration storms.

Infiltration Rates and Capacities. The most common method used to determine loss rates and runoff volumes in Cook County has been the Soil Conservation Service (SCS) Curve Number method. The method is acceptable for the hydrologic modeling that is performed as part of a DWP. Other methods may be used when appropriate at the discretion of the District. When using the SCS Curve Number method, the modeler will follow guidance contained in Urban Hydrology for Small Watersheds (USDA NRCS, TR-55, June 1986) or as approved by the District.

Runoff and Overland Flow Parameters (Existing and Future). Impervious area coverage, aerial photography, topographic mapping, soils groups mapping and other soils data, land use mapping, and other land use data all will be used to determine watershed areas, flow paths, slopes, lengths, time of concentration, and any other parameters necessary to support developing stormwater runoff hydrographs consistent with the guidance within USDA NRCS TR-55 or as approved by the District.

Unit Hydrograph/Routing. Unit hydrographs acceptable for routing runoff include SCS dimensionless, Clark, or Snyder. A user-specified unit hydrograph may be used for a watershed if enough quality data are available for it to be properly derived from observed rainfall and runoff.

6.4.2.3 Hydraulic Model Data Development

Channel Cross Section Data. Channel cross sections used within hydraulic modeling applications will be obtained through field surveys that meet survey standards described in Table 6.9. Field survey efforts will include the determination of the appropriate Manning's roughness parameters based on observations of characteristics that include surface roughness, vegetation, channel size, channel shape, channel alignment, and obstructions. If observed water surface profile information is available in the form of gauge data, calibration of Manning's "n" values is possible and desirable.

Open Channel Hydraulics by V. T. Chow (McGraw-Hill 1959; reissued 1988) contains excellent guidance for determining Manning's "n" values for a wide range of rivers and streams. The USGS Illinois Water Science Center has computed Manning's "n" values at many representative urban and rural sites in Illinois, available at http://il.water.usgs.gov/proj/nvalues/. Figure E-1 in Appendix E is an example of the type of form to be used to document Manning's "n" values in the field. Separate Manning's "n" values are generally appropriate to be used for the channel and the overbanks. The typical channel cross section template form in Figure E-2 in Appendix E is an example of the type of form that will be used to gather cross-sectional data during a survey.

Bridge and Culvert Crossings. Bridges and culverts generally will be modeled as existing. For the baseline conditions model, bridge or culvert replacement projects that are under construction or in the late stages of the planning process and unlikely to be revised may be modeled as proposed. The model must account for bridge deck, piers, abutments, and embankment side slopes.

Storage Areas. Storage areas that are simulated as a part of hydraulic modeling will be represented with stage-area or stage-volume relationships developed from best available topographic information and discharge rating curves developed according to hydraulic properties of the controlling device.

Downstream Boundary Conditions. Downstream boundary conditions for hydraulic analysis will be based on known water surface elevations when available. If the water surface elevation is unknown at the downstream end of the study reach, normal depth will be used at a location further downstream so as not to have influence on the profile. To test whether the starting cross section is sufficiently downstream for a given discharge, the distance is varied until the water elevation at the project boundary does not change appreciably, which indicates that the profile will not be affected by the starting elevation.

6.4.2.4 Steady State vs. Unsteady Flow Analysis

If there is reason to believe that a steady-state model would inadequately represent actual hydraulic conditions, such as extremely flat slopes (Froude number < 0.1) or flow restrictions that may cause significant storage within the channel or situations with reverse flow, then unsteady-state modeling will be considered and used where necessary.

6.4.2.5 Critical Duration Storm Analysis

A critical duration storm analysis (CDSA) will be performed and documented as a part of design event simulations performed to develop flood damage curves. A CDSA is performed for each problem area to identify the duration storm that produces the critical water surface elevation and level of damage. CDSA involves running a range of duration storm events for a given recurrence interval to determine which duration storm is critical. Generally, this duration is somewhere near the time of concentration of the watershed tributary to a given point. The IDNR-OWR generally requires a CDSA as a part of the regulatory map revision process.

6.4.2.6 Model Calibration and Verification

Calibration must be performed in developing defensible H&H models representative of actual conditions. High water marks, historic floods, or other stream gauge data will be used to compare with model results and adjust model parameters, typically the roughness coefficients. The final calibrated model must not contain model parameters outside their "reasonable" bounds, although it may be permitted when performing model sensitivity analyses. If enough data exist, the model will be validated by comparing calibrated model results to a set of data that was not included in the calibration.

H&H model data will be calibrated to a point where the runoff volume and stream flow rates are within roughly 30 percent of the data recorded at stream gauges. Water surface elevations will match within 6 inches. In some cases, where rain gauge data are used to support calibration, it is not possible to adjust H&H model data with confidence when the spatial distribution of rainfall appears to be inadequately captured and reflected in the model.

6.4.3 Floodplain Mapping

To ensure that H&H modeling performed as a part of a DWP can be utilized for future FEMA FIRM remapping efforts, the District will require that all modeling performed be consistent with current IDNR-OWR and FEMA standards. Both agencies have published standards that will be followed: *Floodplain Map Revision Manual* (March 1996) published by IDNR-OWR and *Guidelines and Specifications for Flood Hazard Mapping Partners* published by FEMA, available at http://www.fema.gov/fhm/gs_main.shtm. It is not a specific goal of the DWPs to replace or revise the current FEMA FIRM maps. However, if a substantial error in the current regulatory maps is identified during a DWP, the District may consider requesting a map revision from FEMA. As the CIP progresses, a decision will be made as to whether the District or the benefiting local government entity will pursue map revisions necessary to reflect the implementation of future flood control projects.

6.5 Problem Area Identification

Stormwater problem areas will be identified through stakeholder involvement, such as WPC meetings, discussion with other agencies, and logs of complaints. They will also be identified and confirmed as a part of the DWP. DWP reports will summarize relevant and known stormwater problem areas and also watershed analyses to confirm the magnitude of flooding problems.

6.5.1 Flooding Problem Areas

Flooding problems are defined as flooding of residential, commercial, industrial and public buildings, or transportation facilities that are critical to the economy and emergency services. H&H models will be the primary method for evaluating flooding problem areas. H&H models will be used to define water surface elevations for the 2-, 5-, 10-, 25-, 50-, 100-, and 500-year recurrence interval design storms. These elevations will be compared with top of foundation and first floor elevations for properties within the floodplain to develop flood damage curves. The methodology for developing flood damage curves and data required to support them are described in Section 6.6.

In some instances flooding may result from non-riverine sources, such as depressions in the ground surface that are inundated by the water table. The majority of such depressional flooding instances are expected to be confined to a single community, and therefore will not be addressed in a DWP. However, cases where depressional inundation results in inter-community flooding will be addressed with the DWP, in conjunction with the District, on a case by case basis.

6.5.2 Erosion Problem Areas

Erosion problems are defined as streambank erosion along waterways that could result in property damage or a risk to human health and safety. As part of a DWP, the District will require an evaluation of streambank conditions to generally identify areas where erosion appears to meet these criteria. Special attention will be paid to areas where the District or other stakeholders have received complaints about erosion problems that are threatening structures or posing a risk to human health and safety. The District will visit the erosion problem areas identified and document existing conditions to support the evaluation of alternatives. Site visits will include the collection of survey data that is necessary to prepare conceptual level plans and cost estimates for alternative improvement scenarios.

6.5.3 Maintenance Problem Areas

Maintenance problems are defined as restrictions on drainage caused by accumulation of debris. They will be identified through field visits by District staff or through stakeholder identification. Further information on maintenance can be found in Section 5.4. Efforts to identify the agencies responsible for maintenance within the watershed will be undertaken in the DWPs.

6.5.4 Water Quality Problem Areas

Water quality problem areas are identified in the IEPA's 303d Report. As discussed in Chapter 4, the report provides a comprehensive summary of waterways within the state of Illinois where water quality standards or listing criteria are not met. Water quality benefits provided by projects planned as a part of DWPs will be shown in qualitative terms as a part of the documentation of improvement projects identified. During development of the draft CCSMP, the District went to great lengths to identify methods accepted by other agencies, such as the USACE and the IDNR-OWR, for determining the economic value of ecosystem impacts and water quality improvement to no avail. Therefore, until an acceptable method is identified and approved by the District, the water quality improvement and ecosystem impact facets of a project will be considered as non-economic factors.

6.5.5 Wetlands, Floodplains, and Riparian Environment at Risk

Wetland, floodplain, and riparian areas will be identified as a part of a DWP. Wetland areas are identified on National Wetland Inventory (NWI) mapping. GIS data for NWI mapping are available on the Web (http://www.fws.gov/nwi/) for download and incorporation into DWPs. Floodplain areas are delineated for many of the Cook County regional waterways and will be summarized as a part of a DWP.

Riparian zones generally are not delineated for Cook County waterways and will be defined as a part of a DWP. Wherever possible, a desktop evaluation of aerial photography or other available field data will be the method for identifying riparian zones. Riparian zones generally are defined as the interfaces between terrestrial and aquatic ecosystems. For the purpose of DWP development, riparian areas will be defined as any vegetated area adjacent to a waterbody that is occasionally inundated by floodwaters resulting in periodic hydric soil conditions. The frequency of inundation impacts the nutrient loads of riparian areas, as well as the soil conditions and plant community composition. The 10-yr delineated floodplain will be used to characterize inundation. For stream reaches where flood frequency data is not available, riparian delineation will attempt to capture the functional relationship between periodic inundation and species diversity in the floodplain.

6.6 Estimates of Existing Damage

Estimating existing damages is the first step in defining the extent of problem areas. Damage estimates defined as a part of a DWP will focus on the economic damages caused by flooding and streambank erosion. Economic damages are estimated by summing damages from four categories:

- Property damage resulting from flooding (residential and commercial)
- Streambank erosion damage
- Transportation damage
- Recreation damage

The following subsections provide guidance on the economic valuation of damages and benefits that will be included as a part of DWP development.

6.6.1 Property Damage

Property damage caused by flooding includes structural damage to buildings (residential, commercial, industrial, and public) and loss of building contents (equipment, furnishings, raw materials, and inventory). The extent of property damage depends on the severity of the flood. For riverine flooding typical of Cook County, severity is dictated primarily by flooding levels and by high flow velocities and the duration of flooding. A floodplain inventory is necessary to understand the assets that are at risk. H&H modeling is used to define water surface elevations for several storm events of varying probability of occurrence and to understand the impact on properties within the floodplain.

Table 6.14 summarizes data requirements for this analysis and suggested data sources. Several public domain applications are available to support the development of average annual damages (*AA_D*) curves using the data listed in Table 6.14 and consistent with the USACE's National Economic Development (NED) methodology.

Table 6.14 Property Damage Calculations

Data Requirement	Source
Flood stage elevations for 2-, 5-, 10-, 25-, 50-, and 100-year storms.	H&H modeling based on guidance contained in Section 6.4. For DWPs, flood stage elevation (floodplain boundaries) will be developed consistent with GIS standards and specifications provided by the District.
Surveyed property and structure Locations	Based on surveys performed during DWP development or acceptable estimates based on topographic data and visual inspections.
Zero-damage elevations for each structure	Based on surveys performed during DWP development or acceptable estimates based on topographic data and visual inspections.
Assessed value of each asset	Cook County tax parcel data.
Valuation of contents of structures	Recommended assumptions: For residential structures, contents are 50% of the replacement value of the structure. For commercial, industrial, or public facilities, contents are 90% of the replacement value of the structure. More specific information can be substituted, if it can be easily obtained through interviews or additional data gathering.

In general, based on the flood stage calculated using H&H models, damages are calculated for six storm events: 2-, 5-, 10-, 25-, 50-, and 100-year. Once the damages are calculated, a damage curve is developed by plotting the value of damages versus the exceedance probability. The AA_D value, which can be determined by calculating the area under the damage curve, is essentially the sum of all the damages weighted by their probability of occurrence.

Appendix F contains a more detailed description of the NED methodology for determining property damages including the development of damage curves and performing benefit-to-cost (BC) analysis.

6.6.2 Streambank Erosion Damage

Streambank erosion damage will be calculated in a manner similar to property damage calculations. Surveys performed by the District will determine where streambank erosion is likely to cause property damage. In such cases, the valuation of the structure and the contents of structures deemed to be at imminent risk will be included. Therefore, frequency determinations are unnecessary, and evaluations will focus on effectiveness for the full range of expected flows, particularly bank full-flow ranges. Only actual property damage to structures will be included in the damage calculation. Loss of land will not be considered.

6.6.3 Transportation Damage

The following damages in the transportation category will be quantified for the purposes of damage assessment:

- Physical damages to roads, bridges, traffic signal installations, and sewers
- Emergency response costs
- Traffic delay or disruption

Transportation damages will be calculated using the following tiered approach:

Tier 1—If avoided transportation damages are not expected to be a significant component of the project, then a 15 percent markup of total property damage should be used to account for indirect damages. This methodology is consistent with the IDNR-OWR's common approach to damage assessment, which includes physical damages, emergency response costs, and traffic delays or disruptions, and is intended to cover such costs as public works staff time, lost wages for residents, and other associated damages.

Tier 2—If the traffic delay component of the project is expected to be more significant, then a more detailed traffic delay analysis will be performed and included as an addition to the 15 percent markup. The methodology used for this analysis will be site-specific and will be approved by the District.

Tier 3—If historic information obtained during DWP preparation shows that flooding in the area has been known to cause significant transportation damage, then project-specific transportation damage curves will be developed in place of the 15 percent markup. An example of this may be that bridges in a particular project area are of high value and vulnerable to flood damages; therefore, the 15 percent markup would not be high enough to account for the damage expected to these bridges. These project-specific damages will be calculated using the formula

$$D_x = F_x Q_x$$

where:

- D_x = the monetary damages derived from a particular flood event; e.g., damages for a 2-year flood
- F_x = multiplication factor incorporating cost; e.g., cost of project-specific bridge replacement
- Q_x = the quantity of the particular facility affected by the flood event; e.g., number of bridges affected by the flood

Specific cost factors and inputs to be used to calculate damages for each transportation cost component will be developed using historic information. As with property damages, transportation damages will be calculated for each flooding event, developed into a damage curve, and then converted into an AA_D. The AA_D is determined by calculating the area under the damage curve. Appendix F contains a detailed explanation of this procedure.

6.6.4 Recreation Damages and Benefits

Recreation damages are incurred through the loss of the use of parks, forest preserves, or other recreational facilities. Recreation benefits can accrue from damages avoided and by the creation of recreation areas as part of a flood control project. Several methods have been developed to calculate recreational damage/benefit. The unit day value (UDV) method will be used for recreational damage or benefit calculation as a part of DWPs. The UDV method relies on annually published studies by the USACE that estimate dollar damages per day ($ person-day) that are accrued based on a point rating. The point rating system includes five criteria related to: available activities, facilities, relative scarcity, ease of access, and aesthetics. Appendix G contains USACE's 2006 published study, which is updated annually. The general formula for calculating damages is:

$$D_x = F_x V_x L_x$$

where:

D_x = the monetary damages derived from a particular flood
F_x = multiplication factor incorporating the UDV
V_x = the average number of daily visitors to a recreational facility
L_x = Length of impact in days

Unless site-specific information can be readily developed, the values contained in Appendix H (Table H-1) will be used to calculate recreational damages or benefits. This table will be evaluated annually to determine if updates are required.

Similar to property and transportation damages, recreation damages must be calculated for each flood event, developed into a damage curve, and then converted into an AA_D for recreation facilities. The AA_D can be determined by calculating the area under the damage curve. Appendix F contains a detailed explanation of the procedure.

6.6.5 Final Calculation

Once damages are calculated for each flood event, a damage curve will be developed for the sum of all damages from each category, and then converted into an overall AA_D. The AA_D can be determined by calculating the area under the damage curve. Appendix F contains a more detailed explanation of this procedure. Table 6.15 summarizes the valuation of damages and benefits proposed in the sections above.

Table 6.15 Summary Recommendation for Economic Valuation

Type of Damage and Benefit	Description	Valuation Method
Property Damage from Flooding		
Residential property —structural damage	Avoided structural damage to residences.	Follow USACE NED guidance. Use HEC-Flood Damage Assessment (FDA) or IDNR-OWR's damages model. Property valuation will be based on assessed value obtained from Cook County tax records.
Residential property—contents	Avoided damage to contents within residences.	Assume 50% of structural damage to account for residential contents.
Industrial commercial property—structural damage	Avoided structural damage to industrial/commercial property.	Follow USACE NED guidance. Use HEC-FDA software or IDNR-OWR's damages. Research individual building types through interviews and other data collection.
Industrial/ commercial property—contents	Avoided damage to contents within industrial/commercial property.	Assume 90% of structural damage unless information can be obtained through interviews and other data collection.

Table 6.15 Summary Recommendation for Economic Valuation

Type of Damage and Benefit	Description	Valuation Method
Streambank Erosion Damage		
Erosion damage	Damages from erosion.	Similar to structural damage, except include damage in areas where erosion is the cause of structural damage rather than flooding. Only structural damage will be included in the valuation, loss of land will not be considered.
Transportation Damage		
Transportation—physical damage and emergency response costs	Physical damage to roads, bridges, and utilities, as well as damages resulting from police, fire and emergency rescue costs.	Assume 15% of property damages (structural plus contents) for indirect transportation damages (this includes both physical damage and emergency response costs).
Transportation damage—operation and delay costs	Damage from additional vehicle operation, and loss of productivity.	Operational delay is considered when the flood elevation reaches 0.5 foot above the low roadway elevation. If significant, estimate damages based on estimated cost of delay.
Transportation damage—vehicles	Damage to vehicles.	Not included for District transportation damage calculations. Assume most vehicles will be removed from flooded areas before damage can occur.
Other damages—income loss	Damage from lost wages of workers that cannot be transferred out of a flooded area.	Not included. Assume that work can be transferred out of the flooded area. (*Note:* The likelihood of an event extreme enough to cause income loss is small.)
Other damages — relocation costs	Damages from additional living expenses of residences required to temporarily relocate.	Not included for District transportation damage calculations. Assume that living expenses are small relative to property damage.
Recreation Damage and Benefit		
Parks and forest preserves	Damage incurred from the loss of use of parks, forest preserves, or other recreation areas. Benefits accrued from the development of new recreation areas created by an alternative will be valued (see Section 6.6.4)	USACE Economics Guidance Memorandum, 07-03 dated November 20, 2006, unit day values for recreation, fiscal year 2007, which estimates $/person-recreation day. This calculation can be used to calculate damages in recreation areas as well as benefit from recreation area created.
Wetland and Riparian Areas		
Wetlands and riparian habitat	Existing damage to wetlands and riparian habitats will not be included in the baseline damages valuation. Damage caused by an alternative will be mitigated and included in the overall cost of an alternative. Benefit from additional wetlands or riparian habitat created by an alternative will be valued (see Section 6.7.3.1).	Not included in damage calculation. For benefit calculations use the market rate of wetlands and riparian habitat from a wetland bank in the appropriate watershed.
Water Quality		
Water quality	Damages from impaired water quality, both ecological and regulatory.	Not included until an acceptable method is developed.

6.7 Alternative Development and Evaluation

Once problem areas are defined (Section 6.5) and damages quantified (Section 6.6), then alternatives to reduce the damages associated with the problems will be developed and evaluated. Several alternatives will be developed and evaluated for each problem area. For flooding problem areas, alternatives will provide a varying level of protection. In other words, some alternatives will address lower recurrence interval storms such as the 15-year storm, and others will address higher recurrence interval storms such as the 100-year storm. Once alternatives are developed, they will be evaluated based on their BC ratio or net benefit.

The enacting legislation, Public Act 93-1049, in which authority was granted to the District for the responsibilities of stormwater management for Cook County, stipulates that BC analysis is required during deliberations for capital project selection. However, the District's Board of Commissioners is not required to select projects solely on BC analysis. They may also decide to consider noneconomic criteria in the selection of alternatives for each problem areas. Information about noneconomic criteria will be summarized for each project so that it can be included as a consideration in the countywide prioritization of stormwater improvement projects. The ultimate decision for funding of any capital project is at the discretion of the District's Board of Commissioners.

Section 6.7 is generally organized according to the steps to be followed as a part of alternative development and evaluation. Alternative development and evaluation will be performed as a part of DWPs. Table 6.16 summarizes the general steps for development and evaluation of alternatives.

Table 6.16 Summary of Alternative Development Sections

CCSMP Section Number	Alternative Development and Evaluation Step	General Overview
6.5	Define problem areas	Use guidance in Section 6.5 to identify and define the magnitude of problem areas.
6.7.1	Identify alternatives	Use technology guidance provided in Section 6.7.1 and information on watershed to identify alternatives that can help resolve problems in problem areas.
6.7.2	Evaluate alternatives	Evaluate alternatives for effectiveness addressing problem areas. This will primarily focus on the evaluation of the effectiveness of flood control alternatives using H&H modeling consistent with protocol established in Section 6.4. Streambank erosion control alternatives will focus on bank-full conditions.
6.7.3	Estimate conceptual cost of alternatives	Use unit costs, markups, and other guidance provided by the District to estimate the conceptual cost of alternatives.
6.7.3	Evaluate cost-effectiveness of alternatives	Use the damages defined in Section 6.6 and the conceptual cost estimates to determine the BC ratio for each alternative. Use the BC ratio to determine whether alternatives address problem areas cost-effectively.
6.8	Summarize recommended projects for each problem area and define noneconomic criteria	Develop lists of projects recommended throughout the watershed for each problem area. Alternatives that have the highest BC ratio (net benefit) generally will be recommended for each problem area. Also summarize noneconomic data for each problem area to be used as a part of District's countywide prioritization of improvement projects.

6.7.1 Technology Guidance and Alternative Identification

Many acceptable technologies can be used alone or in combination to form project alternatives to remediate existing stormwater problems. Where opportunities exist, projects funded by the District will incorporate BMPs that provide secondary water quality benefits. Section 6.7.1 provides guidance on the use of technologies in developing alternatives to remediate flooding and erosion problems.

6.7.1.1 Flood Control Technologies

As described in Section 6.5, flooding problems occur when flood waters reach structures, transportation facilities, utilities, critical facilities, or recreation areas. Damages arise from the effects on the facilities and their contents, as well as the consequences of loss of service. Table 6.17 contains descriptions of technologies that can remediate flooding problems and also general guidance on their use for the development of alternatives. The technologies will be used as appropriate for the development of flood control alternatives as a part of a DWP.

Technologies listed in Table 6.17 are summarized in terms of their ability to remediate flooding problems. It is assumed that these technologies would be implemented along with a regulatory program that requires measures to prevent future flooding problems. Without measures to prevent future flooding problems, such as site discharge restrictions, the technologies may not prove as effective in the future as when they originally were designed and implemented.

Table 6.17 Summary of Flood Control Options

Flood Control Option	Description
Detention/Retention	
Detention facilities	Impoundments to temporarily store stormwater. This centralized technology includes wet basins, stormwater wetlands, regional facilities, and flood control reservoirs.
Retention facilities (Wet basins)	Impoundments to permanently store stormwater and remove it through infiltration and evaporation. Retention facilities generally have an outfall to the receiving waterway that is located at an elevation above the permanent pool.
Underground detention	A specialized form of storage where stormwater is detained in underground facilities such as vaults or tunnels.
Bioretention	Decentralized microbasins distributed throughout a site or watershed to control runoff close to where it is generated. Runoff is detained in the bioretention facilities and infiltrated into the soil and removed through evapotranspiration.
Conveyance Improvement	
Culvert/bridge re-placement	Enhancement of the hydraulic capacity of culverts or bridges serving as stream crossings through size increase, roughness reduction, and removal of obstacles (for example, piers).
Channel improvement	Enhancement of the hydraulic capacity of channels by enlarging cross sections (for example, floodplain enhancement), reducing roughness (for example, lining), or channel realignment.
Flood Barriers	
Levees	Earth embankments built along rivers and streams to keep flood waters within the channel.
Floodwalls	Vertical walls typically made of concrete or other hard materials built along rivers and streams to keep flood waters within the channel.
Relocation	
Buyouts	Acquisition and demolition of properties in the floodplain to eliminate flood damages.
Building relocation	Relocation of buildings (typically houses) to higher ground to remove them from the floodplain. This technology requires purchasing new land and transporting buildings to new locations.
Elevation	Modification of a structure’s foundation to elevate the building above a given flood level. Typically applied to houses.
Floodproofing	
Dry floodproofing	Installation of impermeable barriers and flood gates along the perimeter of a building to keep flood waters out. Typically deployed around commercial and industrial build-ings that cannot be elevated or relocated.
Wet floodproofing	Implementation of measures that do not prevent water from entering a building but minimize damages; for example, utility relocation and installation of water resistant materials.

Note that sometimes applications of flood control technologies to address problems in one location may aggravate problems in another location (for example, conveyance improvements reduce flooding upstream but may worsen conditions downstream). Therefore, the potential applications of flood control technologies to address problems will not be analyzed in isolation. No alternative recommended as a part of a DWP may create negative impacts within the watershed or outside of the watershed, including areas lying outside of Cook County.

6.7.1.2 Erosion Control Technologies

As described in Section 6.5, streambank erosion can result in property damage or a risk to human health and safety. Damages arise from the effects on the facilities and their contents, as well as the consequences of loss of service. A description of appropriate technologies that can remediate existing streambank erosion problems and general guidance on their utilization for the development of alternatives, is presented in Table 6.18.

Table 6.18 Streambank Erosion Control Options

Control Option	Description
Natural (vegetated or bioengineered) stabilization	The stabilization and protection of eroding overland flow areas or streambanks with selected vegetation using bioengineering techniques. The practice applies to natural or excavated channels where the streambanks are susceptible to erosion from the action of water, ice, or debris and the problem can be solved using vegetation. Vegetative stabilization is generally applicable where bankfull flow velocity does not exceed 5 ft/sec and soils are more erosion resistant, such as clayey soils. Combinations of the stabilization methods listed below and others may be used.
Vegetating by sodding, seeding or planting	Establishing permanent vegetative cover to stabilize disturbed or exposed areas. Required in open areas to prevent erosion and provide runoff control. This stabilization method often includes the use of geotextile materials to provide stability until the vegetation is established and able to resist scour and shear forces.
Vegetated armoring (joint planting)	The insertion of live stakes, trees, shrubs and other vegetation in the openings or joints between rocks in a riprap or articulated block mat (ABM). The object is to reinforce riprap or ABM by establishing roots into the soil. Drainage may also be improved through extracting soil moisture.
Vegetated cellular grid (erosion blanket)	Lattice-like network of structural material installed with planted vegetation to facilitate the establishment of the vegetation, but not strong enough to armor the slope. Typically involves the use of coconut or plastic mesh fiber (erosion blanket) that may disintegrate over time after the vegetation is established.
Reinforced grass systems	Similar to the vegetated cellular grid, but the structural coverage is designed to be permanent. The technology can include the use of mats, meshes, interlocking concrete blocks, or the use of geocells containing fill material.
Live cribwall	Installation of a regular framework of logs, timbers, rock, and woody cuttings to protect an eroding channel bank with structural components consisting of live wood.
Structural stabilization	Stabilization of eroding streambanks or other areas by use of designed structural measures. Structural stabilization is generally applicable where flow velocities exceed 5 ft/sec or where vegetative streambank protection is inappropriate.
Riprap	A section of rock placed in the channel or on the channel banks to prevent erosion. Riprap typically is underlain by a sand and geotextile base to provide a foundation for the rock, and to prevent scour behind the rock.
Interlocking concrete	Interlocking concrete may include A-Jacks®, ABM, or similar structural controls that form a grid or matrix to protect the channel from erosion. A-Jacks armor units may be assembled into a continuous, flexible matrix that provides channel toe protection against high velocity flow. The matrix of A-Jacks can be backfilled with topsoil and vegetated to increase system stability and to provide in-stream habitat. ABM can be used with or without joint planting with vegetation. ABM is available in several sizes and configurations from several manufacturers. The size and configuration of the ABM is determined by the shear forces and site conditions of the channel.

Table 6.18 Streambank Erosion Control Options

Control Option	Description
Gabions	Gabions are wire mesh baskets filled with river stone of specific size to meet the shear forces in a channel. The gabions are used more often in urban areas where space is not available for other stabilization techniques. Gabions can provide stability when designed and installed correctly.
Grade Control	Grade control measures may be used to prevent stream incision into the channel bed or upstream nickpoint migration. Grade control measures involve some means of stabilizing the channel bed at a desired elevation with natural materials such as rocks or logs, or in some situations concrete. Rock vortex weirs, rock cross vanes, and log drops are means of grade control that impede channel incision and often result in scour pools developing downstream of the grade control measure.
Concrete channels	A constructed concrete channel designed to convey flow at a high velocity (greater than 5 ft/sec) where other stabilization methods cannot be used. May be suitable in situations where downstream areas can handle the increase in peak flows and there is limited space available for conveyance.
Outlet stabilization	Prevent streambank erosion from excessive discharge velocities where stormwater flows out of a pipe. Outlet stabilization may include any method discussed above.

USDA NRCS and IEPA. *Illinois Urban Manual.* 2002

Sometimes applications of streambank erosion control technologies to address problems in one location may aggravate problems in another location (for example, lining a channel in one location may exacerbate streambank erosion at another location). Therefore, application of streambank erosion or grade control technologies to address problems must not be analyzed in isolation. As stated previously, no alternative recommended as a part of a DWP may create negative impacts in the watershed or outside of the watershed including areas outside of Cook County.

Bioengineering techniques for stabilizing water body shorelines provide more natural solutions than hard armoring. Hard armoring, which protects the bank with concrete, riprap, or other nonnatural materials, is sometimes necessary when a bioengineered solution will not provide the necessary level of protection or cannot withstand flow velocities. In preparing a DWP, consideration will be made to allow only the minimum necessary amount of hard armoring. The DWP will consider the use of bioengineering techniques where appropriate. A combination of treatments will likely be suggested to maximize durability.

6.7.2 Alternative Evaluation

Alternatives developed to address flooding will be evaluated using H&H modeling consistent with methodologies described in Section 6.4. Modeling will determine the avoided damages or benefit for each alternative. The avoided damage or benefit will be used to calculate the BC ratio for each alternative.

Frequency determinations are unnecessary in evaluating alternatives developed to address erosions problems. Evaluations will focus on effectiveness for the full range of expected flows, particularly the bank full flow ranges. Costs will be considered, but not using the multistorm approach applied for flood damages.

6.7.3 Evaluating Cost Effectiveness of Alternatives

BC ratio is determined by calculating the benefit of a project in terms of avoided damages or benefit added, and the construction and operation and maintenance (O&M) costs associated with a project. Section 6.6 provides a description of the process to be followed to determine the benefit or damages for problem areas. Benefits are then divided by the cost to obtain an indicator of the cost effectiveness of each project. Net benefit can also be calculated by subtracting the cost from the benefit.

6.7.3.1 Benefit Calculation

In economic terms, benefit is the dollar value of the damages avoided because of implementation of an alternative (flood control project, soil stabilization project, buyouts). Benefits are calculated by determining damages without a project minus damages with a project; that is, damages avoided. Benefits can include the added value of recreation facilities, wetlands, or riparian areas. As explained in Appendix F, benefits can be expressed as a present value, PV_B, or can be annualized to obtain the average annual benefits AA_B.

Recreation Areas. If the project creates recreation areas, the value will be included as a benefit to the project using the economic valuation method described in Section 6.6.4. Recreation benefit, once created, can be assumed to accrue annually over the life of the project.

Wetlands and Riparian Areas. If the project creates wetlands or riparian areas, their value will be included as an economic benefit of the project. The value of wetlands and riparian areas is calculated based on the market rate of wetlands in the watershed. Appendix H provides the 2006 market rate for wetlands by watershed (Table H-2). The values are variable and will be confirmed annually.

6.7.3.2 Costing Assumptions

Project costs involve all expenditures necessary for implementation. For traditional flood control projects such as levees or reservoirs, they include study, design, land acquisition, construction, and O&M costs. For a residential buyout, there is a one-time cost to purchase structures in the floodplain, including demolition of the structures, restoration of the land, relocation and closing costs. Floodproofing costs may be represented by one-time costs of utility relocation and the occasional complete replacement of flood shields.

Flood protection projects provide benefits throughout a defined period of time that depends on the useful life of a project. A levee may have a useful life of 50 years, whereas relocation of a house outside the floodplain is a permanent solution. Every year that the project performs its functions, it provides benefits and, in principle, requires some expenditure, although most of the cost is incurred during construction. Therefore, the concept of annualizing is applied to compare these unevenly distributed benefits and costs.

Annualizing benefits and costs is a basic concept of engineering economics that accounts for the time value of money. To calculate the annual payment, benefits accrued and the costs incurred every year are discounted using compound interest procedures. The typical discount rate is set by the federal government and is also used by IDNR-OWR. Recently it has varied between 3 and 7 percent. In 2005, the value used by IDNR-OWR for discounting was 5.375 percent. The District will validate the discount rate annually. If the life expectancy of facilities is less than the period for which benefits are calculated, then replacement costs must be incorporated to account for the total cost of facilities for the entire time period.

Standard engineering economics textbooks provide formulas for converting a present value or a future value into a uniform series of “payments.” For example, a capital expenditure can be converted into an annual payment using the formula

$$AAc = PV \frac{i(1+i)^n}{(1+i)^n - 1}$$

where:

AAc = annual cost
n = useful life of the project in years
PV = total cost or benefit in the present
i = discount rate

To calculate costs accurately, it is necessary to have an assumption of the life expectancy of a project. Table 6.19 lists the standard assumptions to be used to estimate project life for purposes of alternative evaluation.

Table 6.19 Life Expectancy and O&M Requirements for Alternative Evaluation

Project	**Life Expectancy (yr)**	**Inspection and Routine O&M (yr)**	**Additional O&M (YR)**
Flood Control Projects			
Detention pond	50	Every 2-3	Every 10
Underground detention	50	Every 2-3	Every 5
Levee with detention	100	Every 3	Every 15
Channel enlargement with detention	50	Every 2-3	Every 5
Floodproofing	20	Every 1	Every 2
Buyouts	Permanent		
Detention pond	50	Every 2-3	Every 10
Underground detention	50	Every 2-3	Every 5
Soil Stabilization Projects			
Natural stabilization	30	Every 1	Every 2
Riprap	30	Every 2-3	Every 5
Reno gabions	30	Every 1	Every 5
Basket gabions	30	Every 1	Every 5
Sloped vertical concrete wall	30	Every 2-3	Every 5
Rectangular concrete channel	50	Every 2-3	Every 5
Trapezoidal concrete channel	50	Every 2-3	Every 5

6.7.3.3 Unit Costs for Alternative Development

The District will develop a current list of unit costs to use as part of alternative cost estimation. Unit cost items will be developed by the District and evaluated annually to determine if updates are required. In addition to the list of unit costs, the District will also establish consistent markups for items such as mobilization, engineering, and contingencies. Unless a customized or site-specific approach to include these costs is approved by the District, standard unit cost items and markups will be used for DWP alternative development to provide for consistency during the countywide prioritization of projects.

6.7.3.4 Calculating Benefit-to-Cost Ratio

Once the average annual benefits (AA_B) and average annual cost (AA_C) have been estimated, the BC ratio is computed using the formula:

$$BC = \frac{AA_B}{AA_C}$$

where:

AA_B = the average annual benefit
AA_C = the average annual costs

Note that the BC ratio can also be computed using benefits and costs expressed as present values:

$$BC = \frac{PV_B}{PV_C}$$

where:

PV_B = the present value of the benefits
PV_C = the present value of the costs

The BC ratio will be used to evaluate whether a project is cost-effective. If the BC ratio is greater than one, the project benefits exceed the costs and the project can be considered cost-effective. Other factors may be considered that would favor a project that did not have a BC ratio greater than one.

Similarly, the net benefits of the project are equal to:

$$NB = PV_B - PV_C$$

If the net benefits are positive, the project is cost-effective and the BC ratio greater than one.

6.7.4 Alternative Selection for Problem Area

As stated previously, the District is required to consider the BC ratio when selecting projects for implementation. In addition the District will consider noneconomic criteria in selecting alternatives. All projects which meet the District's absolute requirements for capital project funding will be prioritized on a countywide basis, with final decision for funding made at the discretion of the District's Board of Commissioners.

6.8 Summary of Recommended Alternatives

Recommended projects will be summarized to describe the economic and noneconomic data to be used as a part of the District's countywide prioritization of improvements. The economic data will focus on the BC ratio defined for each problem area, consistent with the documentation provided in Sections 6.6 and 6.7. Noneconomic data to be developed for each project are summarized in Section 6.8.1.

Exhibit 6.1 depicts the documentation that will be prepared as a part of each DWP to support the countywide prioritization of projects. Only alternatives that meet the District's minimum criteria for funding (see Chapter 1) will be developed and evaluated. For each project that meets the minimum criteria, a BC analysis will be developed, as will information on the development of noneconomic data. That information will be summarized in a manner consistent with what is shown in Exhibit 6.1 for incorporation into the District's countywide prioritization of improvement projects. Note that all costs and net benefits shown in Exhibit 6.1 shall be expressed as present values.

6.8.1 Other Noneconomic Evaluation Criteria

In addition to the BC ratio, the following information will be compiled for the District to use as a part of the countywide prioritization of projects:

- Total cost to the District
- Area (in acres) removed from the floodplain
- Number of structures protected
- Probability that funding will be provided by outside agencies (identify funding source, and percent of project to be funded, if known)
- Implementation time (in months)
- Water quality benefit, based on the qualitative scale described in Section 6.8.2
- Cook County communities involved
- Wetland or riparian area protected (ac)

6.8.2 Water Quality Benefit

To determine the water quality benefit of a flood control or erosion control project, the following questions must be addressed:

- Does the project contribute to the implementation of a TMDL established for the watershed?
- Does the project improve water quality concerns identified as a part of an NPDES Phase II Stormwater Permit?
- Does the project improve water quality related to a pollutant or pollution identified in the state's 303(d) Report?
- Does the project have an effect on habitat?

Once these questions are addressed, water quality benefit will be evaluated qualitatively using the scale in Table 6.20.

Table 6.20 Water Quality Benefit Evaluation Scale

Rating	Description
No Impact	No notable impact on water quality.
Slightly Positive	Project partly addresses or affects an NPDES Phase II Stormwater Permit, a TMDL established for the watershed, violations in water quality standards or listing criteria, or habitat.
Positive	Project fully addresses or impacts an NPDES Phase II Stormwater Permit, a TMDL established for the watershed, violations in water quality standards or listing criteria, or habitat.

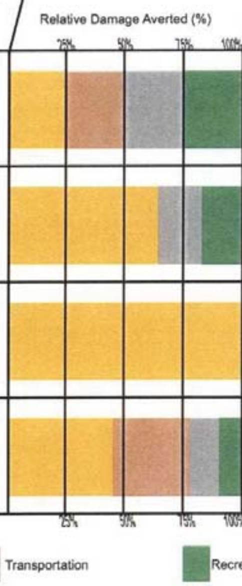
6.9 Implementation Plan

Each DWP will include an implementation plan that identifies issues critical to implementation of watershed recommendations. The recommendations will include stormwater improvement projects to address watershed problems, data management needs and responsibilities, special coordination requirements identified as a part of DWP development, scheduled updates to DWPs, and any other issues identified as critical to the District.

Exhibit 6-1 Example CIP Prioritization Matrix

Metropolitan Water Reclamation District of Greater Chicago
Example Prioritization Matrix

	B/C Ratio	Total Benefits ($)	Total Project Cost ($)	Total Cost To MWRDGC ($)	Relative Damage Averted (%)	Area Removed from Floodplain (ac)	Wetland or Riparian Area Protected (ac)	Number of Structures Protected	Possibility of Funding Provided by Outside Agencies	Implementation Time (months)	Water Quality Benefit	Communities Involved
Project A	1.25	5.0 M	4.0 M	3.2 M		5.0	40	6	Very Likely	6	Positive	Oak Park Berwyn Cicero
Project B	2.5	7.5 M	3.0 M	3.0 M		2.6	8	10	Not Likely	28	Slightly Positive	Park Ridge Des Plaines Mount Prospect
Project C	1.2	12.0 M	10.0 M	7.8 M		13.0	0	50	Somewhat Likely	3	No Impact	Oak Lawn Chicago Ridge
Project D	1.0	15.0 M	15.0 M	14.0 M		3.9	15	25	Not Likely	24	Slightly Postive	Buffalo Grove Wheeling Des Plaines Mount Prospect Prospect Heights



Note: This prioritization matrix may be expanded to include additional non-economic criteria. All values are hypothetical and for demonstration purposes only.

Introduction

SCS hydrology uses the empirical CN parameter as a part of calculating runoff volumes based on landscape characteristics such as soil type, land cover, imperviousness, and land-use development. Areas characterized by saturated or poorly infiltrating soils, or impervious development, have higher CN values, converting a greater portion of rainfall volume into runoff. The principle data sources used to develop CN values for the Lower Des Plaines River DWP are the NRCS soil data for Cook County and the 2001 NIPC land-use mapping for Cook County. The below subsections discusses the procedure used to develop a CN grid for use in hydrologic modeling for the Lower Des Plaines River Watershed and the assumptions inherent in this procedure.

Approach

CN values are dependent on a number of factors, including the soil infiltration characteristics and condition, as well as land cover characteristics such as directly connected impervious area and cover type. Therefore both soil data and land-use data are required to estimate CN. The best available soil and land-use data for Cook County are the NRCS soil data and NIPC land-use data. Table C1 lists curve numbers based on combinations of land-use data and soil data for small urban watersheds.

TABLE C1
Curve Number Generation for Small Urban Watersheds

Cover Type and Hydrologic Condition	Average % Impervious Area	Curve Number by Hydrologic Soil Group			
		A	B	C	D
Fully developed urban areas (vegetation established)					
Open Space (lawns, parks, golf courses, cemeteries, etc.)					
Poor condition (grass cover < 50%)		68	79	86	89
Fair condition (grass cover 50 to 75%)		49	69	79	84
Good condition (grass cover > 75%)		39	61	74	80
Impervious Areas					
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)		98	98	98	98
Streets and roads					
Paved; curbs and storm sewers (excluding right-of-way)		98	98	98	98
Paved; open ditches (including right-of-way)		83	89	92	93
Gravel (including right-of-way)		76	85	89	91
Dirt (including right-of-way)		72	82	87	89
Western Desert Urban Areas					
Natural desert landscaping (pervious areas only)		63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin barriers		96	96	96	96
Urban Districts					
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93

Cover Type and Hydrologic Condition	Average % Impervious Area	Curve Number by Hydrologic Soil Group			
		A	B	C	D
Residential Districts by Average Lot Size					
1/8 acre or less	65	77	85	90	92
1/4 acre	38	61	75	83	87
1/3 acre	30	57	72	81	86
1/2 acre	25	54	70	80	85
1 acre	20	51	68	79	84
2 acres	12	46	65	77	82
Developing Urban Areas					
Newly Graded Areas (pervious areas only, no vegetation)		77	86	91	94

Notes: Average runoff condition, and Ia = 0.2S. Source: *TR-55: Urban Hydrology for Small Watersheds* (U.S. Department of Agriculture [USDA], 1986)

A slightly modified version of this table will be used for curve number generation in the Lower Des Plaines River DWP, shown in Table C2. Both the soil data and the land use data require preprocessing before generating curve numbers using the lookup table.

TABLE C2
Modified Curve Number Generation for Lower Des Plains River DWP

Description	Average % Impervious	Curve Number by Hydrologic Soil Group				Typical Land Uses
		A	B	C	D	
Residential (High Density)	65	77	85	90	92	Multi-family, Apartments, Condos, Trailer Parks
Residential (Med. Density)	30	57	72	81	86	Single-Family, Lot Size ¼ to 1 acre
Residential (Low Density)	15	48	66	78	83	Single-Family, Lot Size 1 acre and Greater
Commercial	85	89	92	94	95	Strip Commercial, Shopping Centers, Convenience Stores
Industrial	72	81	88	91	93	Light Industrial, Schools, Prisons, Treatment Plants

Source: http://gis2.esri.com/library/userconf/proc00/professional/papers/PAP657/p657.htm Data is for average AMC II- dormant season (5-day) rainfall averaging from 0.5 to 1.1 inches and growing season rainfall from 1.4 to 2.1 inches

NRCS Soil data

NRCS soil data representative of 2005 conditions was obtained for Cook, DuPage, and Will Counties in Illinois. There are several areas where soil data are not mapped within the study area. These areas include the City of Chicago and portions of nearby communities that consist primarily of urban land forms. These urban land forms were assumed to be HSG C.

The NRCS soil data includes hydrologic soil group, representing the minimum infiltration rate of the soil after wetting. Table C3 summarizes the hydrologic soil groups.

TABLE C3
Hydrologic Soil Groups

Hydrologic Soil Group	Description	Texture	Infiltration Rates (in/hr)
A	Low runoff potential and high infiltration rates even when wetted	Sand, loamy sand, or sandy loam	> 0.30
B	Moderate infiltration rates when wetted	Silt loam or loam	0.15 – 0.30
C	Low infiltration rates when wetted	Sandy clay loam	0.05 – 0.15
D	High runoff potential and very low infiltration when wetted	Clay loam, silty clay loam, sandy clay, silty clay, or clay	0 – 0.05

Source: *TR-55: Urban Hydrology for Small Watersheds* (U.S. Department of Agriculture [USDA], 1986)

NIPC Land Use Data

A 2001 land use inventory for the Chicago metropolitan area was received from CMAP in GIS format. The data was used to characterize existing conditions land use within the LDPR River Watershed. The data include 15 land use classifications for summarizing land use.

Generation of CN

Table C4 describes the input data used to develop the CN values throughout the watershed.

TABLE C4
Description of Curve Number Input Data

Variable Used to Determine CN	Approach for Definition of Variable for Lower Des Plaines River Watershed Hydrologic Modeling
Ground cover	CMAP 2001 land use inventory (v.1.2 2006) was used to define land use. A lookup table was developed to link CMAP categories to CN values and soil types.
Soil type	The NRCS publishes county soil surveys that include a hydrologic classification of A, B, C, or D.
Antecedent moisture condition	AMC reflects the initial soil storage capacity available for rainfall. For areas within Northeastern Illinois, it is typical to assume an AMC of II.

The subbasin curve numbers were determined based on existing land use and soil types. The NRCS soil maps were imported into ArcGIS. The CMAP 2001 land use data was imported into ArcGIS. The USGS raster data was converted to a polygon file. The soil type polygons and land use polygons were intersected in ArcGIS to end up with polygons with consistent land use and soil type in each polygon. Based on the land use and soil type in these polygons, a curve number was assigned to each polygon. The land use/soil type/curve number assignment was based on *TR-55: Urban Hydrology for Small Watersheds* (U.S. Department of Agriculture [USDA], 1986). The Spatial Analyst extension was then used to calculate the average curve number for each subbasin.

Table C5 shows the curve number by land use type used in the Lower Des Plaines River DWP.

TABLE C5
Curve Number by Land Use Type

NIPC 2001 Land Use Code	Land Use Description	A	B	C	D
11	Open Water	100	100	100	100
21	Developed, Open Space	37	58	70	76
22	Developed, Low Intensity	51	67	76	81
23	Developed, Medium Intensity	58	71	79	83
24	Developed, High Intensity	78	84	87	88
31	Barren Land	72	81	85	86
41	Deciduous Forest	29	52	67	73
42	Evergreen Forest	29	52	67	73
43	Mixed Forest	29	52	67	73
52	Shrub/Scrub	29	46	62	69
71	Grassland	37	58	70	76
81	Pasture/Hay	29	55	67	74
82	Cultivated Crops	64	74	81	85
90	Woody Wetlands	46	64	73	79
95	Emergent Wetlands	65	75	82	85

Christopher B. Burke

Engineering, Ltd.

CERTIFICATION OF COMPLIANCE

Project Name:	MWDRGC Lower Des Plaines Watershed
Statement/Agreement Date:	DB Sterlin – 10/23/2008
Certification Date:	October 08, 2010

Tasks/Activities Covered by This Certification (Check All That Apply)

❑	**Entire Project**
❑	**Survey deliverable date:** ____________________
|	**Other (Specify): Survey**

This is to certify that the work summarized above was completed in accordance with the statement/agreement cited above and all amendments thereto, together with all such modifications, either written or oral, as directed by Christopher B. Burke Engineering, Ltd., as such modifications affect the statement/agreement, and that all such work has been accomplished to meet accuracy guidelines contained in *Guidelines and Specifications for Flood Hazard Mapping Partners* cited in the survey scope of work document, and in accordance with sound and accepted engineering practices within the contract provisions for respective phases of the work.

Name: Thomas J. Galbreath

Title: Survey Manager

Firm/Agency Represented: DB Sterlin Consultants, Inc.

Registration No.: 035-3134

Signature: [signature] 10-26-2010

THOMAS J. GALBREATH
35-3134
PROFESSIONAL
LAND SURVEYOR
STATE OF ILLINOIS
Renewable
11-30-10
CHICAGO

EXPIRES 11-30-2010

Seal

This form must be signed, stamped, and dated by the surveyor in responsible charge from the firm contracted to perform the work who is registered as a Professional Land Surveyor in the State of Illinois.

Appendix F - Depth Damage Curves

TABLE 1.
Residential, One Story with Basement.

Structure			Content		
Depth	Mean of Damage	Standard Deviation of Damage	Depth	Mean of Damage	Standard Deviation of Damage
-8	0%	0	-8	0.10%	1.6
-7	0.70%	1.34	-7	0.80%	1.16
-6	0.80%	1.06	-6	2.10%	0.92
-5	2.40%	0.94	-5	3.70%	0.81
-4	5.20%	0.91	-4	5.70%	0.78
-3	9.00%	0.88	-3	8.00%	0.76
-2	13.80%	0.85	-2	10.50%	0.74
-1	19.40%	0.83	-1	13.20%	0.72
0	25.50%	0.85	0	16.00%	0.74
1	32.00%	0.96	1	18.90%	0.83
2	38.70%	1.14	2	21.80%	0.98
3	45.50%	1.37	3	24.70%	1.17
4	52.20%	1.63	4	27.40%	1.39
5	58.60%	1.89	5	30.00%	1.6
6	64.50%	2.14	6	32.40%	1.81
7	69.80%	2.35	7	34.50%	1.99
8	74.20%	2.52	8	36.30%	2.13
9	77.70%	2.66	9	37.70%	2.25
10	80.10%	2.77	10	38.60%	2.35
11	81.10%	2.88	11	39.10%	2.45
12	81.10%	2.88	12	39.10%	2.45
13	81.10%	2.88	13	39.10%	2.45
14	81.10%	2.88	14	39.10%	2.45
15	81.10%	2.88	15	39.10%	2.45

TABLE 1.
Residential, One Story with Basement.

Structure			Content		
16	81.10%	2.88	16	39.10%	2.45

TABLE 2.
Residential, Two or More Stories, With Basement

Structure			Content		
Depth	Mean of Damage	Standard Deviation of Damage	Depth	Mean of Damage	Standard Deviation of Damage
-8	1.70%	2.7	-8	0%	0
-7	1.70%	2.7	-7	1.00%	2.27
-6	1.90%	2.11	-6	2.30%	1.76
-5	2.90%	1.8	-5	3.70%	1.49
-4	4.70%	1.66	-4	5.20%	1.37
-3	7.20%	1.56	-3	6.80%	1.29
-2	10.20%	1.47	-2	8.40%	1.21
-1	13.90%	1.37	-1	10.10%	1.13
0	17.90%	1.32	0	11.90%	1.09
1	22.30%	1.35	1	13.80%	1.11
2	27.00%	1.5	2	15.70%	1.23
3	31.90%	1.75	3	17.70%	1.43
4	36.90%	2.04	4	19.80%	1.67
5	41.90%	2.34	5	22.00%	1.92
6	46.90%	2.63	6	24.30%	2.15
7	51.80%	2.89	7	26.70%	2.36
8	56.40%	3.13	8	29.10%	2.56
9	60.80%	3.38	9	31.70%	2.76
10	64.80%	3.71	10	34.40%	3.04
11	68.40%	4.22	11	37.20%	3.46
12	71.40%	5.02	12	40.00%	4.12
13	73.70%	6.19	13	43.00%	5.08
14	75.40%	7.79	14	46.10%	6.39
15	76.40%	9.84	15	49.30%	8.08
16	76.40%	12.36	16	52.60%	10.15

TABLE 3.
Residential, Split Level, With Basement

Structure			Content		
Depth	Mean of Damage	Standard Deviation of Damage	Depth	Mean of Damage	Standard Deviation of Damage
-8			-8	0.60%	2.09
-7			-7	0.70%	1.49
-6	2.50%	1.80%	-6	1.40%	1.14
-5	3.10%	1.60%	-5	2.40%	1.01
-4	4.70%	1.50%	-4	3.80%	1
-3	7.20%	1.60%	-3	5.40%	1.02
-2	10.40%	1.60%	-2	7.30%	1.03
-1	14.20%	1.60%	-1	9.40%	1.04
0	18.50%	1.60%	0	11.60%	1.06
1	23.20%	1.70%	1	13.80%	1.12
2	28.20%	1.90%	2	16.10%	1.23
3	33.40%	2.10%	3	18.20%	1.38
4	38.60%	2.40%	4	20.20%	1.57
5	43.80%	2.60%	5	22.10%	1.76
6	48.80%	2.90%	6	23.60%	1.95
7	53.50%	3.20%	7	24.90%	2.13
8	57.80%	3.40%	8	25.80%	2.28
9	61.60%	3.60%	9	26.30%	2.44
10	64.80%	3.90%	10	26.30%	2.44
11	67.20%	4.20%	11	26.30%	2.44
12	68.80%	4.80%	12	26.30%	2.44
13	69.30%	5.70%	13	26.30%	2.44
14	69.30%	5.70%	14	26.30%	2.44
15	69.30%	5.70%	15	26.30%	2.44
16	69.30%	5.70%	16	26.30%	2.44

TABLE 4.
Residential, One Story, No Basement

Structure			Content		
Depth	Mean of Damage	Standard Deviation of Damage	Depth	Mean of Damage	Standard Deviation of Damage
-2	0%	0%	-2	0%	0%
-1	2.50%	2.70%	-1	2.40%	2.10%
0	13.40%	2.00%	0	8.10%	1.50%
1	23.30%	1.60%	1	13.30%	1.20%
2	32.10%	1.60%	2	17.90%	1.20%
3	40.10%	1.80%	3	22.00%	1.40%
4	47.10%	1.90%	4	25.70%	1.50%
5	53.20%	2.00%	5	28.80%	1.60%
6	58.60%	2.10%	6	31.50%	1.60%
7	63.20%	2.20%	7	33.80%	1.70%
8	67.20%	2.30%	8	35.70%	1.80%
9	70.50%	2.40%	9	37.20%	1.90%
10	73.20%	2.70%	10	38.40%	2.10%
11	75.40%	3.00%	11	39.20%	2.30%
12	77.20%	3.30%	12	39.70%	2.60%
13	78.50%	3.70%	13	40.00%	2.90%
14	79.50%	4.10%	14	40.00%	3.20%
15	80.20%	4.50%	15	40.00%	3.50%
16	80.70%	4.90%	16	40.00%	3.80%

TABLE 5.
Residential, Two of More Stories, No Basement

Structure			Content		
Depth	Mean of Damage	Standard Deviation of Damage	Depth	Mean of Damage	Standard Deviation of Damage
-2	0%	0%	-2	0%	0%
-1	3.00%	4.10%	-1	1.00%	3.50%
0	9.30%	3.40%	0	5.00%	2.90%
1	15.20%	3.00%	1	8.70%	2.60%
2	20.90%	2.80%	2	12.20%	2.50%
3	26.30%	2.90%	3	15.50%	2.50%
4	31.40%	3.20%	4	18.50%	2.70%
5	36.20%	3.40%	5	21.30%	3.00%
6	40.70%	3.70%	6	23.90%	3.20%
7	44.90%	3.90%	7	26.30%	3.30%
8	48.80%	4.00%	8	28.40%	3.40%
9	52.40%	4.10%	9	30.30%	3.50%
10	55.70%	4.20%	10	32.00%	3.50%
11	58.70%	4.20%	11	33.40%	3.50%
12	61.40%	4.20%	12	34.70%	3.50%
13	63.80%	4.20%	13	35.60%	3.50%
14	65.90%	4.30%	14	36.40%	3.60%
15	67.70%	4.60%	15	36.90%	3.80%
16	69.20%	5.00%	16	37.20%	4.20%

TABLE 6.
Residential, Split Level, No basement

Structure			Content		
Depth	Mean of Damage	Standard Deviation of Damage	Depth	Mean of Damage	Standard Deviation of Damage
-2	0%	0%	-2	0%	0%
-1	6.40%	2.90%	-1	2.20%	2.20%
0	7.20%	2.10%	0	2.90%	1.50%
1	9.40%	1.90%	1	4.70%	1.20%
2	12.90%	1.90%	2	7.50%	1.30%
3	17.40%	2.00%	3	11.10%	1.40%
4	22.80%	2.20%	4	15.30%	1.50%
5	28.90%	2.40%	5	20.10%	1.60%
6	35.50%	2.70%	6	25.20%	1.80%
7	42.30%	3.20%	7	30.50%	2.10%
8	49.20%	3.80%	8	35.70%	2.50%
9	56.10%	4.50%	9	40.90%	3.00%
10	62.60%	5.30%	10	45.80%	3.50%
11	68.60%	6.00%	11	50.20%	4.10%
12	73.90%	6.70%	12	54.10%	4.60%
13	78.40%	7.40%	13	57.20%	5.00%
14	81.70%	7.90%	14	59.40%	5.40%
15	83.80%	8.30%	15	60.50%	5.70%
16	84.40%	8.70%	16	60.50%	6.00%

TABLE 7.
Non-residential, Commercial and Industry

Structure		Contents	
Depth	Combined Commercial Industrial	Depth	Combined Commercial Industrial
-8		-8	
-7		-7	
-6		-6	
-5		-5	
-4	0.00%	-4	0.00%
-3	0.00%	-3	0.00%
-2	0.00%	-2	0.00%
-1	0.00%	-1	0.00%
0	0.68%	0	2.75%
1	10.21%	1	19.50%
2	14.21%	2	33.73%
3	17.46%	3	45.16%
4	20.92%	4	55.26%
5	24.02%	5	62.08%
6	27.35%	6	66.93%
7	30.50%	7	70.34%
8	33.72%	8	73.19%
9	36.89%	9	75.46%
10	39.86%	10	77.21%
11	43.52%	11	79.60%
12	46.85%	12	81.10%
13	49.45%	13	82.40%
14	51.85%	14	83.64%
15	54.31%	15	84.28%
16	56.53%	16	84.82%

Note: This curve was created by USACE, Galveston District

References:

Economic Guidance Memorandum (EGM) 04-01, Generic Depth-Damage Relationships for Residential Structures with Basements.

United States Army Corp of Engineers, Galveston District, HAZUS application.

CECW-PG 10 October 2003

MEMORANDUM FOR SEE DISTRIBUTION

SUBJECT: Economic Guidance Memorandum (EGM) 04-01, Generic Depth-Damage Relationships for Residential Structures with Basements.

1. Purpose. The purpose of this memorandum is to release, and provide guidance for the use of, generic depth-damage curves for use in U.S. Army Corps of Engineers flood damage reduction studies.

2. Background. Proper planning and evaluation of flood damage reduction projects require knowledge of actual damage caused to various types of properties. The primary purpose of the Flood Damage Data Collection Program is to meet that requirement by providing Corps district offices with standardized relationships for estimating flood damage and other costs of flooding, based on actual losses from flood events. Under this program, data have been collected from major flooding that occurred in various parts of the United States from 1996 through 2001. Damage data collected are based on comprehensive accounting of losses from flood victims' records. The generic functions developed and provided in this EGM represent a substantive improvement over other generalized depth-damage functions such as the Flood Insurance Administration (FIA) Rate Reviews.

3. Results. Generic damage functions are attached for one-story homes with basement, two or more story homes with basement, and split-level homes with basement. Generic damage functions for similar structures without basements were published in 2000 and are included as enclosure 1 for ready reference.

a. Regression analysis was used to create the damage functions. While several independent variables, such as flood duration and flood warning lead-time, were examined in building the models, the models that were most efficient in explaining the percent damage to structure and contents were quadratic and cubic forms with depth as the only independent variable.

b. Content damage was modeled with the dependent variable being content damage as a percentage of structure value. This differs from the previous technique of first developing content valuations and then content damage relationships as a function of content valuations. The generic content damage models are statistically significant and their use eliminates the need to establish content-to-structure ratios through surveys.

c. While the data collected include information on all aspects of National Economic Development (NED) losses, only results and recommendations related to the structure and content damages for homes with basements are included in this EGM.

Direct costs for cleanup expenses, unpaid hours for cleanup and repair, emergency damage prevention actions, and other flood-related costs are not included in these damage functions. Information on other residential flood costs, beyond those included in these damage functions will found the summary report, discussed in paragraph 5. These costs should be developed using site-specific historical information.

4. Application. The following paragraphs provide information on the application of the generic curves within the HEC-FDA damage calculation program.

a. The economic section of HEC-FDA divides the quantification of flood damages into a direct method and an indirect method. The direct method allows the user to directly enter a stage-damage relationship for any structure. This approach is commonly used for large or unique properties such as industrial or pubic buildings. The indirect method quantifies the stage-damage relationship for a group of structures that have significant commonality. Typically damage to residential structures is calculated using the indirect method. The procedures described in the following paragraphs apply only when using the indirect method to determine the stage-damage relationship.

b. The traditional approach to quantifying damage to contents by the indirect method relies on three pieces of information: 1) structure value; 2) content-to-structure value ratio; and 3) the content depth-damage relationship. The content-to-structure value ratio and content depth-damage relationship are unique to the structure occupancy type to which a structure is assigned. The content depth-damage relationship provides the estimate of content flood damage as a percentage of content value. Thus, to calculate a content stage-damage function for an individual structure, the structure value for an individual structure is first multiplied by the content-to-structure value ratio to provide an estimate of the content value. This content value is then multiplied by each percent damage value of the content depth-damage relationship.

c. The new content depth-damage functions provided herein are different from those used by the Corps in the past in one important aspect. The new functions calculate content damage as a percent of structure value rather than content value. Using these functions within HEC-FDA requires care in specifying a content-to-structure value ratio. To understand the requirements for using the new content depth-damage functions requires a basic understanding of how HEC-FDA calculates content damage.

(1). To calculate damages by the indirect method, each structure must be assigned to a structure occupancy type. For each structure occupancy type a content-to-structure value ratio and content depth-damage relationship are defined. These data for calculating content damage within HEC-FDA is entered on the “Study Structure Occupancy Type” screen. As long as a content value is not entered for a structure in the Structure Inventory Data, HEC-FDA calculates the content stage-damage by first calculating content using the structure value multiplied by the content-to-structure value ratio.

In some instances, however, analysts develop unique estimates of content values for a structure, which are entered for the individual structure on the Structure Inventory Data screen. For each structure that has a content value entered, calculating a content value by using the content-to-structure value ratio is ignored and the user entered content value is used to calculate content damage.

(2). The new content depth-damage functions do not require this intermediate step of calculating content values. Therefore, the content-to-structure value ratio for each structure occupancy type using the new content depth-damage relationships must be set to one hundred percent (100). This forces the content depth-damage function to be multiplied by the structure value as required. Also, the "Error Associated with Content/Structure Value" on the "Study Structure Occupancy Type" screen should be left blank. This implies that the error in content-to-structure value ratio is part of the new content depth-damage relationship.

(3). Because entering a content value on the Structure Inventory Data window overrides the content-to-structure value ratio, the new content depth-damage relationships should not be used for structures that have separately entered content values.

(4). Questions concerning the use of the generic curves within the HEC-FDA model can be addressed to Dr. David Moser, Institute of Water Resources (IWR), (703) 428-8066.

5. <u>Report</u>. A report summarizing the data collection effort and analyses performed to derive these curves will shortly be available on the IWR website. More information may be obtained by contacting the program's principal investigator, Stuart Davis, (703) 428-7086.

6. <u>Waiver to Policy</u>. These curves are developed for nation-wide applicability in flood damage reduction studies. When using these curves, the requirement to develop site-specific depth-damage curves contained in ER 1105-2-100, E-19q.(2) is waived. Additionally, the requirement to develop content valuations and content-to-structure ratios based on site-specific or comparable floodplain information, ER 1005-2-100, E-19q.(1)(a), is also waived. Note these waivers currently apply only to single-family homes with and without basements for which generic curves have been published, and not other categories of flood inundation damages for which no generic curves exist. Feasibility reports must state the generic curves are being used in the flood damage analysis for residential structures with and/or without basements. Use of these curves is optional and analysts should always endeavor to use the best available information to accurately quantify the damages and benefits in inundation reduction studies.

7. Point of Contact. Administrators of the Flood Damage Data Collection Program continue to collect and analyze flood-related damages to both residential and commercial properties. The HQUSACE program monitor is Lillian Almodovar, (202) 761-4233, who can address any questions concerning the program.

FOR THE COMMANDER:

/s/

Encl

WILLIAM R. DAWSON, P.E.
Chief, Planning and Policy Division
Directorate of Civil Works

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DAMAGE FUNCTIONS
FOR SINGLE FAMILY RESIDENTIAL
STRUCTURES WITH BASEMENTS

Structure Depth-Damage

Table 1 Structure One Story, With Basement		
Depth	Mean of Damage	Standard Deviation of Damage
-8	0%	0
-7	0.7%	1.34
-6	0.8%	1.06
-5	2.4%	0.94
-4	5.2%	0.91
-3	9.0%	0.88
-2	13.8%	0.85
-1	19.4%	0.83
0	25.5%	0.85
1	32.0%	0.96
2	38.7%	1.14
3	45.5%	1.37
4	52.2%	1.63
5	58.6%	1.89
6	64.5%	2.14
7	69.8%	2.35
8	74.2%	2.52
9	77.7%	2.66
10	80.1%	2.77
11	81.1%	2.88
12	81.1%	2.88
13	81.1%	2.88
14	81.1%	2.88
15	81.1%	2.88
16	81.1%	2.88

Table 2 Structure Two or More Stories, With Basement		
Depth	Mean of Damage	Standard Deviation of Damage
-8	1.7%	2.70
-7	1.7%	2.70
-6	1.9%	2.11
-5	2.9%	1.80
-4	4.7%	1.66
-3	7.2%	1.56
-2	10.2%	1.47
-1	13.9%	1.37
0	17.9%	1.32
1	22.3%	1.35
2	27.0%	1.50
3	31.9%	1.75
4	36.9%	2.04
5	41.9%	2.34
6	46.9%	2.63
7	51.8%	2.89
8	56.4%	3.13
9	60.8%	3.38
10	64.8%	3.71
11	68.4%	4.22
12	71.4%	5.02
13	73.7%	6.19
14	75.4%	7.79
15	76.4%	9.84
16	76.4%	12.36

Table 3 Structure Split Level, With Basement		
Depth	Mean of Damage	Standard Deviation of Damage
-8		
-7		
-6	2.5%	1.8%
-5	3.1%	1.6%
-4	4.7%	1.5%
-3	7.2%	1.6%
-2	10.4%	1.6%
-1	14.2%	1.6%
0	18.5%	1.6%
1	23.2%	1.7%
2	28.2%	1.9%
3	33.4%	2.1%
4	38.6%	2.4%
5	43.8%	2.6%
6	48.8%	2.9%
7	53.5%	3.2%
8	57.8%	3.4%
9	61.6%	3.6%
10	64.8%	3.9%
11	67.2%	4.2%
12	68.8%	4.8%
13	69.3%	5.7%
14	69.3%	5.7%
15	69.3%	5.7%
16	69.3%	5.7%

Content Depth-Damage

Table 4 Content One Story, With Basement		
Depth	Mean of Damage	Standard Deviation of Damage
-8	0.1%	1.60
-7	0.8%	1.16
-6	2.1%	0.92
-5	3.7%	0.81
-4	5.7%	0.78
-3	8.0%	0.76
-2	10.5%	0.74
-1	13.2%	0.72
0	16.0%	0.74
1	18.9%	0.83
2	21.8%	0.98
3	24.7%	1.17
4	27.4%	1.39
5	30.0%	1.60
6	32.4%	1.81
7	34.5%	1.99
8	36.3%	2.13
9	37.7%	2.25
10	38.6%	2.35
11	39.1%	2.45
12	39.1%	2.45
13	39.1%	2.45
14	39.1%	2.45
15	39.1%	2.45
16	39.1%	2.45

Table 5 Content Two or More Stories-With Basement		
Depth	Mean of Damage	Standard Deviation of Damage
-8	0%	0
-7	1.0%	2.27
-6	2.3%	1.76
-5	3.7%	1.49
-4	5.2%	1.37
-3	6.8%	1.29
-2	8.4%	1.21
-1	10.1%	1.13
0	11.9%	1.09
1	13.8%	1.11
2	15.7%	1.23
3	17.7%	1.43
4	19.8%	1.67
5	22.0%	1.92
6	24.3%	2.15
7	26.7%	2.36
8	29.1%	2.56
9	31.7%	2.76
10	34.4%	3.04
11	37.2%	3.46
12	40.0%	4.12
13	43.0%	5.08
14	46.1%	6.39
15	49.3%	8.08
16	52.6%	10.15

Table 6 Content Split-Level-With Basement		
Depth	Mean of Damage	Standard Deviation of Damage
-8	0.6%	2.09
-7	0.7%	1.49
-6	1.4%	1.14
-5	2.4%	1.01
-4	3.8%	1.00
-3	5.4%	1.02
-2	7.3%	1.03
-1	9.4%	1.04
0	11.6%	1.06
1	13.8%	1.12
2	16.1%	1.23
3	18.2%	1.38
4	20.2%	1.57
5	22.1%	1.76
6	23.6%	1.95
7	24.9%	2.13
8	25.8%	2.28
9	26.3%	2.44
10	26.3%	2.44
11	26.3%	2.44
12	26.3%	2.44
13	26.3%	2.44
14	26.3%	2.44
15	26.3%	2.44
16	26.3%	2.44

ENCLOSURE
DAMAGE FUNCTIONS
FOR SINGLE FAMILY RESIDENTIAL

STRUCTURES WITHOUT BASEMENTS

Structure One Story, No Basement		
Depth	**Mean of Damage**	**Standard Deviation of Damage**
-2	0%	0%
-1	2.5%	2.7%
0	13.4%	2.0%
1	23.3%	1.6%
2	32.1%	1.6%
3	40.1%	1.8%
4	47.1%	1.9%
5	53.2%	2.0%
6	58.6%	2.1%
7	63.2%	2.2%
8	67.2%	2.3%
9	70.5%	2.4%
10	73.2%	2.7%
11	75.4%	3.0%
12	77.2%	3.3%
13	78.5%	3.7%
14	79.5%	4.1%
15	80.2%	4.5%
16	80.7%	4.9%

Structure Two or More Stories-No Basement		
Depth	**Mean of Damage**	**Standard Deviation of Damage**
-2	0%	0%
-1	3.0%	4.1%
0	9.3%	3.4%
1	15.2%	3.0%
2	20.9%	2.8%
3	26.3%	2.9%
4	31.4%	3.2%
5	36.2%	3.4%
6	40.7%	3.7%
7	44.9%	3.9%
8	48.8%	4.0%
9	52.4%	4.1%
10	55.7%	4.2%
11	58.7%	4.2%
12	61.4%	4.2%
13	63.8%	4.2%
14	65.9%	4.3%
15	67.7%	4.6%
16	69.2%	5.0%

Structure Split-Level-No Basement		
Depth	**Mean of Damage**	**Standard Deviation of Damage**
-2	0%	0%
-1	6.4%	2.9%
0	7.2%	2.1%
1	9.4%	1.9%
2	12.9%	1.9%
3	17.4%	2.0%
4	22.8%	2.2%
5	28.9%	2.4%
6	35.5%	2.7%
7	42.3%	3.2%
8	49.2%	3.8%
9	56.1%	4.5%
10	62.6%	5.3%
11	68.6%	6.0%
12	73.9%	6.7%
13	78.4%	7.4%
14	81.7%	7.9%
15	83.8%	8.3%
16	84.4%	8.7%

Content One Story, No Basement		
Depth	Mean of Damage	Standard Deviation of Damage
-2	0%	0%
-1	2.4%	2.1%
0	8.1%	1.5%
1	13.3%	1.2%
2	17.9%	1.2%
3	22.0%	1.4%
4	25.7%	1.5%
5	28.8%	1.6%
6	31.5%	1.6%
7	33.8%	1.7%
8	35.7%	1.8%
9	37.2%	1.9%
10	38.4%	2.1%
11	39.2%	2.3%
12	39.7%	2.6%
13	40.0%	2.9%
14	40.0%	3.2%
15	40.0%	3.5%
16	40.0%	3.8%

Content Two or More Stories-No Basement		
Depth	**Mean of Damage**	**Standard Deviation of Damage**
-2	0%	0%
-1	1.0%	3.5%
0	5.0%	2.9%
1	8.7%	2.6%
2	12.2%	2.5%
3	15.5%	2.5%
4	18.5%	2.7%
5	21.3%	3.0%
6	23.9%	3.2%
7	26.3%	3.3%
8	28.4%	3.4%
9	30.3%	3.5%
10	32.0%	3.5%
11	33.4%	3.5%
12	34.7%	3.5%
13	35.6%	3.5%
14	36.4%	3.6%
15	36.9%	3.8%
16	37.2%	4.2%

Content Split-Level-No Basement		
Depth	**Mean of Damage**	**Standard Deviation of Damage**
-2	0%	0%
-1	2.2%	2.2%
0	2.9%	1.5%
1	4.7%	1.2%
2	7.5%	1.3%
3	11.1%	1.4%
4	15.3%	1.5%
5	20.1%	1.6%
6	25.2%	1.8%
7	30.5%	2.1%
8	35.7%	2.5%
9	40.9%	3.0%
10	45.8%	3.5%
11	50.2%	4.1%
12	54.1%	4.6%
13	57.2%	5.0%
14	59.4%	5.4%
15	60.5%	5.7%
16	60.5%	6.0%

Appendix G

HEC-HMS Existing Conditions Hydrologic Parameters

Waterway	Subbasin ID	Area (mi^2)	CN	Clark Tc (hr)	R
67th Street Ditch	67DT-1	0.171	81	0.41	2.52
67th Street Ditch	67DT-2	0.086	78	0.24	1.47
Addison Creek	Sub 10	0.837	84	1.53	3.56
Addison Creek	Sub 20	2.867	79	1.71	4.00
Addison Creek	Sub 40	1.616	85	1.29	3.01
Addison Creek	Sub 50	0.314	93	5.18	12.09
Addison Creek	Sub 51	0.611	83	1.28	2.99
Addison Creek	Sub 52	0.393	85	1.25	2.92
Addison Creek	Sub 60	0.825	81	3.03	7.06
Addison Creek	Sub 70	0.749	84	2.45	5.72
Addison Creek	Sub 80	0.672	84	1.15	2.69
Lake and Mannheim Tributary	Sub 81	0.547	83	0.91	2.13
Addison Creek	Sub 90	0.353	84	1.60	3.74
Addison Creek	Sub 100	0.165	89	2.17	5.06
Lake and Mannheim Tributary	Sub 120	0.661	93	1.62	3.78
Lake and Mannheim Tributary	Sub 121	0.397	82	2.04	4.76
Lake and Mannheim Tributary	Sub 123	1.369	81	1.20	2.81
Lake and Mannheim Tributary	Sub 125	0.070	89	0.44	1.02
Addison Creek	Sub 130	0.520	85	4.73	11.03
Addison Creek	Sub 131	0.196	90	2.26	5.27
Addison Creek	Sub 132	0.352	88	6.22	14.51
Addison Creek	Sub 140	0.344	89	1.86	4.34
Addison Creek	Sub 145	1.009	83	1.70	6.92
Addison Creek	Sub 150	0.297	87	1.44	5.88
Addison Creek	Sub 151	0.102	89	0.96	3.92
Addison Creek	Sub 152	0.161	88	1.16	4.75
Addison Creek	Sub 153	0.083	84	1.12	4.58
Addison Creek	Sub 160	1.038	83	1.88	7.67
Addison Creek	Sub 161	1.412	83	2.06	8.42
Addison Creek	Sub 162	0.242	89	0.78	3.20
Addison Creek	Sub 170	0.723	83	2.60	10.62
Addison Creek	Sub 180	1.046	81	1.77	7.25
Addison Creek	Sub 181	1.220	81	0.74	3.02
Addison Creek	Sub 190	0.878	87	3.00	12.26
Buffalo Creek	B10	1.050	77	1.43	8.33
Buffalo Creek	B11	1.500	74	1.83	10.70
White Pine Ditch	B12	1.290	81	0.77	4.50
Buffalo Creek	B13	0.260	82	0.49	2.85
Buffalo Creek	B14	0.400	79	0.66	3.85
Buffalo Creek	B15	0.120	79	0.29	1.70
Buffalo Creek	B16	0.330	82	0.58	3.40
Buffalo Creek	B17	0.220	79	0.40	2.35
Buffalo Creek	B18	1.380	80	1.55	9.05
Buffalo Creek	B19	0.360	76	1.63	9.53
Buffalo Creek	B1A	0.520	79	0.58	3.40
Buffalo Creek	B1B	0.950	77	0.65	3.78
Buffalo Creek	B1C	1.170	75	0.72	4.23
Buffalo Creek	B1D	0.630	72	1.09	6.38
Buffalo Creek	B2	1.510	76	0.87	5.08
Buffalo Creek	B20	0.530	84	2.85	16.63
Buffalo Creek Overflow	B21	2.270	79	2.11	12.3
Buffalo Creek	B22	0.300	78	0.87	5.05
Buffalo Creek	B23	0.590	78	1.53	8.93
Buffalo Creek	B3	1.440	77	1.17	6.85
Buffalo Creek	B4	1.350	77	0.97	5.68

Appendix G

HEC-HMS Existing Conditions Hydrologic Parameters

Waterway	Subbasin ID	Area (mi^2)	CN	Clark Tc (hr)	R
Buffalo Creek	B5A	0.480	75	0.73	4.28
Buffalo Creek	B5B	0.300	75	0.61	3.55
Buffalo Creek	B5C	0.420	74	0.55	3.20
Buffalo Creek	B6A	0.360	75	0.42	2.43
Buffalo Creek	B6B	0.230	76	0.40	2.33
Buffalo Creek	B7	0.790	74	0.98	5.73
Buffalo Creek Tributary A	B8A	0.168	78	0.94	5.50
Unnamed Tributary to Tributary A	B8B	0.525	77	1.46	8.53
Buffalo Creek Tributary A	B8C	2.550	76	2.12	12.38
Buffalo Creek Tributary A	B9	3.050	78	2.25	13.13
Sexton Ditch	CYCR1	0.190	83	1.26	2.95
Sexton Ditch	CYCR1A	0.160	85	1.73	4.03
Crystal Creek Tributary	CYCR2	0.080	87	1.01	2.35
Motel Tributary	CYCR3	0.135	92	0.77	1.79
Motel Tributary	CYCR4	0.134	91	1.32	3.08
Crystal Creek	CYCR5	0.360	88	1.63	3.80
Crystal Creek	CYCR6	0.056	74	0.34	0.79
O'Hare South Detenton Basin	CYCR7	3.599	86	2.92	7.15
Crystal Creek	CYCR8	0.753	85	1.89	4.41
Crystal Creek Tributary	CYCR9	0.143	83	1.43	3.33
Crystal Creek	CYCR10	0.407	84	1.60	3.73
Crystal Creek Tributary	CYCR11	0.170	93	1.41	3.28
Des Plaines River	DPR1	2.960	74	1.64	11.52
Des Plaines River	DPR2	3.860	77	2.09	9.04
Des Plaines River	DPR3	4.720	76	2.26	9.76
Des Plaines River	DPR4	2.810	76	1.24	5.36
Des Plaines River	DPR5	2.070	70	1.47	6.34
Des Plaines River	DPR6	0.630	76	2.73	11.76
Des Plaines River	DPR7	1.350	81	1.75	7.53
Des Plaines River	DPR8	0.740	79	3.42	14.76
Des Plaines River	DPR9	3.180	82	1.94	8.36
Des Plaines River	DPR10	1.080	81	1.52	6.56
Des Plaines River	DPR11	4.680	80	2.36	10.18
Des Plaines River	DPR12	1.430	78	1.74	7.53
Des Plaines River	DPR13	0.124	86	0.86	3.69
Des Plaines River	DPR14	2.000	83	1.44	6.22
Des Plaines River	DPR15	0.240	84	2.69	11.59
Des Plaines River	DPR16	0.230	83	0.92	3.96
Des Plaines River	DPR17	1.500	83	2.52	10.88
Des Plaines River	DPR18	5.990	84	3.10	13.40
Des Plaines River	DPR19	3.310	80	2.20	9.52
Des Plaines River	DPR20	4.540	85	1.82	7.85
Des Plaines River	DPR21	7.720	82	2.67	11.52
Des Plaines River	DPR22	5.070	81	2.65	11.46
Des Plaines River	DPR23	8.500	81	3.38	14.59
Des Plaines River	DPR24	20.430	77	3.56	15.36
Des Plaines River	141A	11.910	76	1.96	32.24
Des Plaines River	RIND	38.060	77	4.15	38.72
Des Plaines River	21A	6.010	75	3.46	18.28
Des Plaines River Tributary A	Basin 2	1.350	80	0.85	5.12
Des Plaines River Tributary A	Basin 3	0.240	78	0.46	2.77
57th Street Ditch	Subbasin 1	0.306	82	0.66	3.24
East Avenue Ditch	Subbasin 2	0.581	81	0.69	3.39
57th Street Ditch	Subbasin 3	0.141	82	1.19	5.84
East Avenue Ditch	Subbasin 4	0.041	89	0.31	1.51

Appendix G

HEC-HMS Existing Conditions Hydrologic Parameters

Waterway	Subbasin ID	Area (mi^2)	CN	Clark Tc (hr)	R
East Avenue Ditch	Subbasin 5	0.094	84	0.89	4.37
East Avenue Ditch	Subbasin 6	0.134	91	1.31	6.44
East Avenue Ditch	Subbasin 7	0.063	83	0.70	3.44
East Avenue Ditch	Subbasin 8	0.251	88	0.91	4.48
Farmers Creek	BAS101	0.058	78	0.42	0.99
Farmers Creek	BAS102	0.048	81	0.38	0.88
Farmers Creek	BAS103	0.039	84	0.40	0.94
Farmers Creek	BAS104	0.060	83	1.20	2.79
Farmers Creek	BAS105	0.023	77	0.59	1.39
Farmers Creek	BAS106	0.072	82	0.99	2.31
Farmers Creek	BAS107	0.071	83	3.69	8.62
Farmers Creek	BAS108	0.065	79	0.68	1.59
Farmers Creek	BAS109	0.033	86	0.14	0.32
Farmers Creek	BAS110	0.078	81	0.97	2.26
Farmers Creek	BAS111	0.067	84	0.93	2.18
Farmers Creek	BAS112	0.039	85	0.64	1.48
Farmers Creek	BAS113	0.094	78	2.23	5.21
Farmers Creek	BAS114	0.034	77	0.43	1.00
Farmers Creek	BAS115	0.027	87	0.75	1.75
Farmers Creek	BAS116	0.082	75	2.68	6.25
Farmers Creek	BAS117	0.097	78	1.59	3.72
Farmers Creek	BAS118	0.034	83	0.89	2.07
Farmers Creek	BAS119	0.057	83	1.38	3.23
Farmers Creek	BAS120	0.233	77	4.73	11.03
Farmers Creek	BAS121	0.068	75	0.62	1.45
Farmers Creek	BAS201	0.121	80	0.56	1.31
Farmers Creek	BAS202	0.331	83	0.84	1.96
Farmers Creek	BAS203	0.091	92	0.70	1.64
Farmers Creek	BAS204	0.153	85	0.79	1.83
Farmers Creek	BAS205	0.104	82	2.20	5.14
Farmers Creek	BAS206	0.112	77	0.75	1.74
Farmers Creek	BAS207	0.118	87	1.36	3.18
Farmers Creek	BAS208	0.085	84	0.63	1.48
Prairie Creek	BAS301	0.271	85	0.72	1.68
Prairie Creek	BAS302	0.168	85	1.37	3.19
Prairie Creek	BAS303	0.070	89	1.80	4.19
Prairie Creek	BAS304	0.263	81	1.25	2.92
Prairie Creek	BAS305	0.061	85	0.72	1.69
Prairie Creek	BAS306	0.221	85	1.02	2.38
Prairie Creek	BAS307	0.041	91	0.46	1.08
Prairie Creek	BAS308	0.023	82	1.14	2.67
Prairie Creek	BAS309	0.134	83	2.65	6.19
Prairie Creek	BAS310	0.109	82	1.00	2.33
Prairie Creek	BAS311	0.056	84	1.02	2.38
Prairie Creek	BAS312	0.034	82	0.41	0.97
Prairie Creek	BAS401	0.286	79	0.78	1.82
Prairie Creek	BAS402	0.073	89	4.53	10.56
Prairie Creek	BAS403	0.125	81	1.66	3.87
Feehanville Ditch	Subbasin-1_US	0.068	62	0.37	2.85
Feehanville Ditch	Subbasin-1_DS	0.100	74	0.40	2.05
Feehanville Ditch	Subbasin-2_US	1.880	77	2.54	12.93
Feehanville Ditch	Subbasin-3	0.659	79	1.56	7.94
59th Street Ditch	59th10	0.516	78	0.43	3.00
59th Street Ditch	59th20	0.790	80	0.69	4.85
63rd Street Ditch	63rd10	0.219	79	0.26	1.82

Appendix G

HEC-HMS Existing Conditions Hydrologic Parameters

Waterway	Subbasin ID	Area (mi^2)	CN	Clark Tc (hr)	R
63rd Street Ditch	63rd20	0.450	78	0.52	3.67
63rd Street Ditch	63rd30	3.407	76	1.77	12.38
79th Street Ditch	79th10	0.050	78	0.23	1.60
79th Street Ditch	79th20	0.589	81	1.24	8.68
Flagg Creek	Flagg10	0.337	69	0.17	1.16
Flagg Creek	Flagg100	0.168	80	0.32	2.22
Flagg Creek	Flagg110	0.526	79	0.64	4.47
Flagg Creek	Flagg120	0.586	80	0.70	4.88
Flagg Creek	Flagg121	0.209	79	0.23	1.59
Flagg Creek	Flagg130	0.283	79	0.70	4.87
Flagg Creek	Flagg131	0.680	79	0.39	2.70
Flagg Creek	Flagg140	0.335	80	0.46	3.25
Flagg Creek	Flagg141	0.620	80	0.45	3.15
Flagg Creek	Flagg150	2.916	79	1.63	11.38
Flagg Creek	Flagg20	0.105	62	0.23	1.60
Flagg Creek	Flagg30	0.431	69	0.09	0.66
Flagg Creek	Flagg40	0.204	73	0.31	2.18
Flagg Creek	Flagg50	0.432	78	0.30	2.07
Flagg Creek	Flagg51	0.206	78	0.22	1.57
Flagg Creek	Flagg52	0.212	81	0.33	2.29
Flagg Creek	Flagg60	0.080	83	0.17	1.21
Flagg Creek	Flagg61	0.126	84	0.30	2.11
Flagg Creek	Flagg70	0.254	79	0.15	1.02
Flagg Creek	Flagg80	0.122	80	0.17	1.20
Flagg Creek	Flagg90	0.200	77	0.18	1.26
Flagg Creek	FlaggWW	0.098	84	0.48	3.38
Plainfield Road Ditch	Plain10	0.215	79	0.25	1.72
Plainfield Road Ditch	Plain11	0.110	81	0.15	1.05
Plainfield Road Ditch	Plain20	1.363	81	1.96	13.74
Flagg Creek Tributary A	TribA10	0.110	78	0.07	0.51
Flagg Creek Tributary A	TribA20	0.096	83	0.45	3.13
Flagg Creek Tributary A	TribA30	0.365	78	0.82	5.75
Flagg Creek Tributary B	TribB10	0.062	76	0.10	0.71
Flagg Creek Tributary B	TribB11	0.191	77	0.36	2.52
Flagg Creek Tributary B	TribB20	0.184	80	0.20	1.40
Flagg Creek Tributary B	TribB30	0.176	79	0.31	2.20
Flagg Creek Tributary C	TribC10	0.247	72	0.12	0.82
Flagg Creek Tributary C	TribC11	0.230	78	0.36	2.49
Flagg Creek Tributary C	TribC20	0.159	78	0.16	1.15
Flagg Creek Tributary C	TribC30	1.123	74	1.11	7.79
Golf Course Tributary	Golf Course Trib. Area	0.556	77	1.16	5.66
Lake Arlington	LA_1	0.153	89	0.35	2.38
McDonald Creek	MC_1	1.065	78	1.48	10.15
McDonald Creek	MC_2	1.115	78	1.35	9.29
McDonald Creek	MC_3	1.309	76	1.86	12.80
McDonald Creek	MC_4	1.042	70	1.78	12.24
McDonald Creek North Branch	MC_NB1	1.167	80	0.94	6.46
McDonald Creek North Branch	MCNB_2	0.442	80	1.08	7.43
McDonald Creek South Branch	MCSB_1	1.121	82	1.31	9.00
McDonald Creek South Branch	MCSB_2	0.733	81	1.26	8.64
McDonald Creek Tributary A	MCTA_1	0.328	77	0.90	6.20
McDonald Creek Tributary A	MCTA_2	0.422	79	1.27	8.76
McDonald Creek Tributary B	MCTA_3	0.152	83	0.61	4.16
McDonald Creek Tributary B	MCTB_1	0.558	80	0.88	6.05
Salt Creek Middle Fork	Subbasin 1	0.210	73	1.59	6.11

Appendix G

HEC-HMS Existing Conditions Hydrologic Parameters

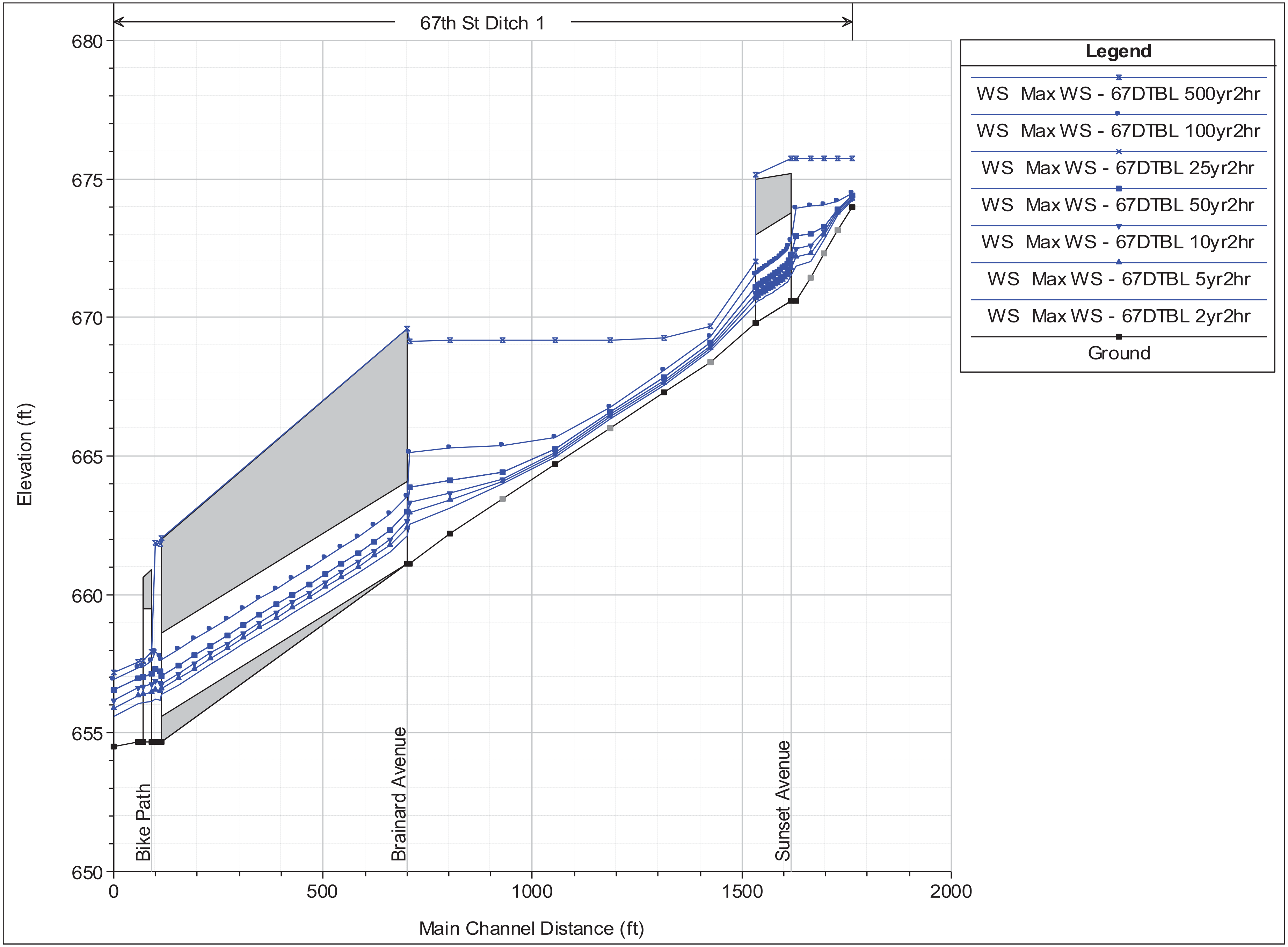
Waterway	Subbasin ID	Area (mi^2)	CN	Clark Tc (hr)	R
Salt Creek	Subbasin 2	2.488	78	2.36	9.07
Salt Creek South Fork	Subbasin 3	0.232	80	1.15	4.43
Salt Creek	Subbasin 8	0.580	79	2.33	8.98
Salt Creek	Subbasin 9	2.781	80	1.48	5.69
Salt Creek South Fork	Subbasin 10	0.384	75	4.10	15.78
Salt Creek	Subbasin 11	1.720	76	2.37	9.14
Salt Creek	Subbasin 13	2.469	81	2.28	8.77
Salt Creek	Subbasin 15	0.075	71	0.68	2.63
Salt Creek Middle Fork	Subbasin 16	0.270	76	4.35	16.77
Salt Creek Middle Fork	Subbasin 17	0.144	84	3.66	14.09
Salt Creek Middle Fork	Subbasin 18	0.070	81	3.04	11.69
Salt Creek Middle Fork	Subbasin 19	0.190	74	4.83	18.58
Salt Creek Middle Fork	Subbasin 20	0.070	81	2.28	8.77
Silver Creek	MP1	0.650	85	2.32	10.17
Silver Creek	MP2	0.289	83	1.82	7.98
Silver Creek	MP3	0.519	87	2.16	9.49
Silver Creek	MP4	0.327	91	1.78	7.82
Silver Creek	MP5	0.724	92	1.49	6.54
Silver Creek	FP1	0.473	86	1.85	8.12
Silver Creek	FP2	0.296	81	1.53	6.73
Silver Creek	FP3	0.307	85	1.30	5.71
Silver Creek	FP4	0.806	86	2.66	11.66
Silver Creek	FP5	0.412	85	1.03	4.54
Silver Creek	FP6	0.778	90	3.54	15.52
Silver Creek	FP7	0.127	84	0.65	2.86
Silver Creek	NL1	0.492	80	1.86	8.14
Silver Creek	LT1	0.344	85	1.15	5.05
Silver Creek	LT2	0.549	82	2.02	8.87
Silver Creek	LT3	0.258	92	1.58	6.92
Silver Creek	LT4	0.294	92	2.36	10.35
Silver Creek	CH1	0.418	85	1.63	7.13
Silver Creek	CH2	0.044	81	0.62	2.70
Silver Creek	CH3	0.266	87	1.45	6.38
Silver Creek	CH4	0.064	81	0.75	3.30
Silver Creek	CH5	0.087	89	1.74	7.62
Silver Creek	CH6	0.103	77	1.53	6.73
Silver Creek	CH7	0.041	79	1.26	5.53
Silver Creek	CH8	0.033	82	1.41	6.18
Silver Creek	CH9	0.266	84	0.29	1.26
Silver Creek	CH10	0.119	76	3.24	14.22
Silver Creek	CH11	0.125	75	3.28	14.40
Silver Creek	BS1	0.202	89	0.68	2.99
Silver Creek	BS2	0.280	85	0.50	2.18
Silver Creek	BS3	0.440	81	0.62	2.70
Silver Creek	BS4	0.414	82	0.88	3.88
Silver Creek	BS5	0.498	81	0.69	3.03
Weller Creek	Wilke-Kirchoff1	1.010	80	1.20	6.16
Weller Creek	Wilke-Kirchoff2	1.450	80	2.12	10.87
Weller Creek	WC2	4.050	80	2.81	14.41
Weller Creek	WC3	1.610	79	3.29	16.87
Weller Creek	WC4	1.629	81	1.63	8.36
Weller Creek	WC5	0.116	79	0.42	2.16
Weller Creek	WC6	0.068	79	0.41	2.09
Weller Creek	WC7	0.042	74	0.37	1.91
Weller Creek	WC8	0.869	82	2.07	10.60

Appendix G
HEC-HMS Existing Conditions Hydrologic Parameters

Waterway	Subbasin ID	Area (mi^2)	CN	Clark Tc (hr)	R
Weller Creek	WC9	0.308	79	0.60	3.06
Weller Creek	WC10	0.113	73	0.49	2.51
Weller Creek	WC11	0.660	79	1.18	6.05
Weller Creek	WC12	0.060	79	0.47	2.42
Weller Creek	WC13	1.106	81	2.07	10.60
Weller Creek	WC14	0.237	80	3.89	19.98
Weller Creek	WC15	0.466	81	4.24	21.73
Weller Creek	WC16	0.141	81	1.09	5.61
Weller Creek	WC17	0.455	80	0.81	4.16
Weller Creek	WC18	3.130	82	4.79	24.57
Weller Creek	WC19	0.103	80	0.46	2.33
Weller Creek	WC20	0.167	86	0.54	2.79
Weller Creek	WC21	0.103	81	1.57	8.05
Weller Creek	WC22	0.252	85	0.72	3.72
Weller Creek	WC23	0.568	85	1.65	8.45
Higgins Creek	H 10	0.254	86	0.88	4.28
Higgins Creek	H 12	0.323	73	0.48	2.32
Higgins Creek	H 21	0.181	86	0.97	4.72
Higgins Creek	H 26	0.383	84	1.42	6.92
Higgins Creek	H 27	0.167	86	0.55	2.68
Higgins Creek	H 131	0.729	88	1.85	9.05
Higgins Creek	H 133	1.065	83	3.89	18.96
Higgins Creek	H 134	0.672	86	2.52	12.27
Higgins Creek	H1701	0.240	71	0.74	3.59
Higgins Creek	H 1702	0.373	85	0.79	3.85
Higgins Creek Tributary A	HA 132	1.829	85	1.56	7.61
Higgins Creek Tributary A	HA 132-2	0.126	86	0.73	3.57
Higgins Creek Tributary B	HB 132-1	0.245	85	1.12	5.45
Willow Creek	W 34	0.522	86	2.46	12.02
Willow Creek	W 37	0.352	81	0.91	4.43
Willow Creek	W 40	0.690	82	1.33	6.46
Willow Creek	W 41	0.185	84	1.28	6.25
Willow Creek	W 120	0.263	77	2.20	10.72
Willow Creek	W 121	0.392	84	1.04	5.08
Willow Creek	W 122	0.269	76	3.64	17.74
Willow Creek	W 123	0.249	90	1.63	7.96
Willow Creek	W 124	0.413	86	1.29	6.31
Willow Creek	W 125	0.279	89	1.64	7.98
Willow Creek	W 127	0.800	84	1.46	7.13
Willow Creek	W 128	0.254	88	0.55	2.68
Willow Creek	W 129	0.331	87	1.36	6.63
Willow Creek	W 139	0.687	91	1.50	7.32
Willow Creek	W 140	0.309	86	2.06	10.07
Willow Creek	W 141	0.564	84	7.33	35.74
Willow Creek	W 143	0.303	90	1.08	5.27
Willow Creek	W 144	0.861	84	3.54	17.26
Willow Creek	WNS/100	5.402	88	2.78	13.54

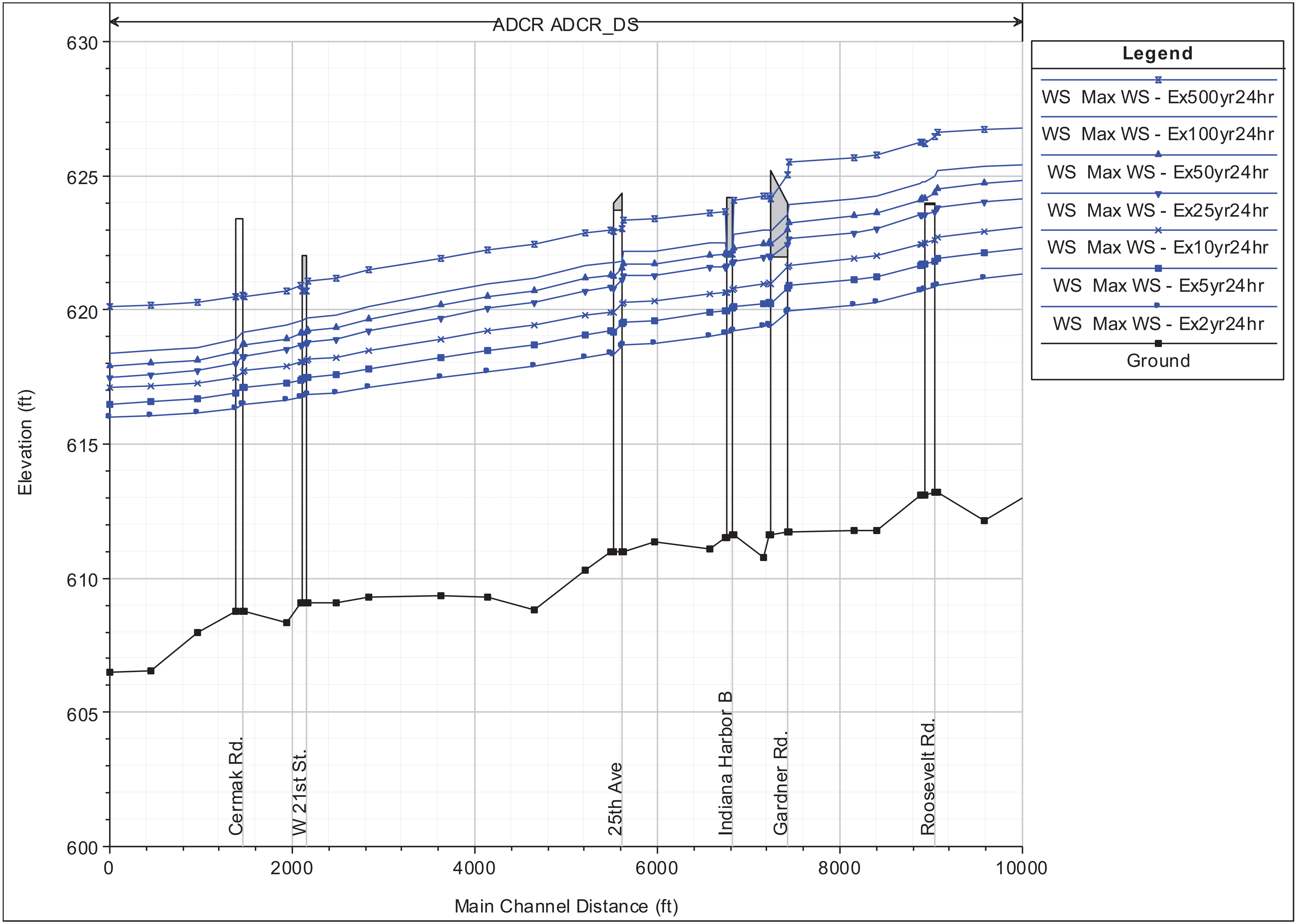
Appendix H
Hydraulic Profiles for Existing Conditions
Lower Des Plaines River Detailed Watershed Plan

67th Street Ditch Subwatershed
Hydraulic Profiles for Existing Conditions

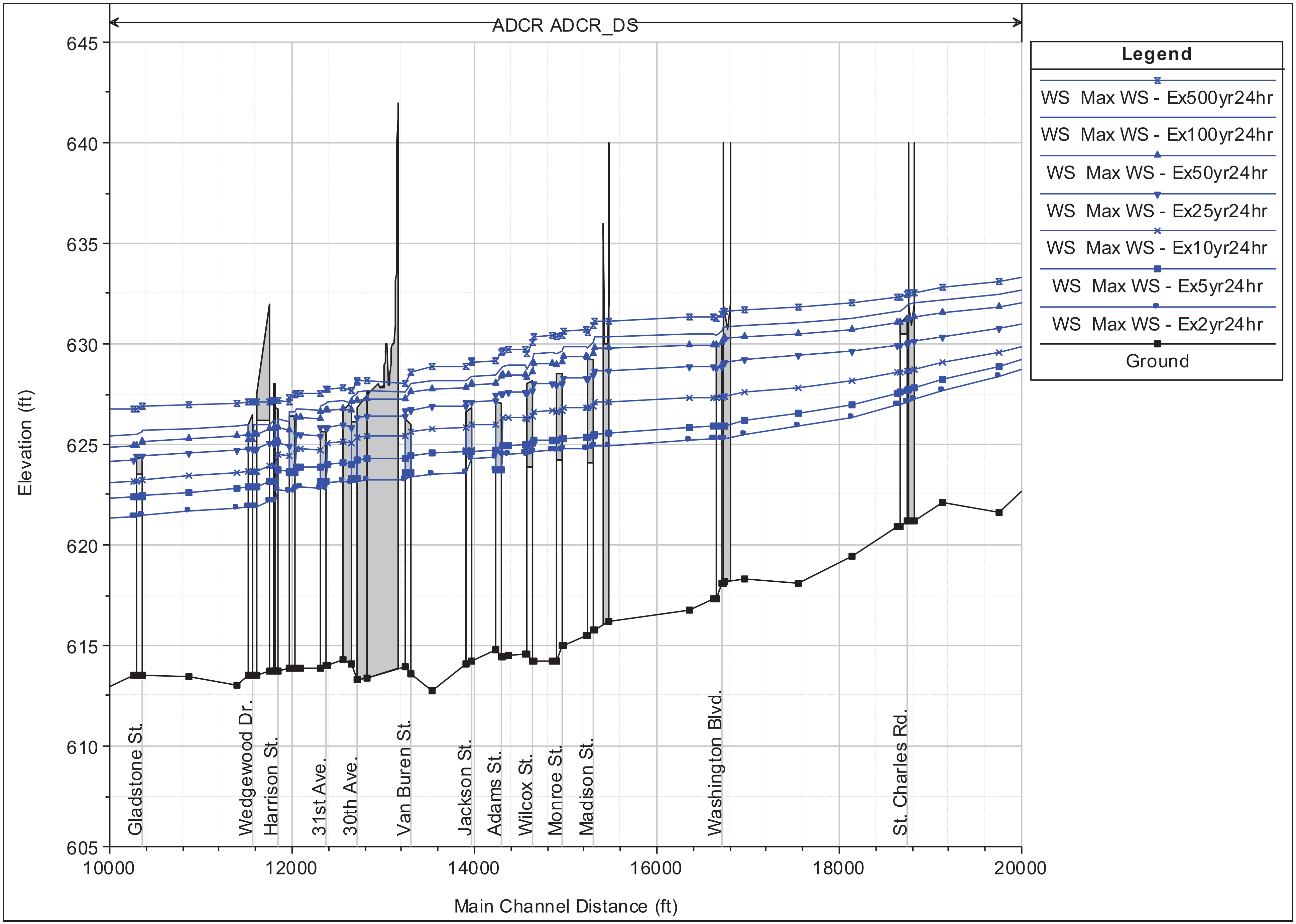


67th Street Ditch from Brainard Avenue to upstream study limit west of Sunset Avenue

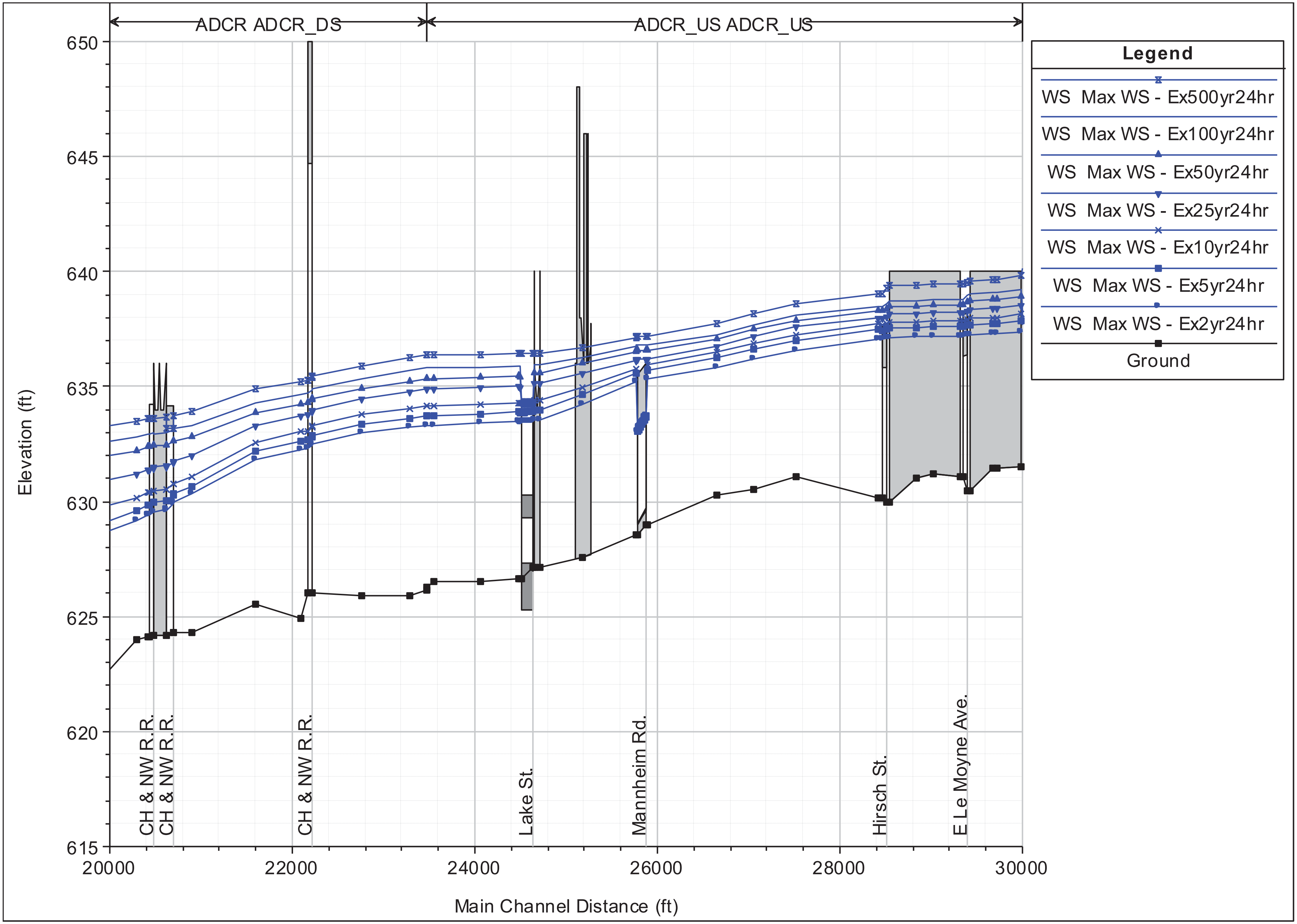
Addison Creek Subwatershed
Hydraulic Profiles for Existing Conditions



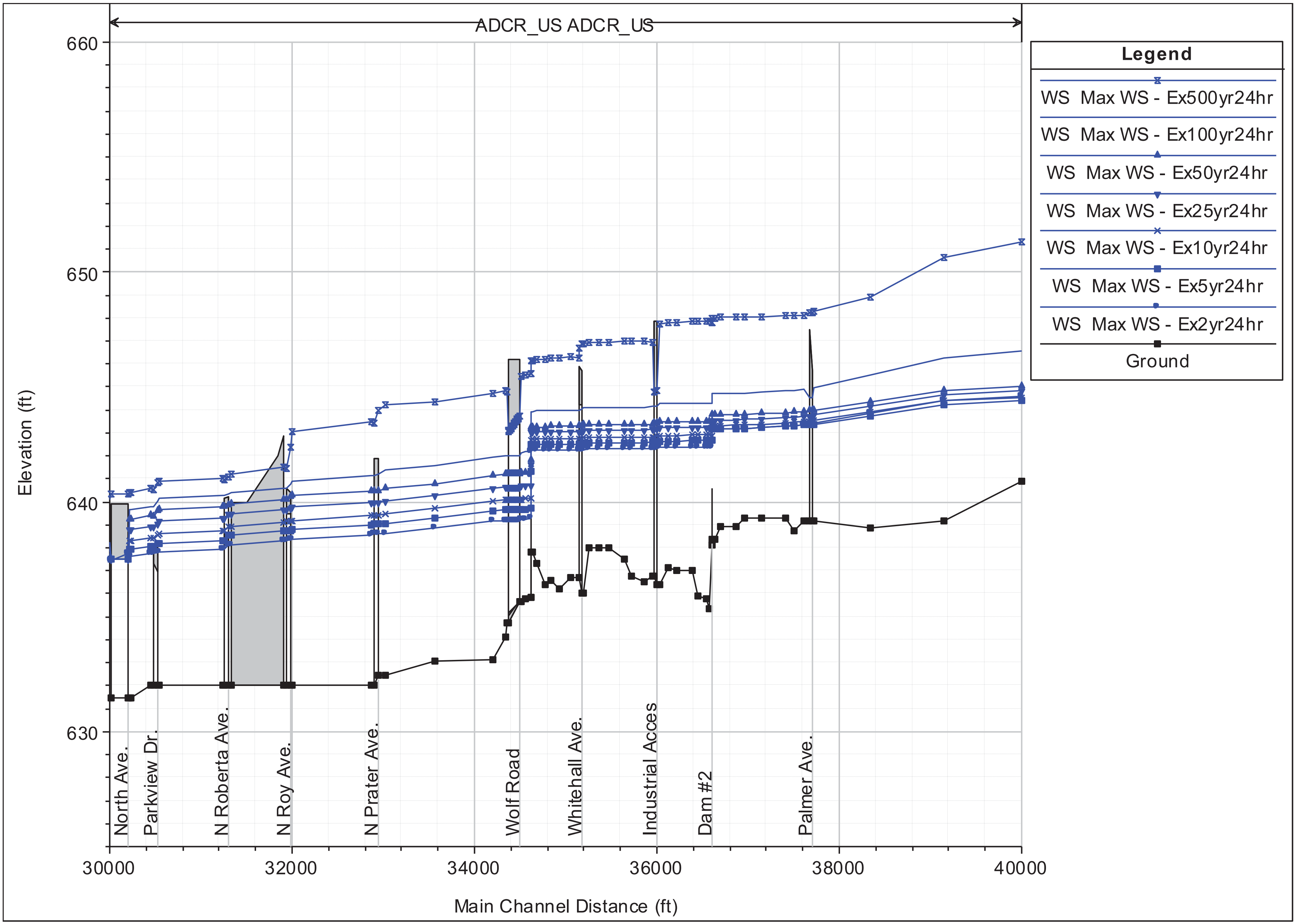
Addison Creek from confluence with Salt Creek to upstream of Roosevelt Road



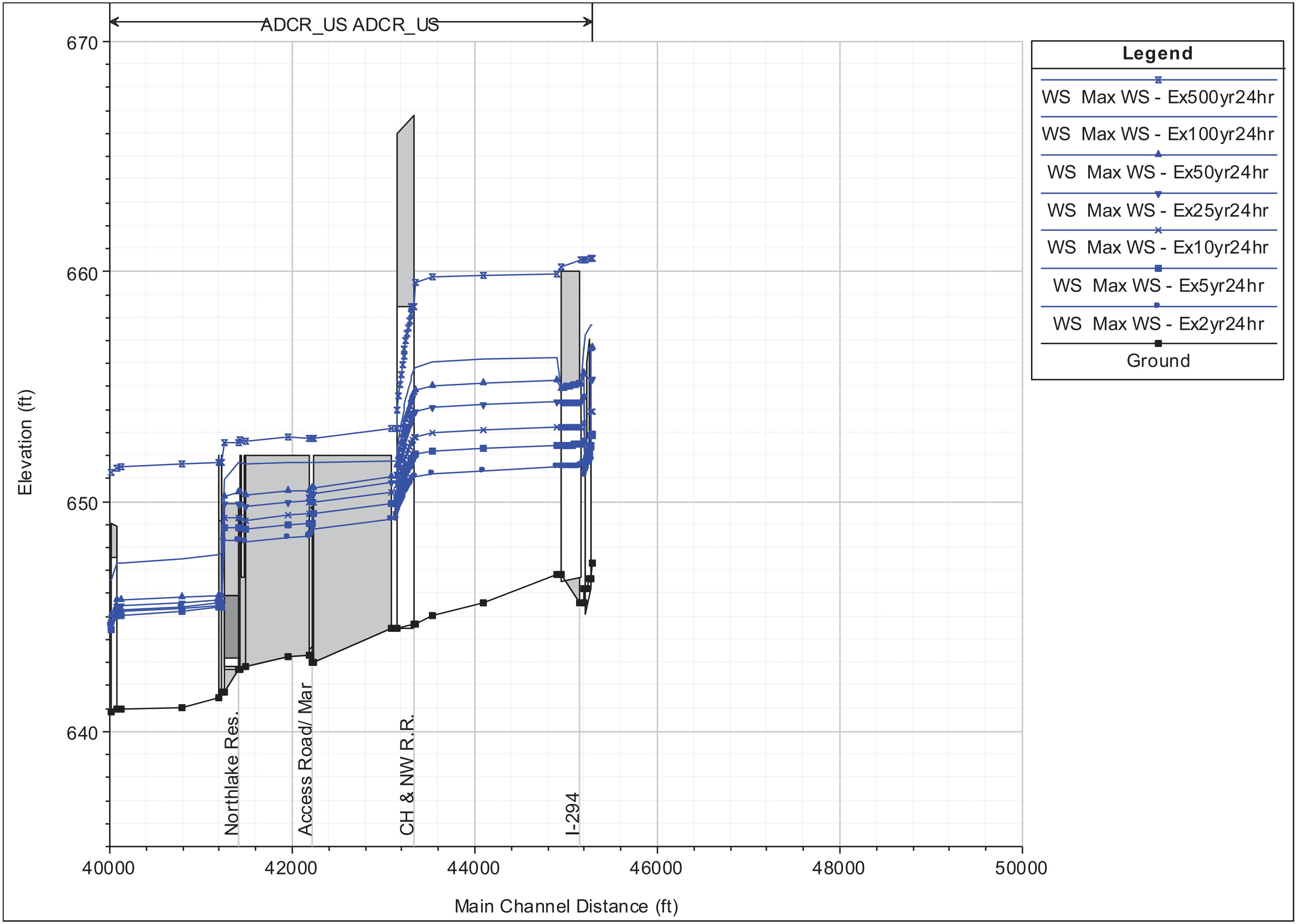
Addison Creek from downstream of Gladstone Street (upstream of Roosevelt Road) to upstream of St. Charles Road



Addison Creek from downstream of the CH&NW R.R. (upstream of St. Charles Road) to upstream of E Le Moyne Ave.

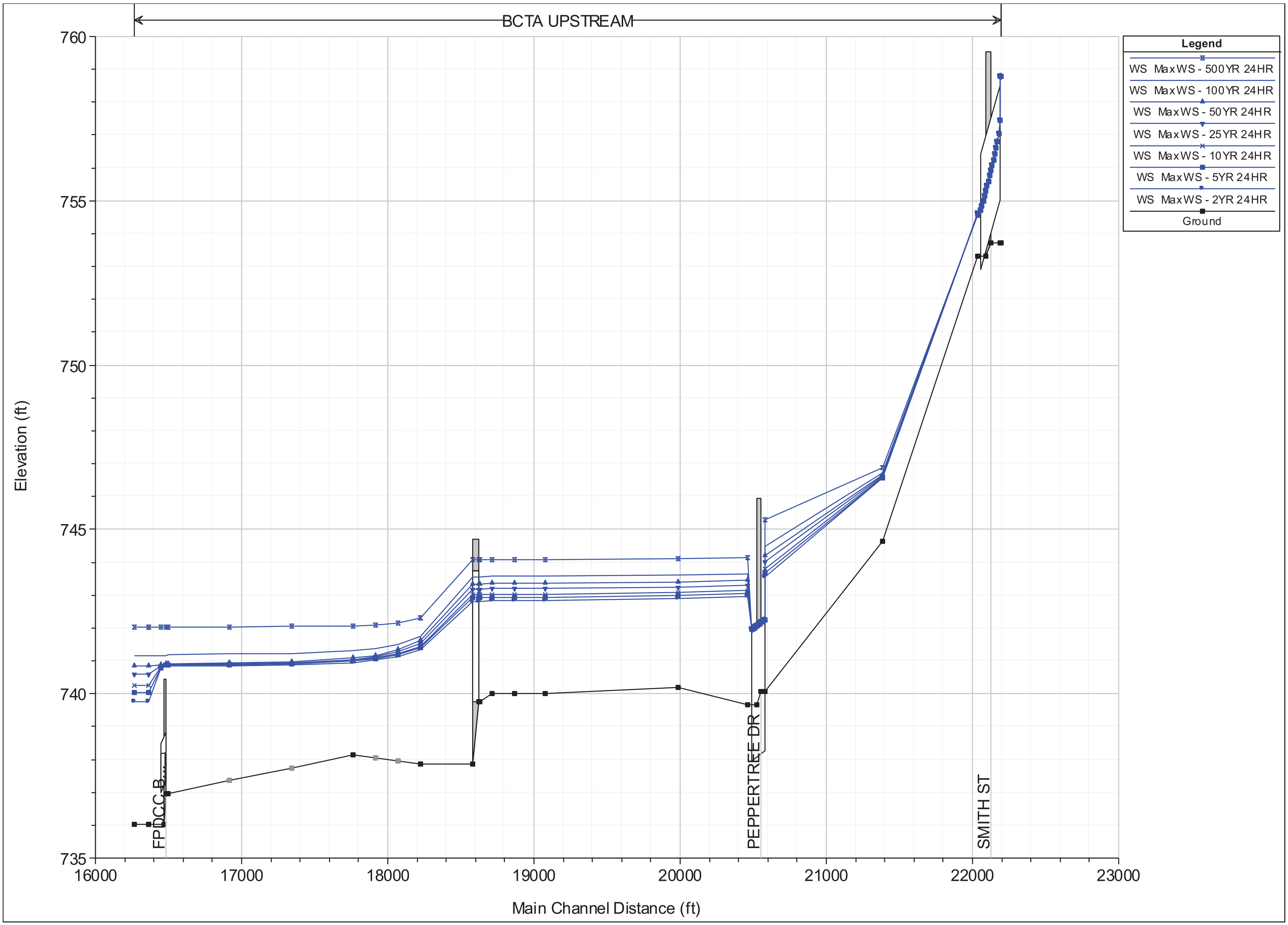


Addison Creek from downstream of North Ave. (upstream of E Le Moyne Ave.) to upstream of Palmer Ave.

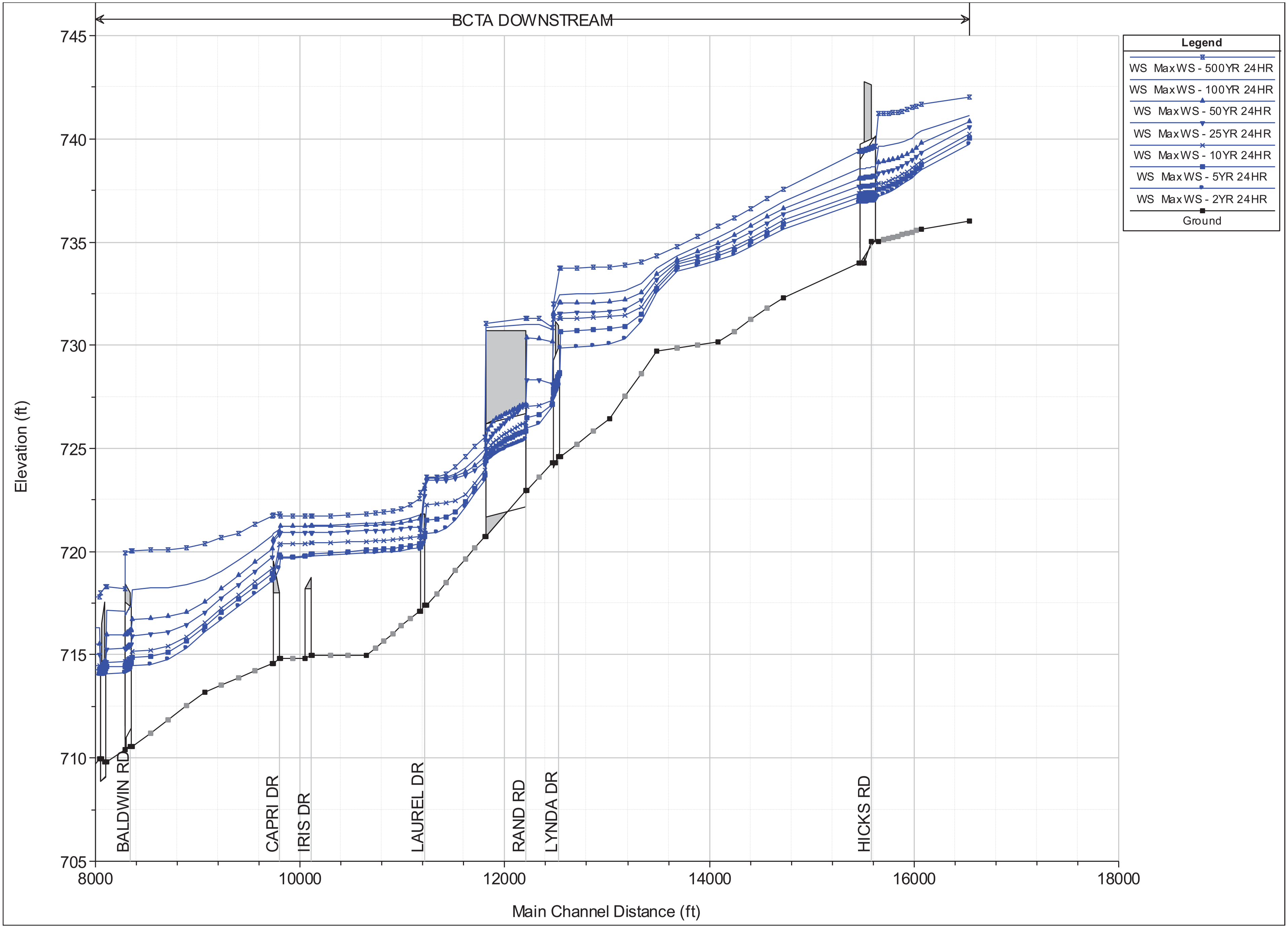


Addison Creek from downstream of King Arthur Drive (Fullerton Ave.) to upstream study limit at County Line Road

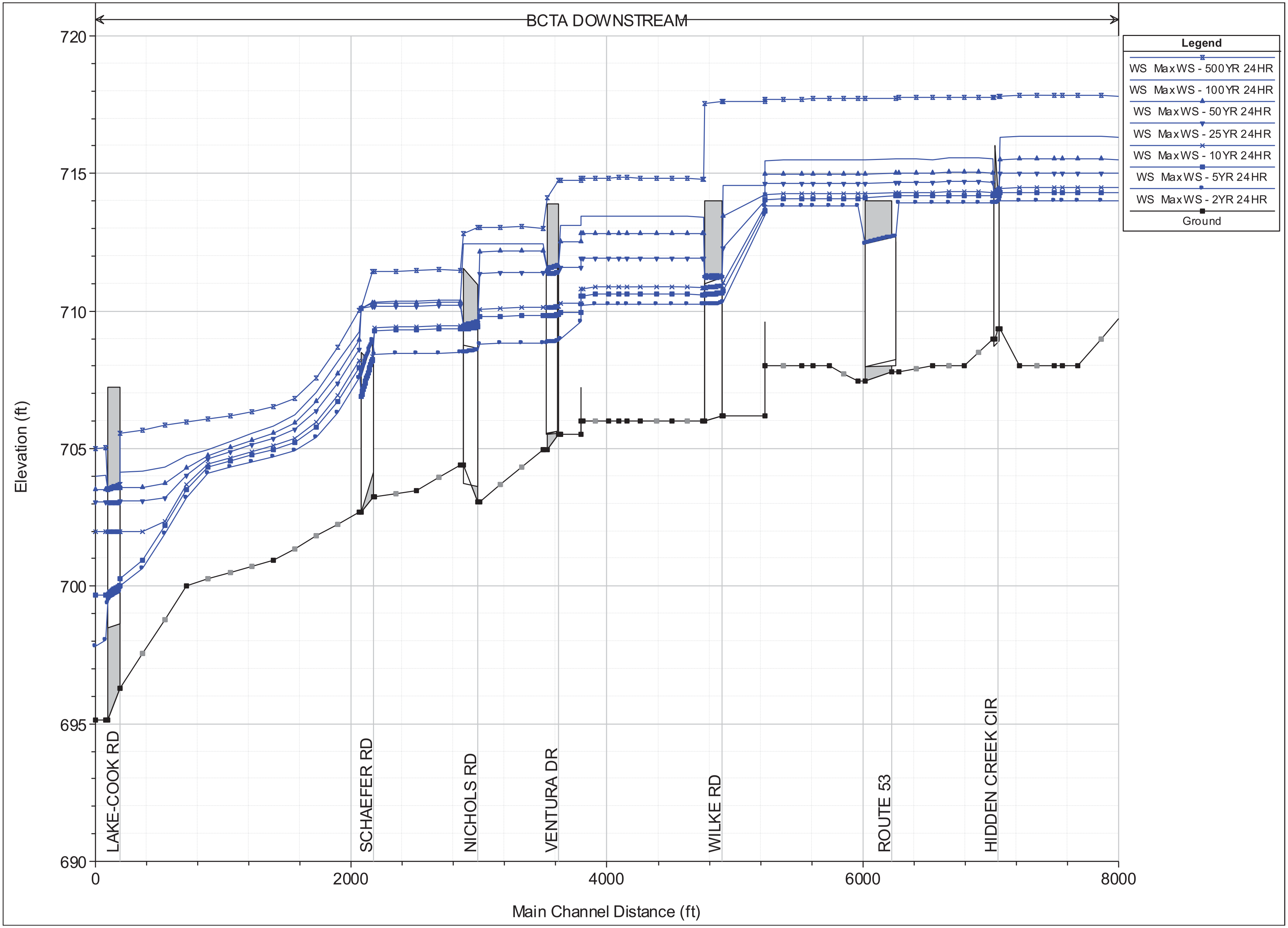
Buffalo Creek Subwatershed
Hydraulic Profiles for Existing Conditions



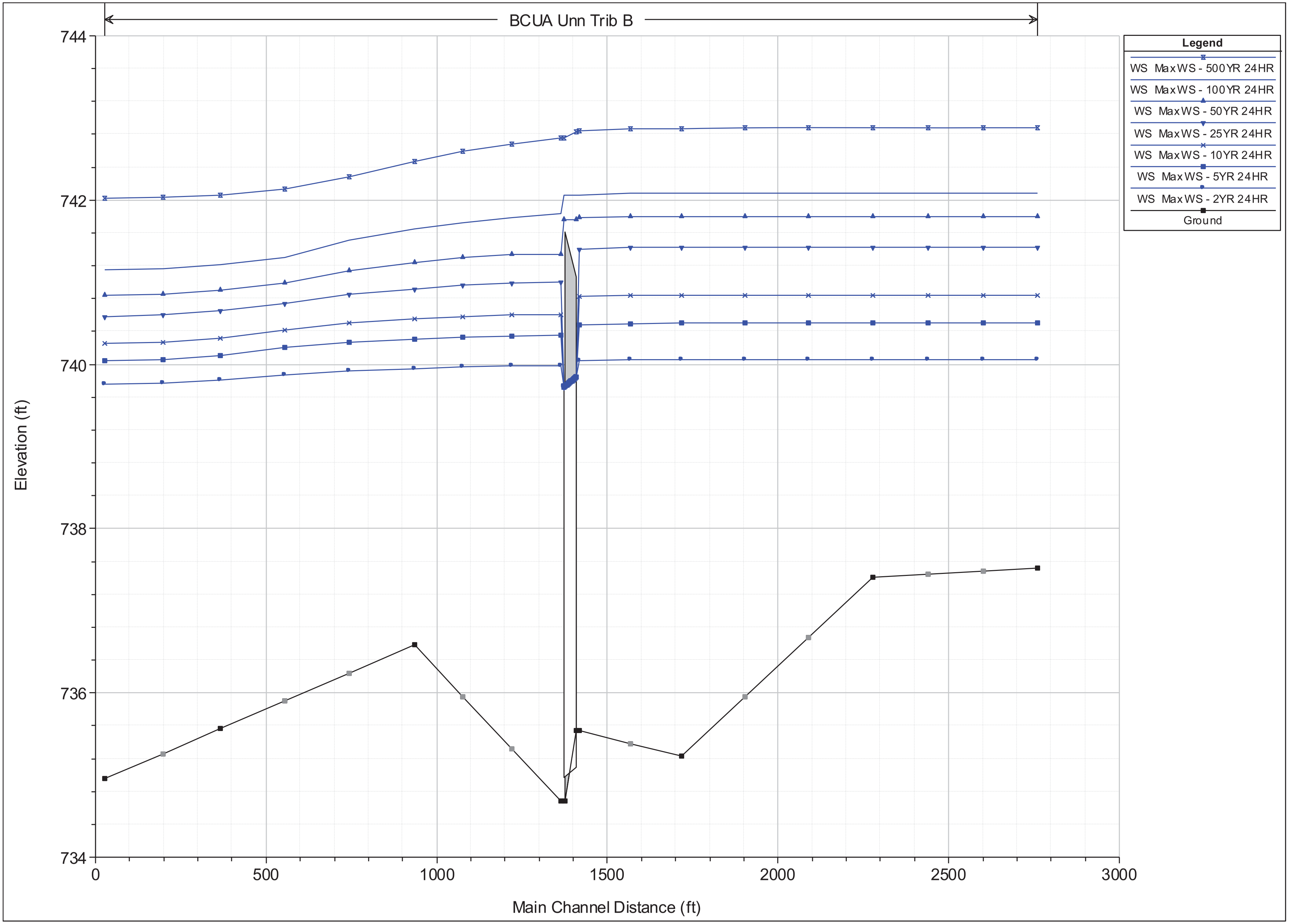
Buffalo Creek Tributary A from Salt Creek Arlington Heights Branch to the confluence with Buffalo Creek Tributary B



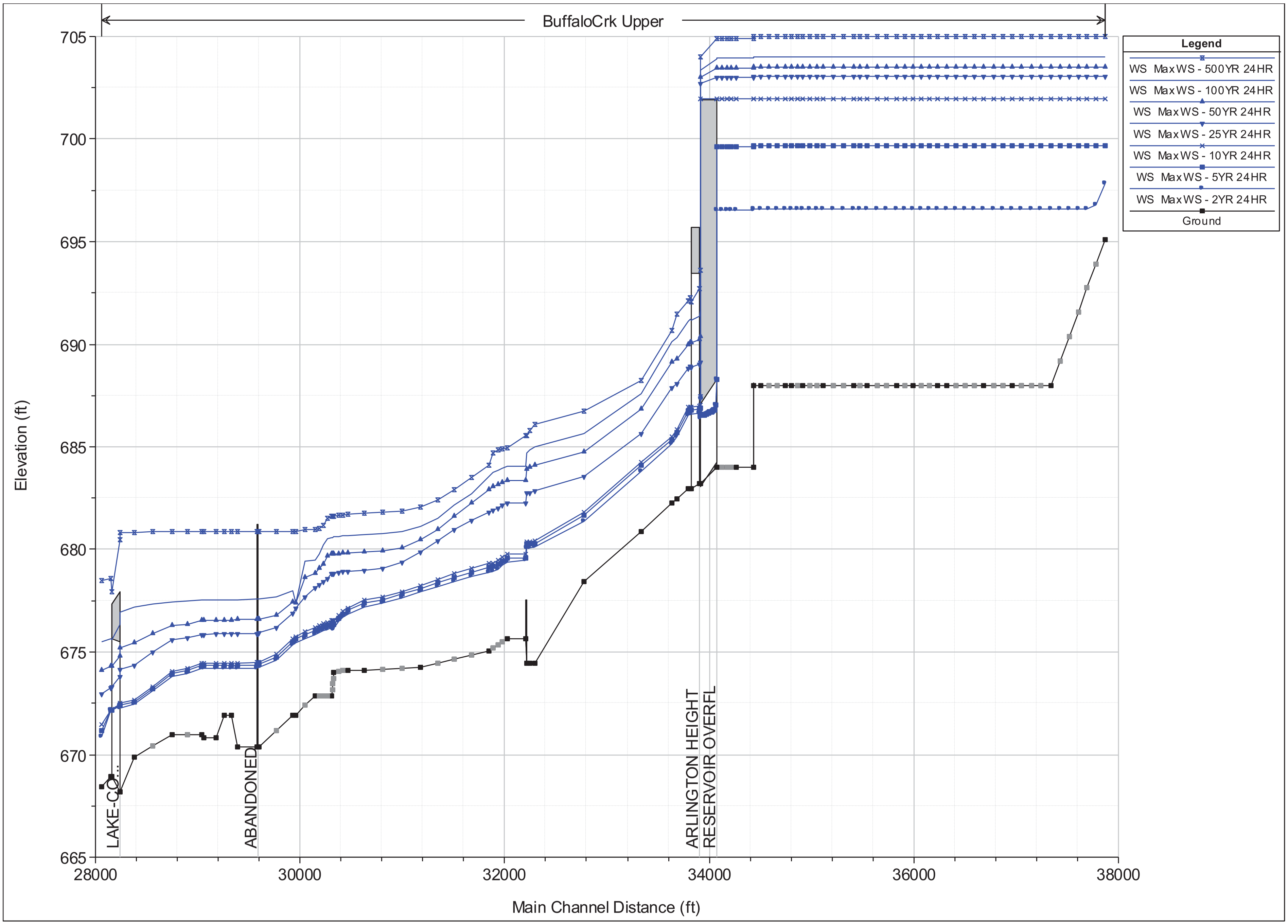
Buffalo Creek Tributary A from the confluence with Buffalo Creek Tributary B to downstream of Baldwin Road



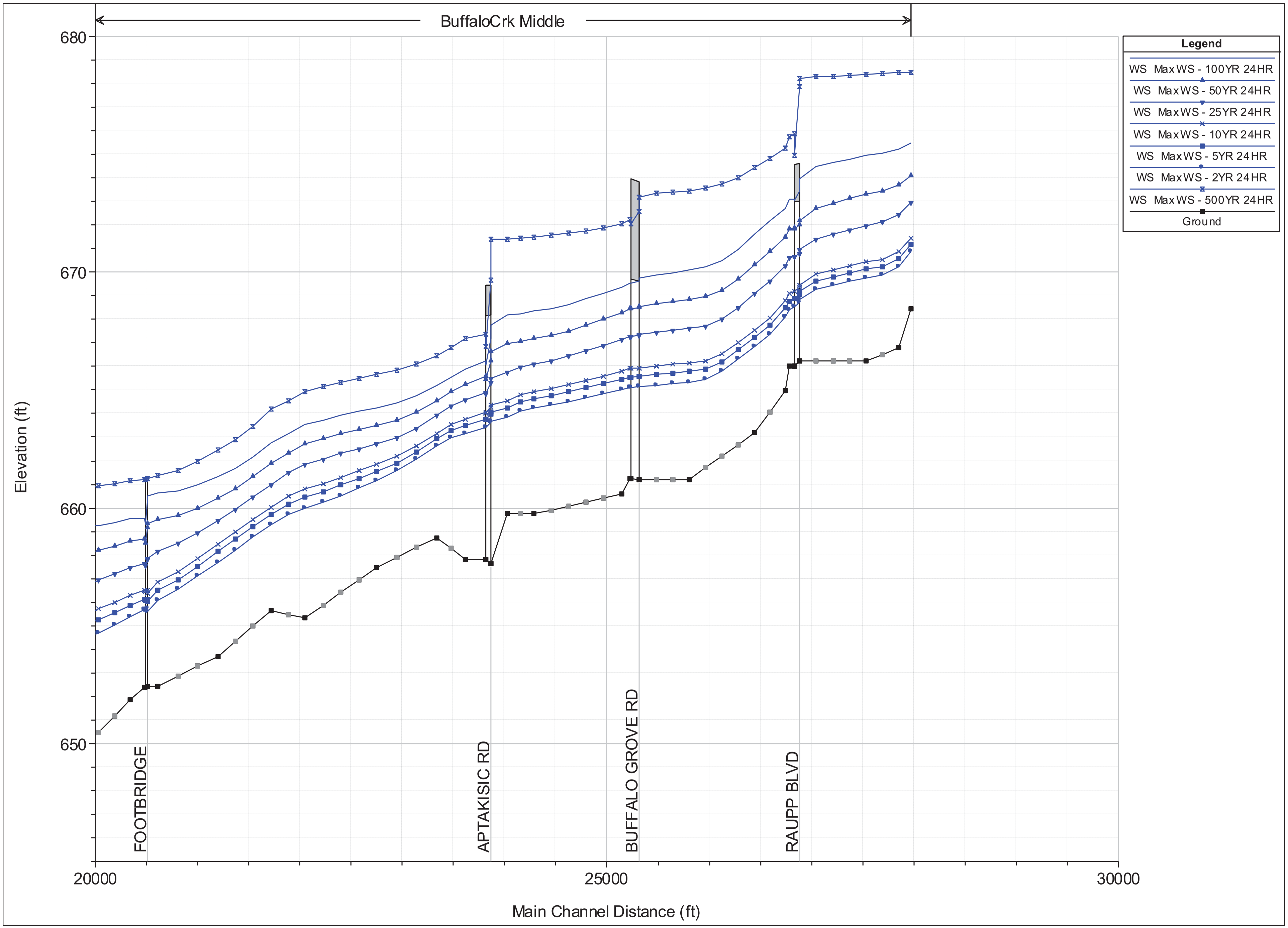
Buffalo Creek Tributary A from downstream of Baldwin Road to the Buffalo Creek Reservoir



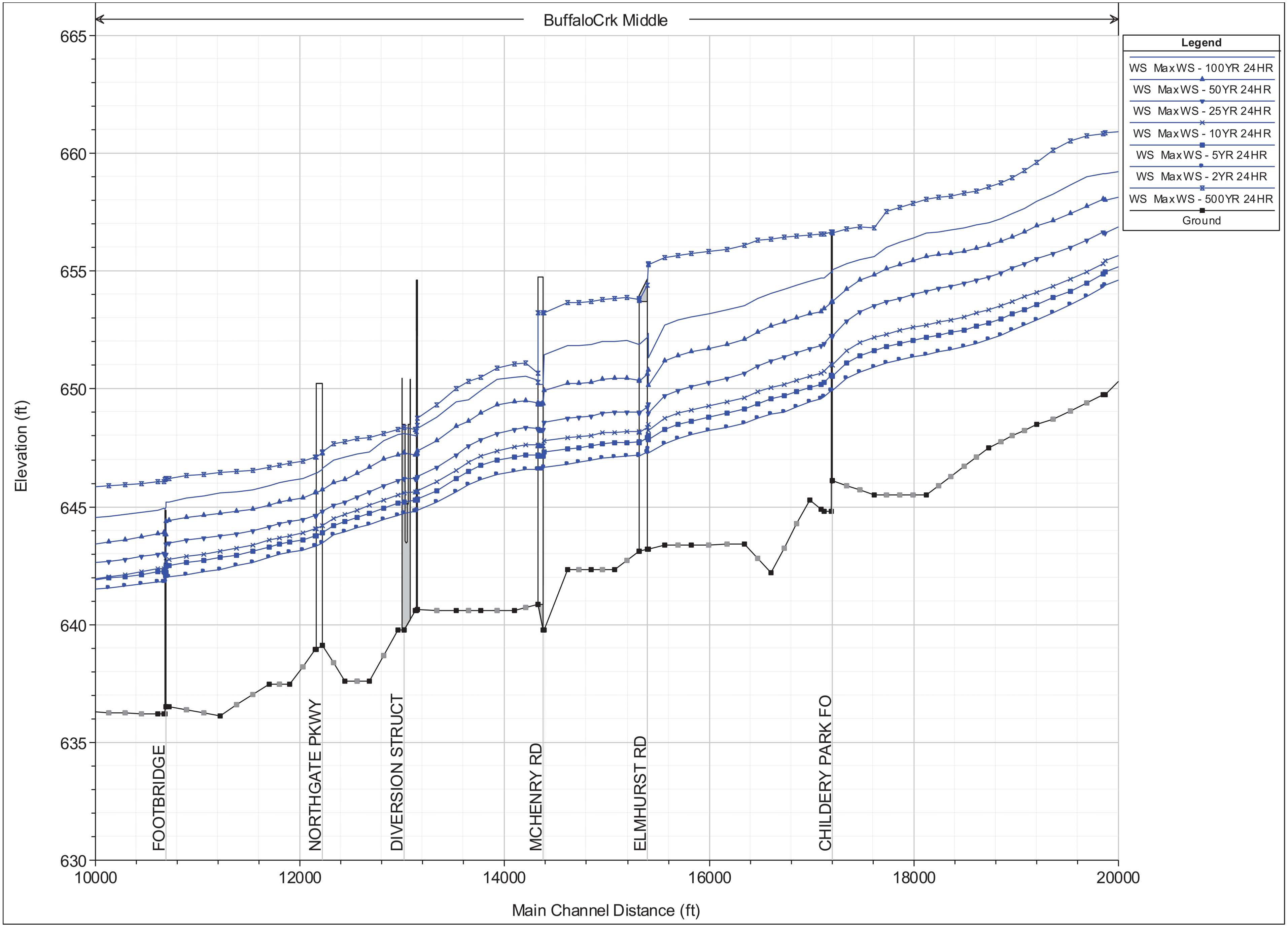
Buffalo Creek Tributary B to the confluence with Buffalo Creek Tributary A



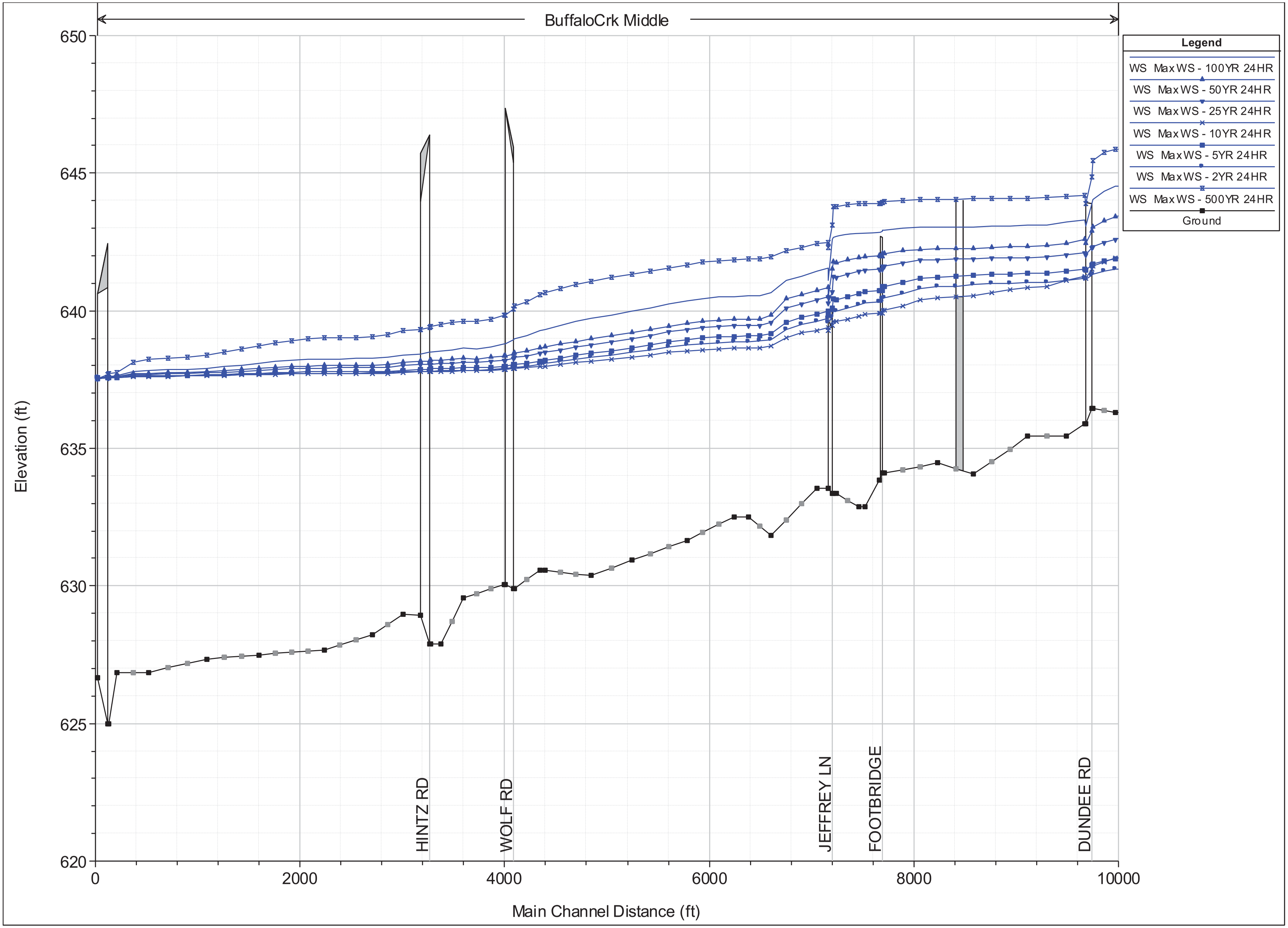
Buffalo Creek from Buffalo Creek Reservoir to Lake-Cook Road



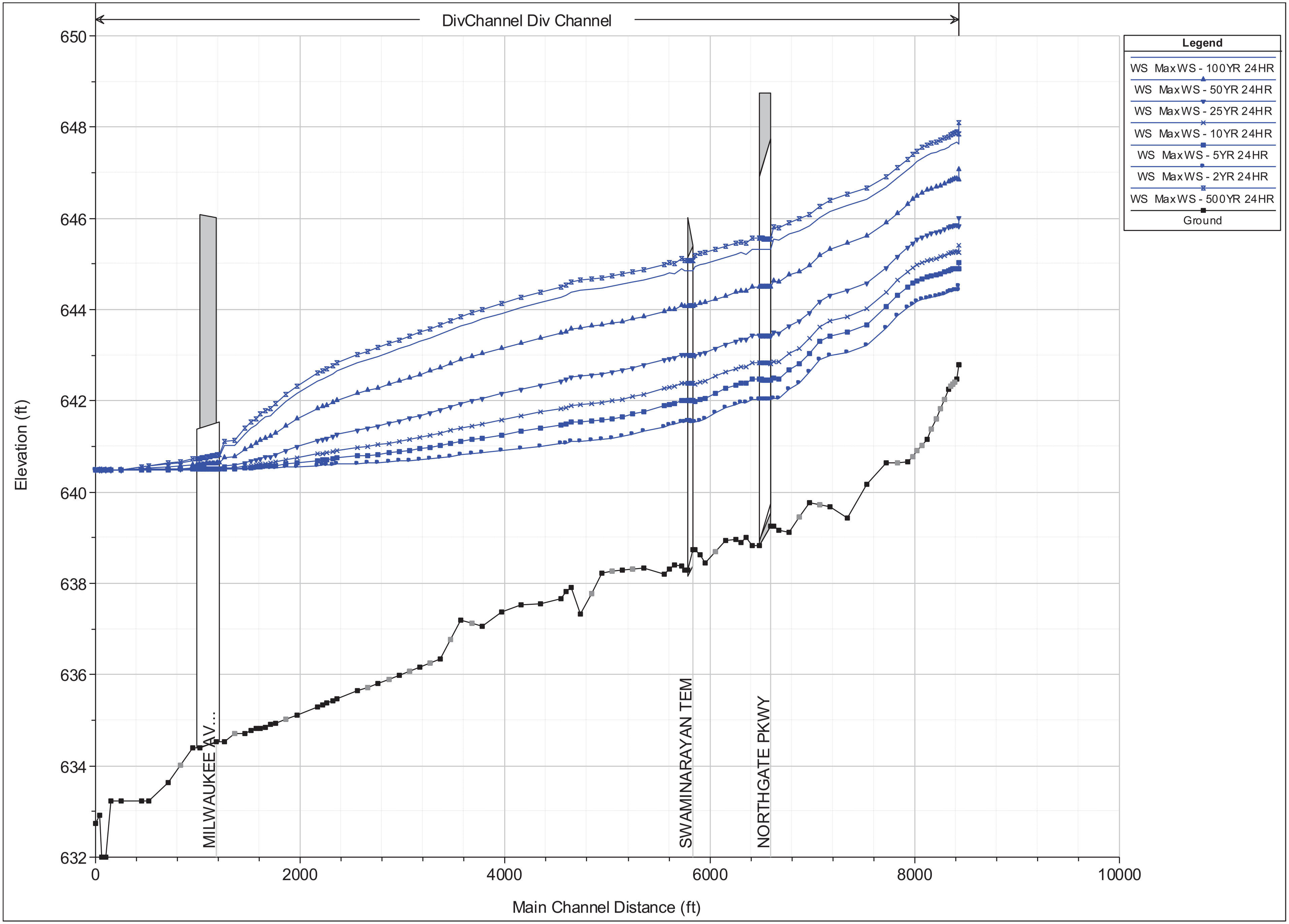
Buffalo Creek from Lake-Cook Road to the downstream of Arlington Club Footbridge



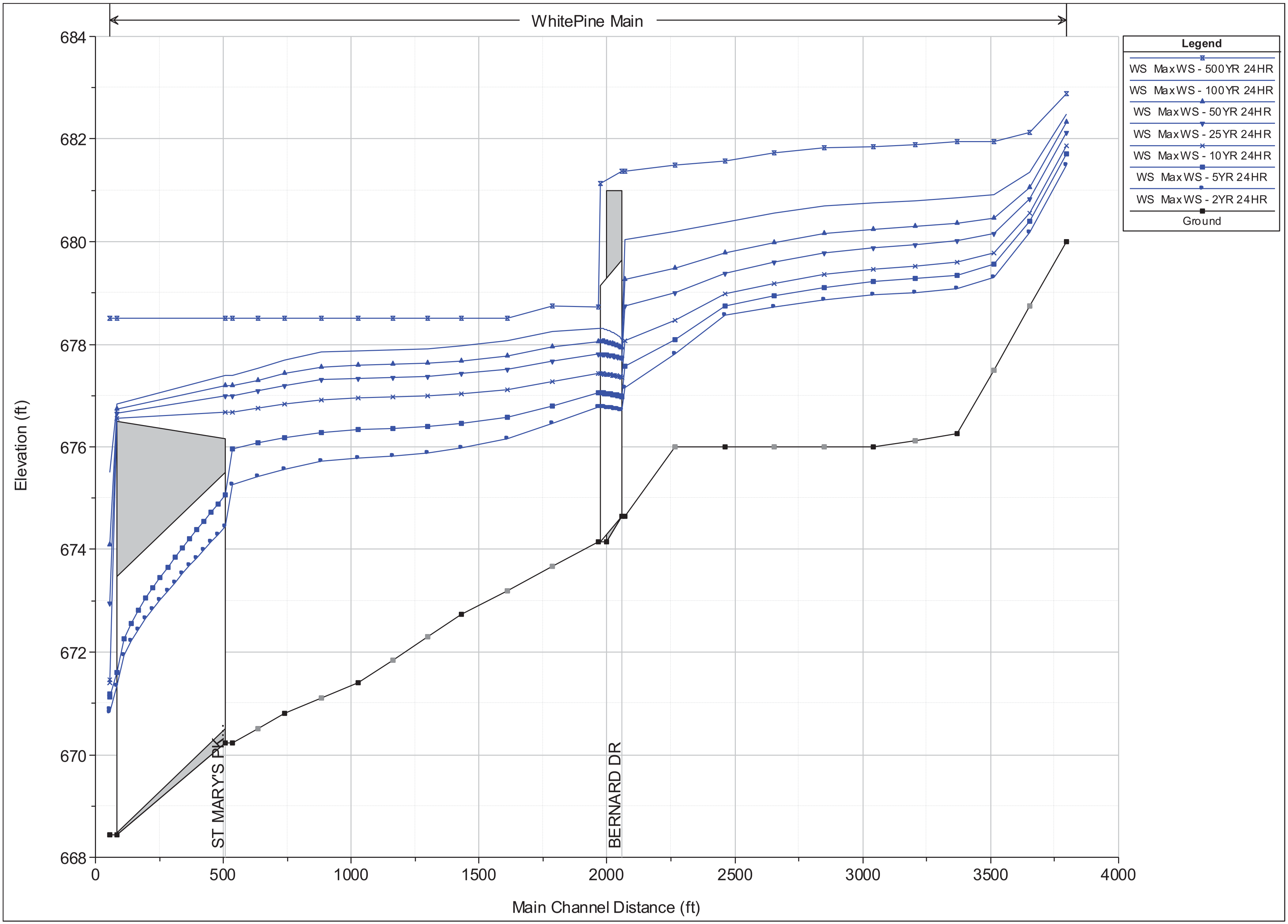
Buffalo Creek from downstream of Arlington Club Footbridge to downstream of Hawthorne School Footbridge



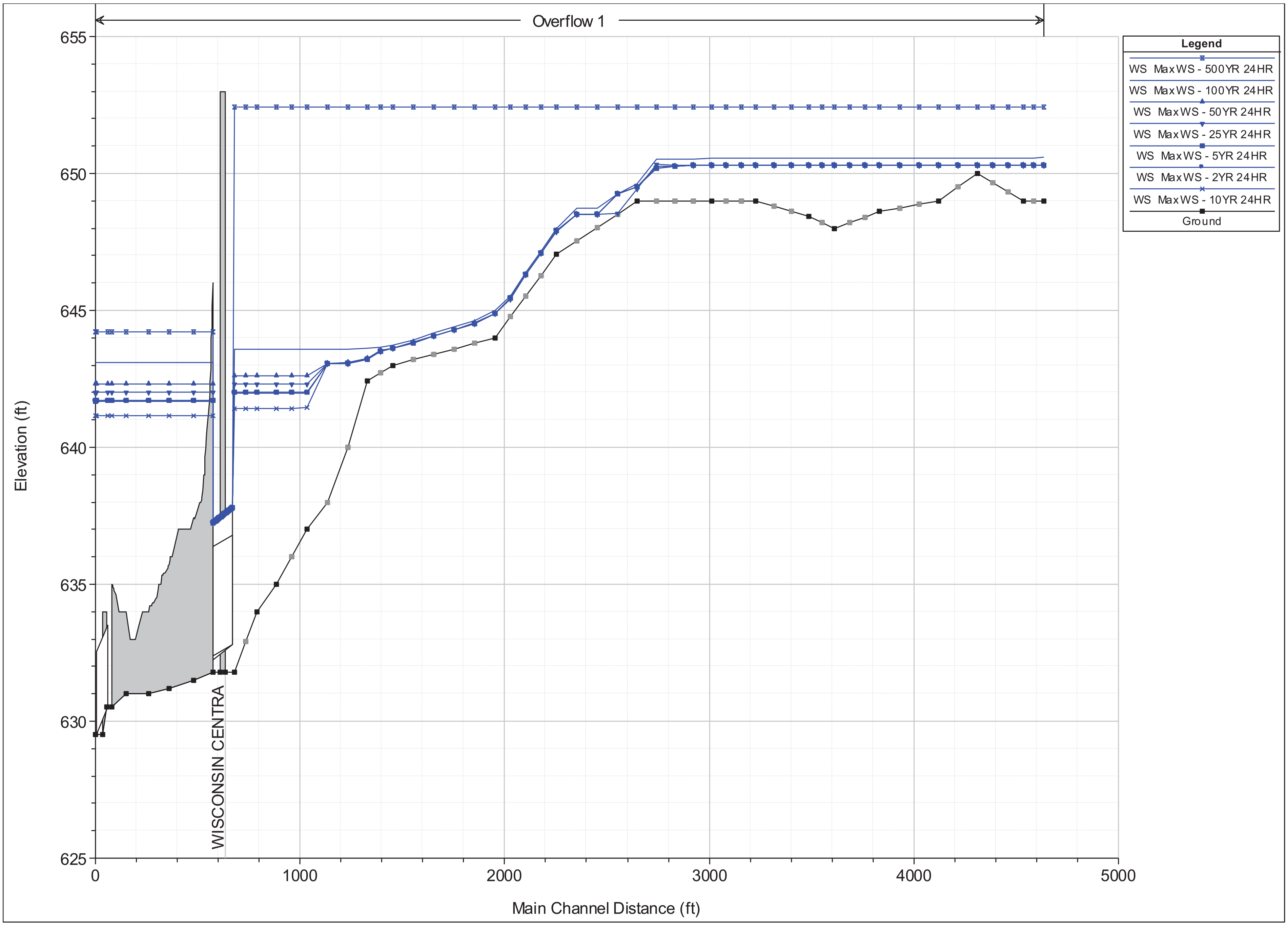
Buffalo Creek from downstream of Hawthorne School Footbridge to the confluence with the Des Plaines River



William Rogers Memorial Diversion Channel from the Buffalo Creek to the Des Plaines River

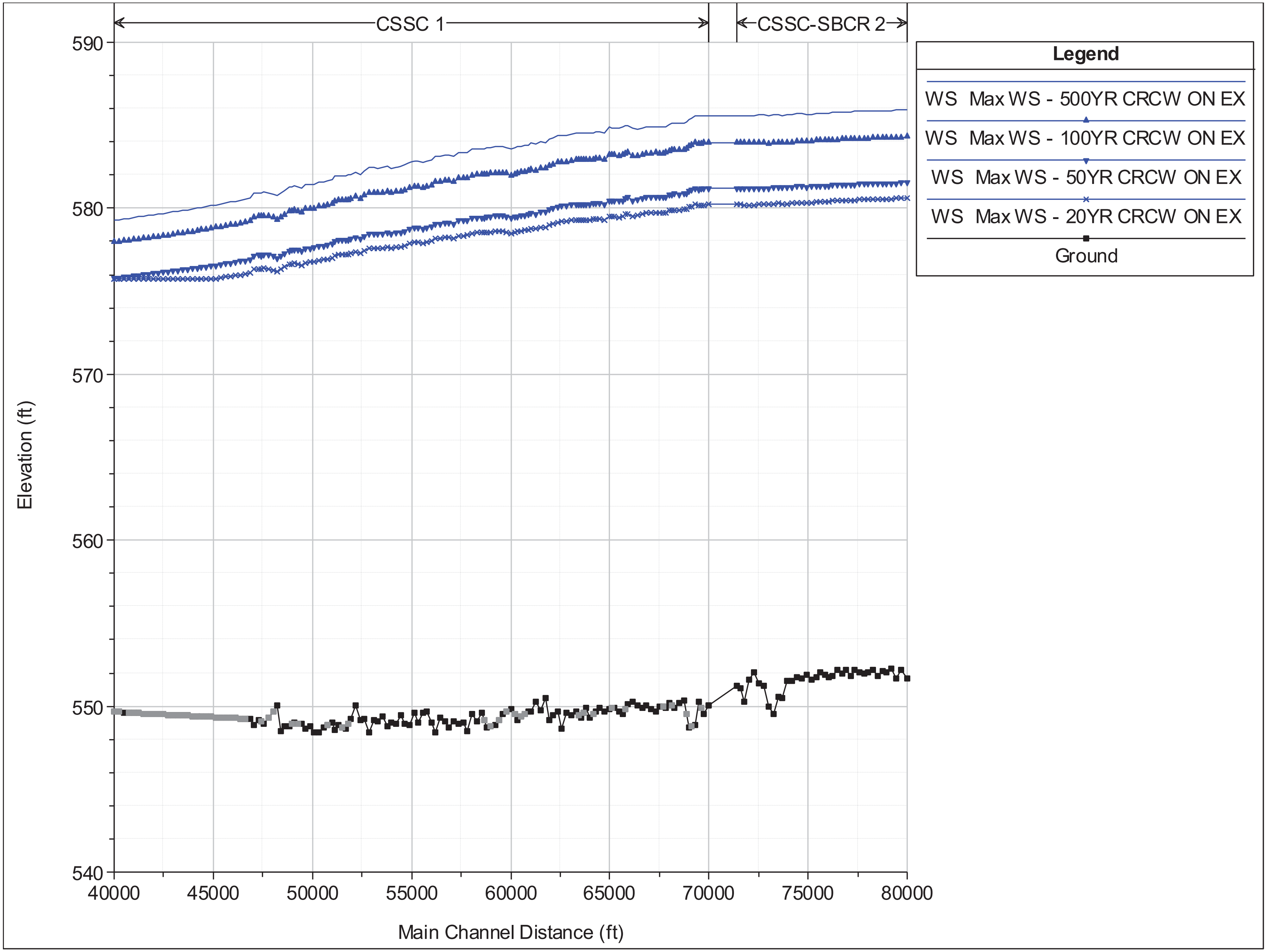


White Pine Ditch from Lion's Park to Buffalo Creek

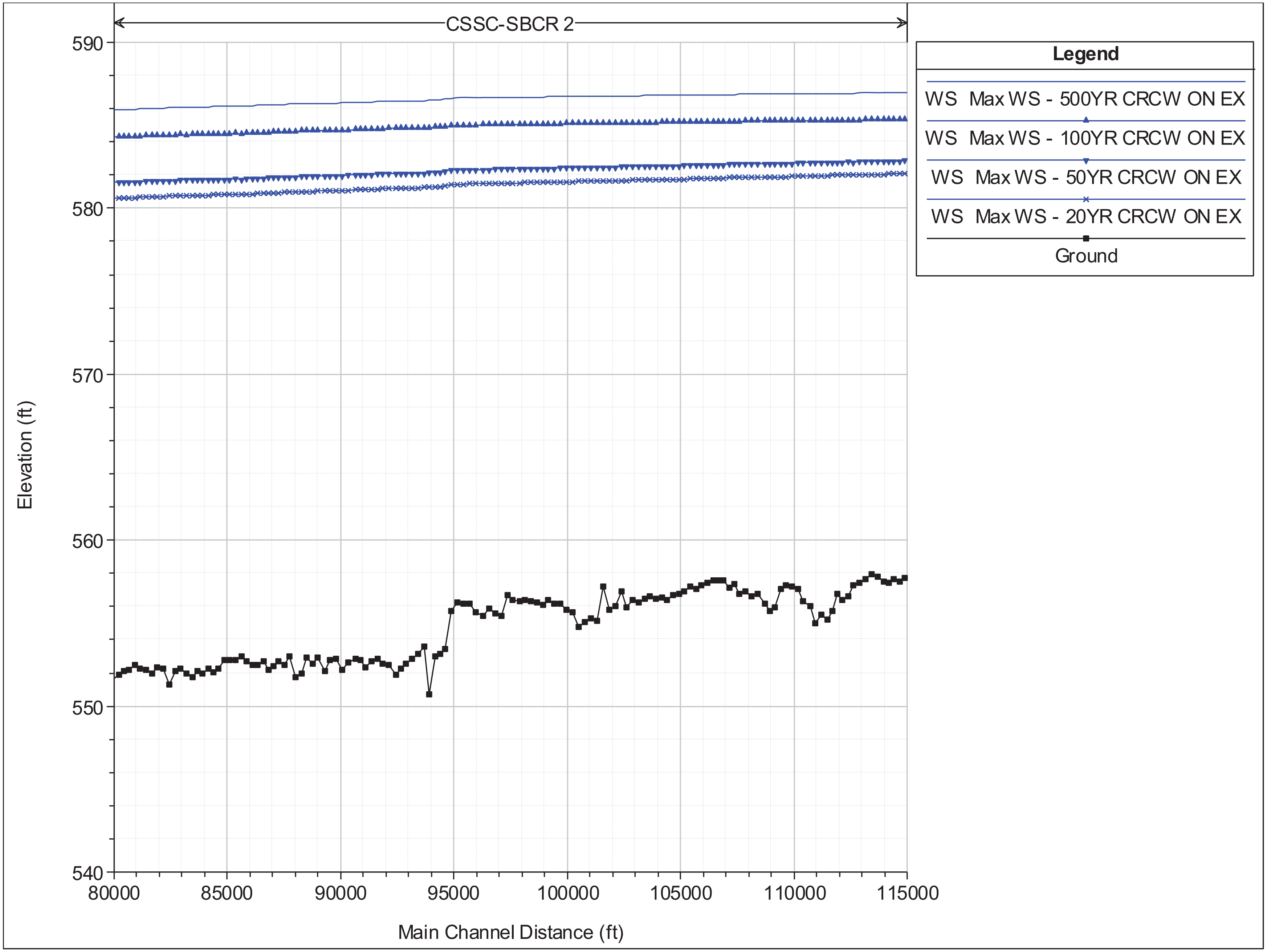


Overflow from Buffalo Creek to Heritage Park

Chicago Sanitary and Ship Canal Subwatershed
Hydraulic Profiles for Existing Conditions

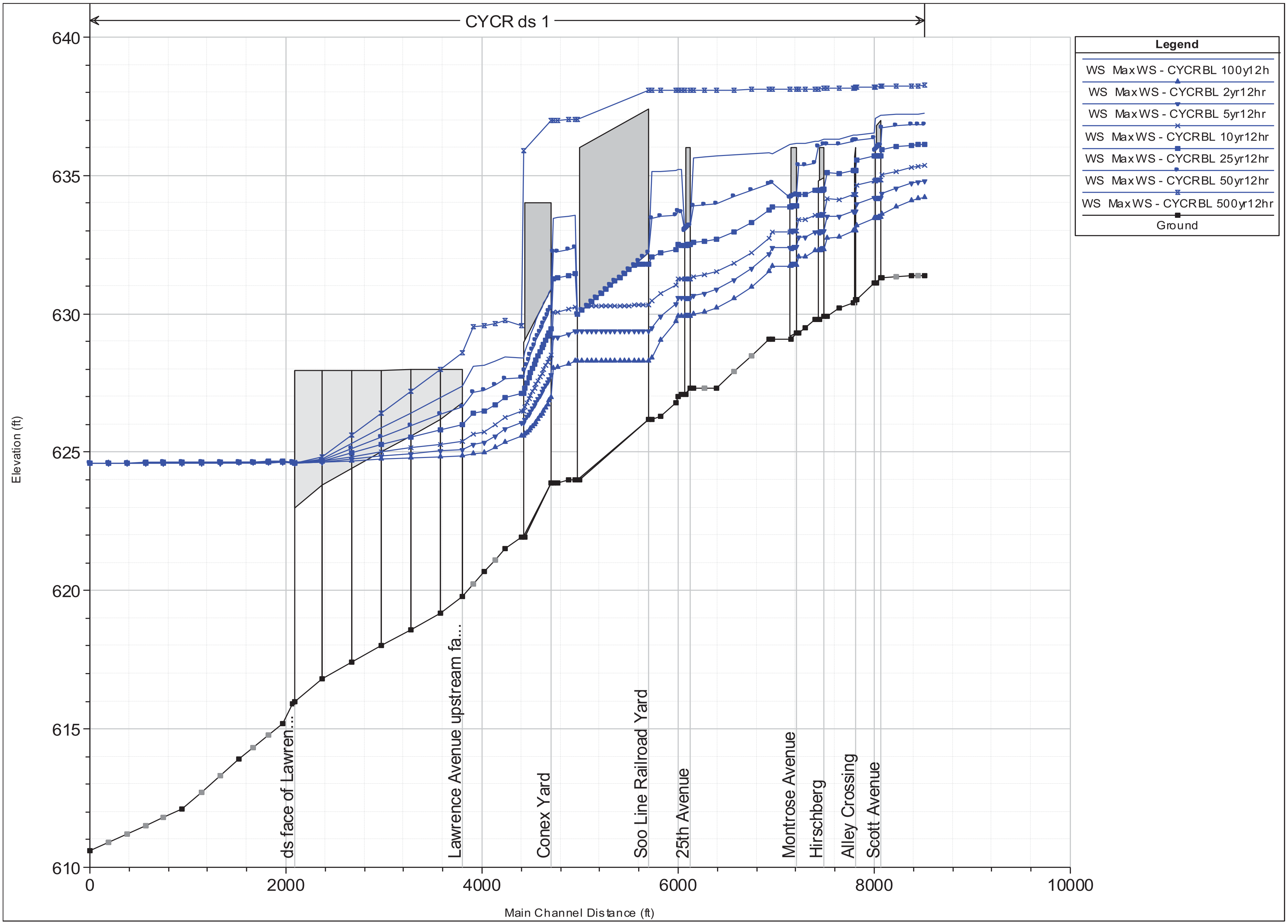


Chicago Sanitary and Ship Canal from downstream of the Will County boundary continuing upstream 40,000 feet to upstream of the confluence with the Calumet Sag Channel

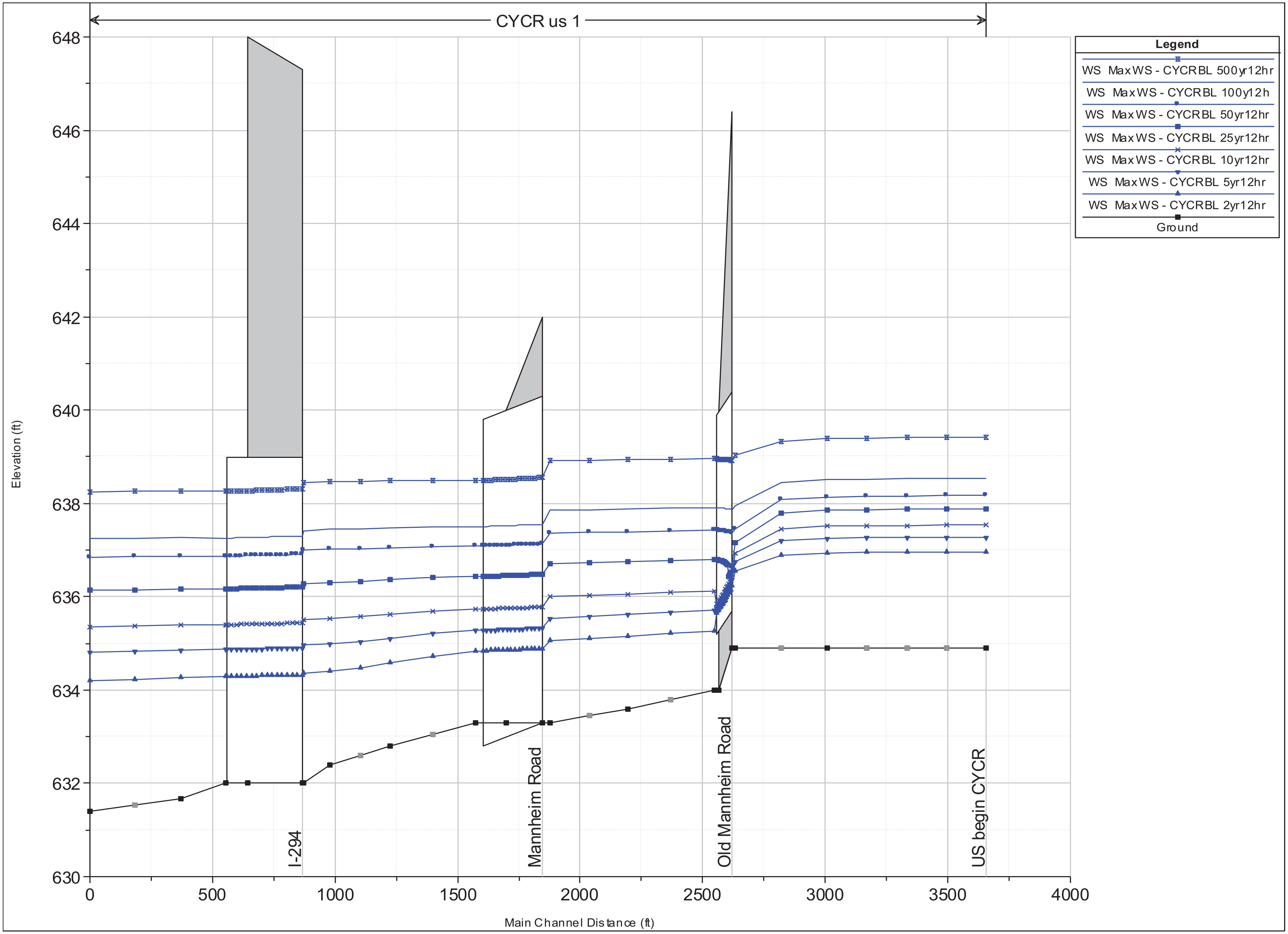


Chicago Sanitary and Ship Canal from upstream of the confluence with the Calumet Sag Channel to approximately Harlem Avenue

Crystal Creek Subwatershed
Hydraulic Profiles for Existing Conditions

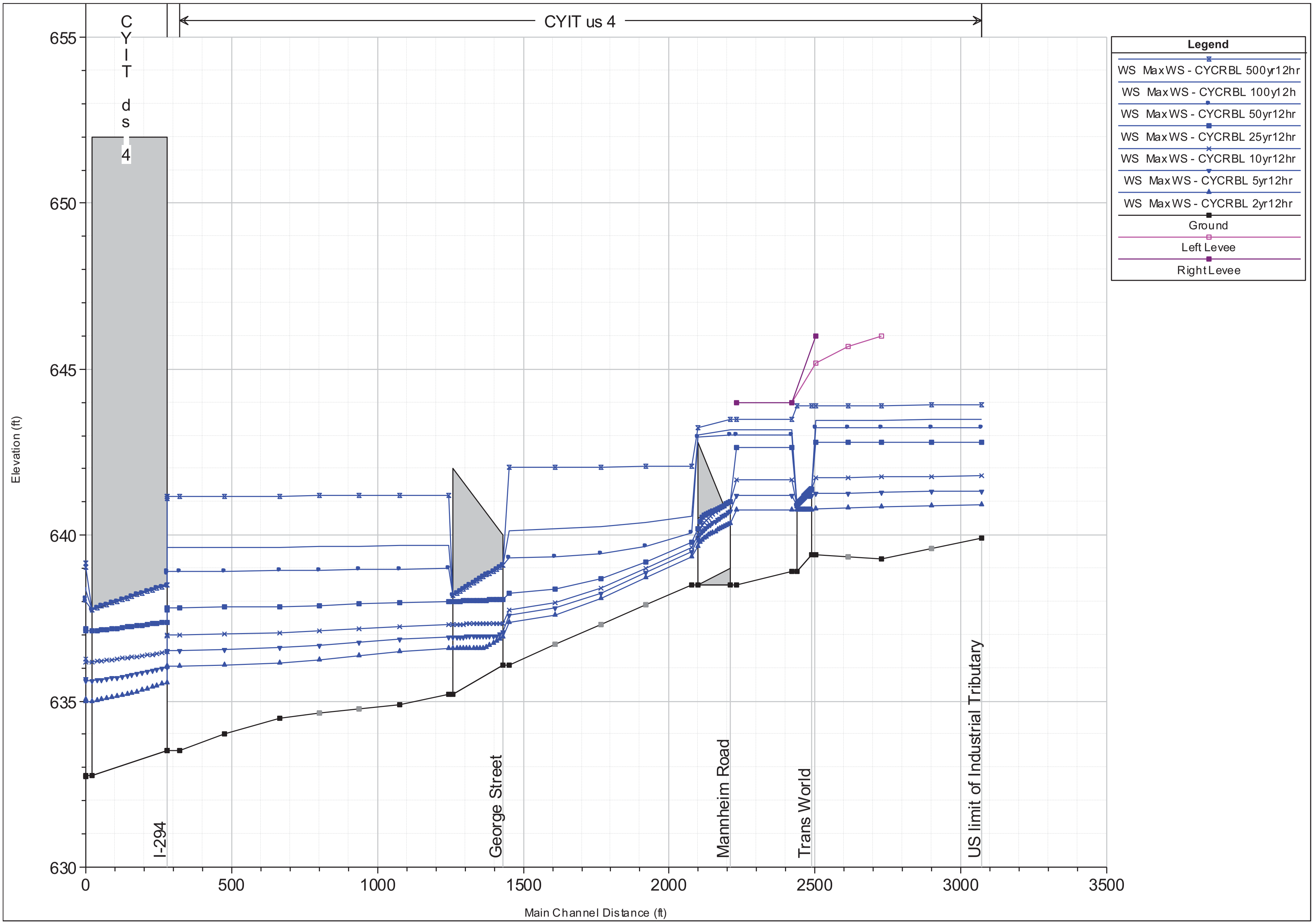


Crystal Creek from confluence with Des Plaines River to confluence with Crystal Creek Tributary

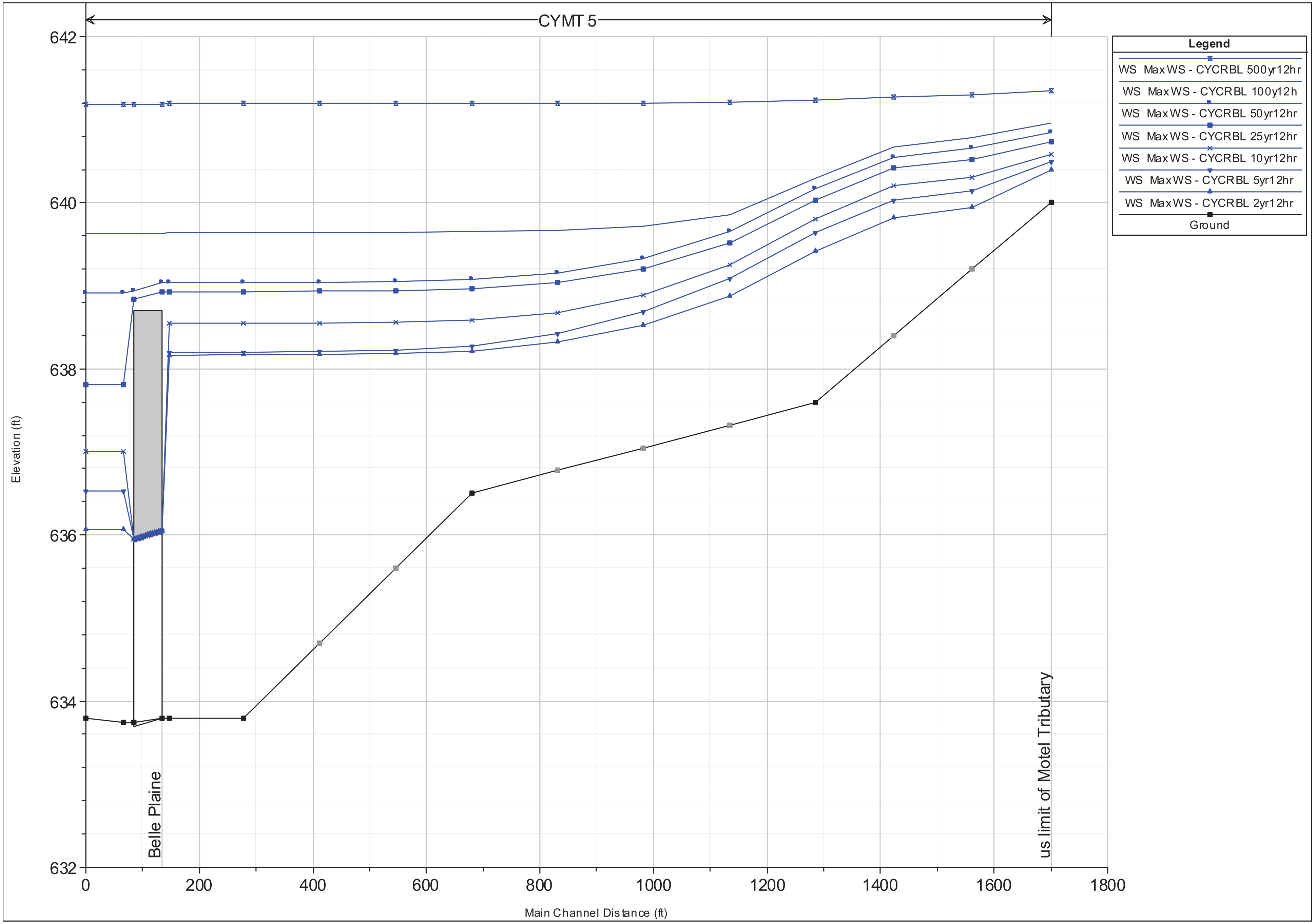


Crystal

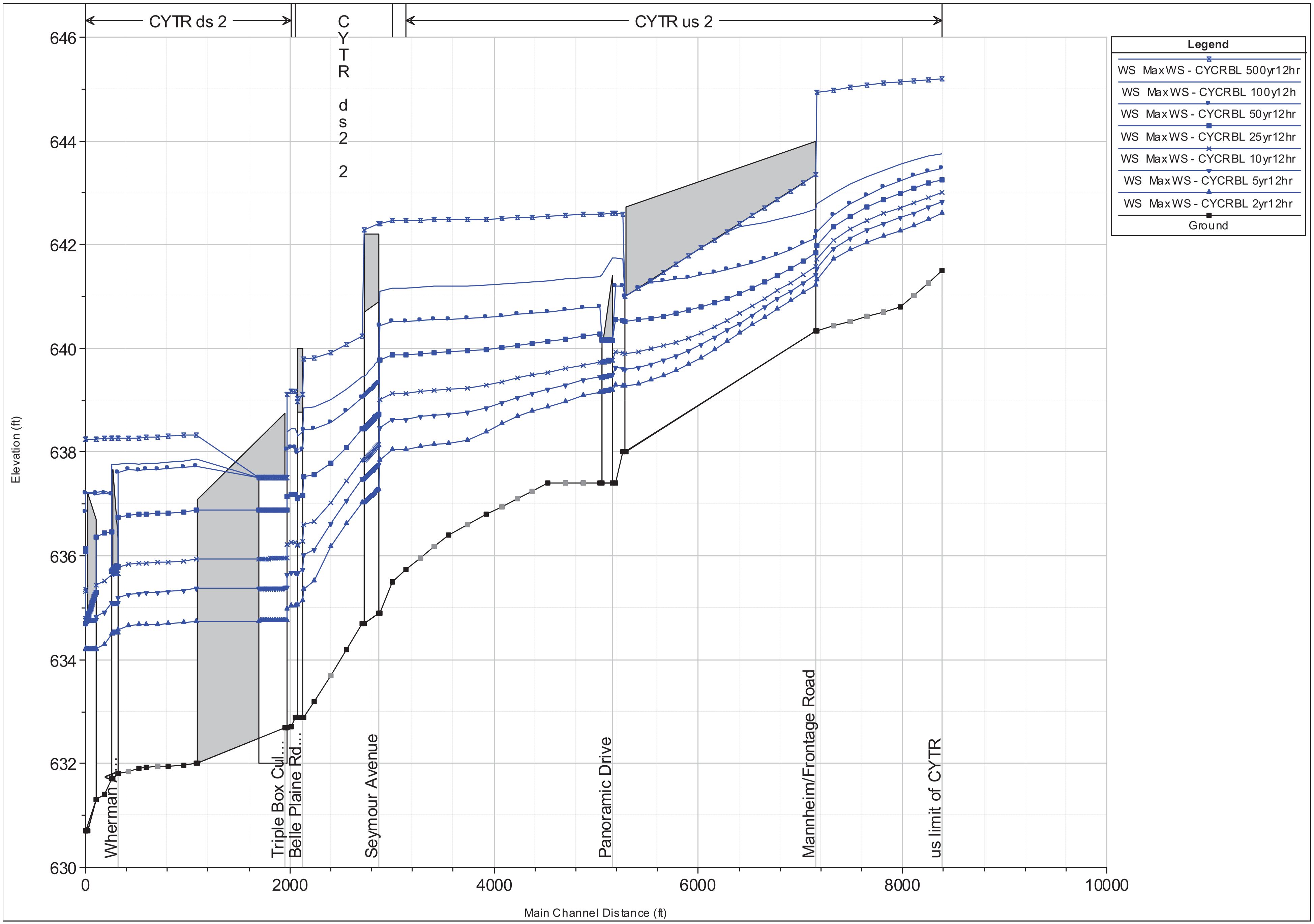
Creek from confluence with Crystal Creek Tributary to upstream limit of study



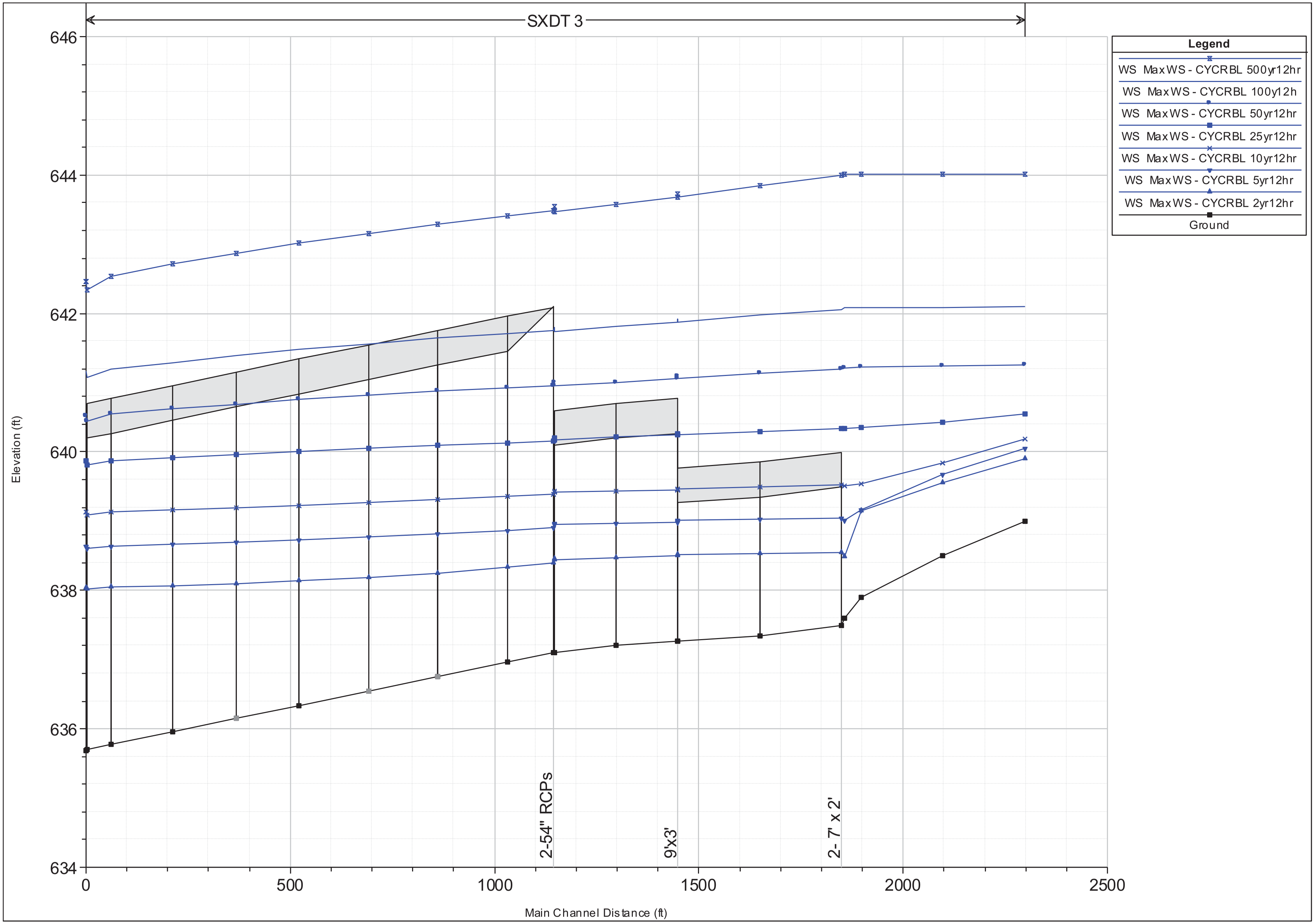
Industrial Tributary from confluence with Crystal Creek Tributary to upstream limit of study



Motel Tributary from confluence with Industrial Tributary to upstream limit of study

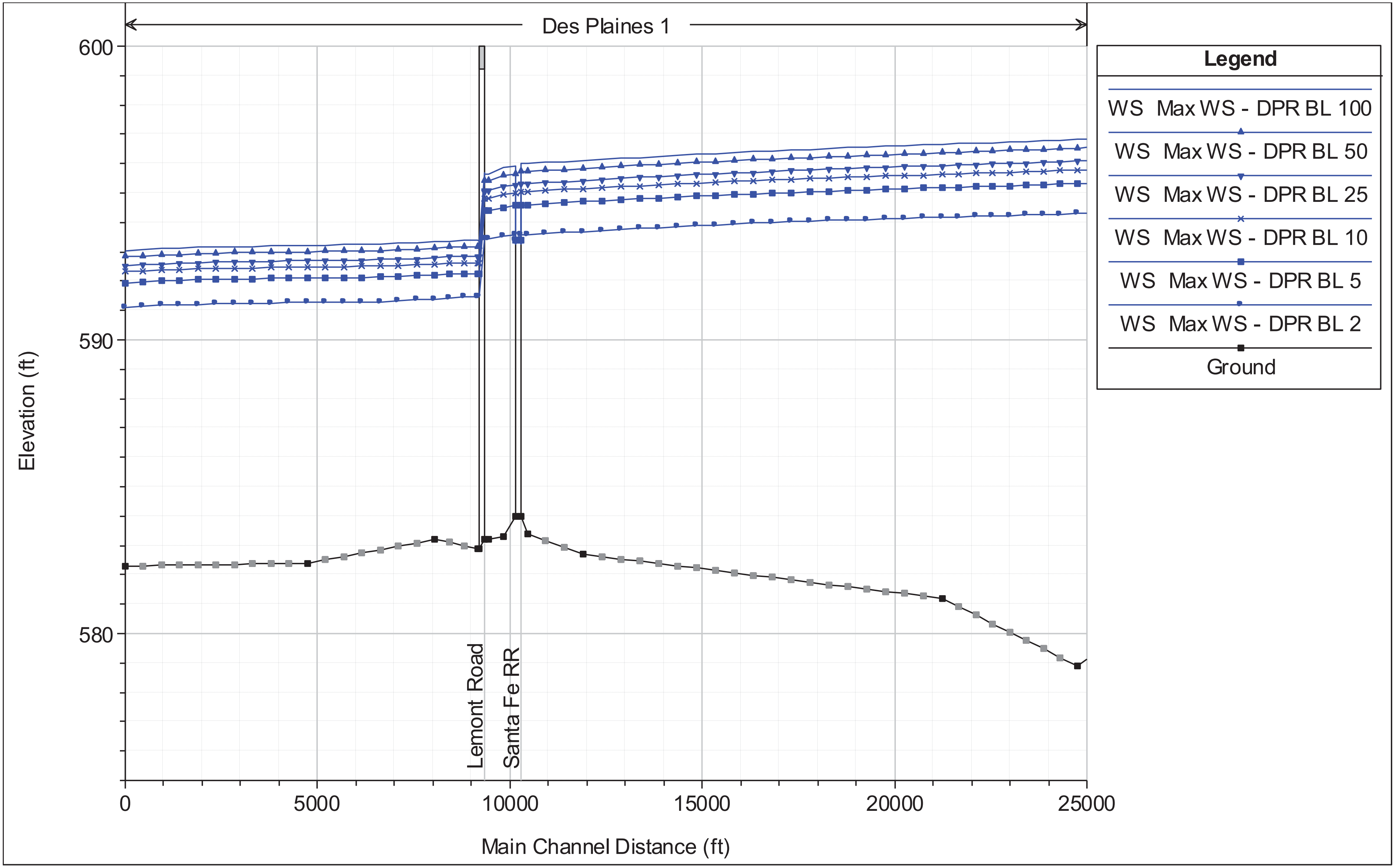


Crystal Creek Tributary from confluence with Crystal Creek to upstream limit of study

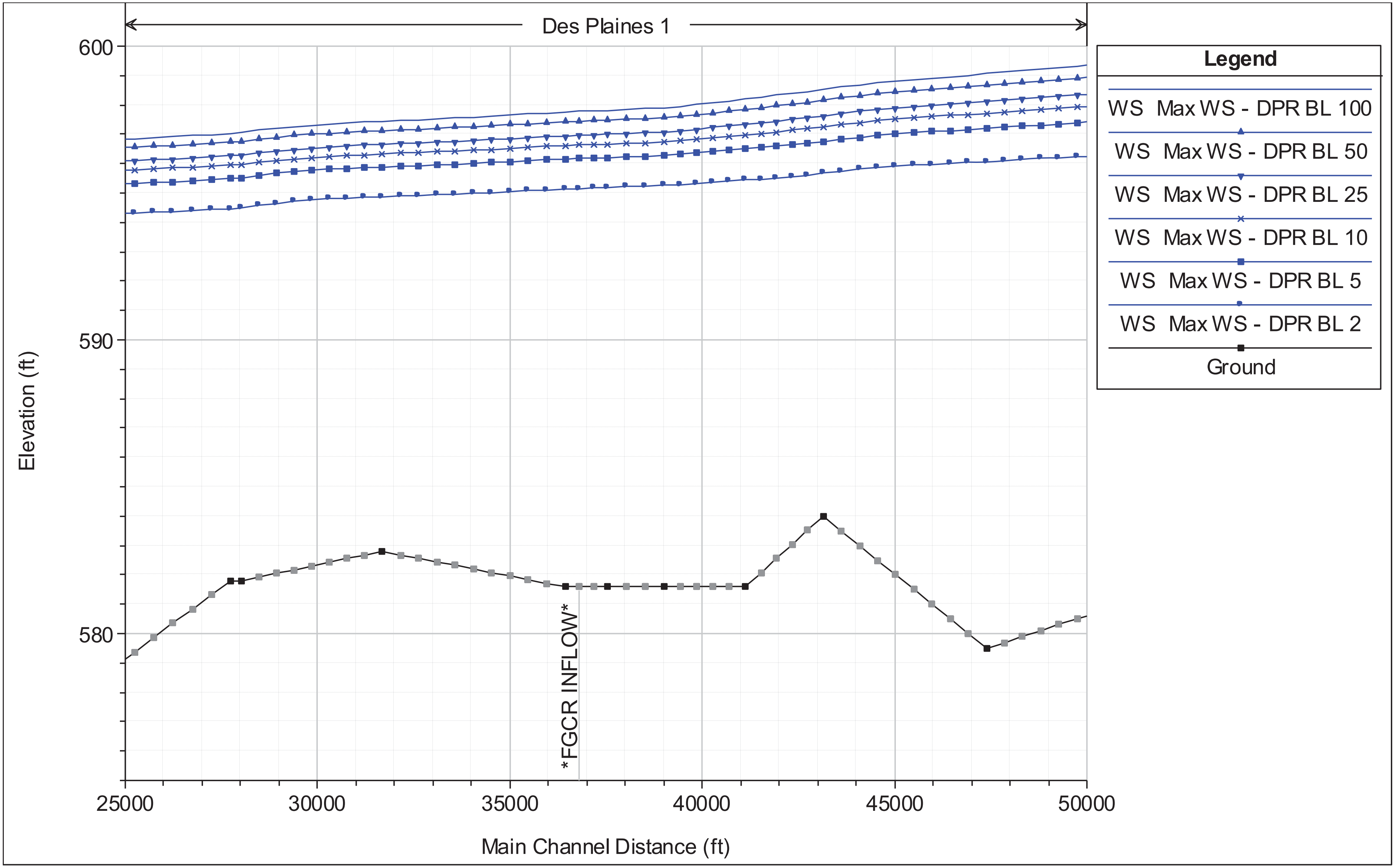


Sexton Ditch from confluence with Crystal Creek Tributary to upstream limit of study.

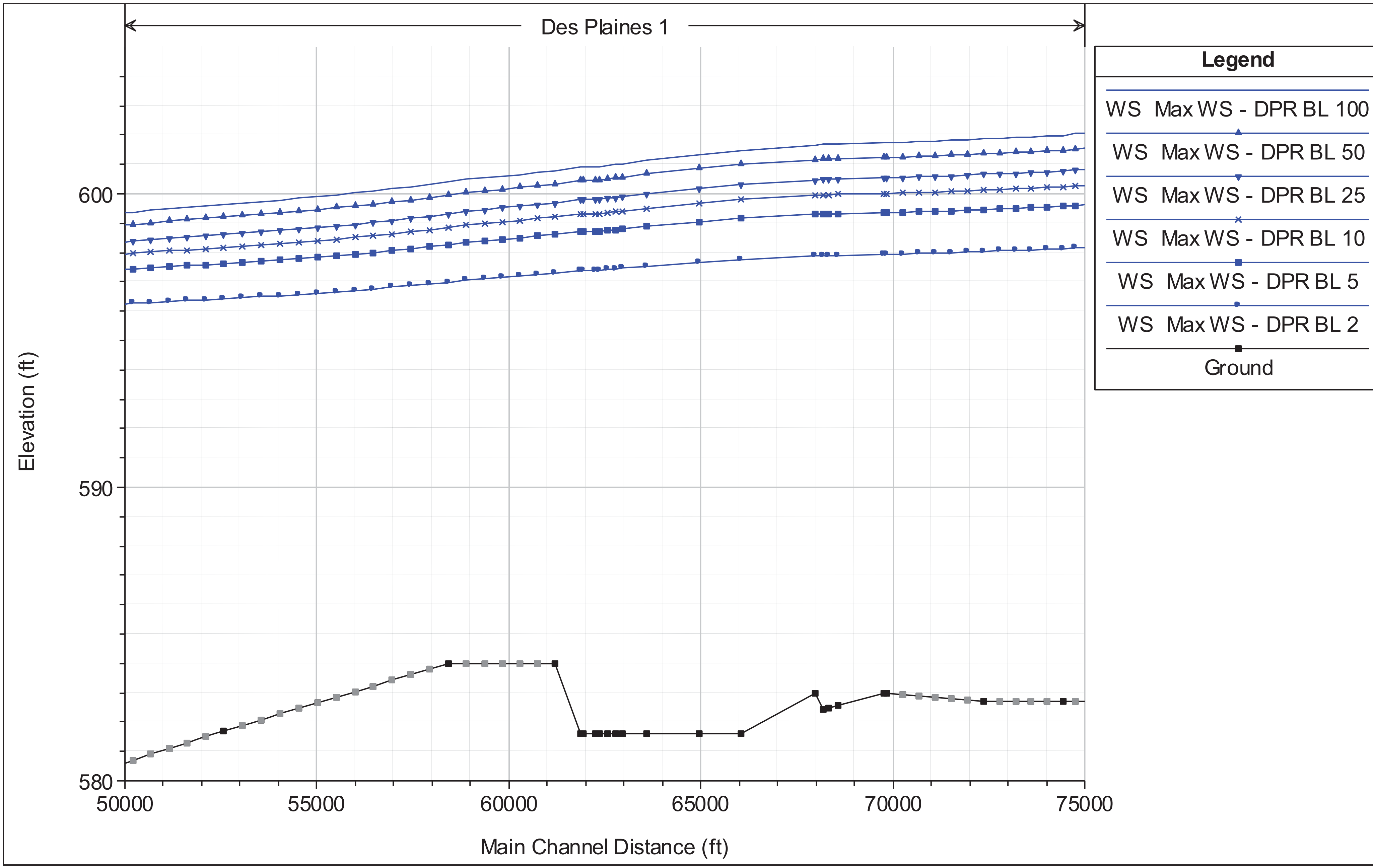
Lower Des Plaines River Mainstem Watershed
Hydraulic Profiles for Existing Conditions



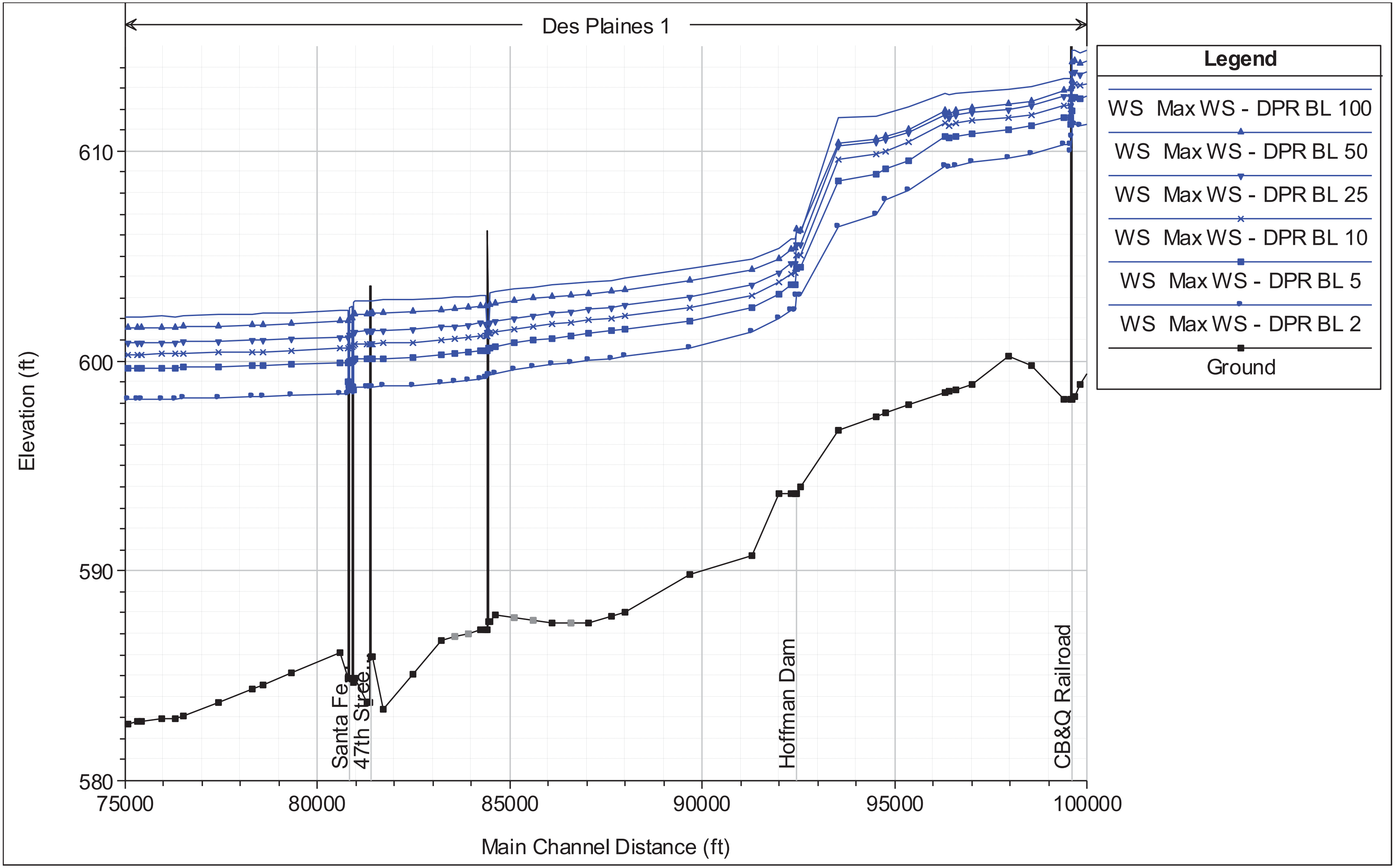
Lower Des Plaines River Mainstem from Will County to approximately 15,000' upstream of Santa Fe Railroad



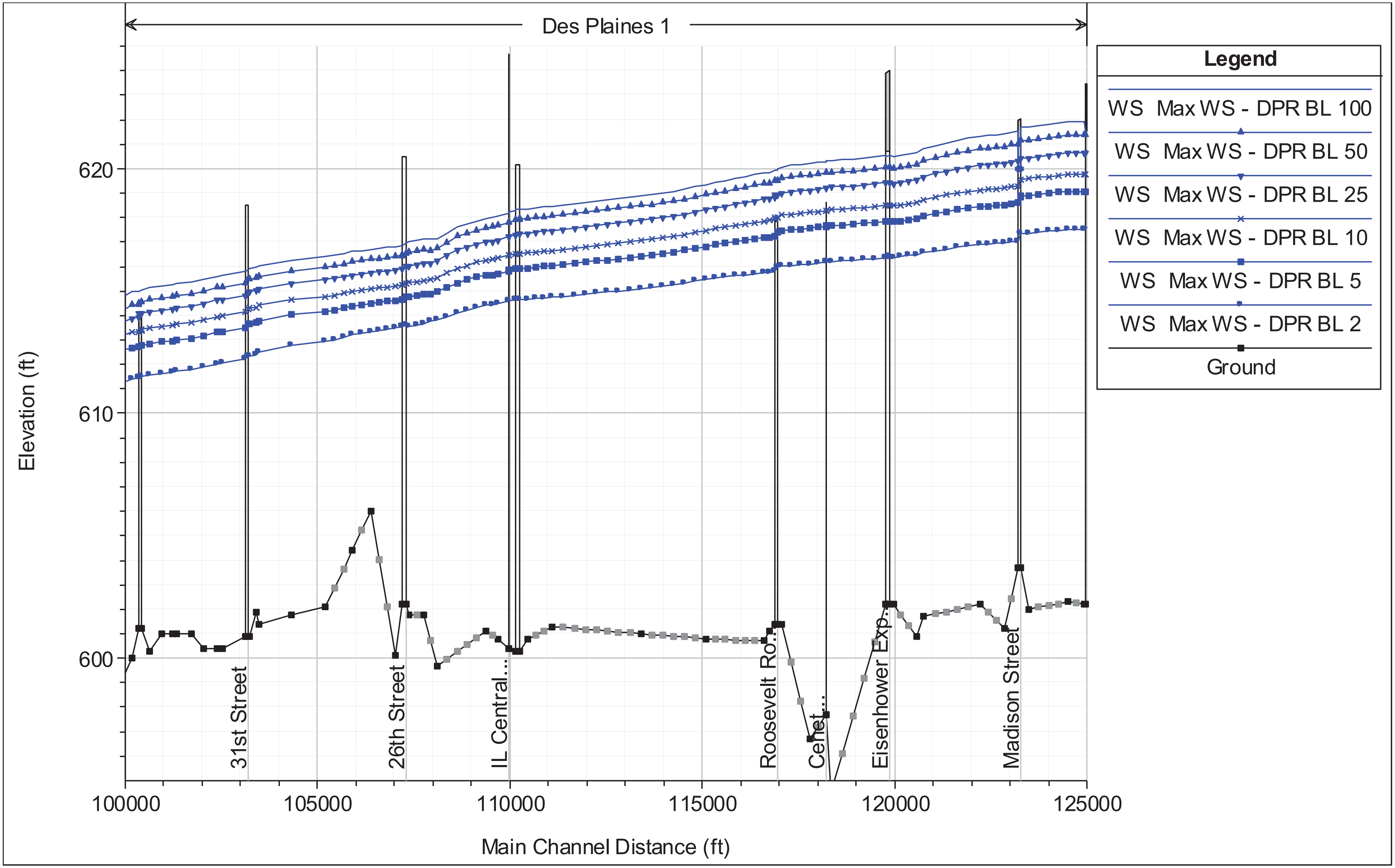
Lower Des Plaines River Mainstem from approximately 15,000’ upstream of Santa Fe Railroad to approximately 13,500’ upstream of Flagg Creek confluence



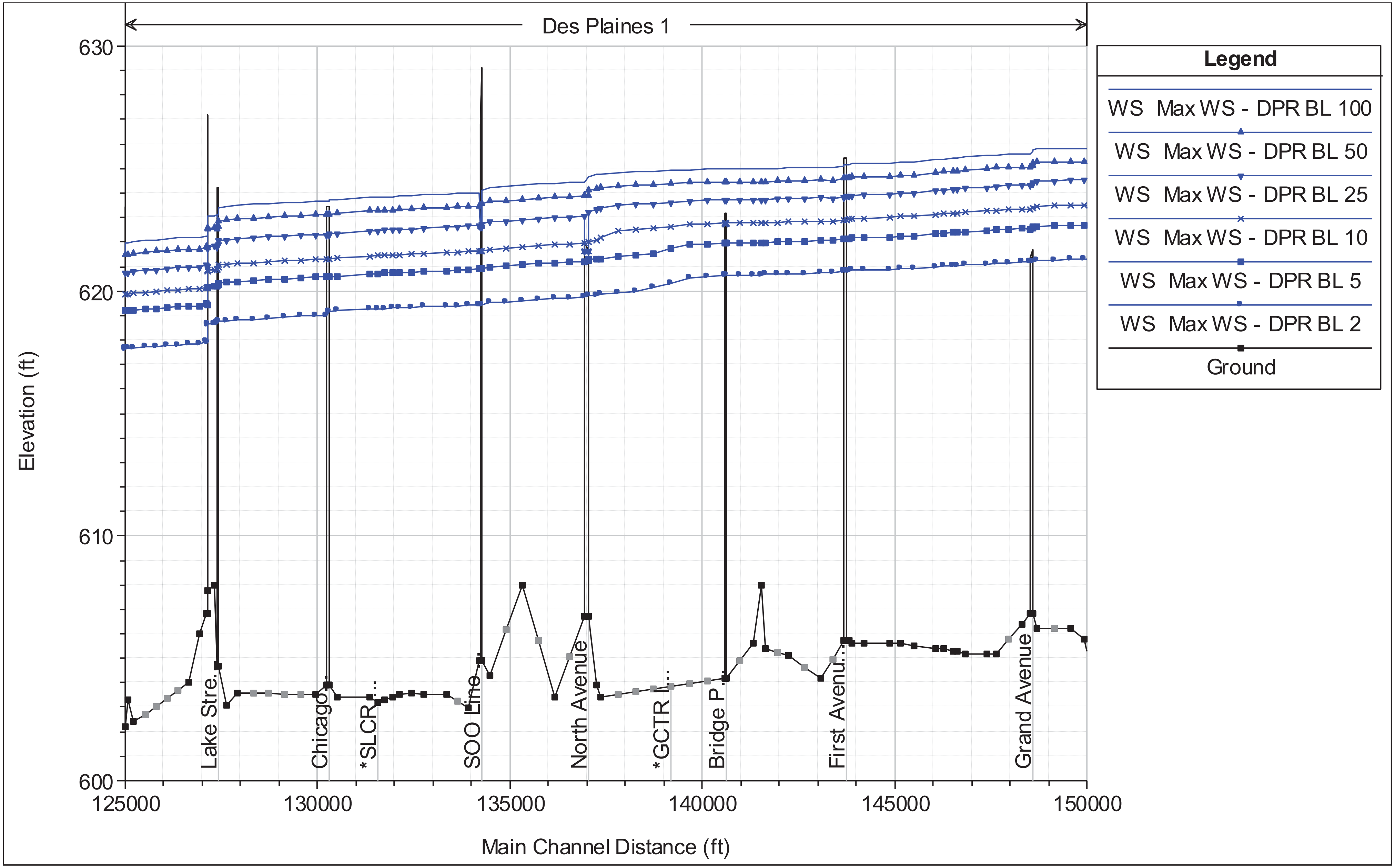
Lower Des Plaines River between Flagg Creek confluence and 47th Street



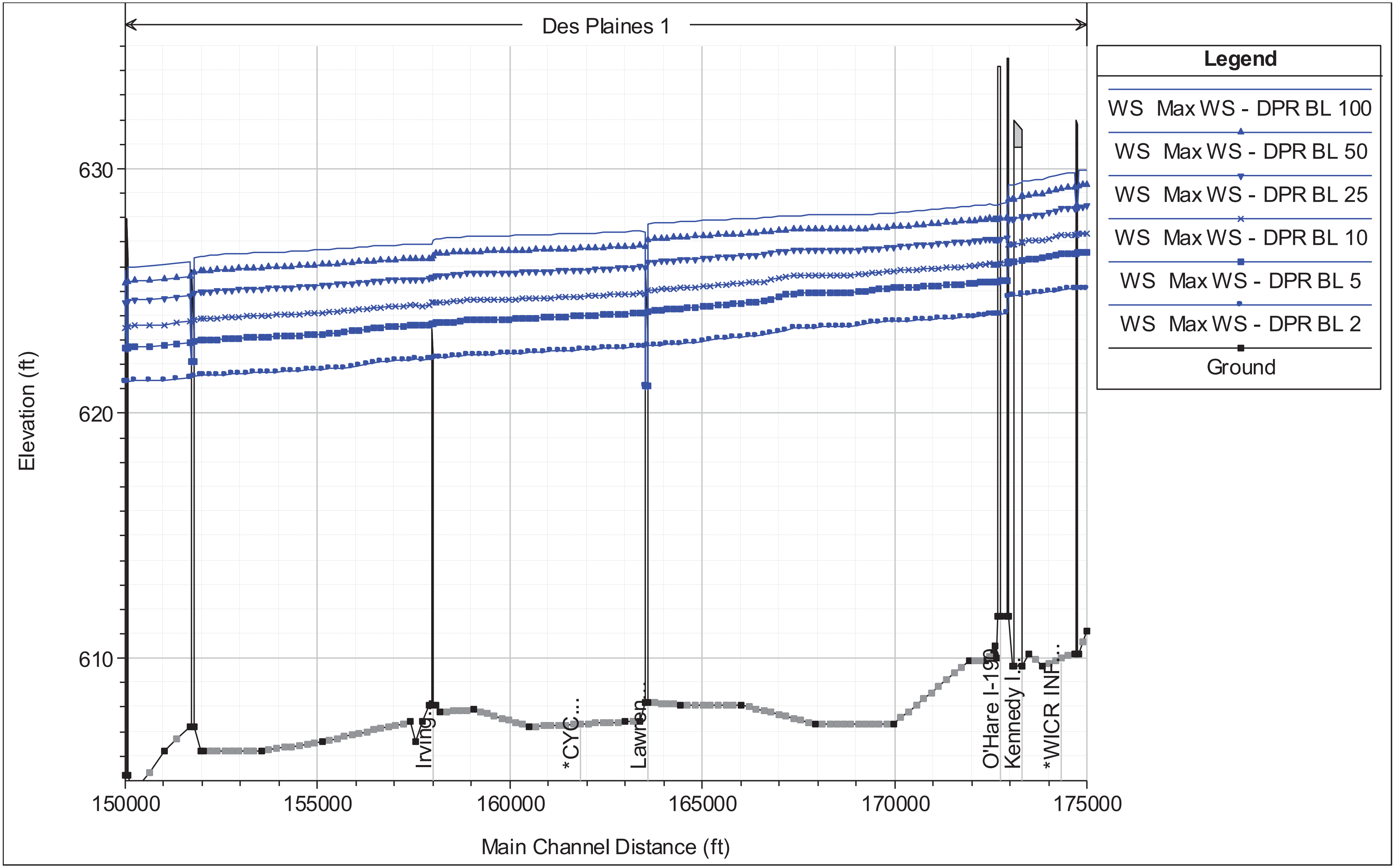
Lower Des Plaines River Mainstem from approximately 6,500’ downstream of 47th Street to upstream of CB&Q railroad



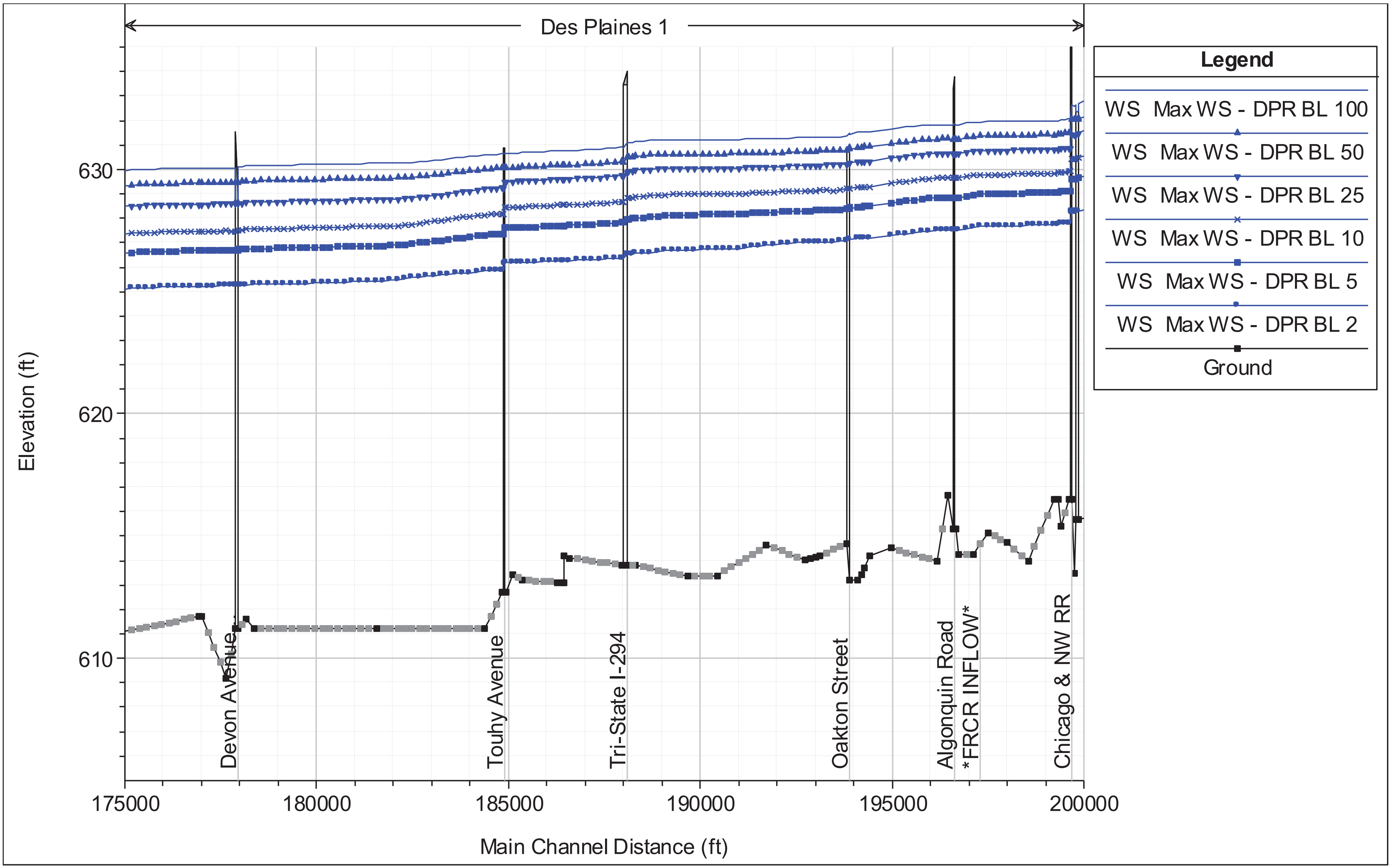
Lower Des Plaines River Mainstem from downstream of 31st Street to upstream of Madison Street



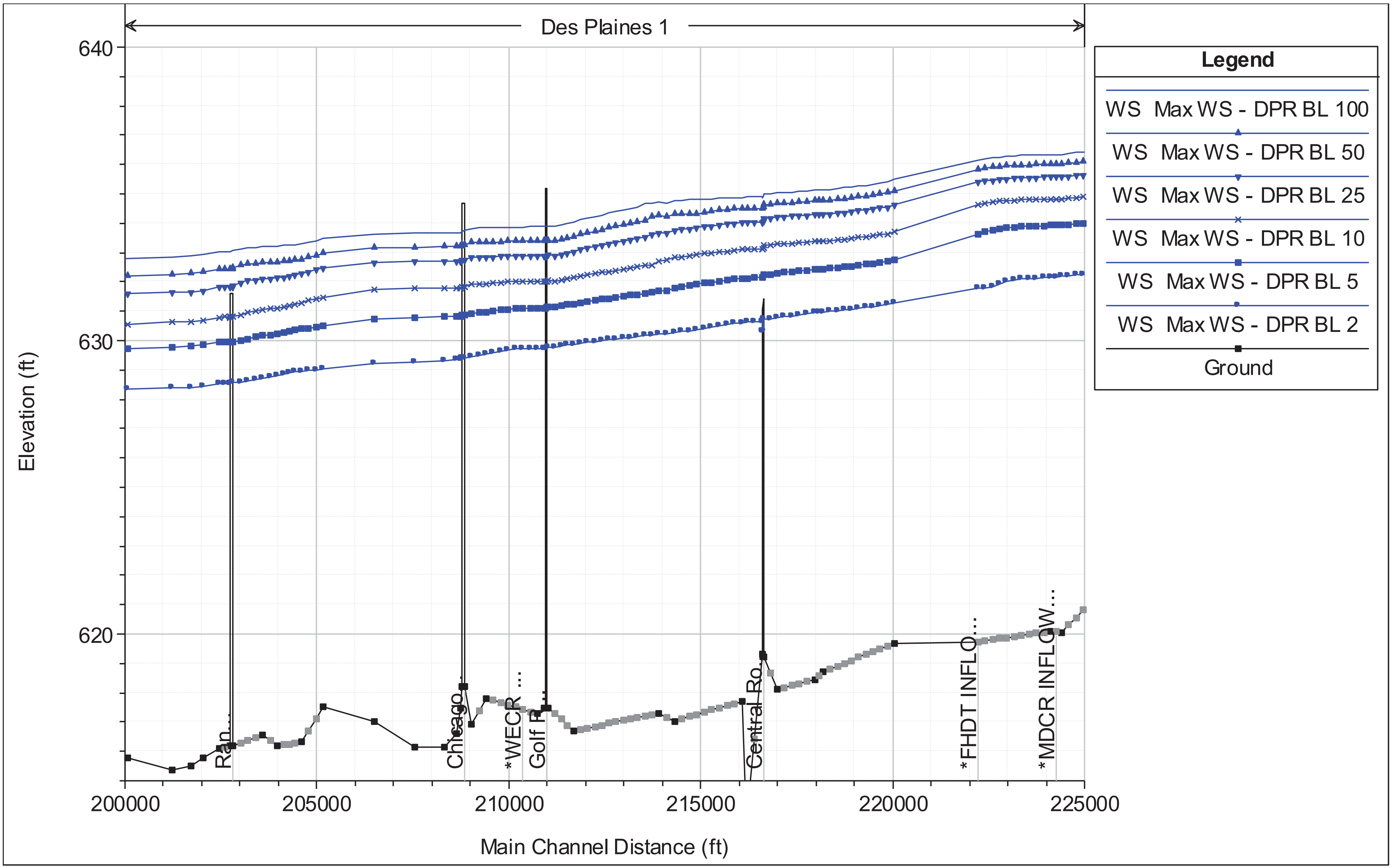
Lower Des Plaines River Mainstem from downstream of Lake Street to upstream of Grand Avenue



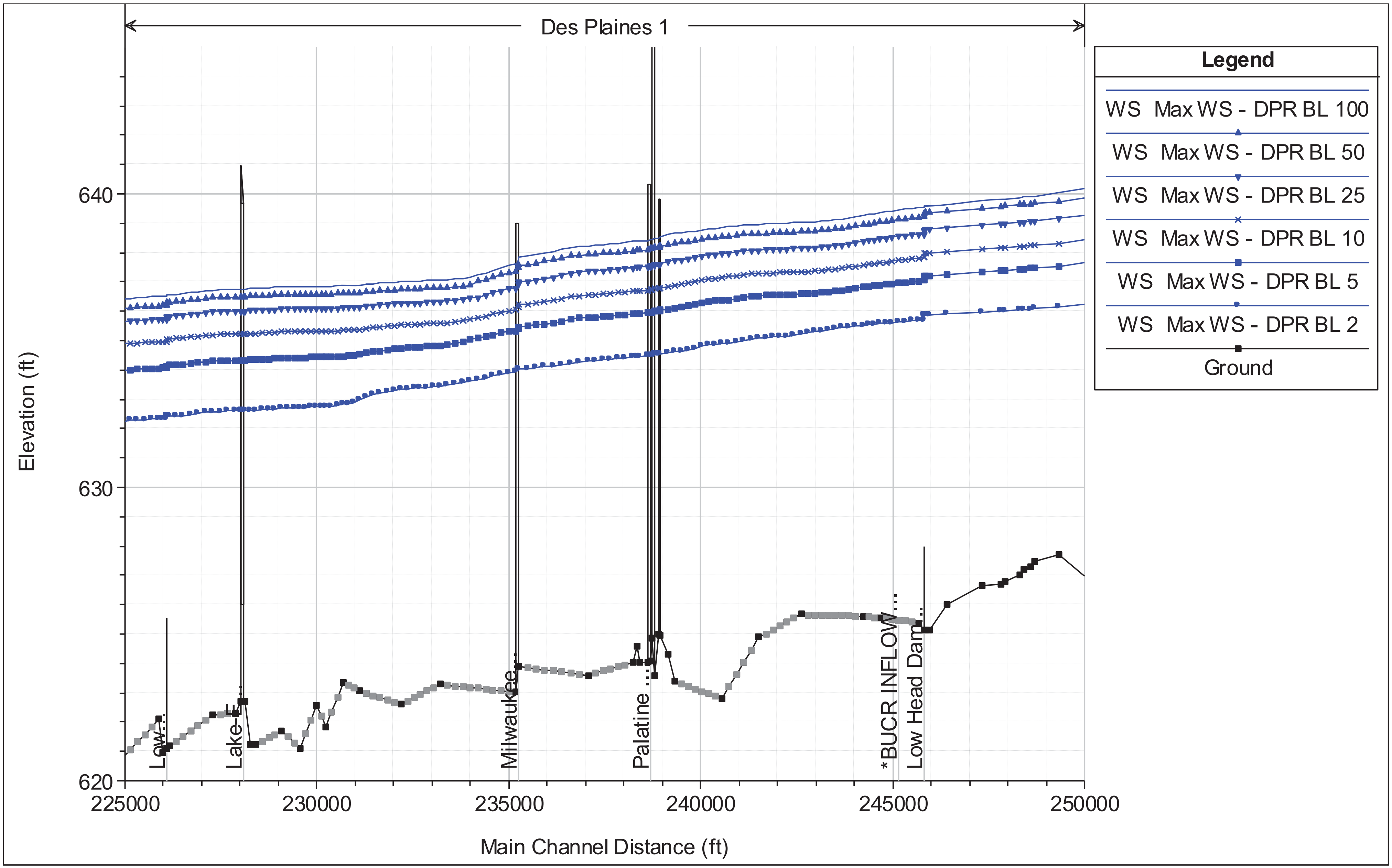
Lower Des Plaines River Mainstem from upstream of Grand Avenue to upstream of Willow Creek confluence



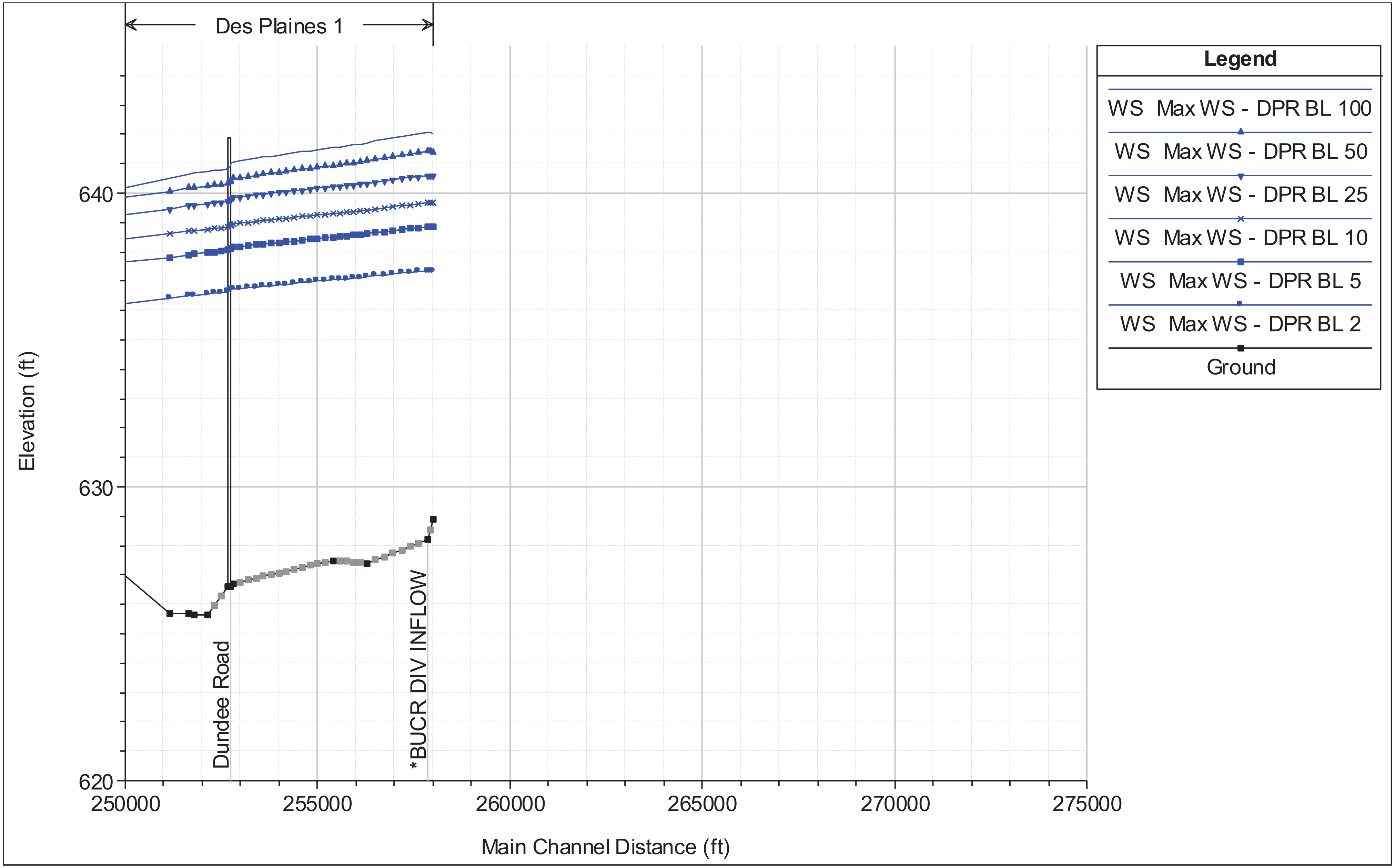
Lower Des Plaines River Mainstem from downstream of Devon Avenue to upstream of Chicago & NW railroad



Lower Des Plaines River Mainstem from downstream of Rand Road to upstream of McDonald Creek confluence

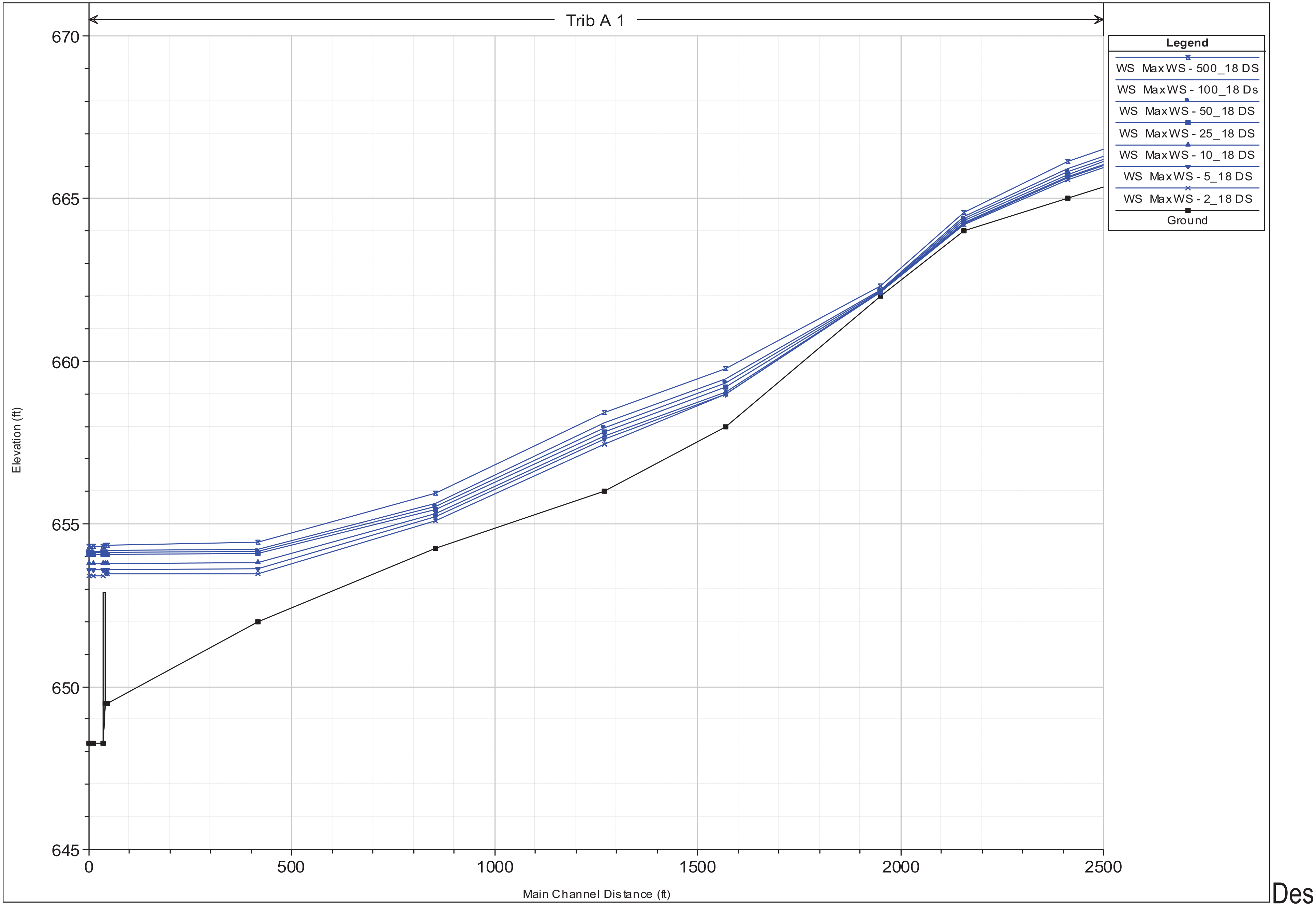


Lower Des Plaines River Mainstem from upstream of McDonald Creek confluence to upstream of Buffalo Creek confluence

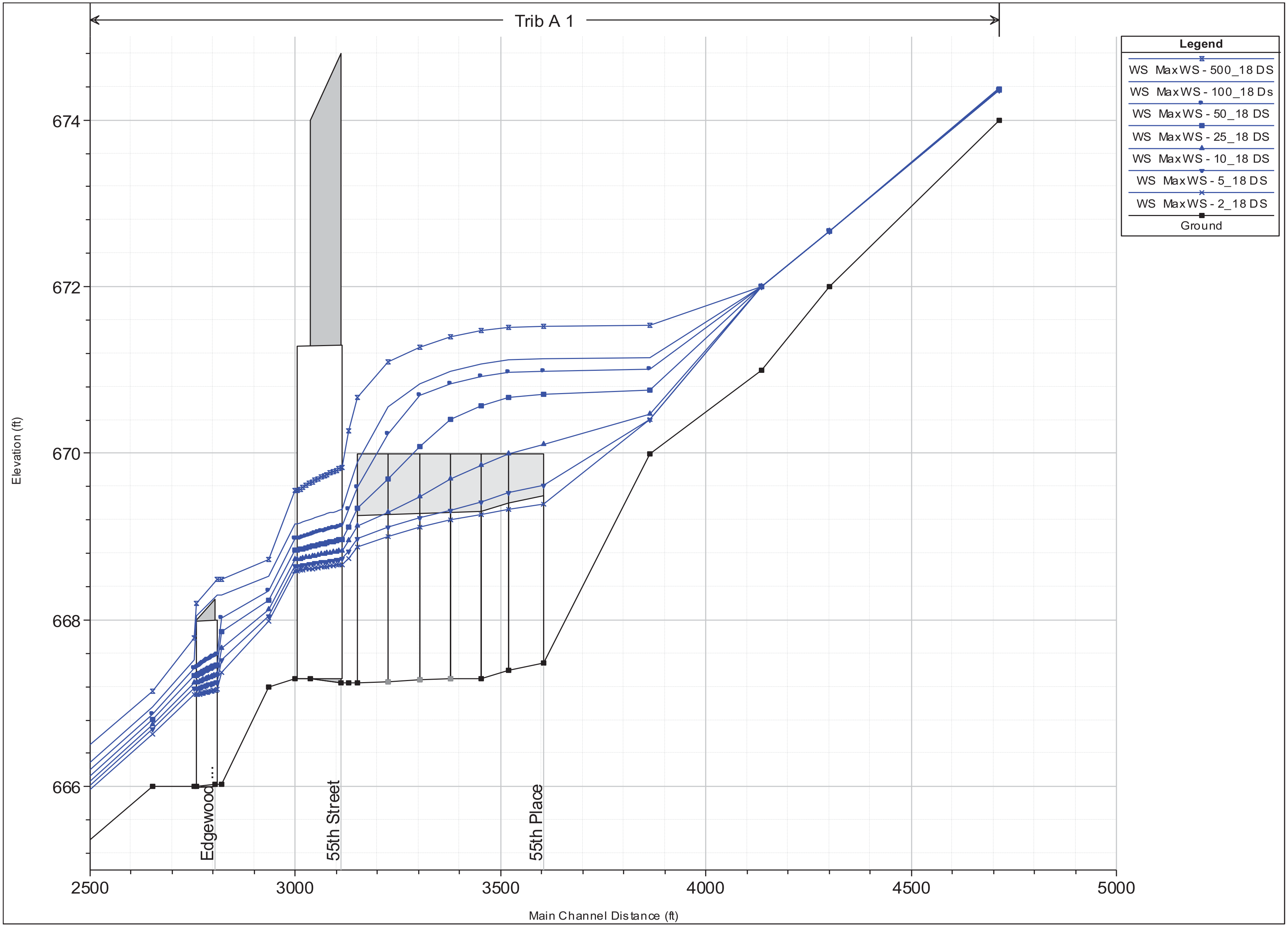


Lower Des Plaines River Mainstem from upstream of Buffalo Creek confluence to William Rogers Memorial Diversion Channel

Des Plaines River Tributary A Subwatershed
Hydraulic Profiles for Existing Conditions

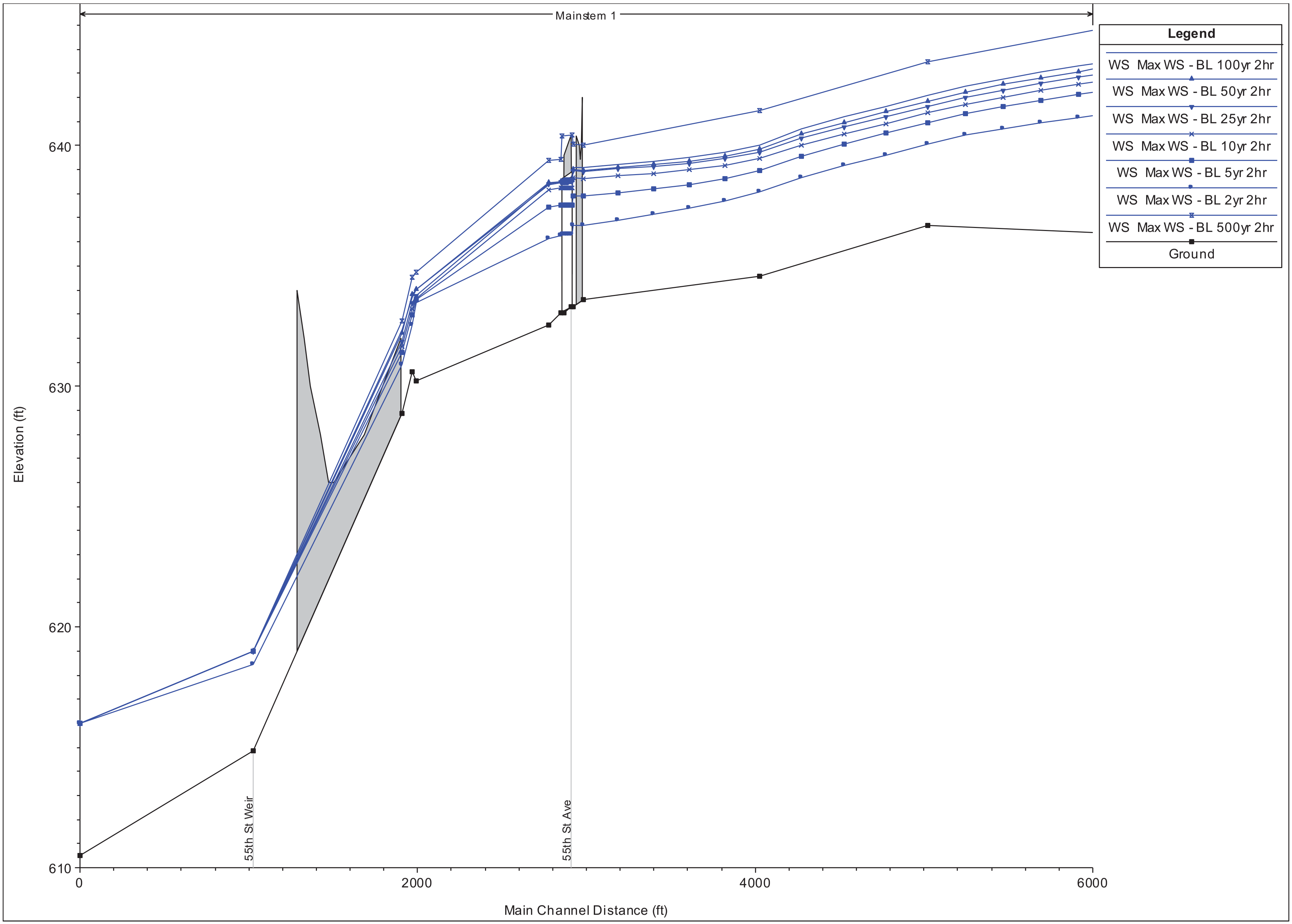


Plaines River Tributary A from 48” RCP at Brainard Avenue to 2500’ upstream

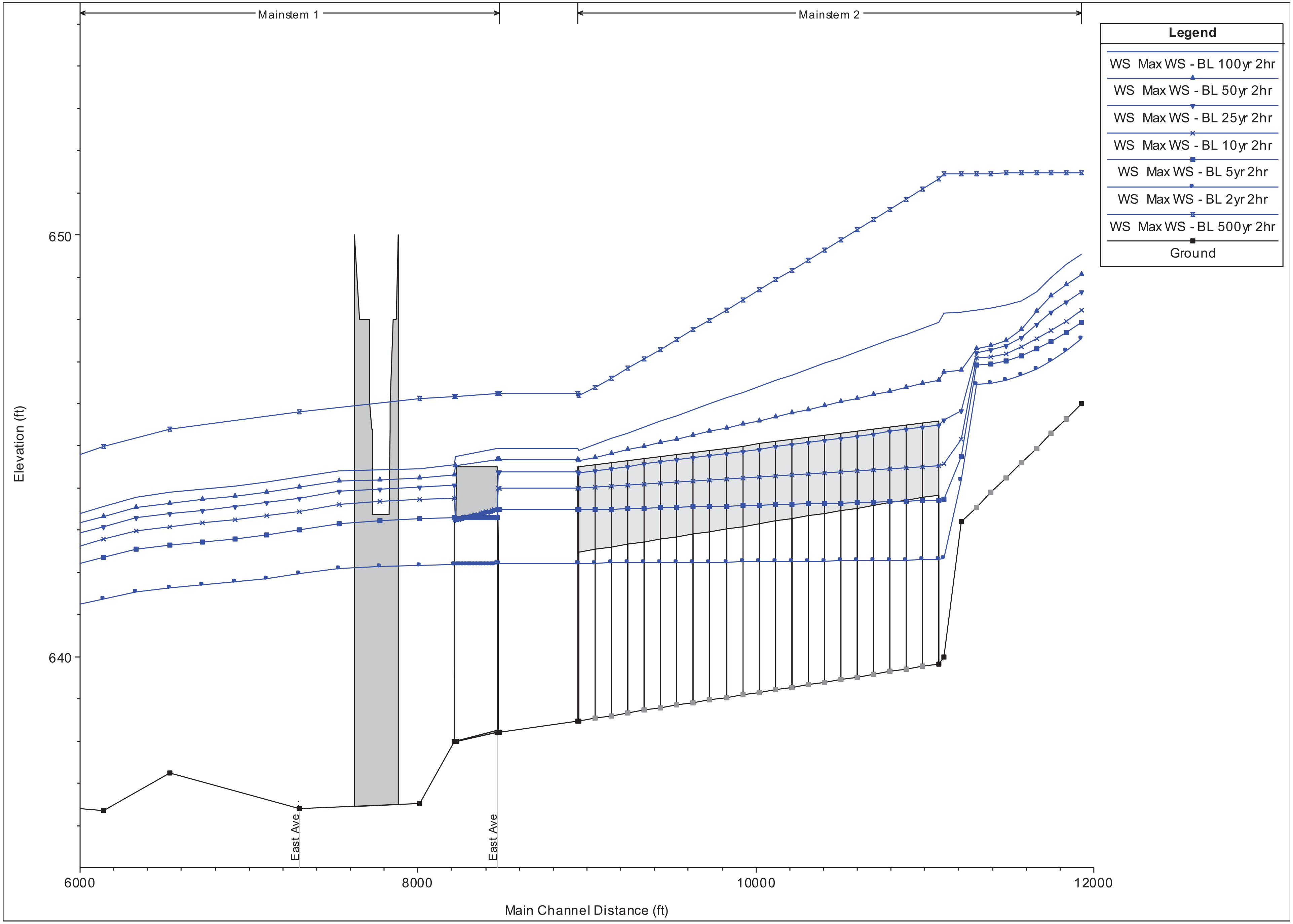


From 2500’ upstream of 48” RCP at Brainard to upstream study limit north of Plainefield Road

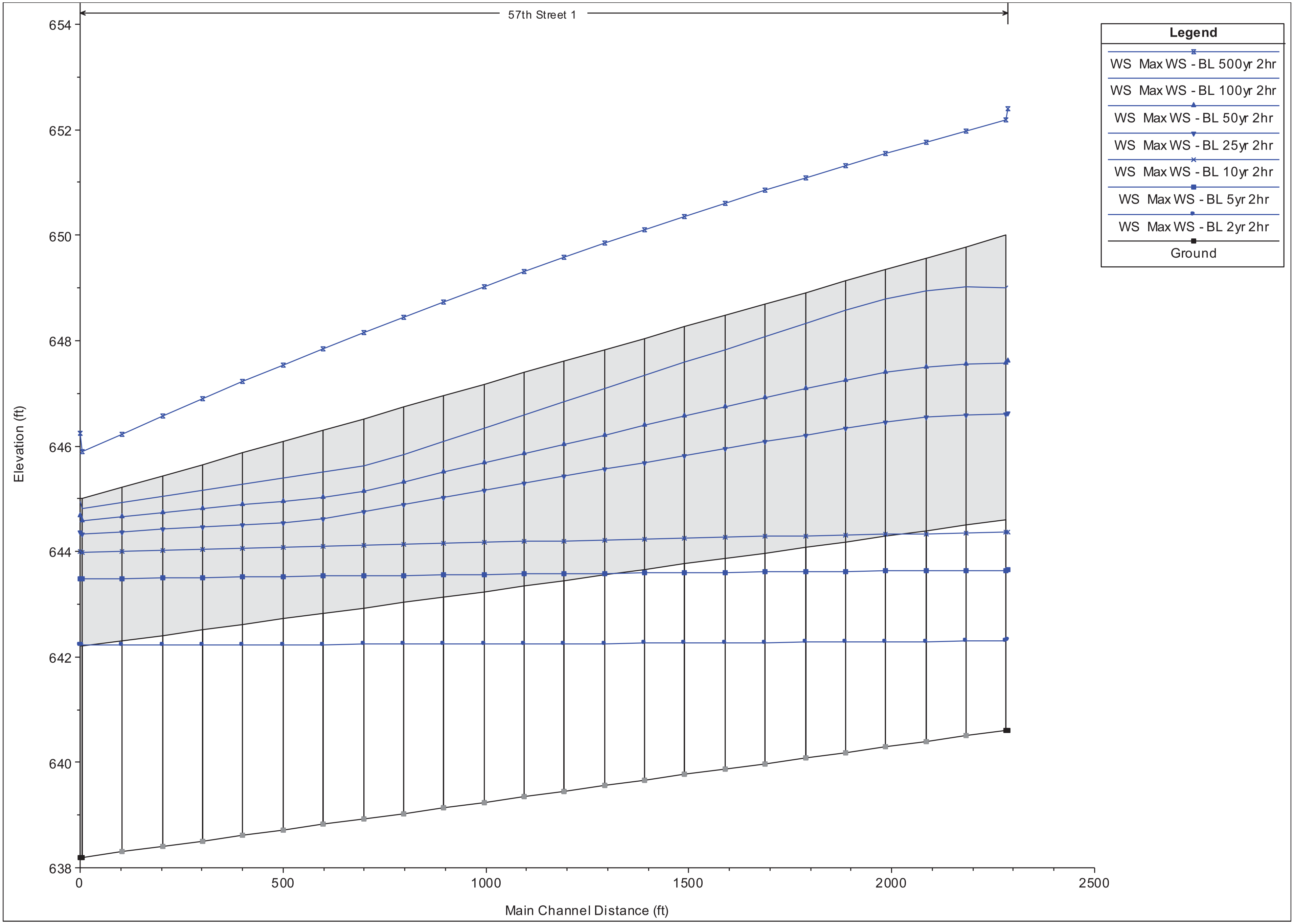
East Avenue Ditch Subwatershed
Hydraulic Profiles for Existing Conditions



East Avenue Ditch from Railroad Yard to 6,000 feet upstream

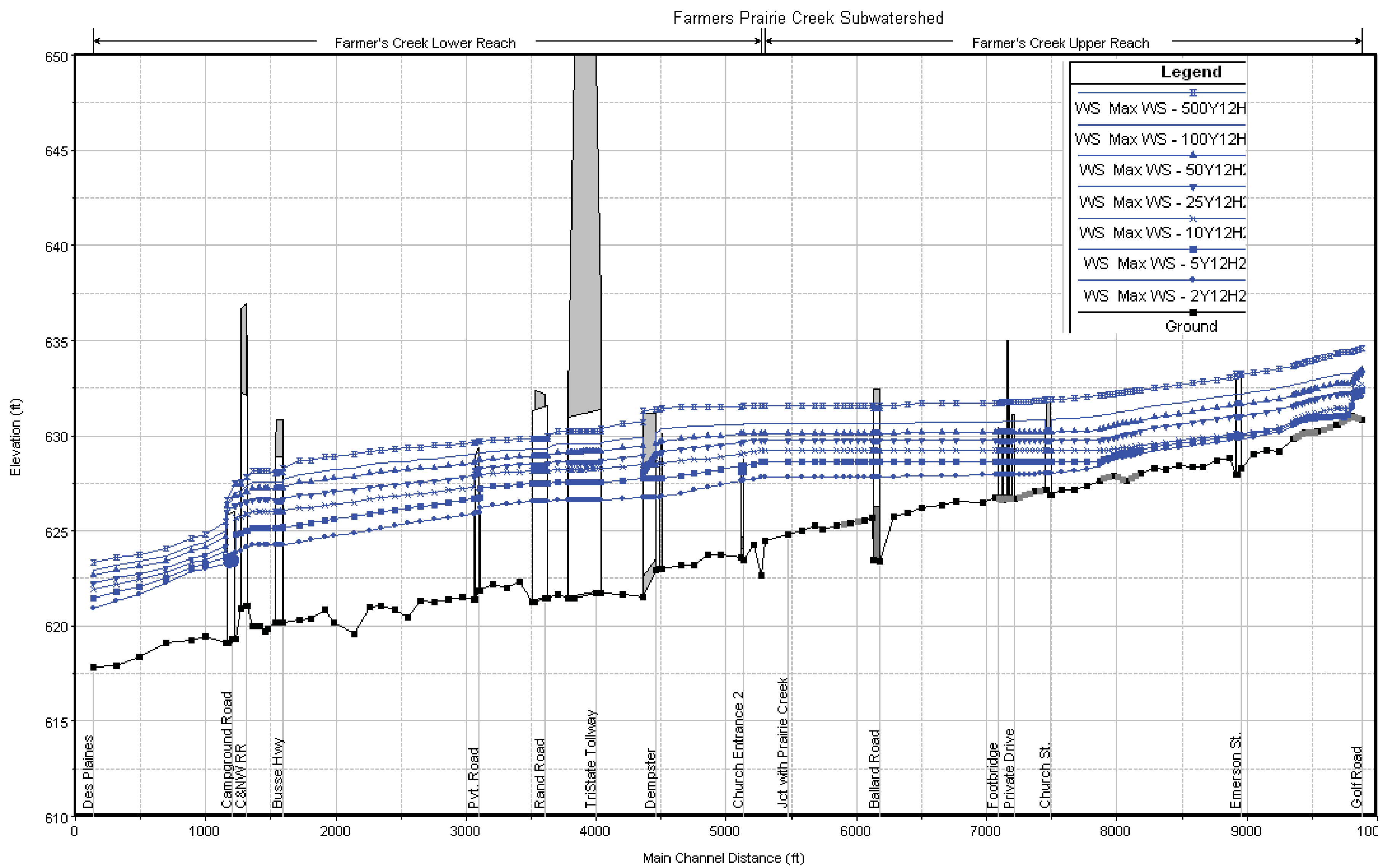


East Avenue Ditch from 6,000 feet upstream of Railroad Yard to LaGrange Road

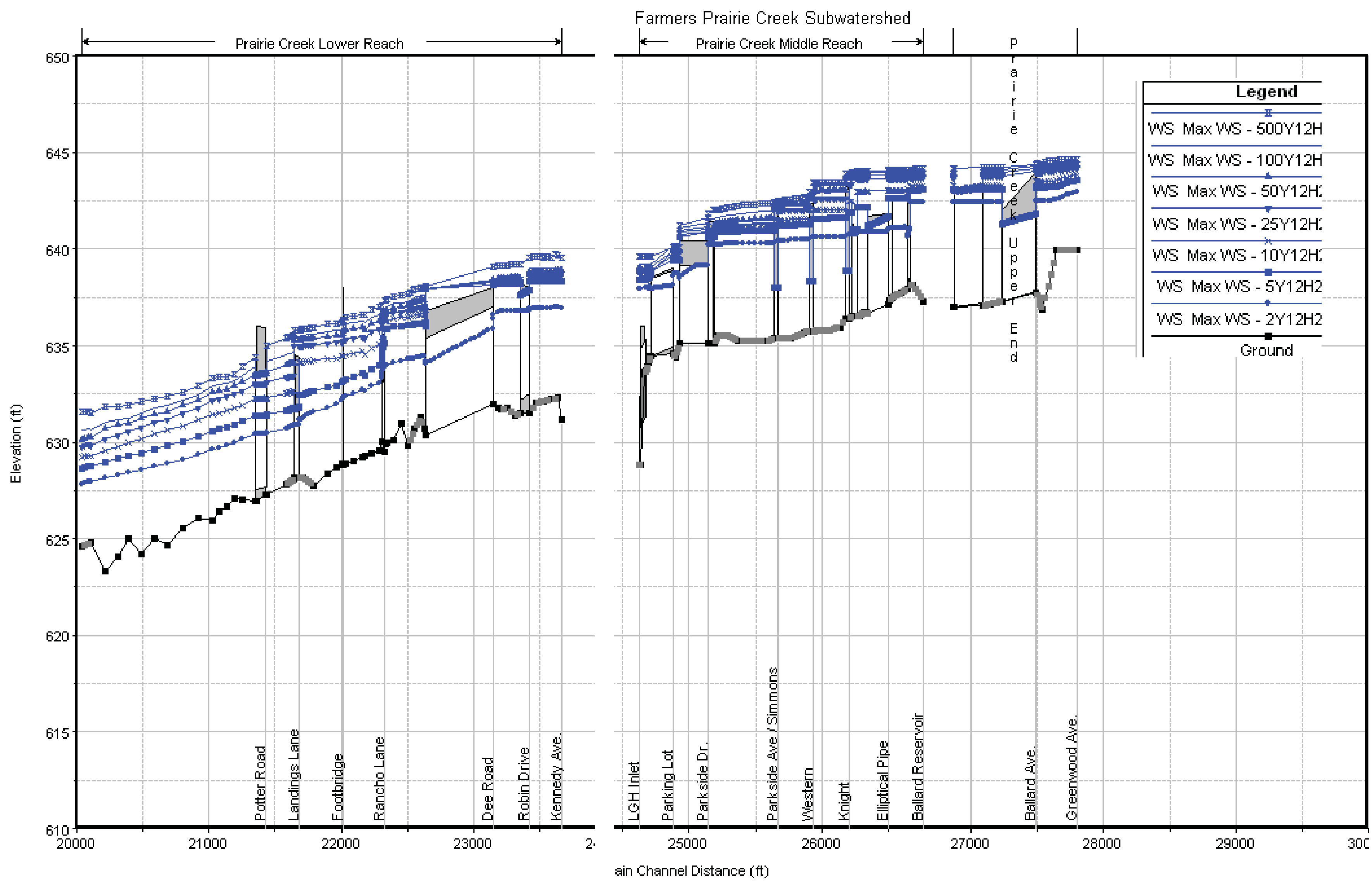


57th Street Ditch from East Ave. Ditch to downstream of LaGrange Road

Farmers Prairie Creek Subwatershed
Hydraulic Profiles for Existing Conditions

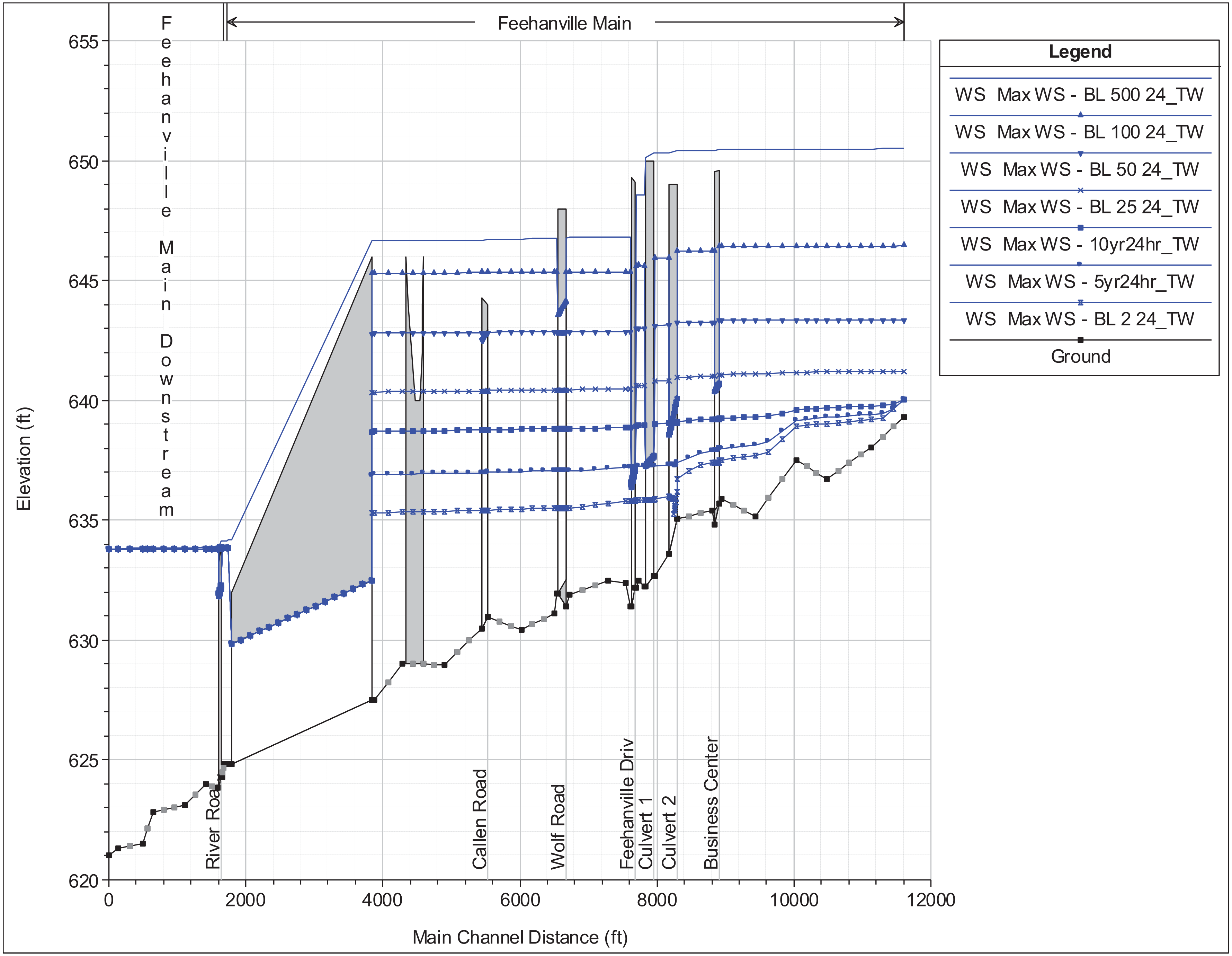


Farmers Creek from Des Plaines River to Golf Road

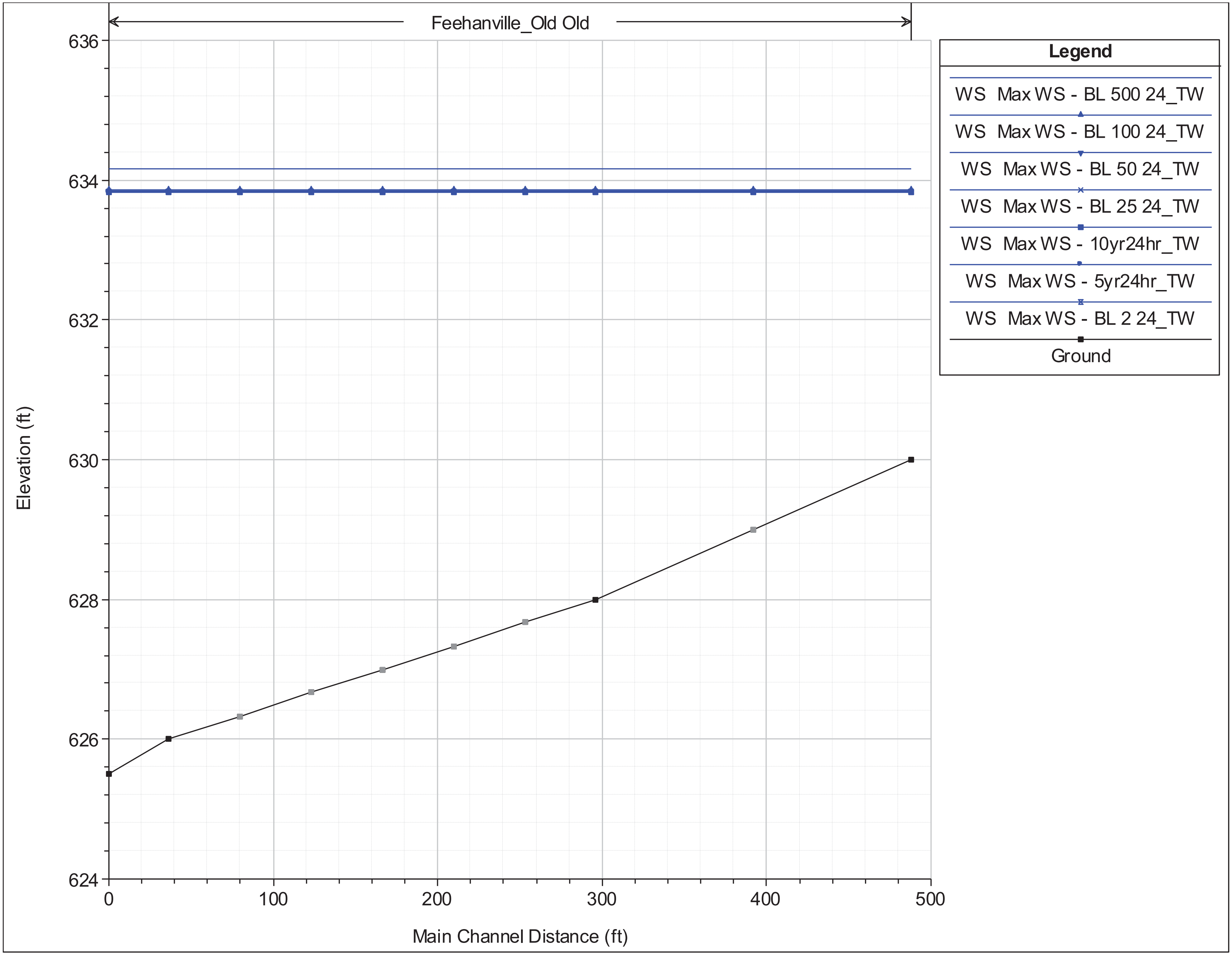


Prairie Creek from Farmers Creek to Greenwood Ave

Feehanville Ditch Subwatershed
Hydraulic Profiles for Existing Conditions

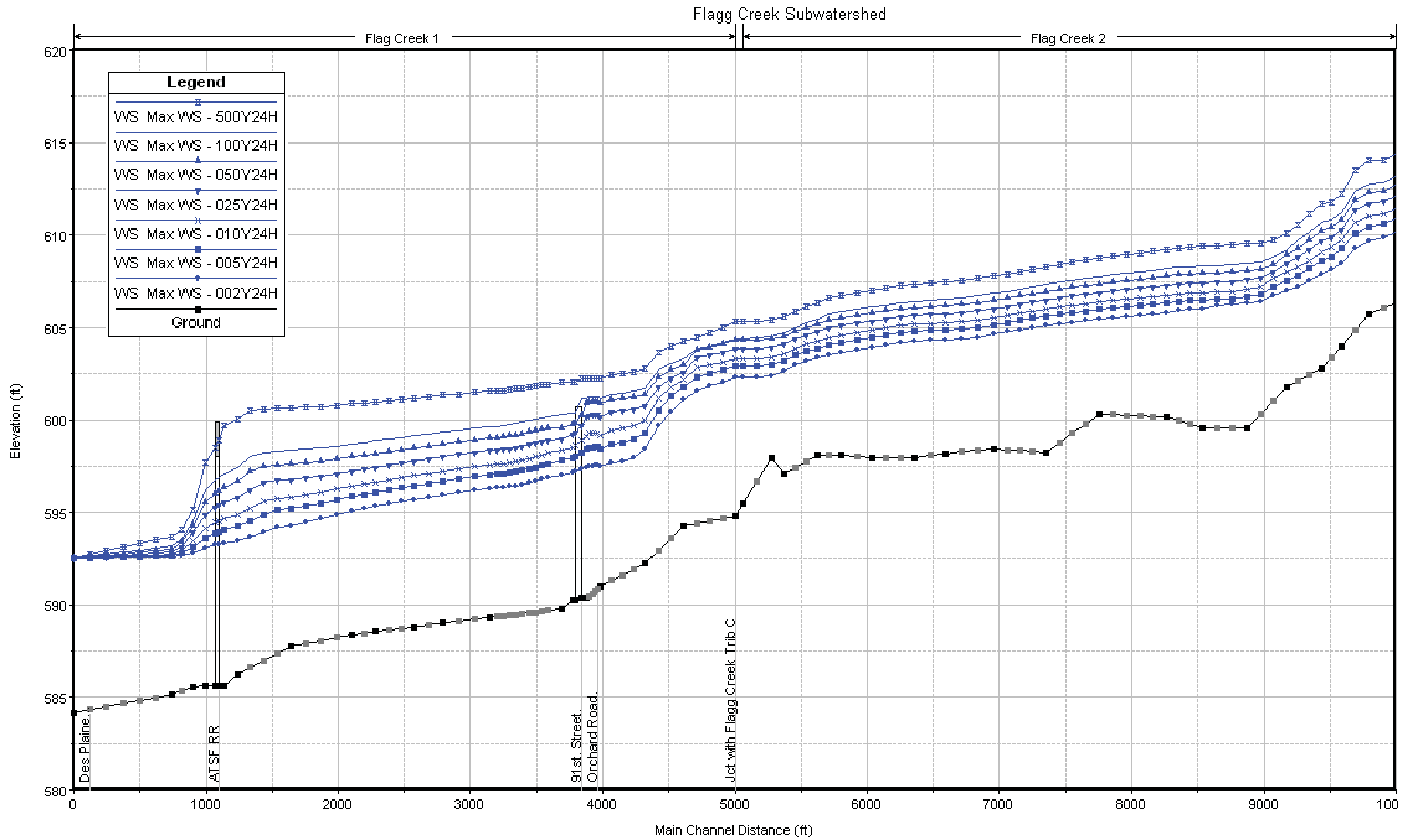


Feehanville Ditch from confluence with Des Plaines River to upstream study limit east of Feehanville Road

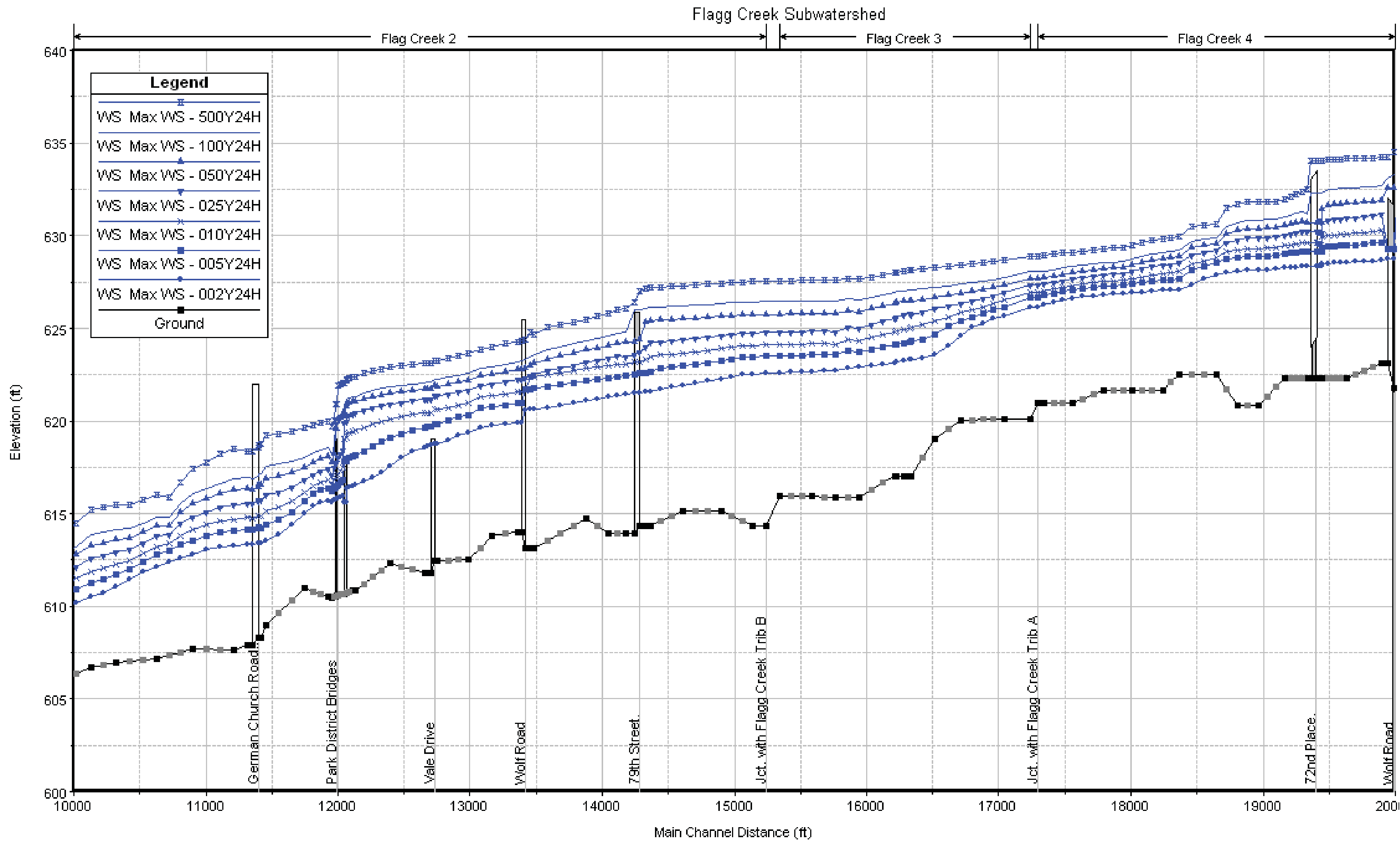


Feehanville Ditch Old Channel from River Road to upstream study limit east of Lee Street

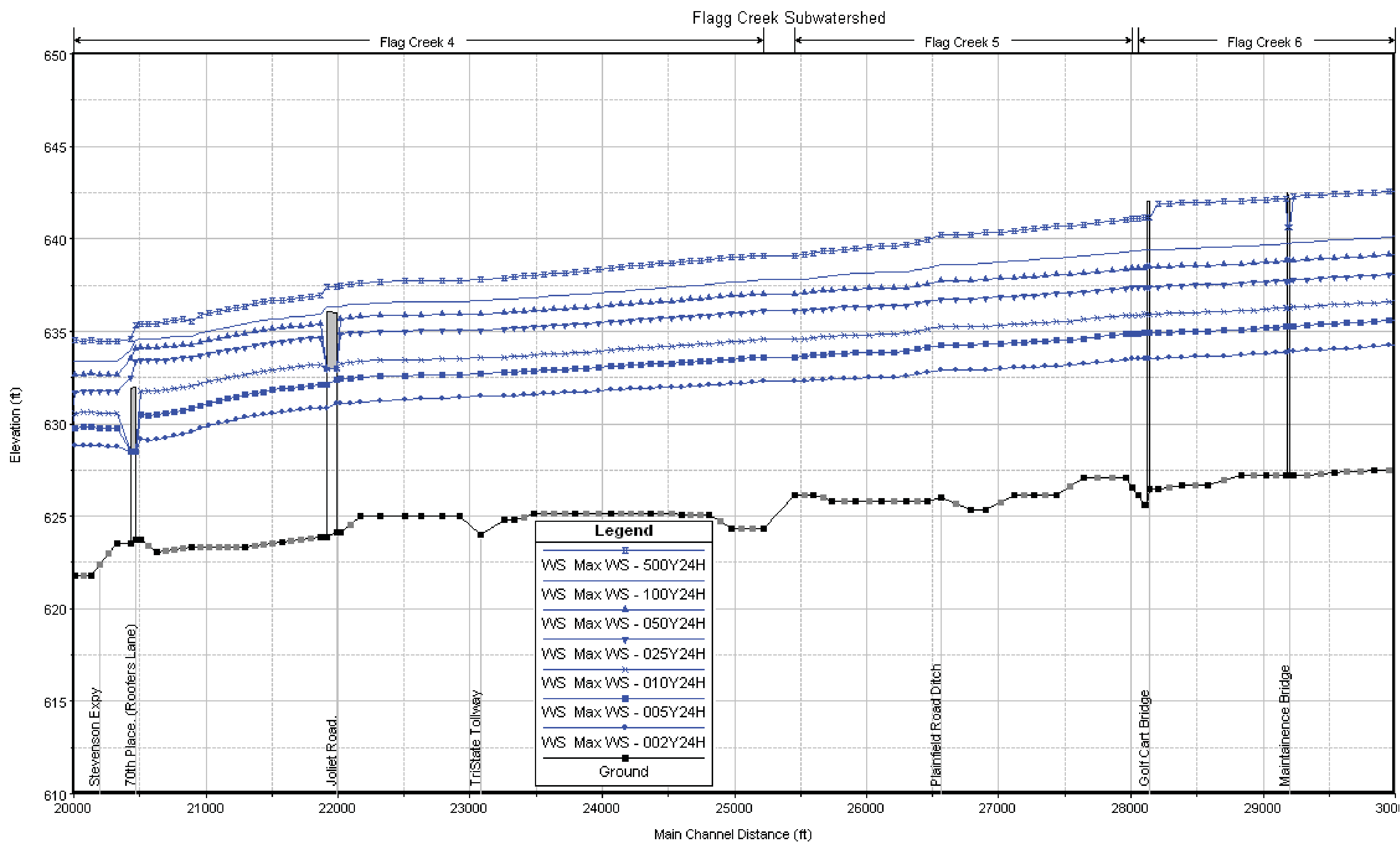
Flagg Creek Subwatershed
Hydraulic Profiles for Existing Conditions



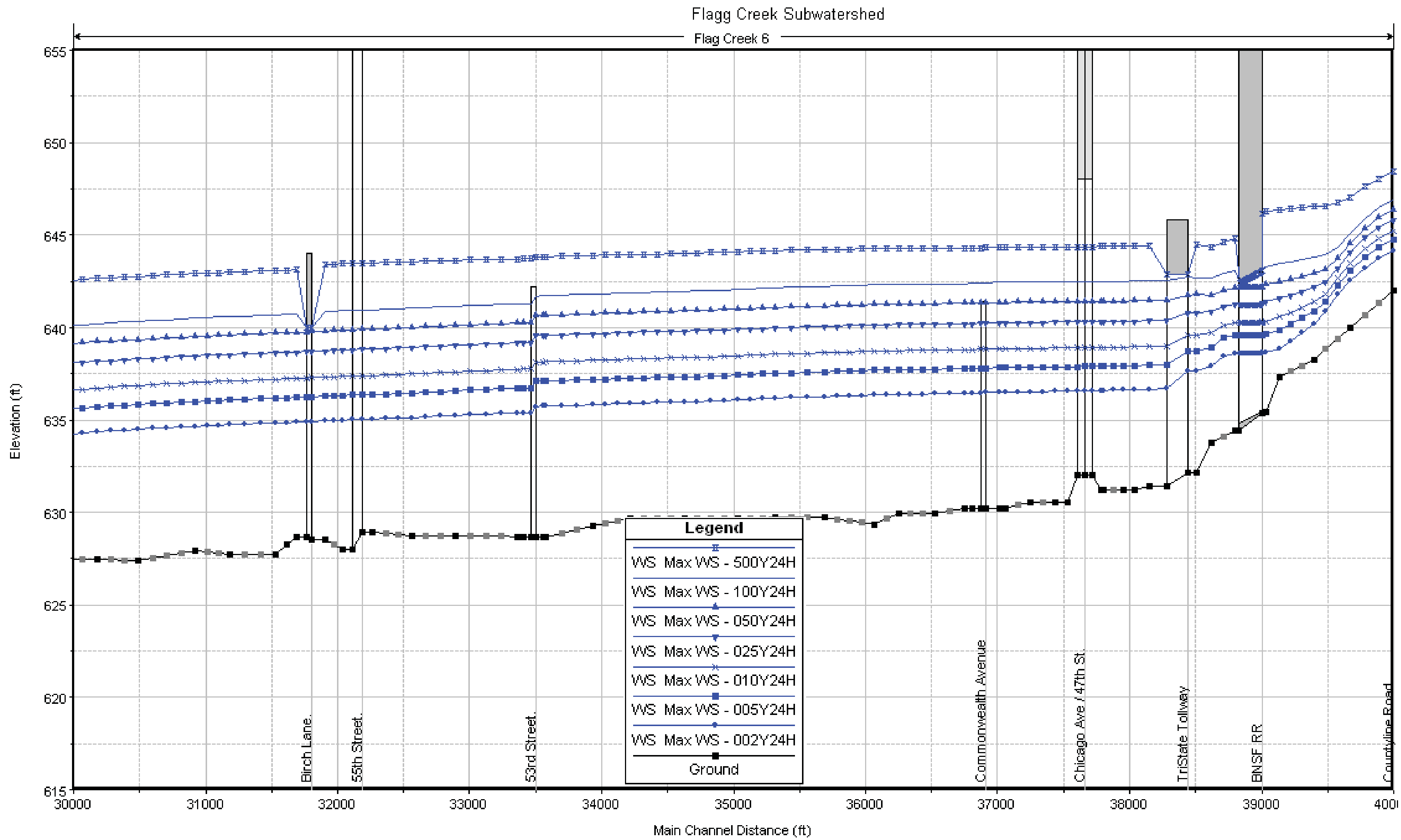
Flagg Creek Mainstem from confluence with the Des Plaines River to Station 10000



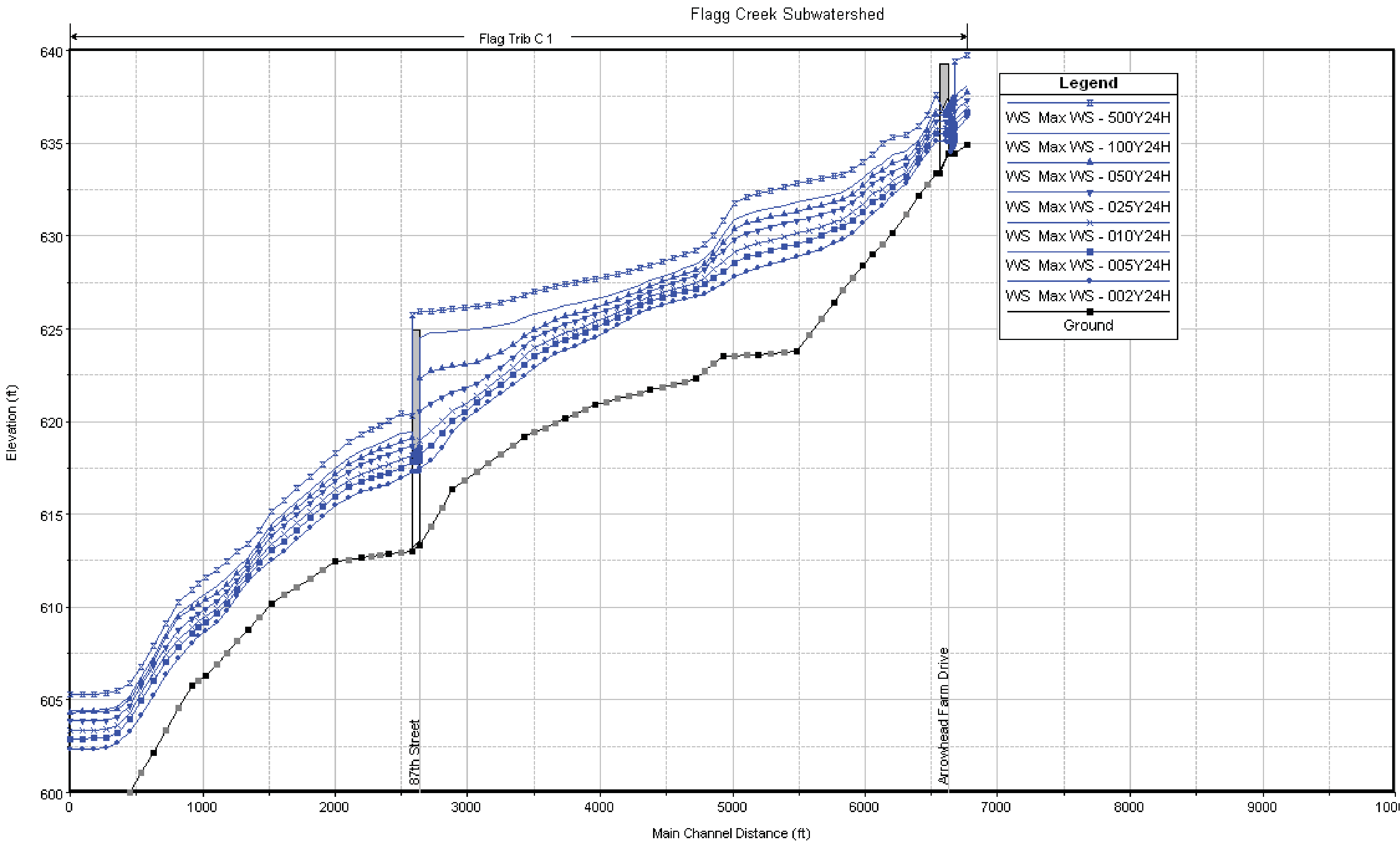
Flagg Creek Mainstem from Station 10000 to Station 20000



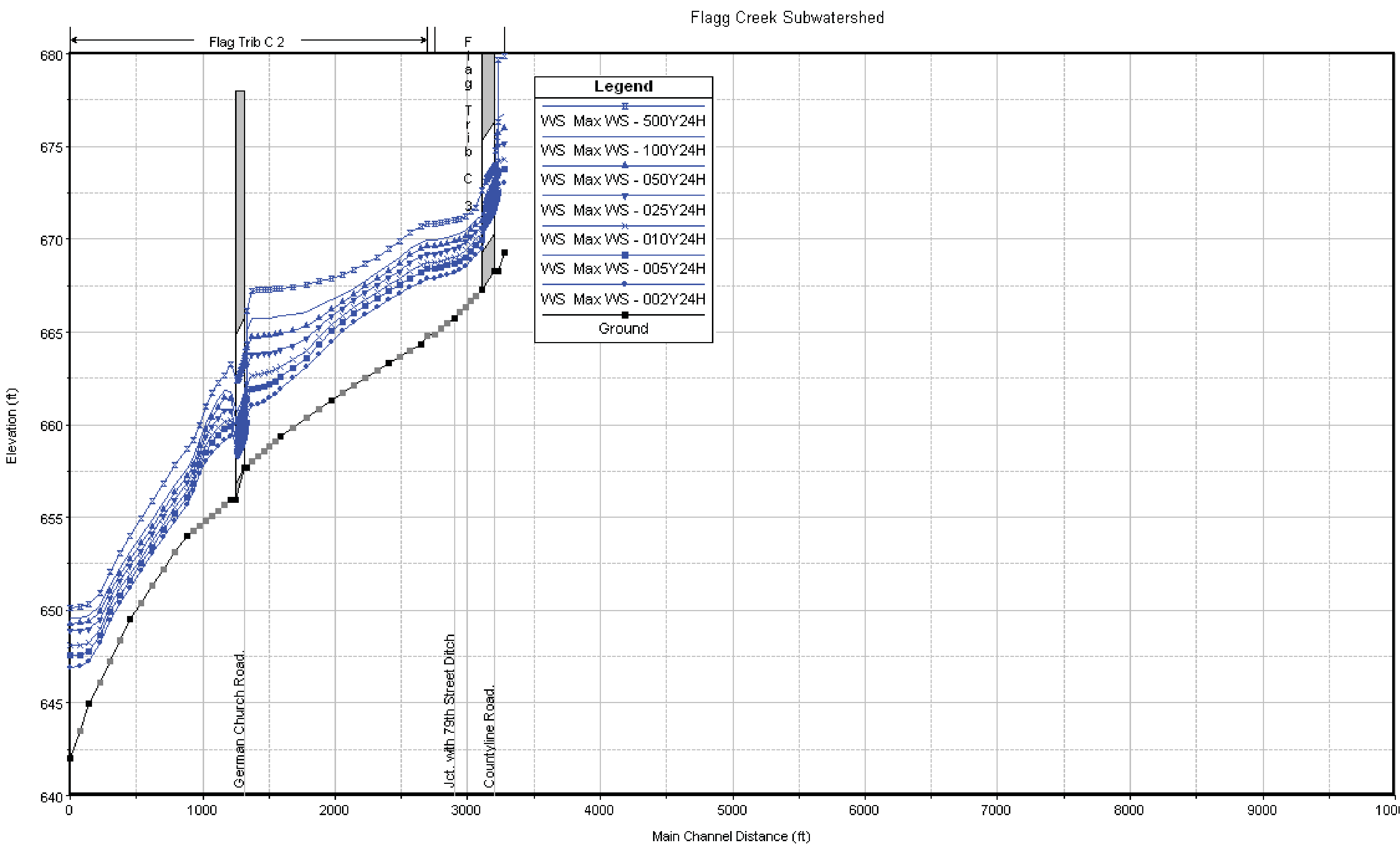
Flagg Creek Mainstem from Station 20000 to Station 30000



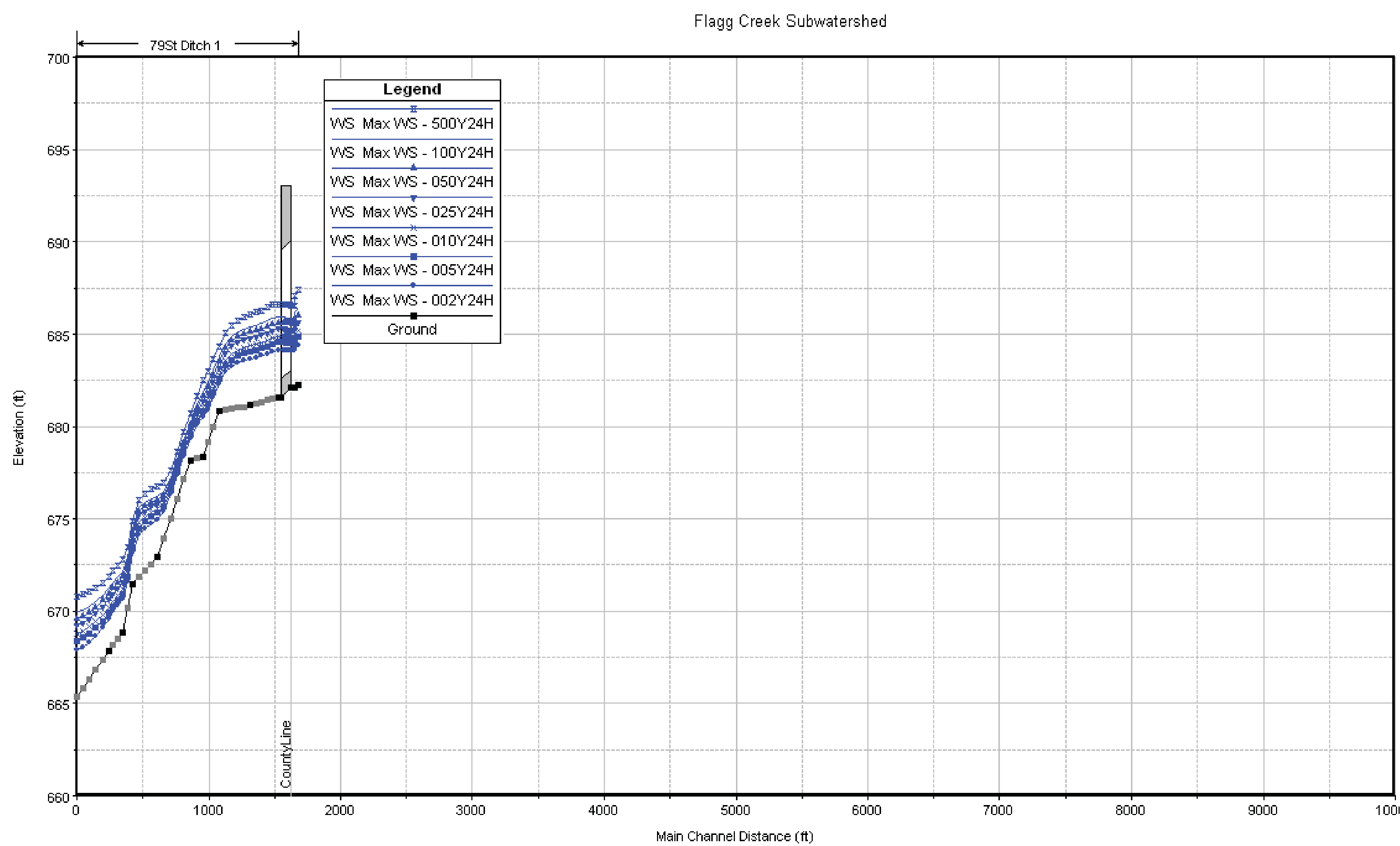
Flagg Creek Mainstem from Station 30000 to Station 40019 (County Line Road)



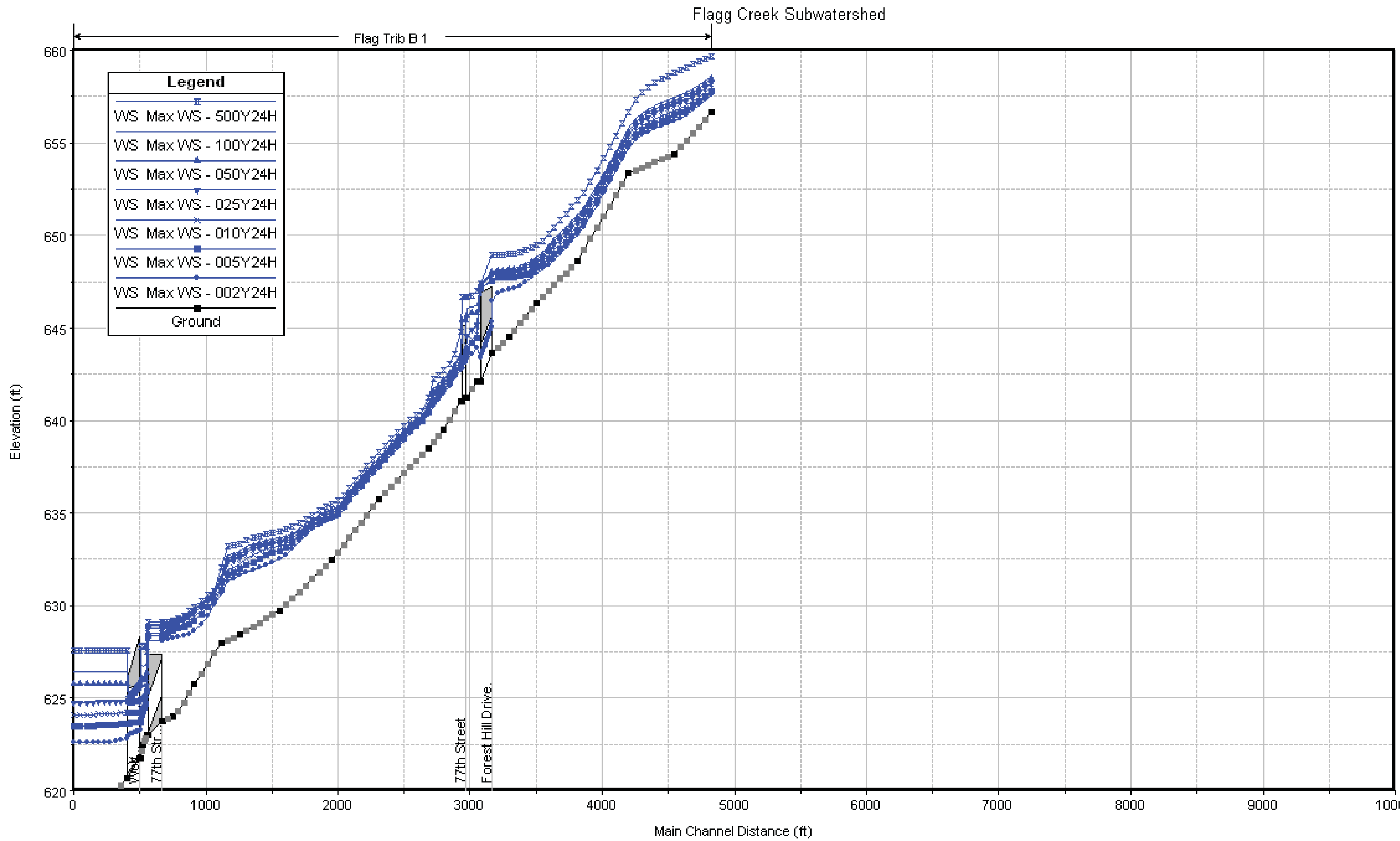
Flagg Creek Tributary C from Flagg Creek Mainstem to pond at Arrowhead Farm Drive



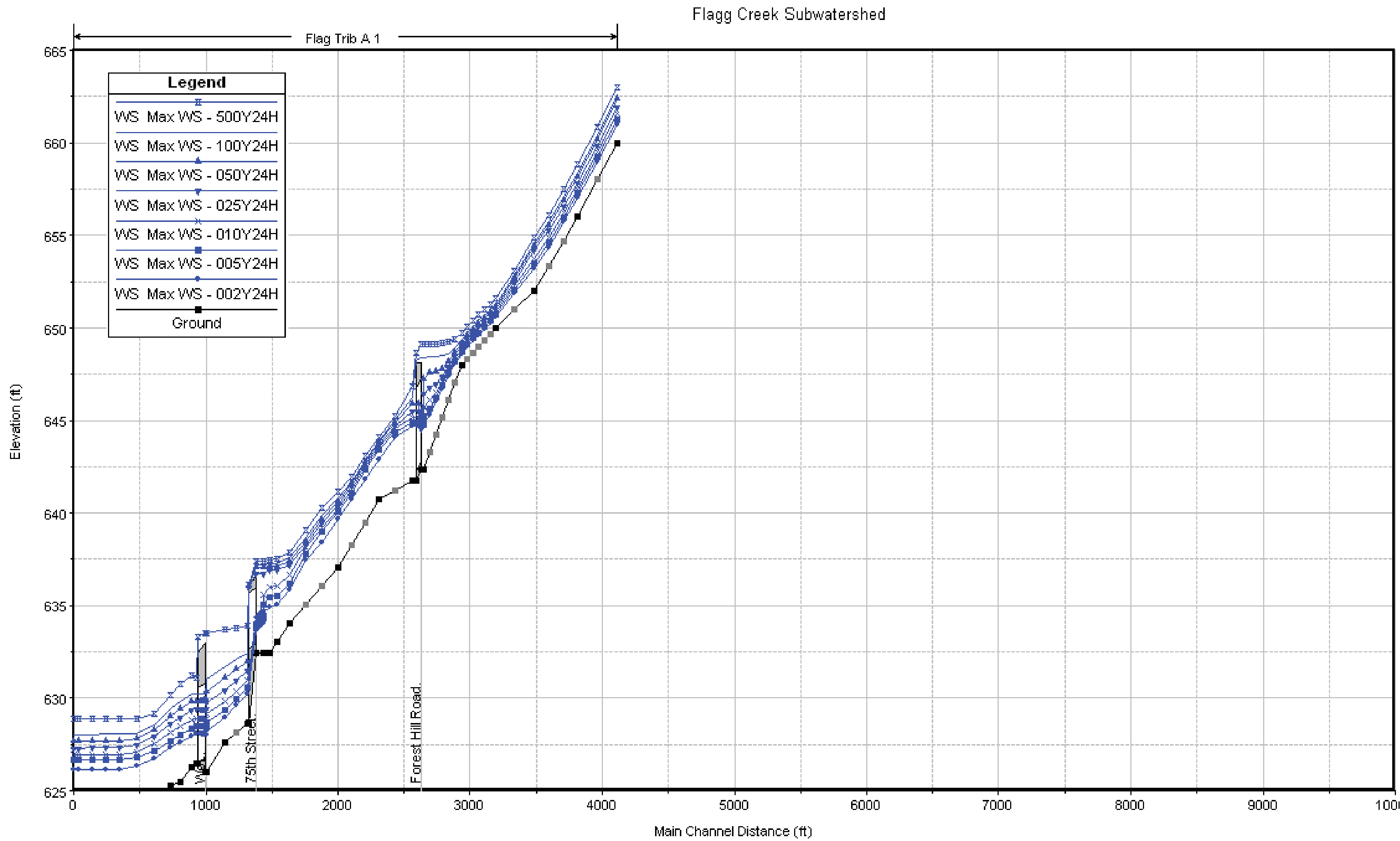
Flagg Creek Tributary C from pond at Arrowhead Farm Drive to Countyline Road



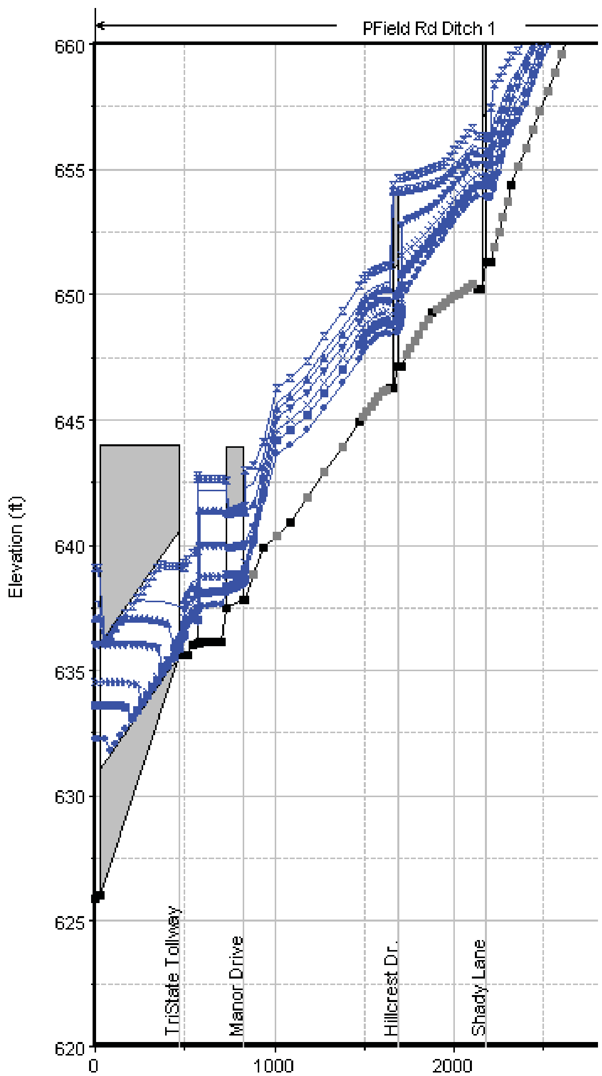
79th Street Ditch from Flagg Creek Tributary C to Countyline Road

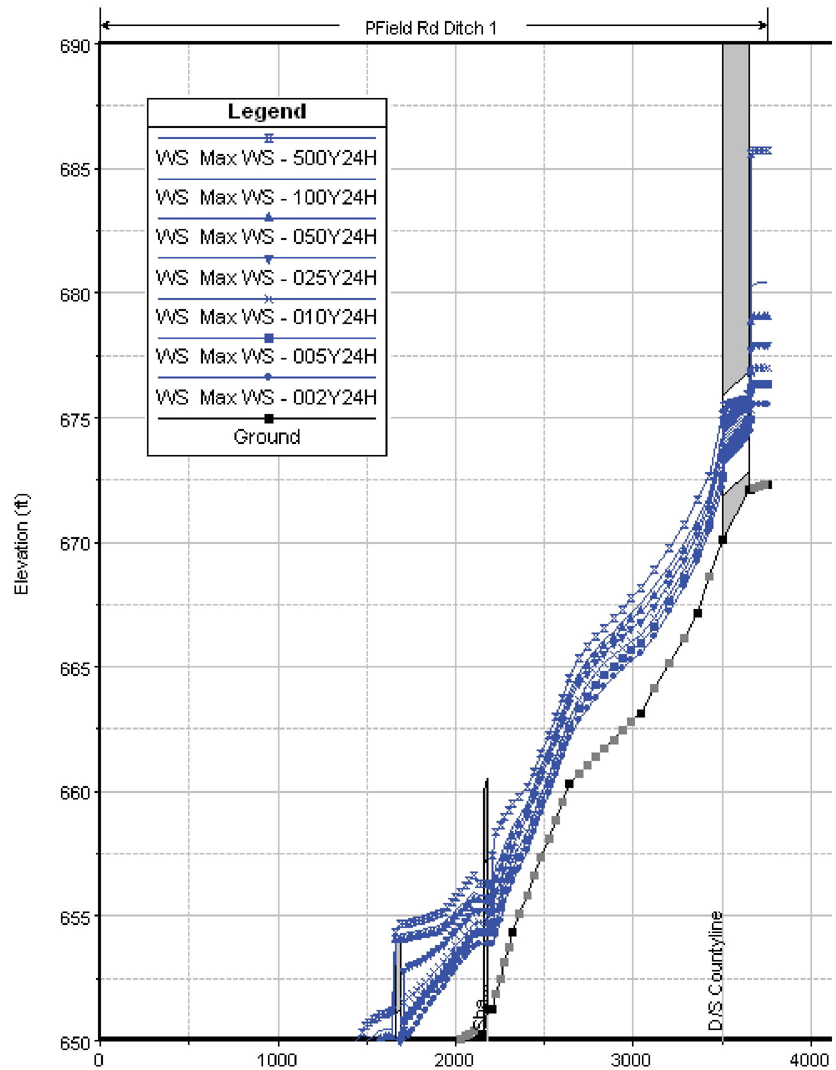


Flagg Creek Tributary B from Flagg CreekMainstem to Burr Ridge Village Center

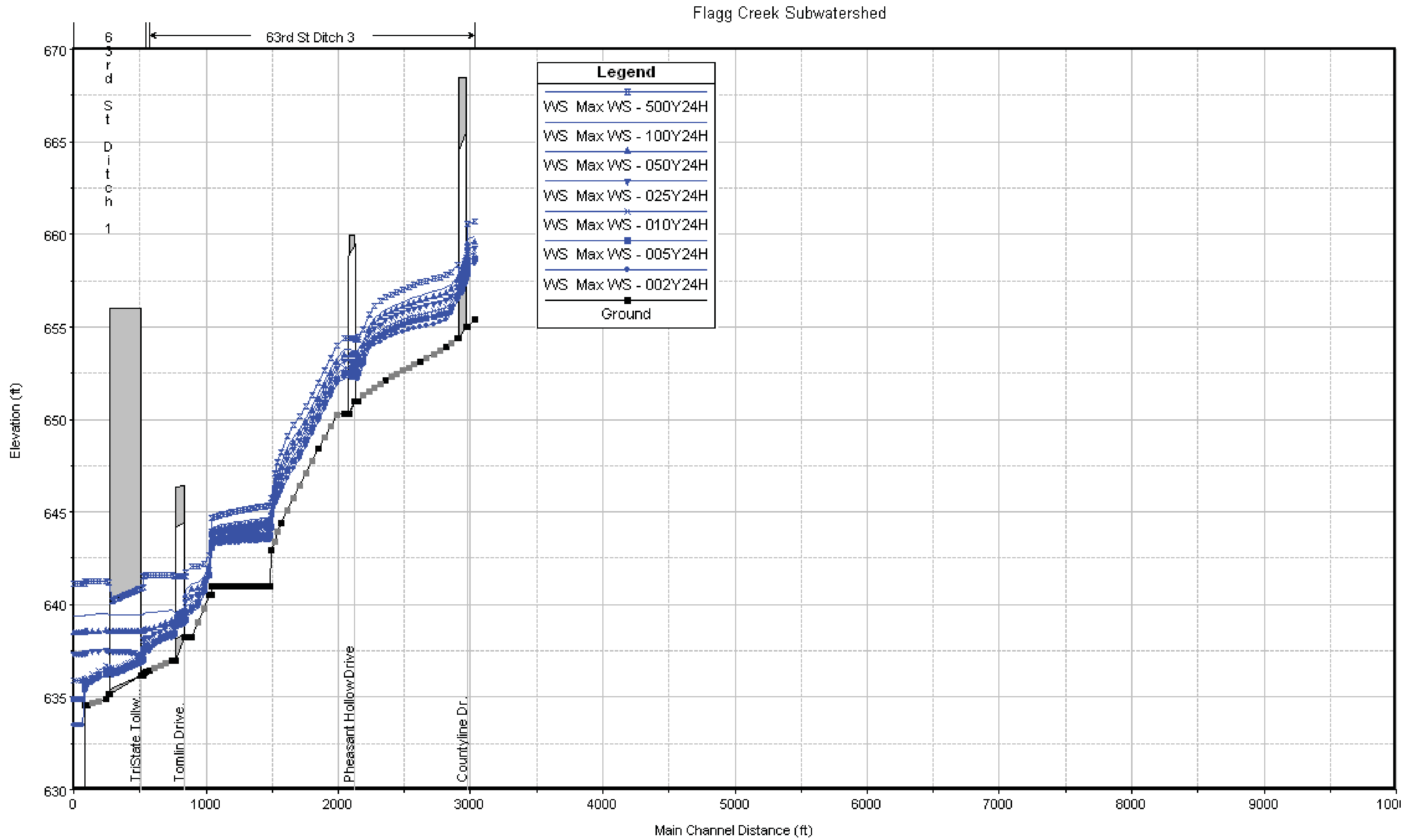


Flagg Creek Tributary A from Flagg CreekMainstem to Burr Ridge Village Center

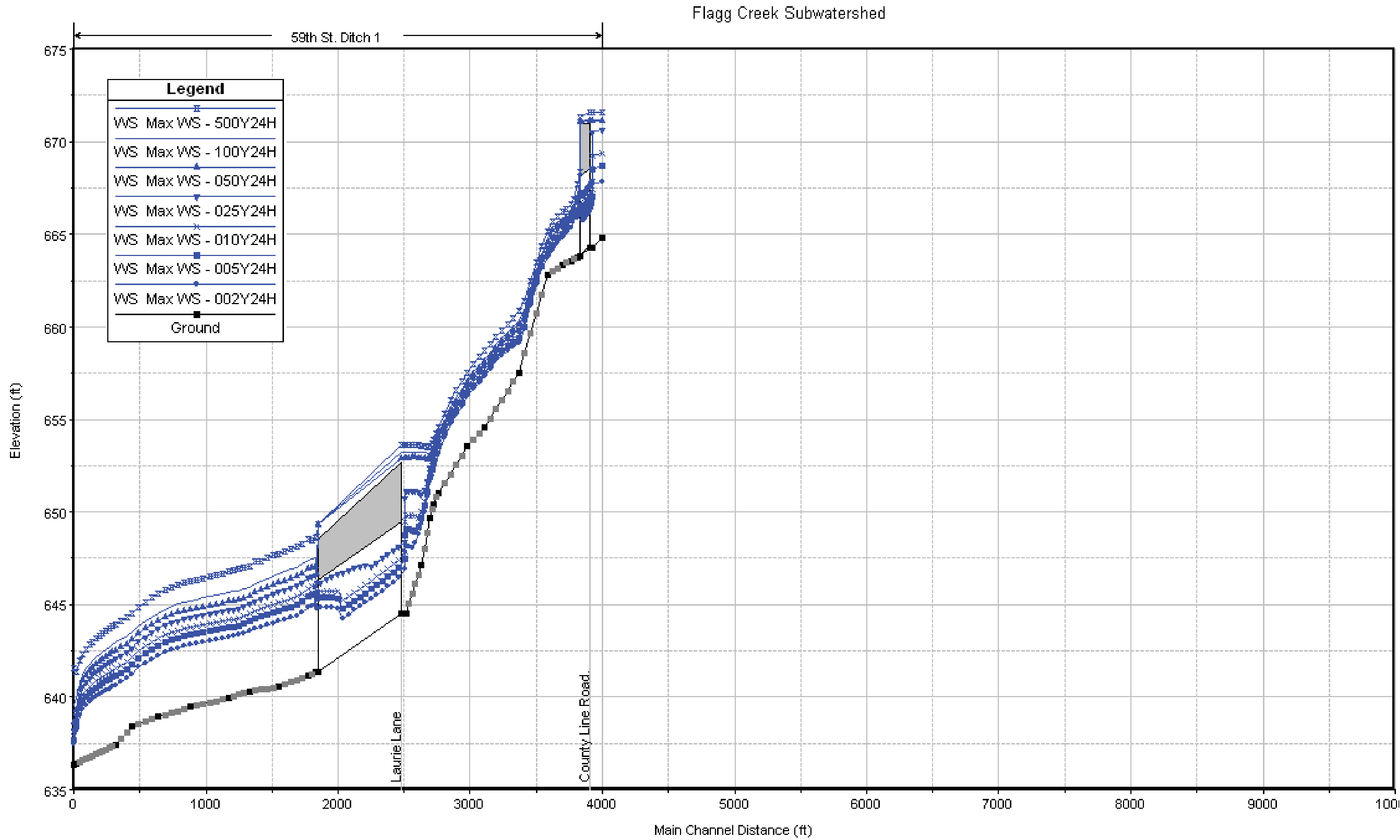




Plainfield Road Ditch from Flagg Creek Mainstem to Countyline Road

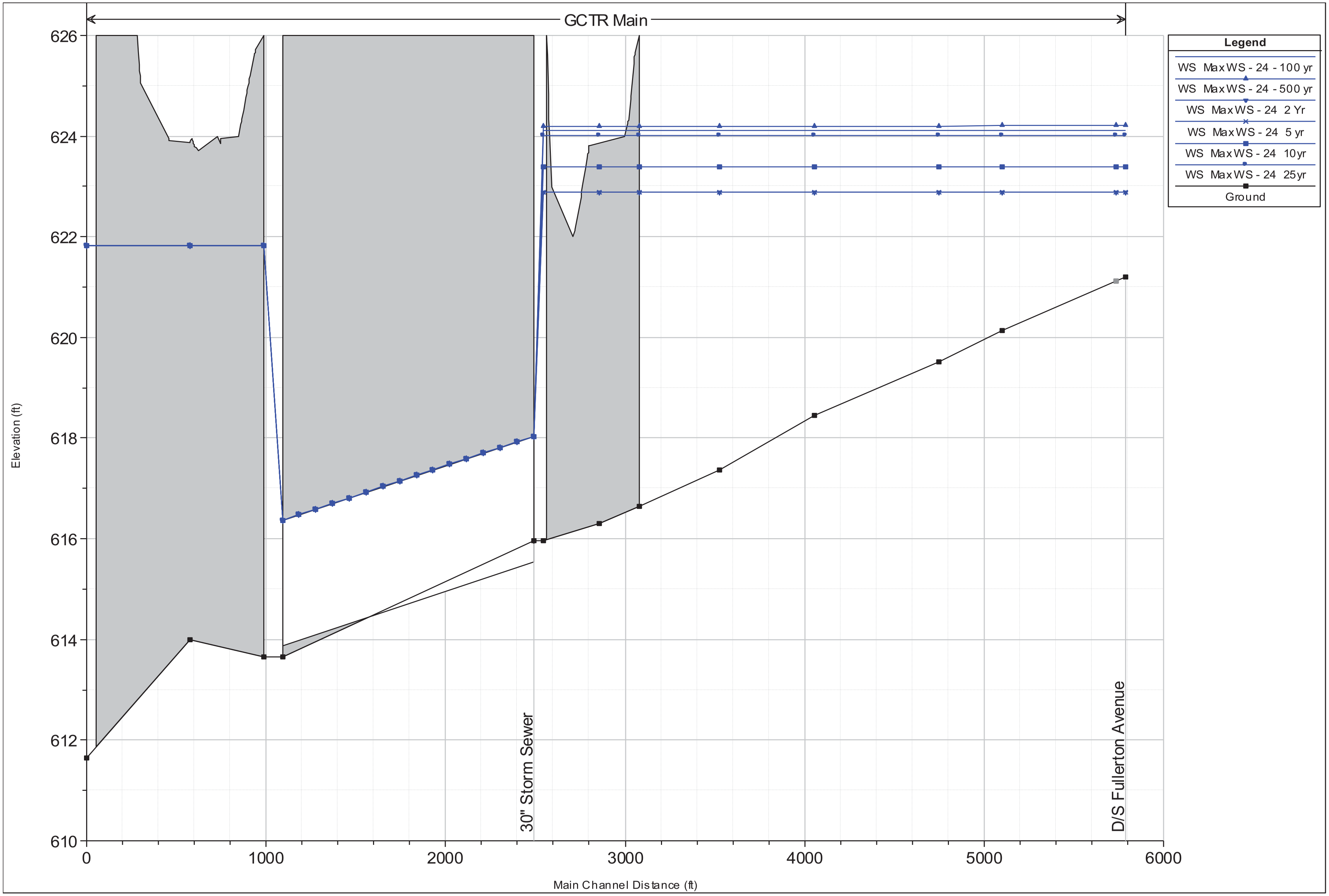


63rd Street Ditch from Flagg Creek Mainstem to Countyline Road



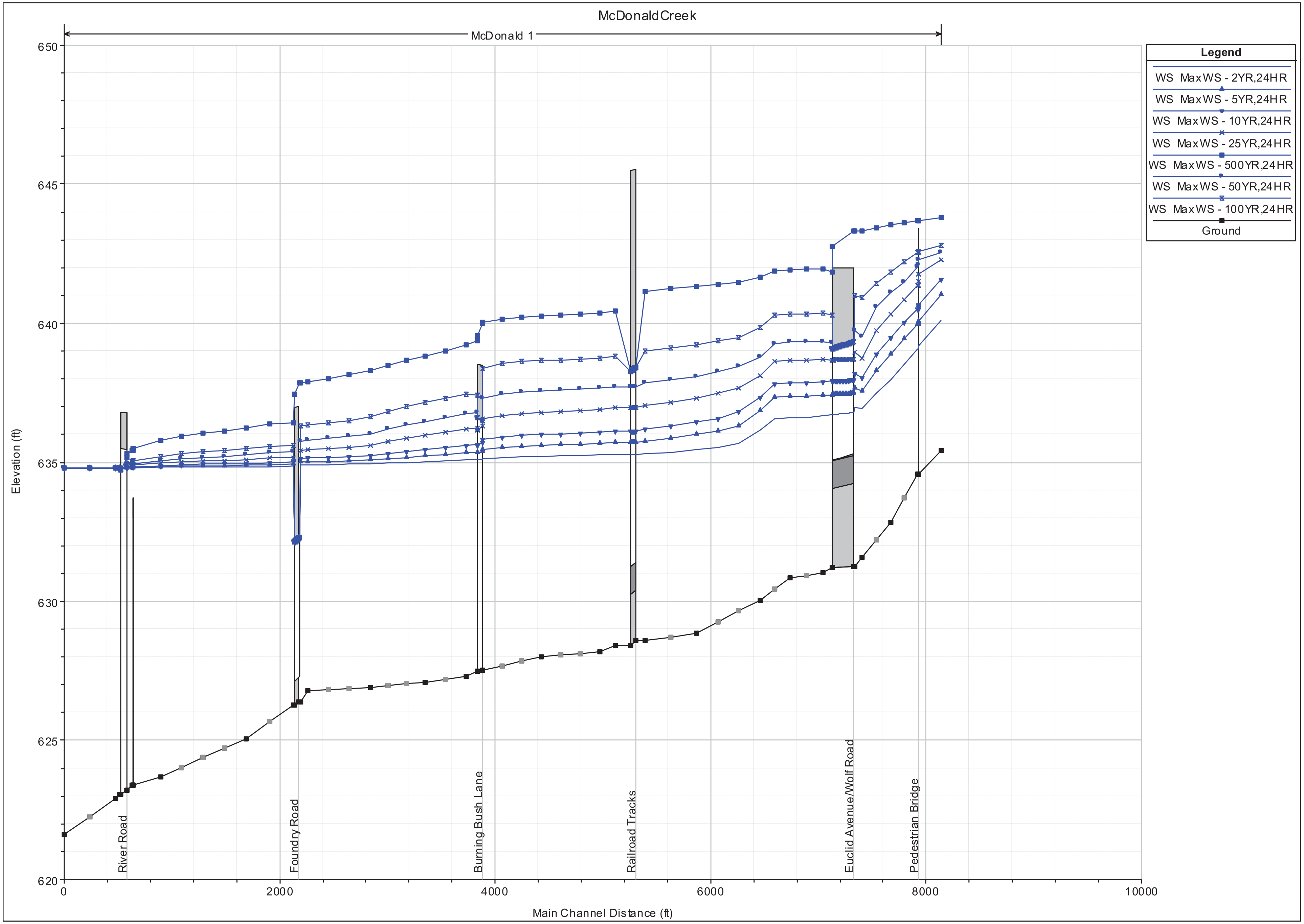
59th Street Ditch from 63rd Street Ditch to Countyline Road

Golf Course Tributary Subwatershed
Hydraulic Profiles for Existing Conditions

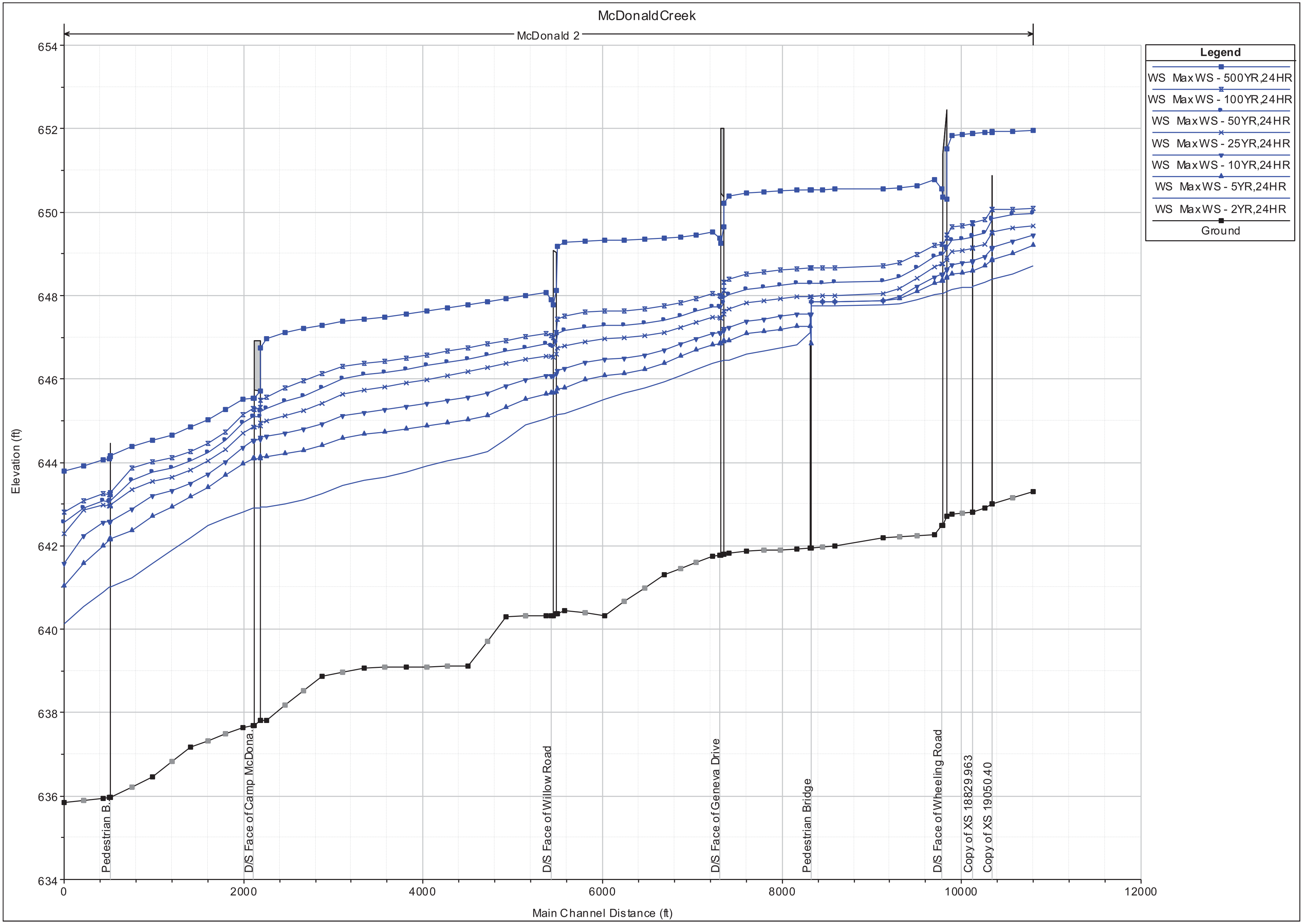


Golf Course Tributary A from confluence with Des Plaines River to upstream study limit south of Fullerton Avenue

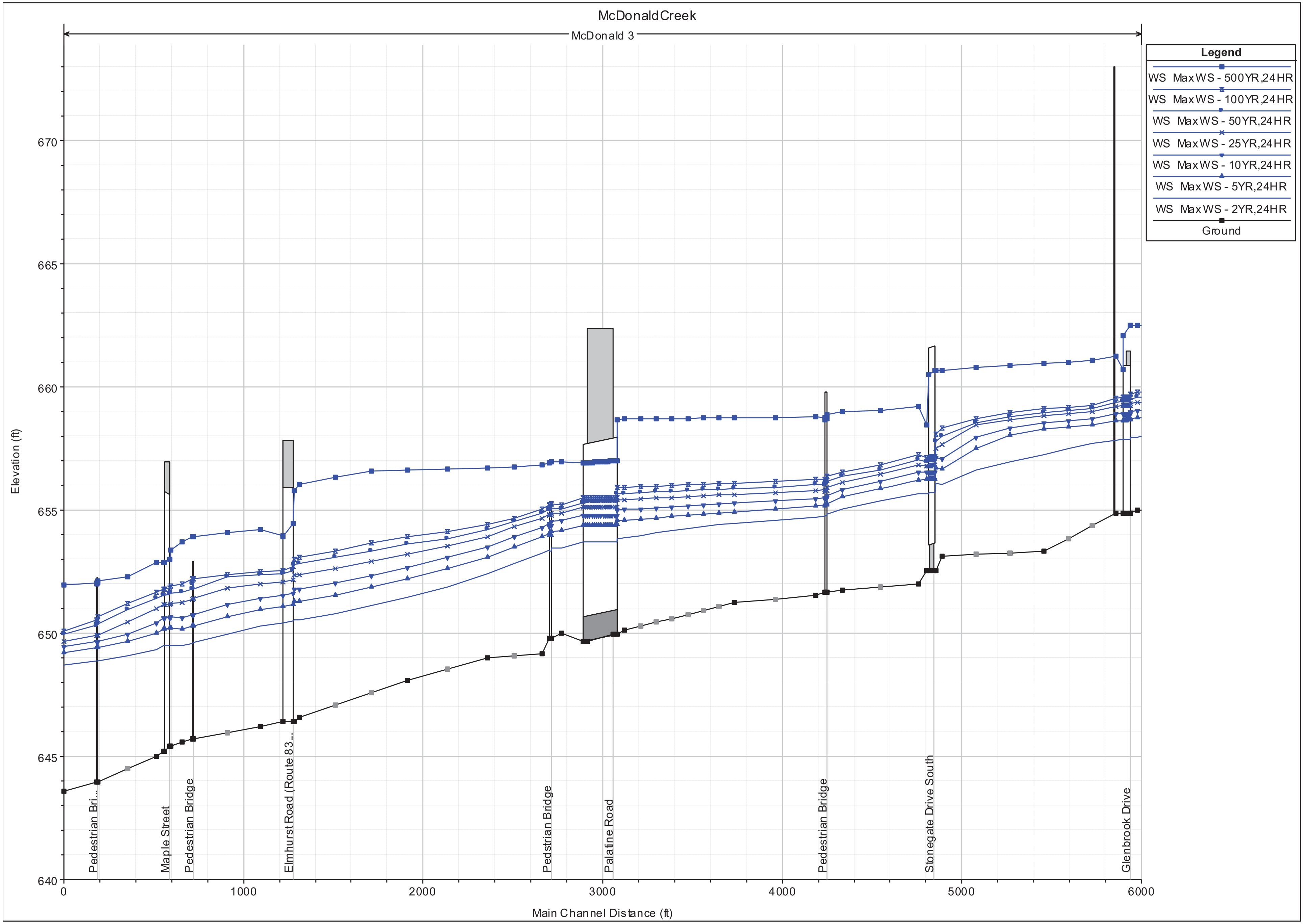
McDonald Creek Subwatershed
Hydraulic Profiles for Existing Conditions



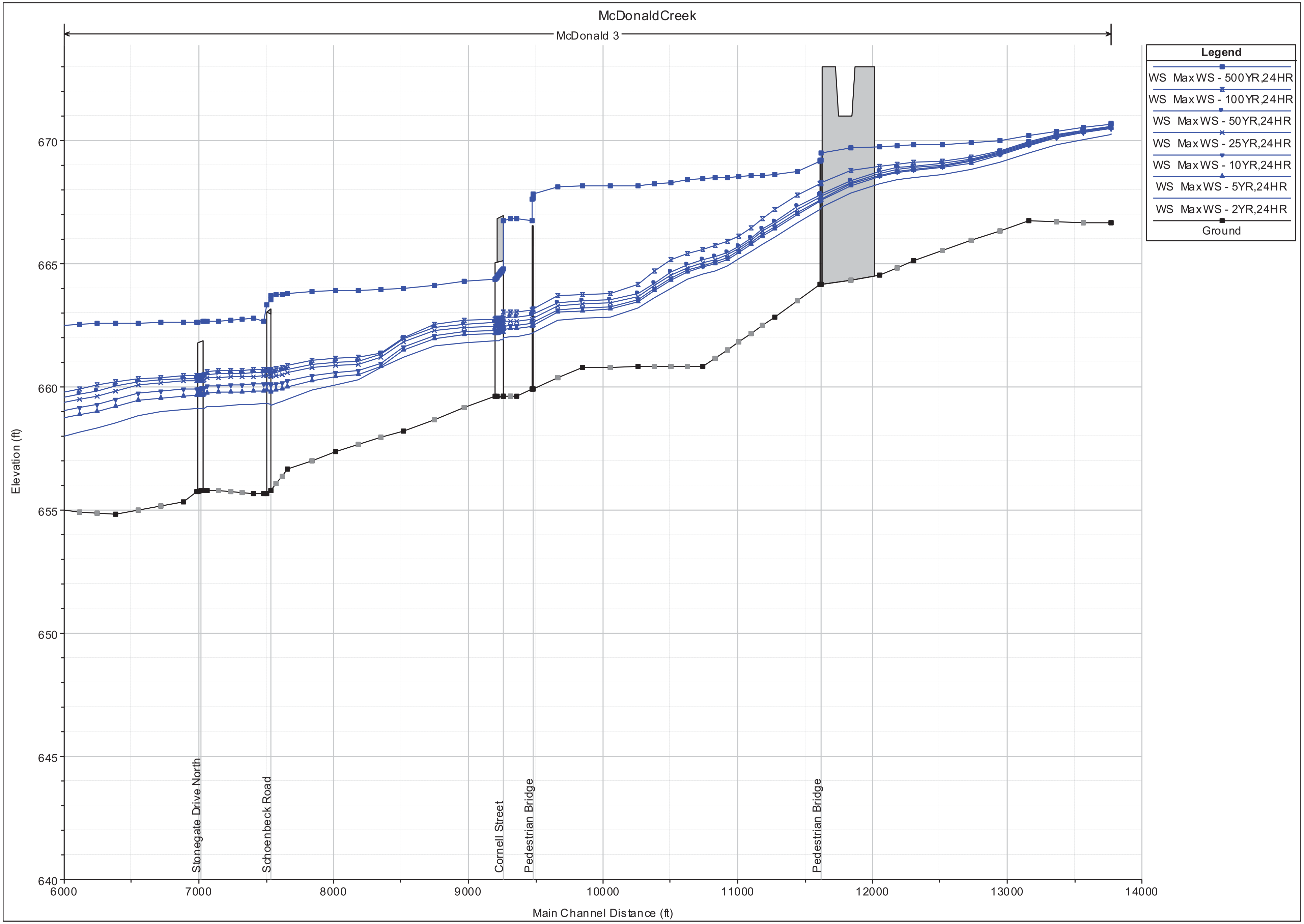
McDonald Creek from confluence with Des Plaines River to confluence with Tributary B



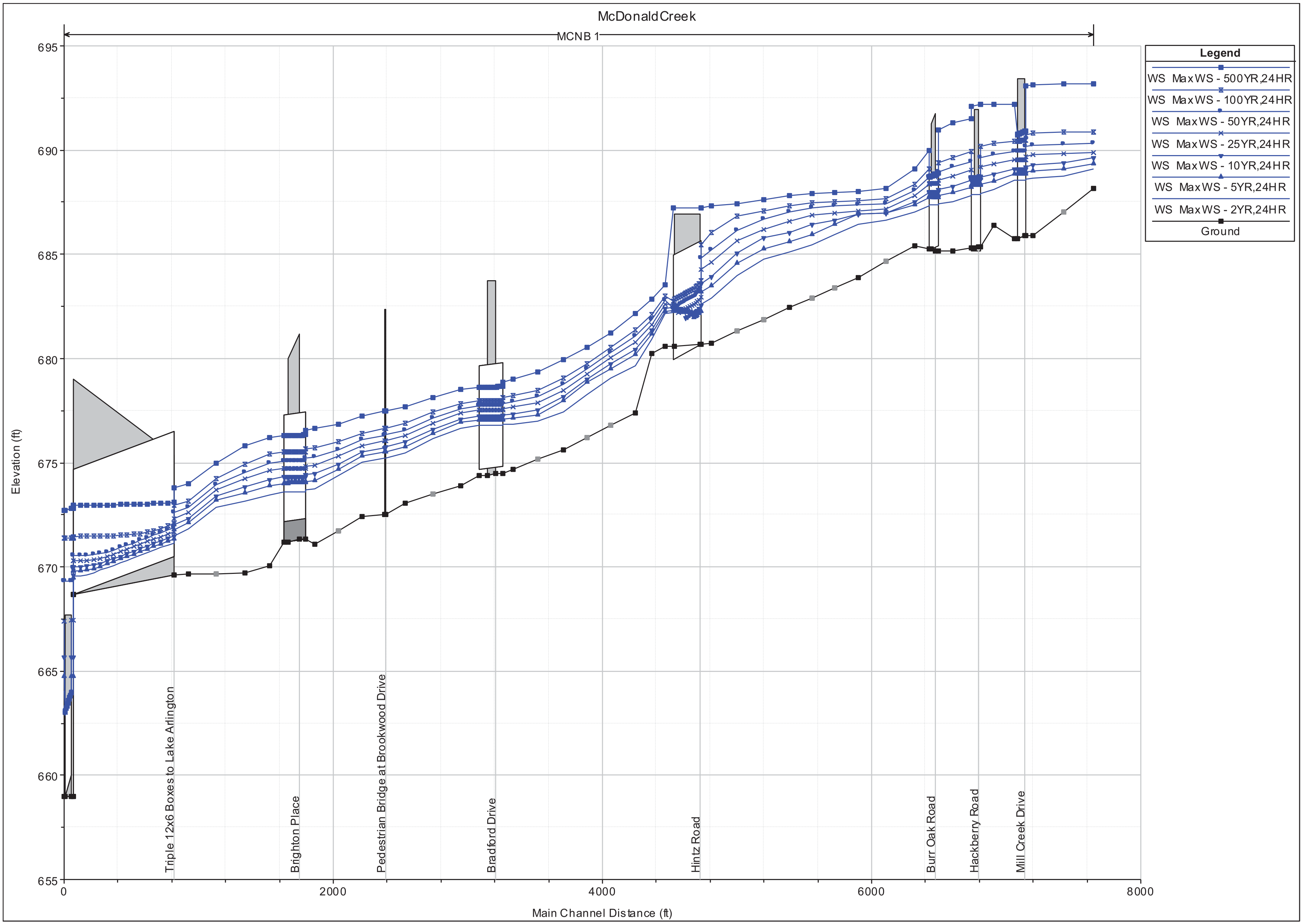
McDonald Creek from confluence with Tributary B to confluence with Tributary A



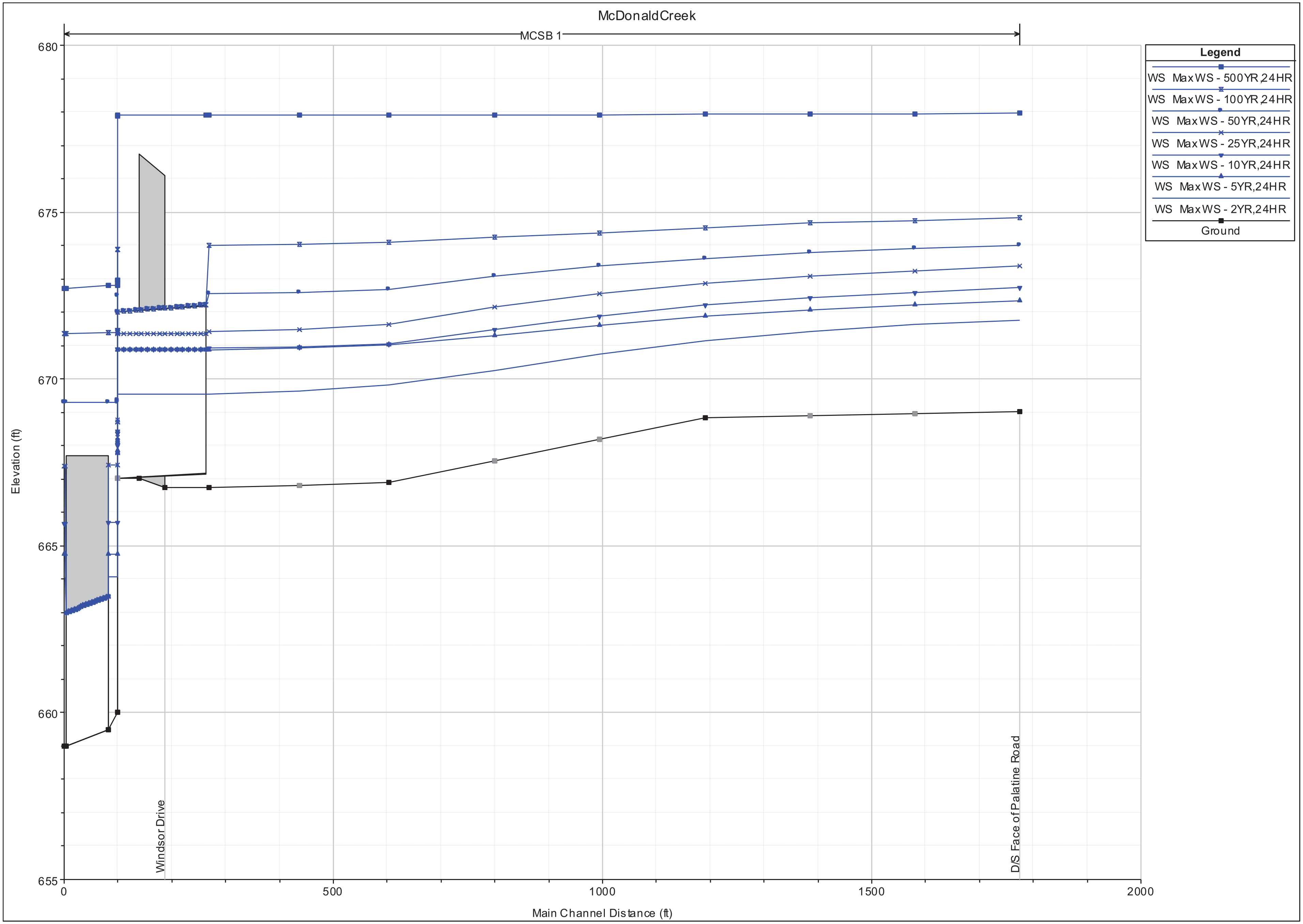
McDonald Creek from confluence with Tributary A to Glenbrook Drive



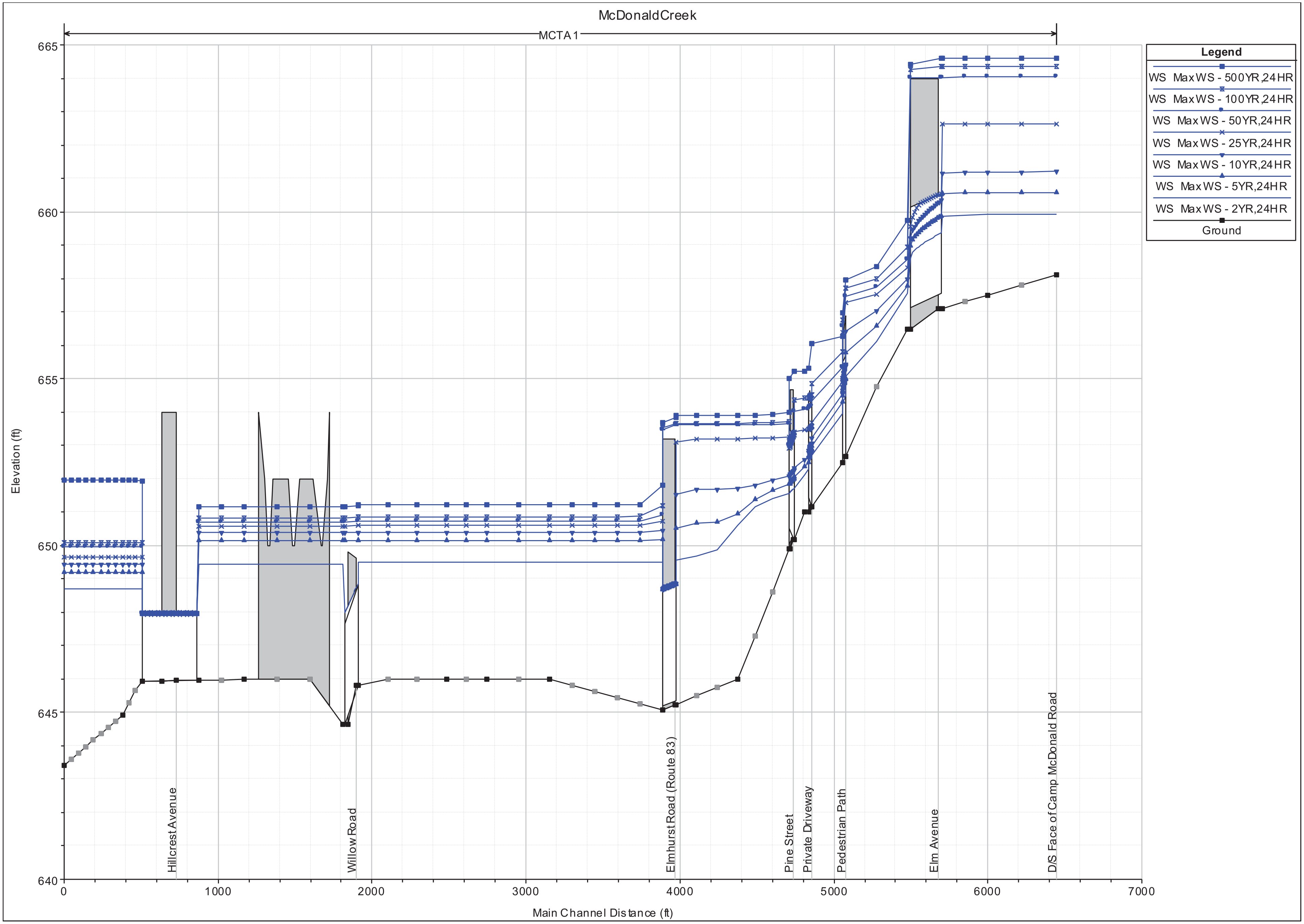
McDonald Creek from Glenbrook Drive to outlet of Lake Arlington



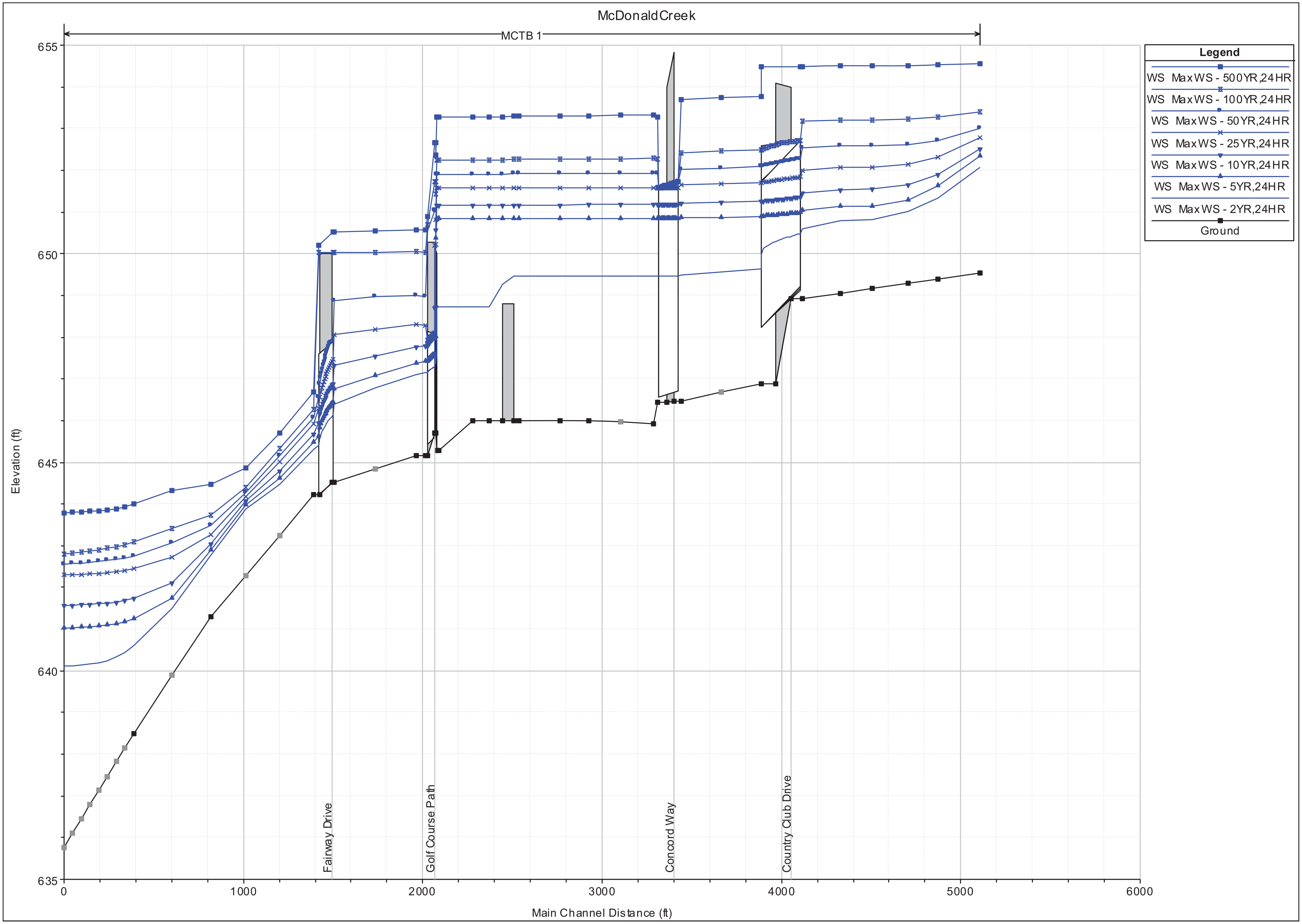
McDonald Creek North Branch from outlet to Lake Arlington to upstream limit of study area



McDonald Creek South Branch from outlet to Lake Arlington to upstream limit of study area

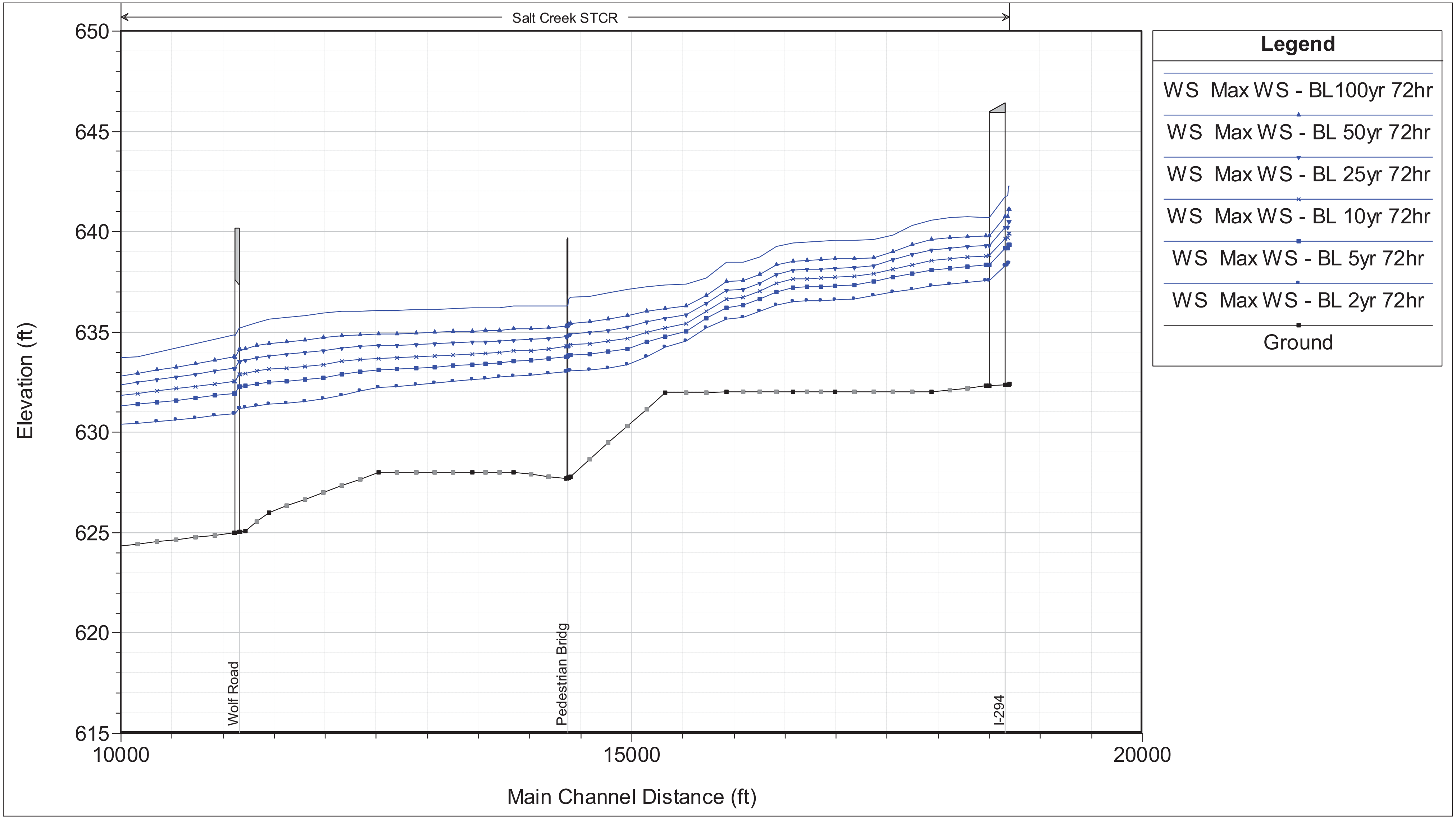


McDonald Creek Tributary A from confluence with McDonald Creek to upstream limit of study area

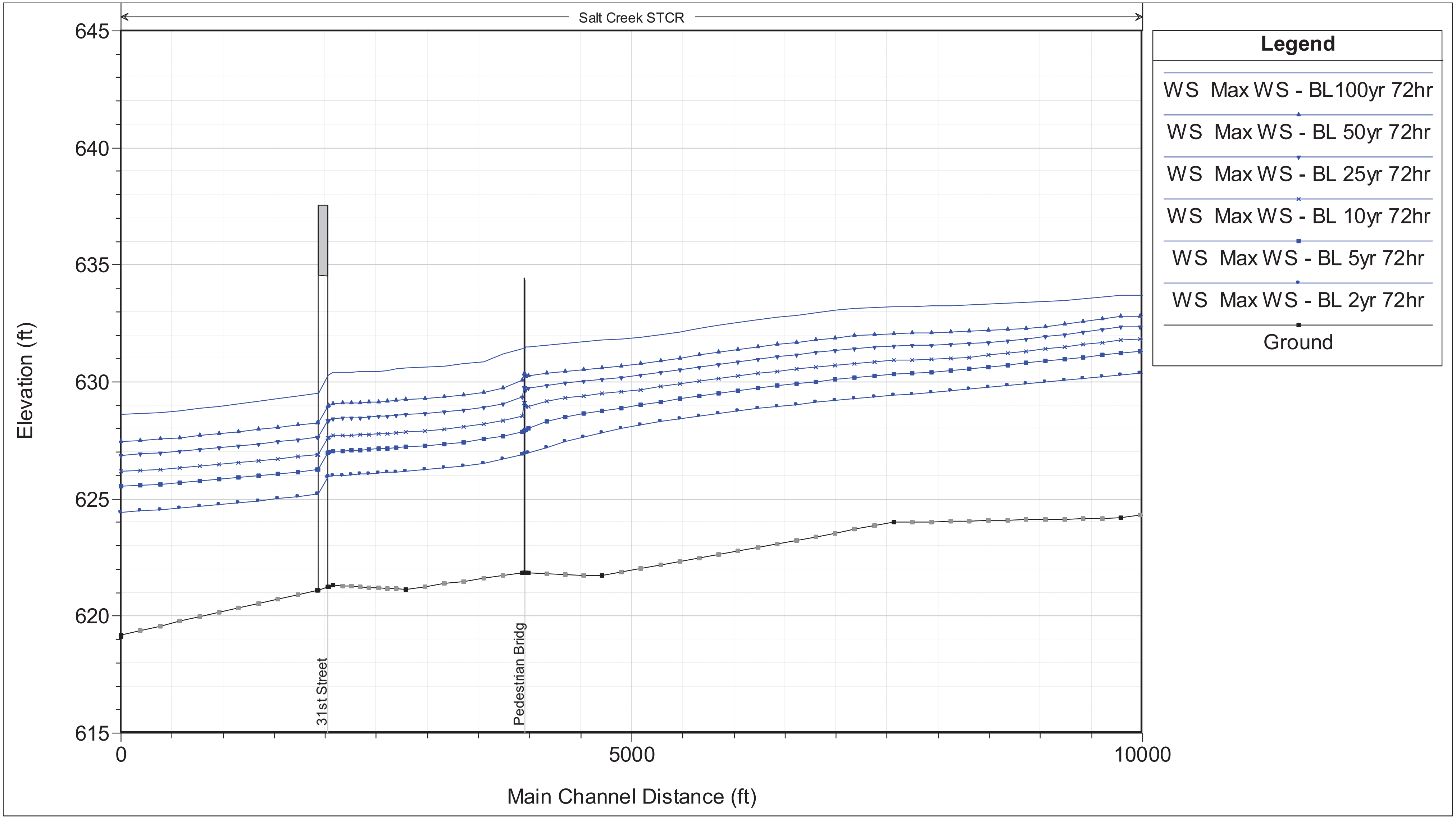


McDonald Creek Tributary B from confluence with McDonald Creek to upstream limit of study area

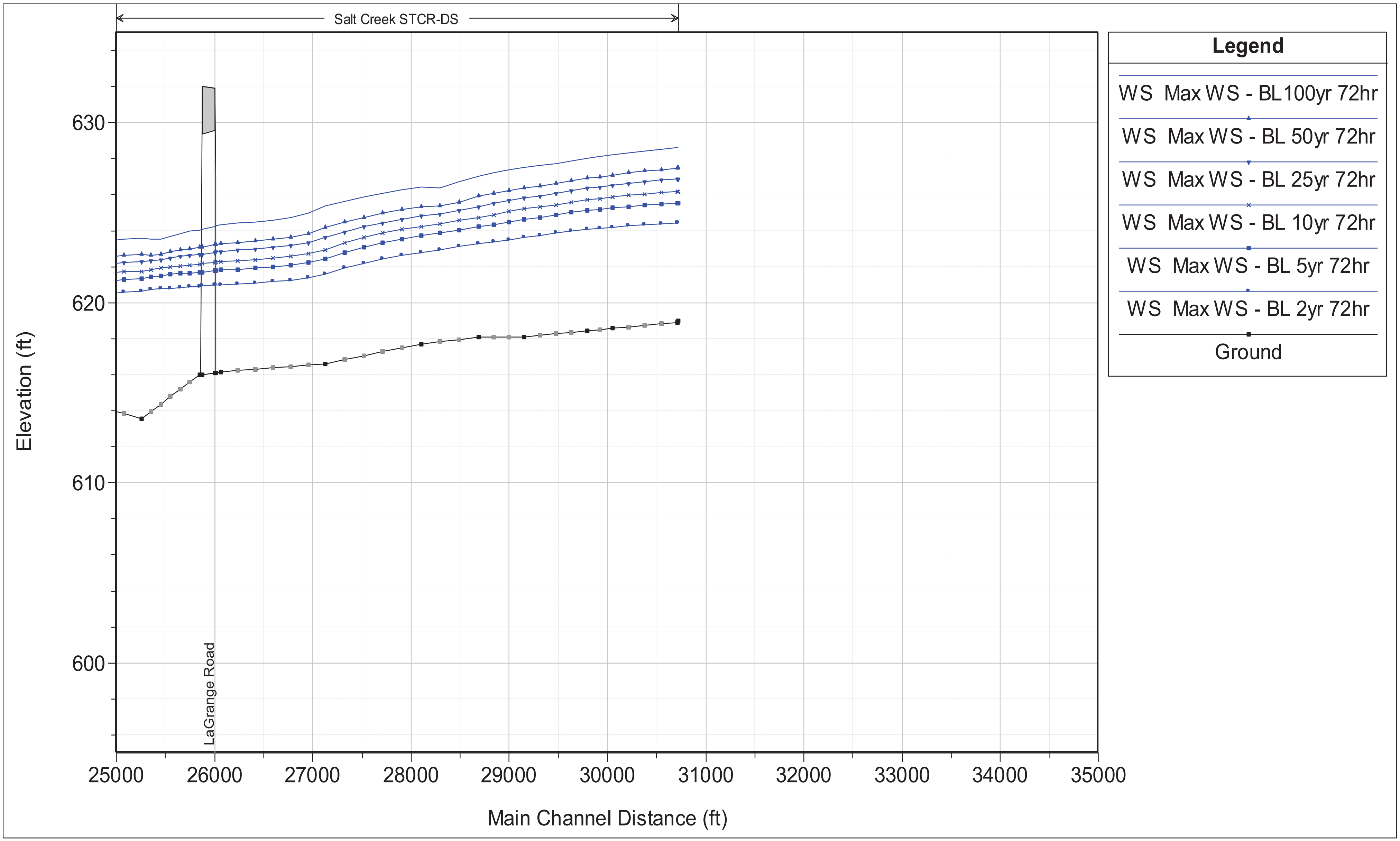
Salt Creek Subwatershed
Hydraulic Profiles for Existing Conditions



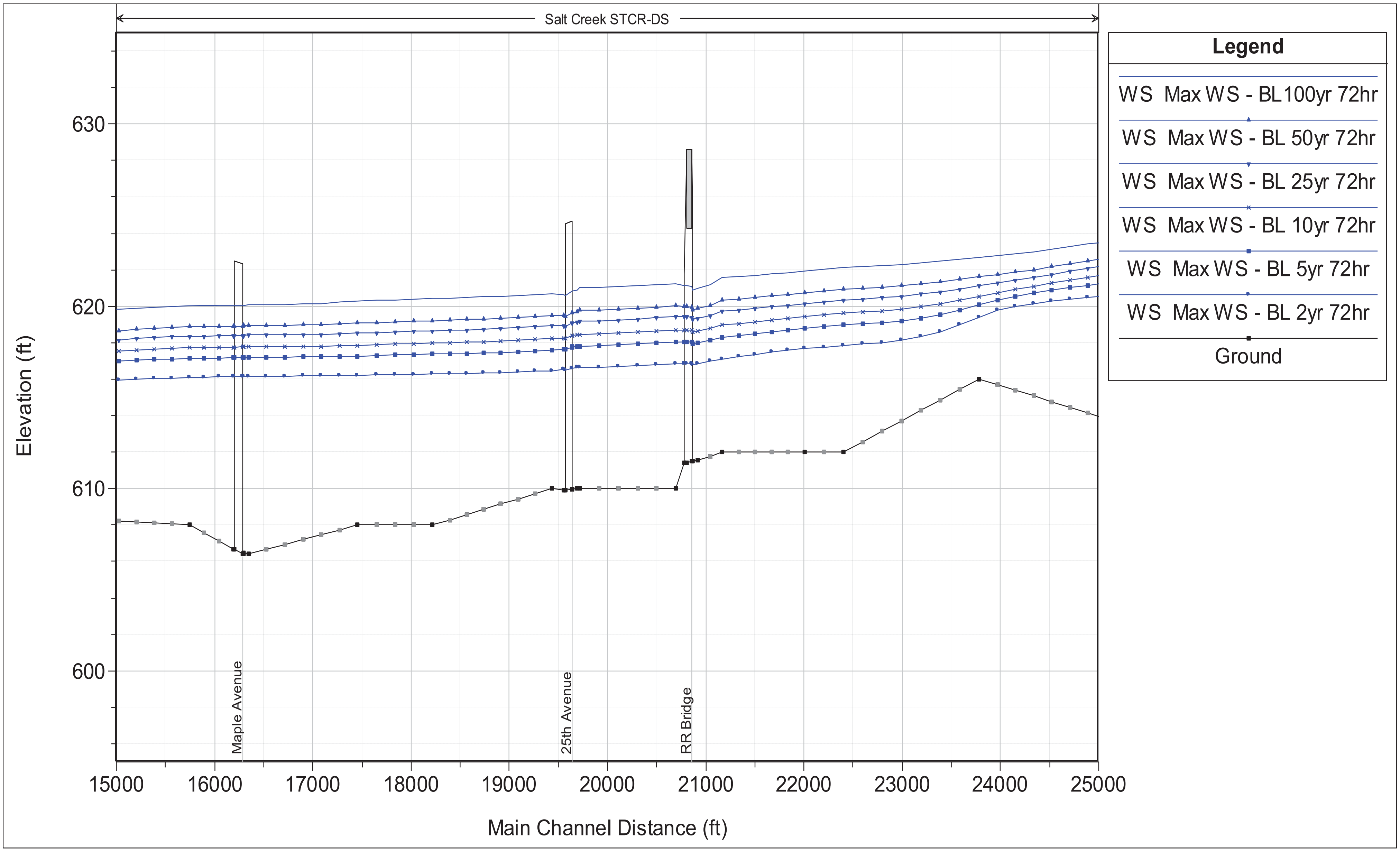
Salt Creek Mainline from I-294 to 10,000 feet downstream of I-294



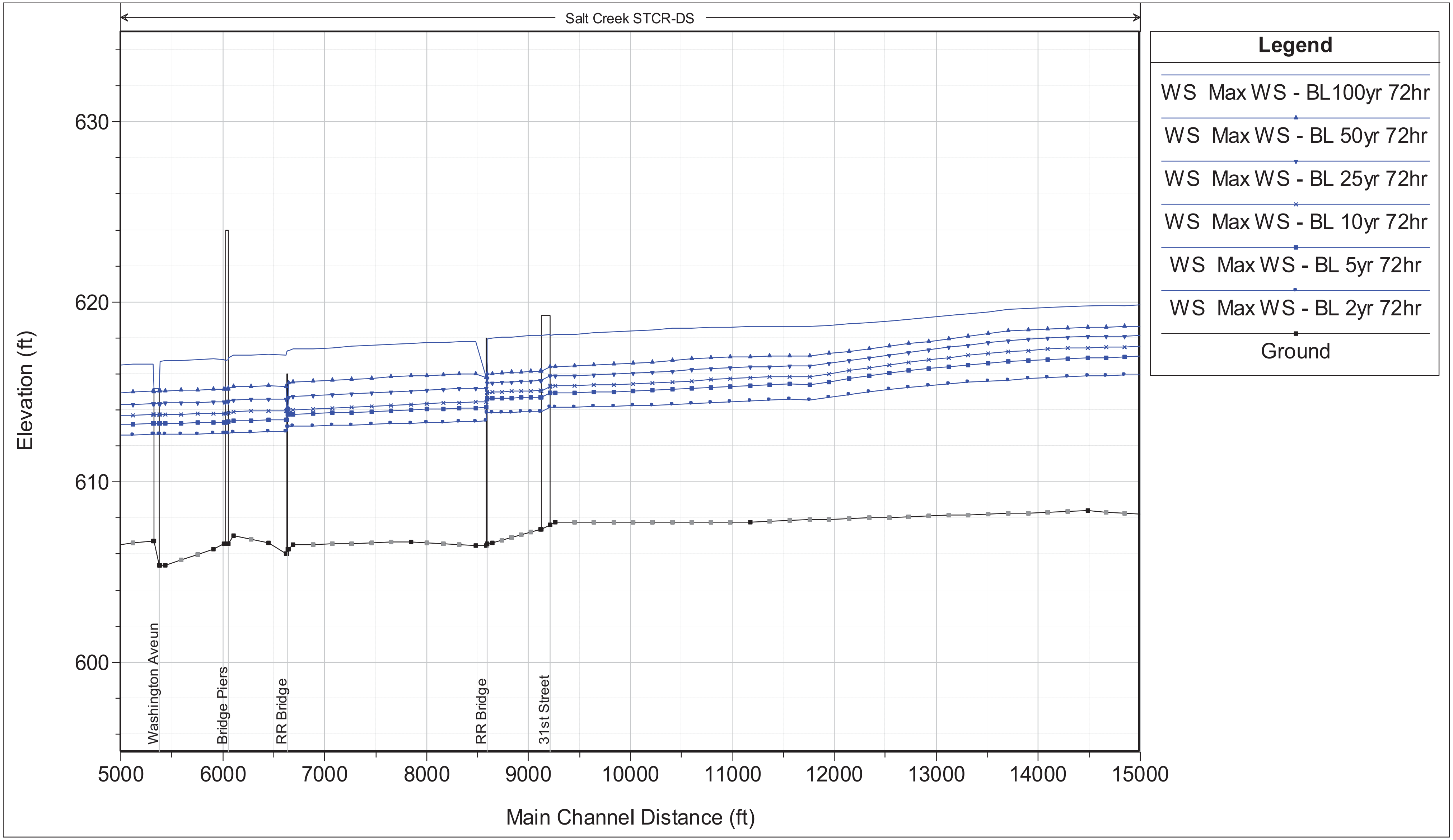
Salt Creek Mainline from 10,000 feet downstream of I-294 to confluence with Salt Creek South Fork



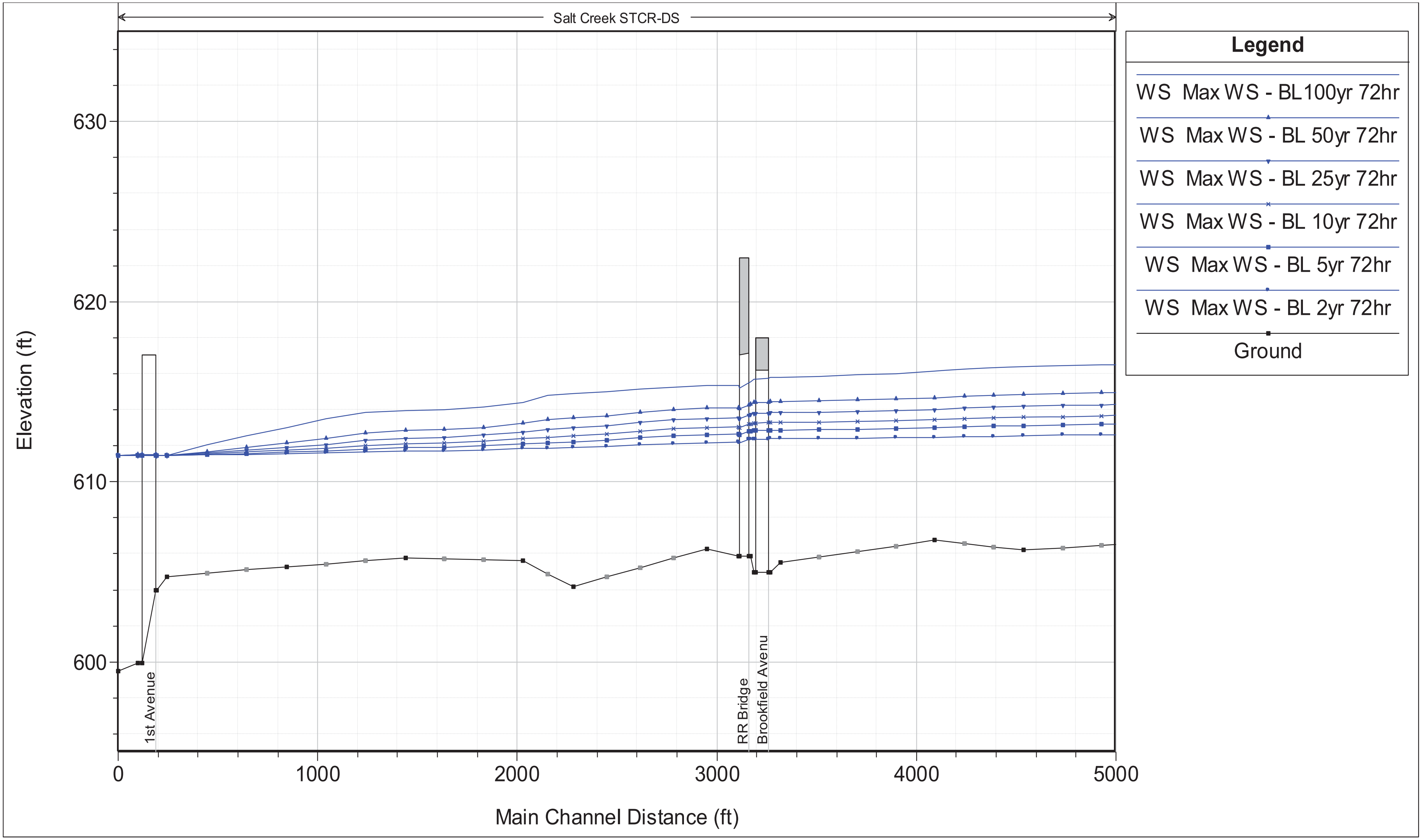
Salt Creek ML from confluence with Salt Creek South Fork to 25,000 feet upstream of confluence with Des Plaines River



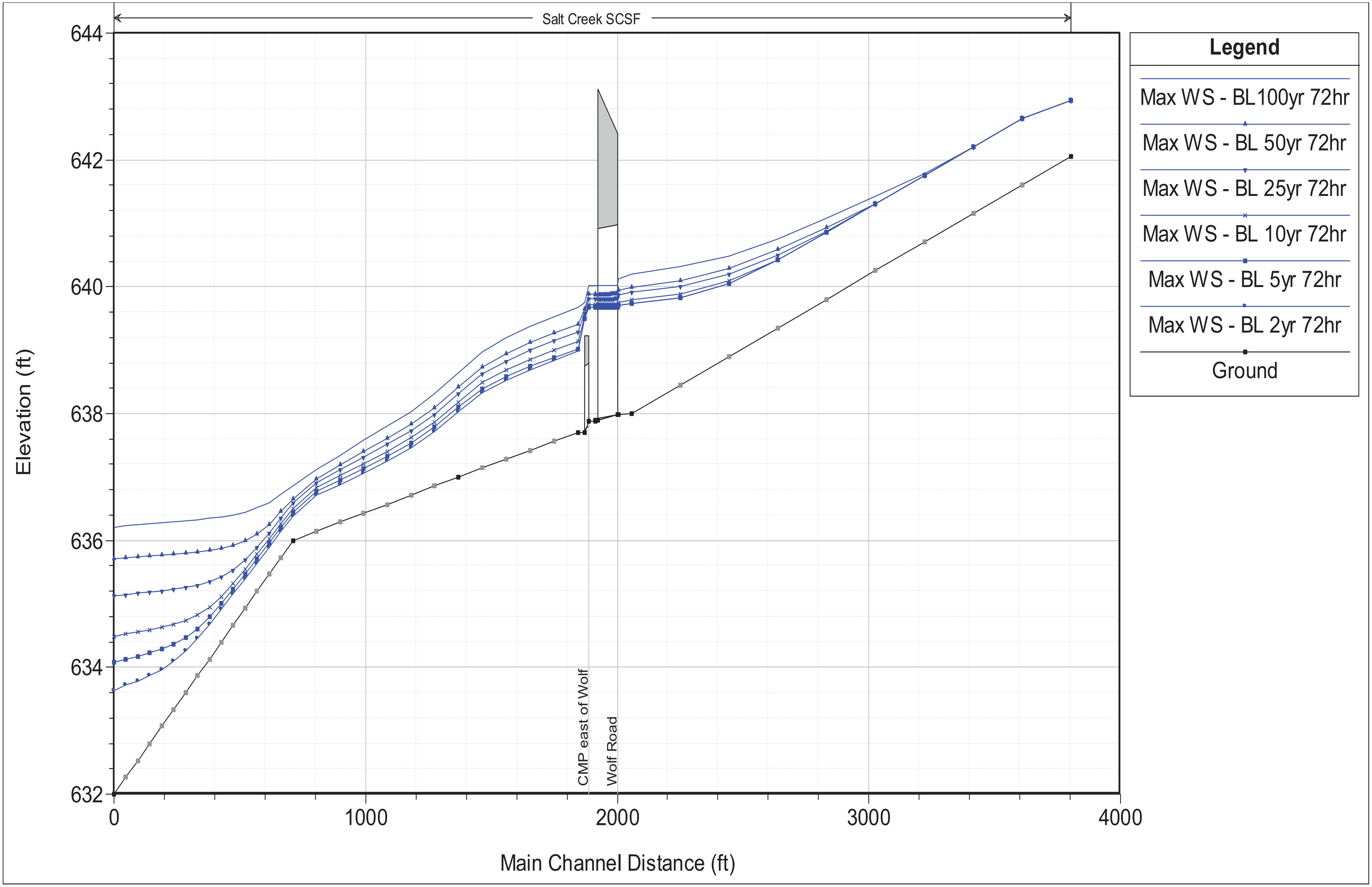
Salt Creek ML from 25,000 feet upstream of Des Plaines River to 15,000 feet upstream of confluence with Des Plaines River



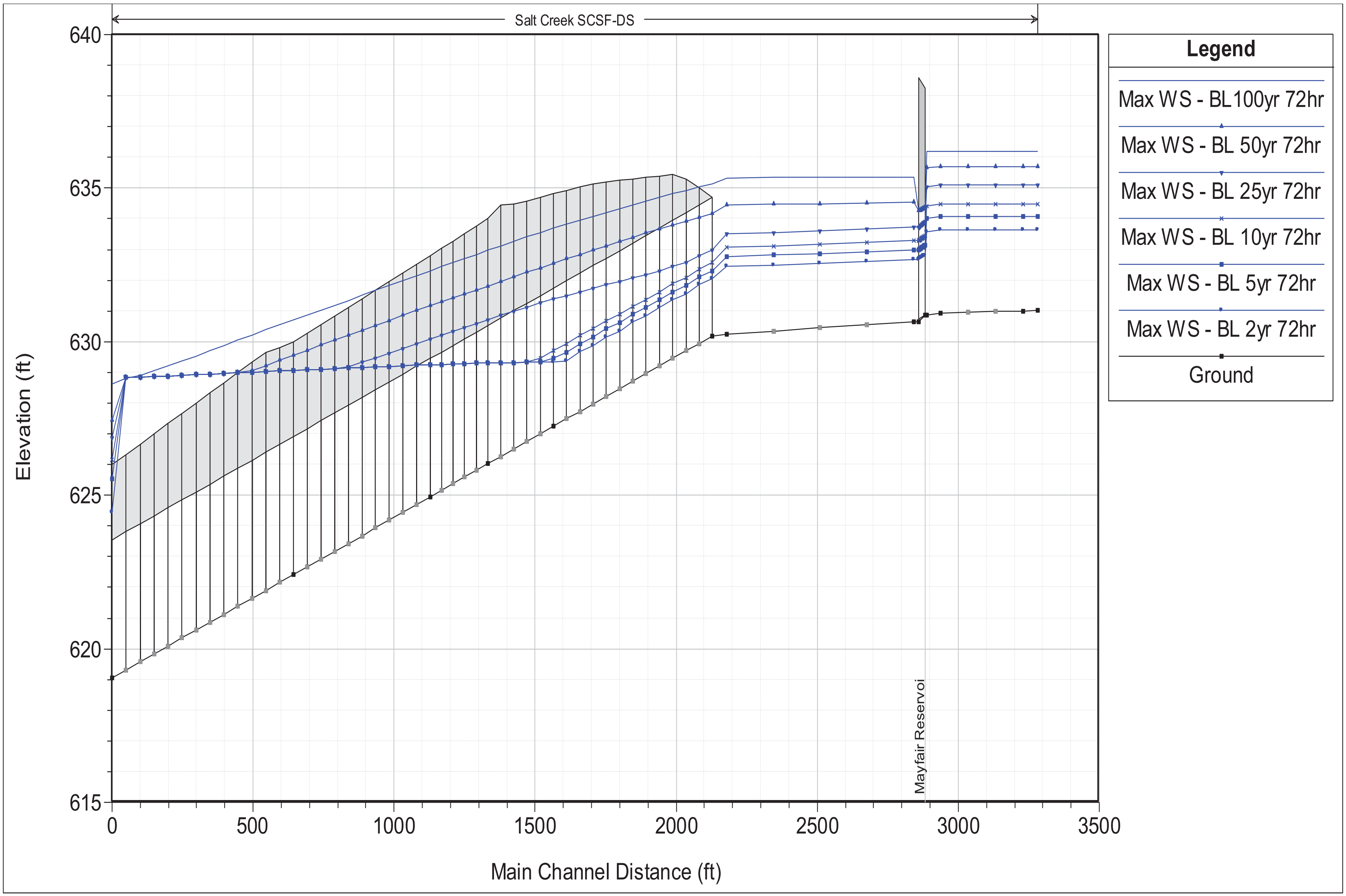
Salt Creek ML from 15,000 feet upstream of Des Plaines River to 5,000 feet upstream of confluence with Des Plaines River



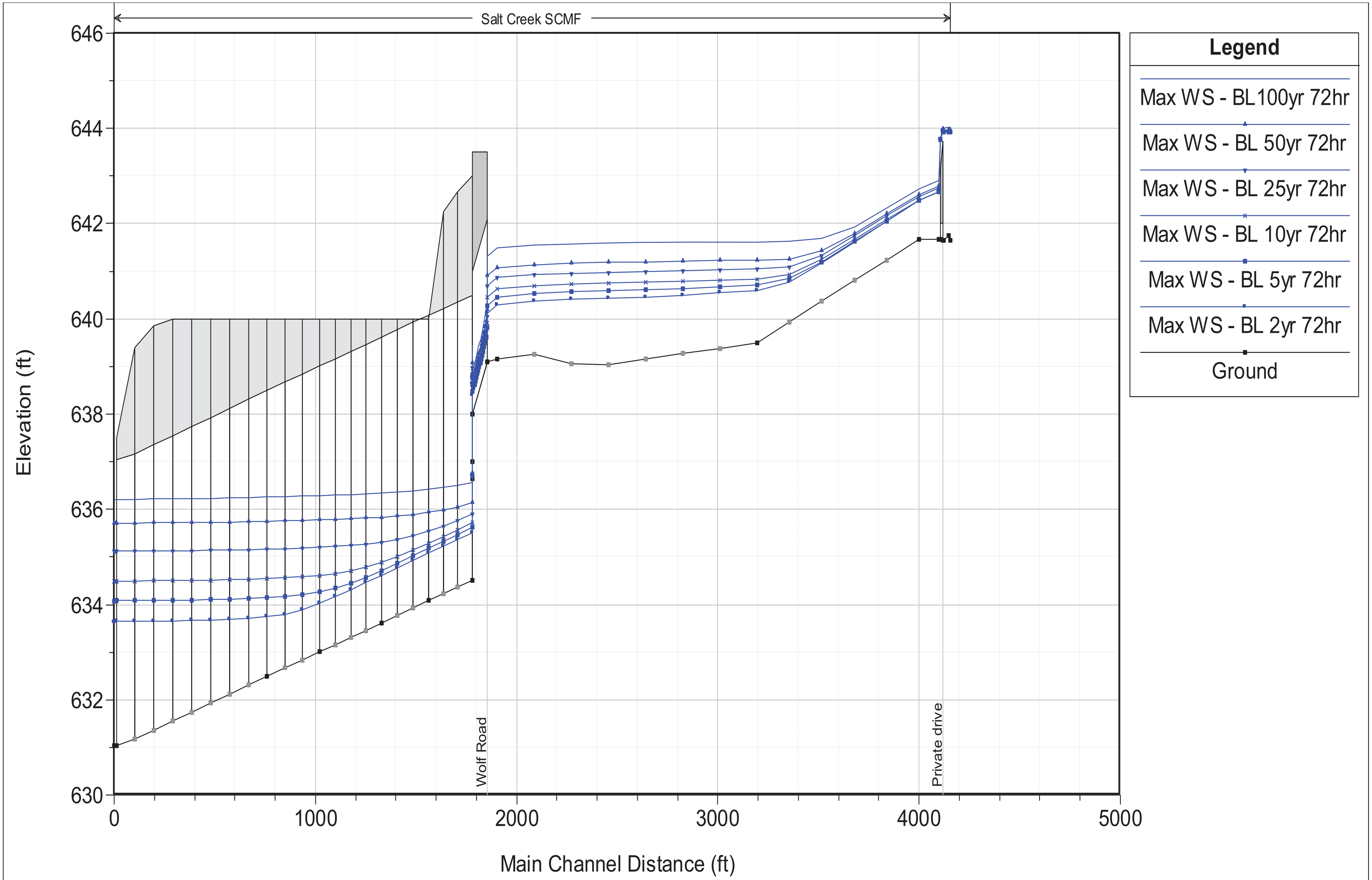
Salt Creek ML from 5,000 feet upstream of confluence with Des Plaines River to confluence with Des Plaines River



Salt Creek South Fork from upstream limits to confluence with Salt Creek Middle Fork

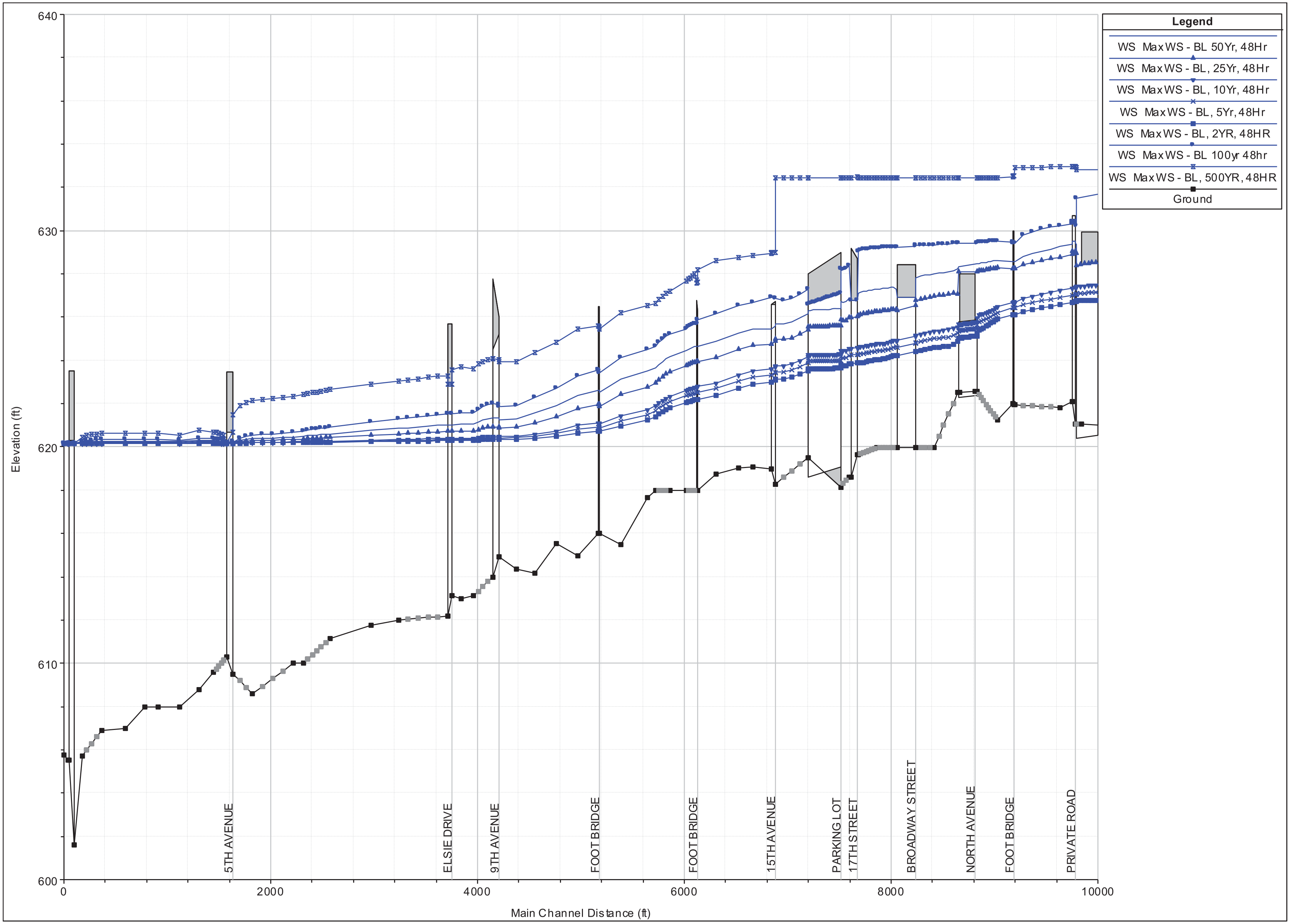


Salt Creek South Fork from confluence with Salt Creek Middle Fork to confluence with Salt Creek Mainline

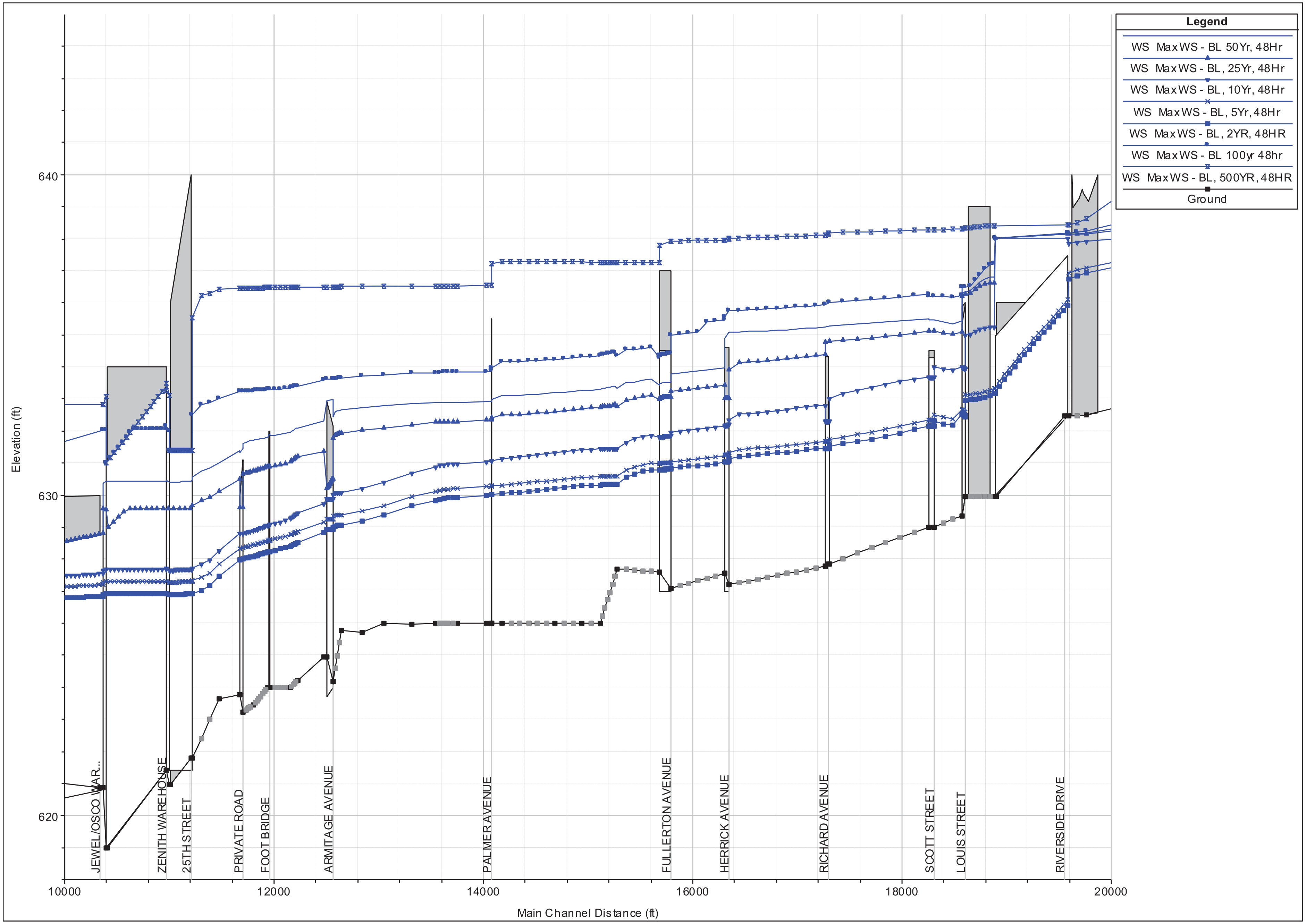


Salt Creek Middle Fork from upstream limits to confluence with Salt Creek South Fork

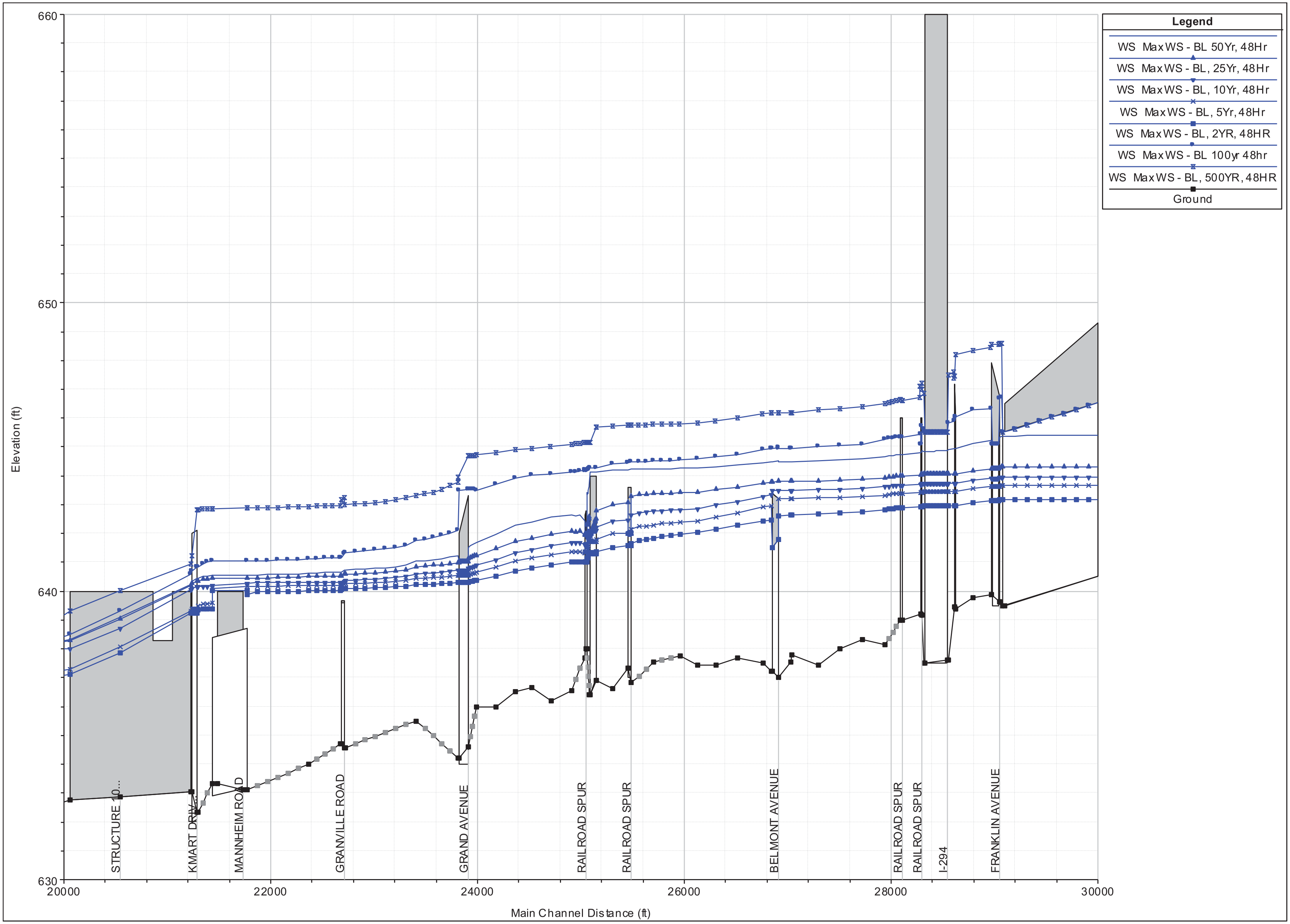
Silver Creek Subwatershed
Hydraulic Profiles for Existing Conditions



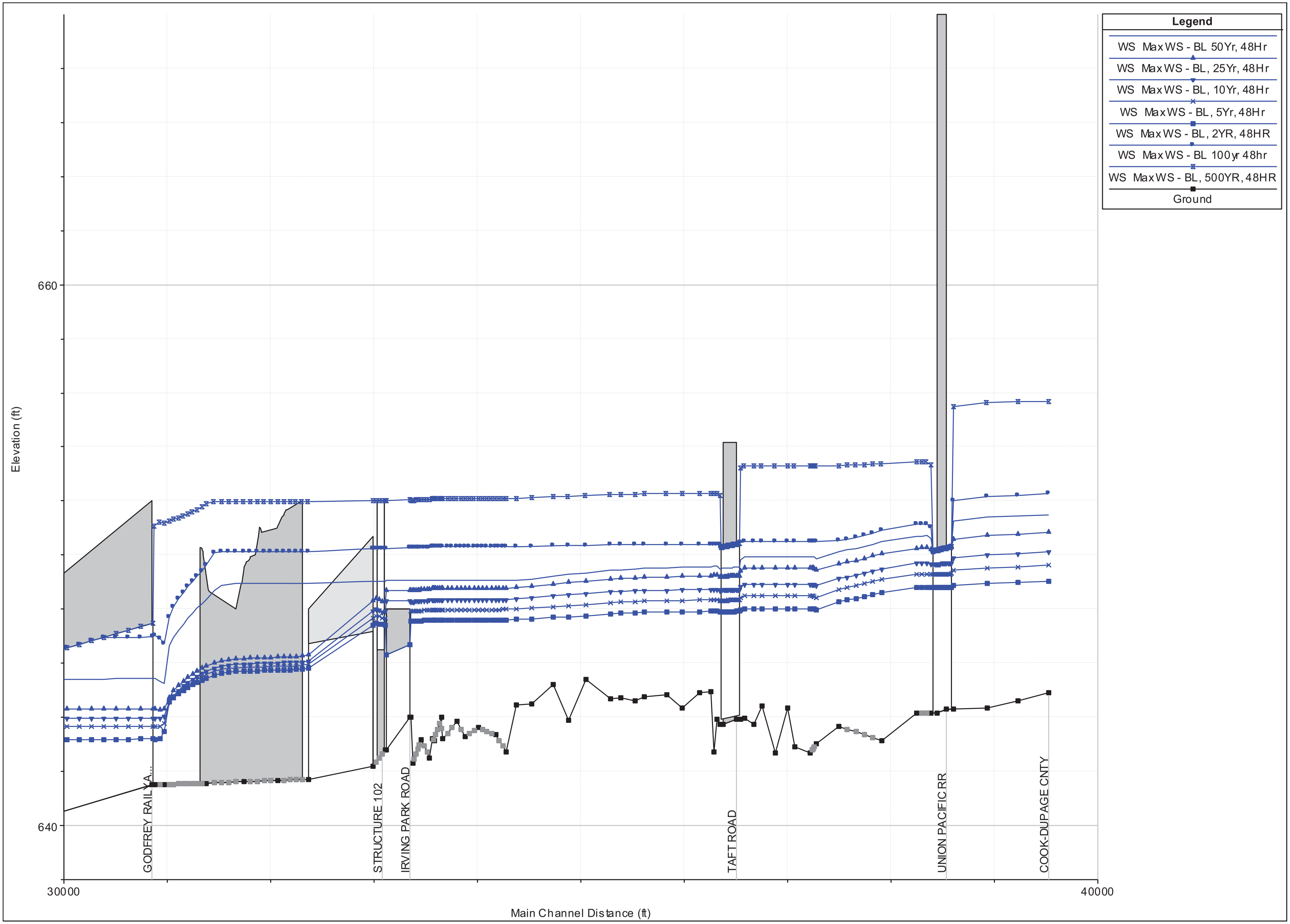
Silver Creek from Des Plaines River Confluence to Jewel Warehouse



Silver Creek from Jewell Warehouse to Structure 106

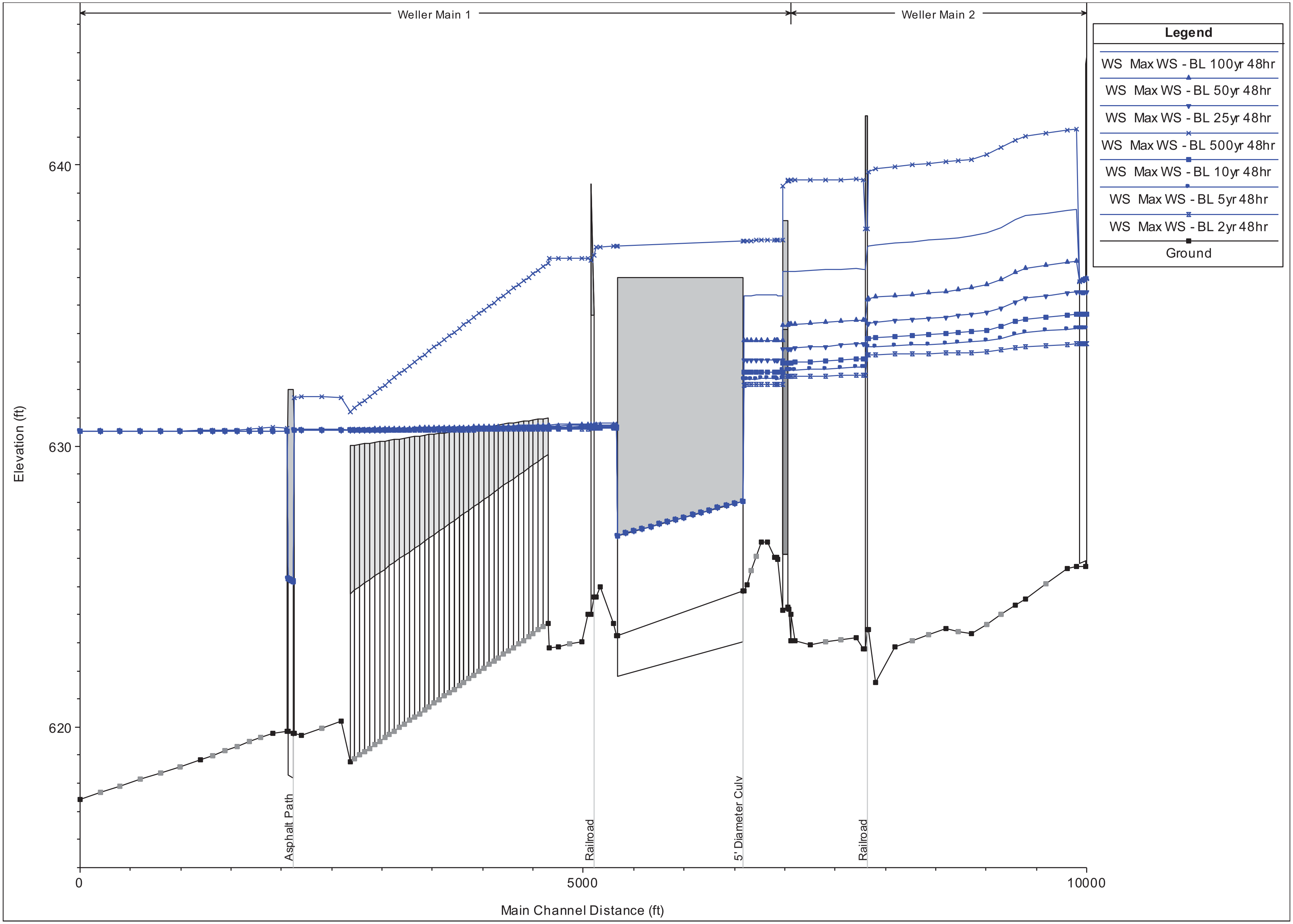


Silver Creek from Structure 106 to Godfrey Railroad

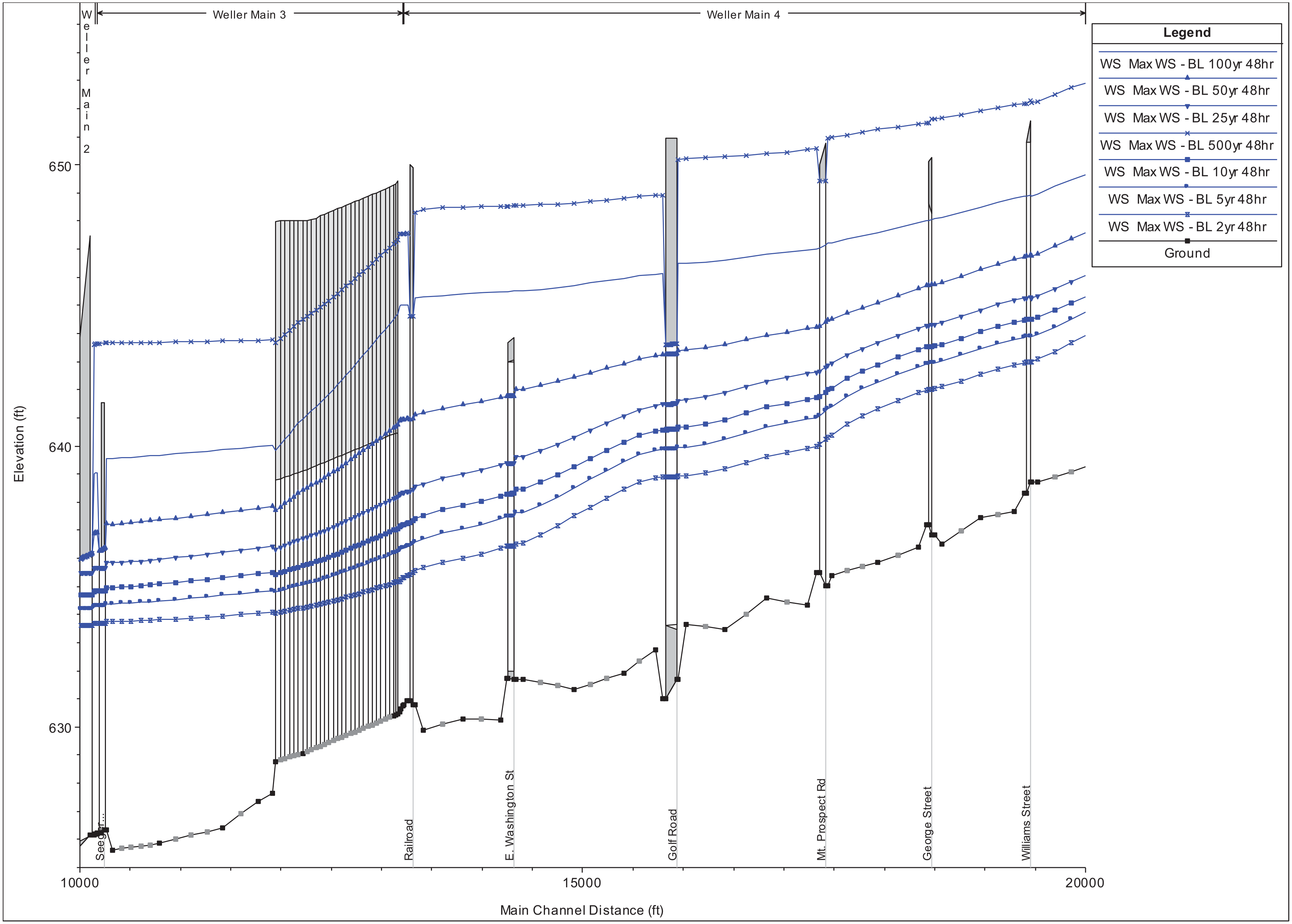


Silver Creek from Godfrey Railyard to Cook-DuPage County Border

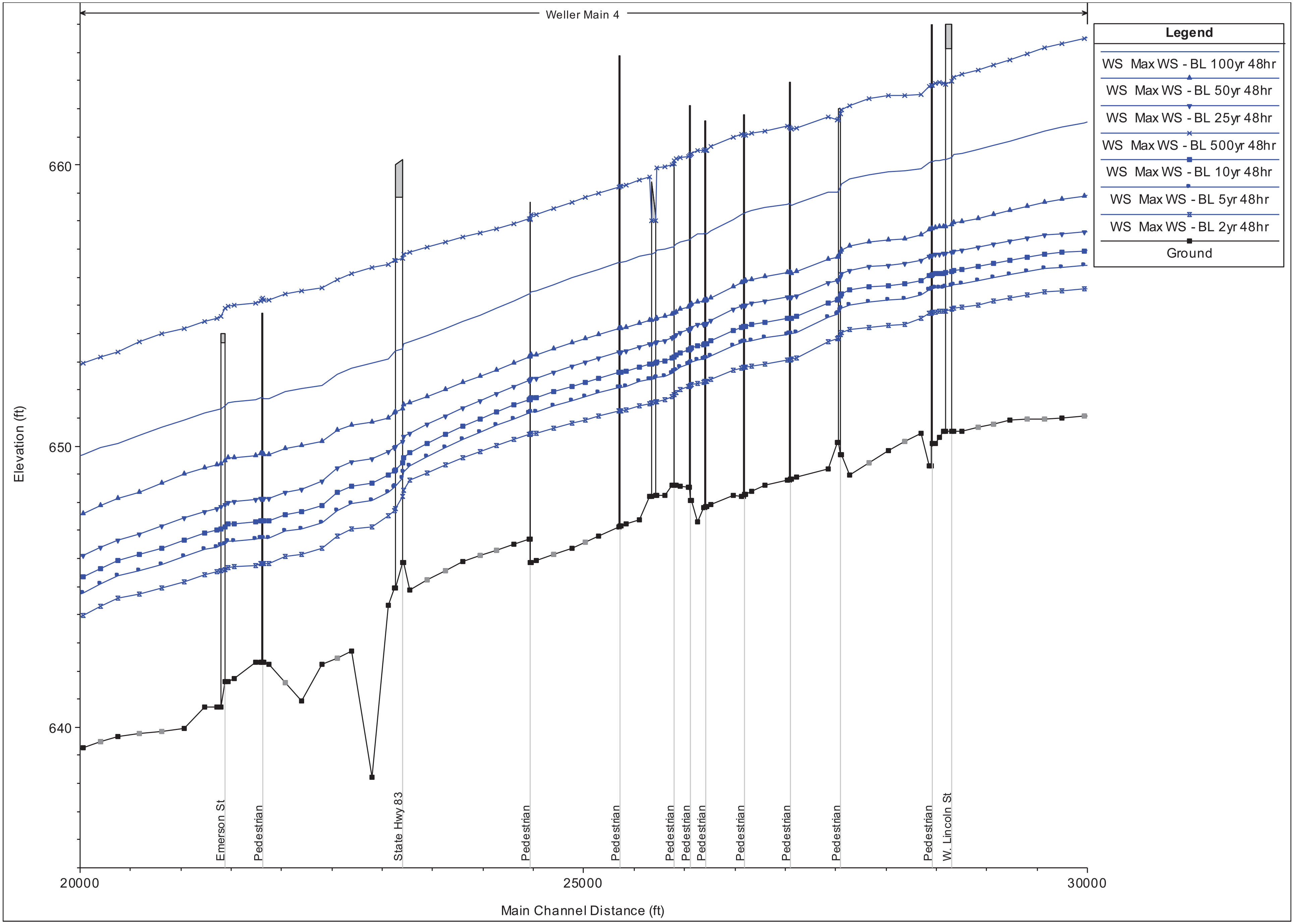
Weller Creek Subwatershed
Hydraulic Profiles for Existing Conditions



Weller Creek from confluence with Des Plaines River to 10,000 feet upstream

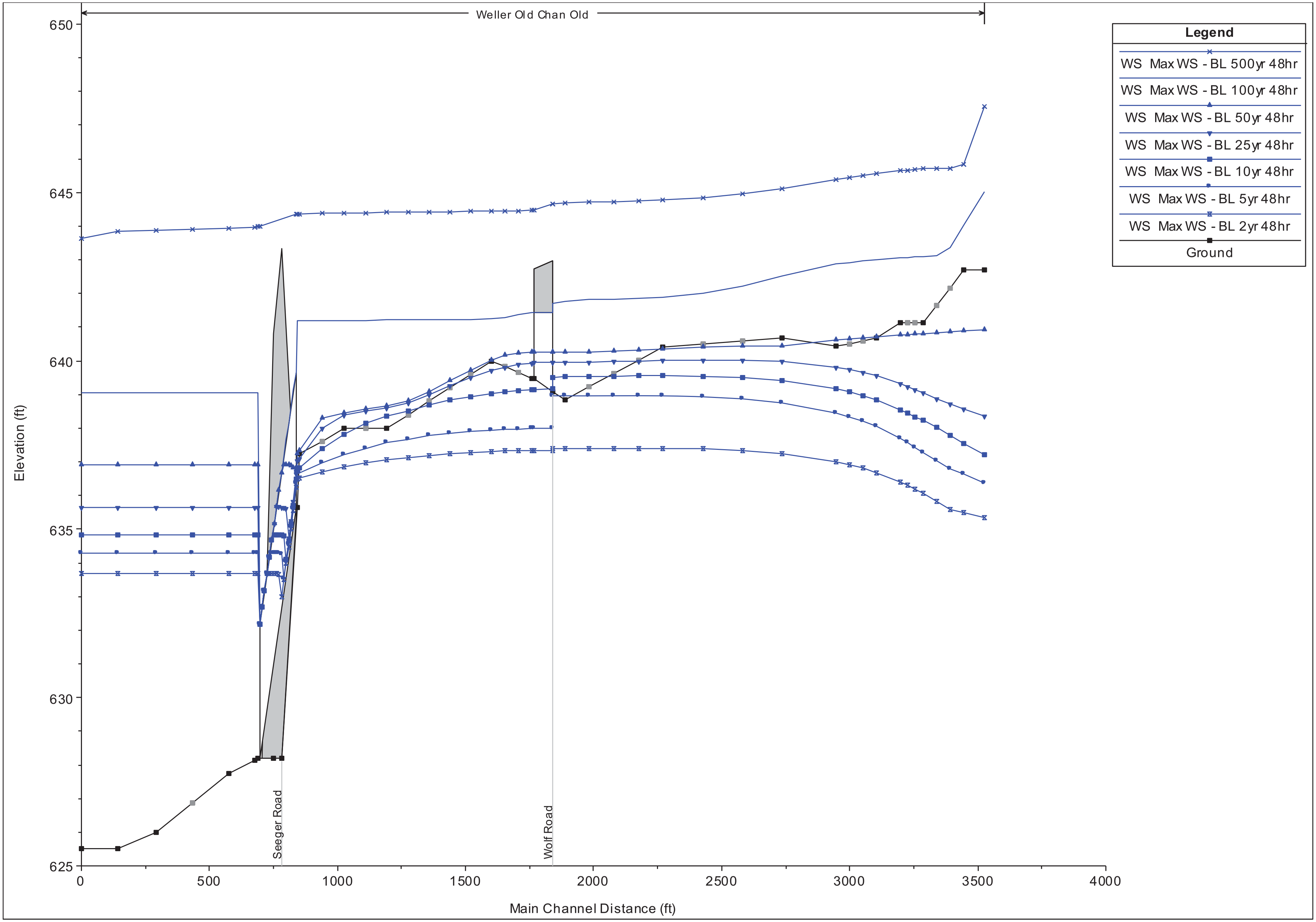


Weller Creek from 10,000 to 20,000 feet upstream of Confluence with the Des Plaines River

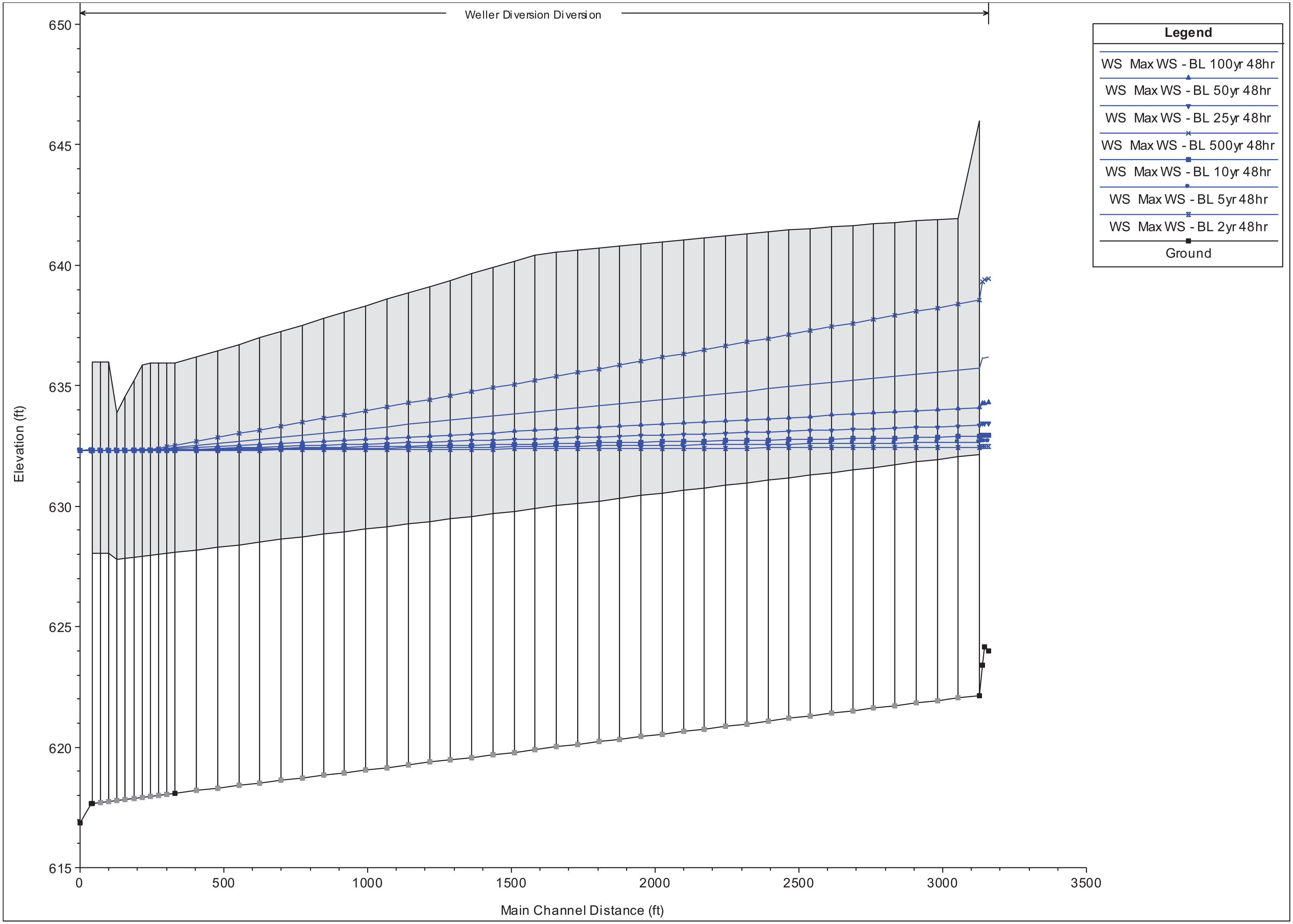


Weller Creek from 20,000 to 30,000 feet upstream of Confluence with the Des Plaines River

Weller Creek from 30,000 to 31,500 feet upstream of Confluence with the Des Plaines River

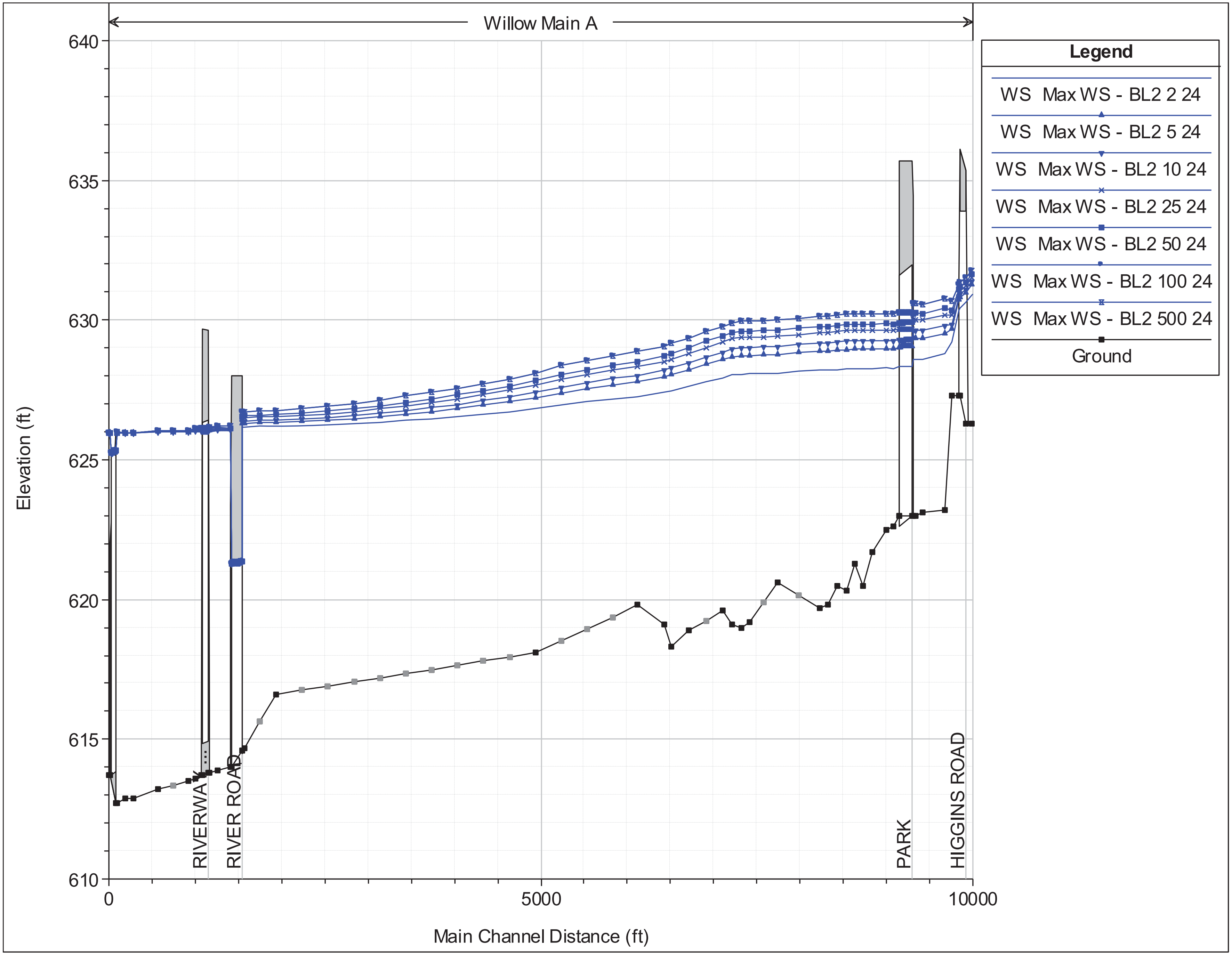


Old Weller Creek from Seegers Road to upstream of Wolf Road

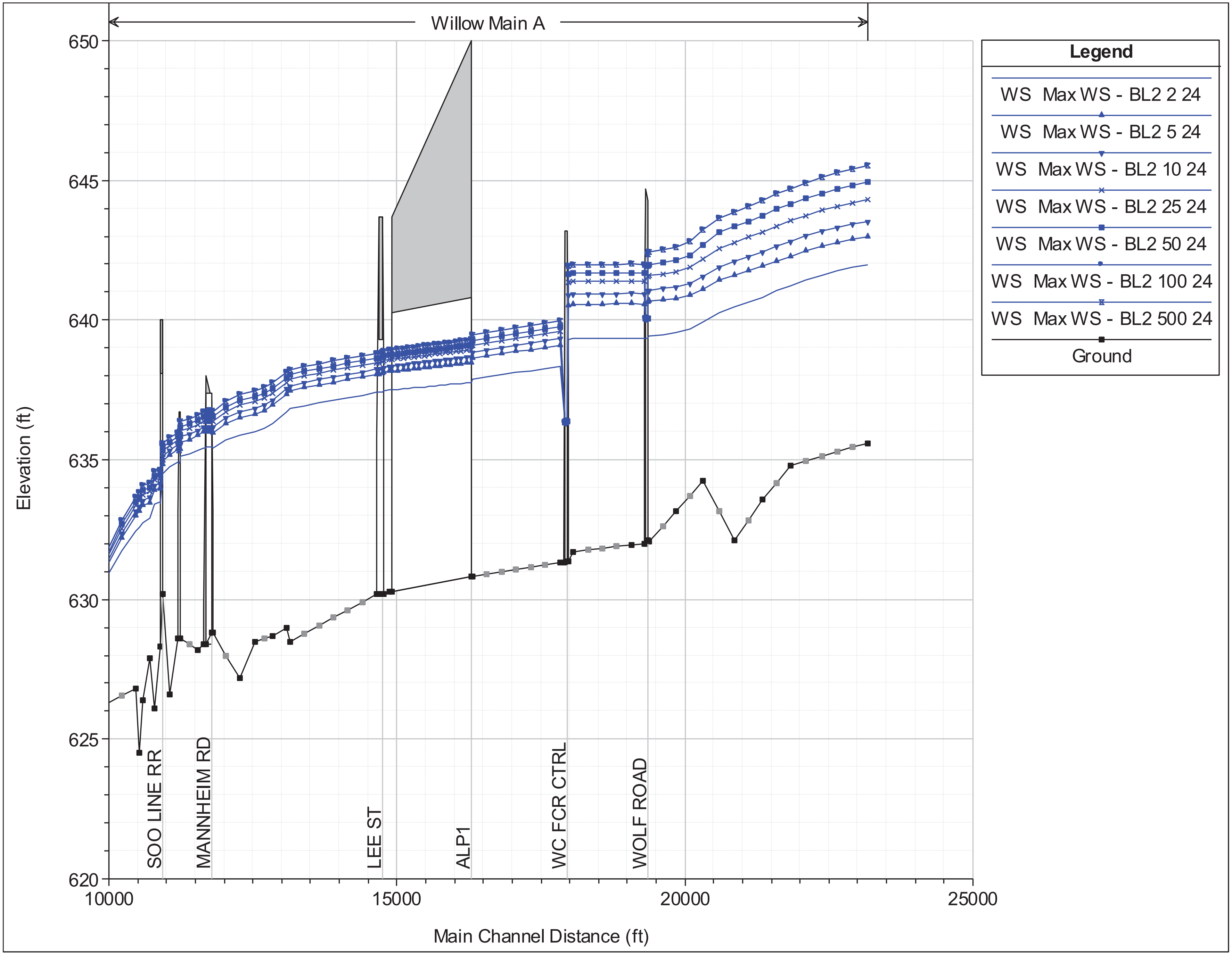


Weller Creek Diversion from confluence with Des Plaines River to upstream study limit south of Central Road

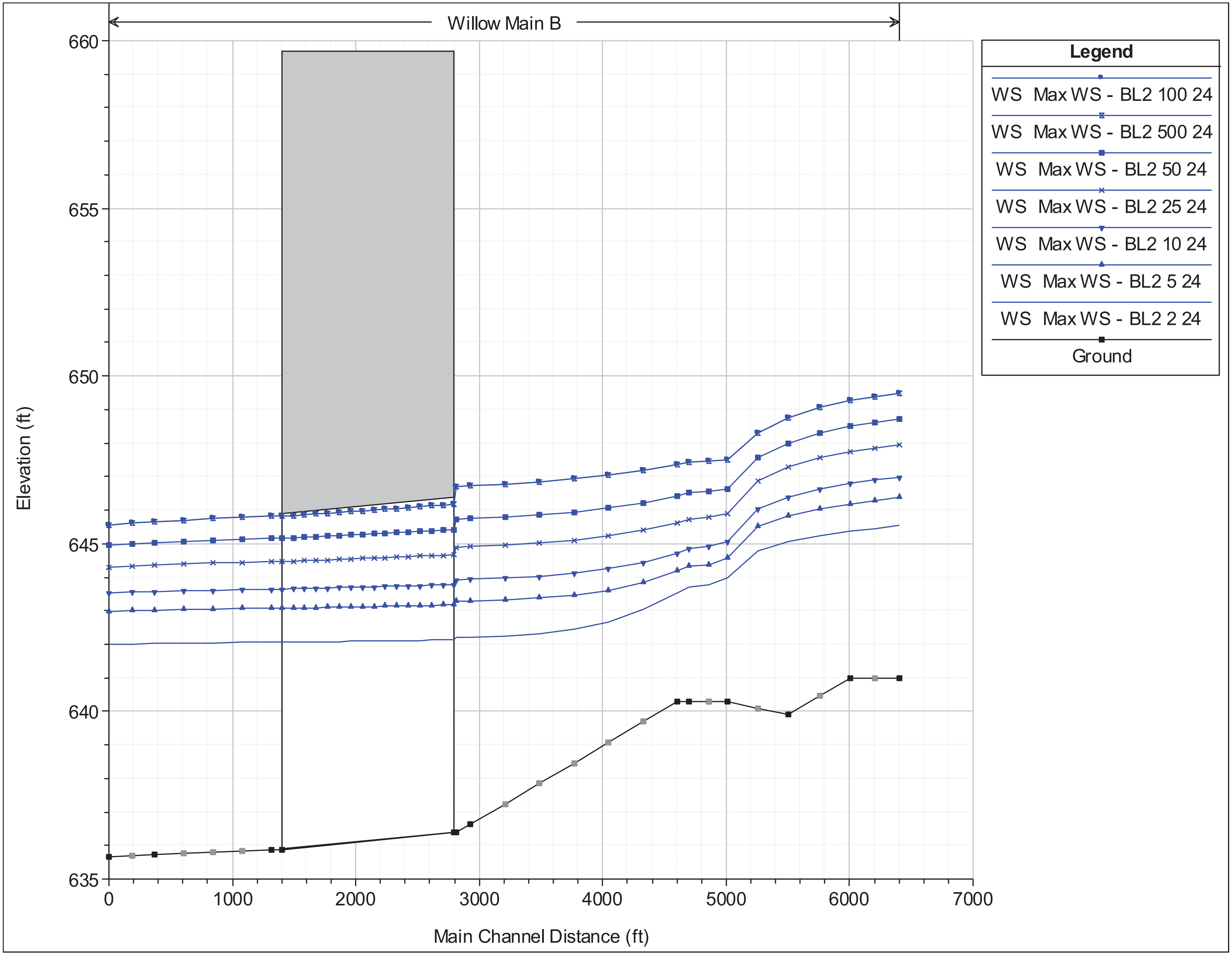
Willow Creek Subwatershed
Hydraulic Profiles for Existing Conditions



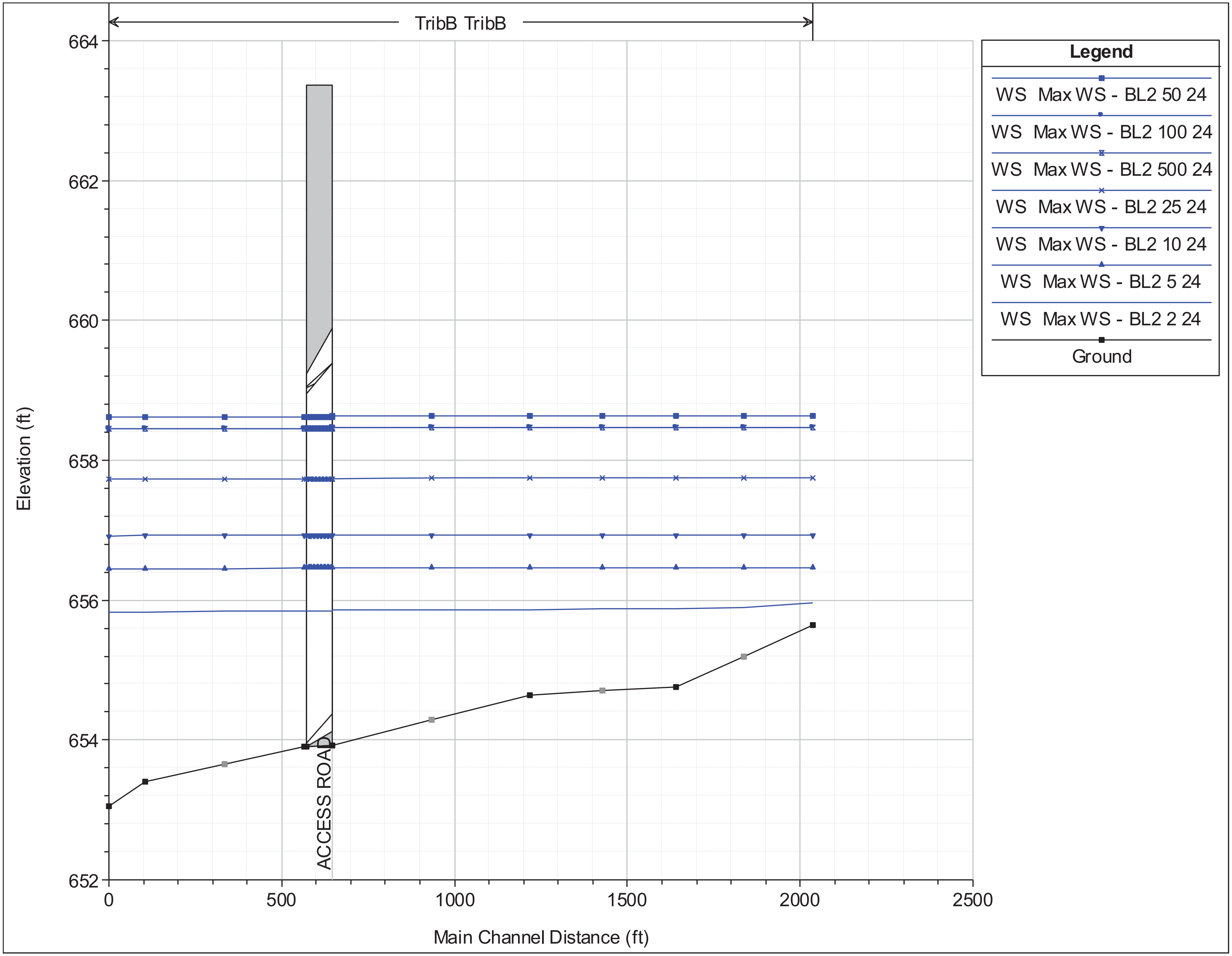
Willow Creek from confluence with Des Plaines River to upstream of Higgins Road



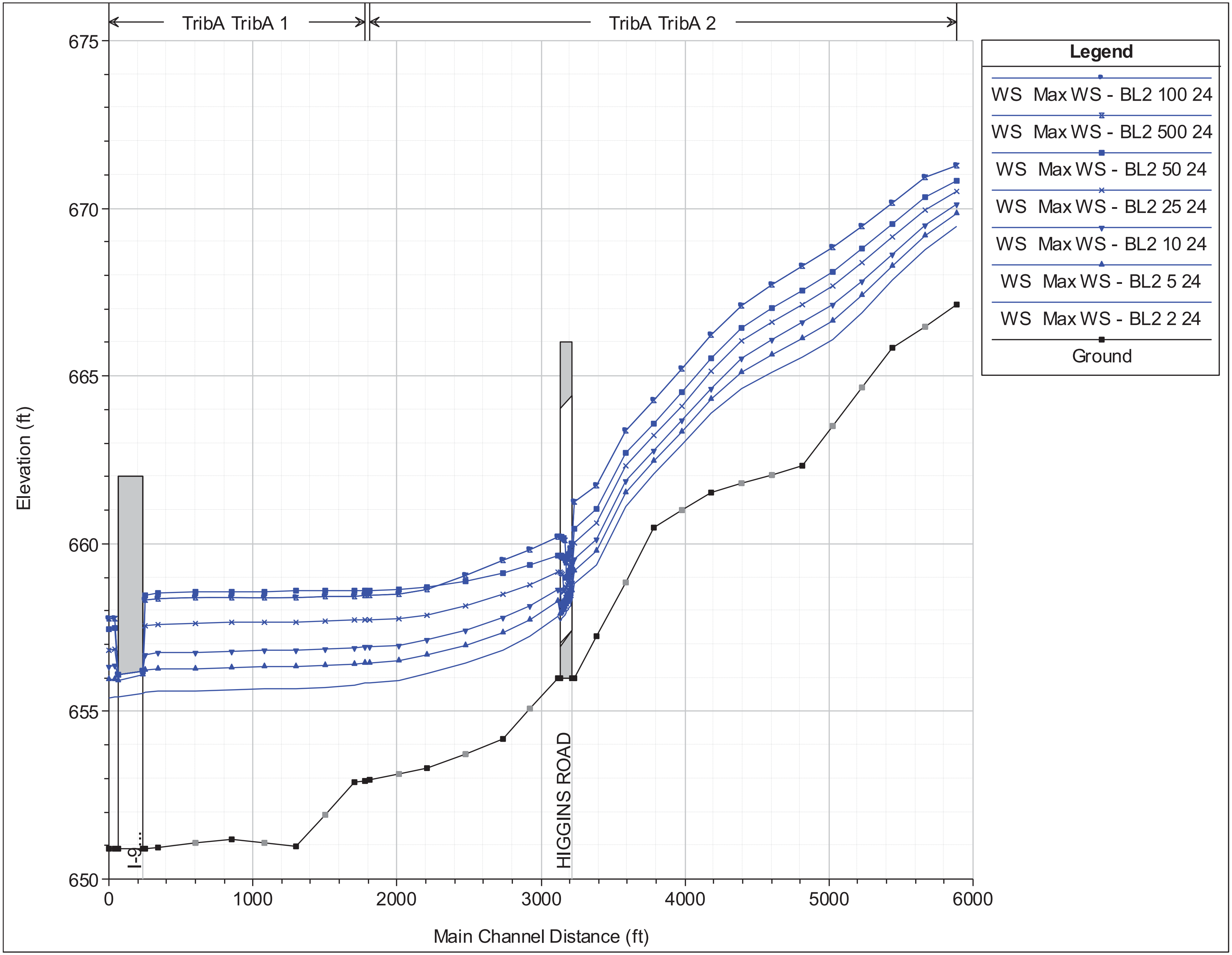
Willow Creek from upstream of Higgins Road to confluence with Higgins Creek



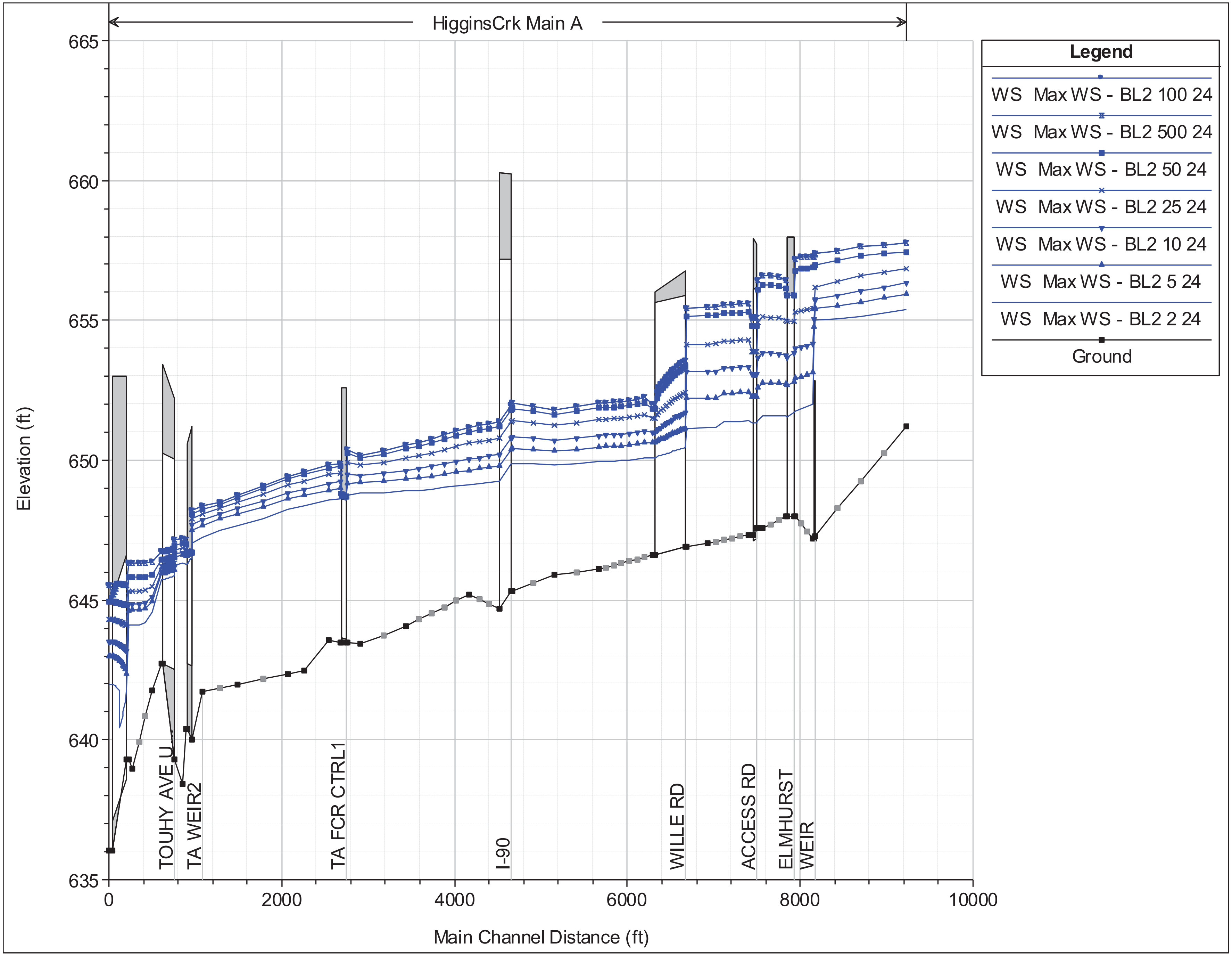
Willow Creek upstream of Higgins Creek confluence to Cook County Boundary



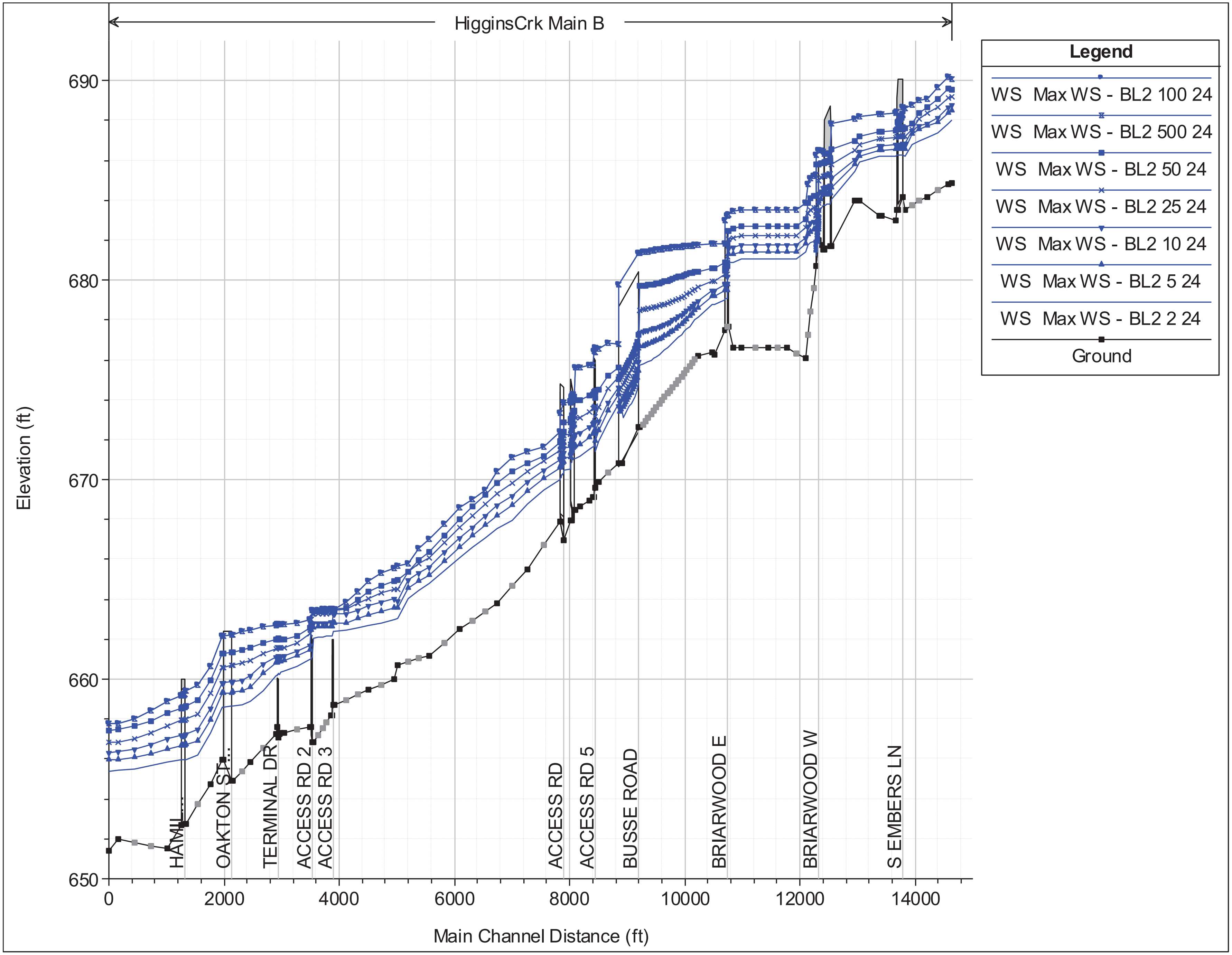
Higgins Creek Tributary B from confluence with Higgins Creek Tributary A to upstream limit of study



Higgins Creek Tributary A from confluence with Higgins Creek to upstream limit of study



Higgins Creek from confluence with Willow Creek to upstream of Elmhurst Road



Higgins Creek from upstream of Elmhurst Road to upstream limit of study

Note regarding Appendix I

Slight differences may exist between the Total Conceptual Cost Reports (Appendix I) and the Total Project Costs in the tables in Volume 1. These slight differences can generally be attributed to the rounding of quantities entered into the District's stormwater database which was used to generate the Appendix I cost reports.

Metropolitan Water Reclamation District of Greater Chicago
LDPR Watershed Detailed Watershed Plan
ADCR 1A: Total Conceptual Cost Report

Alternative Name ADCR1aP

Problem Description Overbank Flooding

Strategy 480 A-F Reservoir SE of Lake and Mannheim . Mannheim Pump Station modification. New Melrose Park

District Minimum Criteria for Funding: Met

Recommended No

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Channel treatment: Soil stabilization and vegetative cover	yd2	25000	$13.88	$347,000.00	$322,705	$83,090	
Channel treatment: Vegetative cover only	yd2	200	$8.54	$1,708.00	$1,588	$409	
Demolition: Wood construction	ft2	95000	$2.14	$203,300.00	$0	$0	
Channel treatment: Additional fill	yd3	10700	$13.88	$148,516.00	$0	$0	
Channel treatment: Compaction	yd3	12100	$7.48	$90,508.00	$0	$0	
Channel treatment: Excavation	yd3	12100	$10.68	$129,228.00	$0	$0	
Channel treatment: Excavation	yd3	451800	$10.68	4,825,224.00	$0	$0	
Channel treatment: Excavation	yd3	545500	$10.68	5,825,940.00	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	1400	$11.75	$16,450.00	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	225900	$11.75	2,654,325.00	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	545500	$11.75	6,409,625.00	$0	$0	
Inlet structures (Headwall): 42 to 66 inches	each	6	$4,757.50	$28,545.00	$26,546	$0	
Pipe in earth (city): 42 to 66 inches / box culvert (15 to 27 ft2)	lf	1350	$208.24	$281,124.00	$261,441	$0	
Pipe in earth (county): 90 to 96 inches / box culvert (39 to 50 ft2)	lf	20	$434.64	$8,692.80	$8,084	$0	
Pipe under pavement (city): 72 to 84 inches / box culvert (28 to 38 ft2)	lf	100	$425.02	$42,502.00	$39,526	$0	
Paving: Asphalt Pavement Installation (24 ft wide, 2 ft C&G, 1 ft Excavation	lf	1350	$148.47	$200,434.50	$186,401	$0	
Concrete: Cast in place	yd3	300	$250.00	$75,000.00	$0	$0	
Land Acquisition: Purchase of Property *	dollar	42256	$1.00	$42,255.78	$0	$0	
Land Acquisition: Purchase of Property *	dollar	8831458	$1.00	8,831,458.26	$0	$0	
Land Acquisition: Temporary Easement *	dollar	27479	$1.00	$27,478.66	$0	$0	
Pump Station: 80 cfs Pump Station with Flap Gate	each	1	$1,415,000.00	1,415,000.00	$789,557	$0	
Pump Station: 40 cfs Pump Station with Flap Gate	each	1	$955,000.00	$955,000.00	$532,881	$0	
Pump Station: 15 cfs Pump Station with Flap Gate	each	1	$560,000.00	$560,000.00	$312,475	$0	

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Alternative Name	ADCR1aP
Problem Description	Overbank Flooding
Strategy	480 A-F Reservoir SE of Lake and Mannheim . Mannheim Pump Station modification. New Melrose Park
District Minimum Criteria for Funding:	Met
Recommended	No

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)							
Subtotal (direct costs)				**$24,218,122**	**$2,481,205**	**$83,499**	
Utility Relocation			4 %	$968,725			
Mobilization \ General Conditions			5%	$1,210,906			
Subtotal with Percent Allowances				**$26,397,753**			
Contingency			30%	$7,919,326			
Profit			5%	$1,715,854			
Probable Construction Cost Estimate				**$36,032,933**			
Design Engineering, Geotechnical, and Construction Management			10%	$3,603,293			
Property Acquisition Cost:				$8,901,193			
Total Conceptual Cost Estimate				**$51,102,123**			

Additional Comments

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Metropolitan Water Reclamation District of Greater Chicago
LDPR Watershed Detailed Watershed Plan
ADCR 1B: Total Conceptual Cost Report

Alternative Name	ADCR1bP
Problem Description	Overbank Flooding
Strategy	960 A-F Reservoir SE of Lake and Mannheim . Mannheim Pump Station modification. New Melrose Park
District Minimum Criteria for Funding:	Met
Recommended	No

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Channel treatment: Soil stabilization and vegetative cover	yd2	25000	$13.88	$347,000.00	$322,705	$83,090	
Channel treatment: Excavation	yd3	2727700	$10.68	9,131,836.00	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	1636600	$11.75	9,230,050.00	$0	$0	
Concrete: Cast in place	yd3	300	$250.00	$75,000.00	$0	$0	
Demolition: Wood construction	ft2	95000	$2.14	$203,300.00	$0	$0	
Inlet structures (Headwall): 42 to 66 inches	each	2	$4,757.50	$9,515.00	$8,849	$0	
Land Acquisition: Purchase of Property *	dollar	8831458	$1.00	8,831,458.26	$0	$0	
Outlet structures (Headwall): 42 to 66 inches	each	2	$4,757.50	$9,515.00	$8,849	$0	
Pipe in earth (county): 90 to 96 inches / box culvert (39 to 50 ft2)	lf	20	$434.64	$8,692.80	$8,084	$0	
Channel treatment: Vegetative cover only	yd2	200	$8.54	$1,708.00	$1,588	$409	
Channel treatment: Additional fill	yd3	10700	$13.88	$148,516.00	$0	$0	
Channel treatment: Compaction	yd3	12100	$7.48	$90,508.00	$0	$0	
Channel treatment: Excavation	yd3	12100	$10.68	$129,228.00	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	1400	$11.75	$16,450.00	$0	$0	
Land Acquisition: Purchase of Property *	dollar	42256	$1.00	$42,255.78	$0	$0	
Land Acquisition: Temporary Easement *	dollar	27479	$1.00	$27,478.66	$0	$0	
Outlet structures (Headwall): 42 to 66 inches	each	2	$4,757.50	$9,515.00	$8,849	$0	
Paving: Asphalt Pavement Installation (24 ft wide, 2 ft C&G, 1 ft Excavation	lf	1350	$148.47	$200,434.50	$186,401	$0	
Pipe in earth (city): 42 to 66 inches / box culvert (15 to 27 ft2)	lf	1350	$208.24	$281,124.00	$261,441	$0	
Pipe under pavement (city): 72 to 84 inches / box culvert (28 to 38 ft2)	lf	100	$425.02	$42,502.00	$39,526	$0	
Pump Station: 80 cfs Pump Station with Flap Gate	each	1	$1,415,000.00	1,415,000.00	$789,557	$0	
Pump Station: 40 cfs Pump Station with Flap Gate	each	2	$955,000.00	1,910,000.00	$1,065,762	$0	

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Alternative Name	ADCR1bP
Problem Description	Overbank Flooding
Strategy	960 A-F Reservoir SE of Lake and Mannheim . Mannheim Pump Station modification. New Melrose Park
District Minimum Criteria for Funding:	Met
Recommended	No

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)							
Subtotal (direct costs)				**$53,259,894**	**$2,701,611**	**$83,499**	
Utility Relocation			4 %	$2,130,396			
Mobilization \ General Conditions			5%	$2,662,995			
Subtotal with Percent Allowances				**$58,053,285**			
Contingency			30%	$17,415,985			
Profit			5%	$3,773,464			
Probable Construction Cost Estimate				**$79,242,734**			
Design Engineering, Geotechnical, and Construction Management			10%	$7,924,273			
Property Acquisition Cost:				$8,901,193			
Total Conceptual Cost Estimate				**$98,853,310**			

Additional Comments

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Metropolitan Water Reclamation District of Greater Chicago
LDPR Watershed Detailed Watershed Plan
ADCR 2A: Total Conceptual Cost Report

Alternative Name ADCR2aP

Problem Description Overbank Flooding

Strategy 480 A-F Reservoir SE of Lake and Mannheim . Mannheim Pump Station modification. New Melrose Park

District Minimum Criteria for Funding: Met

Recommended No

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Channel treatment: Basket gabions	yd3	2189	$266.98	$584,499.31	$543,575	$139,960	
Channel treatment: Sheet piling	yd2	18883	$303.28	5,726,836.24	$0	$1,371,306	
Channel treatment: Soil stabilization and vegetative cover	yd2	55584	$13.88	$771,505.92	$717,489	$184,739	
Channel treatment: Soil stabilization and vegetative cover	yd2	25000	$13.88	$347,000.00	$322,705	$83,090	
Channel treatment: Vegetative cover only	yd2	200	$8.54	$1,708.00	$1,588	$409	
Demolition: Wood construction	ft2	95000	$2.14	$203,300.00	$0	$0	
Channel treatment: Additional fill	yd3	5000	$13.88	$69,400.00	$0	$0	
Channel treatment: Additional fill	yd3	10700	$13.88	$148,516.00	$0	$0	
Channel treatment: Compaction	yd3	5000	$7.48	$37,400.00	$0	$0	
Channel treatment: Compaction	yd3	12100	$7.48	$90,508.00	$0	$0	
Channel treatment: Excavation	yd3	52000	$10.68	$555,360.00	$0	$0	
Channel treatment: Excavation	yd3	12100	$10.68	$129,228.00	$0	$0	
Channel treatment: Excavation	yd3	997300	$10.68	0,651,164.00	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	47000	$11.75	$552,250.00	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	1400	$11.75	$16,450.00	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	771400	$11.75	9,063,950.00	$0	$0	
Inlet structures (Headwall): 42 to 66 inches	each	2	$4,757.50	$9,515.00	$8,849	$0	
Outlet structures (Headwall): 42 to 66 inches	each	2	$4,757.50	$9,515.00	$8,849	$0	
Outlet structures (Headwall): 42 to 66 inches	each	2	$4,757.50	$9,515.00	$8,849	$0	
Pipe in earth (city): 42 to 66 inches / box culvert (15 to 27 ft2)	lf	1350	$208.24	$281,124.00	$261,441	$0	
Pipe in earth (city): 90 to 96 inches / box culvert (39 to 50 ft2)	lf	20	$434.64	$8,692.80	$8,084	$0	
Pipe under pavement (city): 72 to 84 inches / box culvert (28 to 38 ft2)	lf	100	$425.02	$42,502.00	$39,526	$0	
Paving: Asphalt Pavement Installation (24 ft wide, 2 ft C&G, 1 ft Excavation	lf	1350	$148.47	$200,434.50	$186,401	$0	
maintenance: Large Channel Maintenance	lf	8993	$100.00	$899,300.00	$836,335	$215,340	
Concrete: Cast in place	yd3	300	$250.00	$75,000.00	$0	$0	
Land Acquisition: Purchase of Property *	dollar	42256	$1.00	$42,255.78	$0	$0	
Land Acquisition: Purchase of Property *	dollar	8831458	$1.00	8,831,458.26	$0	$0	
Land Acquisition: Temporary Easement *	dollar	661962	$1.00	$661,962.42	$0	$0	
Land Acquisition: Temporary Easement *	dollar	27479	$1.00	$27,478.66	$0	$0	
Pump Station: 80 cfs Pump Station with Flap Gate	each	1	$1,415,000.00	1,415,000.00	$789,557	$0	

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Alternative Name ADCR2aP

Problem Description Overbank Flooding

Strategy 480 A-F Reservoir SE of Lake and Mannheim . Mannheim Pump Station modification. New Melrose Park

District Minimum Criteria for Funding: Met

Recommended No

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Pump Station: 40 cfs Pump Station with Flap Gate	each	1	$955,000.00	$955,000.00	$532,881	$0	
Pump Station: 15 cfs Pump Station with Flap Gate	each	1	$560,000.00	$560,000.00	$312,475	$0	

* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)

Subtotal (direct costs)		**$33,414,674**	**$4,578,604**	**$1,994,844**
Utility Relocation	4 %	$1,336,587		
Mobilization \ General Conditions	5%	$1,670,734		
Subtotal with Percent Allowances		**$36,421,994**		
Contingency	30%	$10,926,598		
Profit	5%	$2,367,430		
Probable Construction Cost Estimate		**$49,716,022**		
Design Engineering, Geotechnical, and Construction Management	10%	$4,971,602		
Property Acquisition Cost:		$9,563,155		
Total Conceptual Cost Estimate		**$70,824,228**		

Additional Comments

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Metropolitan Water Reclamation District of Greater Chicago
LDPR Watershed Detailed Watershed Plan
ADCR 2B: Total Conceptual Cost Report

Alternative Name ADCR2bP

Problem Description Overbank Flooding

Strategy 960 A-F Reservoir SE of Lake and Mannheim .   Mannheim Pump Station modification. New Melrose Park

District Minimum Criteria for Funding: Met

Recommended No

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Channel treatment: Basket gabions	yd3	2189	$266.98	$584,499.31	$543,575	$139,960	
Channel treatment: Sheet piling	yd2	18883	$303.28	5,726,836.24	$0	$1,371,306	
Channel treatment: Soil stabilization and vegetative cover	yd2	55584	$13.88	$771,505.92	$717,489	$184,739	
Channel treatment: Soil stabilization and vegetative cover	yd2	25000	$13.88	$347,000.00	$322,705	$83,090	
Channel treatment: Vegetative cover only	yd2	200	$8.54	$1,708.00	$1,588	$409	
Demolition: Wood construction	ft2	95000	$2.14	$203,300.00	$0	$0	
Channel treatment: Additional fill	yd3	5000	$13.88	$69,400.00	$0	$0	
Channel treatment: Additional fill	yd3	10700	$13.88	$148,516.00	$0	$0	
Channel treatment: Compaction	yd3	5000	$7.48	$37,400.00	$0	$0	
Channel treatment: Compaction	yd3	12100	$7.48	$90,508.00	$0	$0	
Channel treatment: Excavation	yd3	52000	$10.68	$555,360.00	$0	$0	
Channel treatment: Excavation	yd3	12100	$10.68	$129,228.00	$0	$0	
Channel treatment: Excavation	yd3	2182200	$10.68	3,305,896.00	$0	$0	
Channel treatment: Excavation	yd3	545500	$10.68	5,825,940.00	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	47000	$11.75	$552,250.00	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	1400	$11.75	$16,450.00	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	1091100	$11.75	2,820,425.00	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	545500	$11.75	6,409,625.00	$0	$0	
Inlet structures (Headwall): 42 to 66 inches	each	2	$4,757.50	$9,515.00	$8,849	$0	
Outlet structures (Headwall): 42 to 66 inches	each	2	$4,757.50	$9,515.00	$8,849	$0	
Outlet structures (Headwall): 42 to 66 inches	each	2	$4,757.50	$9,515.00	$8,849	$0	
Pipe in earth (city): 42 to 66 inches / box culvert (15 to 27 ft2)	lf	1350	$208.24	$281,124.00	$261,441	$0	
Pipe in earth (county): 90 to 96 inches / box culvert (39 to 50 ft2)	lf	20	$434.64	$8,692.80	$8,084	$0	
Pipe under pavement (city): 72 to 84 inches / box culvert (28 to 38 ft2)	lf	100	$425.02	$42,502.00	$39,526	$0	
Paving: Asphalt Pavement Installation (24 ft wide, 2 ft C&G, 1 ft Excavation	lf	1350	$148.47	$200,434.50	$186,401	$0	
maintenance: Large Channel Maintenance	lf	8993	$100.00	$899,300.00	$836,335	$215,340	
Concrete: Cast in place	yd3	300	$250.00	$75,000.00	$0	$0	
Land Acquisition: Purchase of Property *	dollar	42256	$1.00	$42,255.78	$0	$0	
Land Acquisition: Purchase of Property *	dollar	8831458	$1.00	8,831,458.26	$0	$0	
Land Acquisition: Temporary Easement *	dollar	661962	$1.00	$661,962.42	$0	$0	
Land Acquisition: Temporary Easement *	dollar	27479	$1.00	$27,478.66	$0	$0	

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Alternative Name ADCR2bP

Problem Description Overbank Flooding

Strategy 960 A-F Reservoir SE of Lake and Mannheim . Mannheim Pump Station modification. New Melrose Park

District Minimum Criteria for Funding: Met

Recommended No

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Pump Station: 80 cfs Pump Station with Flap Gate	each	1	$1,415,000.00	$1,415,000.00	$789,557	$0	
Pump Station: 40 cfs Pump Station with Flap Gate	each	2	$955,000.00	$1,910,000.00	$1,065,762	$0	

* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)

Subtotal (direct costs)		**$62,456,446**	**$4,799,011**	**$1,994,844**
Utility Relocation	4 %	$2,498,258		
Mobilization \ General Conditions	5%	$3,122,822		
Subtotal with Percent Allowances		**$68,077,526**		
Contingency	30%	$20,423,258		
Profit	5%	$4,425,039		
Probable Construction Cost Estimate		**$92,925,823**		
Design Engineering, Geotechnical, and Construction Management	10%	$9,292,582		
Property Acquisition Cost:		$9,563,155		
Total Conceptual Cost Estimate		**$118,575,415**		

Additional Comments

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Metropolitan Water Reclamation District of Greater Chicago
LDPR Watershed Detailed Watershed Plan
ADCR 3A: Total Conceptual Cost Report

Alternative Name ADCR3aP

Problem Description Overbank Flooding

Strategy 480 A-F Reservoir SE of Lake & Mannheim . Mannheim Pump Station & Road modification. Melrose Park

District Minimum Criteria for Funding: Met

Recommended No

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Channel treatment: Sheet piling	yd2	2007	$303.28	$608,682.96	$0	$145,751	
Channel treatment: Sheet piling	yd2	5978	$303.28	1,813,007.84	$0	$434,130	
Channel treatment: Soil stabilization and vegetative cover	yd2	19928	$13.88	$276,600.64	$257,234	$66,233	
Channel treatment: Soil stabilization and vegetative cover	yd2	49961	$13.88	$693,458.68	$644,906	$166,051	
Channel treatment: Soil stabilization and vegetative cover	yd2	25000	$13.88	$347,000.00	$322,705	$83,090	
Channel treatment: Vegetative cover only	yd2	200	$8.54	$1,708.00	$1,588	$409	
Demolition: Wood construction	ft2	95000	$2.14	$203,300.00	$0	$0	
Channel treatment: Additional fill	yd3	1000	$13.88	$13,880.00	$0	$0	
Channel treatment: Additional fill	yd3	10700	$13.88	$148,516.00	$0	$0	
Channel treatment: Compaction	yd3	1000	$7.48	$7,480.00	$0	$0	
Channel treatment: Compaction	yd3	12100	$7.48	$90,508.00	$0	$0	
Channel treatment: Excavation	yd3	8400	$10.68	$89,712.00	$0	$0	
Channel treatment: Excavation	yd3	22000	$10.68	$234,960.00	$0	$0	
Channel treatment: Excavation	yd3	12100	$10.68	$129,228.00	$0	$0	
Channel treatment: Excavation	yd3	451800	$10.68	4,825,224.00	$0	$0	
Channel treatment: Excavation	yd3	545500	$10.68	5,825,940.00	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	8400	$11.75	$98,700.00	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	21000	$11.75	$246,750.00	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	1400	$11.75	$16,450.00	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	225900	$11.75	2,654,325.00	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	545500	$11.75	6,409,625.00	$0	$0	
Inlet structures (Headwall): 42 to 66 inches	each	2	$4,757.50	$9,515.00	$8,849	$0	
Outlet structures (Headwall): 42 to 66 inches	each	2	$4,757.50	$9,515.00	$8,849	$0	
Outlet structures (Headwall): 42 to 66 inches	each	2	$4,757.50	$9,515.00	$8,849	$0	
Pipe in earth (city): 42 to 66 inches / box culvert (15 to 27 ft2)	lf	1350	$208.24	$281,124.00	$261,441	$0	
Pipe in earth (county): 90 to 96 inches / box culvert (39 to 50 ft2)	lf	20	$434.64	$8,692.80	$8,084	$0	
Pipe under pavement (city): 72 to 84 inches / box culvert (28 to 38 ft2)	lf	100	$425.02	$42,502.00	$39,526	$0	
Paving: Asphalt Pavement Installation (24 ft wide, 2 ft C&G, 1 ft Excavation	lf	1350	$148.47	$200,434.50	$186,401	$0	
maintenance: Large Channel Maintenance	lf	2258	$100.00	$225,800.00	$209,991	$54,068	
maintenance: Large Channel Maintenance	lf	3587	$100.00	$358,700.00	$333,586	$85,892	

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Alternative Name	ADCR3aP
Problem Description	Overbank Flooding
Strategy	480 A-F Reservoir SE of Lake & Mannheim . Mannheim Pump Station & Road modification. Melrose Park
District Minimum Criteria for Funding:	Met
Recommended	No

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Concrete: Cast in place	yd3	300	$250.00	$75,000.00	$0	$0	
Land Acquisition: Purchase of Property *	dollar	42256	$1.00	$42,255.78	$0	$0	
Land Acquisition: Purchase of Property *	dollar	8831458	$1.00	8,831,458.26	$0	$0	
Land Acquisition: Permanent Easement *	dollar	840740	$1.00	$840,740.18	$0	$0	
Land Acquisition: Temporary Easement *	dollar	216421	$1.00	$216,420.95	$0	$0	
Land Acquisition: Temporary Easement *	dollar	216421	$1.00	$216,420.95	$0	$0	
Land Acquisition: Temporary Easement *	dollar	27479	$1.00	$27,478.66	$0	$0	
Pump Station: 80 cfs Pump Station with Flap Gate	each	1	$1,415,000.00	1,415,000.00	$789,557	$0	
Pump Station: 40 cfs Pump Station with Flap Gate	each	1	$955,000.00	$955,000.00	$532,881	$0	
Pump Station: 15 cfs Pump Station with Flap Gate	each	1	$560,000.00	$560,000.00	$312,475	$0	

* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)

Subtotal (direct costs)		**$28,885,854**	**$3,926,921**	**$1,035,624**
Utility Relocation	4 %	$1,155,434		
Mobilization \ General Conditions	5%	$1,444,293		
Subtotal with Percent Allowances		**$31,485,581**		
Contingency	30%	$9,445,674		
Profit	5%	$2,046,563		
Probable Construction Cost Estimate		**$42,977,819**		
Design Engineering, Geotechnical, and Construction Management	10%	$4,297,782		
Property Acquisition Cost:		$10,174,775		
Total Conceptual Cost Estimate		**$62,412,921**		

Additional Comments

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Metropolitan Water Reclamation District of Greater Chicago
LDPR Watershed Detailed Watershed Plan
ADCR 3B: Total Conceptual Cost Report

Alternative Name ADCR3bP

Problem Description Flooding Improvements

Strategy 960 A-F Reservoir SE of Lake & Mannheim . Mannheim Pump Station & Road modification. Melrose Park

District Minimum Criteria for Funding: Met

Recommended No

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Channel treatment: Sheet piling	yd2	2007	$303.28	$608,682.96	$0	$145,751	
Channel treatment: Sheet piling	yd2	2007	$303.28	$608,682.96	$0	$145,751	
Channel treatment: Sheet piling	yd2	5978	$303.28	1,813,007.84	$0	$434,130	
Channel treatment: Soil stabilization and vegetative cover	yd2	19928	$13.88	$276,600.64	$257,234	$66,233	
Channel treatment: Soil stabilization and vegetative cover	yd2	19928	$13.88	$276,600.64	$257,234	$66,233	
Channel treatment: Soil stabilization and vegetative cover	yd2	49961	$13.88	$693,458.68	$644,906	$166,051	
Channel treatment: Soil stabilization and vegetative cover	yd2	25000	$13.88	$347,000.00	$322,705	$83,090	
Channel treatment: Vegetative cover only	yd2	200	$8.54	$1,708.00	$1,588	$409	
Demolition: Wood construction	ft2	95000	$2.14	$203,300.00	$0	$0	
Channel treatment: Additional fill	yd3	1000	$13.88	$13,880.00	$0	$0	
Channel treatment: Additional fill	yd3	10700	$13.88	$148,516.00	$0	$0	
Channel treatment: Compaction	yd3	1000	$7.48	$7,480.00	$0	$0	
Channel treatment: Compaction	yd3	12100	$7.48	$90,508.00	$0	$0	
Channel treatment: Excavation	yd3	8400	$10.68	$89,712.00	$0	$0	
Channel treatment: Excavation	yd3	8400	$10.68	$89,712.00	$0	$0	
Channel treatment: Excavation	yd3	22000	$10.68	$234,960.00	$0	$0	
Channel treatment: Excavation	yd3	12100	$10.68	$129,228.00	$0	$0	
Channel treatment: Excavation	yd3	2182200	$10.68	3,305,896.00	$0	$0	
Channel treatment: Excavation	yd3	545500	$10.68	5,825,940.00	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	8400	$11.75	$98,700.00	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	8400	$11.75	$98,700.00	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	21000	$11.75	$246,750.00	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	1400	$11.75	$16,450.00	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	1091100	$11.75	2,820,425.00	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	545500	$11.75	6,409,625.00	$0	$0	
Inlet structures (Headwall): 42 to 66 inches	each	2	$4,757.50	$9,515.00	$8,849	$0	
Outlet structures (Headwall): 42 to 66 inches	each	2	$4,757.50	$9,515.00	$8,849	$0	
Outlet structures (Headwall): 42 to 66 inches	each	2	$4,757.50	$9,515.00	$8,849	$0	
Pipe in earth (city): 42 to 66 inches / box culvert (15 to 27 ft2)	lf	1350	$208.24	$281,124.00	$261,441	$0	
Pipe in earth (county): 90 to 96 inches / box culvert (39 to 50 ft2)	lf	20	$434.64	$8,692.80	$8,084	$0	

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Alternative Name	ADCR3bP
Problem Description	Flooding Improvements
Strategy	960 A-F Reservoir SE of Lake & Mannheim . Mannheim Pump Station & Road modification. Melrose Park
District Minimum Criteria for Funding:	Met
Recommended	No

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Pipe under pavement (city): 72 to 84 inches / box culvert (28 to 38 ft2)	lf	100	$425.02	$42,502.00	$39,526	$0	
Paving: Asphalt Pavement Installation (24 ft wide, 2 ft C&G, 1 ft Excavation	lf	1350	$148.47	$200,434.50	$186,401	$0	
maintenance: Large Channel Maintenance	lf	2258	$100.00	$225,800.00	$209,991	$54,068	
maintenance: Large Channel Maintenance	lf	2258	$100.00	$225,800.00	$209,991	$54,068	
maintenance: Large Channel Maintenance	lf	3587	$100.00	$358,700.00	$333,586	$85,892	
Concrete: Cast in place	yd3	300	$250.00	$75,000.00	$0	$0	
Land Acquisition: Purchase of Property *	dollar	42256	$1.00	$42,255.78	$0	$0	
Land Acquisition: Purchase of Property *	dollar	8831458	$1.00	8,831,458.26	$0	$0	
Land Acquisition: Permanent Easement *	dollar	840740	$1.00	$840,740.18	$0	$0	
Land Acquisition: Temporary Easement *	dollar	216421	$1.00	$216,420.95	$0	$0	
Land Acquisition: Temporary Easement *	dollar	216421	$1.00	$216,420.95	$0	$0	
Land Acquisition: Temporary Easement *	dollar	216421	$1.00	$216,420.95	$0	$0	
Land Acquisition: Temporary Easement *	dollar	27479	$1.00	$27,478.66	$0	$0	
Pump Station: 80 cfs Pump Station with Flap Gate	each	1	$1,415,000.00	1,415,000.00	$789,557	$0	
Pump Station: 80 cfs Pump Station with Flap Gate	each	1	$1,415,000.00	1,415,000.00	$789,557	$0	
Pump Station: 40 cfs Pump Station with Flap Gate	each	1	$955,000.00	$955,000.00	$532,881	$0	
Pump Station: 40 cfs Pump Station with Flap Gate	each	2	$955,000.00	1,910,000.00	$1,065,762	$0	
Pump Station: 15 cfs Pump Station with Flap Gate	each	1	$560,000.00	$560,000.00	$312,475	$0	

* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)

Subtotal (direct costs)		**$62,157,122**	**$6,249,466**	**$1,301,676**
Utility Relocation	4 %	$2,486,285		
Mobilization \ General Conditions	5%	$3,107,856		
Subtotal with Percent Allowances		**$67,751,263**		
Contingency	30%	$20,325,379		
Profit	5%	$4,403,832		
Probable Construction Cost Estimate		**$92,480,474**		
Design Engineering, Geotechnical, and Construction Management	10%	$9,248,047		
Property Acquisition Cost:		$10,391,196		
Total Conceptual Cost Estimate		**$119,670,859**		

Additional Comments

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Metropolitan Water Reclamation District of Greater Chicago
LDPR Watershed Detailed Watershed Plan
ADCR 4A: Total Conceptual Cost Report

Alternative Name ADCR4aP

Problem Description Overbank Flooding

Strategy 480 A-F Reservoir SE of Lake & Mannheim . Mannheim Pump Station modification. Melrose Park Pump

District Minimum Criteria for Funding: Met

Recommended No

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Channel treatment: Sheet piling	yd2	2007	$303.28	$608,682.96	$0	$145,751	
Channel treatment: Soil stabilization and vegetative cover	yd2	19928	$13.88	$276,600.64	$257,234	$66,233	
Channel treatment: Soil stabilization and vegetative cover	yd2	25000	$13.88	$347,000.00	$322,705	$83,090	
Channel treatment: Vegetative cover only	yd2	200	$8.54	$1,708.00	$1,588	$409	
Demolition: Wood construction	ft2	95000	$2.14	$203,300.00	$0	$0	
Channel treatment: Additional fill	yd3	10700	$13.88	$148,516.00	$0	$0	
Channel treatment: Compaction	yd3	12100	$7.48	$90,508.00	$0	$0	
Channel treatment: Excavation	yd3	8400	$10.68	$89,712.00	$0	$0	
Channel treatment: Excavation	yd3	12100	$10.68	$129,228.00	$0	$0	
Channel treatment: Excavation	yd3	451800	$10.68	4,825,224.00	$0	$0	
Channel treatment: Excavation	yd3	545500	$10.68	5,825,940.00	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	8400	$11.75	$98,700.00	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	1400	$11.75	$16,450.00	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	225900	$11.75	2,654,325.00	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	545500	$11.75	6,409,625.00	$0	$0	
Inlet structures (Headwall): 42 to 66 inches	each	2	$4,757.50	$9,515.00	$8,849	$0	
Outlet structures (Headwall): 42 to 66 inches	each	2	$4,757.50	$9,515.00	$8,849	$0	
Outlet structures (Headwall): 42 to 66 inches	each	2	$4,757.50	$9,515.00	$8,849	$0	
Pipe in earth (city): 42 to 66 inches / box culvert (15 to 27 ft2)	lf	1350	$208.24	$281,124.00	$261,441	$0	
Pipe in earth (county): 90 to 96 inches / box culvert (39 to 50 ft2)	lf	20	$434.64	$8,692.80	$8,084	$0	
Pipe under pavement (city): 72 to 84 inches / box culvert (28 to 38 ft2)	lf	100	$425.02	$42,502.00	$39,526	$0	
Paving: Asphalt Pavement Installation (24 ft wide, 2 ft C&G, 1 ft Excavation	lf	1350	$148.47	$200,434.50	$186,401	$0	
maintenance: Large Channel Maintenance	lf	2258	$100.00	$225,800.00	$209,991	$54,068	
Concrete: Cast in place	yd3	300	$250.00	$75,000.00	$0	$0	
Land Acquisition: Purchase of Property *	dollar	42256	$1.00	$42,255.78	$0	$0	
Land Acquisition: Purchase of Property *	dollar	8831458	$1.00	8,831,458.26	$0	$0	
Land Acquisition: Temporary Easement *	dollar	216421	$1.00	$216,420.95	$0	$0	
Land Acquisition: Temporary Easement *	dollar	27479	$1.00	$27,478.66	$0	$0	

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Alternative Name	ADCR4aP
Problem Description	Overbank Flooding
Strategy	480 A-F Reservoir SE of Lake & Mannheim . Mannheim Pump Station modification. Melrose Park Pump
District Minimum Criteria for Funding:	Met
Recommended	No

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)							
Subtotal (direct costs)				**$22,587,618**	**$1,313,517**	**$349,551**	
Utility Relocation			4 %	$903,505			
Mobilization \ General Conditions			5%	$1,129,381			
Subtotal with Percent Allowances				**$24,620,504**			
Contingency			30%	$7,386,151			
Profit			5%	$1,600,333			
Probable Construction Cost Estimate				**$33,606,987**			
Design Engineering, Geotechnical, and Construction Management			10%	$3,360,699			
Property Acquisition Cost:				$9,117,614			
Total Conceptual Cost Estimate				**$47,748,367**			

Additional Comments

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Metropolitan Water Reclamation District of Greater Chicago
LDPR Watershed Detailed Watershed Plan
ADCR 4B: Total Conceptual Cost Report

Alternative Name ADCR4bP

Problem Description Overbank Flooding

Strategy 960 A-F Reservoir SE of Lake & Mannheim . Mannheim Pump Station modification. Melrose Park Pump

District Minimum Criteria for Funding: Met

Recommended No

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Channel treatment: Sheet piling	yd2	2007	$303.28	$608,682.96	$0	$145,751	
Channel treatment: Sheet piling	yd2	2007	$303.28	$608,682.96	$0	$145,751	
Channel treatment: Soil stabilization and vegetative cover	yd2	19928	$13.88	$276,600.64	$257,234	$66,233	
Channel treatment: Soil stabilization and vegetative cover	yd2	19928	$13.88	$276,600.64	$257,234	$66,233	
Channel treatment: Soil stabilization and vegetative cover	yd2	25000	$13.88	$347,000.00	$322,705	$83,090	
Channel treatment: Vegetative cover only	yd2	200	$8.54	$1,708.00	$1,588	$409	
Demolition: Wood construction	ft2	95000	$2.14	$203,300.00	$0	$0	
Channel treatment: Additional fill	yd3	10700	$13.88	$148,516.00	$0	$0	
Channel treatment: Compaction	yd3	12100	$7.48	$90,508.00	$0	$0	
Channel treatment: Excavation	yd3	8400	$10.68	$89,712.00	$0	$0	
Channel treatment: Excavation	yd3	8400	$10.68	$89,712.00	$0	$0	
Channel treatment: Excavation	yd3	12100	$10.68	$129,228.00	$0	$0	
Channel treatment: Excavation	yd3	2182200	$10.68	3,305,896.00	$0	$0	
Channel treatment: Excavation	yd3	545500	$10.68	5,825,940.00	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	8400	$11.75	$98,700.00	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	8400	$11.75	$98,700.00	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	1400	$11.75	$16,450.00	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	1091100	$11.75	2,820,425.00	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	545500	$11.75	6,409,625.00	$0	$0	
Inlet structures (Headwall): 42 to 66 inches	each	2	$4,757.50	$9,515.00	$8,849	$0	
Outlet structures (Headwall): 42 to 66 inches	each	2	$4,757.50	$9,515.00	$8,849	$0	
Outlet structures (Headwall): 42 to 66 inches	each	2	$4,757.50	$9,515.00	$8,849	$0	
Pipe in earth (city): 42 to 66 inches / box culvert (15 to 27 ft2)	lf	1350	$208.24	$281,124.00	$261,441	$0	
Pipe in earth (county): 90 to 96 inches / box culvert (39 to 50 ft2)	lf	20	$434.64	$8,692.80	$8,084	$0	
Pipe under pavement (city): 72 to 84 inches / box culvert (28 to 38 ft2)	lf	100	$425.02	$42,502.00	$39,526	$0	
Paving: Asphalt Pavement Installation (24 ft wide, 2 ft C&G, 1 ft Excavation	lf	1350	$148.47	$200,434.50	$186,401	$0	
maintenance: Large Channel Maintenance	lf	2258	$100.00	$225,800.00	$209,991	$54,068	
maintenance: Large Channel Maintenance	lf	2258	$100.00	$225,800.00	$209,991	$54,068	
Concrete: Cast in place	yd3	300	$250.00	$75,000.00	$0	$0	
Land Acquisition: Purchase of Property *	dollar	42256	$1.00	$42,255.78	$0	$0	

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Alternative Name	ADCR4bP
Problem Description	Overbank Flooding
Strategy	960 A-F Reservoir SE of Lake & Mannheim . Mannheim Pump Station modification. Melrose Park Pump
District Minimum Criteria for Funding:	Met
Recommended	No

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Land Acquisition: Purchase of Property *	dollar	8831458	$1.00	8,831,458.26	$0	$0	
Land Acquisition: Temporary Easement *	dollar	216421	$1.00	$216,420.95	$0	$0	
Land Acquisition: Temporary Easement *	dollar	216421	$1.00	$216,420.95	$0	$0	
Land Acquisition: Temporary Easement *	dollar	27479	$1.00	$27,478.66	$0	$0	
Pump Station: 80 cfs Pump Station with Flap Gate	each	1	$1,415,000.00	1,415,000.00	$789,557	$0	
Pump Station: 40 cfs Pump Station with Flap Gate	each	2	$955,000.00	1,910,000.00	$1,065,762	$0	

* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)

Subtotal (direct costs)		**$55,858,886**	**$3,636,061**	**$615,603**
Utility Relocation	4 %	$2,234,355		
Mobilization \ General Conditions	5%	$2,792,944		
Subtotal with Percent Allowances		**$60,886,185**		
Contingency	30%	$18,265,856		
Profit	5%	$3,957,602		
Probable Construction Cost Estimate		**$83,109,643**		
Design Engineering, Geotechnical, and Construction Management	10%	$8,310,964		
Property Acquisition Cost:		$9,334,035		
Total Conceptual Cost Estimate		**$105,006,306**		

Additional Comments

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Metropolitan Water Reclamation District of Greater Chicago
LDPR Watershed Detailed Watershed Plan
ADCR 6A: Total Conceptual Cost Report

Alternative Name ADCR6aP

Problem Description Overbank Flooding

Strategy 480 A-F Reservoir SE of Lake & Mannheim . Mannheim pump & culvert modification. Melrose Park

District Minimum Criteria for Funding: Met

Recommended No

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Channel treatment: Basket gabions	yd3	2189	$266.98	$584,499.31	$543,575	$139,960	
Channel treatment: Sheet piling	yd2	5978	$303.28	1,813,007.84	$0	$434,130	
Channel treatment: Sheet piling	yd2	18883	$303.28	5,726,836.24	$0	$1,371,306	
Channel treatment: Soil stabilization and vegetative cover	yd2	49961	$13.88	$693,458.68	$644,906	$166,051	
Channel treatment: Soil stabilization and vegetative cover	yd2	55584	$13.88	$771,505.92	$717,489	$184,739	
Channel treatment: Soil stabilization and vegetative cover	yd2	25000	$13.88	$347,000.00	$322,705	$83,090	
Channel treatment: Vegetative cover only	yd2	200	$8.54	$1,708.00	$1,588	$409	
Demolition: Wood construction	ft2	95000	$2.14	$203,300.00	$0	$0	
Channel treatment: Additional fill	yd3	1000	$13.88	$13,880.00	$0	$0	
Channel treatment: Additional fill	yd3	5000	$13.88	$69,400.00	$0	$0	
Channel treatment: Additional fill	yd3	10700	$13.88	$148,516.00	$0	$0	
Channel treatment: Compaction	yd3	1000	$7.48	$7,480.00	$0	$0	
Channel treatment: Compaction	yd3	5000	$7.48	$37,400.00	$0	$0	
Channel treatment: Compaction	yd3	12100	$7.48	$90,508.00	$0	$0	
Channel treatment: Excavation	yd3	22000	$10.68	$234,960.00	$0	$0	
Channel treatment: Excavation	yd3	52000	$10.68	$555,360.00	$0	$0	
Channel treatment: Excavation	yd3	12100	$10.68	$129,228.00	$0	$0	
Channel treatment: Excavation	yd3	451800	$10.68	4,825,224.00	$0	$0	
Channel treatment: Excavation	yd3	545500	$10.68	5,825,940.00	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	21000	$11.75	$246,750.00	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	47000	$11.75	$552,250.00	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	1400	$11.75	$16,450.00	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	225900	$11.75	2,654,325.00	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	545500	$11.75	6,409,625.00	$0	$0	
Inlet structures (Headwall): 42 to 66 inches	each	2	$4,757.50	$9,515.00	$8,849	$0	
Outlet structures (Headwall): 42 to 66 inches	each	2	$4,757.50	$9,515.00	$8,849	$0	
Outlet structures (Headwall): 42 to 66 inches	each	2	$4,757.50	$9,515.00	$8,849	$0	
Pipe in earth (city): 42 to 66 inches / box culvert (15 to 27 ft2)	lf	1350	$208.24	$281,124.00	$261,441	$0	
Pipe in earth (county): 90 to 96 inches / box culvert (39 to 50 ft2)	lf	20	$434.64	$8,692.80	$8,084	$0	
Pipe under pavement (city): 72 to 84 inches / box culvert (28 to 38 ft2)	lf	100	$425.02	$42,502.00	$39,526	$0	

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Alternative Name	ADCR6aP
Problem Description	Overbank Flooding
Strategy	480 A-F Reservoir SE of Lake & Mannheim . Mannheim pump & culvert modification. Melrose Park
District Minimum Criteria for Funding:	Met
Recommended	No

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Paving: Asphalt Pavement Installation (24 ft wide, 2 ft C&G, 1 ft Excavation	lf	1350	$148.47	$200,434.50	$186,401	$0	
maintenance: Large Channel Maintenance	lf	3587	$100.00	$358,700.00	$333,586	$85,892	
maintenance: Large Channel Maintenance	lf	8993	$100.00	$899,300.00	$836,335	$215,340	
Concrete: Cast in place	yd3	300	$250.00	$75,000.00	$0	$0	
Land Acquisition: Purchase of Property *	dollar	42256	$1.00	$42,255.78	$0	$0	
Land Acquisition: Purchase of Property *	dollar	8831458	$1.00	8,831,458.26	$0	$0	
Land Acquisition: Permanent Easement *	dollar	840740	$1.00	$840,740.00	$0	$0	
Land Acquisition: Temporary Easement *	dollar	216421	$1.00	$216,420.95	$0	$0	
Land Acquisition: Temporary Easement *	dollar	661962	$1.00	$661,962.42	$0	$0	
Land Acquisition: Temporary Easement *	dollar	27479	$1.00	$27,478.66	$0	$0	
Pump Station: 80 cfs Pump Station with Flap Gate	each	1	$1,415,000.00	1,415,000.00	$789,557	$0	
Pump Station: 40 cfs Pump Station with Flap Gate	each	1	$955,000.00	$955,000.00	$532,881	$0	
Pump Station: 15 cfs Pump Station with Flap Gate	each	1	$560,000.00	$560,000.00	$312,475	$0	

* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)

Subtotal (direct costs)		**$36,782,910**	**$5,557,096**	**$2,680,917**
Utility Relocation	4 %	$1,471,316		
Mobilization \ General Conditions	5%	$1,839,146		
Subtotal with Percent Allowances		**$40,093,372**		
Contingency	30%	$12,028,012		
Profit	5%	$2,606,069		
Probable Construction Cost Estimate		**$54,727,453**		
Design Engineering, Geotechnical, and Construction Management	10%	$5,472,745		
Property Acquisition Cost:		$10,620,316		
Total Conceptual Cost Estimate		**$79,058,527**		

Additional Comments

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Metropolitan Water Reclamation District of Greater Chicago
LDPR Watershed Detailed Watershed Plan
ADCR 6B: Total Conceptual Cost Report

Alternative Name	ADCR6bP
Problem Description	Overbank Flooding
Strategy	960 A-F Reservoir SE of Lake & Mannheim . Mannheim pump & culvert modification. Melrose Park
District Minimum Criteria for Funding:	Met
Recommended	Yes

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Channel treatment: Basket gabions	yd3	3333	$266.98	$889,844.34	$827,542	$213,076	
Channel treatment: Basket gabions	yd3	2189	$266.98	$584,499.31	$543,575	$139,960	
Channel treatment: Sheet piling	yd2	5067	$303.28	1,536,719.76	$0	$367,972	
Channel treatment: Sheet piling	yd2	5978	$303.28	1,813,007.84	$0	$434,130	
Channel treatment: Sheet piling	yd2	18883	$303.28	5,726,836.24	$0	$1,371,306	
Channel treatment: Soil stabilization and vegetative cover	yd2	15389	$13.88	$213,599.32	$198,644	$51,147	
Channel treatment: Soil stabilization and vegetative cover	yd2	49961	$13.88	$693,458.68	$644,906	$166,051	
Channel treatment: Soil stabilization and vegetative cover	yd2	55584	$13.88	$771,505.92	$717,489	$184,739	
Channel treatment: Soil stabilization and vegetative cover	yd2	25000	$13.88	$347,000.00	$322,705	$83,090	
Channel treatment: Vegetative cover only	yd2	200	$8.54	$1,708.00	$1,588	$409	
Demolition: Wood construction	ft2	95000	$2.14	$203,300.00	$0	$0	
Channel treatment: Additional fill	yd3	1100	$13.88	$15,268.00	$0	$0	
Channel treatment: Additional fill	yd3	1000	$13.88	$13,880.00	$0	$0	
Channel treatment: Additional fill	yd3	5000	$13.88	$69,400.00	$0	$0	
Channel treatment: Additional fill	yd3	10700	$13.88	$148,516.00	$0	$0	
Channel treatment: Compaction	yd3	1100	$7.48	$8,228.00	$0	$0	
Channel treatment: Compaction	yd3	1000	$7.48	$7,480.00	$0	$0	
Channel treatment: Compaction	yd3	5000	$7.48	$37,400.00	$0	$0	
Channel treatment: Compaction	yd3	12100	$7.48	$90,508.00	$0	$0	
Channel treatment: Excavation	yd3	6200	$10.68	$66,216.00	$0	$0	
Channel treatment: Excavation	yd3	22000	$10.68	$234,960.00	$0	$0	
Channel treatment: Excavation	yd3	52000	$10.68	$555,360.00	$0	$0	
Channel treatment: Excavation	yd3	12100	$10.68	$129,228.00	$0	$0	
Channel treatment: Excavation	yd3	2182200	$10.68	3,305,896.00	$0	$0	
Channel treatment: Excavation	yd3	545500	$10.68	5,825,940.00	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	5100	$11.75	$59,925.00	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	21000	$11.75	$246,750.00	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	47000	$11.75	$552,250.00	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	1400	$11.75	$16,450.00	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	1091100	$11.75	2,820,425.00	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	545500	$11.75	6,409,625.00	$0	$0	
Inlet structures (Headwall): 42 to 66 inches	each	2	$4,757.50	$9,515.00	$8,849	$0	

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Alternative Name	ADCR6bP
Problem Description	Overbank Flooding
Strategy	960 A-F Reservoir SE of Lake & Mannheim . Mannheim pump & culvert modification. Melrose Park
District Minimum Criteria for Funding:	Met
Recommended	Yes

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Outlet structures (Headwall): 42 to 66 inches	each	2	$4,757.50	$9,515.00	$8,849	$0	
Outlet structures (Headwall): 42 to 66 inches	each	2	$4,757.50	$9,515.00	$8,849	$0	
Pipe in earth (city): 42 to 66 inches / box culvert (15 to 27 ft2)	lf	1350	$208.24	$281,124.00	$261,441	$0	
Pipe in earth (county): 90 to 96 inches / box culvert (39 to 50 ft2)	lf	20	$434.64	$8,692.80	$8,084	$0	
Pipe under pavement (city): 72 to 84 inches / box culvert (28 to 38 ft2)	lf	100	$425.02	$42,502.00	$39,526	$0	
Paving: Asphalt Pavement Installation (24 ft wide, 2 ft C&G, 1 ft Excavation	lf	1350	$148.47	$200,434.50	$186,401	$0	
maintenance: Large Channel Maintenance	lf	2770	$100.00	$277,000.00	$257,606	$66,328	
maintenance: Large Channel Maintenance	lf	3587	$100.00	$358,700.00	$333,586	$85,892	
maintenance: Large Channel Maintenance	lf	8993	$100.00	$899,300.00	$836,335	$215,340	
Concrete: Cast in place	yd3	300	$250.00	$75,000.00	$0	$0	
Land Acquisition: Purchase of Property *	dollar	42256	$1.00	$42,255.78	$0	$0	
Land Acquisition: Purchase of Property *	dollar	8831458	$1.00	8,831,458.26	$0	$0	
Land Acquisition: Permanent Easement *	dollar	840740	$1.00	$840,740.18	$0	$0	
Land Acquisition: Temporary Easement *	dollar	110034	$1.00	$110,033.92	$0	$0	
Land Acquisition: Temporary Easement *	dollar	216421	$1.00	$216,420.95	$0	$0	
Land Acquisition: Temporary Easement *	dollar	661962	$1.00	$661,962.42	$0	$0	
Land Acquisition: Temporary Easement *	dollar	27479	$1.00	$27,478.66	$0	$0	
Pump Station: 80 cfs Pump Station with Flap Gate	each	1	$1,415,000.00	1,415,000.00	$789,557	$0	
Pump Station: 40 cfs Pump Station with Flap Gate	each	2	$955,000.00	1,910,000.00	$1,065,762	$0	

* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)

Subtotal (direct costs)		**$68,891,483**	**$7,061,294**	**$3,379,440**
Utility Relocation	4 %	$2,755,659		
Mobilization \ General Conditions	5%	$3,444,574		
Subtotal with Percent Allowances		**$75,091,716**		
Contingency	30%	$22,527,515		
Profit	5%	$4,880,962		
Probable Construction Cost Estimate		**102,500,193**		
Design Engineering, Geotechnical, and Construction Management	10%	$10,250,019		
Property Acquisition Cost:		$10,730,350		
Total Conceptual Cost Estimate		**$133,921,296**		

Additional Comments

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Metropolitan Water Reclamation District of Greater Chicago
LDPR Watershed Detailed Watershed Plan
ADCR 7: Total Conceptual Cost Report

Alternative Name ADCR7

Problem Description Streambank erosion

Strategy Streambank stabilization between Whitehall and along Fullerton/King Arthur Drive

District Minimum Criteria for Funding: Met

Recommended Yes

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Channel treatment: Reinforced one sided concrete wall	yd3	240	$587.35	$140,964.00	$131,094	$33,754	
Channel treatment: Soil stabilization and vegetative cover	yd2	800	$13.88	$11,104.00	$10,327	$2,659	
Channel treatment: Excavation	yd3	360	$10.68	$3,844.80	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	360	$11.75	$4,230.00	$0	$0	
Channel treatment: Reinforced one sided concrete wall	yd3	204	$587.35	$119,819.40	$111,430	$28,691	
Channel treatment: Soil stabilization and vegetative cover	yd2	556	$13.88	$7,717.28	$7,177	$1,848	
Channel treatment: Excavation	yd3	306	$10.68	$3,268.08	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	306	$11.75	$3,595.50	$0	$0	

* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)

Subtotal (direct costs)		**$294,543**	**$260,028**	**$66,952**
Utility Relocation	4 %	$11,782		
Mobilization \ General Conditions	5%	$14,727		
Subtotal with Percent Allowances		**$321,052**		
Contingency	30%	$96,316		
Profit	5%	$20,868		
Probable Construction Cost Estimate		**$438,236**		
Design Engineering, Geotechnical, and Construction Management	10%	$43,824		
Property Acquisition Cost:		$0		
Total Conceptual Cost Estimate		**$809,040**		

Additional Comments

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Metropolitan Water Reclamation District of Greater Chicago
LDPR Watershed Detailed Watershed Plan
ADCR 8: Total Conceptual Cost Report

Alternative Name ADCR8

Problem Description Overbank flooding in the City of Northlake and Leyden Township.

Strategy 200 A-F Reservoir @ Centerpoint Preserve. Bulkhead Wolf Rd for park flood storage. Dams removed w/

District Minimum Criteria for Funding: Met

Recommended No

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Channel treatment: Soil stabilization and vegetative cover	yd2	121000	$13.88	1,679,480.00	$1,561,891	$402,156	
Channel treatment: Dumped riprap	yd3	400	$67.28	$26,912.00	$25,028	$6,444	
Channel treatment: Excavation	yd3	1556000	$10.68	6,618,080.00	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	1556000	$11.75	8,283,000.00	$0	$0	
Embankment construction, grading and restoration: Compaction of fill	yd3	7000	$5.34	$37,380.00	$0	$0	
Outlet structures: Concrete swale	yd2	10000	$98.25	$982,500.00	$913,710	$0	
Pipe under pavement (county): 90 to 96 inches / box culvert (39 to 50 ft2)	lf	100	$661.03	$66,103.00	$61,475	$0	
Pump Station: 10ac-ft per day interior drainage	each	1	$800,000.00	$800,000.00	$743,988	$0	
Culvert Modification: Bulhead Culver	each	3	$20,000.00	$60,000.00	$33,479	$0	

* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)

Subtotal (direct costs)		**$38,553,455**	**$3,339,570**	**$408,600**
Utility Relocation	4 %	$1,542,138		
Mobilization \ General Conditions	5%	$1,927,673		
Subtotal with Percent Allowances		**$42,023,266**		
Contingency	30%	$12,606,980		
Profit	5%	$2,731,512		
Probable Construction Cost Estimate		**$57,361,758**		
Design Engineering, Geotechnical, and Construction Management	10%	$5,736,176		
Property Acquisition Cost:		$0		
Total Conceptual Cost Estimate		**$66,846,104**		

Additional Comments

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Metropolitan Water Reclamation District of Greater Chicago
LDPR Watershed Detailed Watershed Plan
DPR 9: Total Conceptual Cost Report

Alternative Name ADCR 9

Problem Description Erosion Control

Strategy Streambank stabilization downstream of Cermak Rd along 19th Avenue

District Minimum Criteria for Funding: Met

Recommended Yes

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Channel treatment: Reinforced one sided concrete wall	yd3	117	$587.35	$68,719.95	$63,909	$16,455	
Channel treatment: Soil stabilization and vegetative cover	yd2	430	$13.88	$5,968.40	$5,551	$1,429	
Channel treatment: Additional fill	yd3	53	$13.88	$735.64	$0	$0	
Channel treatment: Compaction	yd3	53	$7.48	$396.44	$0	$0	
Channel treatment: Excavation	yd3	230	$10.68	$2,456.40	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	175	$11.75	$2,056.25	$0	$0	

* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)

Subtotal (direct costs)		**$80,333**	**$69,459**	**$17,884**
Utility Relocation	4 %	$3,213		
Mobilization \ General Conditions	5%	$4,017		
Subtotal with Percent Allowances		**$87,563**		
Contingency	30%	$26,269		
Profit	5%	$5,692		
Probable Construction Cost Estimate		**$119,524**		
Design Engineering, Geotechnical, and Construction Management	10%	$11,952		
Property Acquisition Cost:		$0		
Total Conceptual Cost Estimate		**$218,819**		

Additional Comments

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Metropolitan Water Reclamation District of Greater Chicago
LDPR Watershed Detailed Watershed Plan
BUCR 1A: Total Conceptual Cost Report

Alternative Name	BUCR 1A
Problem Description	Buffalo Grove at thet confluence with White Pine Ditch
Strategy	Floodwall Lake-Cook Rd To Raupp Blvd. Chanel Improvements Buffalo Grove Rd to Aptakisic. Bulkhead
District Minimum Criteria for Funding:	Met
Recommended	No

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Channel treatment: Dumped rock	yd3	110	$67.28	$7,400.80	$6,883	$1,772	
Channel treatment: Reinforced one sided concrete wall	yd3	1386	$587.35	$814,067.10	$757,070	$194,931	
Channel treatment: Sheet piling	yd2	2422	$303.28	$734,544.16	$0	$175,889	
Channel treatment: Soil stabilization and vegetative cover	yd2	24222	$13.88	$336,201.36	$312,662	$80,504	
Channel treatment: Soil stabilization and vegetative cover	yd2	924	$13.88	$12,825.12	$11,927	$3,071	
Channel treatment: Excavation	yd3	24222	$10.68	$258,690.96	$0	$0	
Channel treatment: Excavation	yd3	7776	$10.68	$83,047.68	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	1386	$11.75	$16,285.50	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	7776	$11.75	$91,368.00	$0	$0	
Outlet structures (Headwall): 36 inches or less	each	7	$2,600.34	$18,202.38	$16,928	$0	
Pipe in earth (county): 36 inches or less	lf	1450	$216.78	$314,331.00	$292,323	$0	
maintenance: Small Channel Maintenance (Brush and debris removal)	lf	2967	$5.00	$14,835.00	$13,796	$3,552	
Land Acquisition: Permanent Easement *	dollar	76750	$1.00	$76,750.00	$0	$0	
Land Acquisition: Temporary Easement *	dollar	46050	$1.00	$46,050.00	$0	$0	
Land Acquisition: Temporary Easement *	dollar	99090	$1.00	$99,090.00	$0	$0	
Pump Station: 10ac-ft per day interior drainage	each	2	$800,000.00	1,600,000.00	$1,487,976	$0	
Culvert Modification: Bulhead Bridge Opening	each	1	$50,000.00	$50,000.00	$27,900	$0	

* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)

Subtotal (direct costs)		**$4,351,799**	**$2,927,464**	**$459,719**
Utility Relocation	4 %	$174,072		
Mobilization \ General Conditions	5%	$217,590		
Subtotal with Percent Allowances		**$4,743,461**		
Contingency	30%	$1,423,038		
Profit	5%	$308,325		
Probable Construction Cost Estimate		**$6,474,824**		
Design Engineering, Geotechnical, and Construction Management	10%	$647,482		
Property Acquisition Cost:		$221,890		
Total Conceptual Cost Estimate		**$10,731,380**		

Additional Comments

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Metropolitan Water Reclamation District of Greater Chicago
LDPR Watershed Detailed Watershed Plan
BUCR 1B: Total Conceptual Cost Report

Alternative Name	BUCR 1B
Problem Description	Overbank Flooding
Strategy	Chanel Improvements
District Minimum Criteria for Funding:	Met
Recommended	Yes

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Channel treatment: Dumped riprap	yd3	163	$67.28	$10,966.64	$10,199	$2,626	
Channel treatment: Soil stabilization and vegetative cover	yd2	3126	$13.88	$43,388.88	$40,351	$10,390	
Channel treatment: Excavation	yd3	3668	$10.68	$39,174.24	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	3668	$11.75	$43,099.00	$0	$0	
Culvert Modification: Bulhead Bridge Opening	each	1	$50,000.00	$50,000.00	$27,900	$0	
Land Acquisition: Temporary Easement *	dollar	136194	$1.00	$136,194.00	$0	$0	
maintenance: Small Channel Maintenance (Brush and debris removal)	lf	4400	$5.00	$22,000.00	$20,460	$5,268	

* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)

Subtotal (direct costs)		**$208,629**	**$98,909**	**$18,284**
Utility Relocation	4 %	$8,345		
Mobilization \ General Conditions	5%	$10,431		
Subtotal with Percent Allowances		**$227,405**		
Contingency	30%	$68,222		
Profit	5%	$14,781		
Probable Construction Cost Estimate		**$310,408**		
Design Engineering, Geotechnical, and Construction Management	10%	$31,041		
Property Acquisition Cost:		$136,194		
Total Conceptual Cost Estimate		**$594,836**		

Additional Comments

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Metropolitan Water Reclamation District of Greater Chicago
LDPR Watershed Detailed Watershed Plan
BUCR 2A: Total Conceptual Cost Report

Alternative Name BUCR2A

Problem Description Various flooding within the Village of Wheeling

Strategy Stormwater storage within Schwinn Farms in the Village of Wheeling- Weiland Rd Alt 1/1a

District Minimum Criteria for Funding: Met

Recommended No

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Channel treatment: Soil stabilization and vegetative cover	yd2	128260	$13.88	1,780,248.80	$1,655,604	$426,285	
Channel treatment: Excavation	yd3	734196	$10.68	7,841,213.28	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	734196	$11.75	8,626,803.00	$0	$0	
Concrete: Cast in place	yd3	1249	$250.00	$312,250.00	$0	$0	
Land Acquisition: Purchase of Property *	dollar	13200000	$1.00	3,200,000.00	$0	$0	
Pump Station: 10ac-ft per day interior drainage	each	1	$800,000.00	$800,000.00	$743,988	$0	

* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)

Subtotal (direct costs)		**$19,360,515**	**$2,399,592**	**$426,285**
Utility Relocation	4 %	$774,421		
Mobilization \ General Conditions	5%	$968,026		
Subtotal with Percent Allowances		**$21,102,961**		
Contingency	30%	$6,330,888		
Profit	5%	$1,371,692		
Probable Construction Cost Estimate		**$28,805,542**		
Design Engineering, Geotechnical, and Construction Management	10%	$2,880,554		
Property Acquisition Cost:		$13,200,000		
Total Conceptual Cost Estimate		**$47,711,974**		

Additional Comments

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Metropolitan Water Reclamation District of Greater Chicago
LDPR Watershed Detailed Watershed Plan
BUCR 2B: Total Conceptual Cost Report

Alternative Name	BUCR2B
Problem Description	Various flooding within the Village of Wheeling
Strategy	Stormwater storage within Schwinn Farms in the Village of Wheeling- Weiland Rd Alt 1/1a
District Minimum Criteria for Funding:	Met
Recommended	No

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Land Acquisition: Purchase of Property *	dollar	10920000	$1.00	0,920,000.00	$0	$0	
Channel treatment: Soil stabilization and vegetative cover	yd2	98388	$13.88	1,365,625.44	$1,270,011	$327,003	
Channel treatment: Excavation	yd3	637363	$10.68	6,807,036.84	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	629012	$11.75	7,390,891.00	$0	$0	
Concrete: Cast in place	yd3	1249	$250.00	$312,250.00	$0	$0	
Embankment construction, grading and restoration: Additional fill	yd3	8351	$13.88	$115,911.88	$0	$0	
Embankment construction, grading and restoration: Compaction of fill	yd3	8351	$5.34	$44,594.34	$0	$0	
Pump Station: 10ac-ft per day interior drainage	each	1	$800,000.00	$800,000.00	$743,988	$0	

* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)

Subtotal (direct costs)		**$16,836,310**	**$2,013,999**	**$327,003**
Utility Relocation	4 %	$673,452		
Mobilization \ General Conditions	5%	$841,815		
Subtotal with Percent Allowances		**$18,351,577**		
Contingency	30%	$5,505,473		
Profit	5%	$1,192,853		
Probable Construction Cost Estimate		**$25,049,903**		
Design Engineering, Geotechnical, and Construction Management	10%	$2,504,990		
Property Acquisition Cost:		$10,920,000		
Total Conceptual Cost Estimate		**$40,815,895**		

Additional Comments

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Metropolitan Water Reclamation District of Greater Chicago
LDPR Watershed Detailed Watershed Plan
BUCR 2C: Total Conceptual Cost Report

Alternative Name	BUCR2C
Problem Description	Various flooding within the Village of Wheeling
Strategy	Stormwater storage within Schwinn Farms in the Village of Wheeling- Weiland Rd Alt 1/1a
District Minimum Criteria for Funding:	Met
Recommended	No

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Channel treatment: Soil stabilization and vegetative cover	yd2	124843	$13.88	1,732,820.84	$1,611,497	$414,929	
Channel treatment: Excavation	yd3	712948	$10.68	7,614,284.64	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	708622	$11.75	8,326,308.50	$0	$0	
Concrete: Cast in place	yd3	1054	$250.00	$263,500.00	$0	$0	
Embankment construction, grading and restoration: Additional fill	yd3	4326	$13.88	$60,044.88	$0	$0	
Embankment construction, grading and restoration: Compaction of fill	yd3	4326	$5.34	$23,100.84	$0	$0	
Pump Station: 10ac-ft per day interior drainage	each	1	$800,000.00	$800,000.00	$743,988	$0	
Land Acquisition: Purchase of Property *	dollar	14400000	$1.00	4,400,000.00	$0	$0	

* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)

Subtotal (direct costs)		**$18,820,060**	**$2,355,485**	**$414,929**
Utility Relocation	4 %	$752,802		
Mobilization \ General Conditions	5%	$941,003		
Subtotal with Percent Allowances		**$20,513,865**		
Contingency	30%	$6,154,160		
Profit	5%	$1,333,401		
Probable Construction Cost Estimate		**$28,001,426**		
Design Engineering, Geotechnical, and Construction Management	10%	$2,800,143		
Property Acquisition Cost:		$14,400,000		
Total Conceptual Cost Estimate		**$47,971,982**		

Additional Comments

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Metropolitan Water Reclamation District of Greater Chicago
LDPR Watershed Detailed Watershed Plan
BUCR 2D: Total Conceptual Cost Report

Alternative Name	BUCR2D
Problem Description	Various flooding within the Village of Wheeling
Strategy	Stormwater storage within Schwinn Farms in the Village of Wheeling- Weiland Rd Alt 1/1a
District Minimum Criteria for Funding:	Met
Recommended	No

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Land Acquisition: Purchase of Property *	dollar	14800000	$1.00	4,800,000.00	$0	$0	
Channel treatment: Soil stabilization and vegetative cover	yd2	129480	$13.88	1,797,182.40	$1,671,352	$430,340	
Channel treatment: Excavation	yd3	741585	$10.68	7,920,127.80	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	737259	$11.75	8,662,793.25	$0	$0	
Concrete: Cast in place	yd3	1054	$250.00	$263,500.00	$0	$0	
Embankment construction, grading and restoration: Additional fill	yd3	4326	$13.88	$60,044.88	$0	$0	
Embankment construction, grading and restoration: Compaction of fill	yd3	4326	$5.34	$23,100.84	$0	$0	
Pump Station: 10ac-ft per day interior drainage	each	1	$800,000.00	$800,000.00	$743,988	$0	

* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)

Subtotal (direct costs)		**$19,526,749**	**$2,415,340**	**$430,340**
Utility Relocation	4 %	$781,070		
Mobilization \ General Conditions	5%	$976,337		
Subtotal with Percent Allowances		**$21,284,157**		
Contingency	30%	$6,385,247		
Profit	5%	$1,383,470		
Probable Construction Cost Estimate		**$29,052,874**		
Design Engineering, Geotechnical, and Construction Management	10%	$2,905,287		
Property Acquisition Cost:		$14,800,000		
Total Conceptual Cost Estimate		**$49,603,841**		

Additional Comments

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Metropolitan Water Reclamation District of Greater Chicago
LDPR Watershed Detailed Watershed Plan
BUCR 3: Total Conceptual Cost Report

Alternative Name	BUCR 3
Problem Description	Flooding downstream through Buffalo Grove and Wheeling
Strategy	Expansion of the Buffalo Creek Flood Control Reservoir by 800 A-F
District Minimum Criteria for Funding:	Met
Recommended	No

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Channel treatment: Soil stabilization and vegetative cover	yd2	212960	$13.88	2,955,884.80	$2,748,928	$707,794	
Channel treatment: Excavation	yd3	1250333	$10.68	3,353,556.44	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	1250256	$11.75	4,690,508.00	$0	$0	
Concrete: Cast in place	yd3	5926	$250.00	1,481,500.00	$0	$0	
Concrete: Cast in place	yd3	0	$250.00	$0.00	$0	$0	
Embankment construction, grading and restoration: Additional fill	yd3	77	$13.88	$1,068.76	$0	$0	
Embankment construction, grading and restoration: Compaction of fill	yd3	77	$5.34	$411.18	$0	$0	
Outlet structures (Headwall): 42 to 66 inches	each	1	$4,757.50	$4,757.50	$4,424	$0	
Pipe in earth (county): 42 to 66 inches / box culvert (15-27 ft2)	lf	20	$208.24	$4,164.80	$3,873	$0	
Land Acquisition: Purchase of Property *	dollar	6000000	$1.00	6,000,000.00	$0	$0	

* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)

Subtotal (direct costs)		**$32,491,851**	**$2,757,225**	**$707,794**
Utility Relocation	4 %	$1,299,674		
Mobilization \ General Conditions	5%	$1,624,593		
Subtotal with Percent Allowances		**$35,416,118**		
Contingency	30%	$10,624,835		
Profit	5%	$2,302,048		
Probable Construction Cost Estimate		**$48,343,001**		
Design Engineering, Geotechnical, and Construction Management	10%	$4,834,300		
Property Acquisition Cost:		$6,000,000		
Total Conceptual Cost Estimate		**$62,642,321**		

Additional Comments

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Metropolitan Water Reclamation District of Greater Chicago
LDPR Watershed Detailed Watershed Plan
BUCR 4: Total Conceptual Cost Report

Alternative Name BUCR 4

Problem Description Overbank flooding along Buffalo Creek Trib A, downstream of Hicks Rd

Strategy Mitigation storage reservoir in forest preserve to accomodate channel improvements, Rand Rd to Baldwin Rd

District Minimum Criteria for Funding: Met

Recommended Yes

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Channel treatment: Dumped rock	yd3	236	$67.28	$15,878.08	$14,766	$3,802	
Channel treatment: Soil stabilization and vegetative cover	yd2	2467	$13.88	$34,241.96	$31,845	$8,199	
Channel treatment: Soil stabilization and vegetative cover	yd2	19360	$13.88	$268,716.80	$249,903	$64,345	
Demolition: Brick, concrete, or stone construction	ft2	2460	$4.27	$10,504.20	$0	$0	
Demolition: Brick, concrete, or stone construction	ft2	15600	$4.27	$66,612.00	$0	$0	
Embankment construction, grading and restoration: Additional fill	yd3	178	$13.88	$2,470.64	$0	$0	
Embankment construction, grading and restoration: Compaction of fill	yd3	178	$5.34	$950.52	$0	$0	
Channel treatment: Excavation	yd3	5549	$10.68	$59,263.32	$0	$0	
Channel treatment: Excavation	yd3	72600	$10.68	$775,368.00	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	5549	$11.75	$65,200.75	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	72600	$11.75	$853,050.00	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	182	$11.75	$2,138.50	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	289	$11.75	$3,395.75	$0	$0	
Outlet structures (Headwall): 36 inches or less	each	1	$2,600.34	$2,600.34	$2,418	$0	
Pipe in earth (county): 36 inches or less	lf	300	$216.78	$65,034.00	$60,481	$0	
Pipe under pavement (county): 90 to 96 inches / box culvert (39 to 50 ft2)	lf	270	$661.03	$178,478.10	$165,982	$0	
Excavation, Structural (deep heavy soil & clay): Structural Excavation (12"-18" deep)	yd3	327	$169.80	$55,524.60	$51,637	$0	
Excavation, Structural (deep heavy soil & clay): Structural Excavation (12"-18" deep)	yd3	156	$169.80	$26,488.80	$24,634	$0	
Pipe under pavement (county): 42 to 66 inches / box culvert (15 to 27 ft2)	lf	800	$291.54	$233,232.00	$216,902	$0	
Paving: Asphalt Pavement Installation (24 ft wide, 2 ft C&G, 1 ft Excavation	lf	490	$148.47	$72,750.30	$67,657	$0	
maintenance: Small Channel Maintenance (Brush and debris removal)	lf	6368	$5.00	$31,840.00	$29,611	$7,624	
Concrete: Cast in place	yd3	207	$250.00	$51,750.00	$0	$0	
Land Acquisition: Purchase of Property *	dollar	600000	$1.00	$600,000.00	$0	$0	
Land Acquisition: Temporary Easement *	dollar	184976	$1.00	$184,976.00	$0	$0	
Pump Station: 10ac-ft per day interior drainage	each	1	$800,000.00	$800,000.00	$743,988	$0	

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Alternative Name BUCR 4

Problem Description Overbank flooding along Buffalo Creek Trib A, downstream of Hicks Rd

Strategy Mitigation storage reservoir in forest preserve to accomodate channel improvements, Rand Rd to Baldwin Rd

District Minimum Criteria for Funding: Met

Recommended Yes

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)							
Subtotal (direct costs)				**$3,675,489**	**$1,659,823**	**$83,970**	
Utility Relocation			4 %	$147,020			
Mobilization \ General Conditions			5%	$183,774			
Subtotal with Percent Allowances				**$4,006,283**			
Contingency			30%	$1,201,885			
Profit			5%	$260,408			
Probable Construction Cost Estimate				**$5,468,576**			
Design Engineering, Geotechnical, and Construction Management			10%	$546,858			
Property Acquisition Cost:				$784,976			
Total Conceptual Cost Estimate				**$8,544,202**			

Additional Comments

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Metropolitan Water Reclamation District of Greater Chicago
LDPR Watershed Detailed Watershed Plan
BUCR 5: Total Conceptual Cost Report

Alternative Name	BUCR 5
Problem Description	Overbank flooding
Strategy	Childerly Park floodwall in conjunction with reservoir on the Horcher and Schwinn Farms.
District Minimum Criteria for Funding:	Met
Recommended	Yes

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Channel treatment: Soil stabilization and vegetative cover	yd2	128260	$13.88	1,780,248.80	$1,655,604	$426,285	
Channel treatment: Excavation	yd3	734196	$10.68	7,841,213.28	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	734196	$11.75	8,626,803.00	$0	$0	
Concrete: Cast in place	yd3	1249	$250.00	$312,250.00	$0	$0	
Pump Station: 10ac-ft per day interior drainage	each	1	$800,000.00	$800,000.00	$743,988	$0	
Channel treatment: Reinforced one sided concrete wall	yd3	2623	$587.35	1,540,619.05	$1,432,752	$368,905	
Channel treatment: Material to be hauled offsite	yd3	2623	$11.75	$30,820.25	$0	$0	
Channel treatment: Soil stabilization and vegetative cover	yd2	45833	$13.88	$636,162.04	$591,621	$152,331	
Channel treatment: Excavation	yd3	45833	$10.68	$489,496.44	$0	$0	
Channel treatment: Sheet piling	yd2	4583	$303.28	1,389,932.24	$0	$332,823	
Pump Station: 10ac-ft per day interior drainage	each	2	$800,000.00	1,600,000.00	$1,487,976	$0	
Pipe in earth (county): 36 inches or less	lf	100	$216.78	$21,678.00	$20,160	$0	
Outlet structures (Headwall): 36 inches or less	each	4	$2,600.34	$10,401.36	$9,673	$0	
Land Acquisition: Temporary Easement *	dollar	82159	$1.00	$82,159.00	$0	$0	
Land Acquisition: Permanent Easement *	dollar	136932	$1.00	$136,932.00	$0	$0	
Land Acquisition: Purchase of Property *	dollar	13200000	$1.00	3,200,000.00	$0	$0	

* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)

Subtotal (direct costs)		**$25,079,624**	**$5,941,774**	**$1,280,344**
Utility Relocation	4 %	$1,003,185		
Mobilization \ General Conditions	5%	$1,253,981		
Subtotal with Percent Allowances		**$27,336,791**		
Contingency	30%	$8,201,037		
Profit	5%	$1,776,891		
Probable Construction Cost Estimate		**$37,314,719**		
Design Engineering, Geotechnical, and Construction Management	10%	$3,731,472		
Property Acquisition Cost:		$13,419,091		
Total Conceptual Cost Estimate		**$61,687,400**		

Additional Comments

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Metropolitan Water Reclamation District of Greater Chicago
LDPR Watershed Detailed Watershed Plan
BUCR 6: Total Conceptual Cost Report

Alternative Name	BUCR 6
Problem Description	Flooding within the Village of Wheeling
Strategy	Expansion of existing Water Tower Basin in Wheeling.
District Minimum Criteria for Funding:	Met
Recommended	No

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Channel treatment: Soil stabilization and vegetative cover	yd2	40414	$13.88	$560,946.32	$521,671	$134,320	
Channel treatment: Excavation	yd3	164011	$10.68	1,751,637.48	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	164011	$11.75	1,927,129.25	$0	$0	
Concrete: Cast in place	yd3	274	$250.00	$68,500.00	$0	$0	
Outlet structures (Headwall): 36 inches or less	each	1	$2,600.34	$2,600.34	$2,418	$0	
Pipe in earth (county): 36 inches or less	lf	25	$216.78	$5,419.50	$5,040	$0	
Pump Station: 10ac-ft per day interior drainage	each	1	$800,000.00	$800,000.00	$743,988	$0	
Land Acquisition: Purchase of Property *	dollar	85724	$1.00	$85,724.00	$0	$0	
Land Acquisition: Temporary Easement *	dollar	30549	$1.00	$30,549.00	$0	$0	

* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)

Subtotal (direct costs)		**$5,116,233**	**$1,273,118**	**$134,320**
Utility Relocation	4 %	$204,649		
Mobilization \ General Conditions	5%	$255,812		
Subtotal with Percent Allowances		**$5,576,694**		
Contingency	30%	$1,673,008		
Profit	5%	$362,485		
Probable Construction Cost Estimate		**$7,612,187**		
Design Engineering, Geotechnical, and Construction Management	10%	$761,219		
Property Acquisition Cost:		$116,273		
Total Conceptual Cost Estimate		**$9,897,116**		

Additional Comments

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Metropolitan Water Reclamation District of Greater Chicago
LDPR Watershed Detailed Watershed Plan
BUCR 7: Total Conceptual Cost Report

Alternative Name	BUCR 7
Problem Description	Flooding within the Village of Wheeling
Strategy	The addition of four reservoirs areas along Wolf Road and channel improvements from Jeffery Avenue to
District Minimum Criteria for Funding:	Met
Recommended	No

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Channel treatment: Soil stabilization and vegetative cover	yd2	92730	$13.88	1,287,092.40	$1,196,976	$308,198	
Channel treatment: Excavation	yd3	149169	$10.68	1,593,124.92	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	149169	$11.75	1,752,735.75	$0	$0	
Concrete: Cast in place	yd3	1716	$250.00	$429,000.00	$0	$0	
Outlet structures (Headwall): 36 inches or less	each	3	$2,600.34	$7,801.02	$7,255	$0	
Pipe in earth (county): 36 inches or less	lf	75	$216.78	$16,258.50	$15,120	$0	
Channel treatment: Dumped rock	yd3	119	$67.28	$8,006.32	$7,446	$1,917	
Channel treatment: Soil stabilization and vegetative cover	yd2	1933	$13.88	$26,830.04	$24,952	$6,425	
Channel treatment: Excavation	yd3	4131	$10.68	$44,119.08	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	4131	$11.75	$48,539.25	$0	$0	
maintenance: Small Channel Maintenance (Brush and debris removal)	lf	3214	$5.00	$16,070.00	$14,945	$3,848	
Land Acquisition: Purchase of Property *	dollar	1017507	$1.00	1,017,507.00	$0	$0	

* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)

Subtotal (direct costs)		**$5,229,577**	**$1,266,693**	**$320,388**
Utility Relocation	4 %	$209,183		
Mobilization \ General Conditions	5%	$261,479		
Subtotal with Percent Allowances		**$5,700,239**		
Contingency	30%	$1,710,072		
Profit	5%	$370,516		
Probable Construction Cost Estimate		**$7,780,827**		
Design Engineering, Geotechnical, and Construction Management	10%	$778,083		
Property Acquisition Cost:		$1,017,507		
Total Conceptual Cost Estimate		**$11,163,498**		

Additional Comments

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Metropolitan Water Reclamation District of Greater Chicago
LDPR Watershed Detailed Watershed Plan
BUCR 8: Total Conceptual Cost Report

Alternative Name	BUCR 8
Problem Description	Flooding within the Villsge of Wheeling
Strategy	Addition of 3 reservoirs along Diversion Channel, revision of diversion structure, improvements of Diversion
District Minimum Criteria for Funding:	Met
Recommended	No

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Channel treatment: Dumped rock	yd3	249	$67.28	$16,752.72	$15,580	$4,011	
Channel treatment: Soil stabilization and vegetative cover	yd2	4577	$13.88	$63,528.76	$59,081	$15,212	
Channel treatment: Soil stabilization and vegetative cover	yd2	299741	$13.88	4,160,405.08	$3,869,113	$996,220	
Channel treatment: Excavation	yd3	17141	$10.68	$183,065.88	$0	$0	
Channel treatment: Excavation	yd3	390217	$10.68	4,167,517.56	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	17141	$11.75	$201,406.75	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	390217	$11.75	4,585,049.75	$0	$0	
Outlet structures (Headwall): 36 inches or less	each	3	$2,600.34	$7,801.02	$7,255	$0	
Pipe in earth (county): 36 inches or less	lf	75	$216.78	$16,258.50	$15,120	$0	
Concrete: Cast in place	yd3	2631	$250.00	$657,750.00	$0	$0	
Land Acquisition: Purchase of Property *	dollar	11000000	$1.00	1,000,000.00	$0	$0	
Land Acquisition: Temporary Easement *	dollar	352663	$1.00	$352,663.00	$0	$0	
Pump Station: 10ac-ft per day interior drainage	each	3	$800,000.00	2,400,000.00	$2,231,963	$0	

* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)

Subtotal (direct costs)		**$16,459,536**	**$6,198,112**	**$1,015,443**
Utility Relocation	4 %	$658,381		
Mobilization \ General Conditions	5%	$822,977		
Subtotal with Percent Allowances		**$17,940,894**		
Contingency	30%	$5,382,268		
Profit	5%	$1,166,158		
Probable Construction Cost Estimate		**$24,489,321**		
Design Engineering, Geotechnical, and Construction Management	10%	$2,448,932		
Property Acquisition Cost:		$11,352,663		
Total Conceptual Cost Estimate		**$45,504,471**		

Additional Comments

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Metropolitan Water Reclamation District of Greater Chicago
LDPR Watershed Detailed Watershed Plan
BUCR 9: Total Conceptual Cost Report

Alternative Name	BUCR 9
Problem Description	Flooding within the village of Wheeling
Strategy	Provide storage volume within the Alington Club and implement channel improvements throught the reach.
District Minimum Criteria for Funding:	Met
Recommended	No

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Channel treatment: Soil stabilization and vegetative cover	yd2	91960	$13.88	1,276,404.80	$1,187,037	$305,639	
Channel treatment: Excavation	yd3	447135	$10.68	4,775,401.80	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	429765	$11.75	5,049,738.75	$0	$0	
Concrete: Cast in place	yd3	500	$250.00	$125,000.00	$0	$0	
Embankment construction, grading and restoration: Additional fill	yd3	17370	$13.88	$241,095.60	$0	$0	
Embankment construction, grading and restoration: Compaction of fill	yd3	17370	$5.34	$92,755.80	$0	$0	
Outlet structures (Headwall): 36 inches or less	each	1	$2,600.34	$2,600.34	$2,418	$0	
Pipe in earth (county): 36 inches or less	lf	25	$216.78	$5,419.50	$5,040	$0	
Pump Station: 10ac-ft per day interior drainage	each	1	$800,000.00	$800,000.00	$743,988	$0	
Channel treatment: Dumped rock	yd3	42	$67.28	$2,825.76	$2,628	$677	
Channel treatment: Soil stabilization and vegetative cover	yd2	507	$13.88	$7,037.16	$6,544	$1,685	
Channel treatment: Excavation	yd3	426	$10.68	$4,549.68	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	426	$11.75	$5,005.50	$0	$0	
maintenance: Small Channel Maintenance (Brush and debris removal)	lf	1142	$5.00	$5,710.00	$5,310	$1,367	
Land Acquisition: Purchase of Property *	dollar	7600000	$1.00	7,600,000.00	$0	$0	

* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)

Subtotal (direct costs)		**$12,393,545**	**$1,952,966**	**$309,368**
Utility Relocation	4 %	$495,742		
Mobilization \ General Conditions	5%	$619,677		
Subtotal with Percent Allowances		**$13,508,964**		
Contingency	30%	$4,052,689		
Profit	5%	$878,083		
Probable Construction Cost Estimate		**$18,439,735**		
Design Engineering, Geotechnical, and Construction Management	10%	$1,843,974		
Property Acquisition Cost:		$7,600,000		
Total Conceptual Cost Estimate		**$30,146,043**		

Additional Comments

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Metropolitan Water Reclamation District of Greater Chicago
LDPR Watershed Detailed Watershed Plan
CYCR 1: Total Conceptual Cost Report

Alternative Name CYCR1

Problem Description Flooding

Strategy Evacuate area upstream of SOO RR tracks and area West of Tristate to provide storage (Smaller Tristate

District Minimum Criteria for Funding: Met

Recommended No

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Channel treatment: Soil stabilization and vegetative cover	yd2	38720	$13.88	$537,433.60	$499,805	$128,690	
Channel treatment: Excavation	yd3	49600	$10.68	$529,728.00	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	49600	$11.75	$582,800.00	$0	$0	
Land Acquisition: Purchase of Property *	dollar	4096329	$1.00	4,096,329.00	$0	$0	

* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)

Subtotal (direct costs)		**$1,649,962**	**$499,805**	**$128,690**
Utility Relocation	4 %	$65,998		
Mobilization \ General Conditions	5%	$82,498		
Subtotal with Percent Allowances		**$1,798,458**		
Contingency	30%	$539,537		
Profit	5%	$116,900		
Probable Construction Cost Estimate		**$2,454,895**		
Design Engineering, Geotechnical, and Construction Management	10%	$245,490		
Property Acquisition Cost:		$4,096,329		
Total Conceptual Cost Estimate		**$7,425,209**		

Additional Comments

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Metropolitan Water Reclamation District of Greater Chicago
LDPR Watershed Detailed Watershed Plan
CYCR 2: Total Conceptual Cost Report

Alternative Name	CYCR2
Problem Description	Overtopping of Belle Plaine Road- Prop 7' x 4' RCBC
Strategy	Replace Culvert
District Minimum Criteria for Funding:	Met
Recommended	No

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Demolition: Brick, concrete, or stone construction	ft2	540	$4.27	$2,305.80	$0	$0	
Inlet structures (Headwall): 42 to 66 inches	each	1	$4,757.50	$4,757.50	$4,424	$0	
Outlet structures (Headwall): 42 to 66 inches	each	1	$4,757.50	$4,757.50	$4,424	$0	
Paving: Asphalt Pavement Installation (24 ft wide, 2 ft C&G, 1 ft Excavation	lf	540	$148.47	$80,173.80	$74,560	$0	
Pipe under pavement (county): 72 to 84 inches / box culvert (28 to 38 ft2)	lf	50	$608.70	$30,435.00	$28,304	$0	

* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)

Subtotal (direct costs)		**$122,430**	**$111,713**	**$0**
Utility Relocation	4 %	$4,897		
Mobilization \ General Conditions	5%	$6,121		
Subtotal with Percent Allowances		**$133,448**		
Contingency	30%	$40,034		
Profit	5%	$8,674		
Probable Construction Cost Estimate		**$182,157**		
Design Engineering, Geotechnical, and Construction Management	10%	$18,216		
Property Acquisition Cost:		$0		
Total Conceptual Cost Estimate		**$312,086**		

Additional Comments

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Metropolitan Water Reclamation District of Greater Chicago
LDPR Watershed Detailed Watershed Plan
CYCR 3: Total Conceptual Cost Report

Alternative Name	CYCR3
Problem Description	Flooding
Strategy	Construct floodwall and small stoage basin West of Tollway
District Minimum Criteria for Funding:	Met
Recommended	No

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Channel treatment: Reinforced one sided concrete wall	yd3	870	$587.35	$510,994.50	$475,217	$122,359	
Channel treatment: Sheet piling	yd2	900	$303.28	$272,952.00	$0	$65,359	
Channel treatment: Soil stabilization and vegetative cover	yd2	18000	$13.88	$249,840.00	$232,347	$59,825	
Channel treatment: Soil stabilization and vegetative cover	yd2	33880	$13.88	$470,254.40	$437,329	$112,604	
Demolition: Brick, concrete, or stone construction	ft2	1100	$4.27	$4,697.00	$0	$0	
Channel treatment: Excavation	yd3	12480	$10.68	$133,286.40	$0	$0	
Channel treatment: Excavation	yd3	42000	$10.68	$448,560.00	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	870	$11.75	$10,222.50	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	42000	$11.75	$493,500.00	$0	$0	
Pipe under pavement (county): 36 inches or less	lf	1100	$415.41	$456,951.00	$424,957	$0	
Paving: Asphalt Pavement Installation (24 ft wide, 2 ft C&G, 1 ft Excavation	lf	1100	$148.47	$163,317.00	$151,882	$0	
Land Acquisition: Purchase of Property *	dollar	69511	$1.00	$69,510.66	$0	$0	
Land Acquisition: Purchase of Property *	dollar	3796248	$1.00	3,796,247.74	$0	$0	
Land Acquisition: Temporary Easement *	dollar	16891	$1.00	$16,891.09	$0	$0	
Pump Station: 10ac-ft per day interior drainage	each	1	$800,000.00	$800,000.00	$743,988	$0	

* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)

Subtotal (direct costs)		**$4,014,575**	**$2,465,721**	**$360,147**
Utility Relocation	4 %	$160,583		
Mobilization \ General Conditions	5%	$200,729		
Subtotal with Percent Allowances		**$4,375,887**		
Contingency	30%	$1,312,766		
Profit	5%	$284,433		
Probable Construction Cost Estimate		**$5,973,085**		
Design Engineering, Geotechnical, and Construction Management	10%	$597,309		
Property Acquisition Cost:		$3,882,649		
Total Conceptual Cost Estimate		**$13,278,911**		

Additional Comments

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Metropolitan Water Reclamation District of Greater Chicago
LDPR Watershed Detailed Watershed Plan
CYCR 4: Total Conceptual Cost Report

Alternative Name	CYCR4
Problem Description	Cross I-294 and Irving Road discharge into open space west of Tollway (1 - 22' x 6' and
Strategy	Large basin West of the Tristate
District Minimum Criteria for Funding:	Met
Recommended	Yes

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Channel treatment: Soil stabilization and vegetative cover	yd2	170000	$13.88	2,359,600.00	$2,194,392	$565,012	
Channel treatment: Excavation	yd3	293500	$10.68	3,134,580.00	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	293500	$11.75	3,448,625.00	$0	$0	
Land Acquisition: Purchase of Property *	dollar	10846422	$1.00	0,846,422.12	$0	$0	
Land Acquisition: Permanent Easement *	dollar	311249	$1.00	$311,249.00	$0	$0	
Pump Station: 10ac-ft per day interior drainage	each	1	$800,000.00	$800,000.00	$743,988	$0	
Channel treatment: Material to be hauled offsite	yd3	5300	$11.75	$62,275.00	$0	$0	
Inlet structures (Headwall): 42 to 66 inches	each	7	$4,757.50	$33,302.50	$30,971	$0	
Outlet structures (Headwall): 42 to 66 inches	each	7	$4,757.50	$33,302.50	$30,971	$0	
Paving: Asphalt Pavement Installation (24 ft wide, 2 ft C&G, 1 ft Excavation	lf	50	$148.47	$7,423.50	$6,904	$0	
Pipe in tunnel: 72 to 84 inches	lf	1650	$2,669.75	4,405,087.50	$4,096,664	$0	
Pipe under pavement (county): 90 to 96 inches / box culvert (39 to 50 ft2)	lf	275	$661.03	$181,783.25	$169,056	$0	

* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)

Subtotal (direct costs)		**$14,465,979**	**$7,272,945**	**$565,012**
Utility Relocation	4 %	$578,639		
Mobilization \ General Conditions	5%	$723,299		
Subtotal with Percent Allowances		**$15,767,917**		
Contingency	30%	$4,730,375		
Profit	5%	$1,024,915		
Probable Construction Cost Estimate		**$21,523,207**		
Design Engineering, Geotechnical, and Construction Management	10%	$2,152,321		
Property Acquisition Cost:		$11,157,671		
Total Conceptual Cost Estimate		**$42,671,156**		

Additional Comments

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Metropolitan Water Reclamation District of Greater Chicago
LDPR Watershed Detailed Watershed Plan
DPR 1: Total Conceptual Cost Report

Alternative Name	DPR1
Problem Description	Des Plaines River overbank flooding
Strategy	Floodwall on west side of Des Plaines River from Dundee Rd to Hintz Ave
District Minimum Criteria for Funding:	Met
Recommended	Yes

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Pump Station: 10ac-ft per day interior drainage	each	2	$800,000.00	1,600,000.00	$1,487,976	$0	
Pipe in earth (county): 36 inches or less	lf	5940	$216.78	1,287,673.20	$1,197,516	$0	
Outlet structures (Headwall): 36 inches or less	each	19	$2,600.34	$49,406.46	$45,947	$0	
Land Acquisition: Permanent Easement *	dollar	202291	$1.00	$202,290.76	$0	$0	
Land Acquisition: Temporary Easement *	dollar	121374	$1.00	$121,374.45	$0	$0	
Channel treatment: Reinforced one sided concrete wall	yd3	2908	$587.35	1,708,248.74	$1,588,645	$409,045	
Channel treatment: Material to be hauled offsite	yd3	2908	$11.75	$34,173.70	$0	$0	
Channel treatment: Soil stabilization and vegetative cover	yd2	66267	$13.88	$919,781.80	$855,383	$220,244	
Channel treatment: Excavation	yd3	37109	$10.68	$396,327.32	$0	$0	
Channel treatment: Sheet piling	yd2	3313	$303.28	1,004,857.62	$0	$240,616	

* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)

Subtotal (direct costs)		**$7,000,469**	**$5,175,467**	**$869,905**
Utility Relocation	4 %	$280,019		
Mobilization \ General Conditions	5%	$350,023		
Subtotal with Percent Allowances		**$7,630,511**		
Contingency	30%	$2,289,153		
Profit	5%	$495,983		
Probable Construction Cost Estimate		**$10,415,648**		
Design Engineering, Geotechnical, and Construction Management	10%	$1,041,565		
Property Acquisition Cost:		$323,665		
Total Conceptual Cost Estimate		**$17,826,250**		

Additional Comments

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Metropolitan Water Reclamation District of Greater Chicago
LDPR Watershed Detailed Watershed Plan
DPR 2A: Total Conceptual Cost Report

Alternative Name	DPR2a
Problem Description	Regional roadway flooding
Strategy	Raise Oakton Street, Central, Rand, and Algonquin Roads, and 2 USACE concept reservoirs.
District Minimum Criteria for Funding:	Met
Recommended	No

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Channel treatment: Soil stabilization and vegetative cover	yd2	941864	$13.88	3,073,072.32	$12,157,757	$3,130,382	
Channel treatment: Soil stabilization and vegetative cover	yd2	1556480	$13.88	1,603,942.40	$20,091,336	$5,173,121	
Channel treatment: Soil stabilization and vegetative cover	yd2	2447	$13.88	$33,964.36	$31,586	$8,133	
Channel treatment: Soil stabilization and vegetative cover	yd2	333	$13.88	$4,622.04	$4,298	$1,107	
Channel treatment: Soil stabilization and vegetative cover	yd2	3913	$13.88	$54,312.44	$50,510	$13,005	
Channel treatment: Vegetative cover only	yd2	2447	$8.54	$20,897.38	$19,434	$5,004	
Channel treatment: Vegetative cover only	yd2	333	$8.54	$2,843.82	$2,645	$681	
Channel treatment: Vegetative cover only	yd2	3913	$8.54	$33,417.02	$31,077	$8,002	
Demolition: Brick, concrete, or stone construction	ft2	180000	$4.27	$768,600.00	$0	$0	
Demolition: Brick, concrete, or stone construction	ft2	64500	$4.27	$275,415.00	$0	$0	
Demolition: Brick, concrete, or stone construction	ft2	105000	$4.27	$448,350.00	$0	$0	
Demolition: Brick, concrete, or stone construction	ft2	128035	$4.27	$546,709.45	$0	$0	
Embankment construction, grading and restoration: Additional fill	yd3	5000	$13.88	$69,400.00	$0	$0	
Embankment construction, grading and restoration: Additional fill	yd3	110000	$13.88	1,526,800.00	$0	$0	
Embankment construction, grading and restoration: Additional fill	yd3	21400	$13.88	$297,032.00	$0	$0	
Embankment construction, grading and restoration: Additional fill	yd3	5867	$13.88	$81,433.96	$0	$0	
Embankment construction, grading and restoration: Additional fill	yd3	10888	$13.88	$151,125.44	$0	$0	
Embankment construction, grading and restoration: Additional fill	yd3	9382	$13.88	$130,222.16	$0	$0	
Embankment construction, grading and restoration: Compaction of fill	yd3	5000	$5.34	$26,700.00	$0	$0	
Embankment construction, grading and restoration: Compaction of fill	yd3	110000	$5.34	$587,400.00	$0	$0	
Embankment construction, grading and restoration: Compaction of fill	yd3	21400	$5.34	$114,276.00	$0	$0	
Embankment construction, grading and restoration: Compaction of fill	yd3	5867	$5.34	$31,329.78	$0	$0	
Embankment construction, grading and restoration: Compaction of fill	yd3	10888	$5.34	$58,141.92	$0	$0	
Embankment construction, grading and restoration: Compaction of fill	yd3	9382	$5.34	$50,099.88	$0	$0	
Embankment construction, grading and restoration: Material hauled from offsite	yd3	21400	$10.68	$228,552.00	$0	$0	

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Alternative Name	DPR2a
Problem Description	Regional roadway flooding
Strategy	Raise Oakton Street, Central, Rand, and Algonquin Roads, and 2 USACE concept reservoirs.
District Minimum Criteria for Funding:	Met
Recommended	No

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Embankment construction, grading and restoration: Material hauled from offsite	yd3	5867	$10.68	$62,659.56	$0	$0	
Embankment construction, grading and restoration: Material hauled from offsite	yd3	10888	$10.68	$116,283.84	$0	$0	
Embankment construction, grading and restoration: Material hauled from offsite	yd3	9382	$10.68	$100,199.76	$0	$0	
Channel treatment: Additional fill	yd3	313955	$13.88	4,357,695.40	$0	$0	
Channel treatment: Additional fill	yd3	519493	$13.88	7,210,562.84	$0	$0	
Channel treatment: Compaction	yd3	313955	$7.48	2,348,383.40	$0	$0	
Channel treatment: Compaction	yd3	519493	$7.48	3,885,807.64	$0	$0	
Channel treatment: Excavation	yd3	3529973	$10.68	7,700,111.64	$0	$0	
Channel treatment: Excavation	yd3	3929920	$10.68	1,971,545.60	$0	$0	
Pipe in earth (county): 36 inches or less	lf	80	$216.78	$17,342.40	$16,128	$0	
Pipe in earth (county): 36 inches or less	lf	80	$216.78	$17,342.40	$16,128	$0	
Paving: Asphalt Pavement Installation (24 ft wide, 2 ft C&G, 1 ft Excavation	lf	7500	$148.47	1,113,525.00	$1,035,561	$0	
Paving: Asphalt Pavement Installation (24 ft wide, 2 ft C&G, 1 ft Excavation	lf	2671	$148.47	$396,563.37	$368,798	$0	
Paving: Asphalt Pavement Installation (24 ft wide, 2 ft C&G, 1 ft Excavation	lf	4375	$148.47	$649,556.25	$604,077	$0	
Paving: Asphalt Pavement Installation (24 ft wide, 2 ft C&G, 1 ft Excavation	lf	6310	$148.47	$936,845.70	$871,252	$0	
Concrete: Cast in place	yd3	103	$250.00	$25,750.00	$0	$0	
Concrete: Cast in place	yd3	130	$250.00	$32,500.00	$0	$0	
Concrete: Cast in place	yd3	500	$250.00	$125,000.00	$0	$0	
Concrete: Cast in place	yd3	194	$250.00	$48,500.00	$0	$0	
Concrete: Cast in place	yd3	324	$250.00	$81,000.00	$0	$0	
Concrete: Cast in place	yd3	292	$250.00	$73,000.00	$0	$0	
Land Acquisition: Purchase of Property *	dollar	56070000	$1.00	6,070,000.00	$0	$0	Forest Preserve property license
Land Acquisition: Purchase of Property *	dollar	50340000	$1.00	0,340,000.00	$0	$0	Forest Preserve property license
Pump Station: 10ac-ft per day interior drainage	each	1	$800,000.00	$800,000.00	$743,988	$0	
Pump Station: 10ac-ft per day interior drainage	each	1	$800,000.00	$800,000.00	$743,988	$0	

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Alternative Name	DPR2a
Problem Description	Regional roadway flooding
Strategy	Raise Oakton Street, Central, Rand, and Algonquin Roads, and 2 USACE concept reservoirs.
District Minimum Criteria for Funding:	Met
Recommended	No

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues

* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)

Subtotal (direct costs)		**$143,088,834**	**$36,788,564**	**$8,339,435**
Utility Relocation	4 %	$5,723,553		
Mobilization \ General Conditions	5%	$7,154,442		
Subtotal with Percent Allowances		**$155,966,829**		
Contingency	30%	$46,790,049		
Profit	5%	$10,137,844		
Probable Construction Cost Estimate		**$212,894,722**		
Design Engineering, Geotechnical, and Construction Management	10%	$21,289,472		
Property Acquisition Cost:		106,410,000		
Total Conceptual Cost Estimate		**$385,722,193**		

Additional Comments

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Metropolitan Water Reclamation District of Greater Chicago
LDPR Watershed Detailed Watershed Plan
DPR 2B: Total Conceptual Cost Report

Alternative Name DPR2b

Problem Description Regional road flooding of Central, Rand, Algonquin Roads, Oakton Street

Strategy Raise Central, Rand, Algonquin Roads and Oakton Street

District Minimum Criteria for Funding: Met

Recommended Yes

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Channel treatment: Soil stabilization and vegetative cover	yd2	2447	$13.88	$33,964.36	$31,586	$8,133	
Channel treatment: Soil stabilization and vegetative cover	yd2	333	$13.88	$4,622.04	$4,298	$1,107	
Channel treatment: Soil stabilization and vegetative cover	yd2	3913	$13.88	$54,312.44	$50,510	$13,005	
Channel treatment: Vegetative cover only	yd2	2447	$8.54	$20,897.38	$19,434	$5,004	
Channel treatment: Vegetative cover only	yd2	333	$8.54	$2,843.82	$2,645	$681	
Channel treatment: Vegetative cover only	yd2	3913	$8.54	$33,417.02	$31,077	$8,002	
Demolition: Brick, concrete, or stone construction	ft2	180000	$4.27	$768,600.00	$0	$0	
Demolition: Brick, concrete, or stone construction	ft2	64500	$4.27	$275,415.00	$0	$0	
Demolition: Brick, concrete, or stone construction	ft2	105000	$4.27	$448,350.00	$0	$0	
Demolition: Brick, concrete, or stone construction	ft2	128035	$4.27	$546,709.45	$0	$0	
Embankment construction, grading and restoration: Additional fill	yd3	21400	$13.88	$297,032.00	$0	$0	
Embankment construction, grading and restoration: Additional fill	yd3	5867	$13.88	$81,433.96	$0	$0	
Embankment construction, grading and restoration: Additional fill	yd3	10888	$13.88	$151,125.44	$0	$0	
Embankment construction, grading and restoration: Additional fill	yd3	9382	$13.88	$130,222.16	$0	$0	
Embankment construction, grading and restoration: Compaction of fill	yd3	21400	$5.34	$114,276.00	$0	$0	
Embankment construction, grading and restoration: Compaction of fill	yd3	5867	$5.34	$31,329.78	$0	$0	
Embankment construction, grading and restoration: Compaction of fill	yd3	10888	$5.34	$58,141.92	$0	$0	
Embankment construction, grading and restoration: Compaction of fill	yd3	9382	$5.34	$50,099.88	$0	$0	
Embankment construction, grading and restoration: Material hauled from offsite	yd3	21400	$10.68	$228,552.00	$0	$0	
Embankment construction, grading and restoration: Material hauled from offsite	yd3	5867	$10.68	$62,659.56	$0	$0	
Embankment construction, grading and restoration: Material hauled from offsite	yd3	10888	$10.68	$116,283.84	$0	$0	
Embankment construction, grading and restoration: Material hauled from offsite	yd3	9382	$10.68	$100,199.76	$0	$0	
Paving: Asphalt Pavement Installation (24 ft wide, 2 ft C&G, 1 ft Excavation	lf	7500	$148.47	$1,113,525.00	$1,035,561	$0	
Paving: Asphalt Pavement Installation (24 ft wide, 2 ft C&G, 1 ft Excavation	lf	2671	$148.47	$396,563.37	$368,798	$0	
Paving: Asphalt Pavement Installation (24 ft wide, 2 ft C&G, 1 ft Excavation	lf	4375	$148.47	$649,556.25	$604,077	$0	

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Alternative Name	DPR2b
Problem Description	Regional road flooding of Central, Rand, Algonquin Roads, Oakton Street
Strategy	Raise Central, Rand, Algonquin Roads and Oakton Street
District Minimum Criteria for Funding:	Met
Recommended	Yes

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Paving: Asphalt Pavement Installation (24 ft wide, 2 ft C&G, 1 ft Excavation	lf	6310	$148.47	$936,845.70	$871,252	$0	
Concrete: Cast in place	yd3	500	$250.00	$125,000.00	$0	$0	
Concrete: Cast in place	yd3	194	$250.00	$48,500.00	$0	$0	
Concrete: Cast in place	yd3	324	$250.00	$81,000.00	$0	$0	
Concrete: Cast in place	yd3	292	$250.00	$73,000.00	$0	$0	
Bridge: Bridge Demolition-Concrete Removal	cf	107520	$25.00	2,688,000.00	$0	$0	Bridge: Waterway opening modification

* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)

Subtotal (direct costs)		**$9,722,478**	**$3,019,239**	**$35,932**
Utility Relocation	4 %	$388,899		
Mobilization \ General Conditions	5%	$486,124		
Subtotal with Percent Allowances		**$10,597,501**		
Contingency	30%	$3,179,250		
Profit	5%	$688,838		
Probable Construction Cost Estimate		**$14,465,589**		
Design Engineering, Geotechnical, and Construction Management	10%	$1,446,559		
Property Acquisition Cost:		$0		
Total Conceptual Cost Estimate		**$18,967,319**		

Additional Comments

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Metropolitan Water Reclamation District of Greater Chicago
LDPR Watershed Detailed Watershed Plan
DPR 3A: Total Conceptual Cost Report

Alternative Name	DPR3a
Problem Description	Des Plaines Riveroverbank flooding
Strategy	City of Des Plaines Regional Floodwall
District Minimum Criteria for Funding:	Met
Recommended	Yes

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Channel treatment: Reinforced one sided concrete wall	yd3	4454	$587.35	2,616,056.90	$2,432,893	$626,422	
Channel treatment: Reinforced one sided concrete wall	yd3	10741	$587.35	6,308,726.35	$5,867,019	$1,510,641	
Channel treatment: Sheet piling	yd2	7222	$303.28	2,190,288.16	$0	$524,470	
Channel treatment: Sheet piling	yd2	22222	$303.28	6,739,488.16	$0	$1,613,788	
Channel treatment: Soil stabilization and vegetative cover	yd2	1558480	$13.88	1,631,702.40	$20,117,152	$5,179,768	
Channel treatment: Soil stabilization and vegetative cover	yd2	941864	$13.88	3,073,072.32	$12,157,757	$3,130,382	
Channel treatment: Soil stabilization and vegetative cover	yd2	72222	$13.88	1,002,441.36	$932,255	$240,037	
Channel treatment: Soil stabilization and vegetative cover	yd2	222222	$13.88	3,084,441.36	$2,868,483	$738,578	
Channel treatment: Vegetative cover only	yd2	406550	$8.54	3,471,937.00	$3,228,848	$831,364	
Embankment construction, grading and restoration: Additional fill	yd3	48359	$13.88	$671,222.92	$0	$0	
Embankment construction, grading and restoration: Additional fill	yd3	110000	$13.88	1,526,800.00	$0	$0	
Embankment construction, grading and restoration: Additional fill	yd3	5000	$13.88	$69,400.00	$0	$0	
Embankment construction, grading and restoration: Compaction of fill	yd3	48359	$5.34	$258,237.06	$0	$0	
Embankment construction, grading and restoration: Compaction of fill	yd3	110000	$5.34	$587,400.00	$0	$0	
Embankment construction, grading and restoration: Compaction of fill	yd3	5000	$5.34	$26,700.00	$0	$0	
Channel treatment: Additional fill	yd3	519493	$13.88	7,210,562.84	$0	$0	
Channel treatment: Additional fill	yd3	313955	$13.88	4,357,695.40	$0	$0	
Channel treatment: Compaction	yd3	1070285	$7.48	8,005,731.80	$0	$0	
Channel treatment: Compaction	yd3	519493	$7.48	3,885,807.64	$0	$0	
Channel treatment: Compaction	yd3	313955	$7.48	2,348,383.40	$0	$0	
Channel treatment: Excavation	yd3	3929920	$10.68	1,971,545.60	$0	$0	
Channel treatment: Excavation	yd3	3529973	$10.68	7,700,111.64	$0	$0	
Channel treatment: Excavation	yd3	84741	$10.68	$905,033.88	$0	$0	
Channel treatment: Excavation	yd3	154074	$10.68	1,645,510.32	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	2300	$11.75	$27,025.00	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	4454	$11.75	$52,334.50	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	10741	$11.75	$126,206.75	$0	$0	
Inlet structures (Headwall): 42 to 66 inches	each	2	$4,757.50	$9,515.00	$8,849	$0	

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Alternative Name	DPR3a
Problem Description	Des Plaines Riveroverbank flooding
Strategy	City of Des Plaines Regional Floodwall
District Minimum Criteria for Funding:	Met
Recommended	Yes

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Outlet structures (Headwall): 36 inches or less	each	30	$2,600.34	$78,010.20	$72,548	$0	
Outlet structures (Headwall): 36 inches or less	each	43	$2,600.34	$111,814.62	$103,986	$0	
Outlet structures (Headwall): 42 to 66 inches	each	2	$4,757.50	$9,515.00	$8,849	$0	
Pipe in earth (county): 36 inches or less	lf	293	$216.78	$63,516.54	$59,069	$0	
Pipe in earth (county): 36 inches or less	lf	80	$216.78	$17,342.40	$16,128	$0	
Pipe in earth (county): 36 inches or less	lf	80	$216.78	$17,342.40	$16,128	$0	
Pipe in earth (county): 36 inches or less	lf	5510	$216.78	1,194,457.80	$1,110,827	$0	
Pipe in earth (county): 36 inches or less	lf	8780	$216.78	1,903,328.40	$1,770,066	$0	
Concrete: Cast in place	yd3	130	$250.00	$32,500.00	$0	$0	
Concrete: Cast in place	yd3	103	$250.00	$25,750.00	$0	$0	
Land Acquisition: Purchase of Property *	dollar	50340000	$1.00	0,340,000.00	$0	$0	Forest Preserve property license
Land Acquisition: Purchase of Property *	dollar	56070000	$1.00	6,070,000.00	$0	$0	Forest Preserve property license
Land Acquisition: Permanent Easement *	dollar	26415000	$1.00	6,415,000.00	$0	$0	
Land Acquisition: Permanent Easement *	dollar	222848	$1.00	$222,847.72	$0	$0	
Land Acquisition: Permanent Easement *	dollar	143003	$1.00	$143,002.52	$0	$0	
Land Acquisition: Permanent Easement *	dollar	525826	$1.00	$525,826.45	$0	$0	LICENSE
Land Acquisition: Temporary Easement *	dollar	274500	$1.00	$274,500.00	$0	$0	
Land Acquisition: Temporary Easement *	dollar	133709	$1.00	$133,708.63	$0	$0	
Land Acquisition: Temporary Easement *	dollar	85802	$1.00	$85,801.51	$0	$0	
Pump Station: 10ac-ft per day interior drainage	each	1	$800,000.00	$800,000.00	$743,988	$0	
Pump Station: 10ac-ft per day interior drainage	each	1	$800,000.00	$800,000.00	$743,988	$0	
Pump Station: 10ac-ft per day interior drainage	each	1	$800,000.00	$800,000.00	$743,988	$0	
Pump Station: 10ac-ft per day interior drainage	each	3	$800,000.00	2,400,000.00	$2,231,963	$0	
Pump Station: 10ac-ft per day interior drainage	each	9	$800,000.00	7,200,000.00	$6,695,890	$0	

* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)

Subtotal (direct costs)		**$186,956,955**	**$61,930,675**	**$14,395,450**
Utility Relocation	4 %	$7,478,278		
Mobilization \ General Conditions	5%	$9,347,848		
Subtotal with Percent Allowances		**203,783,081**		
Contingency	30%	$61,134,924		
Profit	5%	$13,245,900		
Probable Construction Cost Estimate		**278,163,906**		
Design Engineering, Geotechnical, and Construction Management	10%	$27,816,391		
Property Acquisition Cost:		134,210,687		
Total Conceptual Cost Estimate		**$516,517,108**		

Additional Comments

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Metropolitan Water Reclamation District of Greater Chicago
LDPR Watershed Detailed Watershed Plan
DPR 4: Total Conceptual Cost Report

Alternative Name DPR4

Problem Description Des Plaines River overbank flooding

Strategy Raise Higgins and River Roads, Glen Lake Ave

District Minimum Criteria for Funding: Met

Recommended Yes

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Channel treatment: Soil stabilization and vegetative cover	yd2	1550	$13.88	$21,514.00	$20,008	$5,152	
Channel treatment: Vegetative cover only	yd2	1550	$8.54	$13,237.00	$12,310	$3,170	
Concrete: Cast in place	yd3	310	$250.00	$77,500.00	$0	$0	
Demolition: Brick, concrete, or stone construction	ft2	422500	$4.27	1,804,075.00	$0	$0	
Embankment construction, grading and restoration: Additional fill	yd3	18973	$13.88	$263,345.24	$0	$0	
Embankment construction, grading and restoration: Compaction of fill	yd3	18973	$5.34	$101,315.82	$0	$0	
Embankment construction, grading and restoration: Material hauled from offsite	yd3	18973	$10.68	$202,631.64	$0	$0	
Paving: Asphalt Pavement Installation (24 ft wide, 2 ft C&G, 1 ft Excavation	lf	13646	$148.47	2,025,947.39	$1,884,100	$0	

* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)

Subtotal (direct costs)		**$4,509,566**	**$1,916,418**	**$8,322**
Utility Relocation	4 %	$180,383		
Mobilization \ General Conditions	5%	$225,478		
Subtotal with Percent Allowances		**$4,915,427**		
Contingency	30%	$1,474,628		
Profit	5%	$319,503		
Probable Construction Cost Estimate		**$6,709,558**		
Design Engineering, Geotechnical, and Construction Management	10%	$670,956		
Property Acquisition Cost:		$0		
Total Conceptual Cost Estimate		**$9,305,254**		

Additional Comments

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Metropolitan Water Reclamation District of Greater Chicago
LDPR Watershed Detailed Watershed Plan
DPR 5: Total Conceptual Cost Report

Alternative Name	DPR5
Problem Description	DPR overbank flooding between Irving Park Road and Belmont Avenue
Strategy	Raise Irving Park Rd, Floodwall west side of river from Irving Park Rd to Belmont Ave.
District Minimum Criteria for Funding:	Met
Recommended	Yes

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Channel treatment: Soil stabilization and vegetative cover	yd2	867	$13.88	$12,033.96	$11,191	$2,882	
Channel treatment: Vegetative cover only	yd2	867	$8.54	$7,404.18	$6,886	$1,773	
Demolition: Brick, concrete, or stone construction	ft2	31200	$4.27	$133,224.00	$0	$0	
Embankment construction, grading and restoration: Additional fill	yd3	2891	$13.88	$40,127.08	$0	$0	
Embankment construction, grading and restoration: Compaction of fill	yd3	2891	$5.34	$15,437.94	$0	$0	
Embankment construction, grading and restoration: Material hauled from offsite	yd3	2891	$10.68	$30,875.88	$0	$0	
Paving: Asphalt Pavement Installation (24 ft wide, 2 ft C&G, 1 ft Excavation	lf	1300	$148.47	$193,011.00	$179,497	$0	
Channel treatment: Reinforced one sided concrete wall	yd3	4848	$587.35	$2,847,472.80	$2,648,106	$681,835	
Channel treatment: Material to be hauled offsite	yd3	4848	$11.75	$56,964.00	$0	$0	
Channel treatment: Soil stabilization and vegetative cover	yd2	29333	$13.88	$407,142.04	$378,636	$97,491	
Channel treatment: Excavation	yd3	99733	$10.68	$1,065,148.44	$0	$0	
Channel treatment: Sheet piling	yd2	7333	$303.28	$2,223,952.24	$0	$532,531	
Pump Station: 10ac-ft per day interior drainage	each	4	$800,000.00	$3,200,000.00	$2,975,951	$0	
Pipe in earth (county): 36 inches or less	lf	1100	$216.78	$238,458.00	$221,762	$0	
Outlet structures (Headwall): 36 inches or less	each	4	$2,600.34	$10,401.36	$9,673	$0	
Land Acquisition: Purchase of Property *	dollar	225000	$1.00	$225,000.00	$0	$0	
Land Acquisition: Temporary Easement *	dollar	682500	$1.00	$682,500.00	$0	$0	
Channel treatment: Soil stabilization and vegetative cover	yd2	650	$13.88	$9,022.00	$8,390	$2,160	
Demolition: Brick, concrete, or stone construction	ft2	117000	$4.27	$499,590.00	$0	$0	
Embankment construction, grading and restoration: Additional fill	yd3	2220	$13.88	$30,813.60	$0	$0	
Embankment construction, grading and restoration: Compaction of fill	yd3	2220	$5.34	$11,854.80	$0	$0	
Embankment construction, grading and restoration: Material hauled from offsite	yd3	2220	$10.68	$23,709.60	$0	$0	
Paving: Asphalt Pavement Installation (24 ft wide, 2 ft C&G, 1 ft Excavation	lf	4875	$148.47	$723,791.25	$673,115	$0	

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Alternative Name	DPR5
Problem Description	DPR overbank flooding between Irving Park Road and Belmont Avenue
Strategy	Raise Irving Park Rd, Floodwall west side of river from Irving Park Rd to Belmont Ave.
District Minimum Criteria for Funding:	Met
Recommended	Yes

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)							
Subtotal (direct costs)				**$11,780,434**	**$7,113,208**	**$1,318,672**	
Utility Relocation			4 %	$471,217			
Mobilization \ General Conditions			5%	$589,022			
Subtotal with Percent Allowances				**$12,840,673**			
Contingency			30%	$3,852,202			
Profit			5%	$834,644			
Probable Construction Cost Estimate				**$17,527,519**			
Design Engineering, Geotechnical, and Construction Management			10%	$1,752,752			
Property Acquisition Cost:				$907,500			
Total Conceptual Cost Estimate				**$28,619,651**			

Additional Comments

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Metropolitan Water Reclamation District of Greater Chicago
LDPR Watershed Detailed Watershed Plan
DPR 6D: Total Conceptual Cost Report

Alternative Name	DPR6D
Problem Description	DPR overbank flooding
Strategy	Raise 1st and Grand Ave floodwall east and west of river, enlarge Grand Ave opening.
District Minimum Criteria for Funding:	Not Met
Recommended	No

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Channel treatment: Reinforced one sided concrete wall	yd3	1333	$587.35	$782,937.55	$728,120	$187,476	
Channel treatment: Reinforced one sided concrete wall	yd3	4419	$587.35	2,595,499.65	$2,413,775	$621,499	
Channel treatment: Sheet piling	yd2	3379	$303.28	1,024,783.12	$0	$245,387	
Channel treatment: Sheet piling	yd2	8373	$303.28	2,539,363.44	$0	$608,057	
Channel treatment: Soil stabilization and vegetative cover	yd2	33789	$13.88	$468,991.32	$436,155	$112,301	
Channel treatment: Soil stabilization and vegetative cover	yd2	83733	$13.88	1,162,214.04	$1,080,841	$278,295	
Channel treatment: Soil stabilization and vegetative cover	yd2	1404	$13.88	$19,487.52	$18,123	$4,666	
Demolition: Brick, concrete, or stone construction	ft2	84000	$4.27	$358,680.00	$0	$0	
Demolition: Brick, concrete, or stone construction	ft2	63000	$4.27	$269,010.00	$0	$0	
Embankment construction, grading and restoration: Additional fill	yd3	15556	$13.88	$215,917.28	$0	$0	
Embankment construction, grading and restoration: Compaction of fill	yd3	15556	$5.34	$83,069.04	$0	$0	
Embankment construction, grading and restoration: Compaction of fill	yd3	3864	$5.34	$20,633.76	$0	$0	
Embankment construction, grading and restoration: Material hauled from offsite	yd3	15556	$10.68	$166,138.08	$0	$0	
Embankment construction, grading and restoration: Material hauled from offsite	yd3	3864	$10.68	$41,267.52	$0	$0	
Channel treatment: Excavation	yd3	11263	$10.68	$120,288.84	$0	$0	
Channel treatment: Excavation	yd3	70336	$10.68	$751,188.48	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	1333	$11.75	$15,662.75	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	4419	$11.75	$51,923.25	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	4667	$11.75	$54,837.25	$0	$0	
Outlet structures (Headwall): 36 inches or less	each	2	$2,600.34	$5,200.68	$4,837	$0	
Outlet structures (Headwall): 36 inches or less	each	4	$2,600.34	$10,401.36	$9,673	$0	
Pipe in earth (county): 36 inches or less	lf	600	$216.78	$130,068.00	$120,961	$0	
Pipe in earth (county): 36 inches or less	lf	1200	$216.78	$260,136.00	$241,923	$0	
Paving: Asphalt Pavement Installation (24 ft wide, 2 ft C&G, 1 ft Excavation	lf	4375	$148.47	$649,556.25	$604,077	$0	
Paving: Asphalt Pavement Installation (24 ft wide, 2 ft C&G, 1 ft Excavation	lf	3000	$148.47	$445,410.00	$414,224	$0	
Concrete: Cast in place	yd3	260	$250.00	$65,000.00	$0	$0	
Pump Station: 10ac-ft per day interior drainage	each	2	$800,000.00	1,600,000.00	$1,487,976	$0	

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Alternative Name	DPR6D
Problem Description	DPR overbank flooding
Strategy	Raise 1st and Grand Ave floodwall east and west of river, enlarge Grand Ave opening.
District Minimum Criteria for Funding:	Not Met
Recommended	No

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Pump Station: 10ac-ft per day interior drainage	each	4	$800,000.00	3,200,000.00	$2,975,951	$0	
Bridge: Bridge Demolition-Concrete Removal	cf	129499	$25.00	3,237,480.00	$0	$0	Bridge: Enlarge waterway opening

* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)

Subtotal (direct costs)		**$20,345,145**	**$10,536,636**	**$2,057,681**
Utility Relocation	4 %	$813,806		
Mobilization \ General Conditions	5%	$1,017,257		
Subtotal with Percent Allowances		**$22,176,208**		
Contingency	30%	$6,652,862		
Profit	5%	$1,441,454		
Probable Construction Cost Estimate		**$30,270,524**		
Design Engineering, Geotechnical, and Construction Management	10%	$3,027,052		
Property Acquisition Cost:		$0		
Total Conceptual Cost Estimate		**$45,891,893**		

Additional Comments

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Metropolitan Water Reclamation District of Greater Chicago
LDPR Watershed Detailed Watershed Plan
DPR 8A: Total Conceptual Cost Report

Alternative Name	DPR8a
Problem Description	Regional roadway flooding
Strategy	Raise and widen waterway opening of Chicago Avenue
District Minimum Criteria for Funding:	Met
Recommended	Yes

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Concrete: Cast in place	yd3	611	$250.00	$152,750.00	$0	$0	
Demolition: Brick, concrete, or stone construction	ft2	148500	$4.27	$634,095.00	$0	$0	
Embankment construction, grading and restoration: Additional fill	yd3	23375	$13.88	$324,445.00	$0	$0	
Embankment construction, grading and restoration: Compaction of fill	yd3	23375	$5.34	$124,822.50	$0	$0	
Embankment construction, grading and restoration: Material hauled from offsite	yd3	23375	$10.68	$249,645.00	$0	$0	
Paving: Asphalt Pavement Installation (24 ft wide, 2 ft C&G, 1 ft Excavation	lf	6188	$148.47	$918,732.36	$854,407	$0	
Bridge: Bridge Demolition-Concrete Removal	cf	136416	$25.00	3,410,400.00	$0	$0	Bridge: Enlarge waterway opening

* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)

Subtotal (direct costs)		**$5,814,890**	**$854,407**	**$0**
Utility Relocation	4 %	$232,596		
Mobilization \ General Conditions	5%	$290,744		
Subtotal with Percent Allowances		**$6,338,230**		
Contingency	30%	$1,901,469		
Profit	5%	$411,985		
Probable Construction Cost Estimate		**$8,651,684**		
Design Engineering, Geotechnical, and Construction Management	10%	$865,168		
Property Acquisition Cost:		$0		
Total Conceptual Cost Estimate		**$10,371,259**		

Additional Comments

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Metropolitan Water Reclamation District of Greater Chicago
LDPR Watershed Detailed Watershed Plan
DPR 8B: Total Conceptual Cost Report

Alternative Name	DPR8b
Problem Description	Des Plaines River overbank flooding
Strategy	Floodwall on east side of Des Plaines River north o Lake Street
District Minimum Criteria for Funding:	Met
Recommended	Yes

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Channel treatment: Reinforced one sided concrete wall	yd3	1155	$587.35	$678,389.25	$630,892	$162,442	
Channel treatment: Material to be hauled offsite	yd3	1155	$11.75	$13,571.25	$0	$0	
Channel treatment: Soil stabilization and vegetative cover	yd2	23889	$13.88	$331,579.32	$308,364	$79,398	
Channel treatment: Excavation	yd3	16563	$10.68	$176,892.84	$0	$0	
Channel treatment: Sheet piling	yd2	1194	$303.28	$362,116.32	$0	$86,710	
Pump Station: 10ac-ft per day interior drainage	each	1	$800,000.00	$800,000.00	$743,988	$0	
Pipe in earth (county): 36 inches or less	lf	50	$216.78	$10,839.00	$10,080	$0	
Outlet structures (Headwall): 36 inches or less	each	2	$2,600.34	$5,200.68	$4,837	$0	
Land Acquisition: Permanent Easement *	dollar	111689	$1.00	$111,689.00	$0	$0	
Land Acquisition: Temporary Easement *	dollar	67033	$1.00	$67,033.00	$0	$0	

* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)

Subtotal (direct costs)		**$2,378,589**	**$1,698,160**	**$328,550**
Utility Relocation	4 %	$95,144		
Mobilization \ General Conditions	5%	$118,929		
Subtotal with Percent Allowances		**$2,592,662**		
Contingency	30%	$777,798		
Profit	5%	$168,523		
Probable Construction Cost Estimate		**$3,538,983**		
Design Engineering, Geotechnical, and Construction Management	10%	$353,898		
Property Acquisition Cost:		$178,722		
Total Conceptual Cost Estimate		**$6,098,313**		

Additional Comments

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Metropolitan Water Reclamation District of Greater Chicago
LDPR Watershed Detailed Watershed Plan
DPR 9A: Total Conceptual Cost Report

Alternative Name	DPR9A
Problem Description	Des Plaines River overbank flooding
Strategy	Roosevelt Road and enlarge waterway opening over Des Plaines River
District Minimum Criteria for Funding:	Met
Recommended	Yes

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Channel treatment: Soil stabilization and vegetative cover	yd2	596	$13.88	$8,272.48	$7,693	$1,981	
Channel treatment: Vegetative cover only	yd2	596	$8.54	$5,089.84	$4,733	$1,219	
Concrete: Cast in place	yd3	132	$250.00	$33,000.00	$0	$0	
Demolition: Brick, concrete, or stone construction	ft2	32175	$4.27	$137,387.25	$0	$0	
Embankment construction, grading and restoration: Additional fill	yd3	2979	$13.88	$41,348.52	$0	$0	
Embankment construction, grading and restoration: Compaction of fill	yd3	2979	$5.34	$15,907.86	$0	$0	
Embankment construction, grading and restoration: Material hauled from offsite	yd3	2979	$10.68	$31,815.72	$0	$0	
Paving: Asphalt Pavement Installation (24 ft wide, 2 ft C&G, 1 ft Excavation	lf	1341	$148.47	$199,098.27	$185,158	$0	
Bridge: Bridge Demolition-Concrete Removal	cf	88560	$25.00	2,214,000.00	$0	$0	Bridge: Enlarge waterway opening

* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)

Subtotal (direct costs)		**$2,685,920**	**$197,585**	**$3,200**
Utility Relocation	4 %	$107,437		
Mobilization \ General Conditions	5%	$134,296		
Subtotal with Percent Allowances		**$2,927,653**		
Contingency	30%	$878,296		
Profit	5%	$190,297		
Probable Construction Cost Estimate		**$3,996,246**		
Design Engineering, Geotechnical, and Construction Management	10%	$399,625		
Property Acquisition Cost:		$0		
Total Conceptual Cost Estimate		**$4,596,656**		

Additional Comments

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Metropolitan Water Reclamation District of Greater Chicago
LDPR Watershed Detailed Watershed Plan
DPR 10: Total Conceptual Cost Report

Alternative Name	DPR10
Problem Description	Regional road flooding at Cermak Road
Strategy	Raise Cermak Road
District Minimum Criteria for Funding:	Met
Recommended	Yes

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Demolition: Brick, concrete, or stone construction	ft2	20250	$4.27	$86,467.50	$0	$0	
Embankment construction, grading and restoration: Additional fill	yd3	1125	$13.88	$15,615.00	$0	$0	
Embankment construction, grading and restoration: Compaction of fill	yd3	1125	$5.34	$6,007.50	$0	$0	
Embankment construction, grading and restoration: Material hauled from offsite	yd3	1125	$10.68	$12,015.00	$0	$0	
Concrete: Cast in place	yd3	49	$250.00	$12,325.00	$0	$0	
Paving: Asphalt Pavement Installation (24 ft wide, 2 ft C&G, 1 ft Excavation	lf	844	$148.47	$125,278.99	$116,508	$0	

* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)

Subtotal (direct costs)		**$257,709**	**$116,508**	**$0**
Utility Relocation	4 %	$10,308		
Mobilization \ General Conditions	5%	$12,885		
Subtotal with Percent Allowances		**$280,903**		
Contingency	30%	$84,271		
Profit	5%	$18,259		
Probable Construction Cost Estimate		**$383,432**		
Design Engineering, Geotechnical, and Construction Management	10%	$38,343		
Property Acquisition Cost:		$0		
Total Conceptual Cost Estimate		**$538,283**		

Additional Comments

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Metropolitan Water Reclamation District of Greater Chicago
LDPR Watershed Detailed Watershed Plan
DPR 11A: Total Conceptual Cost Report

Alternative Name DPR11A

Problem Description Des Plaines River overbank flooding

Strategy East and west floodwalls, raise 1st and Foster Avenues

District Minimum Criteria for Funding: Met

Recommended No

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Channel treatment: Reinforced one sided concrete wall	yd3	2217	$587.35	1,302,154.95	$1,210,984	$311,804	
Channel treatment: Reinforced one sided concrete wall	yd3	570	$587.35	$334,789.50	$311,349	$80,166	
Channel treatment: Sheet piling	yd2	3874	$303.28	1,174,906.72	$0	$281,335	
Channel treatment: Sheet piling	yd2	722	$303.28	$218,968.16	$0	$52,433	
Channel treatment: Soil stabilization and vegetative cover	yd2	38744	$13.88	$537,766.72	$500,115	$128,770	
Channel treatment: Soil stabilization and vegetative cover	yd2	14444	$13.88	$200,482.72	$186,446	$48,006	
Channel treatment: Soil stabilization and vegetative cover	yd2	2150	$13.88	$29,842.00	$27,753	$7,146	
Channel treatment: Vegetative cover only	yd2	2150	$8.54	$18,361.00	$17,075	$4,397	
Demolition: Brick, concrete, or stone construction	ft2	174150	$4.27	$743,620.50	$0	$0	
Demolition: Brick, concrete, or stone construction	ft2	81000	$4.27	$345,870.00	$0	$0	
Embankment construction, grading and restoration: Additional fill	yd3	7167	$13.88	$99,477.96	$0	$0	
Embankment construction, grading and restoration: Additional fill	yd3	7500	$13.88	$104,100.00	$0	$0	
Embankment construction, grading and restoration: Compaction of fill	yd3	7167	$5.34	$38,271.78	$0	$0	
Embankment construction, grading and restoration: Compaction of fill	yd3	7500	$5.34	$40,050.00	$0	$0	
Embankment construction, grading and restoration: Material hauled from offsite	yd3	7167	$10.68	$76,543.56	$0	$0	
Embankment construction, grading and restoration: Material hauled from offsite	yd3	7500	$10.68	$80,100.00	$0	$0	
Channel treatment: Excavation	yd3	38744	$10.68	$413,785.92	$0	$0	
Channel treatment: Excavation	yd3	4815	$10.68	$51,424.20	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	2217	$11.75	$26,049.75	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	570	$11.75	$6,697.50	$0	$0	
Outlet structures (Headwall): 36 inches or less	each	13	$2,600.34	$33,804.42	$31,438	$0	
Outlet structures (Headwall): 36 inches or less	each	2	$2,600.34	$5,200.68	$4,837	$0	
Pipe in earth (county): 36 inches or less	lf	2500	$216.78	$541,950.00	$504,005	$0	
Pipe in earth (county): 36 inches or less	lf	1100	$216.78	$238,458.00	$221,762	$0	
Paving: Asphalt Pavement Installation (24 ft wide, 2 ft C&G, 1 ft Excavation	lf	6450	$148.47	$957,631.50	$890,583	$0	
Paving: Asphalt Pavement Installation (24 ft wide, 2 ft C&G, 1 ft Excavation	lf	3375	$148.47	$501,086.25	$466,003	$0	
Concrete: Cast in place	yd3	333	$250.00	$83,250.00	$0	$0	

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Alternative Name	DPR11A
Problem Description	Des Plaines River overbank flooding
Strategy	East and west floodwalls, raise 1st and Foster Avenues
District Minimum Criteria for Funding:	Met
Recommended	No

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Land Acquisition: Purchase of Property *	dollar	55500	$1.00	$55,500.00	$0	$0	License
Land Acquisition: Permanent Easement *	dollar	93543	$1.00	$93,543.12	$0	$0	
Land Acquisition: Permanent Easement *	dollar	44766	$1.00	$44,766.00	$0	$0	
Land Acquisition: Temporary Easement *	dollar	56126	$1.00	$56,125.87	$0	$0	
Land Acquisition: Temporary Easement *	dollar	13430	$1.00	$13,430.00	$0	$0	
Pump Station: 10ac-ft per day interior drainage	each	3	$800,000.00	·2,400,000.00	$2,231,963	$0	
Pump Station: 10ac-ft per day interior drainage	each	2	$800,000.00	·1,600,000.00	$1,487,976	$0	

* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)

Subtotal (direct costs)		**$12,204,644**	**$8,092,288**	**$914,057**
Utility Relocation	4 %	$488,186		
Mobilization \ General Conditions	5%	$610,232		
Subtotal with Percent Allowances		**$13,303,062**		
Contingency	30%	$3,990,919		
Profit	5%	$864,699		
Probable Construction Cost Estimate		**$18,158,679**		
Design Engineering, Geotechnical, and Construction Management	10%	$1,815,868		
Property Acquisition Cost:		$263,365		
Total Conceptual Cost Estimate		**$29,244,257**		

Additional Comments

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Metropolitan Water Reclamation District of Greater Chicago
LDPR Watershed Detailed Watershed Plan
DPR 11B: Total Conceptual Cost Report

Alternative Name	DPR11B
Problem Description	Des Plaines overbank flooding
Strategy	Groveland AvenueFloodwall
District Minimum Criteria for Funding:	Met
Recommended	No

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Channel treatment: Reinforced one sided concrete wall	yd3	2217	$587.35	1,302,154.95	$1,210,984	$311,804	
Channel treatment: Material to be hauled offsite	yd3	2217	$11.75	$26,049.75	$0	$0	
Channel treatment: Soil stabilization and vegetative cover	yd2	38744	$13.88	$537,766.72	$500,115	$128,770	
Channel treatment: Excavation	yd3	38744	$10.68	$413,785.92	$0	$0	
Channel treatment: Sheet piling	yd2	3874	$303.28	1,174,906.72	$0	$281,335	
Pump Station: 10ac-ft per day interior drainage	each	3	$800,000.00	2,400,000.00	$2,231,963	$0	
Pipe in earth (county): 36 inches or less	lf	2500	$216.78	$541,950.00	$504,005	$0	
Outlet structures (Headwall): 36 inches or less	each	13	$2,600.34	$33,804.42	$31,438	$0	
Land Acquisition: Permanent Easement *	dollar	55500	$1.00	$55,500.00	$0	$0	
Land Acquisition: Permanent Easement *	dollar	93543	$1.00	$93,543.12	$0	$0	
Land Acquisition: Temporary Easement *	dollar	56126	$1.00	$56,125.87	$0	$0	

* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)

Subtotal (direct costs)		**$6,430,418**	**$4,478,505**	**$721,909**
Utility Relocation	4 %	$257,217		
Mobilization \ General Conditions	5%	$321,521		
Subtotal with Percent Allowances		**$7,009,156**		
Contingency	30%	$2,102,747		
Profit	5%	$455,595		
Probable Construction Cost Estimate		**$9,567,498**		
Design Engineering, Geotechnical, and Construction Management	10%	$956,750		
Property Acquisition Cost:		$205,169		
Total Conceptual Cost Estimate		**$15,929,831**		

Additional Comments

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Metropolitan Water Reclamation District of Greater Chicago
LDPR Watershed Detailed Watershed Plan
DPR 11C: Total Conceptual Cost Report

Alternative Name DPR11C

Problem Description Des Plaines RIver overbank flooding

Strategy Groveland Avenue Floodwall

District Minimum Criteria for Funding: Met

Recommended Yes

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Channel treatment: Reinforced one sided concrete wall	yd3	1702	$587.35	$999,669.70	$929,678	$239,374	
Channel treatment: Reinforced one sided concrete wall	yd3	2217	$587.35	1,302,154.95	$1,210,984	$311,804	
Channel treatment: Reinforced one sided concrete wall	yd3	570	$587.35	$334,789.50	$311,349	$80,166	
Channel treatment: Sheet piling	yd2	318	$303.28	$96,443.04	$0	$23,094	
Channel treatment: Sheet piling	yd2	3874	$303.28	1,174,906.72	$0	$281,335	
Channel treatment: Sheet piling	yd2	722	$303.28	$218,968.16	$0	$52,433	
Channel treatment: Soil stabilization and vegetative cover	yd2	733	$13.88	$10,174.04	$9,462	$2,436	
Channel treatment: Soil stabilization and vegetative cover	yd2	38744	$13.88	$537,766.72	$500,115	$128,770	
Channel treatment: Soil stabilization and vegetative cover	yd2	14444	$13.88	$200,482.72	$186,446	$48,006	
Channel treatment: Vegetative cover only	yd2	733	$8.54	$6,259.82	$5,822	$1,499	
Demolition: Brick, concrete, or stone construction	ft2	66000	$4.27	$281,820.00	$0	$0	
Demolition: Brick, concrete, or stone construction	ft2	33750	$4.27	$144,112.50	$0	$0	
Embankment construction, grading and restoration: Additional fill	yd3	2567	$13.88	$35,629.96	$0	$0	
Embankment construction, grading and restoration: Additional fill	yd3	1875	$13.88	$26,025.00	$0	$0	
Embankment construction, grading and restoration: Compaction of fill	yd3	2567	$5.34	$13,707.78	$0	$0	
Embankment construction, grading and restoration: Compaction of fill	yd3	1875	$5.34	$10,012.50	$0	$0	
Embankment construction, grading and restoration: Material hauled from offsite	yd3	2567	$10.68	$27,415.56	$0	$0	
Embankment construction, grading and restoration: Material hauled from offsite	yd3	1875	$10.68	$20,025.00	$0	$0	
Channel treatment: Excavation	yd3	38744	$10.68	$413,785.92	$0	$0	
Channel treatment: Excavation	yd3	4815	$10.68	$51,424.20	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	318	$11.75	$3,736.50	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	2217	$11.75	$26,049.75	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	570	$11.75	$6,697.50	$0	$0	
Outlet structures (Headwall): 36 inches or less	each	13	$2,600.34	$33,804.42	$31,438	$0	
Outlet structures (Headwall): 36 inches or less	each	2	$2,600.34	$5,200.68	$4,837	$0	
Pipe in earth (county): 36 inches or less	lf	2500	$216.78	$541,950.00	$504,005	$0	
Pipe in earth (county): 36 inches or less	lf	1100	$216.78	$238,458.00	$221,762	$0	

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Alternative Name	DPR11C
Problem Description	Des Plaines RIver overbank flooding
Strategy	Groveland Avenue Floodwall
District Minimum Criteria for Funding:	Met
Recommended	Yes

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Paving: Asphalt Pavement Installation (24 ft wide, 2 ft C&G, 1 ft Excavation	lf	2750	$148.47	$408,292.50	$379,706	$0	
Paving: Asphalt Pavement Installation (24 ft wide, 2 ft C&G, 1 ft Excavation	lf	1406	$148.47	$208,748.82	$194,133	$0	
Concrete: Cast in place	yd3	139	$250.00	$34,750.00	$0	$0	
Land Acquisition: Purchase of Property *	dollar	55500	$1.00	$55,500.00	$0	$0	License
Land Acquisition: Permanent Easement *	dollar	93543	$1.00	$93,543.12	$0	$0	
Land Acquisition: Permanent Easement *	dollar	44766	$1.00	$44,766.00	$0	$0	
Land Acquisition: Temporary Easement *	dollar	56126	$1.00	$56,125.87	$0	$0	
Land Acquisition: Temporary Easement *	dollar	13430	$1.00	$13,430.00	$0	$0	
Pump Station: 10ac-ft per day interior drainage	each	3	$800,000.00	2,400,000.00	$2,231,963	$0	
Pump Station: 10ac-ft per day interior drainage	each	2	$800,000.00	1,600,000.00	$1,487,976	$0	

* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)

Subtotal (direct costs)		**$11,413,262**	**$8,209,674**	**$1,168,917**
Utility Relocation	4 %	$456,530		
Mobilization \ General Conditions	5%	$570,663		
Subtotal with Percent Allowances		**$12,440,456**		
Contingency	30%	$3,732,137		
Profit	5%	$808,630		
Probable Construction Cost Estimate		**$16,981,222**		
Design Engineering, Geotechnical, and Construction Management	10%	$1,698,122		
Property Acquisition Cost:		$263,365		
Total Conceptual Cost Estimate		**$28,321,300**		

Additional Comments

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Metropolitan Water Reclamation District of Greater Chicago
LDPR Watershed Detailed Watershed Plan
DPR 12: Total Conceptual Cost Report

Alternative Name	DPR12
Problem Description	Regional roadway flooding at Ogden Avenue
Strategy	Raise Ogden Avenue
District Minimum Criteria for Funding:	Met
Recommended	Yes

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Concrete: Cast in place	yd3	117	$250.00	$29,250.00	$0	$0	
Demolition: Brick, concrete, or stone construction	ft2	40500	$4.27	$172,935.00	$0	$0	
Embankment construction, grading and restoration: Additional fill	yd3	1125	$13.88	$15,615.00	$0	$0	
Embankment construction, grading and restoration: Compaction of fill	yd3	1125	$5.34	$6,007.50	$0	$0	
Embankment construction, grading and restoration: Material hauled from offsite	yd3	1125	$10.68	$12,015.00	$0	$0	
Paving: Asphalt Pavement Installation (24 ft wide, 2 ft C&G, 1 ft Excavation	lf	1688	$148.47	$250,617.36	$233,070	$0	

* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)

Subtotal (direct costs)		**$486,440**	**$233,070**	**$0**
Utility Relocation	4 %	$19,458		
Mobilization \ General Conditions	5%	$24,322		
Subtotal with Percent Allowances		**$530,219**		
Contingency	30%	$159,066		
Profit	5%	$34,464		
Probable Construction Cost Estimate		**$723,750**		
Design Engineering, Geotechnical, and Construction Management	10%	$72,375		
Property Acquisition Cost:		$0		
Total Conceptual Cost Estimate		**$1,029,195**		

Additional Comments

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Metropolitan Water Reclamation District of Greater Chicago
LDPR Watershed Detailed Watershed Plan
DPR 13: Total Conceptual Cost Report

Alternative Name DPR13

Problem Description Des Plaines River overbank flooding

Strategy Riverside Lawndale Floodwall

District Minimum Criteria for Funding: Met

Recommended Yes

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Channel treatment: Reinforced one sided concrete wall	yd3	1397	$587.35	$820,527.95	$763,078	$196,478	
Channel treatment: Material to be hauled offsite	yd3	1397	$11.75	$16,414.75	$0	$0	
Channel treatment: Soil stabilization and vegetative cover	yd2	26467	$13.88	$367,361.96	$341,641	$87,966	
Channel treatment: Excavation	yd3	22232	$10.68	$237,437.76	$0	$0	
Channel treatment: Sheet piling	yd2	2647	$303.28	$802,782.16	$0	$192,228	
Pump Station: 10ac-ft per day interior drainage	each	2	$800,000.00	,1,600,000.00	$1,487,976	$0	
Pipe in earth (county): 36 inches or less	lf	590	$216.78	$127,900.20	$118,945	$0	
Outlet structures (Headwall): 36 inches or less	each	2	$2,600.34	$5,200.68	$4,837	$0	
Land Acquisition: Permanent Easement *	dollar	116586	$1.00	$116,586.00	$0	$0	
Land Acquisition: Temporary Easement *	dollar	61698	$1.00	$61,698.00	$0	$0	

* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)

Subtotal (direct costs)		**$3,977,625**	**$2,716,477**	**$476,672**
Utility Relocation	4 %	$159,105		
Mobilization \ General Conditions	5%	$198,881		
Subtotal with Percent Allowances		**$4,335,612**		
Contingency	30%	$1,300,684		
Profit	5%	$281,815		
Probable Construction Cost Estimate		**$5,918,110**		
Design Engineering, Geotechnical, and Construction Management	10%	$591,811		
Property Acquisition Cost:		$178,284		
Total Conceptual Cost Estimate		**$9,881,354**		

Additional Comments

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Metropolitan Water Reclamation District of Greater Chicago
LDPR Watershed Detailed Watershed Plan
DPR 14A: Total Conceptual Cost Report

Alternative Name	DPR14A
Problem Description	Des Plaines River overbank flooding
Strategy	Floodwall on west side of Des Plaines River, north of 47th street
District Minimum Criteria for Funding:	Met
Recommended	Yes

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Pump Station: 10ac-ft per day interior drainage	each	1	$800,000.00	$800,000.00	$743,988	$0	
Pipe in earth (county): 36 inches or less	lf	200	$216.78	$43,356.00	$40,320	$0	
Outlet structures (Headwall): 36 inches or less	each	1	$2,600.34	$2,600.34	$2,418	$0	
Land Acquisition: Temporary Easement *	dollar	12450	$1.00	$12,450.00	$0	$0	
Land Acquisition: Permanent Easement *	dollar	30750	$1.00	$30,750.00	$0	$0	
Channel treatment: Reinforced one sided concrete wall	yd3	584	$587.35	$343,129.87	$319,106	$82,163	
Channel treatment: Material to be hauled offsite	yd3	584	$11.75	$6,864.35	$0	$0	
Channel treatment: Soil stabilization and vegetative cover	yd2	13311	$13.88	$184,758.07	$171,822	$44,241	
Channel treatment: Excavation	yd3	7454	$10.68	$79,610.86	$0	$0	
Channel treatment: Sheet piling	yd2	1331	$303.28	$403,696.01	$0	$96,666	

* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)

Subtotal (direct costs)		**$1,864,016**	**$1,277,654**	**$223,070**
Utility Relocation	4 %	$74,561		
Mobilization \ General Conditions	5%	$93,201		
Subtotal with Percent Allowances		**$2,031,777**		
Contingency	30%	$609,533		
Profit	5%	$132,066		
Probable Construction Cost Estimate		**$2,773,375**		
Design Engineering, Geotechnical, and Construction Management	10%	$277,338		
Property Acquisition Cost:		$43,200		
Total Conceptual Cost Estimate		**$4,594,637**		

Additional Comments

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Metropolitan Water Reclamation District of Greater Chicago
LDPR Watershed Detailed Watershed Plan
DPR 14B: Total Conceptual Cost Report

Alternative Name	DPR14B
Problem Description	Regional roadway flooding
Strategy	Raise road and enlarge waterway opening at 47th Street
District Minimum Criteria for Funding:	Met
Recommended	Yes

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Channel treatment: Soil stabilization and vegetative cover	yd2	846	$13.88	$11,742.48	$10,920	$2,812	
Channel treatment: Vegetative cover only	yd2	846	$8.54	$7,224.84	$6,719	$1,730	
Demolition: Brick, concrete, or stone construction	ft2	31500	$4.27	$134,505.00	$0	$0	
Embankment construction, grading and restoration: Additional fill	yd3	4866	$13.88	$67,540.08	$0	$0	
Embankment construction, grading and restoration: Compaction of fill	yd3	4866	$5.34	$25,984.44	$0	$0	
Embankment construction, grading and restoration: Material hauled from offsite	yd3	4866	$10.68	$51,968.88	$0	$0	
Paving: Asphalt Pavement Installation (24 ft wide, 2 ft C&G, 1 ft Excavation	lf	1313	$148.47	$194,941.11	$181,292	$0	
Bridge: Bridge Demolition-Concrete Removal	cf	420105	$25.00	0,502,622.00	$0	$0	Bridge: Enlarge waterway opening

* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)

Subtotal (direct costs)		**$10,996,529**	**$198,932**	**$4,542**
Utility Relocation	4 %	$439,861		
Mobilization \ General Conditions	5%	$549,826		
Subtotal with Percent Allowances		**$11,986,216**		
Contingency	30%	$3,595,865		
Profit	5%	$779,104		
Probable Construction Cost Estimate		**$16,361,185**		
Design Engineering, Geotechnical, and Construction Management	10%	$1,636,119		
Property Acquisition Cost:		$0		
Total Conceptual Cost Estimate		**$18,200,778**		

Additional Comments

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Metropolitan Water Reclamation District of Greater Chicago
LDPR Watershed Detailed Watershed Plan
DPR 14C: Total Conceptual Cost Report

Alternative Name DPR14C

Problem Description Des Plaines River overbank flooding
Strategy McCook Levee enhancement
District Minimum Criteria for Funding: Met
Recommended Yes

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Channel treatment: Sheet piling	yd2	14527	$303.28	4,405,748.56	$0	$1,054,968	

* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)

Subtotal (direct costs)		**$4,405,749**	**$0**	**$1,054,968**
Utility Relocation	4 %	$176,230		
Mobilization \ General Conditions	5%	$220,287		
Subtotal with Percent Allowances		**$4,802,266**		
Contingency	30%	$1,440,680		
Profit	5%	$312,147		
Probable Construction Cost Estimate		**$6,555,093**		
Design Engineering, Geotechnical, and Construction Management	10%	$655,509		
Property Acquisition Cost:		$0		
Total Conceptual Cost Estimate		**$8,265,570**		

Additional Comments

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Metropolitan Water Reclamation District of Greater Chicago
LDPR Watershed Detailed Watershed Plan
DPR 14D: Total Conceptual Cost Report

Alternative Name	DPR14D
Problem Description	Des Plaines River overbank flooding
Strategy	Floodwall on east side of river from north of 47th Street, strorage in Lyons Quarry
District Minimum Criteria for Funding:	Met
Recommended	Yes

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Channel treatment: Reinforced one sided concrete wall	yd3	1315	$587.35	$772,365.25	$718,288	$184,945	
Channel treatment: Material to be hauled offsite	yd3	1315	$11.75	$15,451.25	$0	$0	
Channel treatment: Soil stabilization and vegetative cover	yd2	33333	$13.88	$462,662.04	$430,269	$110,786	
Channel treatment: Excavation	yd3	11111	$10.68	$118,665.48	$0	$0	
Channel treatment: Sheet piling	yd2	6667	$303.28	2,021,967.76	$0	$484,166	
Pump Station: 10ac-ft per day interior drainage	each	1	$800,000.00	$800,000.00	$743,988	$0	
Pipe in earth (county): 36 inches or less	lf	250	$216.78	$54,195.00	$50,401	$0	
Outlet structures (Headwall): 36 inches or less	each	2	$2,600.34	$5,200.68	$4,837	$0	
Land Acquisition: Permanent Easement *	dollar	103306	$1.00	$103,306.00	$0	$0	
Land Acquisition: Temporary Easement *	dollar	41322	$1.00	$41,322.00	$0	$0	
Channel treatment: Additional fill	yd3	521107	$13.88	7,232,965.16	$0	$0	
Channel treatment: Compaction	yd3	521107	$7.48	3,897,880.36	$0	$0	
Concrete: Cast in place	yd3	7407	$250.00	1,851,750.00	$0	$0	
Demolition: Brick, concrete, or stone construction	ft2	6000	$4.27	$25,620.00	$0	$0	
Embankment construction, grading and restoration: Additional fill	yd3	6341723	$13.88	8,023,115.24	$0	$0	
Embankment construction, grading and restoration: Compaction of fill	yd3	6341723	$5.34	3,864,800.82	$0	$0	
Inlet structures (Headwall): 42 to 66 inches	each	10	$4,757.50	$47,575.00	$44,244	$0	
Land Acquisition: Purchase of Property *	dollar	12137010	$1.00	2,137,010.00	$0	$0	
Land Acquisition: Temporary Easement *	dollar	104820	$1.00	$104,820.00	$0	$0	
Outlet structures (Headwall): 42 to 66 inches	each	10	$4,757.50	$47,575.00	$44,244	$0	
Pipe under pavement (county): 90 to 96 inches / box culvert (39 to 50 ft2)	lf	4500	$661.03	2,974,635.00	$2,766,365	$0	
Pump Station: 10ac-ft per day interior drainage	each	5	$800,000.00	4,000,000.00	$3,719,939	$0	

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Alternative Name	DPR14D
Problem Description	Des Plaines River overbank flooding
Strategy	Floodwall on east side of river from north of 47th Street, strorage in Lyons Quarry
District Minimum Criteria for Funding:	Met
Recommended	Yes

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)							
Subtotal (direct costs)				**$146,216,424**	**$8,522,573**	**$779,897**	
Utility Relocation			4 %	$5,848,657			
Mobilization \ General Conditions			5%	$7,310,821			
Subtotal with Percent Allowances				**$159,375,902**			
Contingency			30%	$47,812,771			
Profit			5%	$10,359,434			
Probable Construction Cost Estimate				**$217,548,107**			
Design Engineering, Geotechnical, and Construction Management			10%	$21,754,811			
Property Acquisition Cost:				$12,386,458			
Total Conceptual Cost Estimate				**$260,991,845**			

Additional Comments

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Metropolitan Water Reclamation District of Greater Chicago
LDPR Watershed Detailed Watershed Plan
DPR 15: Total Conceptual Cost Report

Alternative Name DPR15

Problem Description Des Plaines River overbank flooding

Strategy Floodwall on west side of Des Plaines River north of I-55

District Minimum Criteria for Funding: Met

Recommended Yes

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Channel treatment: Reinforced one sided concrete wall	yd3	321	$587.35	$188,539.35	$175,339	$45,146	
Channel treatment: Material to be hauled offsite	yd3	321	$11.75	$3,771.75	$0	$0	
Channel treatment: Soil stabilization and vegetative cover	yd2	8133	$13.88	$112,886.04	$104,982	$27,031	
Channel treatment: Excavation	yd3	2711	$10.68	$28,953.48	$0	$0	
Channel treatment: Sheet piling	yd2	407	$303.28	$123,434.96	$0	$29,557	
Pump Station: 10ac-ft per day interior drainage	each	1	$800,000.00	$800,000.00	$743,988	$0	
Pipe in earth (county): 36 inches or less	lf	100	$216.78	$21,678.00	$20,160	$0	
Outlet structures (Headwall): 36 inches or less	each	1	$2,600.34	$2,600.34	$2,418	$0	
Channel treatment: Reinforced one sided concrete wall	yd3	1072	$587.35	$629,639.20	$585,555	$150,769	
Channel treatment: Material to be hauled offsite	yd3	1072	$11.75	$12,596.00	$0	$0	
Channel treatment: Soil stabilization and vegetative cover	yd2	24433	$13.88	$339,130.04	$315,386	$81,206	
Channel treatment: Excavation	yd3	13683	$10.68	$146,134.44	$0	$0	
Channel treatment: Sheet piling	yd2	1222	$303.28	$370,608.16	$0	$88,743	
Pump Station: 10ac-ft per day interior drainage	each	1	$800,000.00	$800,000.00	$743,988	$0	
Pipe in earth (county): 36 inches or less	lf	100	$216.78	$21,678.00	$20,160	$0	
Outlet structures (Headwall): 36 inches or less	each	1	$2,600.34	$2,600.34	$2,418	$0	
Channel treatment: Reinforced one sided concrete wall	yd3	3745	$587.35	2,199,625.75	$2,045,618	$526,706	
Channel treatment: Material to be hauled offsite	yd3	3745	$11.75	$44,003.75	$0	$0	
Channel treatment: Soil stabilization and vegetative cover	yd2	77489	$13.88	1,075,547.32	$1,000,243	$257,543	
Channel treatment: Excavation	yd3	53726	$10.68	$573,793.68	$0	$0	
Channel treatment: Sheet piling	yd2	3874	$303.28	1,174,906.72	$0	$281,335	
Pump Station: 10ac-ft per day interior drainage	each	2	$800,000.00	1,600,000.00	$1,487,976	$0	
Pipe in earth (county): 36 inches or less	lf	250	$216.78	$54,195.00	$50,401	$0	
Outlet structures (Headwall): 36 inches or less	each	2	$2,600.34	$5,200.68	$4,837	$0	
Land Acquisition: Permanent Easement *	dollar	15109	$1.00	$15,108.79	$0	$0	0.25 ac
Land Acquisition: Permanent Easement *	dollar	45388	$1.00	$45,388.29	$0	$0	0.76 ac
Land Acquisition: Temporary Easement *	dollar	6044	$1.00	$6,043.52	$0	$0	0.5 ac
Land Acquisition: Temporary Easement *	dollar	18155	$1.00	$18,155.32	$0	$0	1.51 ac

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Alternative Name	DPR15
Problem Description	Des Plaines River overbank flooding
Strategy	Floodwall on west side of Des Plaines River north of I-55
District Minimum Criteria for Funding:	Met
Recommended	Yes

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)							
Subtotal (direct costs)				**$10,331,523**	**$7,303,467**	**$1,488,036**	
Utility Relocation			4 %	$413,261			
Mobilization \ General Conditions			5%	$516,576			
Subtotal with Percent Allowances				**$11,261,360**			
Contingency			30%	$3,378,408			
Profit			5%	$731,988			
Probable Construction Cost Estimate				**$15,371,757**			
Design Engineering, Geotechnical, and Construction Management			10%	$1,537,176			
Property Acquisition Cost:				$84,696			
Total Conceptual Cost Estimate				**$25,785,132**			

Additional Comments

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Metropolitan Water Reclamation District of Greater Chicago
LDPR Watershed Detailed Watershed Plan
DPR 22: Total Conceptual Cost Report

Alternative Name	DPR22
Problem Description	Des Plaines RIver overbank flooding
Strategy	Storage at Lyons Quarry
District Minimum Criteria for Funding:	Met
Recommended	No

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Channel treatment: Additional fill	yd3	521107	$13.88	7,232,965.16	$0	$0	
Channel treatment: Compaction	yd3	521107	$7.48	3,897,880.36	$0	$0	
Concrete: Cast in place	yd3	7407	$250.00	1,851,750.00	$0	$0	
Demolition: Brick, concrete, or stone construction	ft2	6000	$4.27	$25,620.00	$0	$0	
Embankment construction, grading and restoration: Additional fill	yd3	6341723	$13.88	8,023,115.24	$0	$0	
Embankment construction, grading and restoration: Compaction of fill	yd3	6341723	$5.34	3,864,800.82	$0	$0	
Inlet structures (Headwall): 42 to 66 inches	each	10	$4,757.50	$47,575.00	$44,244	$0	
Land Acquisition: Purchase of Property *	dollar	12137010	$1.00	2,137,010.00	$0	$0	
Land Acquisition: Temporary Easement *	dollar	104820	$1.00	$104,820.00	$0	$0	
Outlet structures (Headwall): 42 to 66 inches	each	10	$4,757.50	$47,575.00	$44,244	$0	
Pipe under pavement (county): 90 to 96 inches / box culvert (39 to 50 ft2)	lf	4500	$661.03	2,974,635.00	$2,766,365	$0	
Pump Station: 10ac-ft per day interior drainage	each	5	$800,000.00	4,000,000.00	$3,719,939	$0	

* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)

Subtotal (direct costs)		**$141,965,917**	**$6,574,792**	**$0**
Utility Relocation	4 %	$5,678,637		
Mobilization \ General Conditions	5%	$7,098,296		
Subtotal with Percent Allowances		**154,742,849**		
Contingency	30%	$46,422,855		
Profit	5%	$10,058,285		
Probable Construction Cost Estimate		**211,223,989**		
Design Engineering, Geotechnical, and Construction Management	10%	$21,122,399		
Property Acquisition Cost:		$12,241,830		
Total Conceptual Cost Estimate		**$251,163,010**		

Additional Comments

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Metropolitan Water Reclamation District of Greater Chicago
LDPR Watershed Detailed Watershed Plan
DPR 23: Total Conceptual Cost Report

Alternative Name	DPR23
Problem Description	Des Plaines overbank flooding
Strategy	5 USACE concept reservoirs
District Minimum Criteria for Funding:	Met
Recommended	No

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Channel treatment: Soil stabilization and vegetative cover	yd2	3690984	$13.88	1,230,857.92	$47,643,914	$12,267,364	
Channel treatment: Vegetative cover only	yd2	1379400	$8.54	1,780,076.00	$10,955,290	$2,820,770	
Channel treatment: Additional fill	yd3	1874048	$13.88	6,011,786.24	$0	$0	
Channel treatment: Compaction	yd3	1874048	$7.48	4,017,879.04	$0	$0	
Channel treatment: Excavation	yd3	5515689	$10.68	8,907,553.18	$0	$0	
Channel treatment: Excavation	yd3	5515689	$10.68	8,907,553.18	$0	$0	
Concrete: Cast in place	yd3	5484	$250.00	1,371,000.00	$0	$0	
Embankment construction, grading and restoration: Additional fill	yd3	174341	$13.88	2,419,853.08	$0	$0	
Embankment construction, grading and restoration: Compaction of fill	yd3	174341	$5.34	$930,980.94	$0	$0	
Inlet structures (Headwall): 36 inches or less	each	3	$2,600.34	$7,801.02	$7,255	$0	
Inlet structures (Headwall): 42 to 66 inches	each	2	$4,757.50	$9,515.00	$8,849	$0	
Pipe in earth (county): 36 inches or less	lf	4933	$216.78	1,069,375.74	$994,503	$0	
Pipe in earth (county): Box culvert (51 to 60 ft2)	lf	1	$472.01	$472.01	$439	$0	
Pipe in earth (county): 90 to 96 inches / box culvert (39 to 50 ft2)	lf	1	$434.64	$434.64	$404	$0	
Pump Station: 10ac-ft per day interior drainage	each	4	$800,000.00	3,200,000.00	$2,975,951	$0	

* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)

Subtotal (direct costs)		**$229,865,138**	**$62,586,605**	**$15,088,134**
Utility Relocation	4 %	$9,194,606		
Mobilization \ General Conditions	5%	$11,493,257		
Subtotal with Percent Allowances		**$250,553,000**		
Contingency	30%	$75,165,900		
Profit	5%	$16,285,945		
Probable Construction Cost Estimate		**$342,004,846**		
Design Engineering, Geotechnical, and Construction Management	10%	$34,200,485		
Property Acquisition Cost:		$0		
Total Conceptual Cost Estimate		**$453,880,069**		

Additional Comments

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Metropolitan Water Reclamation District of Greater Chicago
LDPR Watershed Detailed Watershed Plan
DPR 26: Total Conceptual Cost Report

Alternative Name DPR26

Problem Description Regional roadway flooding at North Avenue
Strategy Raise North Avenue
District Minimum Criteria for Funding: Met
Recommended Yes

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Channel treatment: Soil stabilization and vegetative cover	yd2	30000	$13.88	$416,400.00	$387,246	$99,708	
Channel treatment: Vegetative cover only	yd2	30000	$8.54	$256,200.00	$238,262	$61,348	
Concrete: Cast in place	yd3	194	$250.00	$48,500.00	$0	$0	
Demolition: Brick, concrete, or stone construction	ft2	12000	$4.27	$51,240.00	$0	$0	
Embankment construction, grading and restoration: Additional fill	yd3	5867	$13.88	$81,433.96	$0	$0	
Embankment construction, grading and restoration: Compaction of fill	yd3	5867	$5.34	$31,329.78	$0	$0	
Embankment construction, grading and restoration: Material hauled from offsite	yd3	5867	$10.68	$62,659.56	$0	$0	
Paving: Asphalt Pavement Installation (24 ft wide, 2 ft C&G, 1 ft Excavation	lf	5000	$148.47	$742,350.00	$690,374	$0	

* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)

Subtotal (direct costs)		**$1,690,113**	**$1,315,882**	**$161,056**
Utility Relocation	4 %	$67,605		
Mobilization \ General Conditions	5%	$84,506		
Subtotal with Percent Allowances		**$1,842,224**		
Contingency	30%	$552,667		
Profit	5%	$119,745		
Probable Construction Cost Estimate		**$2,514,635**		
Design Engineering, Geotechnical, and Construction Management	10%	$251,464		
Property Acquisition Cost:		$0		
Total Conceptual Cost Estimate		**$4,243,036**		

Additional Comments

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Metropolitan Water Reclamation District of Greater Chicago
CBBEL_Test Watershed Detailed Watershed Plan
FRCR-1 Total Conceptual Cost Report

Alternative Name	FRCR-1
Problem Description	Farmers Creek Overbank Flooding
Strategy	42 inch concrete culvert LMA to Dude Ranch Pond
District Minimum Criteria for Funding:	Met
Recommended	No

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Inlet structures (Headwall): 42 to 66 inches	each	1	$4,757.50	$4,757.50	$4,424	$0	
Outlet structures (Headwall): 42 to 66 inches	each	1	$4,757.50	$4,757.50	$4,424	$0	
Concrete: Cast in place	yd3	20	$250.00	$5,000.00	$0	$0	
Paving: Asphalt Pavement Installation (24 ft wide, 2 ft C&G, 1 ft Excavation	lf	65	$148.47	$9,650.55	$8,975	$0	
Pipe under pavement (county): 42 to 66 inches / box culvert (15 to 27 ft2)	lf	80	$291.54	$23,323.20	$21,690	$0	
Pipe in earth (county): 42 to 66 inches / box culvert (15-27 ft2)	lf	360	$208.24	$74,966.40	$69,718	$0	
Embankment construction, grading and restoration: Compaction of fill	yd3	270	$5.34	$1,441.80	$0	$0	
Demolition: Brick, concrete, or stone construction	ft2	1600	$4.27	$6,832.00	$0	$0	
Channel treatment: Vegetative cover only	yd2	5600	$8.54	$47,824.00	$44,476	$11,452	
Channel treatment: Material to be hauled offsite	yd3	20470	$11.75	$240,522.50	$0	$0	
Channel treatment: Excavation	yd3	20740	$10.68	$221,503.20	$0	$0	
Land Acquisition: Permanent Easement *	dollar	375000	$1.00	$375,000.00	$0	$0	
Land Acquisition: Temporary Easement *	dollar	62000	$1.00	$62,000.00	$0	$0	
Pump Station: Small Pump Station with Flap Gate	each	1	$650,000.00	$650,000.00	$362,694	$0	

* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)

Subtotal (direct costs)		**$1,290,579**	**$516,401**	**$11,452**
Utility Relocation	4 %	$51,623		
Mobilization \ General Conditions	5%	$64,529		
Subtotal with Percent Allowances		**$1,406,731**		
Contingency	30%	$422,019		
Profit	5%	$91,438		
Probable Construction Cost Estimate		**$1,920,187**		
Design Engineering, Geotechnical, and Construction Management	10%	$192,019		
Property Acquisition Cost:		$437,000		
Total Conceptual Cost Estimate		**$3,077,059**		

Additional Comments

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Metropolitan Water Reclamation District of Greater Chicago
CBBEL_Test Watershed Detailed Watershed Plan
FRCR-4 Total Conceptual Cost Report

Alternative Name FRCR-4

Problem Description Prairie Creek Overbank Flooding

Strategy 500 ft long 48 inch bypass pipe around LGH West

District Minimum Criteria for Funding: Met

Recommended No

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Inlet structures (Headwall): 42 to 66 inches	each	2	$4,757.50	$9,515.00	$8,849	$0	
Outlet structures (Headwall): 42 to 66 inches	each	2	$4,757.50	$9,515.00	$8,849	$0	
Pipe in earth (county): 42 to 66 inches / box culvert (15-27 ft2)	lf	1000	$208.24	$208,240.00	$193,660	$0	
Embankment construction, grading and restoration: Compaction of fill	yd3	500	$5.34	$2,670.00	$0	$0	
Channel treatment: Vegetative cover only	yd2	1000	$8.54	$8,540.00	$7,942	$2,045	
Channel treatment: Material to be hauled offsite	yd3	1000	$11.75	$11,750.00	$0	$0	
Channel treatment: Excavation	yd3	2000	$10.68	$21,360.00	$0	$0	
Pump Station: 10ac-ft per day interior drainage	each	1	$800,000.00	$800,000.00	$743,988	$0	
Inlet structures (Headwall): 36 inches or less	each	1	$2,600.34	$2,600.34	$2,418	$0	
Outlet structures (Headwall): 36 inches or less	each	1	$2,600.34	$2,600.34	$2,418	$0	
Pipe in earth (county): 36 inches or less	lf	500	$216.78	$108,390.00	$100,801	$0	
Land Acquisition: Temporary Easement *	dollar	25000	$1.00	$25,000.00	$0	$0	
Land Acquisition: Permanent Easement *	dollar	275000	$1.00	$275,000.00	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	90000	$11.75	1,057,500.00	$0	$0	
Channel treatment: Excavation	yd3	90000	$10.68	$961,200.00	$0	$0	
Concrete: Cast in place	yd3	50	$250.00	$12,500.00	$0	$0	

* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)

Subtotal (direct costs)		**$3,216,381**	**$1,068,925**	**$2,045**
Utility Relocation	4 %	$128,655		
Mobilization \ General Conditions	5%	$160,819		
Subtotal with Percent Allowances		**$3,505,855**		
Contingency	30%	$1,051,756		
Profit	5%	$227,881		
Probable Construction Cost Estimate		**$4,785,492**		
Design Engineering, Geotechnical, and Construction Management	10%	$478,549		
Property Acquisition Cost:		$300,000		
Total Conceptual Cost Estimate		**$6,635,011**		

Additional Comments

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Metropolitan Water Reclamation District of Greater Chicago
CBBEL_Test Watershed Detailed Watershed Plan
FRCR-5 Total Conceptual Cost Report

Alternative Name	FRCR-5
Problem Description	Prairie Creek Overbank Flooding
Strategy	- High School Reservoir
District Minimum Criteria for Funding:	Met
Recommended	No

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Channel treatment: Vegetative cover only	yd2	43560	$8.54	$372,002.40	$345,957	$89,077	
Channel treatment: Excavation	yd3	92757	$10.68	$990,644.76	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	92757	$11.75	1,089,894.75	$0	$0	
Concrete: Cast in place	yd3	5	$250.00	$1,250.00	$0	$0	
Pipe in earth (county): 90 to 96 inches / box culvert (39 to 50 ft2)	lf	800	$434.64	$347,712.00	$323,367	$0	
Paving: Asphalt Pavement Installation (24 ft wide, 2 ft C&G, 1 ft Excavation	lf	1200	$148.47	$178,164.00	$165,690	$0	
Land Acquisition: Temporary Easement *	dollar	12000	$1.00	$12,000.00	$0	$0	
Land Acquisition: Permanent Easement *	dollar	375000	$1.00	$375,000.00	$0	$0	
Pump Station: Small Pump Station with Flap Gate	each	1	$650,000.00	$650,000.00	$362,694	$0	

* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)

Subtotal (direct costs)		**$3,629,668**	**$1,197,707**	**$89,077**
Utility Relocation	4 %	$145,187		
Mobilization \ General Conditions	5%	$181,483		
Subtotal with Percent Allowances		**$3,956,338**		
Contingency	30%	$1,186,901		
Profit	5%	$257,162		
Probable Construction Cost Estimate		**$5,400,401**		
Design Engineering, Geotechnical, and Construction Management	10%	$540,040		
Property Acquisition Cost:		$387,000		
Total Conceptual Cost Estimate		**$7,614,226**		

Additional Comments

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Metropolitan Water Reclamation District of Greater Chicago
CBBEL_Test Watershed Detailed Watershed Plan
FRCR-7 Total Conceptual Cost Report

Alternative Name	FRCR-7
Problem Description	Prairie Creek Overbank Flooding
Strategy	4200 ft of 60 inch pipe
District Minimum Criteria for Funding:	Met
Recommended	No

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Concrete: Cast in place	yd3	20	$250.00	$5,000.00	$0	$0	
Demolition: Brick, concrete, or stone construction	ft2	29403	$4.27	$125,550.81	$0	$0	
Inlet structures (Headwall): 42 to 66 inches	each	1	$4,757.50	$4,757.50	$4,424	$0	
Outlet structures (Headwall): 42 to 66 inches	each	1	$4,757.50	$4,757.50	$4,424	$0	
Paving: Asphalt Pavement Installation (24 ft wide, 2 ft C&G, 1 ft Excavation	lf	1225	$148.47	$181,875.75	$169,142	$0	
Pipe under pavement (county): 42 to 66 inches / box culvert (15 to 27 ft2)	lf	1000	$291.54	$291,540.00	$271,128	$0	
Embankment construction, grading and restoration: Compaction of fill	yd3	2800	$5.34	$14,952.00	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	2800	$11.75	$32,900.00	$0	$0	
Channel treatment: Excavation	yd3	5600	$10.68	$59,808.00	$0	$0	
Land Acquisition: Temporary Easement *	dollar	5000	$1.00	$5,000.00	$0	$0	
Pipe under pavement (county): 72 to 84 inches / box culvert (28 to 38 ft2)	lf	3200	$608.70	,1,947,840.00	$1,811,461	$0	
Concrete: Cast in place	yd3	40	$250.00	$10,000.00	$0	$0	

* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)

Subtotal (direct costs)		**$2,678,982**	**$2,260,580**	**$0**
Utility Relocation	4 %	$107,159		
Mobilization \ General Conditions	5%	$133,949		
Subtotal with Percent Allowances		**$2,920,090**		
Contingency	30%	$876,027		
Profit	5%	$189,806		
Probable Construction Cost Estimate		**$3,985,923**		
Design Engineering, Geotechnical, and Construction Management	10%	$398,592		
Property Acquisition Cost:		$5,000		
Total Conceptual Cost Estimate		**$6,650,095**		

Additional Comments

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Metropolitan Water Reclamation District of Greater Chicago
CBBEL_Test Watershed Detailed Watershed Plan
FRCR-8 Total Conceptual Cost Report

Alternative Name	FRCR-8
Problem Description	Prairie Creek Overbank Flooding
Strategy	Channel Improvements between Rancho and Dee = 318 LF = 65 CY based on RAS quantities.
District Minimum Criteria for Funding:	Met
Recommended	No

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Demolition: Brick, concrete, or stone construction	ft2	2100	$4.27	$8,967.00	$0	$0	
Paving: Asphalt Pavement Installation (24 ft wide, 2 ft C&G, 1 ft Excavation	lf	50	$148.47	$7,423.50	$6,904	$0	
Pipe under pavement (county): 90 to 96 inches / box culvert (39 to 50 ft2)	lf	164	$661.03	$108,408.92	$100,819	$0	
Channel treatment: Soil stabilization and vegetative cover	yd2	350	$13.88	$4,858.00	$4,518	$1,163	
Channel treatment: Excavation	yd3	65	$10.68	$694.20	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	65	$11.75	$763.75	$0	$0	
Concrete: Cast in place	yd3	15	$250.00	$3,750.00	$0	$0	
Demolition: Brick, concrete, or stone construction	ft2	720	$4.27	$3,074.40	$0	$0	
Demolition: Brick, concrete, or stone construction	ft2	50	$4.27	$213.50	$0	$0	
Pipe under pavement (county): 90 to 96 inches / box culvert (39 to 50 ft2)	lf	14	$661.03	$9,254.42	$8,606	$0	
Paving: Asphalt Pavement Installation (24 ft wide, 2 ft C&G, 1 ft Excavation	lf	14	$148.47	$2,078.58	$1,933	$0	
Demolition: Brick, concrete, or stone construction	ft2	6736	$4.27	$28,762.72	$0	$0	
Demolition: Metal construction	ft2	2500	$2.14	$5,350.00	$0	$0	
Channel treatment: Excavation	yd3	2000	$10.68	$21,360.00	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	1500	$11.75	$17,625.00	$0	$0	
Embankment construction, grading and restoration: Compaction of fill	yd3	500	$5.34	$2,670.00	$0	$0	
Paving: Asphalt Pavement Installation (24 ft wide, 2 ft C&G, 1 ft Excavation	lf	503	$148.47	$74,680.41	$69,452	$0	
Pipe under pavement (county): Box culvert (51 to 60 ft2)	lf	1000	$661.03	$661,030.00	$614,748	$0	
Land Acquisition: Temporary Easement *	dollar	8200	$1.00	$8,200.00	$0	$0	

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Alternative Name	FRCR-8
Problem Description	Prairie Creek Overbank Flooding
Strategy	Channel Improvements between Rancho and Dee = 318 LF = 65 CY based on RAS quantities.
District Minimum Criteria for Funding:	Met
Recommended	No

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)							
Subtotal (direct costs)				**$960,964**	**$806,979**	**$1,163**	
Utility Relocation			4 %	$38,439			
Mobilization \ General Conditions			5%	$48,048			
Subtotal with Percent Allowances				**$1,047,451**			
Contingency			30%	$314,235			
Profit			5%	$68,084			
Probable Construction Cost Estimate				**$1,429,771**			
Design Engineering, Geotechnical, and Construction Management			10%	$142,977			
Property Acquisition Cost:				$8,200			
Total Conceptual Cost Estimate				**$2,389,090**			

Additional Comments

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Metropolitan Water Reclamation District of Greater Chicago
CBBEL_Test Watershed Detailed Watershed Plan
FRCR9: Total Conceptual Cost Report

Alternative Name	FRCR-9
Problem Description	Prairie Creek Overbank Flooding
Strategy	Remove Pipe and Daylight Creek between Parkside and Demolition 4 ft pipe by 218 ft = 872 ft2, Greenwood
District Minimum Criteria for Funding:	Met
Recommended	No

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Channel treatment: Soil stabilization and vegetative cover	yd2	363	$13.88	$5,038.44	$4,686	$1,206	
Channel treatment: Excavation	yd3	500	$10.68	$5,340.00	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	500	$11.75	$5,875.00	$0	$0	
Demolition: Brick, concrete, or stone construction	ft2	872	$4.27	$3,723.44	$0	$0	
Demolition: Brick, concrete, or stone construction	ft2	1400	$4.27	$5,978.00	$0	$0	
Paving: Asphalt Pavement Installation (24 ft wide, 2 ft C&G, 1 ft Excavation	lf	58	$148.47	$8,611.26	$8,008	$0	
Demolition: Metal construction	ft2	180	$2.14	$385.20	$0	$0	
Demolition: Brick, concrete, or stone construction	ft2	1440	$4.27	$6,148.80	$0	$0	
Paving: Asphalt Pavement Installation (24 ft wide, 2 ft C&G, 1 ft Excavation	lf	50	$148.47	$7,423.50	$6,904	$0	
Demolition: Brick, concrete, or stone construction	ft2	9280	$4.27	$39,625.60	$0	$0	
Channel treatment: Soil stabilization and vegetative cover	yd2	6450	$13.88	$89,526.00	$83,258	$21,437	
Channel treatment: Excavation	yd3	1000	$10.68	$10,680.00	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	1000	$11.75	$11,750.00	$0	$0	
Land Acquisition: Temporary Easement *	dollar	1500	$1.00	$1,500.00	$0	$0	
Land Acquisition: Purchase of Property *	dollar	40000	$1.00	$40,000.00	$0	$0	
Inlet structures (Headwall): 42 to 66 inches	each	2	$4,757.50	$9,515.00	$8,849	$0	
Outlet structures (Headwall): 42 to 66 inches	each	2	$4,757.50	$9,515.00	$8,849	$0	
Pipe in earth (county): 42 to 66 inches / box culvert (15-27 ft2)	lf	1000	$208.24	$208,240.00	$193,660	$0	
Embankment construction, grading and restoration: Compaction of fill	yd3	500	$5.34	$2,670.00	$0	$0	
Channel treatment: Vegetative cover only	yd2	1000	$8.54	$8,540.00	$7,942	$2,045	
Channel treatment: Material to be hauled offsite	yd3	1000	$11.75	$11,750.00	$0	$0	
Channel treatment: Excavation	yd3	2000	$10.68	$21,360.00	$0	$0	
Pump Station: 10ac-ft per day interior drainage	each	1	$800,000.00	$800,000.00	$743,988	$0	
Inlet structures (Headwall): 36 inches or less	each	1	$2,600.34	$2,600.34	$2,418	$0	
Outlet structures (Headwall): 36 inches or less	each	1	$2,600.34	$2,600.34	$2,418	$0	
Pipe in earth (county): 36 inches or less	lf	500	$216.78	$108,390.00	$100,801	$0	
Land Acquisition: Temporary Easement *	dollar	25000	$1.00	$25,000.00	$0	$0	
Land Acquisition: Permanent Easement *	dollar	275000	$1.00	$275,000.00	$0	$0	

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Alternative Name FRCR-9

Problem Description Prairie Creek Overbank Flooding

Strategy Remove Pipe and Daylight Creek between Parkside and Demolition 4 ft pipe by 218 ft = 872 ft2, Greenwood

District Minimum Criteria for Funding: Met

Recommended No

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Channel treatment: Material to be hauled offsite	yd3	90000	$11.75	,1,057,500.00	$0	$0	
Channel treatment: Excavation	yd3	90000	$10.68	$961,200.00	$0	$0	
Concrete: Cast in place	yd3	50	$250.00	$12,500.00	$0	$0	
Channel treatment: Dumped rock	yd3	621	$67.28	$41,780.88	$38,856	$10,005	
Channel treatment: Reinforced one sided concrete wall	yd3	231	$587.35	$135,677.85	$126,178	$32,488	
Channel treatment: Excavation	yd3	367	$10.68	$3,919.56	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	367	$11.75	$4,312.25	$0	$0	
Land Acquisition: Permanent Easement *	dollar	25563	$1.00	$25,563.00	$0	$0	
Land Acquisition: Temporary Easement *	dollar	5113	$1.00	$5,113.00	$0	$0	

* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)

Subtotal (direct costs)		**$3,602,176**	**$1,336,815**	**$67,181**
Utility Relocation	4 %	$144,087		
Mobilization \ General Conditions	5%	$180,109		
Subtotal with Percent Allowances		**$3,926,372**		
Contingency	30%	$1,177,912		
Profit	5%	$255,214		
Probable Construction Cost Estimate		**$5,359,498**		
Design Engineering, Geotechnical, and Construction Management	10%	$535,950		
Property Acquisition Cost:		$372,176		
Total Conceptual Cost Estimate		**$7,671,620**		

Additional Comments

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Metropolitan Water Reclamation District of Greater Chicago
CBBEL_Test Watershed Detailed Watershed Plan
FRCR 12: Total Conceptual Cost Report

Alternative Name	FRCR-12
Problem Description	Farmers and Prairie Creek Overbank Flooding
Strategy	FRCR-1 & FRCR-4 & FRCR-7 & FRCR-8 & FRCR-9
District Minimum Criteria for Funding:	Met
Recommended	Yes

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Inlet structures (Headwall): 42 to 66 inches	each	1	$4,757.50	$4,757.50	$4,424	$0	
Outlet structures (Headwall): 42 to 66 inches	each	1	$4,757.50	$4,757.50	$4,424	$0	
Concrete: Cast in place	yd3	20	$250.00	$5,000.00	$0	$0	
Paving: Asphalt Pavement Installation (24 ft wide, 2 ft C&G, 1 ft Excavation	lf	65	$148.47	$9,650.55	$8,975	$0	
Pipe under pavement (county): 42 to 66 inches / box culvert (15 to 27 ft2)	lf	80	$291.54	$23,323.20	$21,690	$0	
Pipe in earth (county): 42 to 66 inches / box culvert (15-27 ft2)	lf	360	$208.24	$74,966.40	$69,718	$0	
Embankment construction, grading and restoration: Compaction of fill	yd3	270	$5.34	$1,441.80	$0	$0	
Demolition: Brick, concrete, or stone construction	ft2	1600	$4.27	$6,832.00	$0	$0	
Channel treatment: Vegetative cover only	yd2	5600	$8.54	$47,824.00	$44,476	$11,452	
Channel treatment: Material to be hauled offsite	yd3	20470	$11.75	$240,522.50	$0	$0	
Channel treatment: Excavation	yd3	20740	$10.68	$221,503.20	$0	$0	
Land Acquisition: Permanent Easement *	dollar	375000	$1.00	$375,000.00	$0	$0	
Land Acquisition: Temporary Easement *	dollar	62000	$1.00	$62,000.00	$0	$0	
Pump Station: Small Pump Station with Flap Gate	each	1	$650,000.00	$650,000.00	$362,694	$0	
Concrete: Cast in place	yd3	20	$250.00	$5,000.00	$0	$0	
Demolition: Brick, concrete, or stone construction	ft2	29403	$4.27	$125,550.81	$0	$0	
Inlet structures (Headwall): 42 to 66 inches	each	1	$4,757.50	$4,757.50	$4,424	$0	
Outlet structures (Headwall): 42 to 66 inches	each	1	$4,757.50	$4,757.50	$4,424	$0	
Paving: Asphalt Pavement Installation (24 ft wide, 2 ft C&G, 1 ft Excavation	lf	1225	$148.47	$181,875.75	$169,142	$0	
Pipe under pavement (county): 42 to 66 inches / box culvert (15 to 27 ft2)	lf	1000	$291.54	$291,540.00	$271,128	$0	
Embankment construction, grading and restoration: Compaction of fill	yd3	2800	$5.34	$14,952.00	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	2800	$11.75	$32,900.00	$0	$0	
Channel treatment: Excavation	yd3	5600	$10.68	$59,808.00	$0	$0	
Land Acquisition: Temporary Easement *	dollar	5000	$1.00	$5,000.00	$0	$0	
Pipe under pavement (county): 72 to 84 inches / box culvert (28 to 38 ft2)	lf	3200	$608.70	$1,947,840.00	$1,811,461	$0	
Concrete: Cast in place	yd3	40	$250.00	$10,000.00	$0	$0	
Demolition: Brick, concrete, or stone construction	ft2	2100	$4.27	$8,967.00	$0	$0	

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Alternative Name	FRCR-12
Problem Description	Farmers and Prairie Creek Overbank Flooding
Strategy	FRCR-1 & FRCR-4 & FRCR-7 & FRCR-8 & FRCR-9
District Minimum Criteria for Funding:	Met
Recommended	Yes

	Unit	**Quantity**	**Unit Cost**	**Base Cost**	**Maint. Cost**	**Replacement Cost**	**Notes/Issues**
Paving: Asphalt Pavement Installation (24 ft wide, 2 ft C&G, 1 ft Excavation	lf	50	$148.47	$7,423.50	$6,904	$0	
Pipe under pavement (county): 90 to 96 inches / box culvert (39 to 50 ft2)	lf	164	$661.03	$108,408.92	$100,819	$0	
Channel treatment: Soil stabilization and vegetative cover	yd2	350	$13.88	$4,858.00	$4,518	$1,163	
Channel treatment: Excavation	yd3	65	$10.68	$694.20	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	65	$11.75	$763.75	$0	$0	
Concrete: Cast in place	yd3	15	$250.00	$3,750.00	$0	$0	
Demolition: Brick, concrete, or stone construction	ft2	720	$4.27	$3,074.40	$0	$0	
Demolition: Brick, concrete, or stone construction	ft2	50	$4.27	$213.50	$0	$0	
Pipe under pavement (county): 90 to 96 inches / box culvert (39 to 50 ft2)	lf	14	$661.03	$9,254.42	$8,606	$0	
Paving: Asphalt Pavement Installation (24 ft wide, 2 ft C&G, 1 ft Excavation	lf	14	$148.47	$2,078.58	$1,933	$0	
Demolition: Brick, concrete, or stone construction	ft2	6736	$4.27	$28,762.72	$0	$0	
Demolition: Metal construction	ft2	2500	$2.14	$5,350.00	$0	$0	
Channel treatment: Excavation	yd3	2000	$10.68	$21,360.00	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	1500	$11.75	$17,625.00	$0	$0	
Embankment construction, grading and restoration: Compaction of fill	yd3	500	$5.34	$2,670.00	$0	$0	
Paving: Asphalt Pavement Installation (24 ft wide, 2 ft C&G, 1 ft Excavation	lf	503	$148.47	$74,680.41	$69,452	$0	
Pipe under pavement (county): Box culvert (51 to 60 ft2)	lf	1000	$661.03	$661,030.00	$614,748	$0	
Land Acquisition: Temporary Easement *	dollar	8200	$1.00	$8,200.00	$0	$0	
Channel treatment: Soil stabilization and vegetative cover	yd2	363	$13.88	$5,038.44	$4,686	$1,206	
Channel treatment: Excavation	yd3	500	$10.68	$5,340.00	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	500	$11.75	$5,875.00	$0	$0	
Demolition: Brick, concrete, or stone construction	ft2	2272	$4.27	$9,701.44	$0	$0	
Paving: Asphalt Pavement Installation (24 ft wide, 2 ft C&G, 1 ft Excavation	lf	58	$148.47	$8,611.26	$8,008	$0	
Demolition: Metal construction	ft2	180	$2.14	$385.20	$0	$0	
Demolition: Brick, concrete, or stone construction	ft2	1440	$4.27	$6,148.80	$0	$0	
Paving: Asphalt Pavement Installation (24 ft wide, 2 ft C&G, 1 ft Excavation	lf	50	$148.47	$7,423.50	$6,904	$0	
Demolition: Brick, concrete, or stone construction	ft2	9280	$4.27	$39,625.60	$0	$0	
Channel treatment: Soil stabilization and vegetative cover	yd2	6450	$13.88	$89,526.00	$83,258	$21,437	
Channel treatment: Excavation	yd3	1000	$10.68	$10,680.00	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	1000	$11.75	$11,750.00	$0	$0	

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Alternative Name FRCR-12

Problem Description Farmers and Prairie Creek Overbank Flooding

Strategy FRCR-1 & FRCR-4 & FRCR-7 & FRCR-8 & FRCR-9

District Minimum Criteria for Funding: Met

Recommended Yes

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Land Acquisition: Temporary Easement *	dollar	1500	$1.00	$1,500.00	$0	$0	
Land Acquisition: Purchase of Property *	dollar	40000	$1.00	$40,000.00	$0	$0	
Inlet structures (Headwall): 42 to 66 inches	each	2	$4,757.50	$9,515.00	$8,849	$0	
Outlet structures (Headwall): 42 to 66 inches	each	2	$4,757.50	$9,515.00	$8,849	$0	
Pipe in earth (county): 42 to 66 inches / box culvert (15-27 ft2)	lf	1000	$208.24	$208,240.00	$193,660	$0	
Embankment construction, grading and restoration: Compaction of fill	yd3	500	$5.34	$2,670.00	$0	$0	
Channel treatment: Vegetative cover only	yd2	1000	$8.54	$8,540.00	$7,942	$2,045	
Channel treatment: Material to be hauled offsite	yd3	1000	$11.75	$11,750.00	$0	$0	
Channel treatment: Excavation	yd3	2000	$10.68	$21,360.00	$0	$0	
Pump Station: 10ac-ft per day interior drainage	each	1	$800,000.00	$800,000.00	$743,988	$0	
Inlet structures (Headwall): 36 inches or less	each	1	$2,600.34	$2,600.34	$2,418	$0	
Outlet structures (Headwall): 36 inches or less	each	1	$2,600.34	$2,600.34	$2,418	$0	
Pipe in earth (county): 36 inches or less	lf	500	$216.78	$108,390.00	$100,801	$0	
Land Acquisition: Temporary Easement *	dollar	25000	$1.00	$25,000.00	$0	$0	
Land Acquisition: Permanent Easement *	dollar	275000	$1.00	$275,000.00	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	90000	$11.75	1,057,500.00	$0	$0	
Channel treatment: Excavation	yd3	90000	$10.68	$961,200.00	$0	$0	
Concrete: Cast in place	yd3	50	$250.00	$12,500.00	$0	$0	
Channel treatment: Dumped rock	yd3	621	$67.28	$41,780.88	$38,856	$10,005	
Channel treatment: Reinforced one sided concrete wall	yd3	231	$587.35	$135,677.85	$126,178	$32,488	
Channel treatment: Excavation	yd3	367	$10.68	$3,919.56	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	367	$11.75	$4,312.25	$0	$0	
Land Acquisition: Permanent Easement *	dollar	25563	$1.00	$25,563.00	$0	$0	
Land Acquisition: Temporary Easement *	dollar	5113	$1.00	$5,113.00	$0	$0	

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Alternative Name	FRCR-12
Problem Description	Farmers and Prairie Creek Overbank Flooding
Strategy	FRCR-1 & FRCR-4 & FRCR-7 & FRCR-8 & FRCR-9
District Minimum Criteria for Funding:	Met
Recommended	Yes

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)							
Subtotal (direct costs)				**$8,532,701**	**$4,920,774**	**$79,796**	
Utility Relocation			4 %	$341,308			
Mobilization \ General Conditions			5%	$426,635			
Subtotal with Percent Allowances				**$9,300,644**			
Contingency			30%	$2,790,193			
Profit			5%	$604,542			
Probable Construction Cost Estimate				**$12,695,379**			
Design Engineering, Geotechnical, and Construction Management			10%	$1,269,538			
Property Acquisition Cost:				$822,376			
Total Conceptual Cost Estimate				**$19,787,864**			

Additional Comments

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Metropolitan Water Reclamation District of Greater Chicago
LDPR Watershed Detailed Watershed Plan
FHDT 1: Total Conceptual Cost Report

Alternative Name FHDT1

Problem Description River Road Flooding
Strategy Raise River Road
District Minimum Criteria for Funding: Met
Recommended No

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Channel treatment: Soil stabilization and vegetative cover	yd2	11250	$13.88	$156,150.00	$145,217	$37,391	
Channel treatment: Vegetative cover only	yd2	11250	$8.54	$96,075.00	$89,348	$23,005	
Channel treatment: Dumped rock	yd3	6000	$67.28	$403,680.00	$375,416	$96,662	
Concrete: Cast in place	yd3	800	$250.00	$200,000.00	$0	$0	
Demolition: Brick, concrete, or stone construction	ft2	45200	$4.27	$193,004.00	$0	$0	
Embankment construction, grading and restoration: Additional fill	yd3	3200	$13.88	$44,416.00	$0	$0	
Embankment construction, grading and restoration: Compaction of fill	yd3	3200	$5.34	$17,088.00	$0	$0	
Inlet structures (Headwall): 36 inches or less	each	10	$2,600.34	$26,003.40	$24,183	$0	
Outlet structures (Headwall): 42 to 66 inches	each	2	$4,757.50	$9,515.00	$8,849	$0	
Pipe under pavement (county): 36 inches or less	lf	750	$415.41	$311,557.50	$289,744	$0	
Pipe under pavement (county): Box culvert (51 to 60 ft2)	lf	120	$661.03	$79,323.60	$73,770	$0	

* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)

Subtotal (direct costs)		**$1,536,813**	**$1,006,527**	**$157,058**
Utility Relocation	4 %	$61,473		
Mobilization \ General Conditions	5%	$76,841		
Subtotal with Percent Allowances		**$1,675,126**		
Contingency	30%	$502,538		
Profit	5%	$108,883		
Probable Construction Cost Estimate		**$2,286,546**		
Design Engineering, Geotechnical, and Construction Management	10%	$228,655		
Property Acquisition Cost:		$0		
Total Conceptual Cost Estimate		**$3,678,786**		

Additional Comments

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Metropolitan Water Reclamation District of Greater Chicago
LDPR Watershed Detailed Watershed Plan
FHDT 2: Total Conceptual Cost Report

Alternative Name FHDT2

Problem Description RIver Road and residential flooding

Strategy Floodwal east of River Road with 2' freeboard, 200 cfs pump station

District Minimum Criteria for Funding: Met

Recommended Yes

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Channel treatment: Reinforced one sided concrete wall	yd3	663	$587.35	$389,413.05	$362,148	$93,246	
Channel treatment: Material to be hauled offsite	yd3	663	$11.75	$7,790.25	$0	$0	
Channel treatment: Soil stabilization and vegetative cover	yd2	12556	$13.88	$174,277.28	$162,075	$41,731	
Channel treatment: Excavation	yd3	10547	$10.68	$112,641.96	$0	$0	
Channel treatment: Sheet piling	yd2	628	$303.28	$190,459.84	$0	$45,606	
Pump Station: 200 cfs Pump Station with Flap Gate	each	1	$2,900,000.00	$2,900,000.00	$1,618,173	$0	
Pipe in earth (county): 36 inches or less	lf	100	$216.78	$21,678.00	$20,160	$0	
Land Acquisition: Purchase of Property *	dollar	8322	$1.00	$8,322.00	$0	$0	
Land Acquisition: Temporary Easement *	dollar	5642	$1.00	$5,642.00	$0	$0	

* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)

Subtotal (direct costs)		**$3,796,260**	**$2,162,557**	**$180,583**
Utility Relocation	4 %	$151,850		
Mobilization \ General Conditions	5%	$189,813		
Subtotal with Percent Allowances		**$4,137,924**		
Contingency	30%	$1,241,377		
Profit	5%	$268,965		
Probable Construction Cost Estimate		**$5,648,266**		
Design Engineering, Geotechnical, and Construction Management	10%	$564,827		
Property Acquisition Cost:		$13,964		
Total Conceptual Cost Estimate		**$8,570,197**		

Additional Comments

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Metropolitan Water Reclamation District of Greater Chicago
CBBEL_Test Watershed Detailed Watershed Plan
FGCR-1 Total Conceptual Cost Report

Alternative Name	FGCR-1
Problem Description	Flagg Creek Overbank Flooding
Strategy	- Add and optimize storage in Spring Rock Park Cut to 633
District Minimum Criteria for Funding:	Met
Recommended	Yes

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Channel treatment: Soil stabilization and vegetative cover	yd2	40000	$13.88	$555,200.00	$516,328	$132,944	$12 (IDOT-2005) $13 (CHICAGO-2006) $8 (IDOT-2005)
Channel treatment: Excavation	yd3	73550	$10.68	$785,514.00	$0	$0	$10 (MEANS-Heavy-2006) 02315-462
Channel treatment: Material to be hauled offsite	yd3	73550	$11.75	$864,212.50	$0	$0	$11 (MEANS-Heavy-2006) 02315-490
Concrete: Cast in place	yd3	25	$250.00	$6,250.00	$0	$0	
Inlet structures (Headwall): 36 inches or less	each	1	$2,600.34	$2,600.34	$2,418	$0	$2435 (MEANS-Heavy-2006) G3030-310-2000
Outlet structures (Headwall): 36 inches or less	each	1	$2,600.34	$2,600.34	$2,418	$0	$2435 (MEANS-Heavy-2006) G3030-310-2000
Pipe in earth (county): 36 inches or less	lf	985	$216.78	$213,528.30	$198,578	$0	Same as City
Land Acquisition: Permanent Easement *	dollar	1400000	$1.00	1,400,000.00	$0	$0	

* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)

Subtotal (direct costs)		**$2,429,905**	**$719,742**	**$132,944**
Utility Relocation	4 %	$97,196		
Mobilization \ General Conditions	5%	$121,495		
Subtotal with Percent Allowances		**$2,648,597**		
Contingency	30%	$794,579		
Profit	5%	$172,159		
Probable Construction Cost Estimate		**$3,615,335**		
Design Engineering, Geotechnical, and Construction Management	10%	$361,533		
Property Acquisition Cost:		$1,400,000		
Total Conceptual Cost Estimate		**$6,229,554**		

Additional Comments

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Metropolitan Water Reclamation District of Greater Chicago
CBBEL_Test Watershed Detailed Watershed Plan
FGCR-2 Total Conceptual Cost Report

Alternative Name FGCR-2

Problem Description Flagg Creek Overbank Flooding

Strategy Floodwall 1 to be constructed to 638.6

District Minimum Criteria for Funding: Met

Recommended Yes

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Channel treatment: Reinforced one sided concrete wall	yd3	414	$587.35	$242,880.97	$225,876	$58,158	
Channel treatment: Material to be hauled offsite	yd3	414	$11.75	$4,858.86	$0	$0	
Channel treatment: Soil stabilization and vegetative cover	yd2	8556	$13.88	$118,751.17	$110,437	$28,435	
Channel treatment: Excavation	yd3	5932	$10.68	$63,352.16	$0	$0	
Channel treatment: Sheet piling	yd2	856	$303.28	$259,474.24	$0	$62,132	
Pump Station: 10ac-ft per day interior drainage	each	0	$800,000.00	$0.00	$0	$0	
Pump Station: Small Pump Station with Flap Gate	each	1	$650,000.00	$650,000.00	$362,694	$0	
Pipe in earth (county): 36 inches or less	lf	10	$216.78	$2,167.80	$2,016	$0	
Outlet structures (Headwall): 36 inches or less	each	1	$2,600.34	$2,600.34	$2,418	$0	
Channel treatment: Reinforced one sided concrete wall	yd3	375	$587.35	$220,438.33	$205,004	$52,785	
Channel treatment: Material to be hauled offsite	yd3	375	$11.75	$4,409.89	$0	$0	
Channel treatment: Soil stabilization and vegetative cover	yd2	7111	$13.88	$98,702.21	$91,792	$23,635	
Channel treatment: Excavation	yd3	5973	$10.68	$63,795.16	$0	$0	
Channel treatment: Sheet piling	yd2	711	$303.28	$215,665.44	$0	$51,642	
Pump Station: 10ac-ft per day interior drainage	each	0	$800,000.00	$0.00	$0	$0	
Pipe in earth (county): 36 inches or less	lf	10	$216.78	$2,167.80	$2,016	$0	
Outlet structures (Headwall): 36 inches or less	each	1	$2,600.34	$2,600.34	$2,418	$0	
Pump Station: Small Pump Station with Flap Gate	each	1	$650,000.00	$650,000.00	$362,694	$0	
Channel treatment: Excavation	yd3	7825	$10.68	$83,571.00	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	7825	$11.75	$91,943.75	$0	$0	
Channel treatment: Reinforced one sided concrete wall	yd3	588	$587.35	$345,397.04	$321,214	$82,706	
Channel treatment: Material to be hauled offsite	yd3	588	$11.75	$6,909.71	$0	$0	
Channel treatment: Soil stabilization and vegetative cover	yd2	12167	$13.88	$168,873.38	$157,050	$40,437	
Channel treatment: Excavation	yd3	8436	$10.68	$90,091.78	$0	$0	
Channel treatment: Sheet piling	yd2	1217	$303.28	$368,991.68	$0	$88,356	
Pump Station: 10ac-ft per day interior drainage	each	1	$800,000.00	$800,000.00	$743,988	$0	
Pipe in earth (county): 36 inches or less	lf	10	$216.78	$2,167.80	$2,016	$0	
Outlet structures (Headwall): 36 inches or less	each	1	$2,600.34	$2,600.34	$2,418	$0	

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Alternative Name	FGCR-2
Problem Description	Flagg Creek Overbank Flooding
Strategy	Floodwall 1 to be constructed to 638.6
District Minimum Criteria for Funding:	Met
Recommended	Yes

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Land Acquisition: Permanent Easement *	dollar	10000	$1.00	$10,000.00	$0	$0	
Land Acquisition: Temporary Easement *	dollar	4000	$1.00	$4,000.00	$0	$0	

* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)

Subtotal (direct costs)		**$4,562,411**	**$2,594,051**	**$488,286**
Utility Relocation	4 %	$182,496		
Mobilization \ General Conditions	5%	$228,121		
Subtotal with Percent Allowances		**$4,973,028**		
Contingency	30%	$1,491,908		
Profit	5%	$323,247		
Probable Construction Cost Estimate		**$6,788,183**		
Design Engineering, Geotechnical, and Construction Management	10%	$678,818		
Property Acquisition Cost:		$14,000		
Total Conceptual Cost Estimate		**$10,563,338**		

Additional Comments

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Metropolitan Water Reclamation District of Greater Chicago
CBBEL_Test Watershed Detailed Watershed Plan
FGCR-3 Total Conceptual Cost Report

Alternative Name FGCR-3

Problem Description Flagg Creek Overbank Flooding

Strategy - Channel Improvements (not needed if FGCR-1 & 59DT-1 are selected)

District Minimum Criteria for Funding: Met

Recommended Yes

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Channel treatment: Reinforced one sided concrete wall	yd3	454	$587.35	$266,539.43	$247,878	$63,824	
Channel treatment: Material to be hauled offsite	yd3	454	$11.75	$5,332.15	$0	$0	
Channel treatment: Soil stabilization and vegetative cover	yd2	9389	$13.88	$130,317.79	$121,194	$31,205	
Channel treatment: Excavation	yd3	6510	$10.68	$69,522.85	$0	$0	
Channel treatment: Sheet piling	yd2	939	$303.28	$284,746.56	$0	$68,183	
Pump Station: Small Pump Station with Flap Gate	each	1	$650,000.00	$650,000.00	$362,694	$0	
Pipe in earth (county): 36 inches or less	lf	10	$216.78	$2,167.80	$2,016	$0	
Outlet structures (Headwall): 36 inches or less	each	1	$2,600.34	$2,600.34	$2,418	$0	
Channel treatment: Excavation	yd3	9535	$10.68	$101,833.80	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	9535	$11.75	$112,036.25	$0	$0	
Land Acquisition: Temporary Easement *	dollar	25000	$1.00	$25,000.00	$0	$0	
Land Acquisition: Permanent Easement *	dollar	105000	$1.00	$105,000.00	$0	$0	

* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)

Subtotal (direct costs)		**$1,625,097**	**$736,199**	**$163,212**
Utility Relocation	4 %	$65,004		
Mobilization \ General Conditions	5%	$81,255		
Subtotal with Percent Allowances		**$1,771,356**		
Contingency	30%	$531,407		
Profit	5%	$115,138		
Probable Construction Cost Estimate		**$2,417,901**		
Design Engineering, Geotechnical, and Construction Management	10%	$241,790		
Property Acquisition Cost:		$130,000		
Total Conceptual Cost Estimate		**$3,689,102**		

Additional Comments

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Metropolitan Water Reclamation District of Greater Chicago
CBBEL_Test Watershed Detailed Watershed Plan
FGCR-4 Total Conceptual Cost Report

Alternative Name	FGCR-4
Problem Description	Flagg Creek Overbank Flooding
Strategy	- Remove/replace ped entrance
District Minimum Criteria for Funding:	Met
Recommended	Yes

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Demolition: Brick, concrete, or stone construction	ft2	1200	$4.27	$5,124.00	$0	$0	
Demolition: Brick, concrete, or stone construction	ft2	760	$4.27	$3,245.20	$0	$0	
Concrete: Cast in place	yd3	1600	$250.00	$400,000.00	$0	$0	
Land Acquisition: Purchase of Property *	dollar	0	$1.00	$0.00	$0	$0	

* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)

Subtotal (direct costs)		**$408,369**	**$0**	**$0**
Utility Relocation	4 %	$16,335		
Mobilization \ General Conditions	5%	$20,418		
Subtotal with Percent Allowances		**$445,122**		
Contingency	30%	$133,537		
Profit	5%	$28,933		
Probable Construction Cost Estimate		**$607,592**		
Design Engineering, Geotechnical, and Construction Management	10%	$60,759		
Property Acquisition Cost:		$0		
Total Conceptual Cost Estimate		**$668,351**		

Additional Comments

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Metropolitan Water Reclamation District of Greater Chicago
CBBEL_Test Watershed Detailed Watershed Plan
FGCR-5 Total Conceptual Cost Report

Alternative Name	FGCR-5
Problem Description	Flagg Creek Overbank Flooding
Strategy	Raise roadway west of structure to 602.07 for 0.5ft FB
District Minimum Criteria for Funding:	Met
Recommended	Yes

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Channel treatment: Soil stabilization and vegetative cover	yd2	2000	$13.88	$27,760.00	$25,816	$6,647	$12 (IDOT-2005) $13 (CHICAGO-2006) $8 (IDOT-2005)
Demolition: Brick, concrete, or stone construction	ft2	4000	$4.27	$17,080.00	$0	$0	$4 (MEANS-Heavy-2006) 02220-130-0240, 02220-240-1200 & 1400
Embankment construction, grading and restoration: Additional fill	yd3	2255	$13.88	$31,299.40	$0	$0	$12 (IDOT-2005)
Embankment construction, grading and restoration: Compaction of fill	yd3	2255	$5.34	$12,041.70	$0	$0	$5 (MEANS-Heavy-2006) 02315-310-Average
Embankment construction, grading and restoration: Material hauled from offsite	yd3	995	$10.68	$10,626.60	$0	$0	$10 (MEANS-Heavy-2006) 02315-490-Average
Paving: Asphalt Pavement Installation (24 ft wide, 2 ft C&G, 1 ft Excavation	lf	515	$148.47	$76,462.05	$71,109	$0	MD E-mail 7/1882008
Channel treatment: Excavation	yd3	1260	$10.68	$13,456.80	$0	$0	
Pipe under pavement (county): 90 to 96 inches / box culvert (39 to 50 ft2)	lf	1200	$661.03	$793,236.00	$737,697	$0	
Land Acquisition: Permanent Easement *	dollar	6000	$1.00	$6,000.00	$0	$0	
Land Acquisition: Temporary Easement *	dollar	1000	$1.00	$1,000.00	$0	$0	

* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)

Subtotal (direct costs)		**$981,963**	**$834,622**	**$6,647**
Utility Relocation	4 %	$39,279		
Mobilization \ General Conditions	5%	$49,098		
Subtotal with Percent Allowances		**$1,070,339**		
Contingency	30%	$321,102		
Profit	5%	$69,572		
Probable Construction Cost Estimate		**$1,461,013**		
Design Engineering, Geotechnical, and Construction Management	10%	$146,101		
Property Acquisition Cost:		$7,000		
Total Conceptual Cost Estimate		**$2,455,384**		

Additional Comments

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Metropolitan Water Reclamation District of Greater Chicago
CBBEL_Test Watershed Detailed Watershed Plan
FGTB-1 Total Conceptual Cost Report

Alternative Name FGTB-1

Problem Description Flagg Creek Tributary B Overbank Flooding

Strategy - New outfall channel for Trib B 3ft exc, 15ft BW, 27ft TW

District Minimum Criteria for Funding: Met

Recommended Yes

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Concrete: Cast in place	yd3	5	$250.00	$1,250.00	$0	$0	
Channel treatment: Vegetative cover only	yd2	2250	$8.54	$19,215.00	$17,870	$4,601	
Channel treatment: Excavation	yd3	1750	$10.68	$18,690.00	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	1750	$11.75	$20,562.50	$0	$0	
Concrete: Cast in place	yd3	400	$250.00	$100,000.00	$0	$0	
Paving: Asphalt Pavement Installation (24 ft wide, 2 ft C&G, 1 ft Excavation	lf	10	$148.47	$1,484.70	$1,381	$0	
Demolition: Brick, concrete, or stone construction	ft2	1040	$4.27	$4,440.80	$0	$0	
Channel treatment: Excavation	yd3	62	$10.68	$662.16	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	47	$11.75	$552.25	$0	$0	
Embankment construction, grading and restoration: Compaction of fill	yd3	15	$5.34	$80.10	$0	$0	
Demolition: Brick, concrete, or stone construction	ft2	480	$4.27	$2,049.60	$0	$0	
Inlet structures (Headwall): 42 to 66 inches	each	2	$4,757.50	$9,515.00	$8,849	$0	
Outlet structures (Headwall): 42 to 66 inches	each	2	$4,757.50	$9,515.00	$8,849	$0	
Pipe under pavement (county): 42 to 66 inches / box culvert (15 to 27 ft2)	lf	100	$291.54	$29,154.00	$27,113	$0	
Paving: Asphalt Pavement Installation (24 ft wide, 2 ft C&G, 1 ft Excavation	lf	20	$148.47	$2,969.40	$2,762	$0	
Land Acquisition: Purchase of Property *	dollar	220000	$1.00	$220,000.00	$0	$0	
Land Acquisition: Temporary Easement *	dollar	4000	$1.00	$4,000.00	$0	$0	
Land Acquisition: Permanent Easement *	dollar	160000	$1.00	$160,000.00	$0	$0	

* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)

Subtotal (direct costs)		**$220,141**	**$66,822**	**$4,601**
Utility Relocation	4 %	$8,806		
Mobilization \ General Conditions	5%	$11,007		
Subtotal with Percent Allowances		**$239,953**		
Contingency	30%	$71,986		
Profit	5%	$15,597		
Probable Construction Cost Estimate		**$327,536**		
Design Engineering, Geotechnical, and Construction Management	10%	$32,754		
Property Acquisition Cost:		$384,000		
Total Conceptual Cost Estimate		**$815,713**		

Additional Comments

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Metropolitan Water Reclamation District of Greater Chicago
CBBEL_Test Watershed Detailed Watershed Plan
59DT-1 Total Conceptual Cost Report

Alternative Name	59DT-1
Problem Description	59th Street Ditch Overbank Flooding
Strategy	- Earthen Berm to 659.55: 3ft freeboard (WSEL=656.55)
District Minimum Criteria for Funding:	Met
Recommended	Yes

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Channel treatment: Excavation	yd3	40	$10.68	$427.20	$0	$0	
Concrete: Cast in place	yd3	25	$250.00	$6,250.00	$0	$0	
Embankment construction, grading and restoration: Additional fill	yd3	40	$13.88	$555.20	$0	$0	
Embankment construction, grading and restoration: Compaction of fill	yd3	850	$5.34	$4,539.00	$0	$0	
Embankment construction, grading and restoration: Material hauled from offsite	yd3	810	$10.68	$8,650.80	$0	$0	
Channel treatment: Vegetative cover only	yd2	1750	$8.54	$14,945.00	$13,899	$3,579	
Land Acquisition: Permanent Easement *	dollar	850000	$1.00	$850,000.00	$0	$0	
Land Acquisition: Temporary Easement *	dollar	44000	$1.00	$44,000.00	$0	$0	

* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)

Subtotal (direct costs)		**$35,367**	**$13,899**	**$3,579**
Utility Relocation	4 %	$1,415		
Mobilization \ General Conditions	5%	$1,768		
Subtotal with Percent Allowances		**$38,550**		
Contingency	30%	$11,565		
Profit	5%	$2,506		
Probable Construction Cost Estimate		**$52,621**		
Design Engineering, Geotechnical, and Construction Management	10%	$5,262		
Property Acquisition Cost:		$894,000		
Total Conceptual Cost Estimate		**$969,361**		

Additional Comments

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Metropolitan Water Reclamation District of Greater Chicago
LDPR Watershed Detailed Watershed Plan
GCTR 1: Total Conceptual Cost Report

Alternative Name	GCTR-1
Problem Description	DPR Mainstream backwatr
Strategy	Floodwall and pump station
District Minimum Criteria for Funding:	Met
Recommended	Yes

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Channel treatment: Reinforced one sided concrete wall	yd3	946	$587.35	$555,633.10	$516,730	$133,048	
Channel treatment: Material to be hauled offsite	yd3	946	$11.75	$11,115.50	$0	$0	
Pipe in earth (county): 36 inches or less	lf	1400	$216.78	$303,492.00	$282,243	$0	
Outlet structures (Headwall): 36 inches or less	each	1	$2,600.34	$2,600.34	$2,418	$0	
Land Acquisition: Purchase of Property *	dollar	26250	$1.00	$26,250.00	$0	$0	
Land Acquisition: Temporary Easement *	dollar	30555	$1.00	$30,555.00	$0	$0	
Land Acquisition: Permanent Easement *	dollar	7290	$1.00	$7,290.00	$0	$0	
Paving: Asphalt Pavement Installation (24 ft wide, 2 ft C&G, 1 ft Excavation	lf	1700	$148.47	$252,399.00	$234,727	$0	
Pipe in earth (county): 36 inches or less	lf	400	$216.78	$86,712.00	$80,641	$0	
Pipe under pavement (county): 36 inches or less	lf	1700	$415.41	$706,197.00	$656,752	$0	
Pump Station: 300 cfs Pump Station with Flap Gate	each	1	$3,970,000.00	3,970,000.00	$2,215,224	$0	
Channel treatment: Soil stabilization and vegetative cover	yd2	21556	$13.88	$299,191.73	$278,244	$71,642	
Channel treatment: Excavation	yd3	12071	$10.68	$128,919.35	$0	$0	
Channel treatment: Sheet piling	yd2	1078	$303.28	$326,875.18	$0	$78,271	

* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)

Subtotal (direct costs)		**$6,643,135**	**$4,266,979**	**$282,961**
Utility Relocation	4 %	$265,725		
Mobilization \ General Conditions	5%	$332,157		
Subtotal with Percent Allowances		**$7,241,017**		
Contingency	30%	$2,172,305		
Profit	5%	$470,666		
Probable Construction Cost Estimate		**$9,883,989**		
Design Engineering, Geotechnical, and Construction Management	10%	$988,399		
Property Acquisition Cost:		$64,095		
Total Conceptual Cost Estimate		**$15,486,423**		

Additional Comments

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Metropolitan Water Reclamation District of Greater Chicago
LDPR Watershed Detailed Watershed Plan
HGCR 1: Total Conceptual Cost Report

Alternative Name	HGCR-1
Problem Description	Degrading weir and streambank erosion on Higgins Creek
Strategy	Weir rehabilitation and bank stabilization
District Minimum Criteria for Funding:	Met
Recommended	Yes

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Channel treatment: Dumped rock	yd3	55	$67.28	$3,700.40	$3,441	$886	
Channel treatment: Reinforced one sided concrete wall	yd3	235	$587.35	$138,027.25	$128,363	$33,051	
Channel treatment: Material to be hauled offsite	yd3	13500	$11.75	$158,625.00	$0	$0	
Land Acquisition: Temporary Easement *	dollar	7013	$1.00	$7,013.00	$0	$0	
Demolition: Brick, concrete, or stone construction	ft2	6000	$4.27	$25,620.00	$0	$0	
Channel treatment: Reinforced trapezoidal concrete channel	yd3	10	$587.35	$5,932.24	$5,517	$0	
Channel treatment: Excavation	yd3	185	$10.68	$1,977.94	$0	$0	
Concrete: Cast in place	yd3	93	$250.00	$23,150.00	$0	$0	

* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)

Subtotal (direct costs)		**$357,033**	**$137,321**	**$33,937**
Utility Relocation	4 %	$14,281		
Mobilization \ General Conditions	5%	$17,852		
Subtotal with Percent Allowances		**$389,166**		
Contingency	30%	$116,750		
Profit	5%	$25,296		
Probable Construction Cost Estimate		**$531,211**		
Design Engineering, Geotechnical, and Construction Management	10%	$53,121		
Property Acquisition Cost:		$7,013		
Total Conceptual Cost Estimate		**$762,604**		

Additional Comments

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Metropolitan Water Reclamation District of Greater Chicago
LDPR Watershed Detailed Watershed Plan
MDCR 2: Total Conceptual Cost Report

Alternative Name	MDCR2
Problem Description	Overbank flooding south of Camp McDonald Road
Strategy	Floodwalls/Channel improvements/ Flood storage
District Minimum Criteria for Funding:	Met
Recommended	Yes

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Channel treatment: Dumped riprap	yd3	25	$67.28	$1,682.00	$1,564	$403	
Channel treatment: Reinforced one sided concrete wall	yd3	2222	$587.35	1,305,091.70	$1,213,715	$312,508	
Channel treatment: Sheet piling	yd2	4597	$303.28	1,394,178.16	$0	$333,840	
Channel treatment: Soil stabilization and vegetative cover	yd2	45967	$13.88	$638,021.96	$593,351	$152,776	
Channel treatment: Soil stabilization and vegetative cover	yd2	10450	$13.88	$145,046.00	$134,891	$34,732	
Channel treatment: Soil stabilization and vegetative cover	yd2	5115	$13.88	$70,996.20	$66,025	$17,000	
Channel treatment: Vegetative cover only	yd2	14470	$8.54	$123,573.80	$114,922	$29,590	
Channel treatment: Excavation	yd3	31870	$10.68	$340,371.60	$0	$0	
Channel treatment: Excavation	yd3	4777	$10.68	$51,018.36	$0	$0	
Channel treatment: Excavation	yd3	32270	$10.68	$344,643.60	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	2222	$11.75	$26,108.50	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	4777	$11.75	$56,129.75	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	32270	$11.75	$379,172.50	$0	$0	
Inlet structures (Headwall): 36 inches or less	each	1	$2,600.34	$2,600.34	$2,418	$0	
Outlet structures (Headwall): 36 inches or less	each	2	$2,600.34	$5,200.68	$4,837	$0	
Outlet structures (Headwall): 36 inches or less	each	1	$2,600.34	$2,600.34	$2,418	$0	
Pipe in earth (county): 36 inches or less	lf	100	$216.78	$21,678.00	$20,160	$0	
Pipe in earth (county): 36 inches or less	lf	50	$216.78	$10,839.00	$10,080	$0	
maintenance: Small Channel Maintenance (Brush and debris removal)	lf	1045	$5.00	$5,225.00	$4,859	$1,251	
Concrete: Cast in place	yd3	370	$250.00	$92,500.00	$0	$0	
Land Acquisition: Purchase of Property *	dollar	173096	$1.00	$173,096.00	$0	$0	
Land Acquisition: Permanent Easement *	dollar	44290	$1.00	$44,290.00	$0	$0	
Land Acquisition: Temporary Easement *	dollar	39227	$1.00	$39,227.00	$0	$0	
Pump Station: 10ac-ft per day interior drainage	each	2	$800,000.00	1,600,000.00	$1,487,976	$0	

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Alternative Name	MDCR2
Problem Description	Overbank flooding south of Camp McDonald Road
Strategy	Floodwalls/Channel improvements/ Flood storage
District Minimum Criteria for Funding:	Met
Recommended	Yes

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)							
Subtotal (direct costs)				**$6,616,677**	**$3,657,216**	**$882,100**	
Utility Relocation			4 %	$264,667			
Mobilization \ General Conditions			5%	$330,834			
Subtotal with Percent Allowances				**$7,212,178**			
Contingency			30%	$2,163,654			
Profit			5%	$468,792			
Probable Construction Cost Estimate				**$9,844,624**			
Design Engineering, Geotechnical, and Construction Management			10%	$984,462			
Property Acquisition Cost:				$256,613			
Total Conceptual Cost Estimate				**$15,625,015**			

Additional Comments

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Metropolitan Water Reclamation District of Greater Chicago
LDPR Watershed Detailed Watershed Plan
MDCR 3: Total Conceptual Cost Report

Alternative Name MDCR3

Problem Description Overbank flooding along McDonald Creek

Strategy Floodwall

District Minimum Criteria for Funding: Met

Recommended Yes

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Channel treatment: Reinforced one sided concrete wall	yd3	1423	$587.35	$835,799.05	$777,280	$200,134	
Channel treatment: Material to be hauled offsite	yd3	1423	$11.75	$16,720.25	$0	$0	
Channel treatment: Soil stabilization and vegetative cover	yd2	24867	$13.88	$345,153.96	$320,988	$82,648	
Channel treatment: Excavation	yd3	24867	$10.68	$265,579.56	$0	$0	
Channel treatment: Sheet piling	yd2	7460	$303.28	2,262,468.80	$0	$541,754	
Pump Station: 10ac-ft per day interior drainage	each	1	$800,000.00	$800,000.00	$743,988	$0	
Pipe in earth (county): 36 inches or less	lf	100	$216.78	$21,678.00	$20,160	$0	
Outlet structures (Headwall): 36 inches or less	each	2	$2,600.34	$5,200.68	$4,837	$0	
Land Acquisition: Temporary Easement *	dollar	134495	$1.00	$134,495.00	$0	$0	
Land Acquisition: Permanent Easement *	dollar	91110	$1.00	$91,110.00	$0	$0	

* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)

Subtotal (direct costs)		**$4,552,600**	**$1,867,253**	**$824,536**
Utility Relocation	4 %	$182,104		
Mobilization \ General Conditions	5%	$227,630		
Subtotal with Percent Allowances		**$4,962,334**		
Contingency	30%	$1,488,700		
Profit	5%	$322,552		
Probable Construction Cost Estimate		**$6,773,586**		
Design Engineering, Geotechnical, and Construction Management	10%	$677,359		
Property Acquisition Cost:		$225,605		
Total Conceptual Cost Estimate		**$10,368,339**		

Additional Comments

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Metropolitan Water Reclamation District of Greater Chicago
LDPR Watershed Detailed Watershed Plan
MDCR 4: Total Conceptual Cost Report

Alternative Name	MDCR4
Problem Description	Sedimentation along McDonald Creek
Strategy	Sediment removal
District Minimum Criteria for Funding:	Met
Recommended	No

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Channel treatment: Excavation	yd3	792	$10.68	$8,458.56	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	792	$11.75	$9,306.00	$0	$0	
maintenance: Small Channel Maintenance (Brush and debris removal)	lf	2210	$5.00	$11,050.00	$10,276	$2,646	
Land Acquisition: Temporary Easement *	dollar	29676	$1.00	$29,676.00	$0	$0	

* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)

Subtotal (direct costs)		**$28,815**	**$10,276**	**$2,646**
Utility Relocation	4 %	$1,153		
Mobilization \ General Conditions	5%	$1,441		
Subtotal with Percent Allowances		**$31,408**		
Contingency	30%	$9,422		
Profit	5%	$2,042		
Probable Construction Cost Estimate		**$42,872**		
Design Engineering, Geotechnical, and Construction Management	10%	$4,287		
Property Acquisition Cost:		$29,676		
Total Conceptual Cost Estimate		**$89,757**		

Additional Comments

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Metropolitan Water Reclamation District of Greater Chicago
LDPR Watershed Detailed Watershed Plan
MDCR 5: Total Conceptual Cost Report

Alternative Name	MDCR5
Problem Description	Bank erosion around pedestrian bridges
Strategy	Bank stabilization
District Minimum Criteria for Funding:	Met
Recommended	Yes

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Land Acquisition: Temporary Easement *	dollar	1500	$1.00	$1,500.00	$0	$0	
Channel treatment: Dumped rock	yd3	49	$67.28	$3,289.99	$3,060	$788	
Channel treatment: Reinforced one sided concrete wall	yd3	279	$587.35	$164,105.59	$152,616	$39,296	
Channel treatment: Excavation	yd3	55	$10.68	$587.40	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	55	$11.75	$646.25	$0	$0	
Channel treatment: Dumped rock	yd3	13	$67.28	$894.82	$832	$214	
Channel treatment: Reinforced one sided concrete wall	yd3	51	$587.35	$29,954.85	$27,858	$7,173	
Channel treatment: Excavation	yd3	17	$10.68	$181.56	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	17	$11.75	$199.75	$0	$0	
Land Acquisition: Temporary Easement *	dollar	450	$1.00	$450.00	$0	$0	
Channel treatment: Dumped rock	yd3	24	$67.28	$1,641.63	$1,527	$393	
Channel treatment: Reinforced one sided concrete wall	yd3	140	$587.35	$82,052.80	$76,308	$19,648	
Channel treatment: Excavation	yd3	31	$10.68	$331.08	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	31	$11.75	$364.25	$0	$0	
Land Acquisition: Temporary Easement *	dollar	750	$1.00	$750.00	$0	$0	

* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)

Subtotal (direct costs)		**$284,250**	**$262,200**	**$67,512**
Utility Relocation	4 %	$11,370		
Mobilization \ General Conditions	5%	$14,213		
Subtotal with Percent Allowances		**$309,832**		
Contingency	30%	$92,950		
Profit	5%	$20,139		
Probable Construction Cost Estimate		**$422,921**		
Design Engineering, Geotechnical, and Construction Management	10%	$42,292		
Property Acquisition Cost:		$2,700		
Total Conceptual Cost Estimate		**$797,625**		

Additional Comments

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Metropolitan Water Reclamation District of Greater Chicago
LDPR Watershed Detailed Watershed Plan
MTCA 1: Total Conceptual Cost Report

Alternative Name	MCTA1
Problem Description	Road flooding at Hillcret Drive/ Owen Court
Strategy	Culvert improvements/ Road improvements/ Flood storage
District Minimum Criteria for Funding:	Met
Recommended	Yes

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Channel treatment: Soil stabilization and vegetative cover	yd2	2431	$13.88	$33,742.28	$31,380	$8,080	
Channel treatment: Vegetative cover only	yd2	28282	$8.54	$241,528.28	$224,618	$57,835	
Demolition: Brick, concrete, or stone construction	ft2	72744	$4.27	$310,616.88	$0	$0	
Embankment construction, grading and restoration: Additional fill	yd3	148	$13.88	$2,054.24	$0	$0	
Embankment construction, grading and restoration: Compaction of fill	yd3	148	$5.34	$790.32	$0	$0	
Embankment construction, grading and restoration: Compaction of fill	yd3	9473	$5.34	$50,585.82	$0	$0	
Embankment construction, grading and restoration: Material hauled from offsite	yd3	9473	$10.68	$101,171.64	$0	$0	
Channel treatment: Excavation	yd3	70685	$10.68	$754,915.80	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	38263	$11.75	$449,590.25	$0	$0	
Inlet structures (Headwall): 36 inches or less	each	1	$2,600.34	$2,600.34	$2,418	$0	
Inlet structures (Headwall): 36 inches or less	each	3	$2,600.34	$7,801.02	$7,255	$0	
Outlet structures (Headwall): 36 inches or less	each	1	$2,600.34	$2,600.34	$2,418	$0	
Outlet structures (Headwall): 36 inches or less	each	3	$2,600.34	$7,801.02	$7,255	$0	
Pipe in earth (county): 36 inches or less	lf	80	$216.78	$17,342.40	$16,128	$0	
Pipe under pavement (county): 36 inches or less	lf	4320	$415.41	1,794,571.20	$1,668,924	$0	
Paving: Asphalt Pavement Installation (24 ft wide, 2 ft C&G, 1 ft Excavation	lf	2598	$148.47	$385,725.06	$358,718	$0	
Land Acquisition: Purchase of Property *	dollar	231154	$1.00	$231,154.00	$0	$0	
Land Acquisition: Temporary Easement *	dollar	132	$1.00	$132.00	$0	$0	

* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)

Subtotal (direct costs)		**$4,163,437**	**$2,319,114**	**$65,915**
Utility Relocation	4 %	$166,537		
Mobilization \ General Conditions	5%	$208,172		
Subtotal with Percent Allowances		**$4,538,146**		
Contingency	30%	$1,361,444		
Profit	5%	$294,980		
Probable Construction Cost Estimate		**$6,194,570**		
Design Engineering, Geotechnical, and Construction Management	10%	$619,457		
Property Acquisition Cost:		$231,286		
Total Conceptual Cost Estimate		**$9,430,341**		

Additional Comments

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Metropolitan Water Reclamation District of Greater Chicago
LDPR Watershed Detailed Watershed Plan
SLCR 1: Total Conceptual Cost Report

Alternative Name	SLCR1
Problem Description	Overbank Flooding
Strategy	Reservoir
District Minimum Criteria for Funding:	Met
Recommended	No

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Channel treatment: Soil stabilization and vegetative cover	yd2	69920	$13.88	$970,489.60	$902,540	$232,386	
Channel treatment: Excavation	yd3	416250	$10.68	4,445,550.00	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	395437	$11.75	4,646,384.75	$0	$0	
Embankment construction, grading and restoration: Additional fill	yd3	20813	$13.88	$288,884.44	$0	$0	
Embankment construction, grading and restoration: Compaction of fill	yd3	1930	$5.34	$10,306.20	$0	$0	
Land Acquisition: Purchase of Property *	dollar	3078555	$1.00	3,078,555.00	$0	$0	

* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)

Subtotal (direct costs)		**$10,361,615**	**$902,540**	**$232,386**
Utility Relocation	4 %	$414,465		
Mobilization \ General Conditions	5%	$518,081		
Subtotal with Percent Allowances		**$11,294,160**		
Contingency	30%	$3,388,248		
Profit	5%	$734,120		
Probable Construction Cost Estimate		**$15,416,529**		
Design Engineering, Geotechnical, and Construction Management	10%	$1,541,653		
Property Acquisition Cost:		$3,078,555		
Total Conceptual Cost Estimate		**$21,171,663**		

Additional Comments

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Metropolitan Water Reclamation District of Greater Chicago
LDPR Watershed Detailed Watershed Plan
SLCR 2: Total Conceptual Cost Report

Alternative Name	SLCR 2
Problem Description	Overbank Flooding
Strategy	Reservoir
District Minimum Criteria for Funding:	Met
Recommended	Yes

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Channel treatment: Soil stabilization and vegetative cover	yd2	136478	$13.88	1,894,314.64	$1,761,684	$453,599	
Channel treatment: Excavation	yd3	927355	$10.68	9,904,151.40	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	880986	$11.75	0,351,585.50	$0	$0	
Embankment construction, grading and restoration: Additional fill	yd3	46369	$13.88	$643,601.72	$0	$0	
Embankment construction, grading and restoration: Compaction of fill	yd3	6391	$5.34	$34,127.94	$0	$0	
Land Acquisition: Purchase of Property *	dollar	7862950	$1.00	7,862,950.00	$0	$0	
Pump Station: 40 cfs Pump Station with Flap Gate	each	1	$955,000.00	$955,000.00	$532,881	$0	
Pump Station: 15 cfs Pump Station with Flap Gate	each	1	$560,000.00	$560,000.00	$312,475	$0	
Pump Station: 15 cfs Pump Station with Flap Gate	each	1	$560,000.00	$336,000.00	$187,485	$0	5 cfs pump

* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)

Subtotal (direct costs)		**$24,678,781**	**$2,794,525**	**$453,599**
Utility Relocation	4 %	$987,151		
Mobilization \ General Conditions	5%	$1,233,939		
Subtotal with Percent Allowances		**$26,899,872**		
Contingency	30%	$8,069,961		
Profit	5%	$1,748,492		
Probable Construction Cost Estimate		**$36,718,325**		
Design Engineering, Geotechnical, and Construction Management	10%	$3,671,832		
Property Acquisition Cost:		$7,862,950		
Total Conceptual Cost Estimate		**$51,501,231**		

Additional Comments

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Metropolitan Water Reclamation District of Greater Chicago
LDPR Watershed Detailed Watershed Plan
SLCR 3: Total Conceptual Cost Report

Alternative Name SLCR 3

Problem Description Overbank Flooding

Strategy Reservoir / Roadway Replacement

District Minimum Criteria for Funding: Met

Recommended No

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Channel treatment: Soil stabilization and vegetative cover	yd2	153254	$13.88	2,127,165.52	$1,978,231	$509,355	
Channel treatment: Vegetative cover only	yd2	1653	$8.54	$14,116.62	$13,128	$3,380	
Channel treatment: Excavation	yd3	1250021	$10.68	3,350,224.28	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	880986	$11.75	0,351,585.50	$0	$0	
Concrete: Cast in place	yd3	110	$250.00	$27,500.00	$0	$0	
Demolition: Brick, concrete, or stone construction	ft2	3500	$4.27	$14,945.00	$0	$0	
Embankment construction, grading and restoration: Additional fill	yd3	62502	$13.88	$867,527.76	$0	$0	
Embankment construction, grading and restoration: Compaction of fill	yd3	6391	$5.34	$34,127.94	$0	$0	
Embankment construction, grading and restoration: Material hauled from offsite	yd3	306533	$10.68	3,273,772.44	$0	$0	
Inlet structures (Headwall): 42 to 66 inches	each	2	$4,757.50	$9,515.00	$8,849	$0	
Land Acquisition: Purchase of Property *	dollar	7862950	$1.00	7,862,950.00	$0	$0	
Outlet structures (Headwall): 42 to 66 inches	each	2	$4,757.50	$9,515.00	$8,849	$0	
Paving: Asphalt Pavement Installation (24 ft wide, 2 ft C&G, 1 ft Excavation	lf	140	$148.47	$20,785.80	$19,330	$0	
Pipe under pavement (county): 90 to 96 inches / box culvert (39 to 50 ft2)	lf	730	$661.03	$482,551.90	$448,766	$0	
Concrete: Cast in place	yd3	128400	$250.00	2,100,000.00	$0	$0	Vertical Wall Construction: Cast in place

* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)

Subtotal (direct costs)		**$62,683,333**	**$2,477,154**	**$512,735**
Utility Relocation	4 %	$2,507,333		
Mobilization \ General Conditions	5%	$3,134,167		
Subtotal with Percent Allowances		**$68,324,833**		
Contingency	30%	$20,497,450		
Profit	5%	$4,441,114		
Probable Construction Cost Estimate		**$93,263,397**		
Design Engineering, Geotechnical, and Construction Management	10%	$9,326,340		
Property Acquisition Cost:		$7,862,950		
Total Conceptual Cost Estimate		**$113,442,575**		

Additional Comments

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Metropolitan Water Reclamation District of Greater Chicago
LDPR Watershed Detailed Watershed Plan
SLCR 5: Total Conceptual Cost Report

Alternative Name	SLCR 5
Problem Description	Roadway Overtopping
Strategy	Raise roadway and replace culvert
District Minimum Criteria for Funding:	Met
Recommended	No

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Channel treatment: Soil stabilization and vegetative cover	yd2	4819	$13.88	$66,887.72	$62,205	$16,016	
Channel treatment: Vegetative cover only	yd2	12916	$8.54	$110,302.64	$102,580	$26,412	
Demolition: Brick, concrete, or stone construction	ft2	138800	$4.27	$592,676.00	$0	$0	
Embankment construction, grading and restoration: Additional fill	yd3	9444	$13.88	$131,082.72	$0	$0	
Inlet structures (Headwall): 42 to 66 inches	each	2	$4,757.50	$9,515.00	$8,849	$0	
Paving: Asphalt Pavement Installation (24 ft wide, 2 ft C&G, 1 ft Excavation	lf	3470	$148.47	$515,190.90	$479,120	$0	
Pipe under pavement (county): Box culvert (51 to 60 ft2)	lf	540	$661.03	$356,956.20	$331,964	$0	

* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)

Subtotal (direct costs)		**$1,782,611**	**$984,717**	**$42,428**
Utility Relocation	4 %	$71,304		
Mobilization \ General Conditions	5%	$89,131		
Subtotal with Percent Allowances		**$1,943,046**		
Contingency	30%	$582,914		
Profit	5%	$126,298		
Probable Construction Cost Estimate		**$2,652,258**		
Design Engineering, Geotechnical, and Construction Management	10%	$265,226		
Property Acquisition Cost:		$0		
Total Conceptual Cost Estimate		**$3,944,628**		

Additional Comments

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Metropolitan Water Reclamation District of Greater Chicago
LDPR Watershed Detailed Watershed Plan
STCR 1234: Total Conceptual Cost Report

Alternative Name STCR1234

Problem Description DP-STCR-BF-FR-01

Strategy Channel Improvements and Reservoir

District Minimum Criteria for Funding: Met

Recommended No

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
maintenance: Large Channel Maintenance	lf	12000	$100.00	1,200,000.00	$1,115,982	$287,343	Clear debris in channel, remove undergrowth and trim trees in overbank area.
Channel treatment: Material to be hauled offsite	yd3	104070	$11.75	1,222,822.50	$0	$0	Haul off the material excavated for the 85 ac-ft reservoir.
Channel treatment: Excavation	yd3	108790	$10.68	1,161,877.20	$0	$0	Excavation for the 85 ac-ft reservoir.
Concrete: Cast in place	yd3	300	$250.00	$75,000.00	$0	$0	Reservoir outlet/overflow weir - 200 feet by 80 feet by 0.5 foot thick.
Channel treatment: Soil stabilization and vegetative cover	yd2	46500	$13.88	$645,420.00	$600,231	$154,548	Approximately 10 acres, reservoir soil stabilization and cover.
Embankment construction, grading and restoration: Additional fill	yd3	4720	$13.88	$65,513.60	$0	$0	Embankment around reservoir
Embankment construction, grading and restoration: Compaction of fill	yd3	4720	$5.34	$25,204.80	$0	$0	Compaction of embankment around reservoir
Pipe in earth (county): 36 inches or less	lf	80	$216.78	$17,342.40	$16,128	$0	Reservoir outlet
Land Acquisition: Temporary Easement *	dollar	542500	$1.00	$542,500.00	$0	$0	Channel improvements, 31 acres
Land Acquisition: Purchase of Property *	dollar	1925000	$1.00	1,925,000.00	$0	$0	Reservoir, 11 acres

* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)

Subtotal (direct costs)		**$4,413,181**	**$1,732,341**	**$441,891**
Utility Relocation	4 %	$176,527		
Mobilization \ General Conditions	5%	$220,659		
Subtotal with Percent Allowances		**$4,810,367**		
Contingency	30%	$1,443,110		
Profit	5%	$312,674		
Probable Construction Cost Estimate		**$6,566,151**		
Design Engineering, Geotechnical, and Construction Management	10%	$656,615		
Property Acquisition Cost:		$2,467,500		
Total Conceptual Cost Estimate		**$11,864,497**		

Additional Comments

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Metropolitan Water Reclamation District of Greater Chicago
LDPR Watershed Detailed Watershed Plan
STCR 5: Total Conceptual Cost Report

Alternative Name	STCR5
Problem Description	DP-STCR-BF-FR-01
Strategy	Floodwall, channel improvement, and reservoir
District Minimum Criteria for Funding:	Met
Recommended	Yes

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Channel treatment: Reinforced one sided concrete wall	yd3	1365	$587.35	$801,732.75	$745,599	$191,977	North floodwall, 3,115 fet long
Channel treatment: Reinforced one sided concrete wall	yd3	1439	$587.35	$845,196.65	$786,020	$202,385	Middle floodwall, 2,100 feet long
Channel treatment: Reinforced one sided concrete wall	yd3	1567	$587.35	$920,377.45	$855,937	$220,387	South floodwall, 2,465 feet long
Channel treatment: Sheet piling	yd2	3461	$303.28	1,049,652.08	$0	$251,342	North floodwall
Channel treatment: Sheet piling	yd2	2333	$303.28	$707,552.24	$0	$169,425	Middle floodwall
Channel treatment: Sheet piling	yd2	2739	$303.28	$830,683.92	$0	$198,909	South floodwall
Channel treatment: Soil stabilization and vegetative cover	yd2	34611	$13.88	$480,400.68	$446,765	$115,033	North floodwall backfill stabilization
Channel treatment: Soil stabilization and vegetative cover	yd2	23333	$13.88	$323,862.04	$301,187	$77,550	Middle floodwall backfill stabilization
Channel treatment: Soil stabilization and vegetative cover	yd2	27389	$13.88	$380,159.32	$353,542	$91,030	South floodwall backfill stabilization
Channel treatment: Soil stabilization and vegetative cover	yd2	46500	$13.88	$645,420.00	$600,231	$154,548	10 acres of topsoil, seeding, blanket for 152 acre-ft reservoir. 4:1 side slope in 18 foot deep reservoir.
Embankment construction, grading and restoration: Additional fill	yd3	5300	$13.88	$73,564.00	$0	$0	Embankment around reservoir
Embankment construction, grading and restoration: Compaction of fill	yd3	5300	$5.34	$28,302.00	$0	$0	Compaction of embankment around reservoir.
Channel treatment: Excavation	yd3	11537	$10.68	$123,215.16	$0	$0	North floodwall foundation excavation
Channel treatment: Excavation	yd3	27378	$10.68	$292,397.04	$0	$0	Middle floodwall foundation excavation
Channel treatment: Excavation	yd3	27389	$10.68	$292,514.52	$0	$0	South floodwall foundation excavation
Channel treatment: Excavation	yd3	189600	$10.68	2,024,928.00	$0	$0	Excavation for 152 acre-ft reservoir and for flodwall footings - 2 feet width and 3.5 feet depth.
Channel treatment: Material to be hauled offsite	yd3	1365	$11.75	$16,038.75	$0	$0	North floodwall excavation
Channel treatment: Material to be hauled offsite	yd3	1439	$11.75	$16,908.25	$0	$0	Middle floodwall excavation
Channel treatment: Material to be hauled offsite	yd3	1567	$11.75	$18,412.25	$0	$0	South floodwall excavation
Channel treatment: Material to be hauled offsite	yd3	184300	$11.75	2,165,525.00	$0	$0	Haul off excess excavated material from site, use some for embankment between creek and reservoir.
Pipe in earth (county): 36 inches or less	lf	80	$216.78	$17,342.40	$16,128	$0	

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Alternative Name	STCR5
Problem Description	DP-STCR-BF-FR-01
Strategy	Floodwall, channel improvement, and reservoir
District Minimum Criteria for Funding:	Met
Recommended	Yes

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
maintenance: Large Channel Maintenance	lf	12000	$100.00	1,200,000.00	$1,115,982	$287,343	STCR 1234 channel improvements
Concrete: Cast in place	yd3	300	$250.00	$75,000.00	$0	$0	Spillway for reservoir
Land Acquisition: Purchase of Property *	dollar	1925000	$1.00	1,925,000.00	$0	$0	Reservoir, 11 acres
Land Acquisition: Permanent Easement *	dollar	87500	$1.00	$87,500.00	$0	$0	Long term maintenance of north floodwall
Land Acquisition: Permanent Easement *	dollar	42350	$1.00	$42,350.00	$0	$0	Long term maintenance of middle floodwall
Land Acquisition: Permanent Easement *	dollar	90232	$1.00	$90,232.00	$0	$0	Long term maintenance of south floodwall, 2.3 acres
Land Acquisition: Temporary Easement *	dollar	542500	$1.00	$542,500.00	$0	$0	North floodwall construction
Land Acquisition: Temporary Easement *	dollar	25410	$1.00	$25,410.00	$0	$0	construction of middle floodwall
Land Acquisition: Temporary Easement *	dollar	41506	$1.00	$41,506.00	$0	$0	Construction easement for south floodwall, 0.9 acres
Pump Station: 10ac-ft per day interior drainage	each	1	$800,000.00	$800,000.00	$743,988	$0	Drainage behind north floodwall
Pump Station: 10ac-ft per day interior drainage	each	1	$800,000.00	$800,000.00	$743,988	$0	Drainage behind middle floodwall
Pump Station: 10ac-ft per day interior drainage	each	1	$800,000.00	$800,000.00	$743,988	$0	Drainage behind south floodwall
Pump Station: 10ac-ft per day interior drainage	each	1	$800,000.00	$800,000.00	$743,988	$0	One pump to evacuate water from reservoir.

* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)

Subtotal (direct costs)		**$16,529,185**	**$8,197,342**	**$1,959,929**
Utility Relocation	4 %	$661,167		
Mobilization \ General Conditions	5%	$826,459		
Subtotal with Percent Allowances		**$18,016,811**		
Contingency	30%	$5,405,043		
Profit	5%	$1,171,093		
Probable Construction Cost Estimate		**$24,592,947**		
Design Engineering, Geotechnical, and Construction Management	10%	$2,459,295		
Property Acquisition Cost:		$2,754,498		
Total Conceptual Cost Estimate		**$39,964,011**		

Additional Comments

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Metropolitan Water Reclamation District of Greater Chicago
LDPR Watershed Detailed Watershed Plan
WECR 1: Total Conceptual Cost Report

Alternative Name	WECR1
Problem Description	Weller Creek old channel overbank flloding
Strategy	Additional culvert, floodwall, flood easement
District Minimum Criteria for Funding:	Met
Recommended	Yes

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Channel treatment: Soil stabilization and vegetative cover	yd2	1711	$13.88	$23,748.68	$22,086	$5,687	
Channel treatment: Material to be hauled offsite	yd3	14444	$11.75	$169,717.00	$0	$0	
Concrete: Cast in place	yd3	57	$250.00	$14,350.00	$0	$0	
Demolition: Brick, concrete, or stone construction	ft2	10600	$4.27	$45,262.00	$0	$0	
Embankment construction, grading and restoration: Additional fill	yd3	139	$13.88	$1,929.32	$0	$0	
Embankment construction, grading and restoration: Compaction of fill	yd3	139	$5.34	$742.26	$0	$0	
Inlet structures (Headwall): 42 to 66 inches	each	3	$4,757.50	$14,272.50	$13,273	$0	
Land Acquisition: Permanent Easement *	dollar	2205674	$1.00	2,205,673.52	$0	$0	
Land Acquisition: Temporary Easement *	dollar	9274	$1.00	$9,273.50	$0	$0	
Outlet structures (Headwall): 42 to 66 inches	each	3	$4,757.50	$14,272.50	$13,273	$0	
Paving: Asphalt Pavement Installation (24 ft wide, 2 ft C&G, 1 ft Excavation	lf	875	$148.47	$129,911.25	$120,815	$0	
Pipe in earth (county): Box culvert (51 to 60 ft2)	lf	2310	$472.01	1,090,343.10	$1,014,002	$0	
Pipe under pavement (county): Box culvert (51 to 60 ft2)	lf	1590	$661.03	1,051,037.70	$977,449	$0	
Pump Station: 40 cfs Pump Station with Flap Gate	each	1	$955,000.00	$955,000.00	$532,881	$0	

* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)

Subtotal (direct costs)		**$3,510,586**	**$2,693,780**	**$5,687**
Utility Relocation	4 %	$140,423		
Mobilization \ General Conditions	5%	$175,529		
Subtotal with Percent Allowances		**$3,826,539**		
Contingency	30%	$1,147,962		
Profit	5%	$248,725		
Probable Construction Cost Estimate		**$5,223,226**		
Design Engineering, Geotechnical, and Construction Management	10%	$522,323		
Property Acquisition Cost:		$2,214,947		
Total Conceptual Cost Estimate		**$10,659,963**		

Additional Comments

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding

Metropolitan Water Reclamation District of Greater Chicago
LDPR Watershed Detailed Watershed Plan
MTCA 1: Total Conceptual Cost Report

Alternative Name	MCTA1
Problem Description	Road flooding at Hillcret Drive/ Owen Court
Strategy	Culvert improvements/ Road improvements/ Flood storage
District Minimum Criteria for Funding:	Met
Recommended	Yes

	Unit	Quantity	Unit Cost	Base Cost	Maint. Cost	Replacement Cost	Notes/Issues
Channel treatment: Soil stabilization and vegetative cover	yd2	2431	$13.88	$33,742.28	$31,380	$8,080	
Channel treatment: Vegetative cover only	yd2	28282	$8.54	$241,528.28	$224,618	$57,835	
Demolition: Brick, concrete, or stone construction	ft2	72744	$4.27	$310,616.88	$0	$0	
Embankment construction, grading and restoration: Additional fill	yd3	148	$13.88	$2,054.24	$0	$0	
Embankment construction, grading and restoration: Compaction of fill	yd3	148	$5.34	$790.32	$0	$0	
Embankment construction, grading and restoration: Compaction of fill	yd3	9473	$5.34	$50,585.82	$0	$0	
Embankment construction, grading and restoration: Material hauled from offsite	yd3	9473	$10.68	$101,171.64	$0	$0	
Channel treatment: Excavation	yd3	70685	$10.68	$754,915.80	$0	$0	
Channel treatment: Material to be hauled offsite	yd3	38263	$11.75	$449,590.25	$0	$0	
Inlet structures (Headwall): 36 inches or less	each	1	$2,600.34	$2,600.34	$2,418	$0	
Inlet structures (Headwall): 36 inches or less	each	3	$2,600.34	$7,801.02	$7,255	$0	
Outlet structures (Headwall): 36 inches or less	each	1	$2,600.34	$2,600.34	$2,418	$0	
Outlet structures (Headwall): 36 inches or less	each	3	$2,600.34	$7,801.02	$7,255	$0	
Pipe in earth (county): 36 inches or less	lf	80	$216.78	$17,342.40	$16,128	$0	
Pipe under pavement (county): 36 inches or less	lf	4320	$415.41	,1,794,571.20	$1,668,924	$0	
Paving: Asphalt Pavement Installation (24 ft wide, 2 ft C&G, 1 ft Excavation	lf	2598	$148.47	$385,725.06	$358,718	$0	
Land Acquisition: Purchase of Property *	dollar	231154	$1.00	$231,154.00	$0	$0	
Land Acquisition: Temporary Easement *	dollar	132	$1.00	$132.00	$0	$0	

* Indicates item excluded from subtotal (e.g. land acquisition, buyouts)

Subtotal (direct costs)		**$4,163,437**	**$2,319,114**	**$65,915**
Utility Relocation	4 %	$166,537		
Mobilization \ General Conditions	5%	$208,172		
Subtotal with Percent Allowances		**$4,538,146**		
Contingency	30%	$1,361,444		
Profit	5%	$294,980		
Probable Construction Cost Estimate		**$6,194,570**		
Design Engineering, Geotechnical, and Construction Management	10%	$619,457		
Property Acquisition Cost:		$231,286		
Total Conceptual Cost Estimate		**$9,430,341**		

Additional Comments

Note: Small differences between the base cost and the reported product of quantity and unit cost due to rounding