
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



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Detailed Watershed Plan for the Lower Des Plaines River Watershed

Prepared for:



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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 county-wide 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 region-

al 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.

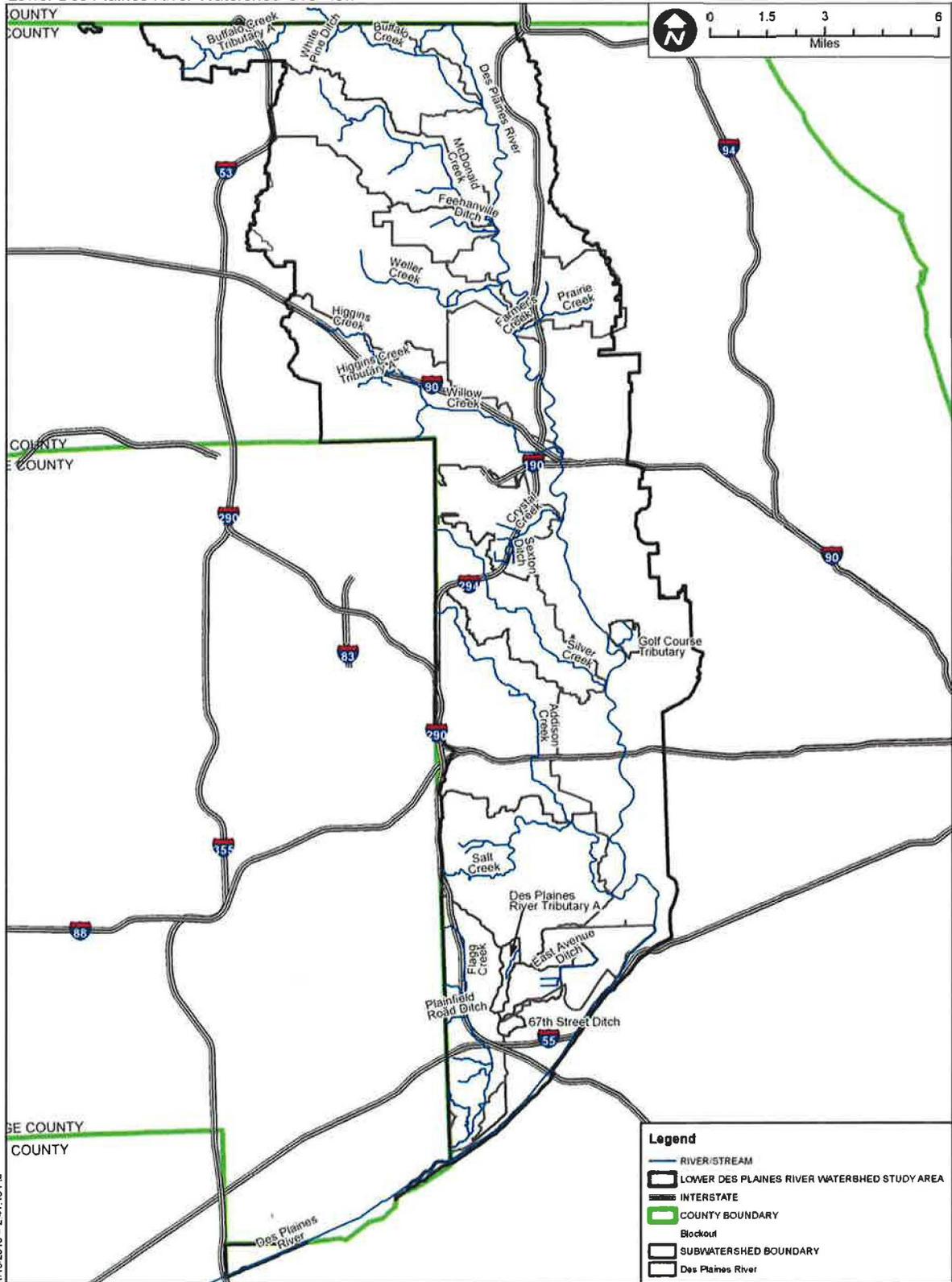
Existing Conditions Evaluation

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

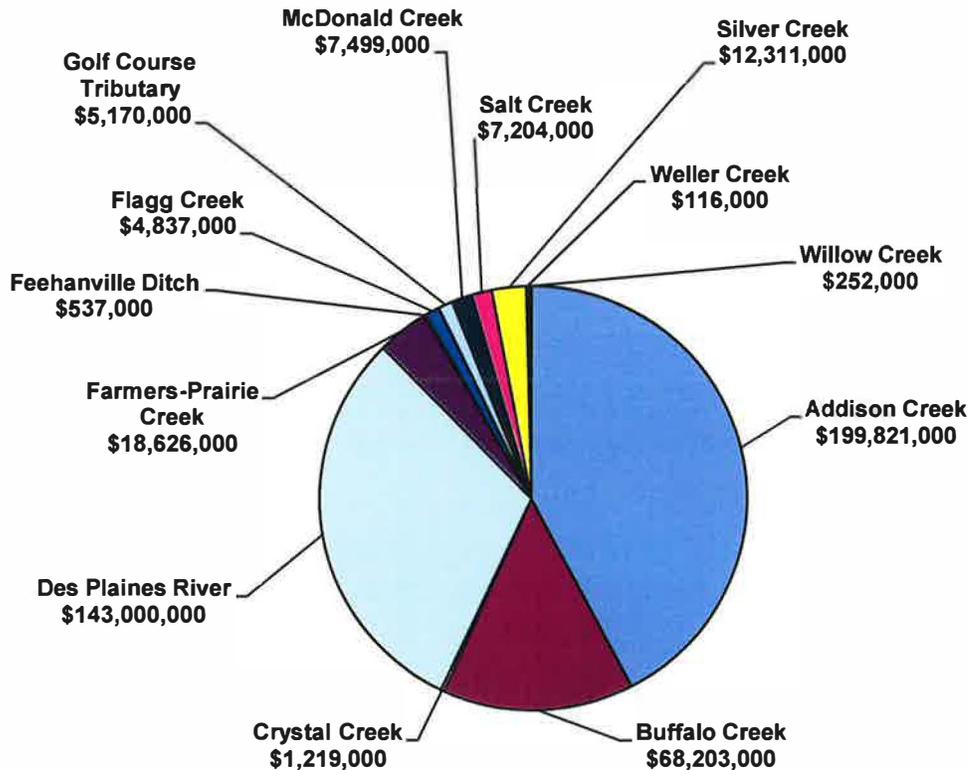


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Damages reported within this document refer to economic damages estimated over a 50-year period of analysis that result from regional overbank flooding or erosion of a regional waterway. Additional damages throughout the watershed exist, including 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 19 th 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 1 st Ave. Raise and enlarge waterway opening at Grand Avenue, raise 1 st 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 1 st 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 47 th Street	0.08	\$371,000	\$4,595,000	\$2,773,000	12	Lyons
DPR-14B	Conveyance	Raise 47 th 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 47 th 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 replace 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 91 st Street, provide 2 box culverts under 91 st 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 reservoir 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

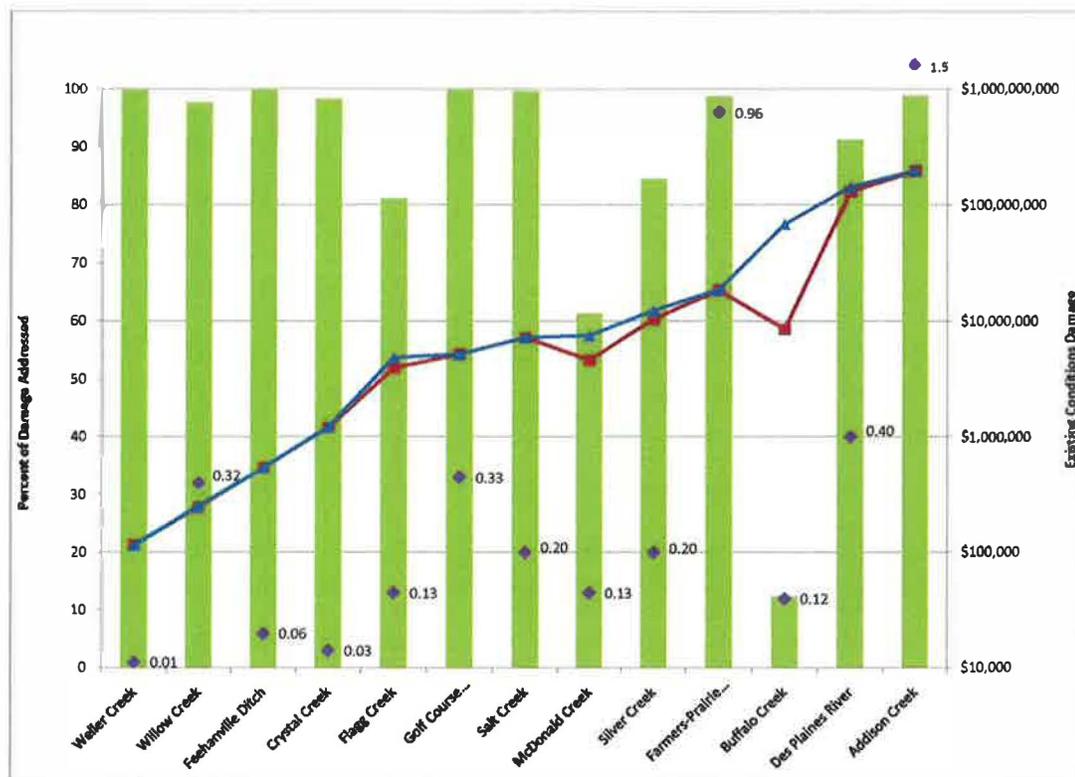
Project	Category	Description	B/C Ratio	Total Benefits	Total Project Cost	Probable Construction Cost	Cumulative Structures Removed from 100-Year Inundation	Communities Involved
SLCR-2	Flood Control Storage	Expansion of Structure 102 by 250 A-F, 150 A-F reservoir south of Belmont Avenue, 80 A-F reservoir 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

¹The 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.