APPENDIX A

Existing Sub-Watershed Plan Executive Summaries
BACKGROUND

This document presents the Watershed Plan which has been prepared for the Ferry Creek watershed by URS Greiner Woodward Clyde (URSGWC) and DuPage County Department of Development and Stormwater (DDS) at the direction of the DuPage County Stormwater Management Committee (SWMC). This Watershed Plan has been completed in accordance with the criteria and standards established by the Committee in the DuPage County Stormwater Management Plan, adopted September 1989. The Ferry Creek Watershed Plan characterizes existing overbank flooding problems and identifies flood hazard reduction projects within the watershed. Once this plan has been accepted and approved by the SWMC and the DuPage County Board, the plan will be incorporated into the watershed plan for the West Branch of the DuPage River.

FEMA flood plain mapping does not currently exist for Tributary No. 1, Tributary No. 2, Tollway Tributary and Tributary No. 3 upstream approximately 1.375 miles above the mouth. As such, limited information is available in these areas to regulate developments within the flood plains. The hydrologic/hydraulic modeling developed as part of this study will be utilized to develop future flood plain mapping for the unmapped tributaries. These maps will assist in regulating future development within the flood plains.

JURISDICTIONAL RESPONSIBILITIES

The DuPage County Stormwater Management Plan was developed by the County's Stormwater Management Committee to address the extensive flood damages within the County and to provide standards for flood plain and stormwater management. The Stormwater Management Plan was developed in response to the State of Illinois Legislation Public Act 85-905 passed in 1987 which authorized specific northeastern Illinois counties to develop Stormwater Management Programs with the authority to regulate and fund stormwater management projects on a countywide basis.

The Stormwater Management Program is under the direction of the Stormwater Management Committee and the DuPage County Board. The directives of the Committee are executed by the staff of the DEC Stormwater Management Division. DEC staff is developing watershed plans for each of the major stream basins within DuPage County. Each plan will identify regulatory requirements, maintenance requirements and capital improvement projects which are necessary to reduce and control the potential for catastrophic flooding within the County.

PLAN COMPONENTS

Components of the watershed plan, which are summarized in this executive summary, include the following:

- Description of Watershed Characteristics
- Discussion of Hydrologic/Hydraulic Analysis
- Summary of Damage Analysis
- Identification of Watershed Problems and Issues
- Recommended Plan and Development
Executive Summary

- Identification of Other Watershed Issues
- Recommended Plan Funding
- Implementation of Recommended Plan

The full Watershed Plan document contains more details on the above topics, plus discussions on Special Management Areas, wetland and riparian areas, water quality, and institutional issues.

WATERSHED CHARACTERISTICS

The Ferry Creek watershed covers approximately 12.2 square miles and includes the cities of Warrenville, Naperville, and unincorporated areas of Winfield and Naperville Townships as shown on Figure ES-1. The watershed boundary, shown in Figure ES-2, extends from Fermi National Accelerator Laboratory in the northwest, to the West Branch of the DuPage River to the east, and Country Lakes Golf Course in Naperville in the southwest.

The Ferry Creek drainage system consists of approximately 3.8 miles of main stem channel with four major tributaries, listed in order from upstream to downstream: Tributary No. 1, Tributary No. 2, I-88 (East-West Tollway) Ditch Tributary (Tollway Ditch Tributary), and Tributary No. 3. The main stem of Ferry Creek begins at a series of lakes located east of Fermi Laboratory, flows generally to the southeast, and joins the West Branch of the DuPage River approximately 3,000 feet south of I-88, the East-West Tollway. The main stem of Ferry Creek is a well-defined channel at an average slope of 0.2 % with several culvert crossings. The direct drainage area to the main stem is approximately 6.2 square miles. Tributaries No. 1 and No. 2 are roadside ditches which flow east from wetland areas west of Illinois Route 59 through a series of culverts. Tributary No. 1 has a drainage area of approximately 0.3 square miles and Tributary No. 2 has a drainage area of approximately 1.1 square miles. These tributaries join the main stem of Ferry Creek just north of the Prairie Path, and approximately 2,000 feet south of Aurora Way, respectively. The Tollway Ditch, which consists of a portion of grassed channel, a portion of concrete channel, and a series of culverts and closed conduits, drains east and joins the Ferry Creek main stem immediately south of the Tollway. There are two culverts which cross under the East-West Tollway and carry flow from the area north of the Tollway to the Tollway Ditch. The Tollway Ditch has a drainage area of approximately 2.3 square miles. Tributary No. 3 flows through a series of lakes in the Country Lakes Golf Course, proceeds through a network of storm sewers, continues through two detention ponds and an open channel to join the Ferry Creek main stem just south of Diehl Road in the McDowell Grove Forest Preserve. Tributary No. 3 has a drainage area of approximately 2.3 square miles.

HYDROLOGIC/HYDRAULIC ANALYSIS

The DuPage County DDS has been working with the Northeastern Illinois Planning Commission (NIPC) to perform the regional hydrologic analysis for various watersheds since early 1980. A continuous hydrologic model -“Hydrologic Simulation Program, FORTRAN (HSPF)” - was used to simulate the hydrologic characteristics of the watershed. HSPF uses a Watershed Data Management (WDM) file for storing input and output data. HSPF simulates continuous hourly
FIGURE ES-1:
LOCATION OF FERRY CREEK WATERSHED
runoff from continuous precipitation and meteorologic data. The simulated runoff generated by HSPF is routed through the stream network using a separate hydraulic model called FEQ. TSF files (Time Series Files) are used to transfer runoff from the HSPF model to the FEQ model.

Hydraulic characteristics of the Ferry Creek main stem and its tributaries, including hydraulic structures and stream cross-sections were obtained from field survey information. Survey data for hydraulic structures include structure dimensions, inverts, and type of structure. Cross-section information was collected at appropriate locations to define the hydraulic geometry of the stream and flood plain. Field reconnaissance was conducted to verify the survey data. Thirty-four (34) structures and ninety (90) cross sections were surveyed for use in the hydraulic model.

Tributary area subbasins were delineated on the DuPage County 2-foot contour topographic maps. Subbasin delineations are primarily at hydraulic structures, reservoirs, and branch breaks in the FEQ model. The land cover data input to the FEQ model represents the tributary area characteristics of the Ferry Creek watershed in 1990. Although the watershed has changed since that time, the effects on the overall hydrology of the basin are assumed to be negligible. The DuPage County Countywide Stormwater and Flood Plain Ordinance was adopted in February 1992. This ordinance significantly reduces the amount of runoff entering local water courses from sites and subdivisions and flooding is minimized.

Calibration of the Ferry Creek FEQ model was conducted using high water marks for the July 1996 storm event. The 1996 flood resulted from record 24-hour precipitation in DuPage and adjacent counties. High water marks were obtained from flood questionnaires and through interviews with area residents.

A TSF developed by NIPC for the July 1996 storm (TSFJUL96.FR1) was used to calibrate the Ferry Creek FEQ model. This TSF contains runoff based on precipitation from three local precipitation gages (located on Figure A-1): Naperville Police Department, USGS Kress Creek, and Aurora Reckinger Road.

After calibration of the hydrologic and hydraulic models, the Ferry Creek FEQ model was run with the TSFLNG01.MAP time series file. TSFLNG01.MAP includes 115 storm events during the period of record from 1949 through 1993. The results of this model run were incorporated into the DEC-2 economic model and were utilized to identify existing flooding problems within the watershed. TSFLNG01.MAP is also used for the evaluation of selected alternatives.

DAMAGE ANALYSIS

Structures which have the potential to flood were identified and surveyed for use in the economic analysis. First floor elevation, low entry elevation, and structure type were determined for each identified structure. The structures identified for damage analysis were determined using maximum water surface elevation results from a preliminary model which had not yet been calibrated. A no damage elevation was estimated based on the results of the survey. The surveyed elevation, along with the structure type, structure value, contents value, and stream station were input for each structure into DuPage County's computer program DEC-2 for economic flood damage analysis. Structure value estimates were obtained from DuPage County tax assessment information. Damage curves obtained from FEMA which correlate flood depth to percent damage to a structure and its contents were also input to the DEC-2 model. Flood stage data generated by the FEQ model incorporating the TSFLNG01 map flood events, (which
includes peak elevations for storm events within the period of record of interest at specific stream locations), constitutes the final input to the DEC-2 model.

For this report, traffic damages are estimated only. The following major roads in addition to numerous private driveway crossings were determined to be overtopped during the TSFLNG01.MAP time series simulations: Ferry Road, Aurora Way, Home Avenue, Prairie Path, Meadow Road, Country Lake Drive, Lakeview Drive, Twin Pines Road, Patterman Road, Butterfield Road, Landon Avenue, Point Oak Drive, McDowell Road, Glenoban Drive, Bruce Lane and Fairway Drive. Associated damages are included as a percentage of the structural damages and are calculated in the DEC-2 model. Associated damages include damage to automobiles, landscaping, emergency living costs, lost wages, and other miscellaneous costs. Costs associated with emergency services were estimated to be 5% of residential damages.

In addition to the DEC-2 analysis, a flood damage questionnaire was issued to residents by DuPage County following the July 1996 flood event. These questionnaires offered further insight into potentially flooded properties in the watershed.

Table ES-1 presents the results of the DEC-2 baseline economic damage analysis for the Ferry Creek Watershed. Actual damages are expected to be greater due to the fact that traffic damages are not included and that more people (on average) reported flooding during the 1996 event than what the model predicts (particularly in the Country Lakes Subdivision area). These discrepancies may be due in part to the County’s definition of overbank flooding on the flood questionnaires. Typically, a local residence owner will report sheet flow or localized storm sewer flooding as overbank flooding. In both of these cases, a property owner’s structure may be inundated by water. However, the damages computed and summarized in this report are due only to overbank flooding.

Table ES-1
SUMMARY OF QUANTIFIED DAMAGES

<table>
<thead>
<tr>
<th>Stream Reach</th>
<th>Residential Structures</th>
<th></th>
<th>Commercial Structures</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. of Properties</td>
<td>No. of</td>
<td>Estimated Direct</td>
<td>No. of</td>
</tr>
<tr>
<td></td>
<td>Subject to Flood</td>
<td>Structures Meeting Buyout</td>
<td>Cumulative Damages (1)</td>
<td>Properties</td>
</tr>
<tr>
<td></td>
<td>Damage</td>
<td>Buyout</td>
<td>Damage</td>
<td>Buyout</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Criteria</td>
<td></td>
<td>Criteria</td>
</tr>
<tr>
<td>Main Stem</td>
<td>28</td>
<td>10</td>
<td>$931,081</td>
<td>4</td>
</tr>
<tr>
<td>Tributary No. 1</td>
<td>9</td>
<td>1</td>
<td>$49,168</td>
<td>1</td>
</tr>
<tr>
<td>Tributary No. 2</td>
<td>3</td>
<td>0</td>
<td>$22,553</td>
<td>0</td>
</tr>
<tr>
<td>Tollway Tributary</td>
<td>0</td>
<td>0</td>
<td>$0</td>
<td>6</td>
</tr>
<tr>
<td>Tributary No. 3</td>
<td>77</td>
<td>26</td>
<td>$1,454,507</td>
<td>0</td>
</tr>
<tr>
<td>TOTAL</td>
<td>117</td>
<td>37</td>
<td>$2,457,309</td>
<td>11</td>
</tr>
</tbody>
</table>

(1) Direct cumulative damages are based on the TSFLNG01.MAP events plus the 1996 event and includes damages to the structure plus 5% for emergency services. Damages do not include traffic-related damages.

(2) Direct cumulative damages are based on the TSFLNG01.MAP events plus the 1996 event and includes damages to the structure only.
FLOODING AND DRAINAGE PROBLEMS

Potential flood-prone areas were identified during hydrologic, hydraulic, and economic analyses of the watershed using existing land use conditions. The areas were verified with the results of the questionnaire sent to residents within the Ferry Creek watershed following the July, 1996 flood event. Based on our analyses, we were able to identify some of the more significant historical flooding problems, the types of flooding that have been observed and could be expected to be seen and specific problem areas subject to flood damages within the watershed. These observations were based on the results of the FEQ and DEC-2 modeling for existing conditions as well as from the flood questionnaires. Information from the questionnaire sent to residents within the Ferry Creek watershed following the July, 1996 flood event assisted in confirming locations of flood damage potential that were identified from the hydrologic/hydraulic analysis.

Some of the more significant historical flooding problems are highlighted below. Problem areas were identified from the results of the hydrologic/hydraulic model supplemented with information from the flood questionnaires.

1. Overbank flooding occurs several times a year along the Ferry Creek Main Stem and its tributaries affecting approximately twenty-eight (28) residential properties and four (4) commercial properties.

2. Extensive flooding and property damage occurred along the Tollway Ditch and Tributary No. 3 from the July 1996 event.

3. Flooding along the Ferry Creek Main Stem occurs primarily between Route 59 and Ferry Road. The main type of flooding in this area is yard flooding due to sheet flow and overbank flows, however, some structures have the potential to incur flood damages as well. Ferry Road, Aurora Way, Home Avenue, Route 59 and Oakview Drive as well as several private driveway crossings are subject to overtopping during flood events.

4. Flooding along Tributary No. 1, consisting primarily of residential driveway and yard flooding and some structural damage, occurs around Patterman Road and upstream of Landon Avenue. This flooding is primarily associated with backwater and overbank flooding from undersized culverts. Nine (9) residential and one (1) commercial property are subject to flood damage in Tributary No. 1. Twin Pines Road, Patterman Road, and Route 59 as well as several private driveway crossings are subject to overtopping during flood events.

5. Flooding along Tributary No. 2 occurs around Route 59 and in the vicinity of Point Oak Drive and Landon Avenue. Flooding problems around Route 59 include driveway flooding as well as structural damage and flooding of the Prairie Path tunnel under Route 59. Yard flooding, Landon Avenue overtopping and Point Oak Drive overtopping are the other key flooding problems on Tributary No. 2. Three (3) residential properties are subject to flood damage in Tributary No. 2.

6. Flooding along the East-West Tollway ditch occurs primarily at commercial businesses downstream of the Prairie Path and upstream of Route 59. Several businesses all reported water within their buildings during the July 1996 storm. Six commercial properties are subject to flood damage in the Tollway Ditch Tributary.
7. Flooding problems along Tributary No. 3 were the most extensive of all the Ferry Creek tributaries. Major flooding of houses (basements and first floors), yards, and roads resulted in significant property damage from the July 1996 from overflow of the Country Lakes Golf Course lakes created by debris blocking the outlet and from storm sewer surcharging in the vicinity of Argyll Lane, Claymore Lane, Allister Lane, Bruce Lane, and Glenoban Drive. Approximately 77 residential properties are subject to flood damages in Tributary No. 3.

8. Flooding of the North Aurora underpass at the EJ&E railroad due to surcharging of an inadequate storm sewer drainage system and inadequate downstream detention storage facilities.

9. Erosion along the shoreline of Summer Lakes.

Figure ES-3 provides the identified problem areas within the watershed. Flooding problems in the Ferry Creek Watershed can generally be categorized as: (1) Overbank flooding, (2) Drainage system surcharging, and (3) Sheet flow.

The flooding problems are generally the result of:

- Increased impervious area associated with development
- The loss of natural flood plain storage areas
- Development encroachment in the flood plain
- Undersized or surcharged storm sewer and conveyance systems
- Inadequate detention storage associated with watershed development

Specific problem areas are discussed by tributary below.

**Main Stem**

**Problem Area 1 (MS-1): Summer Lakes Shoreline**

**Problem Description:** The shoreline around Summer Lakes has been reported to have experienced erosional processes.

**Probable Cause:** The erosion which is occurring is likely due to wave action within the lake and from localized runoff to the lake.

**Problem Area 2 (MS-2): Area Between Route 59 and Home Avenue**

**Problem Description:** Flooding to the south of Route 59 upstream of Home Avenue has affected numerous residential and business structures. This flooding is mainly created by overbank flooding of the right bank created by backwater from the Home Avenue culvert. Approximately thirteen (13) residential and two (2) commercial properties are subject to flood damages in this reach.

**Probable Cause:** The upstream ditch and existing culvert structure at Home Avenue (42-inch x 30-inch elliptical culverts) appears to be undersized to convey the full range of historic flows.
Problem Area 3 (MS-3): Upstream of 90 Degree Bend

Problem Description: Ferry Creek in the reach upstream of Ferry Road includes an almost 90 degree channel bend. Backwater from downstream conveyance structures and the channel alignment causes flood runoff to be conveyed onto the developed flood plain impacting residential structures and yards. Approximately five (5) residential and two (2) commercial properties are subject to flood damages in this reach.

Probable Cause: Flooding is likely associated with backwater from the private drive and Ferry Road. A new bridge structure is proposed at Ferry Road as part of the current road widening project. This structure will be hydraulically evaluated to determine the effects on upstream flooding.

Problem Area 4 (MS-4): Left Overbank Upstream of Ferry Road

Problem Description: Creek flooding upstream of Ferry Road impacts several existing residential structures.

Probable Cause: Flooding is likely associated with backwater from the private drive and Ferry Road. A new bridge structure is proposed at Ferry Road as part of the current road widening project. This structure will be hydraulically evaluated to determine the effects on upstream flooding. Flooding includes overbank flooding causing damages to structures and yards. Approximately ten (10) residential properties are subject to flood damage in this reach.

Tributary No. 1

Problem Area 1 (T1-1): Near Confluence with Main Stem

Problem Description: Overbank flooding created by backwater from cross culverts and causing damages to yards, driveways and residential structures. Approximately four (4) residential properties are subject to flood damage in this reach.

Probable Cause: Backwater from the Main Stem Ferry Creek and cross culverts creates overbank flooding.

Problem Area 2 (T1-2): Upstream of Route 59

Problem Description: Overbank flooding causing damages to one (1) commercial property.

Probable Cause: Backwater from the Route 59 culvert (2-foot x 2-foot concrete box) creates overbank flooding upstream.

Problem Area 3 (T1-3): Between Prairie Path and Route 59

Problem Description: Localized flooding between the Prairie Path and Route 59.

Probable Cause: Localized flooding caused by backwater created by inadequate capacities of cross culverts. Approximately four (4) residential properties are subject to flood damages in this reach.

Tributary No. 2

Problem Area 1(T2-1): Upstream of Aurora Way

Problem Description: Overbank flooding of residential structures.
**Executive Summary**

Probable Cause: Backwater from the Aurora Way culvert (12-foot wide x 4-foot high concrete box) and a drop structure creates overbank flooding upstream. Approximately two (2) residential properties are subject to flood damage in this reach.

**Problem Area 2 (T2-2): Upstream Route 59**

Problem Description: Overbank flooding of one (1) residential property.

Probable Cause: Backwater created by the existing Prairie Path cross culvert (twin 24-inch RCP) creates overbank flooding upstream.

**Tollway Ditch**

**Problem Area 1 (TW-1): Southwest Intersection of Tollway and Route 59**

Problem Description: Overtopping of the Tollway Ditch has caused flooding within six (6) commercial properties to the south of the Tollway. During the 1996 event, several businesses incurred damage from flooding.

Probable Cause: Backwater created by the conveyance structures at the interchange structure and Tollway Ditch conveyance capacity being too small.

**Tributary No. 3**

**Problem Area 1 (T3-1): North Aurora Road Underpass of the EJ&E Railroad**

Problem Description: Flood inundation of the Aurora Road underpass.

Probable Cause: The flooding is a result of the storm sewer curb inlet (Elev. 714.52) at the underpass being lower than the design high water elevation (determined from design plans to be Elev. 715.75) in the detention pond located approximately 2,200 feet to the north. The back pressure to the underpass storm sewer inlet could be remedied by using an in-line flap gate or valve to prevent water from going in the opposite direction. However, the problem with this situation is that the water within the subwatershed can not be drained through the existing system until the downstream water levels decrease. Therefore, a pump station would also likely be required. Also, catch basin inlets at the underpass and drainage ditches along North Aurora are in very poor condition and add to the flooding problem.

**Problem Area 2 (T3-2): Country Lakes Pond No. 3**

Problem Description: Critical wetland habitat; beaver dams at outlet structure have plugged spillway structure, spillway structure requires improvement. Although no damages were simulated by the FEQ model, this problem area has the potential to add to the downstream flooding potential by increasing upstream flood pool levels and/or increasing in downstream discharges created by a breach in the structure. Plans to rehabilitate the spillway structure may be included as part of an adjacent development.

Probable Cause: The golf course has constructed temporary emergency overflow spillway within the right abutment to alleviate overtopping concerns from beavers plugging the existing concrete spillway structure. However, it is recommended that a more permanent solution should be pursued.
**Problem Area 3 (T3-3): Country Lakes Pond No. 2**

**Problem Description:** The outlet of Country Lakes Pond No. 2 is connected to downstream storm sewer systems. The adequate operation of the spillway is key to minimizing residential flooding downstream within the Country Lakes Subdivision including Fairway Drive at Country Lakes Drive.

**Probable Cause:** Country Lakes No. 2 is connected to the Country Lakes Subdivision storm sewer system via a 42-inch culvert. This culvert may become surcharged under significant flooding events.

**Problem Area 4 (T3-4): Storm Sewer System within Country Lakes/Scots Plains Subdivisions (Area bounded by Fairway Drive, Diehl Road, Route 59 and Bruce Lane)**

**Problem Description:** Residential flooding associated with surcharging of the existing storm sewer system. Specific identified flooding areas (as determined from the flood damage questionnaires and the FEQ modeling effort) include: (1) An area between Fairway Drive and Bruce Lane, (2) Country Lake Drive and Allistar Lane, (3) Glenoban Drive at Bruce Lane, and (4) Scots Drive at Argyll Lane. Approximately seventy-seven (77) residential properties are subject to flood damage in this reach.

**Probable Cause:** Yard, street and structure flooding as a result of inadequate storm sewer capacity and runoff in local streets from the Country Lakes Pond No.1 overflow.

**Problem Area 5 (T3-5): Country Lakes Pond No. 1**

**Problem Description:** Blockage of the outlet from the lake during the 1996 event created reported residential flooding around the lake and contributed to the flooding in the Longwood Subdivision.

**Probable Cause:** Collection of debris within the spillway structure during flood events created an increased flood pool level upstream.

**ALTERNATIVES EVALUATION**

The Ferry Creek FEQ model was utilized to analyze alternatives for the significant problem areas as identified above. The goal of the alternatives evaluation was to minimize flood damages in each tributary watershed and to optimize the cost/benefit associated with flood control improvements.

In general, four alternatives were evaluated for each tributary watershed:

1. No action
2. Buyouts and floodproofing
3. Structural flood control measures combined with select property buyouts and floodproofing
# Alternatives Analysis Summary

<table>
<thead>
<tr>
<th>Stream Reach/Alternative</th>
<th>Property Buyout Costs (1)</th>
<th>Floodproofing Costs (2)</th>
<th>Land Acquisition Costs (3)</th>
<th>Structural Flood Control Measures Costs (4)</th>
<th>Total Capital Costs</th>
<th>Total Remaining Damages (5)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Main Stem</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alternative 1-No Action</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$1,000,033</td>
</tr>
<tr>
<td>(32 properties affected)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alternative 2-Buyouts/Floodproofing (12 buyouts, 5 floodproofs)</td>
<td>$6,029,100</td>
<td>$90,000</td>
<td>$0</td>
<td>$0</td>
<td>$6,119,100</td>
<td>$17,397</td>
</tr>
<tr>
<td>Alternative 3-Structural+Buyout/Floodproofing (8 buyouts, 7 floodproofs)</td>
<td>$895,070</td>
<td>$110,000</td>
<td>$0</td>
<td>$235,000</td>
<td>$1,240,070</td>
<td>$23,550</td>
</tr>
<tr>
<td>Alternative 4-Structural Only</td>
<td>$0</td>
<td>$0</td>
<td>$15,000,000</td>
<td>$1,600,000</td>
<td>$16,600,000</td>
<td>$0</td>
</tr>
<tr>
<td><strong>Tributary No. 1</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alternative 1-No Action</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$77,671</td>
</tr>
<tr>
<td>(10 properties affected)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alternative 2-Buyouts/Floodproofing (3 floodproofs)</td>
<td>$0</td>
<td>$50,000</td>
<td>$0</td>
<td>$50,000</td>
<td>$0</td>
<td>$7,111</td>
</tr>
<tr>
<td>Alternative 3-Structural+Buyout/Floodproofing</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Alternative 4-Structural Only</td>
<td>$0</td>
<td>$0</td>
<td>$160,000</td>
<td>$160,000</td>
<td>$0</td>
<td></td>
</tr>
<tr>
<td><strong>Tributary No. 2</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alternative 1-No Action</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$22,553</td>
</tr>
<tr>
<td>(3 properties affected)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alternative 2-Buyouts/Floodproofing (1 floodproof)</td>
<td>$0</td>
<td>$20,000</td>
<td>$0</td>
<td>$20,000</td>
<td>$0</td>
<td>$2,266</td>
</tr>
<tr>
<td>Alternative 3-Structural+Buyout/Floodproofing</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Alternative 4-Structural Only</td>
<td>$0</td>
<td>$0</td>
<td>$150,000</td>
<td>$150,000</td>
<td>$0</td>
<td></td>
</tr>
<tr>
<td><strong>Tollway Ditch Tributary (6)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alternative 1-No Action</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$11,424,068</td>
</tr>
<tr>
<td>(6 properties affected)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alternative 2-Buyouts/Floodproofing (6 buyouts)</td>
<td>$22,059,540</td>
<td>$0</td>
<td>$0</td>
<td>$22,059,540</td>
<td>$0</td>
<td>$0</td>
</tr>
<tr>
<td>Alternative 3-Structural+Buyout/Floodproofing</td>
<td>$0</td>
<td>$50,000</td>
<td>$12,000,000</td>
<td>$2,250,000</td>
<td>$14,300,000</td>
<td>$0</td>
</tr>
<tr>
<td>Alternative 4-Structural Only</td>
<td>$0</td>
<td>$0</td>
<td>$12,000,000</td>
<td>$2,500,000</td>
<td>$14,500,000</td>
<td>$886,651</td>
</tr>
<tr>
<td><strong>Tributary No. 3</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alternative 1-No Action</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$1,454,507</td>
</tr>
<tr>
<td>(77 properties affected)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alternative 2-Buyouts/Floodproofing (22 buyouts, 17 floodproofs)</td>
<td>$3,464,640</td>
<td>$290,000</td>
<td>$0</td>
<td>$3,754,640</td>
<td>$39,720</td>
<td></td>
</tr>
<tr>
<td>Alternative 3-Structural+Buyout/Floodproofing (12 buyouts, 18 floodproofs)</td>
<td>$1,907,780</td>
<td>$280,000</td>
<td>$0</td>
<td>$2,300,000 to $2,900,000</td>
<td>$4,487,780 to $11,975</td>
<td></td>
</tr>
<tr>
<td>Alternative 4-Structural Only</td>
<td>$0</td>
<td>$0</td>
<td>$15,000,000</td>
<td>$4,700,000</td>
<td>$19,700,000</td>
<td>$806,145</td>
</tr>
</tbody>
</table>

Notes:
1. Property buyout costs are for both the structure and property and is assumed to be 3 times the assessed value plus 20 percent.
2. Assumed to be $10,000 per structure for flooding up to 6-inches depth and $20,000 per structure for flooding between 6-inches and 1-foot.
3. Based on a cost of between $6 to $7 per square foot.
4. Includes estimated construction costs for the preferred structural alternative.
5. Total remaining damages include the residual damages calculated by the DEC-2 model plus 5 percent of residential damages for emergency services. Residual traffic damages are not included.
6. Does not include damages for one (1) major business in the tributary. Information from business not available.
Executive Summary

Figure ES-4b
Ferry Creek Watershed Capital Improvement Plan
Tollway Tributary and Country Lakes Area
4. Structural/non-structural flood control measures only.

Potential alternatives to alleviate flooding problems in the watershed were developed and evaluated based on the hydrologic/hydraulic evaluations and the results of the damage analysis supplemented by information from the flooding questionnaires. The alternatives consist of various combinations of structural and non-structural improvements. Alternatives were evaluated against the criteria in the DuPage County Stormwater Management Plan. Table ES-2 provides a summary of the alternatives evaluated.

RECOMMENDED PLAN AND DEVELOPMENT

The goal of the recommended plan is to decrease simulated damages from floods over the period of record including the 1996 event. The recommended watershed plan consists of capital improvement projects to address overbank flooding concerns and other improvements to mitigate additional watershed problems, such as impaired water quality and impacts to wetlands. Figure ES-4 provides an overview of the recommended capital improvement plan. The components of the recommended plan have been selected based on their effectiveness in eliminating existing flood plain flooding, overall project cost, impacts on water quality, effects on existing channel geomorphology, impacts on aquatic habitat, feasibility, and conformance to DuPage County ordinance requirements. The funding, maintenance and implementation requirements of the plan are also discussed below.

Main Stem

Recommended Alternative: Alternative 3 - Structural Measures with Select Buyouts and Floodproofing

Total Baseline Damages: $1,000,033 (not including traffic damages)

Description: Area MS-1 (Summer Lakes Shoreline) -- Select erosion control measures of the Summer Lake shoreline is recommended. This option may include riprap, vegetation, erosion control reinforcement matting (ECRM) or concrete revetment blocks. Alternative vegetation and mowing practices should also be evaluated. The estimated total capital costs are approximately $65,000.

Area MS-2 (Area Between Route 59 and Home Avenue) -- Between Route 59 and Home Avenue, approximately 30 percent of the damages within the Main Stem occurs and it is recommended that structural measures including upgrading the culvert crossing at Home Avenue and providing a set-back berm on the right overbank area to mitigate flooding between Home Avenue and Route 59 along with select floodproofing and property buyouts be initiated to alleviate flood damages. The estimated total capital costs are approximately $170,000.

Areas MS-3 and MS-4 (Upstream of Ferry Road and 90 degree Bend) -- Upstream of Ferry Road and below Tributary No. 2, approximately 70 percent of the damages within the Main Stem occurs. It is recommended that property buyouts and floodproofing be initiated in this reach due to the high cost associated with structural improvements (approximately $1.5 million plus approximately $15 million required for land acquisition for a 200 acre-foot detention facility). The estimated total capital costs for property buyouts is approximately $895,070 and the estimated total capital costs for floodproofing is approximately $110,000.

Estimated Capital Costs: approximately $1,240,070
Executive Summary

Residual Damages: $23,550

Funding: DuPage County DDS and Transportation Departments

Other Issues: Wetlands and water quality -- The improvements recommended should generally improve water quality by decreasing the potential for transporting sediment. Efforts should be made to minimize the impact to wetlands during final design of the recommended improvements.

**Tributary No. 1**

Recommended Alternative: Alternative 2 - Buyouts and Floodproofing

Total Baseline Damages: $77,671 (not including traffic damages)

Description: **Areas T1-1, T1-2 and T1-3** (from Confluence with Main Stem to Route 59) -- The preferred alternative consists of floodproofing for three (3) structures.

Estimated Capital Costs: approximately $50,000

Residual Damages: $7,111

Funding: DuPage County DDS

Other Issues: Wetlands and water quality -- The improvements recommended should have minimal impact on water quality and wetlands.

Recommendations for Future Work: Provide upgrades to existing private drive culverts between Twin Pines Road and Route 59, including upgrades to the culverts at Aurora Way and Route 59 as part of future roadway improvements. Although not recommended as part of this watershed plan, future compensatory storage could be provided in a regional detention pond on the Main Stem below Tributary No. 2.

**Tributary No. 2**

Recommended Alternative: Alternative 2 - Buyouts and Floodproofing

Total Baseline Damages: $22,553 (not including traffic damages)

Description: **Areas T2-1 and T2-2** (between Aurora Way and Route 59) -- The preferred alternative consists of floodproofing of one (1) residential structure.

Estimated Capital Costs: approximately $20,000

Residual Damages: $2,266

Funding: DuPage County DDS

Other Issues: Wetlands and water quality -- The improvements recommended should have minimal impact on water quality and wetlands.

Recommendations for Future Work: Provide upgrades to existing private drive culverts between Landon Avenue and Route 59, including upgrades to the culverts at Landon Avenue and Route 59 as part of future roadway improvements. Although not recommended as part of this watershed plan, future compensatory storage could be provided in a regional detention pond on the Main Stem below Tributary No. 2.
Executive Summary

Tollway Ditch

Recommended Alternative: Alternative 3 - Structural Measures with Select Floodproofing

Total Baseline Damages: $11,424,068 (not including traffic damages or damages to one commercial structure)

Description: Area TW-1 (Southwest Intersection of Tollway and Route 59) -- The preferred alternative consists of structural flood control measures which include: (1) upgrading the Tollway/Route 59 interchange culvert from 66-inches to 84-inches diameter, (2) providing detention storage (approximately 200 acre-feet) upstream of the Prairie Path by select excavation and reducing the size of the existing Prairie Path cross culvert (from 60-inches to 12-inches), (3) providing an excavated diversion channel from the Tollway Ditch to convey floodwaters from upstream subwatersheds to the new detention area upstream of the Prairie Path and (4) select floodproofing of two (2) commercial structures.

Estimated Capital Costs: approximately $14,300,000

Residual Damages: $0

Funding: DuPage County DDS and Transportation Departments

Other Issues: Wetlands and water quality -- The improvements recommended should generally enhance water quality and wetlands due to the detention area upstream of the Prairie Path and the reduced potential to convey sediments and debris during flood events.

Tributary No. 3

Recommended Alternative: Alternative 3 - Structural Measures and Select Buyout/Floodproofing

Total Baseline Damages: $1,454,507 (not including traffic damages)

Description: Area T3-1 (North Aurora Road Underpass of the EJ&E Railroad) -- The recommended alternative consists of upgrading the existing storm sewer system from the underpass to an existing detention pond located approximately 2,200 feet to the north by 1) Installing an in-line flap valve or gate in the storm sewer system draining the underpass, 2) Providing a 500 to 1000 gpm pump station to drain the underpass should the existing system become surcharged, and 3) Upgrading the existing storm sewer system (approximately 1020 linear feet) to a pressurized system. The pump station and storm sewer system should be designed for a total hydraulic head of approximately 10 feet. As an alternative to upgrading the storm sewer system, a 5 acre-feet detention pond near the intersection in conjunction with a flap valve could be constructed to minimize the flood problem. Calculations indicate that only approximately 1.5 acre-feet of storage could be available in existing downstream detention basins. Therefore, this option would have a greater overall cost than the recommended alternative. The estimated total capital costs are approximately $123,500.

Area T3-2 (Country Lakes Pond No. 3) -- The recommended alternative includes upgrading the existing spillway to ensure safe passage of flood waters downstream and minimizing the potential for clogging, increased backwater effects and overtopping. This could be partially funded by adjacent development issues. The estimated total capital costs are approximately $69,000.
Executive Summary

**Area T3-3 (Country Lakes Pond No. 2)** -- The recommended alternative includes upgrading the existing spillway to ensure safe passage of flood waters downstream and minimizing the potential for clogging, increased backwater effects and overtopping. This alternative item could include designing for increased flood and compensatory storage as part of downstream improvements. The estimated total capital costs are approximately $50,000.

**Area T3-4 (Storm Sewer System within Country Lakes/Scots Plains Subdivisions)** -- The recommended alternative includes a) upgrading the existing storm sewer system along Bruce Lane by installation of an additional 48-inch diameter reinforced concrete pipe storm sewer and appurtenant structures, b) upgrading the existing storm sewer system from Country Lakes No. 1 to Bruce Lane by installation of an additional 48-inch diameter reinforced concrete pipe storm sewer and appurtenant structures, c) upgrading the existing storm sewer system from along Bruce Lane across Route 59 by installation of an additional 72-inch diameter reinforced concrete pipe storm sewer and appurtenances (including incorporation of an existing 5 foot by 9 foot concrete box culvert at Route 59 to the extent possible), d) providing compensatory storage downstream in either Moose Pond or Bond Pond, e) select floodproofing of approximately eighteen (18) structures and (f) select property buyouts of twelve (12) residential structures. The estimated total capital costs are approximately $4,176,280.

**Area T3-5 (Country Lakes Pond No. 1)** -- The recommended alternative includes upgrading the existing spillway to ensure safe passage of flood waters downstream and minimizing the potential for clogging, increased backwater effects upstream and overtopping. During the final design phase, the ability to provide additional flood storage in Country Lakes Pond No.1 by lowering the control crest of the spillway will be pursued. The estimated capital costs are approximately $69,000.

**Estimated Capital Costs:** approximately $4,487,780 to $5,087,780 (not including potential compensatory storage costs or flood easement costs)

**Residual Damages:** $11,975

**Funding:** DuPage County DDS, City of Naperville, Naperville Township, local development interests

**Other Issues:** Phased construction approach – As part of the recommended alternative for Tributary No. 3, a phased construction approach may be warranted. The first phase of construction would involve the following: 1) improvements to the spillway at Country Lakes Pond No. 1, possibly including the storage of additional flood waters upstream by lowering of the spillway crest and 2) incorporating a storm sewer tie-in to the existing 5’ X 9’ concrete box culvert at Route 59 and a catch basin inlet in Scots Drive near Argyll Lane. This portion of the work would allow for decreased flooding potential in Allister Lane, Argyll Lane, and Scots Drive, however, it would not protect all structures in the subdivision from flooding during all the flood events analyzed.

Phase 2 of the construction would include the following: 1) the improvements to the storm sewer system at the North Aurora underpass, 2) the improvements to the weirs at County Lakes Ponds No. 2 and 3, 3) the storm sewer system within the Country Lakes/Scots Plains
Executive Summary

subdivisions and 4) provisions for any compensatory storage. Total cost for Phase I construction is approximately $430,000 and total cost for Phase 2 construction is $2.1 million to $2.75 million, depending on the compensatory storage provisions required.

Wetlands and water quality -- The improvements recommended should generally increase water quality and have a minimal impact on wetlands.

Recommendations for Future Work: Provide for additional stormwater detention (compensatory storage) at either (1) Bond Pond/McDowell Pond, (2) Area south of the Tollway and North of Diehl Road, (3) Open area east of Route 59, or (4) upstream in existing Country Lakes No. 1, 2 or 3.

OTHER WATERSHED ISSUES

Wetlands and Riparian Areas

Wetland and riparian sites have been identified within the Ferry Creek watershed to assist planners, developers, and permit reviewers in implementation of the Ordinance wetland provisions. The maps should be utilized as a tool for better planning during the development process.

Flood plain Maps

The FEQ model of Ferry Creek has been constructed to support future County efforts to develop new and refined flood plain maps within the watershed. The final flood plain mapping will be completed subsequent to the County Board’s adoption of the Ferry Creek Watershed Plan. The existing FEMA flood plain mapping will be evaluated and revised based on the FEQ model and PVSTATS results.

Water Quality Considerations

The quality of existing waters is constantly threatened by the effects of urbanization. The Ordinance requires inclusion of water quality related stormwater best management practices wherever practical. These practices are mandated by federal law for industries and municipalities covered by the NPDES requirements for stormwater. The watershed plan includes several recommendations to mitigate the adverse effects of development on water quality. These recommendations (which are general in nature) include construction site sediment and erosion control, maintenance of natural stream channel characteristics, protection against scouring velocities, maintenance of riparian vegetation, and provisions for sediment traps or pocket wetlands in constructed detention ponds.

Development Issues

Large areas of undeveloped agricultural/open/forest land exist currently within the watershed. To accommodate the needs of developers while maintaining adequate flood control protection, DEC staff must continue to coordinate the review of development projects. It is envisioned that development will continue in all areas of the Ferry Creek watershed. Without adequate drainage facilities associated with new developments,
increased flooding can be expected. To the extent possible, certain areas should remain as open space to ensure an adequate amount of natural flood detention is realized. This includes large tracts of land in the upstream watershed including the Fermi National Acceleration Laboratory.

RECOMMENDED PLAN FUNDING

Table ES-3 presents the recommended funding plans for the alternatives under consideration. Funding sources include County stormwater, County transportation, individual property owners, federal, state and local government funds. Current County policy assumes a maximum contribution from the County stormwater funds of $100,000 per structure affected.
### Table ES-3
PRELIMINARY FUNDING ANALYSIS

<table>
<thead>
<tr>
<th>Stream Reach/Alternative</th>
<th>County Stormwater</th>
<th>County Transportation Department</th>
<th>Other Outside Funding Source</th>
<th>Local Cost</th>
<th>Total Capital Costs</th>
<th>County Stormwater per Damage Reduction</th>
<th>Local &amp; County Transportation Cost per Damage Point Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Main Stem</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alternative 3-Structural+Buyout/Floodproofing</td>
<td>$1,030,070</td>
<td>$100,000</td>
<td>$110,000</td>
<td>$0</td>
<td>$1,240,070</td>
<td>$1,929</td>
<td>$393</td>
</tr>
<tr>
<td><strong>Tributary No. 1</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alternative 2-Buyouts/Floodproofing</td>
<td>$0</td>
<td>$0</td>
<td>$50,000</td>
<td>$0</td>
<td>$50,000</td>
<td>$0</td>
<td>$980</td>
</tr>
<tr>
<td><strong>Tributary No. 2</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alternative 2-Buyouts/Floodproofing</td>
<td>$0</td>
<td>$0</td>
<td>$20,000</td>
<td>$0</td>
<td>$20,000</td>
<td>$0</td>
<td>$769</td>
</tr>
<tr>
<td><strong>Tollway Ditch Tributary</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alternative 3-Structural + Select Floodproofs</td>
<td>$600,000</td>
<td>$1,000,000</td>
<td>$12,700,000</td>
<td>$0</td>
<td>$14,300,000</td>
<td>$1,667</td>
<td>$38,056</td>
</tr>
<tr>
<td><strong>Tributary No. 3</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alternative 3-Structural+Select Buyouts/Floodproofing</td>
<td>$3,207,780 to $3,907,780</td>
<td>$0</td>
<td>$380,000</td>
<td>$900,000</td>
<td>$4,487,780 to $5,087,780</td>
<td>$4,890 to $5805</td>
<td>$1,951</td>
</tr>
</tbody>
</table>

Note: Local cost refers to DuPage County Drainage/Bond cost and/or costs incurred by local governments.
IMPLEMENTATION OF RECOMMENDED PLAN

The following steps should be completed in order to implement the recommended plan:

- The public review process must be successfully completed, and the Watershed Plan must be adopted by the County Board.
- A public notice should be published regarding the voluntary buyout program.
- Property owners can be notified of the availability of technical assistance for floodproofing through the public meeting/hearing process.
- Funds for the various structural measures should be approved.
- Land for the detention basin within the Tollway Tributary should be acquired.
- Final design of the structural flood control measures should be performed.
- Property buyouts and floodproofing of affected residences and commercial structures on the Main Stem, Tributary No. 1, Tributary No. 2, Tollway Tributary and Tributary No. 3 should be performed.
- Priority construction of recommended flood control measures should be commenced in the order of importance as presented below. In general, flood control improvements should be constructed from downstream to upstream within a tributary watershed area to avoid problems with creating additional flooding problems downstream. The order of priority was determined based on public concern and the severity of flooding estimated and reported by property owners.
  1. Flap valve and pump station at North Aurora Road (Tributary No. 3).
  2. Phase I construction within Tributary No.3
  3. Tollway Tributary diversion/detention project (Tollway Tributary).
  4. Upgrade to Country Lakes storm sewer system (Phase II construction) (Tributary No. 3).
  5. Improvements to area between Route 59 and Home Avenue (Main Stem).
  6. Improvements to spillway structures on Country Lakes (Tributary No. 3).
  7. Erosion control measures along Summer Lakes shoreline (Main Stem).
  8. Property buyouts and floodproofing of structures (Main Stem, Tributary No. 1, Tributary No. 2 and Tributary No. 3).

In addition, future flood control projects should consider increasing the capacities of culvert structures of Tributary No. 1 at Route 59, Tributary No. 2 at Aurora Way, Tributary No. 2 at Route 59, Tributary No. 2 at Landon Avenue, and providing compensatory storage/regional detention within the Main Stem of Ferry Creek upstream of Ferry Road.
KLEIN CREEK

I. EXECUTIVE SUMMARY

1.0 Background

Hundreds of homes in the heart of the Klein Creek Watershed in DuPage County are periodically subjected to flooding. This flooding has historically occurred in the older sections of the Village of Carol Stream located within the Klein Creek floodplain. Figure No. 1 shows the location in the watershed where most of the flooding occurs.

A watershed study was performed to evaluate existing and future flooding problems along Klein Creek, and to develop flood control measures to alleviate these problems. Several flood control projects have been developed to significantly reduce the potential for stormwater damage to public health, safety, life, and property. These projects are part of a plan to provide cost effective flood damage reduction for this watershed. When approved by the DuPage County Board, the Klein Creek Watershed Plan will become a component of the West Branch DuPage River Watershed Plan.

2.0 Watershed Description

The Klein Creek Watershed is comprised of suburban residential communities intermixed with industrial and commercial developments and agricultural lands. The Village of Carol Stream, in Bloomingdale Township, comprises the majority of the watershed with smaller portions of Wayne, Milton and Winfield Townships also contributing. The Villages of Bloomingdale, Glendale Heights and Winfield and a portion of Unincorporated DuPage County are also within the watershed. Figure No. 2 illustrates the Klein Creek Watershed with major roads, tributaries and townships.

Klein Creek flows through the center of the Village of Carol Stream generally in a southwesterly direction to its confluence with the West Branch of the DuPage River. Klein Creek has a total watershed of 12.7 square miles. Significant tributaries include: Tributary No. 1 which enters Klein Creek from the east, north of Geneva Road; Tributary No. 2 which enters Klein Creek from the east just upstream of Thunderbird Trail; and Tributary No. 3 which enters Klein Creek near the intersection of Gary Avenue and Army Trail Road.

3.0 Study Area Flooding Problems

Historically, flooding has occurred in the older sections of the Village of Carol Stream primarily between Kuhn Road and Mitchell Lakes on the Mainstem and between the confluence and Gary Avenue along Tributary No. 2. The principle causes of flooding in the area have been inadequate capacities of the natural channels to convey runoff due to flood plain development and stream channelization. Additional problems have been created by the many channel and floodway constrictions due to inadequate waterway openings at bridges and culverts. Most flood plain areas in the older sections of the Village include residential developments, garages, sheds, fences and other construction near or on the banks of the creek. In many cases, these developments cause restrictions to the passage of flood water.
During the August 1987 flood event, the Klein Creek water level increased an average of 8 to 9 feet above normal (low flow level) along its reach through the older section of the Village. The Village of Carol Stream residents indicated (through questionnaire responses) that more than 170 residences in the older section of the Village reported surface water or surface water related sanitary sewer flooding problems during the 9187 event.

4.0 Study Methodology

DuPage County has adopted a comprehensive approach for evaluating flooding conditions in the County. The County evaluation system utilized state-of-the-art techniques to define hydrologic, hydraulic and economic conditions within a watershed.

The unsteady-state FEQ hydraulic model was used to evaluate physical stream features and define flood flow/elevation relationships. The FEQ model is capable of using actual historical storm data to estimate existing and future flooding conditions in a watershed. The Klein Creek FEQ model was calibrated to high water marks obtained during the August 13-14, 1987 flood event.

The DEC-1 economic model, which utilizes FEQ flood elevation data, was used to evaluate flood damages to building structures, structure contents, yards, landscaping, etc. The DEC-1 model uses surveyed home elevations data, home types and flood damage estimate curves for the damage estimation. The DEC-1 model provides a basis for evaluating flood damage reduction for a given flood control project.

5.0 Baseline Conditions

Baseline flood conditions were defined to provide a benchmark against which the effectiveness of proposed flood control measures could be quantified. The baseline condition assumes ultimate future development lands use with no additional stormwater detention, and existing stream features. Estimated baseline condition flood damage that would occur for this criteria for the storms that occurred between 1949 and 1988 are as follows:

- 196 structures flooded (including detached garages)
- $8,704,719 of structural, structure contents, associated and emergency services damages

Approximately 60% of the damages are along Klein Creek between County Farm Road and Lies Road, and 40% are along Tributary No. 2.

6.0 Alternatives Analysis Approach

Several sites locate din the middle and upper portions of the Klein Creek Watershed were evaluated for flood control and flood damage reduction potential. The existing and potential enhancement of hydraulic features, recreational use and environmental significance of each site was considered. Sites which were determined to have good flood control benefits were analyzed and optimized with structural improvements. The goals and objectives of the
DuPage County Stormwater Management Plan were attained for the evaluated sites. The FEQ and DEC-1 models were utilized to provide the effectiveness/flood damage reduction for the structural improvements.

The DuPage County Structure Buyout Criteria was used to evaluate residential structures that were still subjected to flooding after the implementation of structural flood control improvements. Residential structures were considered eligible for buyout if they would be flooded by one foot or more in any storm in the historical storm series, or if they would be flooded by 0.5 feet in two or more flood events in the historical storm series. Residential and commercial structures not removed from flooding through structural improvements or buyouts were recommended to be floodproofed.

7.0 **Interim Flood Control Project (Phase I)**

During the early planning stages, a project was identified which would provide obvious and immediate flood control benefits. This project was designated “Phase I” and was approved for implementation during 1993. Phase I construction was initiated in December 1993 and is scheduled for completion in August 1994. The project involves replacement of a restrictive access road bridge serving the Village of Carol Stream wastewater treatment plan. The new bridge provides greater flood conveyance capacity and is less prone to debris accumulation and flow restriction. A 13 acre-foot compensatory storage reservoir was also constructed to mitigate increases in downstream flood discharge caused by the new bridge. The reservoir is being constructed immediately downstream of the new bridge on land owned by the Village. The Phase I project provides a reduction of $877,342 in total damages for the historical storm series, and will be a component of all Phase II alternatives.

8.0 **Alternative Development (Phase II)**

An inventory of properties that could potentially accommodate a flood control project was developed. Properties considered to have cost effective flood control potential with a minimum of impact to existing recreation features and green space included:

- Lake George
- Old Home Base Site
- Armstrong Park
- Mitchell Lakes
- Carol Point Detention/Wetland Complex
- Open Space Adjacent to Gary Avenue (Tributary No. 2)
- Property Adjacent to Mill Ponds (Wetlands)

Flood control potential for stand alone projects on each of these properties, and a combination of several of these projects were evaluated. This screening process produced alternatives considered to have good flood control potential. Structural improvements to enhance this potential were developed and optimized, and flood reduction benefits for each alternative were estimated based upon expected flood elevation reductions.

A description of four flood control alternatives that were developed follows. Figure No. 3 illustrates the general location of sites which will accommodate structural improvement for these alternatives.
Table Nos. 1, 2, and 3 present an Alternatives Comparison Summary, Flood Damage Reduction Summary, and an Alternative Cost Summary, Respectively. A tax revenue impact column was provided in Table No. 3 to account for the loss of tax revenues resulting from buyouts. The tax revenue losses were projected over a 50 year period for each buyout. The amounts in the column are present value amounts assuring a tax levy annual increase of 3% and an earned investment rate of 5%.

a. **Alternative No. 1-Tributary No. 2 Flood Control Reservoir**

   Tributary No. 2 near the intersection of Gary Avenue and Kehoe Boulevard produces sufficient baseline condition flood damages to warrant consideration of structural improvements. A flood storage reservoir is proposed on the southeast corner of this intersection to mitigate these damages. An undeveloped 21-acre parcel of land which exists in this area could be acquired and developed as an off-line flood storage facility with approximately 143 ac-ft of capacity. This reservoir would have the following features:

   - Temporary flood storage during storm peaks, thereby reducing downstream flooding.
   - Low flows would be transported around the reservoir along Kehoe Boulevard in a storm sewer.
   - The reservoir would drain by gravity after passage of the storm peak.
   - The small pond which exists on the 21-acre parcel would be enlarged and incorporated into the reservoir.
   - The project will be developed with an open water zone and landscape buffering to complement the Village of Carol Stream corridor plan for Gary Avenue.

   The following additional project features would be required to accommodate nearly 100% flood damage reduction:

   - Buyout of 31 residences
   - Floodproofing of 97 residences

   Alternative No. 1 provides for 65% total flood damage reduction with structural improvements above, and a 98% total flood damage reduction with buyouts and floodproofing.

b. **Alternative No. 2 – Mainstream Flood Control Project at Old Home Base Site**

   The existing Klein Creek corridor configuration in the vicinity of the Old Home Base development on the northeast corner of Gary Avenue and Lies Road presents a cost effective flood control opportunity in the watershed. The existing creek and reservoir configuration do not efficiently utilize the storage potential in this area. The Home Base reservoir is presently an on-line structure with uncontrolled access by the Klein
Creek. A flood control alternative was developed to optimize existing the storage potential of this area as follows:

- By-pass low flow and non-damaging flood flows during early stages of storms around the 12-acre Home Base reservoir to preserve this storage for peak flow attenuation.

- Modify the Home Base reservoir intake and outfall structures to create an off-line facility that is only accessed during peak flood periods.

- Enhance existing wetland mitigation in the Home Base reservoir by improving water level control.

- Modify the Carol Point Detention/Wetland Complex water level control structure to enhance flood storage potential. This structure is a culvert under a railroad spur located immediately upstream of the Home Base reservoir. Flood levels will be increased in this complex by 2.5 feet during a 100-year flood. Flood levels for smaller frequent flood events which cause little downstream damage will not rise significantly (i.e. mean annual flood levels will rise approximately 0.2 feet). This low flow level enhancement will provide a benefit to existing wetlands which are in need of additional water. The structure modification will not change the normal water level in the complex or cause flood level increases upstream (east) of the complex.

The following additional project features would be required to accommodate nearly 100% flood damage reduction:

- Buyout of 38 residences

- Floodproofing of 76 residences

Alternative No. 2 provides for 32% total flood damage reduction with structural improvements alone, and 98% total flood damage reduction with buyouts and floodproofing.

c. **Alternative No. 3 – Combine Alternative Nos. 1 and 2**

This alternative assumes the structural improvement measures of both Alternative Nos. 1 and 2 will be implemented. Under this scenario, the buyout and floodproofing requirements to attain nearly 100% total flood damage reduction would be as follows:

- 14 residences would require a buyout

- 25 residences would be floodproofed

This alternative provides for 85% total flood damage reductions with structural improvements above and 99% total flood damage reduction with buyouts and floodproofing.
d. **Alternative No. 4 – Buyout of Flood Residences**  
This alternative would include the buyout of flooded residences and floodproofing with no structural improvements implemented. All structures meeting the County buyout criteria for the baseline condition would be purchased. Structural damages remaining after buyouts would be removed through floodproofing. For this alternative, the buyout and floodproofing requirements to attain nearly 100% total flood damage reduction would be as follows:

- 62 residences would require a buyout
- 25 residences would be floodproofed

**9.0 Alternative Recommendation**

Each of the four alternatives presented were developed to provide nearly 100% flood damage reduction. Structural improvement sites associated with the alternatives were selected over other sites evaluated based on damage reduction potential and cost effectiveness. The primary goal of the alternatives development was to maximize flood damage reduction through cost effective structural improvements. Buyouts and floodproofing measures were added to structural improvements to further increase flood damage reduction potential.

Two project sites were identified for structural improvements, and when combined, provide for 85% flood damage reduction for structures/properties located along Klein Creek and Tributary No. 2. These two projects combine to form the structural improvement portion of **Alternative No. 3**, which is the recommended alternative for the Klein Creek Watershed Study and Flood Control Plan.

Although Alternative No. 3 is not the least cost alternative, it provides the highest level of flood protection by significantly lowering flood levels in the primary drainage areas. Required numbers of buyouts and floodproofing are also minimized with Alternative No. 3. Because buyouts and floodproofing are minimized, the majority of the flood damage reduction benefits (85%) are realized immediately following implementation of structural improvements. Other alternatives presented herein provide similar overall flood damage reduction, but would require longer project implementation periods to complete buyouts and floodproofing. Although not analyzed specifically, sanitary sewer backup problems would most likely be reduced with Alternative No. 3 since less surface water ponding will occur in sewered areas.
### Table 1
**KLEIN CREEK WATERSHED**
**FLOOD CONTROL ALTERNATIVE COMPARISON**

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>ALTERNATIVE</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Damage Reduction w/ Projects</td>
<td></td>
<td>62%</td>
<td>24%</td>
<td>85%</td>
<td>0</td>
</tr>
<tr>
<td>Damage Reduction w/ Projects, Buyouts and Floodproofing</td>
<td></td>
<td>98%</td>
<td>98%</td>
<td>99%</td>
<td>97%</td>
</tr>
<tr>
<td>Number of Buyouts Required</td>
<td></td>
<td>31</td>
<td>38</td>
<td>14</td>
<td>62</td>
</tr>
<tr>
<td>Number of Floodproofing Projects Required</td>
<td></td>
<td>97</td>
<td>76</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>Avg. Flood Level Reduction Mainstem</td>
<td></td>
<td>0.7 ft.</td>
<td>1.1 ft.</td>
<td>1.7 ft.</td>
<td>0</td>
</tr>
<tr>
<td>Avg. Flood Level Reduction – Tributary No. 2</td>
<td></td>
<td>1.0 ft.</td>
<td>0.4 ft.</td>
<td>1.5 ft.</td>
<td>0</td>
</tr>
<tr>
<td>Ease of Implementation</td>
<td></td>
<td>Medium</td>
<td>Medium</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Wetland Enhancement Potential</td>
<td></td>
<td>Low</td>
<td>High</td>
<td>High</td>
<td>N/A</td>
</tr>
<tr>
<td>Water Quality Benefits</td>
<td></td>
<td>Medium</td>
<td>Medium</td>
<td>High</td>
<td>Medium</td>
</tr>
<tr>
<td>Recreation/Greenspace Opportunities</td>
<td></td>
<td>Medium</td>
<td>Medium</td>
<td>Low</td>
<td>High</td>
</tr>
</tbody>
</table>

### Table 2
**KLEIN CREEK WATERSHED**
**FLOOD DAMAGE REDUCTION SUMMARY**

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Flood Damage Reduction*</th>
<th>County Damage Point Reduction**</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Project</td>
<td>Buyouts</td>
</tr>
<tr>
<td>1</td>
<td>$4,861,887</td>
<td>$1,058,858</td>
</tr>
<tr>
<td>2</td>
<td>$1,861,526</td>
<td>$4,221,116</td>
</tr>
<tr>
<td>3</td>
<td>$6,660,601</td>
<td>$303,159</td>
</tr>
<tr>
<td>4</td>
<td>$0</td>
<td>$5,267,685</td>
</tr>
</tbody>
</table>

* Flood Damages were determined based upon the historical series of storms from 1949 through 1988.

** Ref. 22

### Table 3
**KLEIN CREEK WATERSHED**
**FLOOD CONTROL ALTERNATIVE COST SUMMARY**

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Construction</th>
<th>Buyouts</th>
<th>Floodproofing</th>
<th>Tax Revenue Impact</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$6,000,000</td>
<td>$4,044,840</td>
<td>$970,000</td>
<td>$2,301,409</td>
<td>$13,316,249</td>
</tr>
<tr>
<td>2</td>
<td>$1,800,000</td>
<td>$5,028,720</td>
<td>$760,000</td>
<td>$2,821,082</td>
<td>$10,409,802</td>
</tr>
<tr>
<td>3</td>
<td>$7,800,000</td>
<td>$1,773,480</td>
<td>$250,000</td>
<td>$1,039,346</td>
<td>$10,862,826</td>
</tr>
<tr>
<td>4</td>
<td>$0</td>
<td>$8,208,500</td>
<td>$950,000</td>
<td>$4,602,818</td>
<td>$13,761,318</td>
</tr>
</tbody>
</table>

* Tax revenue impact was estimated for each alternative to account for the loss of tax revenues resulting from buyouts. The amounts provided are present value amounts assuming a tax levy annual increase of 3% and an investment rate of 5%.
10.0 Funding Considerations

The Stormwater Management Committee Approved 10 Year Plan includes funding for the implementation of the Klein Creek Watershed Study and Flood Control Plan. The flooding problems identified in the study meet the regional classification criteria. County stormwater funds are generally only used to construct improvements and purchase properties meeting the buyout criteria. Table 4 summarizes the eligible County funding for the alternatives. Funding is generally provided up to the level of the least cost alternative. Alternative No. 2 is the least cost alternative with County eligible funding of $6,828,720. If a more costly alternative is selected, County stormwater funding levels for the project would have to be increased and/or the difference would be funded through other sources.

Table 4
KLEIN CREEK WATERSHED
COUNTY FUNDING PARTICIPATION SUMMARY

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Project</th>
<th>Buyout</th>
<th>Total</th>
<th>County Cost Per Damage Point Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$6,000,000</td>
<td>$4,044,840</td>
<td>$10,044,840</td>
<td>$2,090</td>
</tr>
<tr>
<td>2</td>
<td>$1,800,000</td>
<td>$5,028,720</td>
<td>$6,828,720</td>
<td>$1,544</td>
</tr>
<tr>
<td>3</td>
<td>$7,800,000</td>
<td>$1,773,480</td>
<td>$9,573,480</td>
<td>$1,890</td>
</tr>
<tr>
<td>4</td>
<td>$0</td>
<td>$8,208,500</td>
<td>$8,208,500</td>
<td>$1,919</td>
</tr>
</tbody>
</table>
Table I

KLEIN CREEK WATERSHED

FLOOD CONTROL ALTERNATIVE COMPARISON

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>ALTERNATIVE</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Damage Reduction w/Projects</td>
<td></td>
<td>62%</td>
<td>24%</td>
<td>85%</td>
<td>0</td>
</tr>
<tr>
<td>Damage Reduction w/Projects, Buyouts and Floodproofing</td>
<td></td>
<td>98%</td>
<td>98%</td>
<td>99%</td>
<td>97%</td>
</tr>
<tr>
<td>Number of Buyouts Required</td>
<td></td>
<td>31</td>
<td>38</td>
<td>14</td>
<td>62</td>
</tr>
<tr>
<td>Number of Floodproofing Projects Required</td>
<td></td>
<td>97</td>
<td>76</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>Avg. Flood Level Reduction - Mainstem</td>
<td></td>
<td>0.7 ft</td>
<td>1.1 ft</td>
<td>1.7 ft</td>
<td>0</td>
</tr>
<tr>
<td>Avg. Flood Level Reduction - Tributary No. 2</td>
<td></td>
<td>1.0 ft</td>
<td>0.4 ft</td>
<td>1.5 ft</td>
<td>0</td>
</tr>
<tr>
<td>Ease of Implementation</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Wetland Enhancement Potential</td>
<td>Low</td>
<td>High</td>
<td>High</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Water Quality Benefits</td>
<td>Medium</td>
<td>Medium</td>
<td>High</td>
<td>Medium</td>
<td></td>
</tr>
<tr>
<td>Recreation/Greenspace Opportunities</td>
<td>Medium</td>
<td>Medium</td>
<td>Low</td>
<td>High</td>
<td></td>
</tr>
</tbody>
</table>
Table 2

KLEIN CREEK WATERSHED

FLOOD DAMAGE REDUCTION SUMMARY

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Project</th>
<th>Buyouts</th>
<th>Floodproofing</th>
<th>Total</th>
<th>County Damage Point Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$4,861,887</td>
<td>$1,058,858</td>
<td>$1,433,936</td>
<td>$7,354,681</td>
<td>4807</td>
</tr>
<tr>
<td>2</td>
<td>$1,861,526</td>
<td>$4,221,116</td>
<td>$1,308,668</td>
<td>$7,391,310</td>
<td>4424</td>
</tr>
<tr>
<td>3</td>
<td>$6,660,601</td>
<td>$303,159</td>
<td>$479,610</td>
<td>$7,443,370</td>
<td>5065</td>
</tr>
<tr>
<td>4</td>
<td>$0</td>
<td>$5,267,685</td>
<td>$1,990,411</td>
<td>$7,258,096</td>
<td>4277</td>
</tr>
</tbody>
</table>

* Flood damages were determined based upon the historical series of storms from 1949 through 1988.
** Ref. 22
Table 3

KLEIN CREEK WATERSHED

FLOOD CONTROL ALTERNATIVE COST SUMMARY

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Construction</th>
<th>Buyouts</th>
<th>Floodproofing</th>
<th>Tax Revenue Impact</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$6,000,000</td>
<td>$4,044,840</td>
<td>$970,000</td>
<td>$2,301,409</td>
<td>$13,316,249</td>
</tr>
<tr>
<td>2</td>
<td>$1,800,000</td>
<td>$5,028,720</td>
<td>$760,000</td>
<td>$2,821,082</td>
<td>$10,409,802</td>
</tr>
<tr>
<td>3</td>
<td>$7,800,000</td>
<td>$1,773,480</td>
<td>$250,000</td>
<td>$1,039,346</td>
<td>$10,862,826</td>
</tr>
<tr>
<td>4</td>
<td>$0</td>
<td>$8,208,500</td>
<td>$950,000</td>
<td>$4,602,818</td>
<td>$13,761,318</td>
</tr>
</tbody>
</table>

* Tax revenue impact was estimated for each alternative to account for the loss of tax revenues resulting from buyouts. The amounts provided are present value amounts assuming a tax levy annual increase of 3% and an investment rate of 5%.
Table 4

KLEIN CREEK WATERSHED

COUNTY FUNDING PARTICIPATION SUMMARY

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Project</th>
<th>Buyout</th>
<th>Total</th>
<th>County Cost Per Damage Point Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$6,000,000</td>
<td>$4,044,840</td>
<td>$10,044,840</td>
<td>$2,090</td>
</tr>
<tr>
<td>2</td>
<td>$1,800,000</td>
<td>$5,028,720</td>
<td>$6,828,720</td>
<td>$1,544</td>
</tr>
<tr>
<td>3</td>
<td>$7,800,000</td>
<td>$1,773,480</td>
<td>$9,573,480</td>
<td>$1,890</td>
</tr>
<tr>
<td>4</td>
<td>$0</td>
<td>$8,208,500</td>
<td>$8,208,500</td>
<td>$1,919</td>
</tr>
</tbody>
</table>
Executive Summary

The Kress Creek Watershed Plan provides a stormwater and floodplain management framework for the conditions that are present within the Kress Creek Watershed. The watershed planning information presented in this document includes watershed characteristics (hydrology and hydraulics), existing flooding and drainage patterns and proposed creek crossing modifications.

There are several waterways that are part of the Watershed. The Mainstem of Kress Creek joins the West Branch DuPage River near Illinois Route 59 and drains the western portion of DuPage County. Portions of the Kress Creek Watershed are located in Kane County. The City of West Chicago is the only municipality located within the watershed. There are several tributaries that drain different portions of the City of West Chicago and Unincorporated DuPage County. Tributary 1 is the largest tributary of Kress Creek and drains the eastern portion of the city of West Chicago and the West Chicago Prairie. Tributary 2 is located primarily within the Fermi National Accelerator Laboratory (Fermilab) property. Tributary 3 is located along the southern boundary of the DuPage Tech Park. Tributary 4 was extensively reworked as part of the DuPage County Airport Authority’s expansion that took place in the early 1990’s. Tributaries 5-8 are located in the northern portion of the watershed and currently are located in an area that is being converted from an agricultural use to industrial/commercial and residential uses. All of the Kress Creek Watershed is crossed by numerous rail lines that have shaped the drainage pattern of the streams. The boundaries of the Kress Creek Mainstem and its Tributaries are shown on Exhibit 1.

Historic flooding and drainage problems in the study area have been documented as part of the Watershed Plan in Section 5. Information pertaining to these historic problems has been obtained from the Illinois Department of Natural Resources – Office of Water Resources (IDNR-OWR), DuPage County Department of Engineering – Division of Stormwater and environmental Concerns (DOESEC), and the City of West Chicago staff. Several alternatives were investigated to reduce flood damages in the Kress Creek Watershed and are discussed in Section 6.

All major wetland areas within the watershed were identified in the field. Wetlands to be directly or indirectly impacted due to implementation of future improvements have been identified and a mitigation plan for those impacts will be developed. The Watershed Plan discusses the wetlands identified and outlines the measures that provide appropriate mitigation of all impacted areas.

The Watershed Plan discusses the limits of the existing riparian areas located within the boundaries of the Watershed. Riparian areas are defined as vegetated areas located within the limits of the regulatory floodplain. Impacts to riparian areas are required to be mitigated. The Watershed Plan provides the framework for appropriate mitigation for the areas impacted by future improvements in the Watershed.
Water quality was addressed as part of the Watershed Plan. It was shown that future improvements made to the Watershed will have a net benefit on the water quality of the Watershed.

The recommended capital improvement project for Kress Creek Watershed is the replacement of a series of restrictive culverts located in an industrial area upstream of the Union Pacific Railroad and west of Kress Road. The increases in flow generated by the larger culverts will be conveyed downstream to a reservoir located within the DuPage County Technology Park near Fabyan Parkway and Roosevelt Road (Route 38). The combination of the reservoir and culvert replacements will reduce the size of the floodplain within the industrial park and provide benefits to other public entities, including the DuPage County Airport Authority, DuPage County Technology Park and the DuPage County Division of Transportation. The opinion of probable cost to build the proposed project is approximately $6,900,000. Funding of the project will be provided by the United States Department of Agriculture – Natural Resources Conservation Service, DuPage County Department of engineering – Division of Stormwater and Environmental Concerns, DuPage County Division of Transportation, DuPage County Airport Authority and the DuPage County Technology Park.
STEEPLE RUN

I. EXECUTIVE SUMMARY

1.0 Overview

Numerous residential, public and institutional properties within the Steeple Run Watershed in DuPage County have been subjected to flooding over the past several decades. This flooding has historically occurred within the older sections of the City of Naperville and unincorporated residential areas along the primary watershed drainage-course, referred to herein as the “Steeple Run Tributary.” Exhibit No. 1 illustrates the watershed location in DuPage County.

A watershed study was performed to evaluate existing flooding problems along the Steeple Run Tributary and to develop and recommend flood control measures to alleviate these problems. Several flood control projects have been developed to significantly reduce the potential for overbank flood damage to public health, safety, life and property. These projects are part of a plan to provide cost effective flood damage reduction for the watershed. Local drainage problems (areas not adjacent to the primary drainage-course), sanitary sewer backups and groundwater seepage/infiltration are not addressed in the study.

When approved by the City of Naperville, the DuPage County Stormwater Management Committee and DuPage County Board, the Steeple Run Watershed Study and Flood Control Plan will become a component of the West Branch DuPage River Watershed Plan.

2.0 Watershed Description

The 2.71 square mile Steeple Run Watershed is comprised of suburban residential areas intermixed with commercial, public open space/parks and private institutional property. The City of Naperville, in Lisle Township, comprises the majority of the watershed, with unincorporated areas accounting for approximately 38% of the total watershed, with unincorporated areas accounting for approximately 38% of the total watershed. Exhibit No. 2 illustrates the Steeple Run Watershed with major roads, drainage networks, developments and significant hydraulic features identified.

The major watershed drainage system (16,200± feet) is significantly urbanized, with only 700± feet of natural stream channel remaining. The uppermost portion of the main Steeple Run Tributary drainage network commences within the Steeple Run Subdivision which contains wet- and dry-bottom stormwater storage facilities interconnected with storm sewer. The Steeple Run Subdivision drainage system conveys stormwater in a northwesterly direction to Naper Boulevard, and into the Century Hill Subdivision North Detention Basin via storm sewer. This North Detention Basin (on-line) also collects rainfall-runoff from a portion of the Century Hill Subdivision and conveys stormwater through the Burlington Northern Railroad embankment to the Pheasant Glen Subdivision stormwater management facility. From Pheasant Glen, the drainage system consists of a series of overland flow swales and road culverts situated along the Spring Hill Subdivision stormwater conveyance corridor. From Spring Hill, stormwater is conveyed in a southerly direction through the Burlington Northern Railroad into the Barclay Manor stormwater management facility.
adjacent to North Avenue, which also receives runoff from the Naperville Country Club and its tributary areas. The Barclay Manor retention pond flows to the Country Commons park site where a series of low-flow and overland flow systems convey runoff along the western boundary of the Fontenaix Development to Chicago Avenue. From Chicago Avenue, stormwater flows southerly through East Greens Park and along the natural stream channel to the intersection of Porter Avenue and Julian Street. At the intersection, flow is conveyed via storm sewer in a westerly direction along Porter Avenue into the North Central College-South Campus to the tributary confluence with the West Branch DuPage River.

3.0 Public Participation

Public involvement in the watershed study was initiated through the mailing of Flooding Questionnaires to property owners with a history of, or potential for, surface water flooding. Flooding Questionnaires provide valuable information such as: frequency, depth, source and damage of historical flooding at a particular location in the watershed. DuPage County distributed a total of 252 questionnaires and received 84 responses. The City of Naperville distributed a Citywide Flooding Questionnaire and received approximately 280 from property owners within the Steeple Run Watershed. DuPage County also received questionnaires from 33 property owners within the Huntington Commons development. In addition to the Flooding Questionnaire data, a number of residents provided insightful information regarding historical drainage system operation and high water mark data.

A public comment period, which includes a public meeting, will commence once the DuPage County Stormwater Management Committee approves the Steeple Run Watershed Study and Flood Control Plan. All comments received will be addressed in a comment response document, which will be incorporated into the Final Watershed Plan.

4.0 Watershed Flooding Problems

Historically, significant overbank flooding along the Steeple Run Tributary has occurred in the City of Naperville and in unincorporated residential areas. The three (3) primary overbank flooding problem areas that have been identified based on public record and detailed hydrologic/hydraulic evaluation are: 1) Steeple Run Subdivision in Unincorporated DuPage County; 2) Huffman Street between Chicago Avenue and School Street in Naperville, and 3) North Central College-South Campus in Naperville. These historical problem areas are identified on Exhibit No. 2. Based on available information and watershed evaluation results, the principal cause of flooding in these areas has been inadequate urbanized channel capacity and stormwater storage to attenuate and convey runoff from extreme rainfall events. The problem rainfall events have been those which exceed in magnitude the best available hydrologic data used at the time the watershed drainage systems were designed, constructed, and/or updated (1970’s and early 80’s).

Most recently, the July 17-18, 1996 flood event caused significant overbank flooding damage in the Steeple Run Watershed, especially within the three (3) problem areas referenced above. Based on local rainfall data for the July, 1996 event, an average of 8.6 inches of rainfall occurred in less than a 24 hour period. This extreme event exceeds the current (Bulletin 70) regional 100-year statistical rainfall amount by nearly 14%. A review of Flooding Questionnaire (see Section 3.0) data indicates that the flood level in portions of the Steeple Run Subdivision stormwater management system increased by as much as 8.5 feet...
above normal water level during the July, 1996 event. The Huffman Street residents reported as much as 5.5 feet of street flooding and an adjacent flood control berm failure during the event. Information provided by North Central College indicated significant flood damage to the Merner Field House, football stadium, track and softball field areas. In addition, significant street flooding was reported on major roads such as Chicago Avenue and Naper Boulevard, with numerous residential streets impassable due to stormwater ponding. Based on historical records, the July 1996 flood event produced the highest recorded flood levels to date in the watershed, and is considered to be the flood-of-record.

5.0 Study Methodology

DuPage County has adopted a comprehensive approach for evaluation flooding conditions in the County. The County’s evaluation system utilizes state-of-the-art techniques to define hydrologic, hydraulic and related economic conditions within a watershed.

The unsteady-state FEQ hydraulic model was used to evaluate physical drainage network features and define flood flow/evaluation relationships. The FEQ model is capable of using actual historical storm data to estimate existing and/or future flooding conditions in a watershed. The Steeple Run Tributary FEQ model was developed based on available hydrologic/hydraulic database information, detailed field surveys, HSPF rainfall-runoff parameter files, and land use data from the County’s GIS database.

To establish the Steeple Run FEQ model accuracy and validity, the model was calibrated to match high-water marks collected during the July 17018, 1996 flood event. High-water marks for this event were collected throughout the watershed along the main drainage corridor. Table 1 provides a comparison of observed high-water marks from the July, 1996 flood with those simulated by the Steeple Run FEQ model. The model calibration effort utilized local rainfall gage data, 1990 land use characteristics from GIS, and the physical drainage system conditions which existed at the time of the flood event.

The DEC-2 economic model, which utilizes FEQ peak flood evaluation data, was used to evaluate flood damages to building structure contents, yards, landscaping, etc. The DEC-2 model uses surveyed structure evaluation data, structure types and percent damage curves for the flood damage assessment. The DEC-2 model provides a basis for evaluating flood damage reduction for a given flood control project.
Table 1
STEEPLE RUN WATERSHED
FEQ MODEL CALIBRATION
HIGH-WATER MARKS
JULY 17-18, 1996 FLOOD EVENT

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>FEQ NODE</th>
<th>WATER SURFACE EVALUATION (FT.)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>OBSERVED</td>
</tr>
<tr>
<td>North Central College Overflow @ Track</td>
<td>F2</td>
<td>675.6±</td>
</tr>
<tr>
<td>Julian Street Porter Avenue</td>
<td>D10</td>
<td>687.0</td>
</tr>
<tr>
<td>Huffman Street</td>
<td>F18</td>
<td>693.5</td>
</tr>
<tr>
<td>Spring Hill Detention Basin</td>
<td>F38</td>
<td>700.6</td>
</tr>
<tr>
<td>Century Hill (N) Basin</td>
<td>F94</td>
<td>715.6</td>
</tr>
<tr>
<td>Steeple Run (N) Basin</td>
<td>F104</td>
<td>717.4</td>
</tr>
</tbody>
</table>

6.0 **Baseline Conditions**

Baseline flood conditions were defined to provide a benchmark against which the effectiveness of possible flood control measures could be quantified. The Baseline Condition for the Steeple Run Watershed utilizes 1990 land use conditions and existing drainage system features. Estimated Baseline Condition flood damage that would occur for this criteria was evaluated for a requisite series of historical storm events which occurred between 1949 and 1993 (as recorded at the Wheaton, Illinois rainfall gage). The historical storm series does not represent events which actually occurred in the subject watershed, but merely simulates the rainfall-runoff response which could result if the storm events were to occur within the existing condition watershed. The July 17-18, 1996 storm event was also included in the baseline data-set given that it is considered the flood-of-record for the watershed.

As summarized in Table 2, the total quantifiable baseline residential damages for the 116 storm historical series is estimated to be $3,156,061, with a total of 71 structures flooded (including detachable garages). Approximately 61% of the total baseline residential damages would occur in the Steeple Run Subdivision, with approximately 38% attributed to the Huffman Street area. The remaining 1% of the total residential damages would be related to associated damages for areas outside the referenced residential problem areas. Of the total residential damages referenced above, $877,682 or 28% would be attributed to the July, 1996 event. Damages not accounted for in the Steeple Run Watershed economic analysis include: sanitary sewer back-ups, groundwater seepage into basements, and failure of local drainage systems.

In addition to the baseline residential damages, a flood damage evaluation was performed for the North Central College-South Campus problem area. The college provided comprehensive information for flood damage which occurred at the field house, football stadium, track and softball field areas during the July, 1996 flood event. The July, 1996 flood damage cost data ($126,000+ in damages) was utilized to estimate the total baseline flood damage which could occur at the College for the series of historical storm events. The
baseline damages were calculated only for events with simulated flood levels that would inundate the field-house and/or overtop into the track/stadium area. Flood damage per event was calculated as a percentage of the July, 1996 damage by multiplying the July, 1996 damage costs by the ratio of the event flood level to the July, 1996 flood level. Based on the simulated flood levels for the 116 events in the historical storm series, the field-house, football stadium and track area would be inundated 60 and 43 times, respectively. The total Baseline Condition flood damages for the South Campus area would be $3,785,182.

Traffic damages for the historical storm series were estimated for Chicago Avenue and Naper Boulevard. These damages are calculated by depth percent/damage curves based on depth and duration of flooding for significant roadways. Assumed detour travel distance, travel time and corresponding lost wages are considered in the damage analysis.

### Table 2

STEEPLE RUN WATERSHED
BASELINE CONDITION FLOOD DAMAGE SUMMARY

<table>
<thead>
<tr>
<th>DAMAGE CATEGORY</th>
<th>DEC-2 DAMAGES</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. RESIDENTIAL DAMAGES</td>
<td></td>
</tr>
<tr>
<td>- Building Structure &amp; Contents</td>
<td>$2,386,137</td>
</tr>
<tr>
<td>- Associated Damages*</td>
<td>650,617</td>
</tr>
<tr>
<td>- Emergency Services**</td>
<td>119,307</td>
</tr>
<tr>
<td>Sub-Total (Residential Damages)</td>
<td>$3,156,061</td>
</tr>
<tr>
<td>2. NORTH CENTRAL COLLEGE DAMAGES</td>
<td>$3,785,182</td>
</tr>
<tr>
<td>3. TRAFFIC DAMAGES</td>
<td>$69,550</td>
</tr>
<tr>
<td>TOTAL QUANTIFIABLE DAMAGES</td>
<td>$7,010,793</td>
</tr>
<tr>
<td>Number of Structures Flooded (including detached garages)***</td>
<td>71</td>
</tr>
</tbody>
</table>

* Damages to lawns, landscaping, gardens, residential traffic disruption, etc.
** Assumed to be 5% of building structure and contents damages.
*** Number of structures in the economic data-set that would incur structural and/or structure content damages during at least one event in the historical storm series.

### 2.0 Alternatives Analysis Approach

Several sites located in the Steeple Run Watershed were evaluated for flood control potential. The existing and potential enhancement of hydraulic features, recreational use and aesthetic significance of each site was considered. Sites and/or specific flood control measures which were determined to be feasible and have significant flood control benefits were analyzed and optimized with structural improvements. The goals and objectives of the DuPage County Stormwater Management Plan were evaluated for each site. The FEQ.and DEC-2 models were used to provide the effectiveness/flood damage reduction for the structural improvements.
The DuPage County Buyout Criteria was used to evaluate residential structures that were still subjected to flooding after the implementation of structural flood control improvements. Residential structures were considered eligible for buyout if they would be flooded by one foot or more in any storm in the historical storm series, or if they would be flooded by 0.5 feet in two or more flood events in the historical storm series. Residential structures which do not meet the County Buyout Criteria but still incur structural or content damage with the structural flood control improvements in-place were recommended to be floodproofed.

3.0 Alternatives Development

An inventory of properties (evaluation sites) that could potentially accommodate a flood control project was developed. Exhibit No. 8 illustrates the location of each evaluation site. Properties considered to have flood control potential included:

A. Benedictine University property south of Maple Avenue
B. Steeple Run Subdivision common/open space areas
C. Century Hill Subdivision open space areas adjacent to the B.N.R.R.
D. Spring Hill Subdivision open space area
E. Open space/farm-land immediately west of Spring Hill
F. Naperville Country Club
G. County Commons Park Site
H. Open Space properties along Chicago Avenue
I. Open Space/recreational areas on North Central College South Campus
J. Huffman Street Flood Control Berm

Flood control potential for stand alone projects on each of these properties, and a combination of several of those projects were evaluated. This screening process produced feasible alternatives considered to have significant flood control and implementation potential. Structural improvements to enhance this potential were developed and optimized, and flood reduction benefits for each alternative were estimated based upon expected flood elevation reductions.

A description of each evaluation site follows:

**A – Benedictine University Open Space:** This site is located at the southeast corner of Maple Avenue and Benedictine Parkway and is currently utilized for agricultural purposes. The on-site depressional area at Maple Avenue receives stormwater runoff from approximately 53 acres within the uppermost portion of the Steeple Run Watershed. The site drains via a 12-inch pipe through Maple Avenue into the Steeple Run Subdivision. The existing site stormwater storage capacity and limited release rate control flow into the Steeple Run Subdivision. Given the site location in the uppermost portion of the watershed, limited tributary drainage area, and existing stormwater release rate control, the site was not considered to have any additional significant flood control potential. Any future development on the Benedictine property would not increase peak flows into the Steeple Run Subdivision given the Countrywide Ordinance stormwater detention and release rate requirements.
B – Steeple Run Subdivision Open Space: The Steeple Run Subdivision drainage network was evaluated to identify existing stormwater storage and conveyance deficiencies. Evaluation results indicate that the existing internal drainage network lacks sufficient stormwater storage and overflow capacity to adequately attenuate and convey runoff for a storm with a magnitude equivalent to the July, 1996 event. Approximately 47.7 ac.-ft. of stormwater storage is provided within the subdivision which was developed between the late 1970’s and mid 1980’s.

An additional 19± ac.-ft. of storage would be required to bring the subdivision up to current DuPage County stormwater storage standards based on the “Unit Area Detention Volumes Based on Continuous Simulation” guidance document prepared for DuPage County by the Northeast Illinois Planning Commission.

As illustrated on Exhibit No. 9, the Steeple Run Central SR(C) and Northeast – SR(NE) perched retention ponds would be excavated to provide an additional 25 ac.-ft. of flood storage. In addition, the SR (NE) pond outlet structure would be reduced from a 24-inch RCP to a 12 inch RCP to control flow from the expanded storage facility. The outlet structure modifications for both ponds would allow for effective utilization of the additional storage provision. The Steeple Run – SR(N) retention basin overflow swale would be lowered from elevation 716.2 to 714.0 to alleviate the current high-flow conveyance restriction. Together, these structural improvements would lower flood heights in the SR(N) basin to levels less than the lowest adjacent home low-entry elevation. The estimated structural improvement cost is $600,00.

As an additional flood protection measure for extreme events (>1996), an additional emergency overflow system could potentially be constructed between the SR(N) retention basin and Rott Creek to the north. In concept, this measure would involve the installation of 2,000± feet of storm sewer, additional culvert capacity through he Burlington Northern Railroad, and the land acquisition and stormwater storage immediately north of the railroad. The estimated cost to provide this additional protection is $1,100,000. This cost is provided for information only, and is not included in the alternative project cost.

C – Century Hill Subdivision Open Space: The detention/open space areas within the subdivision (adjacent to the railroad) were evaluated for additional stormwater storage volume and flood flow reduction potential. It was determined that the existing detention/open space areas have limited additional storage capability when maintaining a gravity/flow drainage system. The close proximity to the Burlington Northern Railroad and adverse functional and aesthetic impact to the existing open space/recreational areas would significantly limit the feasibility of constructing pumped-storage facilities on the site. Given the potential impacts and negligible benefit, the site was not considered to have significant flood control potential.

D – Springhill Subdivision Open Space: This project area is the downstream on-line dry-bottom grassed detention facility of the Springhill subdivision, located north of the Burlington-Northern RR tracks as illustrated on Exhibit No. 10. It is currently a recreational park maintained by the City of Naperville Park District. This detention area is bermed from the adjacent areas and is hydraulically controlled by a weir/pipe structure. Because of the relatively flat gradient of the area, excavating the facility deeper such that significant effective storage would be obtained would preclude a gravity-drained condition. To best
utilize the storage in this location, it would be necessary to combine it with the adjacent “Farm Field” area. To maximize the storage in this location, however, the park would be lowered such that the bottom would be flat. This would exacerbate maintaining a dry park, and depending on the Park District staff or Springhill residents, this would likely need to be converted to either a wet-bottom or wetland facility.

E – Farm Field West of Springhill: This site is currently a farm field located immediately west of the Springhill subdivision detention facility, and north of the Burlington-Northern RR tracks. To best utilize the storage in this location it would be necessary to combine it with the Springhill detention area.

The increase in storage would be provided by excavation within these two areas given of the relatively small change in elevation between NWL and HWL (approximately 5.5 ft. for the July 1996 storm event). To maintain the current release rate, a similar structure to the existing one would be placed at the outflow point. Maximizing both project sites with respect to storage, results in approximately 29 acre-ft. of additional volume. Estimated Construction Cost: $1,600,000, which includes an estimated cost for acquisition of the farm but not for the Springhill detention basin.

F – Naperville County Club: As illustrated on Exhibit No. 10, this project consists of additional storage within the Naperville Country Club Golf Course, which has a tributary drainage area of approximately 242 acres. The Naperville Country Club Golf Course is located east of the Barclay Manor and Fontenaix developments. The additional storage would be provided along the existing drainage path which consists of two sequential on-line level-pool areas, and for this study are identified as the Naperville County Club East and the Naperville County Club West storage areas. The increase in storage would be provided by excavation and berming at the downstream end of each storage area to impound additional flood water. The project would not increase flows into the golf course and would provide approximately 33 acre-ft of additional stormwater storage. The hydraulic evaluation indicates that providing storage at this location results in significant flow attenuation to downstream areas. Although the area proposed for excavation and berming is within the existing golf course fairways, it appears that the project can be incorporated into the golf course layout to minimize the impact. This phase would be closely coordinated with the Naperville Country Club Board and staff. Estimated Construction Cost: $810,000 without easements.

G – Naperville County Commons Park: This project area is the existing on-line dry-bottom grasses detention area south of North Avenue. This stormwater management facility is currently maximized with respect to gravity drained storage. If the facility was converted into a wet-bottom facility by excavating from the bottom of the existing side slopes, it appears that approximately 6 acre-ft of additional storage would be gained. This site was not considered in the hydraulic evaluation due to the relatively small volume of storage that would be gained; and potential impact to wetland areas which have established the dry-bottom detention area.

H – Open Space Along Chicago Avenue: This project area is located south of Chicago Avenue and east of the Naperville County Commons overflow swale. It is currently vacant and partially forested. The site is on average approximately 10 ft higher that the flood levels which typically occur in the overflow swale near Huffman Street. The area would require
excavation to provide storage and a lift station constructed to pump water from the Huffman area to the reservoir. Several high capacity pumps may be required to convey flow during severe storm events. Due to the physical characteristics of the site and the high cost of implementing this improvement, this site was eliminated from consideration.

I – North Central College Open Space: As illustrated on Exhibit No 1, a flood control measure consisting of a low flow and extreme event conveyance relocation has been developed for the North Central College – South Campus facility. Currently, flow is conveyed through a series of storm sewers along Porter Avenue and through the track/stadium area to the West Branch DuPage River. The existing drainage system is inadequate to safely convey even moderate rainfall-runoff through the college without causing damage to the field-house, football stadium and outdoor track facilities. It is proposed to relocate the on-site storm sewer system and overflow route to the south, around the baseball field to the West Branch DuPage River. Existing on-line detention storage on-site would be maintained and enhanced and no regulatory floodplain fill would be required. It should be noted that the project would not alleviate backwater flooding on the track from the West Branch DuPage River; backwater flooding was not considered to be a significant source of damage to the track/stadium. The proposed flood control improvements alleviate flood damage potential for the field house, football stadium and track. Estimated structural improvement cost is $250,000.

J – Huffman Street Flood Control Berm: As illustrated on Exhibit No. 10, this project consists of elevating the Naperville County Commons overflow swale berm and Benton Avenue street grades to contain the design flows within the swale. The overflow swale is currently confined to a relatively narrow pathway between the top of berm located along the west side and the abutting residential properties along Greensboro and Oakleaf Courts. It does not appear physically feasible to provide the required freeboard by filling the existing west slope to obtain the desired top of berm elevation. However, flows could be contained using a stone-finished concrete wall constructed along the west side of the overflow swale. The wall would extend approximately 2 ft above the existing grade along the top of berm, and provide approximately 1 ft. of freeboard for the extreme flood events. The stone finish has been included to make the concrete wall more aesthetically pleasing.

Additionally, as part of these improvements, the Huffman Street main storm sewer which outfalls into the main channel at the southside of Chicago Avenue would be upgraded from a 30” RCP to a 42” RCP along Huffman Street. This upgrade is necessary to properly drain the Huffman Street area during the most severe storms. Also, the storm sewer below the overflow swale would be increased in size/capacity to reduce swale flows. Several inlet grates would be installed to reduce ponding along the swale. Estimated Construction Cost: $1,300,000.

A summary of six flood control alternatives that were developed based on the individual and combined site evaluations is provided below. Table 3 summarizes the estimated alternative costs and residual flood damage amounts.

Alternative No. 1 – No Action: This alternative consists of no capital improvements, buyouts or floodproofing projects to reduce flooding in the watershed, and therefore, provides no flood control benefit.
Alternative No. 2 – buyouts and Floodproofing:
This alternative would include the buyout of 37 residences which meet the County Buyout Criteria, along with the floodproofing of 20 structures. This alternative includes floodproofing the water entry points at the North Central College Field House building as one of the 20 structures referenced above. The estimated cost of this alternative is $5,714,616.

Alternative No. 3 – Projects B, J and I:
This alternative involves structural improvements projects at the Steeple Run Subdivision, Huffman Street Berm and North Central College. The results from this alternative showed increased flood elevations downstream of Chicago Avenue due to the Huffman Street Flood Control Berm Improvement (i.e. loss of storage). The estimated structural improvement cost is $2,150,000. The total estimated cost is $2,417,492 which includes one (1) buyout and two (2) floodproofing projects. Given the downstream flow increases, this alternative does not meet the requirements set forth in the County Stormwater Ordinance and has therefore been eliminated from consideration.

Alternative No. 4 – Projects B, J, I and F:
This alternative includes the project components described in Alternative No. 3 and stormwater management improvement on the Naperville Country Club property. The additional stormwater storage on the Country Club site effectively mitigates for the flood level increases due to the Huffman Street flood protection berm improvement. Estimated structural improvement cost is $2,960,000. The total estimated cost is $3,227,492 which includes one (1) buyout and two (2) floodproofing projects.

Alternative No. 5 – Projects B, J, I and D/E:
This alternative includes the project components described in Alternative No. 3 and stormwater storage improvement at the Spring Hill Subdivision and adjacent farm field. The alternative was evaluated, and although the alternative provides flow attenuation to downstream areas, there are flood evaluation increases downstream of the Huffman Street area, i.e. south of Chicago Avenue, when compared to the Baseline Condition. This alternative does not meet the requirements set forth in the DuPage County Countywide Stormwater and Flood Plain Ordinance and is therefore eliminated from consideration. However, if this alternative was combined with additional storage downstream, the flood evaluation increases could be mitigated. One of the combinations was examined under Alternative 6. Estimated structural improvement cost for the alternative is $3,750,000. The total estimated cost is $4,017,492 which includes one (1) buyout and two (2) floodproofing projects.

Alternative No. 6 – Projects B, J, I, F and D/E:
Includes the project components described in Alternative No. 3 with stormwater management improvements at the Naperville Country Club and at Spring Hill/farm field. This alternative evaluates the potential for less impact to the Country Club by including additional stormwater storage at the Spring Hill/farm field project area. The hydraulic evaluation results indicate that this project would mitigate the downstream increases in flood elevation experienced under Alternative 5. Because this alternative impacts more site locations, the total cost is estimated to be higher than either Alternatives 4 or 5. Estimated structural improvement cost for the alternative is $4,560,000. The total estimated cost is $4,827,492 which includes one (1) buyout and two (2) floodproofing projects.
Table 3

STEEPLE RUN WATERSHED
ALTERNATIVE COST SUMMARY

<table>
<thead>
<tr>
<th>ALTERNATIVE</th>
<th>STRUCTURAL IMPROVEMENT COST</th>
<th>BUYOUT COST</th>
<th>FLOOD-PROOFING COST</th>
<th>TOTAL COST</th>
<th>RESIDUAL DAMAGES</th>
<th>COUNTY COST PER DAMAGE PT. REDUCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>0</td>
<td>5,414,616</td>
<td>300,000</td>
<td>5,714,616</td>
<td>1,289,164</td>
<td>$2,366</td>
</tr>
<tr>
<td>4</td>
<td>$2,960,000</td>
<td>237,492</td>
<td>30,000</td>
<td>3,227,492</td>
<td>$81,400</td>
<td>$1,283</td>
</tr>
<tr>
<td>6</td>
<td>$4,560,000</td>
<td>237,492</td>
<td>30,000</td>
<td>4,827,492</td>
<td>$81,400</td>
<td>$1,924</td>
</tr>
</tbody>
</table>

Notes: Cost data for Alternatives 3 and 5 not provided, given that those alternatives do not meet the County Ordinance requirements.

4.0 Alternative Recommendation

For the six flood control alternatives presented herein, Alternative Nos. 3-6 provide for nearly a 100% reduction in structure and structure content damage with structural improvements along. Only one buyout and two floodproofing projects are required with these alternatives. In comparison, Alternative No. 2 would require 37 buyouts and 20 floodproofing projects to eliminate the structure and structure content damages.

Several project components were evaluated on an individual and combined structural improvement basis. Evaluation results indicate that, of the structural improvements analyzed (Alternatives 3-6), only Alternatives 4 and 6 would satisfy the County Stormwater Ordinance requirements (i.e. no downstream flood stage increases). Alternative 4 would be selected over Alternative 6 based on cost. Alternative 4 would also be selected over Alternative No. 2 based on cost, overall damage reduction benefit, and opportunity for water quality and natural resource enhancement in the watershed. Therefore, Alternative No. 4 is the recommended alternative to significantly reduce the potential for over-bank flood damage in the Steeple Run Watershed. Alternative No. 4, nor any of the other alternatives described above, will solve flooding problems due to sanitary sewer back-ups, groundwater seepage into basements, and the failure of local drainage systems.

10.0 Funding Consideration for Recommended Plan

The flooding problems identified in the Steeple Run Watershed Study meet the regional project classification criteria. Projects meeting this criteria qualify for flood control financial assistance under the County Stormwater Division Funding Plan. County stormwater funds are generally only used to construct flood control improvements and purchase properties meeting the buyout criteria. Funding is generally provided up to the level of the least cost flood control alternative. Alternative No. 4 is the least cost alternative with eligible County funding of $3,197,492. If a more costly alternative is selected, County stormwater funding levels for the projects would have to be increased and/or the difference funded through other sources.
11.0 **Implementation of Recommended Plan**

Following is a summary of issues to be addressed for implementation of the recommended flood control alternative:

- Public Review and Comment Period in accordance with the DuPage County Stormwater Management Plan.
- Stormwater Committee approval of Final Watershed Plan.
- DuPage County Board approval of Final Watershed Plan.
- Obtain approval and flood easements from property owners of the proposed structural improvement sites and resolve any conceptual design/proposed improvement configuration issues.
- Refine basis-of-design analyses and complete Final Engineering Design for the structural improvement projects.
- Obtain required permits from the regulatory community.
- Implement proposed structural improvements.
- Proceed with voluntary buyouts based on available County funding.
- Provide technical assistance to property owners which may require floodproofing.
<table>
<thead>
<tr>
<th>LOCATION</th>
<th>FEQ NODE</th>
<th>WATER SURFACE ELEVATION (FT.)</th>
<th>OBSERVED</th>
<th>SIMULATED</th>
</tr>
</thead>
<tbody>
<tr>
<td>North Central College Overflow @ Track</td>
<td>F2</td>
<td>675.6±</td>
<td>675.9</td>
<td></td>
</tr>
<tr>
<td>Julian Street/Porter Avenue</td>
<td>D10</td>
<td>687.0</td>
<td>686.9</td>
<td></td>
</tr>
<tr>
<td>Huffman Street</td>
<td>F18</td>
<td>693.5</td>
<td>693.4</td>
<td></td>
</tr>
<tr>
<td>Spring Hill Detention Basin</td>
<td>F38</td>
<td>700.6</td>
<td>700.6</td>
<td></td>
</tr>
<tr>
<td>Century Hill (N) Basin</td>
<td>F94</td>
<td>715.6</td>
<td>715.9</td>
<td></td>
</tr>
<tr>
<td>Steeple Run (N) Basin</td>
<td>F104</td>
<td>717.4</td>
<td>717.5</td>
<td></td>
</tr>
</tbody>
</table>
## TABLE 2

STEEPLE RUN WATERSHED
BASELINE CONDITION FLOOD DAMAGE SUMMARY

<table>
<thead>
<tr>
<th>DAMAGE CATEGORY</th>
<th>DEC-2 DAMAGES</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) RESIDENTIAL DAMAGES</td>
<td></td>
</tr>
<tr>
<td>- Building Structure &amp; Contents</td>
<td>$2,386,137</td>
</tr>
<tr>
<td>- Associated Damages *</td>
<td>$650,617</td>
</tr>
<tr>
<td>- Emergency Services **</td>
<td>$119,307</td>
</tr>
<tr>
<td>Sub-Total (Residential Damages)</td>
<td>$3,156,061</td>
</tr>
<tr>
<td>2) NORTH CENTRAL COLLEGE DAMAGES</td>
<td>$3,785,182</td>
</tr>
<tr>
<td>3) TRAFFIC DAMAGES</td>
<td>$69,550</td>
</tr>
<tr>
<td><strong>TOTAL QUANTIFIABLE DAMAGES</strong></td>
<td>$7,010,793</td>
</tr>
</tbody>
</table>

Number of Structures Flooded (including detached garages)*** 71

---

* Damages to lawns, landscaping, gardens, residential traffic disruption, etc.

** Assumed to be 5% of building structure and contents damages.

*** Number of structures in the economic data-set that would incur structural and/or structure content damages during at least one event in the historical storm series.
# Table 3

**Steeple Run Watershed Alternative Cost Summary**

<table>
<thead>
<tr>
<th>ALTERNATIVE</th>
<th>Structural Improvement Cost</th>
<th>Buyout Cost</th>
<th>Flood-proofing Cost</th>
<th>Total Cost</th>
<th>Residual Damages</th>
<th>County Cost per Damage Pt. Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>$7,010,793</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>0</td>
<td>$5,414,616</td>
<td>$300,000</td>
<td>$5,714,616</td>
<td>$1,289,164</td>
<td>$2,366</td>
</tr>
<tr>
<td>4</td>
<td>$2,960,000</td>
<td>$237,492</td>
<td>$30,000</td>
<td>$3,227,492</td>
<td>$81,400</td>
<td>$1,283</td>
</tr>
<tr>
<td>6</td>
<td>$4,560,000</td>
<td>$237,492</td>
<td>$30,000</td>
<td>$4,827,492</td>
<td>$81,400</td>
<td>$1,924</td>
</tr>
</tbody>
</table>

*Notes: Cost data for Alternatives 3 and 5 not provided, given that those alternatives do not meet the County Ordinance requirements.*
Background

This document presents the Tributary No. 1 to the West Branch of the DuPage River (TRIB 1) Watershed Plan which has been prepared by V3 Consultants and the DuPage County Department of Development and Environmental Concerns (DEC) at the direction of the DuPage County Stormwater Management Committee (SWMC). This Watershed Plan has been completed in accordance with the criteria and standards established by the SWMC in the DuPage County Stormwater Management Plan, adopted September 1989. The TRIB 1 Watershed Plan characterizes existing problems with flooding, fragmentation of riparian habitat, and water quality, and identifies a project within the watershed to reduce flood hazards, enhance the riparian habitat corridor, and improve water quality. Once this plan has been accepted and approved by the SWMC and the DuPage County Board, the plan will be incorporated into the watershed plan for the West Branch of the DuPage River.

Watershed Characteristics

The TRIB 1 watershed covers approximately 2.7 square miles. The TRIB 1 drainage system consists of Tributary No. 1 to the West Branch of the DuPage River (TRIB 1 Main Stem) with five tributaries to the TRIB 1 Main Stem. Most of the watershed is unincorporated, although portions are incorporated into Bloomingdale to the south, and Hanover Park and Roselle to the north. The watershed boundary in general extends from Lake Street in the north to roughly Schick Road in the south, to the West Branch of the DuPage River to the west. The western portion of the watershed is primarily contained in the Mallard Lake Forest Preserve. The eastern portion of the watershed is mainly residential.

Problem Areas

Potential flood-prone areas were identified during hydrologic, hydraulic, and economic analyses of the watershed using existing (1990) land use conditions. Site investigations were conducted to identify ecological problem areas that result in fragmentation of the riparian habitat corridor. In addition, water quality problem areas were identified, where there is little buffer between the stream and areas of sediment and pollutant input into the system. Three major problem areas were identified. These three major problem areas (outlined below) and other minor problem areas are discussed in detail in Section 5 of the TRIB 1 Watershed Plan.

1. **TRIB 1 Main Stem – Gary Avenue to Cloverdale Road.** This reach of the TRIB 1 Main Stem is highly channelized and is a problem area for water quality and
riparian corridor fragmentation. Channelized streams tend to have little in-stream structural diversity, which is typically requisite for a healthy aquatic community. For the eastern half of this reach, the creek is directly adjacent to Foster Avenue, and the riparian corridor is entirely contained within the channel banks. It resembles a roadside ditch, with a few trees or other natural vegetation buffering the channel from Foster Avenue runoff.

Because there is mostly undeveloped land surrounding the channel in this reach, there is little flood damage in the immediate area, except for minor flood damage estimated on two properties. However, riparian restoration of this area has good potential to extend riparian habitat from the critical habitat located east of Gary Avenue, and improve water quality.

2. **TRIB 1 Main Stem – Argyle/Papworth Intersection Area.** In this reach, the TRIB 1 Main Stem flows through two culverts, one under Argyle Avenue and one under Papworth Street, within close proximity to each other. Many properties near the intersection of Argyle Avenue and Papworth Street experience overbank flooding. This area has the most potential to incur flood damages as well, for a total of approximately $545,000 of estimated flood damages.

Between the culverts, the creek is highly channelized and unnatural in configuration. It exists as a ditch along the roadsides, and does not possess a natural floodplain community. Because of the close proximity of the creek with the roads, there is direct salt spray and runoff of roadway pollutants into the creek. The floodplain corridor encompasses several residential lots in this area including existing buildings, driveways, and yards. This area separates the floodplain wetland areas to the east from the critical habitat west of Keeney Road, and severely disrupts the continuity of the habitat corridor. Acquisition of flood-prone properties and riparian restoration of this area has good potential to increase continuity of the riparian habitat corridor, improve water quality, and decrease flood damages.

3. **TRIB 1 Main Stem – Keeneyville Drainage Improvements – Lake Street, Thorn Avenue, and Cloverdale Road.** Flooding problems currently exist in the low-lying areas around Lake Street and Thorn Avenue due to the inadequate capacity of the existing storm sewer system to convey the stormwater runoff produced in a 100-year design storm event. Storm runoff accumulates in low-lying areas until it finds a natural overflow route, and residents located near low-lying areas or in the path of overflow routes are subsequently exposed to flooding damages. A more comprehensive analysis of this area is outlined in the Keeneyville Drainage Relief Project Phase I Design Report by SDI Consultants, Ltd. (preceding name of V3 Consultants) dated June 2000.
Recommended Plan and Development

The goals of the recommended plan are to decrease simulated damages from floods in the period of record, enhance the riparian habitat corridor, and improve water quality with the watershed.

Preferred Alternative: Alternatives 1A, 1B, 2B, 4, 5, & 7B:

Implementation of the preferred alternatives (1A, 1B, 2B, 4, 5, & 7B) would facilitate fullest achievement of all three goals of this watershed plan – flood damage reduction, riparian habitat corridor enhancement, and water quality improvement.

Total Historical Damages: $546,500 (not including traffic damages)

Description of Preferred Alternative:

- Riparian restoration between Gary Avenue and Cloverdale Road (Alternatives 1A and 1B);
- Termination of Papworth Street and riparian restoration of the Argyle/Papworth intersection area (Alternative 2B);
- Riparian buffer enhancement along the entire corridor through native plantings and education and coordination with adjacent property owners (Alternative 4);
- Implementation of Best Management Practices throughout the watershed to improve water quality (Alternative 5)
- Improvement of Storm Sewer system along Lake Street and Cloverdale Road with compensatory storage in the proposed Cambridge Home development’s detention pond.

Benefits:

1. Flood Damage Reduction. The implementation of the preferred alternative is predicted to reduce estimated flood damages by $545,200, from approximately $546,000 to only $1,643 (Table 4-2). This is primarily due to acquisition of the two structures under Alternative 2B that are subject to most of the estimated damages under existing conditions. These two structures are eligible for buyout according to DuPage County criteria.

2. Flood Peak Reductions. Implementation of the preferred alternative is projected to decrease maximum peak flood elevations along most of the TRIB 1 Main Stem, as well as decreasing maximum flow rates and velocities along most of the creek.

3. Enhancing Riparian Habitat Corridor. In addition to the benefits associated with reducing flood damages, implementation of the preferred alternative provides the most complete alternative for enhancing the entire riparian habitat corridor. It would restore the two reaches (Alternatives 1 and 2) that are currently responsible
for the most habitat corridor fragmentation. It would also increase the effective area of existing riparian habitat patches by increasing native riparian buffer plantings (Alternative 4). In doing so, it would provide a synergistic effect for increasing the functions and values of the riparian habitat corridor as a whole.

4. Water Quality Improvement. Similarly, implementation of the preferred alternative provides the most complete alternative for improving water quality. It would result in increasing the amount of floodplain wetland under Alternatives 1 and 2, re-vegetating the floodplain corridor with native species, and thus increasing the biofiltration of floodwater during storm events. By reconstructing the creek in Problem Areas 1 and 2, this alternative would also reduce contract between the creek and known water quality problem sources such as roads. This would reduce direct salt spray and runoff of roadway pollutants, sediments, and nutrients into the creek, and create a natural filtration buffer between the remaining water quality problem sources (i.e. roads) and the creek. In addition, implementation of Best Management Practices to reduce erosion around detention pond perimeters (Alternative 5) would complement these other activities to improve water quality and provide the greatest overall result.

In general, implementation of the preferred alternative would facilitate fullest achievement of all three goals of this watershed plan – flood damage reduction, riparian habitat corridor enhancement, and water quality improvement.

**Estimated Capital Costs:** Approximately $2,705,000.

**Residual Flood Damages:** $1,643

**Implementation of Recommended Plan**

The following steps should be completed in order to implement the recommended plan:

- The public review process must be successfully completed, and the Watershed Plan must be adopted by the County Board;

- A public notice should be published regarding the voluntary buyout program;

- Since the long-term success of the watershed plan depends on participatory involvement of the property owners, all interested property owners should be included in the planning stages of specific aspects of the recommended plan through a modified public meeting/hearing process and education materials;

- Funds for the various aspects of the recommended plan should be approved;

- Final design of the riparian restoration areas should be performed;

- Acquisition of specified properties should be performed;
• Priority construction of recommended activities should be commenced in the order of importance as presented below. The order of priority was determined based on the severity of the flooding estimated and reported by property owners.

1. Construction of relief storm sewer to serve the Lake Street, Thorn Avenue, and Cloverdale Road area,
2. Demolition of the acquired structures,
3. Removal of a portion of Papworth Street,
4. Reconstruction of the riparian corridor from east of Papworth Street to Argyle Road,
5. Reconstruction of the riparian corridor from Gary Avenue to Cloverdale Road,
6. Implementation of a riparian buffer program, and
## DEC-2 Economic Analysis Summary Table

**Tributary No. 1 to the West Branch of the DuPage River**

<table>
<thead>
<tr>
<th>DEC-2 ID</th>
<th>Structure Type</th>
<th>1st Floor El. (ft)</th>
<th>Zero Damage El. (ft)</th>
<th>Structure Value</th>
<th>Contents Value</th>
<th>Low Entry El. (ft)</th>
<th>Max. Structure Depth of Flooding (ft)</th>
<th>Estimated Damages</th>
<th>Type of Flood Protection</th>
<th>Cost of Buyouts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existing Condition</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W1-T2</td>
<td>D4</td>
<td>776.4</td>
<td>768.4</td>
<td>$96,330</td>
<td>$28,899</td>
<td>770</td>
<td>0</td>
<td>$0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>W1-AR4</td>
<td>B</td>
<td>774.5</td>
<td>770.5</td>
<td>$142,320</td>
<td>$42,696</td>
<td>774.5</td>
<td>0</td>
<td>$0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>W1-AR5</td>
<td>B</td>
<td>773</td>
<td>769</td>
<td>$90,450</td>
<td>$27,135</td>
<td>773</td>
<td>1.11</td>
<td>$470,423</td>
<td>Residual</td>
<td></td>
</tr>
<tr>
<td>W1-AR5G</td>
<td>D</td>
<td>773</td>
<td>773</td>
<td>$45,000</td>
<td>$15,000</td>
<td>773</td>
<td>1.11</td>
<td>$74,586</td>
<td>Residual</td>
<td></td>
</tr>
<tr>
<td>W1-K8G2</td>
<td>G</td>
<td>774.06</td>
<td>774.06</td>
<td>$6,500</td>
<td>$1,950</td>
<td>774.06</td>
<td>0.05</td>
<td>$270</td>
<td>Residual</td>
<td></td>
</tr>
<tr>
<td>W1-GD4G</td>
<td>G</td>
<td>776.92</td>
<td>776.92</td>
<td>$6,500</td>
<td>$1,950</td>
<td>776.92</td>
<td>0.34</td>
<td>$1,215</td>
<td>Residual</td>
<td></td>
</tr>
<tr>
<td>Total:</td>
<td></td>
<td></td>
<td></td>
<td>$546,494</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Alternative 1A

<table>
<thead>
<tr>
<th>DEC-2 ID</th>
<th>Structure Type</th>
<th>1st Floor El. (ft)</th>
<th>Zero Damage El. (ft)</th>
<th>Structure Value</th>
<th>Contents Value</th>
<th>Low Entry El. (ft)</th>
<th>Max. Structure Depth of Flooding (ft)</th>
<th>Estimated Damages</th>
<th>Type of Flood Protection</th>
<th>Cost of Buyouts</th>
</tr>
</thead>
<tbody>
<tr>
<td>W1-T2</td>
<td>D4</td>
<td>776.4</td>
<td>768.4</td>
<td>$96,330</td>
<td>$28,899</td>
<td>770</td>
<td>0</td>
<td>$453</td>
<td>Residual</td>
<td></td>
</tr>
<tr>
<td>W1-AR4</td>
<td>B</td>
<td>774.5</td>
<td>770.5</td>
<td>$142,320</td>
<td>$42,696</td>
<td>774.5</td>
<td>0</td>
<td>$2</td>
<td>Residual</td>
<td></td>
</tr>
<tr>
<td>W1-AR5</td>
<td>B</td>
<td>773</td>
<td>769</td>
<td>$90,450</td>
<td>$27,135</td>
<td>773</td>
<td>1.11</td>
<td>$470,283</td>
<td>Residual</td>
<td></td>
</tr>
<tr>
<td>W1-AR5G</td>
<td>D</td>
<td>773</td>
<td>773</td>
<td>$45,000</td>
<td>$15,000</td>
<td>773</td>
<td>1.11</td>
<td>$74,464</td>
<td>Residual</td>
<td></td>
</tr>
<tr>
<td>W1-K8G2</td>
<td>G</td>
<td>774.06</td>
<td>774.06</td>
<td>$6,500</td>
<td>$1,950</td>
<td>774.06</td>
<td>0.05</td>
<td>$270</td>
<td>Residual</td>
<td></td>
</tr>
<tr>
<td>W1-GD4G</td>
<td>G</td>
<td>776.92</td>
<td>776.92</td>
<td>$6,500</td>
<td>$1,950</td>
<td>776.92</td>
<td>0.34</td>
<td>$1,215</td>
<td>Residual</td>
<td></td>
</tr>
<tr>
<td>Total:</td>
<td></td>
<td></td>
<td></td>
<td>$546,687</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Alternative 1B

<table>
<thead>
<tr>
<th>DEC-2 ID</th>
<th>Structure Type</th>
<th>1st Floor El. (ft)</th>
<th>Zero Damage El. (ft)</th>
<th>Structure Value</th>
<th>Contents Value</th>
<th>Low Entry El. (ft)</th>
<th>Max. Structure Depth of Flooding (ft)</th>
<th>Estimated Damages</th>
<th>Type of Flood Protection</th>
<th>Cost of Buyouts</th>
</tr>
</thead>
<tbody>
<tr>
<td>W1-T2</td>
<td>D4</td>
<td>776.4</td>
<td>768.4</td>
<td>$96,330</td>
<td>$28,899</td>
<td>770</td>
<td>0</td>
<td>$453</td>
<td>Residual</td>
<td></td>
</tr>
<tr>
<td>W1-AR4</td>
<td>B</td>
<td>774.5</td>
<td>770.5</td>
<td>$142,320</td>
<td>$42,696</td>
<td>774.5</td>
<td>0</td>
<td>$2</td>
<td>Residual</td>
<td></td>
</tr>
<tr>
<td>W1-AR5</td>
<td>B</td>
<td>773</td>
<td>769</td>
<td>$90,450</td>
<td>$27,135</td>
<td>773</td>
<td>1.11</td>
<td>$470,423</td>
<td>Residual</td>
<td></td>
</tr>
<tr>
<td>W1-AR5G</td>
<td>D</td>
<td>773</td>
<td>773</td>
<td>$45,000</td>
<td>$15,000</td>
<td>773</td>
<td>1.11</td>
<td>$74,586</td>
<td>Residual</td>
<td></td>
</tr>
<tr>
<td>W1-K8G2</td>
<td>G</td>
<td>774.06</td>
<td>774.06</td>
<td>$6,500</td>
<td>$1,950</td>
<td>774.06</td>
<td>0.05</td>
<td>$270</td>
<td>Residual</td>
<td></td>
</tr>
<tr>
<td>W1-GD4G</td>
<td>G</td>
<td>776.92</td>
<td>776.92</td>
<td>$6,500</td>
<td>$1,950</td>
<td>776.92</td>
<td>0.34</td>
<td>$1,215</td>
<td>Residual</td>
<td></td>
</tr>
<tr>
<td>Total:</td>
<td></td>
<td></td>
<td></td>
<td>$546,949</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Alternative 2A

<table>
<thead>
<tr>
<th>DEC-2 ID</th>
<th>Structure Type</th>
<th>1st Floor El. (ft)</th>
<th>Zero Damage El. (ft)</th>
<th>Structure Value</th>
<th>Contents Value</th>
<th>Low Entry El. (ft)</th>
<th>Max. Structure Depth of Flooding (ft)</th>
<th>Estimated Damages</th>
<th>Type of Flood Protection</th>
<th>Cost of Buyouts</th>
</tr>
</thead>
<tbody>
<tr>
<td>W1-T2</td>
<td>D4</td>
<td>776.4</td>
<td>768.4</td>
<td>$96,330</td>
<td>$28,899</td>
<td>770</td>
<td>0.02</td>
<td>$549</td>
<td>Residual</td>
<td></td>
</tr>
<tr>
<td>W1-AR4</td>
<td>B</td>
<td>774.5</td>
<td>770.5</td>
<td>$142,320</td>
<td>$42,696</td>
<td>774.5</td>
<td>0</td>
<td>$0</td>
<td>Buyout</td>
<td>$185,000</td>
</tr>
<tr>
<td>W1-AR5</td>
<td>B</td>
<td>773</td>
<td>769</td>
<td>$90,450</td>
<td>$27,135</td>
<td>773</td>
<td>0</td>
<td>$0</td>
<td>Buyout</td>
<td>$130,500</td>
</tr>
<tr>
<td>W1-AR5G</td>
<td>D</td>
<td>773</td>
<td>773</td>
<td>$45,000</td>
<td>$15,000</td>
<td>773</td>
<td>0</td>
<td>$0</td>
<td>Buyout</td>
<td></td>
</tr>
<tr>
<td>W1-K8G2</td>
<td>G</td>
<td>774.06</td>
<td>774.06</td>
<td>$6,500</td>
<td>$1,950</td>
<td>774.06</td>
<td>0</td>
<td>$0</td>
<td>Change</td>
<td></td>
</tr>
<tr>
<td>W1-GD4G</td>
<td>G</td>
<td>776.92</td>
<td>776.92</td>
<td>$6,500</td>
<td>$1,950</td>
<td>776.92</td>
<td>0.34</td>
<td>$1,212</td>
<td>Residual</td>
<td></td>
</tr>
<tr>
<td>Total:</td>
<td></td>
<td></td>
<td></td>
<td>$1,761</td>
<td></td>
<td></td>
<td></td>
<td>$315,500</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## DEC-2 Economic Analysis Summary Table (cont)

<table>
<thead>
<tr>
<th>DEC-2 ID</th>
<th>Structure Type</th>
<th>1st Floor El. (ft)</th>
<th>Zero Damage El. (ft)</th>
<th>Structure Value</th>
<th>Contents Value</th>
<th>Low Entry El. (ft)</th>
<th>Max. Structure Depth of Flooding (ft)</th>
<th>Estimated Damages</th>
<th>Type of Flood Protection</th>
<th>Cost of Buyouts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alternative 2B</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W1-T2</td>
<td>D4</td>
<td>776.4</td>
<td>768.4</td>
<td>$96,330</td>
<td>$28,899</td>
<td>770</td>
<td>0</td>
<td>$424</td>
<td>Residual</td>
<td>$185,000</td>
</tr>
<tr>
<td>W1-AR4</td>
<td>B</td>
<td>774.5</td>
<td>770.5</td>
<td>$142,320</td>
<td>$42,696</td>
<td>774.5</td>
<td>0</td>
<td>$0</td>
<td>Buyout</td>
<td>$130,500</td>
</tr>
<tr>
<td>W1-AR5</td>
<td>B</td>
<td>773</td>
<td>769</td>
<td>$90,450</td>
<td>$27,135</td>
<td>773</td>
<td>0</td>
<td>$0</td>
<td>Buyout</td>
<td>$130,500</td>
</tr>
<tr>
<td>W1-AR5G</td>
<td>D</td>
<td>773</td>
<td>773</td>
<td>$45,000</td>
<td>$15,000</td>
<td>773</td>
<td>0</td>
<td>$0</td>
<td>Buyout</td>
<td>$130,500</td>
</tr>
<tr>
<td>W1-K8G2</td>
<td>G</td>
<td>774.06</td>
<td>774.06</td>
<td>$6,500</td>
<td>$1,950</td>
<td>774.06</td>
<td>0</td>
<td>$0</td>
<td>No Damage</td>
<td>$130,500</td>
</tr>
<tr>
<td>W1-GD4G</td>
<td>G</td>
<td>776.92</td>
<td>$777</td>
<td>$6,500</td>
<td>1950</td>
<td>776.92</td>
<td>0.35</td>
<td>$1,219</td>
<td>Residual</td>
<td>$315,500</td>
</tr>
<tr>
<td>Preferred Alternative</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W1-T2</td>
<td>D4</td>
<td>776.4</td>
<td>768.4</td>
<td>$96,330</td>
<td>$28,899</td>
<td>770</td>
<td>0</td>
<td>$424</td>
<td>Residual</td>
<td>$185,000</td>
</tr>
<tr>
<td>W1-AR4</td>
<td>B</td>
<td>774.5</td>
<td>770.5</td>
<td>$142,320</td>
<td>$42,696</td>
<td>774.5</td>
<td>0</td>
<td>$0</td>
<td>Buyout</td>
<td>$130,500</td>
</tr>
<tr>
<td>W1-AR5</td>
<td>B</td>
<td>773</td>
<td>769</td>
<td>$90,450</td>
<td>$27,135</td>
<td>773</td>
<td>0</td>
<td>$0</td>
<td>Buyout</td>
<td>$130,500</td>
</tr>
<tr>
<td>W1-AR5G</td>
<td>D</td>
<td>773</td>
<td>773</td>
<td>$45,000</td>
<td>$15,000</td>
<td>773</td>
<td>0</td>
<td>$0</td>
<td>Buyout</td>
<td>$130,500</td>
</tr>
<tr>
<td>W1-K8G2</td>
<td>G</td>
<td>774.06</td>
<td>774.06</td>
<td>$6,500</td>
<td>$1,950</td>
<td>774.06</td>
<td>0</td>
<td>$0</td>
<td>No Damage</td>
<td>$130,500</td>
</tr>
<tr>
<td>W1-GD4G</td>
<td>G</td>
<td>776.92</td>
<td>$777</td>
<td>$6,500</td>
<td>1950</td>
<td>776.92</td>
<td>0.35</td>
<td>$1,219</td>
<td>Residual</td>
<td>$315,500</td>
</tr>
</tbody>
</table>

**TOTAL: $1,636**

**TOTAL: $1,643**
Overview

The purpose of this report is to summarize the results of a comprehensive stormwater watershed study and preliminary engineering analysis performed for Tributary No. 4 of the West Branch DuPage River; and to recommend the modifications necessary to upgrade the Wayne Oaks Lake/Dam to meet IDOT-DWR Dam Safety regulations. The preliminary engineering analysis was performed on the entire Tributary No. 4 watershed with detailed emphasis on the Wayne Oaks Lake/Dam, and the resulting recommended capital improvement plan addresses measures: to reduce both structural and street flooding within the watershed; and to upgrade the Wayne Oaks Lake/Dam to meet Dam Safety regulations. The recommended alternative plan presented in this report, upon approval and acceptance by the DuPage County Stormwater Management Committee, and County Board, will be a component of the West Branch DuPage River Watershed Plan.

Watershed Description

The Tributary No. 4 Watershed is located in central DuPage County and drains approximately 2.86 square miles of area within the Village of Carol Stream (approximately two-thirds) and Unincorporated DuPage County where it meets with the West Branch of the DuPage River. In general, the tributary within the Unincorporated area is an open-channel, while within the Village of Carol Stream the drainage network generally consists of stormwater reservoir/detention ponds and connecting storm sewers.

Public Involvement and Study Area Problems

A questionnaire related to stormwater issues (e.g., occurrence of flooding, depth of flooding, source of flooding, damage of flooding, etc.) was distributed to all property/homeowners that were adjacent to: the stream; any recorded drainage easement; or any stormwater detention facility. The resident living in the unincorporated area of the watershed along Timber Lane (Wayne Oaks subdivision) report in the submitted questionnaires that, in general, they have flooded more frequently in the past five years or so than in the preceding 15 years.

Two major problems have been identified in the Unincorporated DuPage County area of the watershed: one, the residential homes along Timber Lane and adjacent to Tributary No. 4 historically are damaged by frequent and severe overbank flooding; and two, the existing Wayne Oaks Lake/Dam needs to be upgraded to meet current IDOT-DWR Dam Safety permitting criteria.
No building damage from overbank flooding was reported in the Village of Carol Stream homes. However, during the August 13-14, 1987 rainfall event the online stormwater detention facilities for the Shining Waters subdivision and for the Shenandoah Valley subdivision, and the associated roads Evergreen Drive, Bike Path, Birchbark Trail, Morton Road, Ridge Trail, Shenandoah Drive, and County Farm Road were overtopped. It should be noted that all developed areas of the Village of Carol Stream within the Tributary No. 4 watershed have stormwater detention facilities, and the results of the watershed study indicate these facilities, when properly maintained, function as designed.

**Recommended Improvement Plan**

The following flood control projects are to be included as part of the Tributary No. 4 capital improvement plan:

- Improve the earthen embankment and replace the existing corrugated-metal pipe at the Wayne Oaks Lake/Dam outlet with a concrete weir control structure.

- Replace the three culverts at Treetops (Van Kampen Estate), downstream of the dam.

- Excavate the Wayne Oaks Lake/Dam site and the public property of Dogwood Park, which is adjacent and immediately north, to provide the necessary compensatory storage to mitigate the downstream stage and flow increases, which would result from the construction of the two above-referenced flood control projects.

- Replace the North Avenue culverts as part of the proposed Route 64 (North Avenue) widening project. The inclusion of this project in the recommended plan as a cost-effective flood control measure depends upon having IDOT – Division of Highways schedule the replacement concurrent with the road improvement for that area and incur the associated costs. The compensatory storage requirements for this project could be provided at the Wayne Oaks Lake/Dam – Dogwood Park site.

**Benefits:** Dam Safety requirements will be met. The economic impacts include the removal and/or reduction in frequency and magnitude of damage to structures, roads, and septic systems.

**Project Funding:**

The modifications required to the Wayne Oaks Lake/Dam by IDOT-DWR Dam Safety ($500,000) will be funded by the Drainage Committee under the DuPage County Corporate Drainage Fund (01-210) since this is the Unincorporated County maintenance responsibility.
The expansion of the flood control facility and replacement of the downstream culverts provides a regional benefit as classified by the Stormwater Committee and the DuPage County Stormwater and Floodplain Ordinance. As a Regional Stormwater Project, the flood control portion ($500,000) is to be funded through the DuPage County Stormwater Management Projects Fund (04-205) and the DuPage County Stormwater Project Fund (46-211).

The costs associated with the North Avenue culvert replacement will be incurred by IDOT-Highways under the North Avenue (Illinois Route 64) right-of-way improvements project.

Maintenance

According to a preliminary maintenance agreement drafted by DCDEC, the Village of Carol Stream will perform the maintenance within its jurisdictional limits; the Wayne Township Highway Department, which currently maintains the unincorporated DuPage County area of the Wayne Oaks Lake/Dam site, will be responsible for routine maintenance of the embankment and surrounding area within the dedicated drainage easements; and Unincorporated DuPage County will be responsible for the remedial maintenance and replacement costs within the unincorporated DuPage County area.

Report

The watershed study and flood control plan report includes five volumes: Volume I – Report, Volume II – Exhibits, Volume III – Appendices, Volume IV – Technical Appendices, and Volume V – Economic Survey Appendices. Copies of these are available for public review at:

DuPage County Department of Environmental Concerns
421 North County Farm Road
Wheaton, IL 708-682-7130
Executive Summary

Overview

The purpose of this report is to summarize the watershed study performed for Winfield Creek, a tributary to the West Branch DuPage River. An assessment of the existing flooding problems within the Winfield Creek watershed was completed, various structural and non-structural flood reduction alternatives were evaluated, and a recommended capital improvement plan was developed. A wetland mitigation bank has been established within this watershed at three locations: Lincoln Marsh, Northside Park and Community Park. A separate study was performed by the DuPage County Department of environmental Concerns (DCDEC) to evaluate the wetland habitat and recommend preliminary master plans for the three sites. The hydraulic impacts of the wetland banking sites were evaluated as part of this study. Northside Park is owned and maintained by the Wheaton Park District; Lincoln Marsh is jointly owned by the DuPage County Forest Preserve District and the Wheaton Park District, and maintained by the Wheaton Park District with review authority by the DC Forest Preserve District; and Community Park is owned by the Village of Carol Stream and maintained by the Wheaton Park District.

The recommended capital improvement plan presented in this report addresses measures to reduce both structural and street overbank flooding within the entire 8.3 square mile watershed. The recommended capital improvement plan, upon approval and acceptance by the DuPage County Stormwater Management Committee, and county Board, will be a component of the West Branch DuPage River Watershed Plan.

Watershed Description

The Winfield Creek watershed, shown in Figure 1 (p.ES17), is located in central DuPage County and drains approximately 8.3 square miles of area within the Villages of Winfield, Carol Stream, Glen Ellyn, and Glendale Heights, the City of Wheaton, and Unincorporated DuPage County. The watershed generally consists of residential and commercial development, and undeveloped areas comprised mostly of Park District properties, Forest Preserve District properties and community parks.

The Upper Winfield Creek Basin, shown in Figure 2 (p.ES18), for purposes of DuPage County watershed planning is defined to be the headwaters of Winfield Creek down to the intersection of Bloomingdale Road and St. Charles Road. The upper basin, which once was a series of wetlands and natural drainage channels, has been converted by development into a series of storage basins and storm sewer systems with overflow paths.

The only "natural" wetland left in this part of the watershed is the Olive Court wetland at the northwest corner of North Avenue and Bloomingdale Road in Bloomingdale Township. This wetland has been severely degraded by
Executive Summary

development, sedimentation and filling over the years. It serves as detention storage and flood control for two older subdivisions that were built before stormwater detention was required: Glen Hill in the Village of Glendale Heights and Glen Ellyn Countryside in unincorporated DuPage County.

The open-channel component of Winfield Creek begins at Bloomingdale Road south of St. Charles Road. Between Bloomingdale Road and Community Park, the floodplain is relatively unencroached, and a tributary originating at North Avenue enters immediately upstream of the park. Community Park, the most upstream wetland banking site, has flood elevations controlled by the culvert under Geneva Road. The creek then flows through the backyards of several City of Wheaton property owners before reaching Main Street (City of Wheaton). Further downstream is Northside Park, the next wetland site, which during major storm events influences flood elevations at Main Street. The most downstream proposed wetland banking site is Lincoln Marsh which is adjacent to Northside Park. The Illinois Prairie Path bisects Lincoln marsh into Lincoln Marsh North and Lincoln Marsh South, and the culvert crossing under the Prairie Path controls the higher flood elevations for Lincoln Marsh North. The flows then proceed downstream through several residential and industrial properties to the Chicago Northwestern Railroad crossing.

Between the railroad tracks and Roosevelt Road is a densely developed residential area where Winfield Creek flows through the backyards. Further downstream and just west of St. Francis High School, is the Belleau Woods Forest Preserve, a densely wooded area owned and maintained by the DuPage County Forest Preserve District.

Between Roosevelt and Manchester Roads there is some development west of the creek and east of East Street and a large undeveloped area comprised of generally small lots. There is no road access for many of these vacant lots. There are a few large undeveloped lots downstream of Manchester Road that have recreational facilities, some of which are owned by DuPage County. The remaining channel reach down to the confluence with the West Branch DuPage River includes mostly residential lots within the fringe areas of downtown Winfield.
Executive Summary

Public Involvement and Study Area Flooding Problems

A questionnaire related to flooding damages and stormwater issues (e.g., occurrences of flooding, depth of flooding, source of flooding, damage of flooding, etc.) was distributed to all property/home owners that were adjacent to the stream or major stormwater detention facilities. From the approximately 1200 questionnaires that were distributed, a total of 155 responses were received of which there was at least once occurrence (total number given in parentheses) of each of the following types of flooding: basement (15), yard (47), crawl space (2), street (5) sewer backup (44) garage (2), and seepage (20). These flooding problems are documented by community in the report, however, the main emphasis of the recommended capital improvement plan is to reduce, or eliminate where feasible, building structural and main roadway flooding damages. Some of the reported occurrences were determined to be local problems, in which case DuPage County Stormwater Management Plan states that it is the responsibility of the municipality to apply local policies and standards to resolve the problems.

A public information meeting was held to present the study purpose and components, and provide a forum for the audience to comment on the study. Comments given during this meeting or included on the questionnaires that provided insight to the location and cause of existing flooding were used in the study during the evaluation of the various flood mitigation alternatives.

Several major flooding problems have been identified in the watershed:

1. At the confluence with the West Branch DuPage River (WBDR) within the Village of Winfield, flood elevations are influenced by the WBDR impacting the reach between the confluence and Church Street.

2. Between Church Street and Roosevelt Road (at Shaffner) there are several residential structures that experience overbank flooding and sanitary sewer back-up due to their proximity to the floodplain and relative low elevation with respect to the flood elevation (BFE).

3. Between Roosevelt Road (upstream crossing) and the Prairie Path the same situation as in (2) exists, however. The sanitary sewer backup is reportedly a more common problem.

4. At Main Street (City of Wheaton) there are several businesses that experience overbank flooding due to the inability of the drainage system to convey the flows from three major sources (Winfield Creek main stem, and two main storm sewer lines).
5. There were two major roads that overtopped where Winfield Creek crosses the embankments, and were barricaded during the August 1972 and August 1987 storm events: Gary Avenue and Main Street (City of Wheaton). These roads and several other minor roads also overtopped during the historical storm series (1949-1988).

6. Between the intersection of Bloomingdale Road and St. Charles Road and the Great Western Trail there is a secluded residential area that floods periodically. Several developed properties lie in depressional zones that also serve as an overflow path for upstream flood waters. This flow path comes under the Great Western Trail embankment through an old stone archway commonly known as the “cattle crossing”.

7. Problem areas in Upper Winfield Creek include the Olive Court wetland area and the Glen Hill School depressional area north of Burdett Avenue. Both of these are depressional areas which overflow during extreme events to flood neighboring houses, septic fields, and wells, as well as the roadways of Olive Court and Burdett Avenue (and rarely, North Avenue). Backup from septic fields into houses is also a problem.

A third problem area exists on Glen Hill Drive in Glendale Heights where one house floods within a narrow drainageway of the upper watershed.

In general, flood damages within and adjacent to the floodplain have been limited to a relatively small percentage of structures, traffic disruption at two main locations, and associated damages (backyard or driveway flooding, nuisance flooding, septic field flooding, etc.).

Study Methodology

The unsteady-state FEQ hydraulic model and the DEC-1 economic model were utilized to establish a baseline condition, and to evaluate the three wetland banking sites and the flood damage reduction alternatives presented in this report. The FEQ model was calibrated to August 1987 high water marks (HWM) that were reported in the questionnaires. The hydrology, provided by DCDEC, consisted of the LANDS rainfall-runoff model generated files, and the land use assignment given by the existing GIS database.

Survey crews were directed to determine low water entry (low entry) elevations of any homes whose property owners had reported overbank flooding damage, or whose low-entry elevation was within one foot of the regulatory base flood elevation. A total of 354 building structures were surveyed.
Executive Summary

Baseline Conditions

The baseline condition is represented by the hydraulic structures, bridges, and culverts in place during 1992; the LANDS hydrology time series files (the approved files during the baseline condition analysis of the watershed); and the anticipated ultimate development land use conditions in the watershed. Based on the results of the FEQ and DEC-1 models, it was determined that there were 75 structures flooded during the full historical storm series resulting in $4,608,703 of building structure and contents, and associated damages. The evaluation of flood control projects for this watershed is based on the baseline condition; however, future storm events or updated hydrologic or hydraulic information may impact the recommendations presented in the watershed plan. As the plan is implemented, DCDEC may reevaluate each project using updated data as it becomes available.

Alternative Analysis Strategy

The recommended improvement plan is based on the evaluation of various combinations of structural and non-structural flood control improvements. Once the task of conceptualizing flood control measures was completed, engineering analysis was used in identifying 3 alternative component combinations, along with the "No Action" alternative. These alternatives, described below, were applied to the watershed using the FEQ and DEC-1 models to develop the recommended improvement plan.

No Action: This is the alternative with no recommended projects. If this alternative is recommended for any reaches, it should be noted that future storm events or updated information may impact the No Action recommendation, and at that time those reaches may be reevaluated using the alternatives described below.

Alternative 1: This is a non-structural alternative without land acquisition. This alternative consisted of floodproofing, and buyouts for those residential structures meeting the buyout criteria. **Residential structures were considered as eligible for buyout if they had been flooded by one foot or more in any storm in the historical storm series, or if they had been flooded by 0.5 foot in two or more events in the historical storm series. Business structures were not considered for buyout in this study.** All building structures, including businesses, subject to overbank flooding and not meeting these criteria were recommended to be floodproofed. **The purpose of this alternative is to eliminate structures from experiencing overbank flooding by non-structural measures only.**

Alternative 2: This is a non-structural alternative with land acquisition. Buyout and floodproofing criteria are the same as Alternative 1. The difference between this alternative and Alternative 1 is that this alternative not only eliminates all existing structural flooding damage, but also establishes a contiguous riparian corridor.
Executive Summary

(open space/greenway area) that maintains the existing floodplain and preserves natural features. Properties with building structures that are subject to flooding damages but don’t meet the buyout criteria, were recommended for buyout if determined to be necessary to maintain a contiguous greenway. The recommended uses for this land will be parks, recreation areas, and forest preserves depending on its location and natural characteristics. The purpose of this alternative is to eliminate structures from experiencing overbank flooding by non-structural measures only, and to establish a riparian corridor where feasible.

Alternative 3: This is a combination of structural and non-structural improvements. The goal of this alternative was to remove as many building structures and main roadways as feasibly possible from experiencing overbank flooding damages through a structural flood control measure. However, complete elimination of structural flooding damages was not always cost-effective or feasible. Therefore, those structures that were still subject to overbank flooding after the proposed structural flood control measures were considered to be in place were recommended for buyout if they met the buyout criteria, otherwise they were recommended to be flood proofed. This alternative also includes the evaluation of the proposed wetland mitigation bank master plan for the three subject sites, and the modifications to the master plan to meet the DuPage County Stormwater and Floodplain Ordinance. The purpose of this alternative is to eliminate structures and main roads from experiencing overbank flooding by a combination of structural and non-structural measures, cost and feasibility determining the balance between the two.

Recommended Capital Improvement Plan

The evaluation of the flood control alternatives was performed by reaches due to the hydraulic characteristics of the watershed. A damage point assessment was calculated for each project using the adopted Stormwater project Classification Policy. The criteria for choosing among the three alternatives was based on the least DuPage County cost per damage point reduction, or if an agency or community was interested in an alternative different than that determined by this method, then DuPage County would fund up to the least cost alternative. Table 1A (p.ES15) summarizes the components for each alternative by reach, along with the associated costs and benefits. The baseline condition is considered to be the “No Action” alternative. The recommended alternative for each reach is marked with an “X” and the “Recommended Plan Total” at the bottom of the table is respective totals for the “X” alternatives. It should be noted that the recommended plan for the entire watershed is a composite of Alternatives 1, 2, and 3 for the nine reaches as described below. The following flood damage reduction projects are recommended to be included as part of the Winfield Creek Capital Improvement Plan (the Watershed Plan):

Reach 1: Reach 1 is between the confluence with the West Branch of the DuPage River (WBDR) and the Church Street Bridge in the Village of Winfield.
Executive Summary

Reach 1 will be evaluated in greater detail during the WBDR main stem study due to the significant backwater effect on this reach. Because of the possibility of flood damage reduction benefits from future WBDR flood control projects, no structural measures were investigated for this reach. Alternative 1 is recommended; however no buyouts will be included until the WBDR study is completed. Only floodproofing is included for a total project cost of $165,000. Damage reduction is $125,030 with the floodproofing measures leaving $12,612 in residual associated damages.

Reach 2: Reach 2 is between the Church Street Bridge and the Belleau Woods Forest Preserve which is just off the intersection of Roosevelt Road and Shaffner Road. Alternative 3 is recommended which includes buyouts, floodproofing, land acquisition, and the construction of a weir structure in the Belleau Woods Forest Preserve for a total project cost of $2,871,476. Damage reduction is $1,099,029 without the floodproofing measures. Including the floodproofing, the damage reduction is $1,188,072 leaving $7,100 in residual associated damages.

Reach 3: Reach 3 is between the Belleau Woods Forest Preserve and the Chicago and Northwestern Railroad (CNWRR) embankment. Alternative 1 is recommended. This includes buyouts, and floodproofing for a total project cost of $658,068. Damage reduction is $323,355 without the floodproofing measures. Including the floodproofing, the damage reduction is $463,914 leaving $7,930 in residual associated damages.

Reach 4-7: Reach 4 is between the CNWRR embankment and the upstream Northside Park pedestrian/utility culvert crossing. Alternative 3 is recommended for Reach 4. The proposed Winfield Creek Wetland Mitigation Bank Master Plan for Lincoln March and Northside Park was modified to meet the DuPage County Stormwater and floodplain Ordinance. For this reach where feasible, the wetland plan design incorporates stream corridor linkages to existing open space and trail systems which provide a continuous connection through Northside Park and Lincoln Marsh. There are also buyouts and floodproofing recommended within this reach.

Reach 5 is between the upstream Northside Park pedestrian/utility culvert crossing and the Cole Avenue culvert crossing. Alternative 3 is recommended for
Executive Summary

Reach 5. The Main Street Culvert will be replaced and the upstream and downstream channel reach, approximately 600’ total length, will be excavated and improved with gabion-lined vertical banks. A pilot channel with a natural meander and vegetated buffer strip adjacent to the channel will be a component of this project to minimize adverse impacts on water quality and aquatic habitat. However, the type of vegetation should be coordinated in the design phase with the proposed conveyance capacity of the channel. Any downstream flow or stage increases are being mitigated by the modifications at Northside Park. No buyouts are recommended, but there are structures that will require floodproofing.

Reach 6 is between the Cole Avenue culvert crossing and the Geneva Road culvert crossing. The No Action Alternative is recommended for Reach 6. Based on the FEQ hydraulic and DEC-1 economic analysis in this study there were no overbank flooding damages in this reach.

Reach 7 is between the Geneva Road culvert crossing and the Bloomingdale Road embankment. Alternative 3 is recommended for Reach 7. This includes the modification to the proposed Community Park Master Plan to meet the DuPage County Stormwater and Flodplain Ordinance.

These reaches were lumped together for two reasons: one, the mitigation for the Main Street (Reach 5) improvements is proposed in Reach 4 within Northside Park and Lincoln Marsh; and two, the study that generated the master plan for the three wetland sites (Reaches 4 and 7) considered the hydrology of upstream sites for downstream design. The total project cost is $5,932,474. Damage reduction is $906,784 without the floodproofing measures. Including the floodproofing, the damage reduction is $1,089,206 leaving $21,204 in residual associated damages.

Reach 8: Reach 8 is between the intersection of Bloomingdale Road and St. Charles Road and the Great Western Trail. Alternative 3 is recommended. This includes installation of approximately 2260 feet of storm sewer, road swale regarding and replacement of the inflow grates on the existing storm sewer system at 7 locations. There is need of minor floodproofing work which consists of landscaping berms of approximately 0.5 feet in height. The Shorewood Apartment Pond outlet structure, overflow weir and internal pipe modification is also included. The total project cost is $639,650. Damage reduction is $998,959 without the floodproofing measures. Including the floodproofing, the damage reduction is $1,405,178 leaving $31,555 in residual associated damages.

Reach 9: Reach 9 is the headwaters area located upstream (north) of North Avenue and west of Bloomingdale Road. This area includes the Olive Court wetland. Alternative 3 is recommended and includes the following components:

1. Glen Hill School Project: Excavation (2.5 ac-ft) and inlet improvements at Glen Hill School and improvement of storm sewer connecting it with the
Executive Summary

Olive Court wetland. Additional lateral excavation (8.5 ac-ft) at the Olive Court wetland is included.

2. Floodproofing is also recommended in this reach.

3. Install overhead sewer/ejector pump systems at 5 Unincorporated DuPage County residences.

4. Increase the capacity of the inlet grates for the storm sewer system at the intersection of Glen Hill Drive and Hartford Street.

The total cost for the recommended alternative is $93,383; damage reduction is $248,751.

Although the cost of Alternative 1 is less expensive, other non-quantified benefits are obtained by implementing Alternative 3. The Olive Court wetland provides regional flood control and detention for the 200-plus acres draining to it and thus should be under public ownership and maintenance. Potential flood storage and wetland expansion at Olive Court can lower the remaining associated damages ad wellhead and local road inundation. Future wetland expansion/enhancement could take the form of public or private mitigation banking, or creation of habitat by private interest groups. The County has recently been approached by a group seeking to create wildfowl habitat. This site would be ideal because it is of low quality now and the habitat creation work would improve the quality of the wetland.

Another benefit provided by Alternative 3 is the Glen Hill School structural project will reduce flooding of school, park, yards, and reduce other associated damages in this area by reducing the flood elevation 1.74 ft. for the 1987 storm event. The reservoir at the school could be planted to wetland or wet prairie vegetation which provides water quality benefits and can also be an educational resource for school children.

Improvements to the school’s drainage system will be considered during final design of the recommended project. Improvements to the local drainage system surrounding the school, including flooding of Bloomingdale Road and the residential area bordering the north end of the school, will also be addressed during final design.

One additional recommendation of the watershed plan, for which the cost has not been included, is to perform an infiltration and inflow study for the sanitary sewer on Burdett Avenue and Olive Court.

Project Funding
Executive Summary

Full implementation of the Winfield Creek Watershed Plan’s recommended projects will require funding from developers, municipalities, property owners, the County and other government agencies. General funding guidelines have been established and are as follows:

1. Floodproofing is generally recommended for flood damaged building structures that do not meet the buyout criteria. Flood damage can be prevented through relatively low cost improvements. **DEDC will develop a Countrywide floodproofing policy and present it to the Stormwater Management Committee for approval.**

2. Buyouts are recommended for flood damaged building structures and associated property when the buyout criteria are met, the buyout/floodproofing alternative is the least cost alternative, and no practical flood control project is available to eliminate or reduce overbank flooding damages. The County generally provides funds to buy properties meeting the criteria. Commitment from an interested government jurisdiction for administrative assistance, property ownership and maintenance is required prior to County participation.

3. Land acquisition is recommended when vacant land is required for the construction of a flood control project or for the establishment of a riparian corridor (i.e., greenway/open space adjacent to the stream). The County generally funds all or a portion of the land acquisition required for a recommended flood control project. Commitment from an interested government jurisdiction for administrative assistance, property ownership, and maintenance is required prior to County participation. Other funding sources are required for riparian corridor land acquisition.

   Note: Generally, riparian corridors are recommended when all of the following criteria are met: i) vacant land and flood damaged buildings are located in floodplain and wetland areas, ii) no feasible flood control project has been identified to alleviate flood damages and iii) properties are contiguous and adjacent to the stream and can be incorporated into an existing or proposed recreational system.

4. Flood control projects are recommended and funded by the County when regional benefits result from cost-effective structural improvements. Cooperative funding from interested agencies or entities is sometimes required to fund a desired project or to accelerate the completion of a low priority project.

   Availability of state funding can affect the priority of projects, buyouts and land acquisition. State funding will be pursued as the watershed plan is implemented.
Executive Summary

Table 1B (p.ES16) provides a tabulated funding plan for the Winfield Creek Watershed Plan recommended projects. A summary of the funding plan is provided below:

**Reach 1:** County provides assistance for floodproofing in accordance with the Countywide floodproofing policy that will be adopted.

**Reach 2:** County provides: 1) funding for the purchase of properties meeting the buyout criteria; 2) assistance for floodproofing in accordance with the Countywide floodproofing policy that will be adopted; 3) technical assistance for the purchase of land; and 4) funding for the construction of the weir structure in Belleau Woods. Other agencies are responsible for funding the purchase of land.

**Reach 3:** County provides funding for the purchase of properties meeting the buyout criteria, and assistance for floodproofing in accordance with the Countywide floodproofing policy that will be adopted.

**Reach 4-7:** County provides: 1) funding for the purchase of properties meeting the buyout criteria; 2) assistance for floodproofing in accordance with the Countywide floodproofing policy that will be adopted; 3) funding for the City of Wheaton Main Street flood control improvements; and 4) 50% funding for the proposed Northside Park Wetland Mitigation Bank. Developers provide funding for balance of the construction of the Winfield Creek Wetland Mitigation Bank through the purchase of wetland credits.

**Reach 8:** County provides assistance for floodproofing in accordance with the Countywide floodproofing policy that will be adopted. Funding for the construction of the flood control improvements in the vicinity of Bloomingdale Road and St. Charles Road is recommended as follows:

- Village of Glendale Heights to fund $17,750 for the improvements to the Shorewood Pond hydraulic structures.

- Unincorporated DuPage County and Milton Township to cost share 50%-50% for the inlet grate improvements totaling $17,500.

- DuPage County Water Commission to fund $13,370 for the installation of the inverted siphon under their water main.
Executive Summary

- Stormwater Management Committee Funds the remaining project costs of $576,030.

Reach 9: County provides: 1) assistance for floodproofing in accordance with the Countywide floodproofing policy that will be adopted; 2) 50% funding for the purchase of vacant properties; and 3) partial funding for flood control improvements in the vicinity of Olive Court and Burdett Avenue. Forest Preserve District provides administrative assistance, 50% funding for the purchase of vacant properties and maintenance of the Olive Court wetland. Bloomingdale Township contributes funds for the replacement of the improvements. Future recapture of enhancements at the Olive Court wetland from developer wetland credits is possible through the implementation of a wetland bank at the Olive Court Marsh. Proposed improvements to the Glen Hill School drainage system will be funded from project contingency funds, and Unincorporated County funds as they are available at the time of project implementation. Proposed improvements to the local drainage system surrounding the school, including Bloomingdale Road, will be presented to the Village of Glendale Heights and the uPage County Highway Department for cost-share.

The above summary and Table 1B is only a projection. The actual amounts and participants may change as more detailed information is made available during the implementation of the plan.

Implementation Plan

The implementation of the recommended projects in the Plan should proceed as follows:

1. **Floodproofing**: Contact all involved municipalities and property owners, and provide assistance as outlined in the DuPage County floodproofing policy. This policy will need to be adopted by the Stormwater Management Committee before it can be implemented.

2. **Buyouts (voluntary)**: Contact all involved municipalities and property owners. Proceed with property purchase based upon funding availability, establishment of ownership and maintenance responsibilities, and voluntary sale by property owner.

3. **Land Acquisition (voluntary)**: contact all involved government jurisdictions and interested parties to develop an overall “greenway” plan for Reach 2 that designates responsibilities.
4. **Belleau Woods Forest Preserve Weir Structure:** Contact the DuPage County Forest Preserve District to grant flood easements within Belleau Woods, to grand approval of the weir structure, and to establish maintenance responsibilities. Contact other affected property owners to obtain flood easements. The weir design will be coordinated with the land acquisition component in Reach 2 to identify feasible areas where additional floodplain storage can be provided to minimize the easements necessary.

5. **Winfield Creek Wetland Mitigation Bank:** The bank has been established and developers are purchasing wetland credits. All or a portion of the bank can be constructed based upon the number of credits sold and the funds available. A portion of the bank improvements are required to mitigate for the City of Wheaton Main Street Flood Control Project.

6. **City of Wheaton Main Street Flood Control Project:** Obtain assistance from the City of Wheaton to gain access rights and drainage easements required to construct improvements. Construct flood storage mitigation with the Winfield Creek Wetland Mitigation Bank project. These costs are additional to the projected bank sites costs.

7. **Bloomingdale Road/St. Charles Road Flood Control Project:** Obtain assistance from the Village of Glendale Heights to gain access rights to construct flood control project. Construct modifications to Shorewood Pond first then install conveyance improvements.

8. **Bloomingdale Road/North Avenue Flood Control Project:** Establish responsibilities between government jurisdictions and implement a wetland mitigation bank for the Olive Court wetland. Construct improvements when funding is made available. In accordance with ordinance requirements the storage in the Olive Court wetland must be built first. Adequate sediment and erosion control must be done when constructing the upstream improvements to minimize the impact to Olive Court.

All Federal, State and local permits necessary for the construction of each project will be obtained as the projects are implemented.

**Report:**

The watershed study and flood control plan report is available for public review at:

DuPage County Department of Environmental Concerns
421 North County Farm Road
Wheaton, IL 60187
Executive Summary

708-682-7130
FIGURE 1
WINFIELD CREEK WATERSHED
PROJECT REACHES

REACH 7
(CAROL STREAM)

COMMUNITY PARK

REACH 6
(WHEATON)

REACH 5
(WHEATON—MAIN ST.)

REACH 4
(WHEATON)

REACH 3
(WHEATON)

REACH 2
(WINFIELD)

REACH 1
(WINFIELD)

ROOSEVELT ROAD

C & NW RD

COUNTY FARM RD

JEWEL RD

LINCOLN AVE.

WINFIELD CREEK

LINCOLN MARSH NORTH
OF ILLINOIS PRAIRIE PATH

LINCOLN MARSH SOUTH
OF ILLINOIS PRAIRIE PATH

NORTHSIDE PARK

GARY AVE.

NORTH AVE.

MAIN ST.

MAIN ST.

WESLEY ST.

GENEVA RD.

PRESIDENT ST.

NORTH AVE.
FIGURE 2
UPPER WINFIELD CREEK
PROJECT REACHES
<table>
<thead>
<tr>
<th>LOCATION</th>
<th>Alternatives</th>
<th>Recommended Plan</th>
<th>Buyout Costs</th>
<th>Floodproofing Costs</th>
<th>Land Acquisition Costs</th>
<th>Structural Flood Control Measure Costs</th>
<th>Total Capital Costs</th>
<th>DuPage County Costs</th>
<th>Other Agency Costs</th>
<th>Benefits w/ Floodproofing</th>
<th>Benefits w/o Floodproofing</th>
<th>Benefits</th>
<th>Damages PL Reduction</th>
<th>County Cost PL Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reach 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>No Action</td>
<td></td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$197,643</td>
<td>$0</td>
<td>$197,643</td>
<td>$0</td>
<td>$0</td>
<td>0</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td></td>
<td>$150,000</td>
<td>$150,000</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$197,643</td>
<td>$0</td>
<td>$197,643</td>
<td>$0</td>
<td>$0</td>
<td>0</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td></td>
<td>$150,000</td>
<td>$150,000</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$197,643</td>
<td>$0</td>
<td>$197,643</td>
<td>$0</td>
<td>$0</td>
<td>0</td>
<td>N/A</td>
</tr>
<tr>
<td>Reach 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>No Action</td>
<td></td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$1,155,172</td>
<td>$0</td>
<td>$1,155,172</td>
<td>$0</td>
<td>$0</td>
<td>0</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td></td>
<td>$855,000</td>
<td>$75,000</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$1,155,172</td>
<td>$0</td>
<td>$1,155,172</td>
<td>$0</td>
<td>$0</td>
<td>0</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td></td>
<td>$855,000</td>
<td>$75,000</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$1,155,172</td>
<td>$0</td>
<td>$1,155,172</td>
<td>$0</td>
<td>$0</td>
<td>0</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td></td>
<td>$855,000</td>
<td>$75,000</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$1,155,172</td>
<td>$0</td>
<td>$1,155,172</td>
<td>$0</td>
<td>$0</td>
<td>0</td>
<td>N/A</td>
</tr>
<tr>
<td>Reach 3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>No Action</td>
<td></td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$1,110,410</td>
<td>$0</td>
<td>$1,110,410</td>
<td>$0</td>
<td>$0</td>
<td>0</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td></td>
<td>$590,086</td>
<td>$150,000</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$1,110,410</td>
<td>$0</td>
<td>$1,110,410</td>
<td>$0</td>
<td>$0</td>
<td>0</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td></td>
<td>$590,086</td>
<td>$150,000</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$1,110,410</td>
<td>$0</td>
<td>$1,110,410</td>
<td>$0</td>
<td>$0</td>
<td>0</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td></td>
<td>$590,086</td>
<td>$150,000</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$1,110,410</td>
<td>$0</td>
<td>$1,110,410</td>
<td>$0</td>
<td>$0</td>
<td>0</td>
<td>N/A</td>
</tr>
<tr>
<td>Reach 4-7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>No Action</td>
<td></td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$1,110,410</td>
<td>$0</td>
<td>$1,110,410</td>
<td>$0</td>
<td>$0</td>
<td>0</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td></td>
<td>$794,023</td>
<td>$135,000</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$1,110,410</td>
<td>$0</td>
<td>$1,110,410</td>
<td>$0</td>
<td>$0</td>
<td>0</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td></td>
<td>$794,023</td>
<td>$135,000</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$1,110,410</td>
<td>$0</td>
<td>$1,110,410</td>
<td>$0</td>
<td>$0</td>
<td>0</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td></td>
<td>$794,023</td>
<td>$135,000</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$1,110,410</td>
<td>$0</td>
<td>$1,110,410</td>
<td>$0</td>
<td>$0</td>
<td>0</td>
<td>N/A</td>
</tr>
<tr>
<td>Reach 8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>No Action</td>
<td></td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$1,110,410</td>
<td>$0</td>
<td>$1,110,410</td>
<td>$0</td>
<td>$0</td>
<td>0</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td></td>
<td>$803,780</td>
<td>$90,000</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$1,110,410</td>
<td>$0</td>
<td>$1,110,410</td>
<td>$0</td>
<td>$0</td>
<td>0</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td></td>
<td>$803,780</td>
<td>$90,000</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$1,110,410</td>
<td>$0</td>
<td>$1,110,410</td>
<td>$0</td>
<td>$0</td>
<td>0</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td></td>
<td>$803,780</td>
<td>$90,000</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$1,110,410</td>
<td>$0</td>
<td>$1,110,410</td>
<td>$0</td>
<td>$0</td>
<td>0</td>
<td>N/A</td>
</tr>
<tr>
<td>Reach 9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>No Action</td>
<td></td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$1,110,410</td>
<td>$0</td>
<td>$1,110,410</td>
<td>$0</td>
<td>$0</td>
<td>0</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td></td>
<td>$133,200</td>
<td>$140,000</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$1,110,410</td>
<td>$0</td>
<td>$1,110,410</td>
<td>$0</td>
<td>$0</td>
<td>0</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td></td>
<td>$133,200</td>
<td>$140,000</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$1,110,410</td>
<td>$0</td>
<td>$1,110,410</td>
<td>$0</td>
<td>$0</td>
<td>0</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td></td>
<td>$133,200</td>
<td>$140,000</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$1,110,410</td>
<td>$0</td>
<td>$1,110,410</td>
<td>$0</td>
<td>$0</td>
<td>0</td>
<td>N/A</td>
</tr>
</tbody>
</table>

**Table Notes:**

1. Residual Damages and Benefits are for the full historical storm events (1949-1988).
2. Floodproofing includes improvements to existing systems.
3. Land Acquisition in this table is for undeveloped property only, except in Reach 2.
4. Because a road embankment is the limit between reaches, the upstream road is considered as part of the upstream reach.
5. More severe flood to a lesser depth than 6', but current design standards are to design for a 10-year event, and design the major system (e.g., roads) to carry the balance of flow up to the 100-year event at depths up to 6'.
6. The Stormwater Management Plan funding program.
7. Floodproofing financial contribution by DuPage County is included but has not yet been approved.
<table>
<thead>
<tr>
<th>RECOMMENDED PROJECT</th>
<th>PLAN COMPONENT</th>
<th>PROPERTY OWNER</th>
<th>DEVELOPER</th>
<th>MUNICIPALITY</th>
<th>COUNTY STORMWATER</th>
<th>OTHER</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>FLOODPROOF BUYOUT</td>
<td>REACH 1</td>
<td>$165,000</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$165,000</td>
</tr>
<tr>
<td>LAND ACQUISITION</td>
<td></td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
</tr>
<tr>
<td>STRUCTURAL</td>
<td></td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
</tr>
<tr>
<td>REACH TOTAL</td>
<td></td>
<td>$165,000</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$165,000</td>
</tr>
<tr>
<td>FLOODPROOF BUYOUT</td>
<td>REACH 2</td>
<td>$120,000</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$120,000</td>
</tr>
<tr>
<td>LAND ACQUISITION</td>
<td></td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
</tr>
<tr>
<td>STRUCTURAL</td>
<td></td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
</tr>
<tr>
<td>REACH TOTAL</td>
<td></td>
<td>$120,000</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$120,000</td>
</tr>
<tr>
<td>FLOODPROOF BUYOUT</td>
<td>REACH 3</td>
<td>$150,000</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$150,000</td>
</tr>
<tr>
<td>LAND ACQUISITION</td>
<td></td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
</tr>
<tr>
<td>STRUCTURAL</td>
<td></td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
</tr>
<tr>
<td>REACH TOTAL</td>
<td></td>
<td>$150,000</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$150,000</td>
</tr>
<tr>
<td>FLOODPROOF BUYOUT</td>
<td>REACH 4-7</td>
<td>$75,000</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$75,000</td>
</tr>
<tr>
<td>LAND ACQUISITION</td>
<td></td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
</tr>
<tr>
<td>STRUCTURAL</td>
<td></td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
</tr>
<tr>
<td>REACH TOTAL</td>
<td></td>
<td>$75,000</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$75,000</td>
</tr>
<tr>
<td>FLOODPROOF BUYOUT</td>
<td>REACH 8</td>
<td>$20,000</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$20,000</td>
</tr>
<tr>
<td>LAND ACQUISITION</td>
<td></td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
</tr>
<tr>
<td>STRUCTURAL</td>
<td></td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
</tr>
<tr>
<td>REACH TOTAL</td>
<td></td>
<td>$20,000</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$20,000</td>
</tr>
<tr>
<td>FLOODPROOF BUYOUT</td>
<td>REACH 9</td>
<td>$72,500</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$72,500</td>
</tr>
<tr>
<td>LAND ACQUISITION</td>
<td></td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
</tr>
<tr>
<td>STRUCTURAL</td>
<td></td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
</tr>
<tr>
<td>REACH TOTAL</td>
<td></td>
<td>$72,500</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$72,500</td>
</tr>
<tr>
<td>FLOODPROOF BUYOUT</td>
<td>TOTAL</td>
<td>$302,500</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$302,500</td>
</tr>
<tr>
<td>LAND ACQUISITION</td>
<td></td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
</tr>
<tr>
<td>STRUCTURAL</td>
<td></td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td>$302,500</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$302,500</td>
</tr>
</tbody>
</table>

NOTES:
1. "OTHER" under funding source includes DuPage County Forest Preserve District, Township Highway Departments, DuPage Water Commission, and other agencies.
2. "MUNICIPALITY" refers to the DuPage County Drainage fund for unincorporated areas.