



City of Decatur, Illinois



Stormwater Master Plan – Phase I

2009 Update – Pre-Final Report

June 2009



Prepared by

Clark Dietz, Inc.

1817 S. Neil Street, Suite 100
Champaign, Illinois 61820

www.clark-dietz.com



City of Decatur, Illinois



Stormwater Master Plan – Phase I

2009 Update – Pre-Final Report

June 2009



Prepared by

Clark Dietz, Inc.

1817 S. Neil Street, Suite 100
Champaign, Illinois 61820

www.clark-dietz.com

TABLE OF CONTENTS

<u>Title</u>	<u>Page No.</u>
1.0 EXECUTIVE SUMMARY	1
1.1 Data Collection and Drainage Problem Inventory	1
1.2 Stormwater Problem Area Prioritization.....	3
1.3 Regulations, Standards, and Policies	6
1.4 Stormwater Expenditures and Funding Mechanisms.....	7
1.5 Future Master Planning Phases	7
2.0 PROJECT OVERVIEW	8
2.1 Introduction and Stormwater Planning Timeline	8
2.2 Program Goals	8
2.3 Stormwater Planning Approach	9
3.0 DATA COLLECTION AND DRAINAGE PROBLEM INVENTORY	12
3.1 Introduction.....	12
3.2 Information Sources.....	12
3.2.1 Previous Reports and Studies	12
3.2.2 Interviews	12
3.2.3 Field Observations	12
3.2.4 Public Input.....	13
3.2.5 Flooding Photos	13
3.2.6 Citizens Response System.....	13
3.3 Drainage Problem Areas	16
3.3.1 Culverts and Bridges.....	16
3.3.2 Water Quality & Erosion Control.....	16
3.3.3 Drainage Problem Areas Map	16
4.0 STORMWATER PROBLEM AREA PRIORITIZATION	36
4.1 Prioritization Criteria	36
4.2 Prioritization Matrix.....	39
4.3 Cost Estimating Approach for Capital Projects	41
4.4 Future Capital Improvement Projects	43
4.5 Early Action Projects	43
4.5.1 Meadowlark Subdivision	44
4.5.2 Nelson Park.....	45
4.5.3 32nd & Fulton	46
4.5.4 Southampton and Buckingham.....	47
4.5.5 Mound Road	48
4.6 Additional Capital Improvement Projects.....	48
4.6.1 Erosion Control Capital Improvements	48
4.6.2 Underpasses	51
4.6.3 Miscellaneous.....	51
5.0 REGULATIONS, STANDARDS, AND POLICIES	52
5.1 Standards and Policies	52
5.1.1 Storm Drainage Policy.....	52
5.1.2 Development Guide for Commercial Building Projects	52
5.1.3 Standards and Policies Recommendations	52
5.2 Stream and Ditch Maintenance	53
5.2.1 Current Stream and Ditch Maintenance	53

5.2.2	<i>Stream and Ditch Maintenance Recommendations</i>	54
5.3	Sewer System (Inlets, Catch Basins, and Sewers) Maintenance.....	54
5.3.1	Current Sewer System (Inlets, Catch Basins, and Sewers) Maintenance	54
5.3.2	Sewer System (Inlets, Catch Basins, and Sewers) Maintenance Recommendations	55
5.4	Floodplain Management	56
5.4.1	<i>Floodplain Buyout Program</i>	56
5.4.2	<i>Floodplain Management Recommendation</i>	57
5.5	NPDES MS4 Regulations	57
5.5.1	<i>Public Education and Outreach</i>	57
5.5.2	<i>Public Participation/Involvement</i>	58
5.5.3	<i>Illicit Discharge Detection and Elimination</i>	58
5.5.4	<i>Construction Site Runoff Control</i>	58
5.5.5	<i>Post-Construction Runoff Control</i>	59
5.5.6	<i>Pollution Prevention/Good Housekeeping</i>	59
5.5.7	<i>NPDES MS4 Compliance Recommendations</i>	60
5.6	City of Decatur Stormwater Related Regulations.....	61
5.6.1	<i>Chapter 38 - Stormwater Ordinance</i>	61
5.6.2	<i>Chapter 67.1 Flood Plains</i>	61
5.6.3	<i>Zoning Ordinance/Land Development Code</i>	61
5.6.4	<i>Subdivision Ordinance</i>	61
5.6.5	<i>Other Ordinances</i>	62
5.6.6	<i>Ordinance Recommendations</i>	62
5.7	GIS Inventory and Maintenance Records	62
5.7.1	<i>Current GIS Inventory and Maintenance</i>	62
5.7.2	<i>GIS Inventory and Routine Maintenance Recommendations</i>	62
5.8	Total Maximum Daily Load (TMDL) Regulations	63
5.8.1	<i>Existing TMDL Regulations</i>	63
5.8.2	<i>TMDL Recommendations</i>	65
6.0	STORMWATER EXPENDITURES AND FUNDING MECHANISMS.....	66
6.1	Typical Stormwater Program Revenue Requirements	66
6.2	Stormwater Expenditures.....	66
6.2.1	<i>Stormwater Capital Improvements</i>	67
6.2.2	<i>Debt Service</i>	68
6.3	Alternative Funding Mechanisms	68
6.3.1	<i>Sales and Other Consumer Taxes</i>	68
6.3.2	<i>Property and Other Taxes</i>	70
6.3.3	<i>Special Assessments</i>	70
6.3.4	<i>Stormwater Utility</i>	70
6.4	<i>Recommendation</i>	72
7.0	SUMMARY OF RECOMMENDATIONS	73
7.1	Recommended Funding Approach.....	73
7.2	SMP Phases and Watershed Studies	73
7.3	Individual Scoping Reports.....	74
7.4	Summary of Recommendations Regulations, Standards, and Policies	74

TABLES

Table ES-1 Top Priority Areas	5
Table 3-1 Drainage Problem Area Inventory.....	18
Table 4-1 Project Prioritization Criteria.....	37
Table 4-2 Top Priority Areas	39
Table 4-3 Additional Areas with High Health and Safety or Degree of Flooding Concerns.....	41
Table 4-4 Drainage Improvement Cost Data	42
Table 4-5 Future Capital Improvements	43
Table 6-1 Stormwater Capital Improvement Projects FY 2009 to FY 2013	68
Table 6-2 Stormwater Utilities - Nationwide Examples	71

FIGURES AND EXHIBITS

Figure ES-1 City of Decatur Drainage Complaints	2
Figure ES-2 City of Decatur Drainage Problem Areas.....	3
Figure ES-3 Top 10 Drainage Priority Areas.....	6
Figure 2-1 City of Decatur Location Map	10
Figure 2-2 City of Decatur Watershed Map.....	11
Figure 3-1 City of Decatur Watershed Map with Drainage Problems.....	15
Figure 4-1 Top Ten Drainage Problem Areas.....	40
Figure 5-1 2006 303(d) List – Impaired Stream Shown in Red.....	63
Figure 5-2 City of Decatur Portion Sangamon/Lake Decatur Watershed included in TMDL.....	64
Exhibit 1 Problem Area Map (foldout map at end of report)	

APPENDICES

Appendix A - Phased Approach Schematics	
Appendix B - References	
Appendix C - Photographs of Flooding	
Appendix D - Project Prioritization	
Appendix E - Illinois Winning Formula in Floodplain Management	

1.0 EXECUTIVE SUMMARY

This Stormwater Master Plan – Phase I Update report is intended to provide the City of Decatur with a preliminary identification of stormwater problem areas and potential solutions. This report also identifies alternative funding methods to finance needed improvements. This report is an update to previous master planning efforts completed in 1966 and 1999. Key elements of the project included:

- Data Collection and Drainage Problem Inventory
- Stormwater Problem Area Prioritization
- Stormwater Expenditures and Funding Mechanisms Analysis
- Regulations, Standards, and Policy Review
- Future Master Planning Phases

The following sections summarize the results of these project elements.

1.1 Data Collection and Drainage Problem Inventory

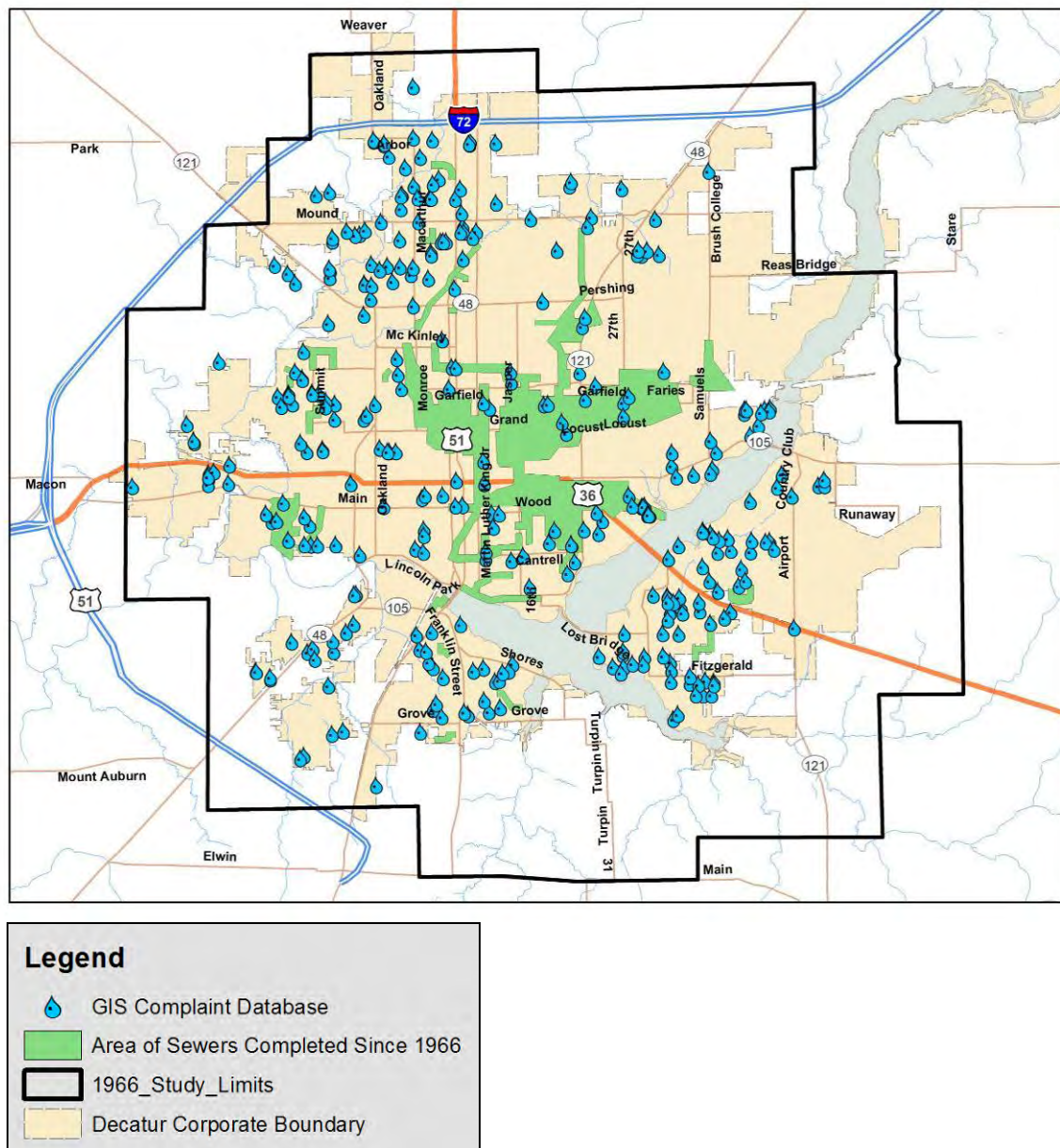
This 2009 Stormwater Master Plan updated data collected from previous stormwater master plans and added additional drainage complaint and project data. Sources of information used to identify remaining flooding problem areas in the City included:

- Previous Reports and Studies
- Interviews
- Field Observations
- Public Input
- Flooding Photographs
- Citizens Response System

Figure ES-1 shows the drainage complaints received in the City from the Citizens Response System since 1993. The green area indicates the area where sewers have been constructed as a result of the 1966 Stormwater Drainage Report. The stormwater improvement projects in these green shaded areas were funded through the issuance of General Obligation Bonds, totaling \$19.75 million in three separate Surface Water Drainage Bonds issued in 1970, 1975, and 1982.

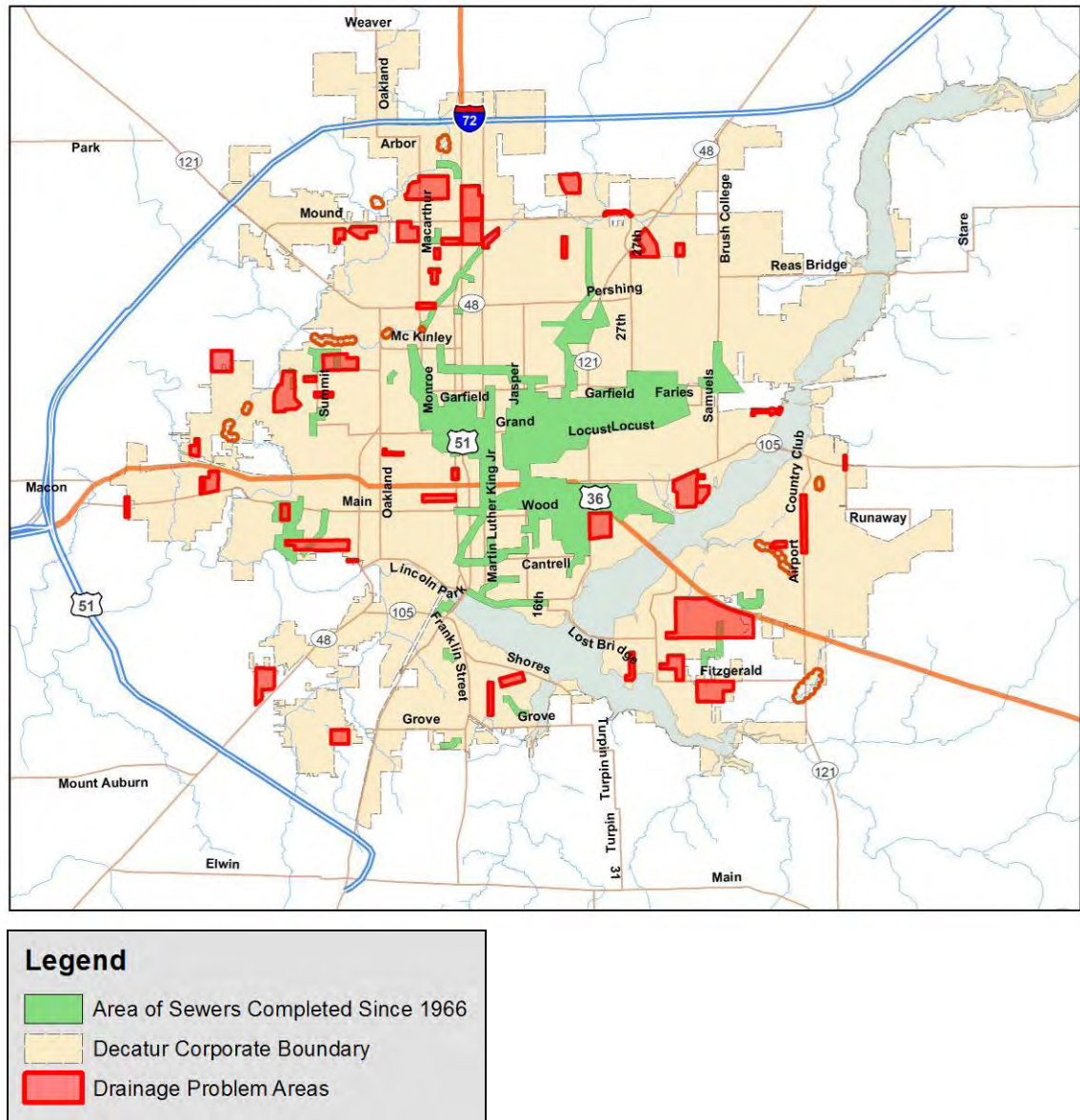
The location of the remaining drainage complaints shows that the investment in stormwater improvements significantly reduced the number of drainage complaints. Most of the remaining complaints are outside of the green shaded area, where no improvements have been made to date.

Figure ES-1 City of Decatur Drainage Complaints



Using the data gathered from the previous stormwater studies, the GIS complaint database, and other information provided by City staff, 46 drainage problem areas were identified. Figure ES-2 shows these Drainage Problem Areas.

Figure ES-2 City of Decatur Drainage Problem Areas



1.2 Stormwater Problem Area Prioritization

A numerical approach was used to objectively prioritize projects based on factors such as health and safety, degree of cost effectiveness, and other factors. The key steps in this process included identifying prioritization criteria, and ranking or scoring of individual projects with numerical scores using a spreadsheet matrix. The resulting list of prioritized projects was used as a guide to develop a list of initial program projects.

The prioritization criteria used to rank projects are as follows:

- Public Health and Safety
- Degree of Street Flooding
- Construction Impacts
- Problems Identified in 1966, But Not Solved
- Implementation Constraints
- Watershed Impact
- Infiltration and Inflow Problems
- Water Quality

For each of these criteria, a scoring system of 0 through 5 was developed. Criteria such as public health and safety and street flooding severity were evaluated based on observations and knowledge obtained from recent past rain events. City staff members familiar with specific drainage problems were interviewed and problem areas were identified and ranked.

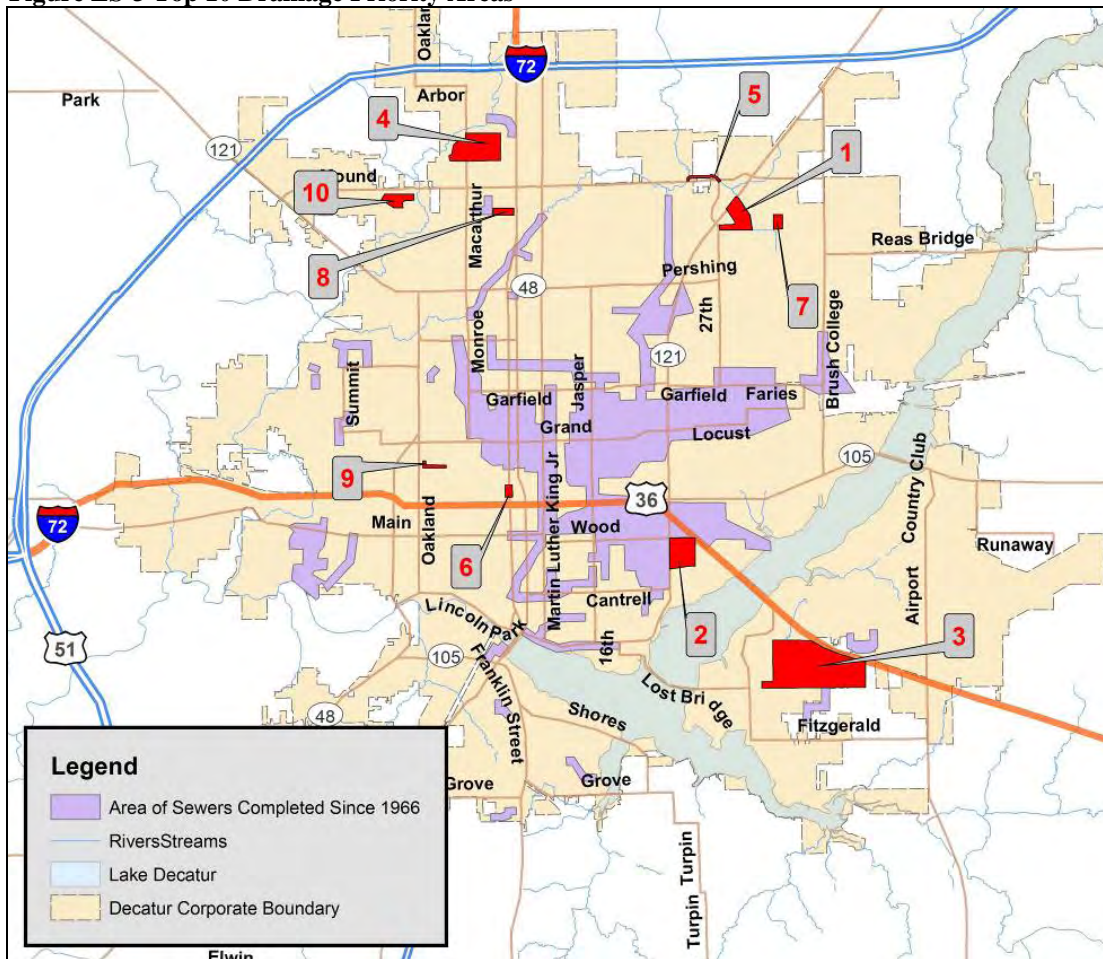
The projects were then ranked from highest score to lowest score. The normalized scores (scale of 0 to 100) ranged from 31 to 87. Table ES-1 shows the top 20 out of the 46 total problem areas identified. Figure ES-3 shows the location of the top 10 projects.

Table ES-1 Top Priority Areas

Priority	Drainage Problem Area	Area (Acres)	Order of Magnitude Cost (\$ M)
1	Meadowlark Subdivision	37.2	1.69
2	Nelson Park	8.2	0.37
3	32nd and Fulton	235.8	10.71
4	Southampton and Buckingham	11.8	0.54
5	Mound Road	5.8	0.26
6	Main Street Underpass	5.5	0.25
7	L&A Industrial Court Pond	8.0	0.36
8	Karen Drive	8.8	0.40
9	Marietta Street	5.1	0.23
10	Woodridge and Manor	6.5	0.30
11	File Drive	41.8	1.90
12	Phillips Drive	63.6	2.89
13	William Street	19.4	0.88
14	Fitzgerald & Fontenac	56.7	2.58
15	Montgomery Hills	32.1	1.46
16	Greenridge & Josephine	8.3	0.38
17	Garfield Avenue	6.7	0.30
18	Lakewood Avenue	9.7	0.44
19	Masters Drive	22.0	1.00
20	Scovill Court	10.4	0.47
Total =			\$27.5 M

An order of magnitude costs for capital projects was developed based on experience on similar past projects involving neighborhood drainage improvements. The total order of magnitude cost for all 46 projects is more than \$50 million. Future phases of the master plan (more detailed engineering analyses) will needed to better quantify improvements costs; however, the funding need will be significant.

Figure ES-3 Top 10 Drainage Priority Areas



1.3 Regulations, Standards, and Policies

In addition to the identification of stormwater problem areas, the City's stormwater regulations, standards and policies were reviewed. Recommendations resulting from this review include the following:

Maintenance Recommendations

- Dedicate resources to obtaining, inputting, maintaining and updating the GIS system
- Perform inspections, clean, and/or repair the following items as part of the stormwater program:
 - Culverts and Pipes
 - Catchbasins and Inlets
 - Ditches (Manmade Channels)
 - Natural Streams and Channels
 - Evaluate flood-prone properties for potential purchase as part of a floodplain buyout program

Regulatory Recommendations

- Enable public and MS4 employee education on green infrastructure
- Incorporate green infrastructure approaches in construction and post-construction runoff programs

Ordinance Recommendations

- The Storm Drainage Policy should be updated to incorporate more information on stormwater quantity and quality
- Consider enacting an ordinance that bans phosphorus in fertilizers

1.4 Stormwater Expenditures and Funding Mechanisms

City expenditures for stormwater management are included in budgets assigned to the Department of Public Works. These budgets are funded by the *General Fund* of the City of Decatur. The Department of Public Works includes five divisions. The three main Public Works Divisions responsible for managing, operating, and maintaining the City's stormwater infrastructure spend approximately \$1,036,200 for 2009-10 based on yearly budgets.

On average, the City is programming approximately \$197,500 per year on stormwater capital improvement projects.

In addition to drainage improvement capital projects, the City is required (by State and Federal regulations) to address water quality issues, including the use of green infrastructure approaches, such as green roofs, trees and tree boxes, rain gardens, vegetated swales, pocket wetlands, infiltration planters, vegetated median strips, reforestation, and protection and enhancement of riparian buffers and floodplains.

With more than \$50 million in improvement needs and only approximately \$200,000 per year budgeted for stormwater capital projects, additional funding will be needed if the City is to more adequately address problem areas, improve system maintenance, and comply with regulatory requirements. The following funding sources were reviewed to improve the City's stormwater program:

- Sales Tax
- Property Tax
- Special Assessments
- Stormwater Utility/User Fee

A Stormwater Utility implementing a user fee was found to offer the most equitable, stable source of revenue. Residents, businesses, and institutions currently pay a fee for other utilities such as sewer and water, based on their usage. A stormwater user fee would be based on the amount of stormwater generated by a site (typically measured as the amount of impervious area). Stormwater user fees are typically based on the amount of impervious area on a single family residential lot (often referred to as an Equivalent Residential Unit, or ERU), which is about 3,000 square feet of roof, driveway, sidewalk, etc. A charge is then set up for this ERU. Non-residential users would be charged based on the number of ERUs on their property.

1.5 Future Master Planning Phases

As the City continues with its stormwater program, future phases of the master planning process will be required. These phases are needed to better define the scope of each problem area, either individually or on a watershed basis. A dedicated funding source is needed if the projects identified in future master planning efforts are to be implemented over a reasonable period of time. These phases will progress as funding allows.

2.0 PROJECT OVERVIEW

2.1 Introduction and Stormwater Planning Timeline

In 1966, Warren & Van Praag, Inc. completed the *Report on Storm Drainage* (1966 Study) for the City of Decatur. This report served as the main resource for stormwater planning in Decatur for many years. After the 1966 Study, many stormwater improvement projects were undertaken, with most of the improvement being in the combined sewer area. Figure 2-1, included at the end of the chapter, shows the City of Decatur with the combined sewer area and the sewer project areas built since 1966.

In 1999, Clark Dietz, Inc. was retained to update the 1966 study. This project is referred to as the *Stormwater Master Plan – Phase I (Pre-Final 2002 SMP) for the City of Decatur, Illinois*. This document was delivered to the City in September 2002 as a pre-final draft, but the City took no further action to finalize the report. It is assumed that budget priorities and staffing constraints prevented the completion of the project. The Pre-Final 2002 SMP updated previous work performed in the 1966 study and addressed new drainage problems that have developed subsequent to the 1966 study. These reports documented problem areas and provided a basis for many stormwater improvement needs in the City of Decatur.

This 2009 Stormwater Master Plan will re-visit these same issues and add additional project data since the Pre-Final 2002 SMP. In addition, this report explores in more detail possible funding sources to address many of the remaining stormwater flooding problem areas.

2.2 Program Goals

Goals formulate the overall direction of the detailed stormwater planning program. Goals can be thought of as statements which broadly describe the aim of the overall program. These include:

- Reduce existing potential for stormwater damage to public health, safety, life, and property.
- Limit future increases in stormwater damage within Decatur.
- Protect and enhance the quality, quantity, and availability of surface and groundwater resources.
- Preserve and enhance existing aquatic and riparian habitats and encourage restoration of degraded areas.
- Control sediment and erosion in and from drainageways, developments, and construction sites.
- Promote equitable, acceptable, and legal stormwater management measures.
- Protect buildings from flood damage to the greatest extent possible.
- Conserve the natural hydrologic, hydraulic, water quality, and other beneficial functions of streams, floodplains, and wetlands.
- Prevent disruption of the economy and governmental services due to stormwater flooding.
- Solve existing local neighborhood area flooding problems.

- Protect beneficial uses of natural flood stages areas.

2.3 Stormwater Planning Approach

A phased approach has been developed to comprehensively address and achieve the program goals. The phased approach can be use for any given area but typically is divided into watersheds. Figure 2-1 shows the City of Decatur, its major stream/rivers systems, and stormwater projects completed since the 1966 study. Figure 2-2 shows the watersheds (with shaded relief) in the City that could be used to implement the four phased approach. The four phases include:

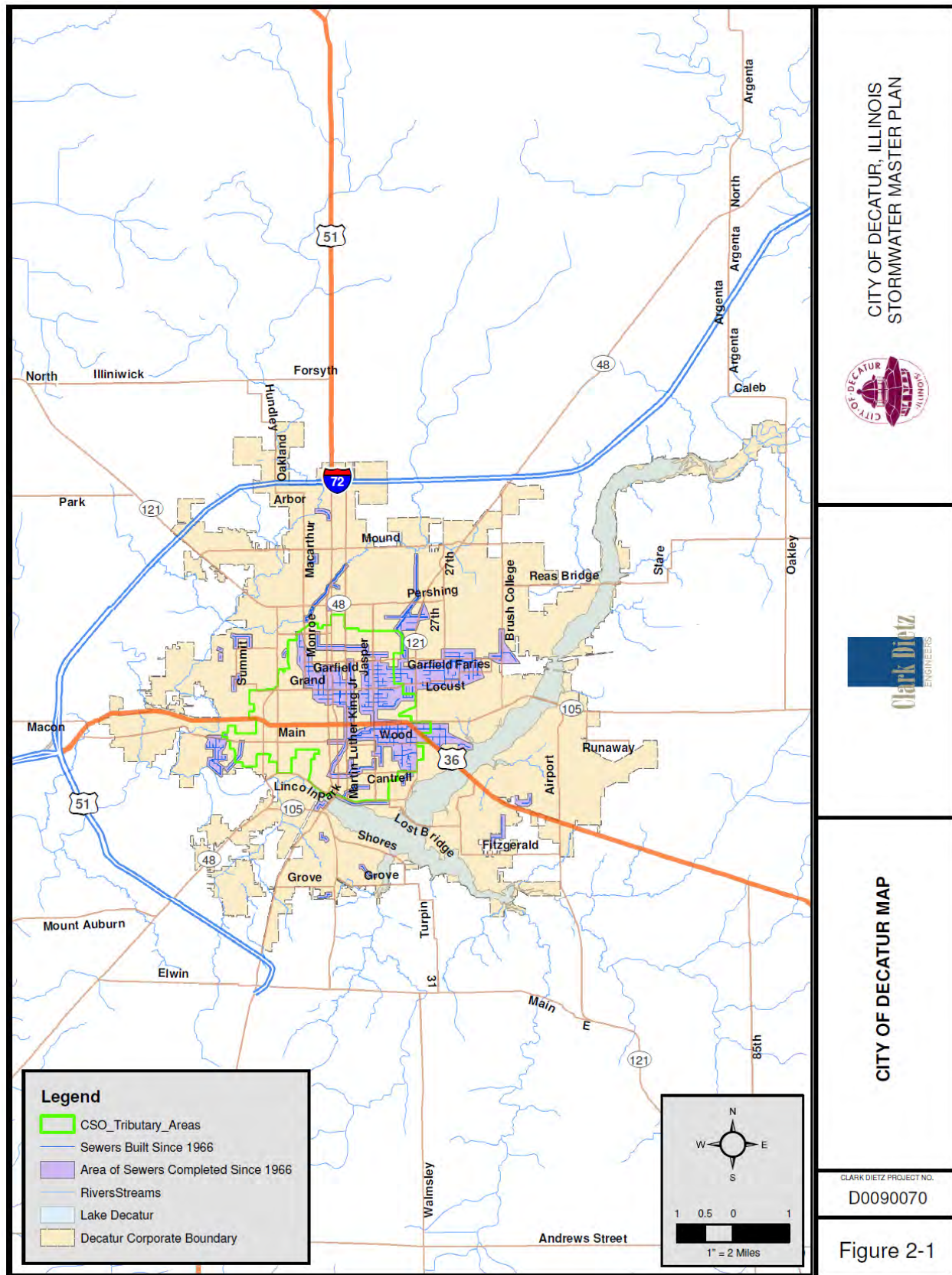
Phase I – Inventory and Problem Identification (this document)

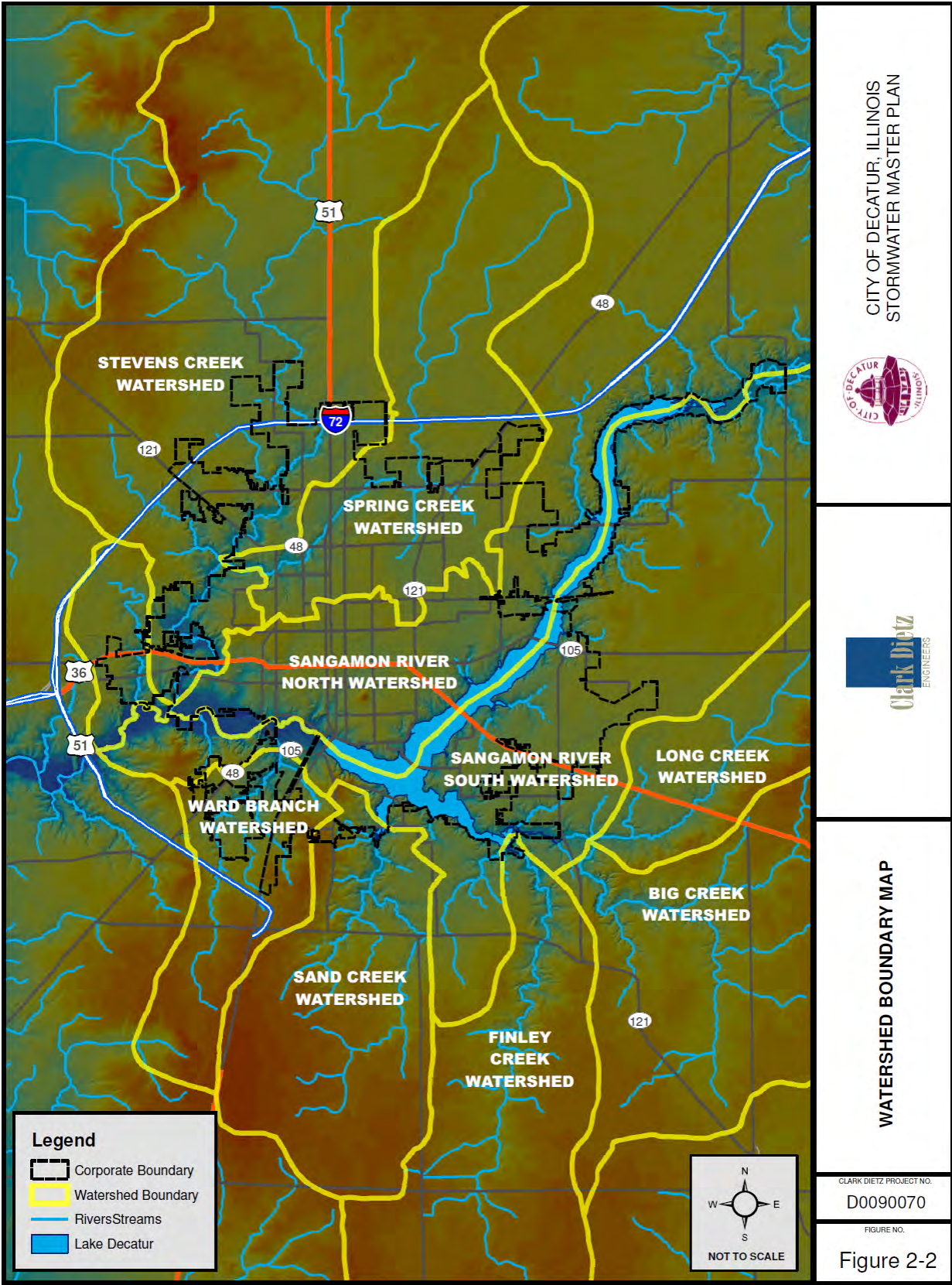
Phase II – Flood Problem Analysis

Phase III – Solutions Development

Phase IV – Implementation

The four-phased approach is shown on flow charts provided in Appendix A. Each page shows the major components of each phase along with the listing of the “deliverables”. Some of the key points in the overall plan include involving the public, addressing both storm sewer and stream system problems (referred to as the minor and major systems), analyzing both stormwater quality and quantity problems, and recommending an overall plan and implementation program.





3.0 DATA COLLECTION AND DRAINAGE PROBLEM INVENTORY

3.1 Introduction

The first step in the Stormwater Master Plan was to develop an inventory of known drainage problems. Various information sources were reviewed and compiled into a single drainage problem location map and database. This chapter summarizes the sources of drainage problem information, the development of a drainage problem map, and the classification of different types of drainage problems.

3.2 Information Sources

The main source of information regarding Decatur's drainage problems came from interviews with City staff and a review of complaints filed by citizens. Other sources included the previous Stormwater Master Plans (1966 and 2002), studies and reports, and City records. The following sections briefly describe these sources.

3.2.1 Previous Reports and Studies

Information obtained includes the prior stormwater master plans, drainage studies, flood insurance studies and floodplain maps. A complete listing of references is provided in Appendix B. Exhibit 1, included in the back of the report, includes a large fold out map showing the completed drainage improvement projects since 1966. Exhibit 1 shows that many of the sewer improvement projects since 1966 have been in or around the combined sewer tributary areas (also shown on the map.)

3.2.2 Interviews

Interviews were conducted with representatives from various City, County and State Agencies. The purpose of these interviews was to obtain available reports, maps, plans, and other relevant information. These interviews were conducted in the spring of 1999. More recent interviews are noted in parenthesis. The following is a list of the agencies that were interviewed:

- City Engineer's Office (2008)
- Sanitary District of Decatur (2008)
- Decatur Area Planning Commission
- Macon County Soil & Water Conservation District
- City of Decatur Lake Management Division
- Decatur Forestry Department

3.2.3 Field Observations

Several field reconnaissance trips were conducted as part of the 2002 Stormwater Master Plan update. The condition of the existing drainage system was noted during these site visits. Unfortunately, no rainfall events occurred during these site visits, making it difficult to confirm reported complaints. However, several recent storm events produced wide-spread flooding in some areas. Many of these areas were documented in photos from City staff.

3.2.4 Public Input

Public input was obtained through a questionnaire distributed as part of the 2002 Stormwater Master Plan update. This questionnaire asked information regarding problems experienced by citizens during rain events. Limited responses were received, probably due to the lack of significant rainfall events during that period.

3.2.5 Flooding Photos

City staff provided photos of flooding areas that were either taken by citizens or City staff during recent storm events. These photos provide documentation of the type and severity of flooding problems experienced. The photographs have been included in Appendix C.

3.2.6 Citizens Response System

The Citizens Response System (CRS) is a reporting system for the City of Decatur that reports and categorizes requests, complaints, and maintenance problems. The City of Decatur utilizes a Citizens Request for Service system via the City's website. This system allows the City to record relevant information regarding a citizen's request or complaint and respond as needed. The CRS documents inspection and work completed to resolve the problem. The Citizen Request for Service screen from the City's website is shown below.

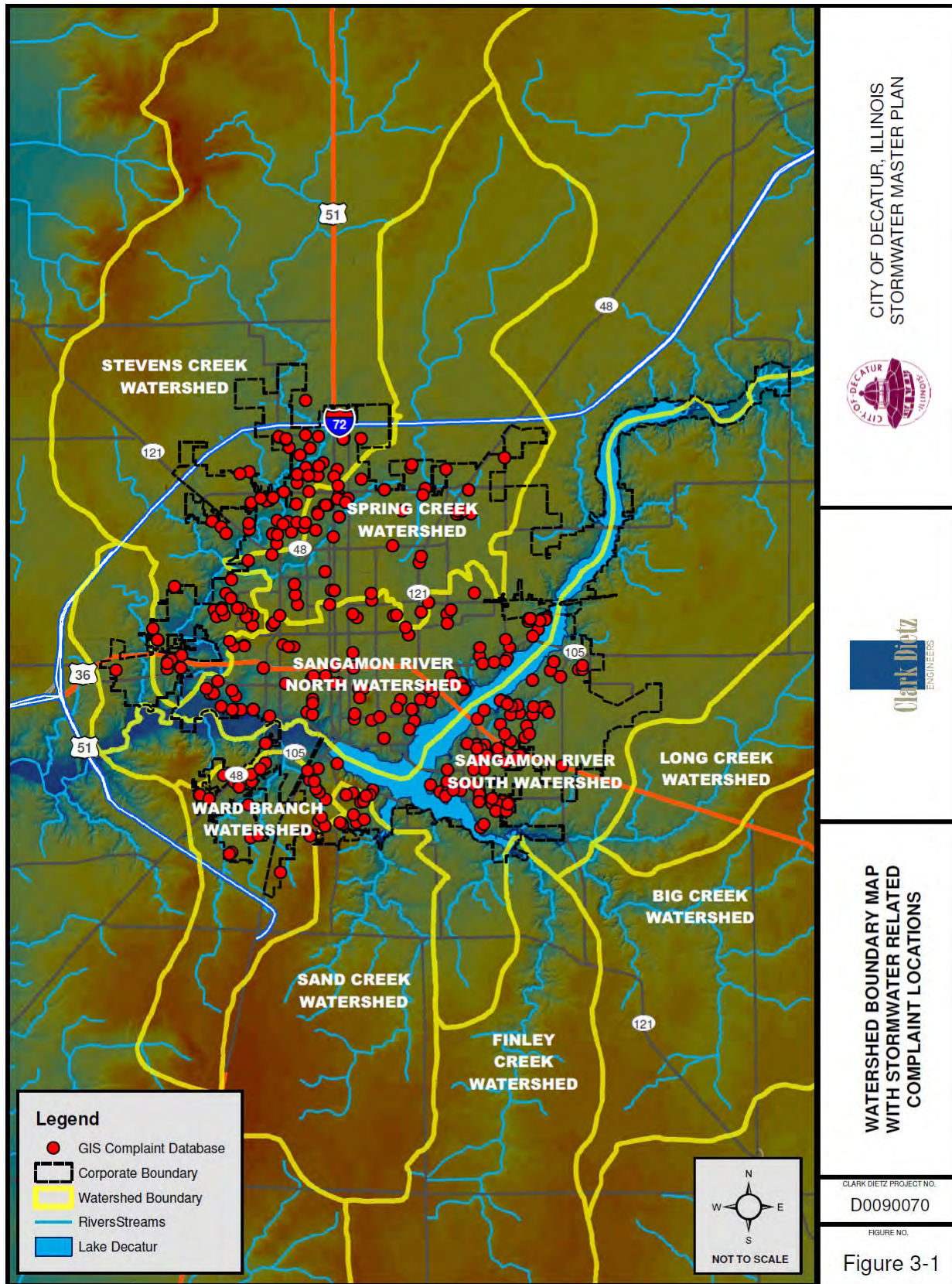
The screenshot shows a web browser window with a navigation bar at the top containing links: Home | City Government | Police | Fire | Water Management | Transit | Municipal Band | Community Resources. Below the navigation bar is a "Back" link. The main heading is "Citizen Request for Service" in bold. A red message states: "If you experience problems using this form, please contact the [Webmaster](#)." Below this is a paragraph: "Use this form to report a non-emergency problem or to request a service from a City department. The information submitted will be directly forwarded to the department that handles the problem type selected." The form fields are: "Problem Type:" with a dropdown menu showing "Please Select A Problem Type" and a red "(Required)" label; "Problem Location:" with a text input field and a red "(Required)" label; "Problem Description:" with a red "(Required)" label and a large text area; "Please provide the following information so we can contact you if necessary." followed by "Name:" with a text input field; "Email Address:" with a text input field and a red "(Required)" label; and "Telephone:" with a text input field. At the bottom left is a "Send" button.

From the problem type pull down menu there are five categories that are or could be related to stormwater issues. They are:

- Water Quality
- Sanitary Sewer (problems can be caused by stormwater)
- Erosion
- Drainage
- Ditching

In addition to the problem type, the problem location, description, name, email, and telephone are available fields for the citizen to report. To help with GIS automated mapping procedures of problem areas it is recommended that more detailed address fields such as street address and zip code be added.

Several individual lists were compiled by City staff members and obtained during the information gathering phase of this report. The records were searched for those complaints involving drainage issues and combined into one complaint database. This database catalogs known drainage complaints within the City of Decatur into a single tool to plan and track stormwater problem solutions. The complaint data was geocoded using ESRI ArcGIS software which placed a spatial referenced point on the map at each address found by the software. This allows for the points to be mapped and analyzed. Figure 3-1 shows the complaint locations on the watershed map.



3.3 Drainage Problem Areas

3.3.1 Culverts and Bridges

Reviewing the CRS complaints it is apparent that many culverts throughout the City are aging and experiencing problems. Routine inspection of these structures should be completed and recommendations made for replacement. Culverts less than 36 inches may be able to be replaced by City crews while larger culvert replacements may need to be bid as a capital improvement project. Stream and ditch maintenance recommendations are discussed with the current maintenance practices in Section 5.2.

3.3.2 Water Quality & Erosion Control

Water quality issues should also be considered in the initial program. Several areas within the City have specific erosion control issues. Three areas were identified that affect nutrient runoff into Lake Decatur during stormwater events. Areas identified for erosion control measures are shown on the drainage problem location map. Potential sites for nutrient and bacteria runoff include the Scovill Children's Zoo, the Big Creek Park Riding Stables, and the riding stables located on Irving Drive (due to animal waste). Some nutrient runoff controls are currently in place but could be expanded to provide Lake Decatur with additional protection. Stream and ditch maintenance recommendations are discussed with the current maintenance practices in Section 5.2.

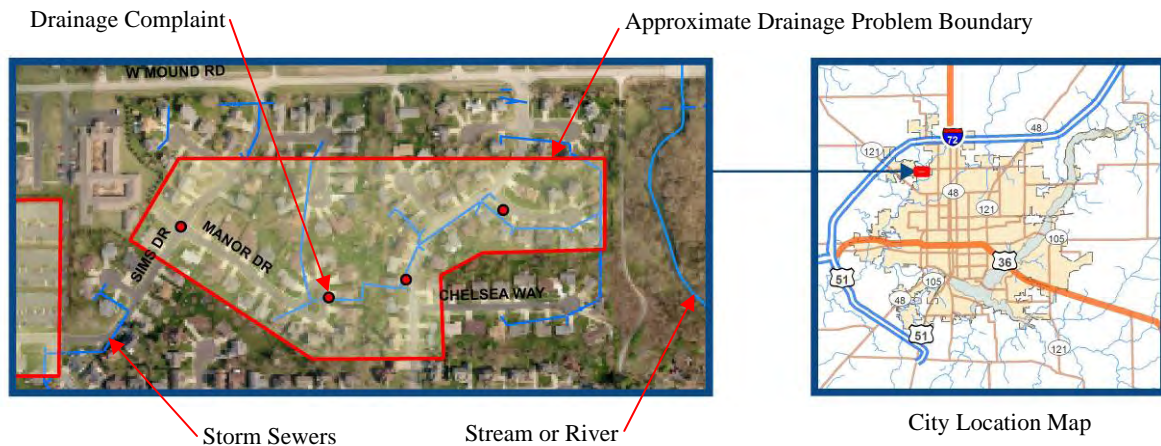
3.3.3 Drainage Problem Areas Map

Using the data gathered from the previous stormwater studies, the GIS complaint database, and other information provided by City staff, 46 drainage problem areas were identified in the City. Exhibit 1 included in the back of the report includes a large fold out map with the drainage problem areas. Remaining drainage problem areas from the Pre-Final 2002 SMP are included and were modified if drainage complaints indicated a particular area needed to be expanded. New drainage problem areas were added based on new drainage complaint information (GIS database), areas provided by the City staff, or in flooding documented by recent photographs. In most cases, the problem areas were delineated based on several sources pointing to a particular area.

A clear observation from the Problem Area Map (Exhibit 1) is that most of Decatur's stormwater problems are located in the fringes of the City. The central portion of the City has relatively few problem areas. One of the reasons for this is that the City made a significant investment in drainage improvements following the completion of the 1966 study. The area shaded in purple on the map, shows projects completed since 1966. These projects were funded through the issuance of General Obligation Bonds, totaling \$19.75 million in three separate Surface Water Drainage Bonds issued in 1970, 1975, and 1982.







In the Pre-Final 2002 SMP the drainage problem areas were denoted by a clouded area. In the 2009 SMP the clouded areas were changed to polygons to allow for better manipulation in GIS. A name was assigned to each problem area based on nearby streets. The names are meant to represent the general vicinity of the drainage problem, not the location of a specific problem. Table 3-1 presents a summary of the drainage problem inventory. The following is a legend for the Table 3-1 drainage problem maps.





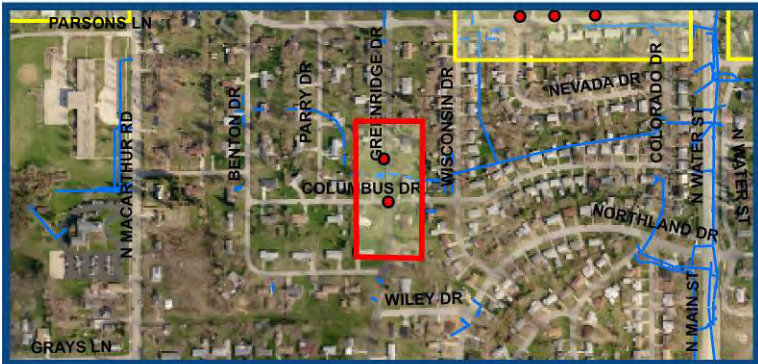

Legend for Table 3-1 Drainage Area Maps Explanation









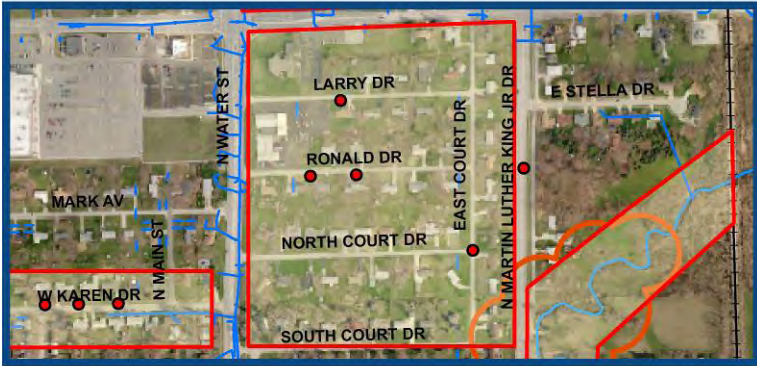


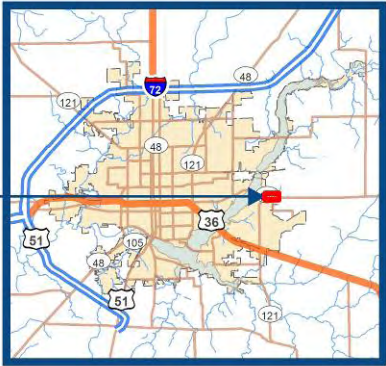


In the Pre-Final 2002 SMP erosion problems were identified. These problem areas were maintained but separated from other drainage problems. Based on the Pre-Final 2002 SMP erosion problem areas, approximately 20,000 feet of streams are experiencing erosion problems.


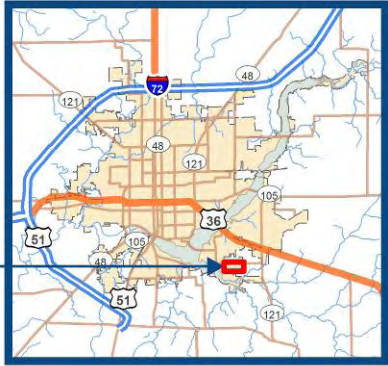


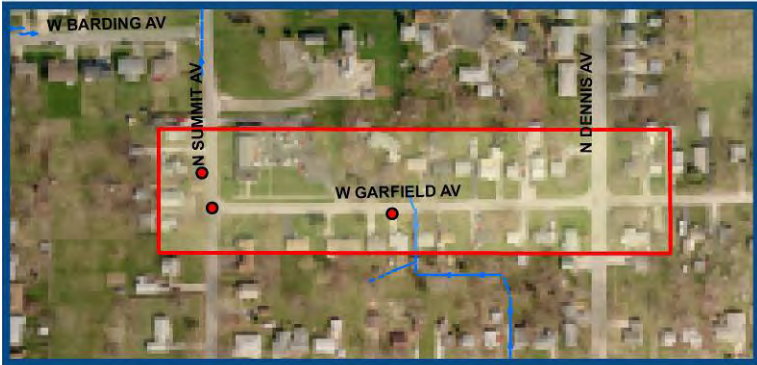

Table 3-1 Drainage Problem Area Inventory





Item No.	Location	Problem Description	Potential Solution	Photo Location (App. C)
1	32nd & Fulton	The main drainage way for the entire neighborhood is isolated on private property and is extremely overgrown. It does not provide adequate drainage for the neighborhood.	Obtain perpetual drainage easement, clean away overgrowth, re-grade, and add storm sewers.	C32, C57, C8
				
2	34th & Prairie	Poor roadway drainage.	Add ditching and/or storm sewers and inlets.	C36
				
3	Airport Road	Poor roadway drainage.	Add ditching and/or storm sewers and inlets.	NA
				





Item No.	Location	Problem Description	Potential Solution	Photo Location (App. C)
4	Bowshier Lane	Lack of roadside drainage. Area may be in floodplain.	Install roadside ditches.	NA
				
5	Cherry and Rainwater	Street flooding and poor drainage. Creek nearby by Rainwater overtops road and local drainage floods roadway.	Replace Culverts, add storm sewers and inlets, and/or erosion control measures.	C41
				
6	Columbus & Greenridge	The drainage way is flat with minimal slope, it has the potential for flooding. Two homes could be affected.	Install a larger storm sewer system to service the neighborhood. Backyard easements may be difficult to obtain.	NA
				


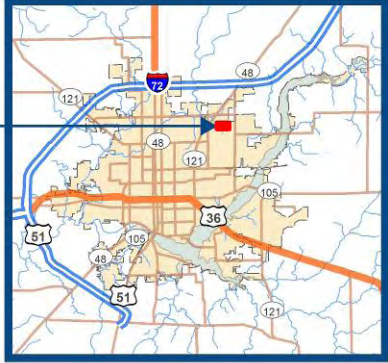


Item No.	Location	Problem Description	Potential Solution	Photo Location (App. C)
7	Constant View and Warren	There are no drainage improvements to bring stormwater to the outlet of the neighborhood. The potential exists to flood five homes. Flooding occurs throughout Village Apartments.	Add storm sewers and inlets.	NA
				
8	Delmar and Woodale	Basement Backups.	Investigate I&I problems. Study area to determine problem better.	NA
				
9	Dennis & Kenwood	Lack of drainage system throughout neighborhood.	Add new storm sewers or ditches.	NA
				

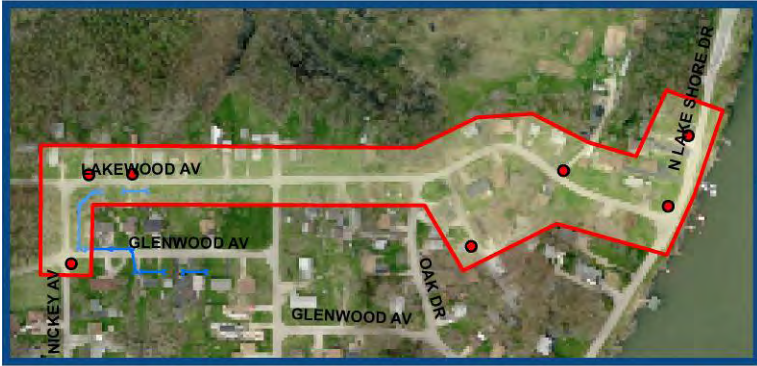
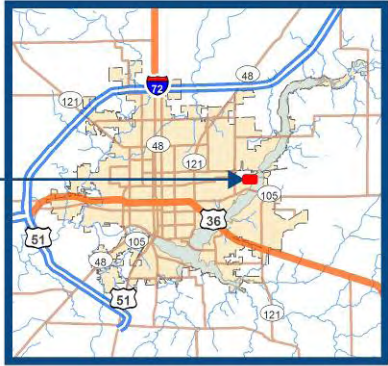




Item No.	Location	Problem Description	Potential Solution	Photo Location (App. C)
10	East Court & North Court	Minor ditch problems and backyard flooding.	Add new storm sewers or ditches.	NA
				
11	Excelsior Road	Ditches do not provide adequate drainage.	Ditch maintenance.	NA
				
12	File Drive	Poor Drainage in neighborhood.	Install ditching or storm sewers and inlets.	C43
				

Item No.	Location	Problem Description	Potential Solution	Photo Location (App. C)
13	Fitzgerald & Fontenac	Only two inlets provide drainage for the entire neighborhood. Multiple drainage complaints.	Add Additional storm sewers and inlets.	C19, C26
				
14	Franzy & Point Bluff ditch	Flooding and erosion problems reported along private drainage ditch.	Install erosion control measures and study the area to determine flooding problems. Obtain perpetual drainage easement.	C5,C16
				
15	Garfield Avenue	Severe flooding surrounds buildings.	Drainage improvements that provide a positive outfall needed.	C47
				

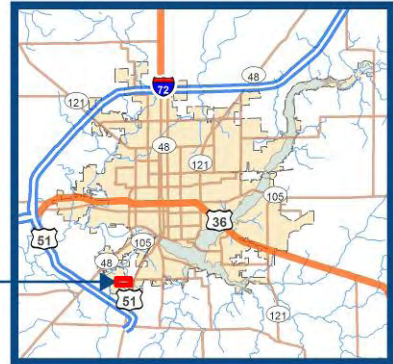
Item No.	Location	Problem Description	Potential Solution	Photo Location (App. C)
16	Greenridge & Josephine	Poor outlet for the neighborhood.	Install storm sewers to properly drain neighborhood.	NA
				
17	Hawthorne Drive	Flooding from streets and erosion problems.	Road side ditching and storm sewers.	NA
				



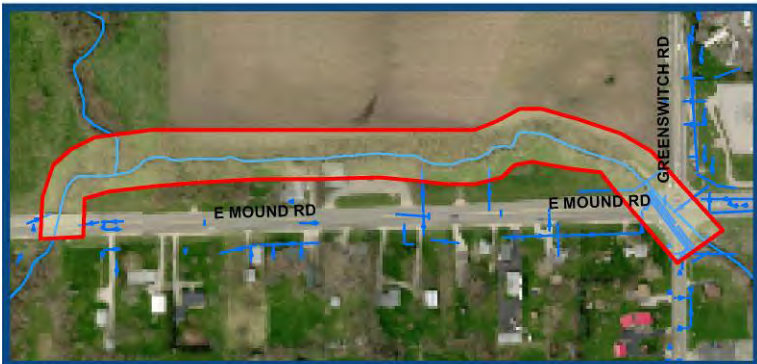

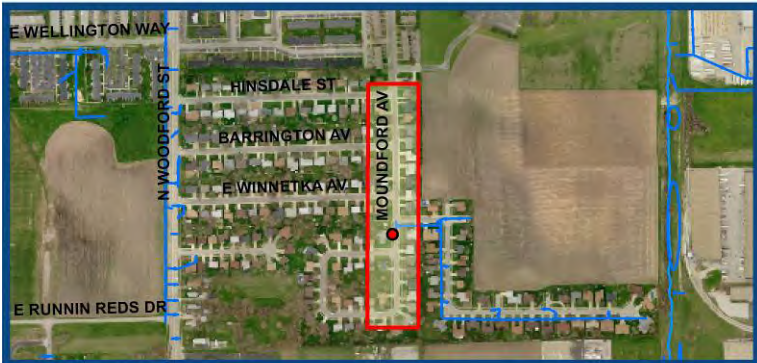
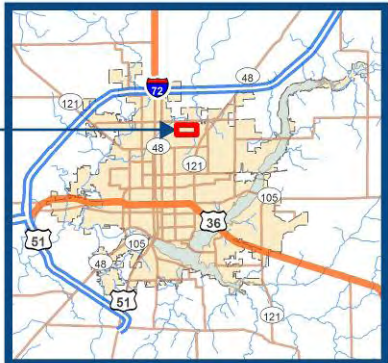
Item No.	Location	Problem Description	Potential Solution	Photo Location (App. C)
18	Karen Drive	The existing drainage swale behind several homes becomes plugged with leaves. Four homes have the potential to flood.	Find an outlet for the neighborhood, maintain the structure from debris, possibly installing a casting more suitable to prevent clogging.	NA
				
19	King Arthur Dr. & Nottingham	Area receives farm runoff and sediment. No evidence of storm sewers along King Arthur could be found. Poor drainage. Storm sewers backing up.	Add storm sewers along King Arthur Drive and provide positive outlet for farm runoff. Analyze other areas.	NA
				

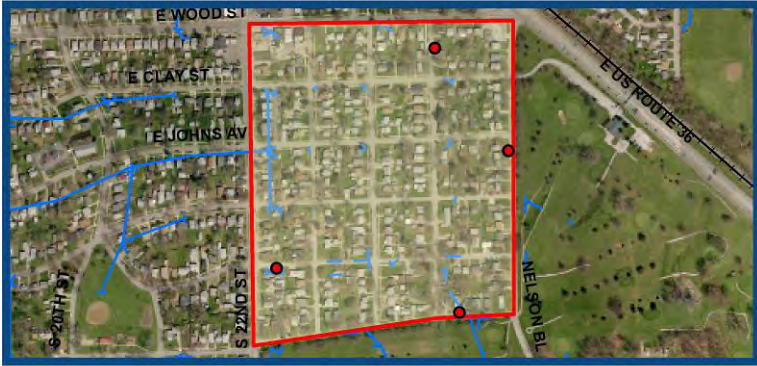


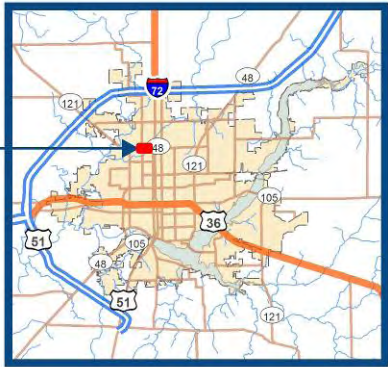


Item No.	Location	Problem Description	Potential Solution	Photo Location (App. C)
20	L&A Industrial Court Pond	Flooding at the west end of Industrial Court possibly due to pond boundary conditions.	Study needed to analyze the problem.	C9
				
21	Lake Beach Addition (Hardy Street, etc.)	Storm water flows through properties beginning at William Street then south to Hardy. The subdivision has no curb and gutter and no sewer system. Stormwater causes flooding and erosion in yards and around buildings.	Install storm sewer system throughout subdivision or identify other alternatives to control stormwater flow.	C36
				




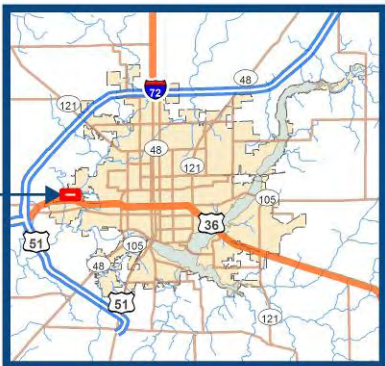
Item No.	Location	Problem Description	Potential Solution	Photo Location (App. C)
22	Lakewood Avenue	Several drainage complaints have been reported. Appears to need drainage improvements.	Install ditching, sewers, and/or inlets.	C2
				
23	Main Street Underpass	Underpass floods in large events.	Flooding problem needs to be analyzed for solutions.	C34
				
24	Marietta Street	Several complaints have been received about poor drainage in roadway and subsequent basement flooding.	Add ditches or storm sewers and inlets.	NA
				




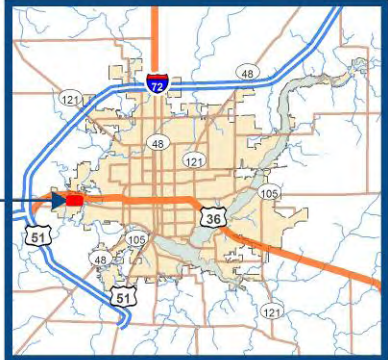


Item No.	Location	Problem Description	Potential Solution	Photo Location (App. C)
25	Masters Drive	Street flooding and poor drainage in several areas.	Study needs to be performed to find solution.	NA
26	Meadowlark Subdivision	Culvert draining the neighborhood beneath State Road 47 & 48 becomes clogged with debris. Also, the intersection of Meadowlark and Whipperwill has the potential to flood if the creek rises. One home could be flooded if this occurs. Erosion.	Maintain culvert, provide intersection drainage, and provide erosion control along the creeks.	C29, C45




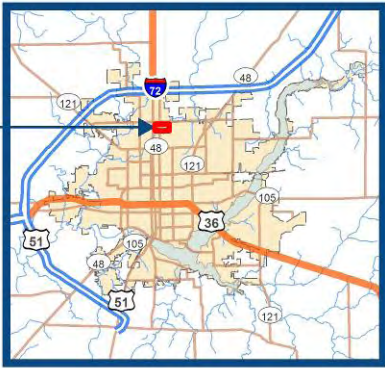
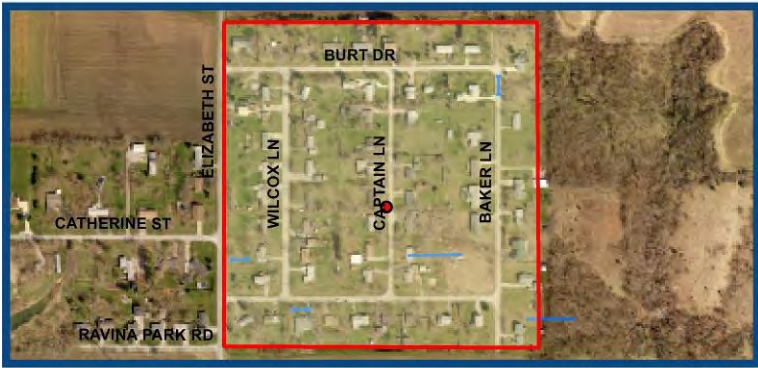
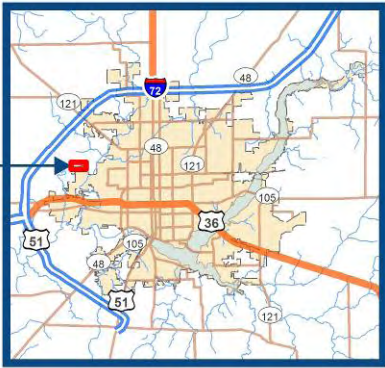



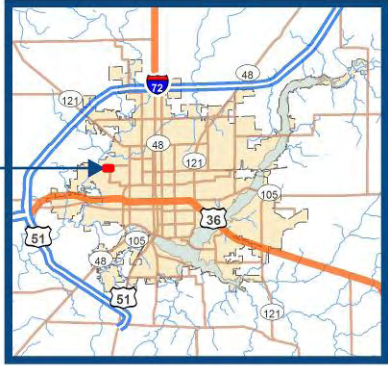

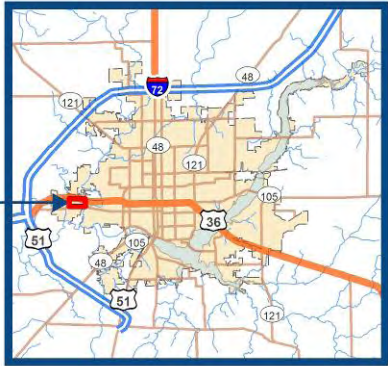


Item No.	Location	Problem Description	Potential Solution	Photo Location (App. C)
27	Montgomery Hills	The neighborhood has curb, gutters and storm sewers. Internal pockets exist with no overland flow outlet that have the possibility of flooding.	Evaluate the storm sewer capacity and verify enough capacity exists to properly serve neighborhood.	C17
				
28	Mound Road	Stream flooding possibly to downstream restraint.	Study needed to determine problem. Possible floodplain property buyout situation.	C7
				
29	Moundford Ave	Inadequate drainage along roadway.	Add storm sewers along Moundford Avenue.	NA
				


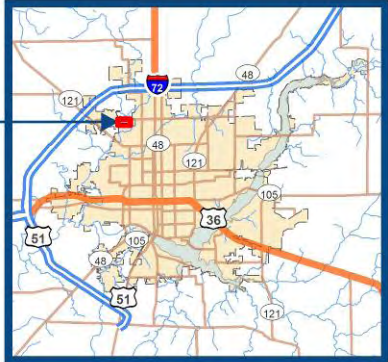


Item No.	Location	Problem Description	Potential Solution	Photo Location (App. C)
30	Nelson Park	Flooding problems from poor drainage and lack of storm sewer system. Sewer backups due to combined sewer system.	Add storm sewers and inlets.	C56, C59
				
31	Pershing Road	Flooding problems at the intersection with Macarthur Road. A low spot exists north on Greenridge. Some ditch work is needed.	Install Ditching and/or Storm Sewers.	NA
				
32	Phillips Drive	Street Flooding.	Improve drainage system with either storm sewers or ditching.	C49
				



Item No.	Location	Problem Description	Potential Solution	Photo Location (App. C)
33	Ramsey & Foster	Poor drainage related to no positive outlet. Other problems throughout the area seem to be related to sewer backups possibly from stormwater infiltration and inflow. Area may flood during heavy rains.	Need additional verification of capacity of existing system. Install additional storm sewers if necessary.	NA
		 		
34	Richland & Cornell	Possible flooding into three garages during heavy rains.	Verify problem before adding storm sewer.	NA
		 		

Item No.	Location	Problem Description	Potential Solution	Photo Location (App. C)
35	Riverview & Sunset	Flooding in occurs due to pump station problems and inadequate ditching.	Add ditches or storm sewers and inlets.	NA
				
36	Scovill Court	Flooding problems from lack of positive fall along road. Stormwater is trapped at end of court.	Add ditches or storm sewers and inlets.	C51
				
37	Sims & West Mounds Apts.	Low spot at entrance to the W. Mounds Apartments on Sims Drive has the potential to flood and may not allow apartment residents access to the complex during rain events.	Install additional inlets for the high intensity rainfall events.	C12
				

Item No.	Location	Problem Description	Potential Solution	Photo Location (App. C)
38	Southampton and Buckingham	Multiple drainage complaints through the neighborhood with some flooding causing property damage.	Install ditching and/or storm sewers and inlets.	C23
				
39	Spring Creek at MLK/Yaegel Bridge	Erosion and flooding in Spring Creek. On the southern side of the area an old residential bridge may cause flooding (Yaegel Bridge).	Install bank stabilization and hydraulic model the stream to determine impacts of structure.	NA
				
40	Sullivan & Elizabeth	Flooding in this area occurs along streets as this area lacks adequate roadside ditching and storm sewers.	Install new ditches. Area is currently outside City limits.	NA
				

Item No.	Location	Problem Description	Potential Solution	Photo Location (App. C)
41	Summit & Harrison	Ditches do not drain well. Flooding may occur at the detention basins.	Clean and regrade the existing ditch and install rip rap to prevent erosion.	NA
				
42	Westminster & Moffet	Ditches do not appear to drain properly.	Minor ditch work needed.	NA
				
43	William Street	Street flooding and basement backups.	Increase size or add storm sewers and inlets.	NA
				

Item No.	Location	Problem Description	Potential Solution	Photo Location (App. C)
44	Woodridge and Manor	The neighborhood to the east also has numerous drainage problems. Drainage complaints have been received along existing storm sewers.	Add inlets and increase storm sewer sizes.	C40
				
45	Wyckles and Main	Flooding has been reported at the intersection.	This area needs additional investigation during wet weather to define the problem. Intersection drainage improvements needed.	NA
				

Item No.	Location	Problem Description	Potential Solution	Photo Location (App. C)
46	Yorktown Court	The upstream end of the storm sewer system for the cul-de-sac does not drain. There is a large undeveloped area north of the cul-de-sac that is draining to the system.	Investigate structural condition of storm sewer system and evaluate if additional sewers are needed.	C31
<div style="display: flex; justify-content: space-around; align-items: center;">   </div>				

4.0 STORMWATER PROBLEM AREA PRIORITIZATION

This chapter reviews the prioritization and development of rudimentary solutions for the problem areas identified in Chapter 3. The goal of the 2009 SMP is to provide an overall identification of drainage problems in the City. Detailed engineering analysis and development of solutions in each problem area will be completed in future phases of the SMP.

4.1 Prioritization Criteria

A numerical approach was used to objectively prioritize projects based on factors such as health and safety, degree of cost effectiveness, and other factors. The key steps in this process included identifying prioritization criteria and ranking or scoring of individual projects with numerical scores using a spreadsheet matrix. The resulting list of prioritized projects was used as a guide to develop a list of initial program projects (or Early Action Projects). A complete list of prioritized projects is included in Appendix D of this report.

The prioritization criteria used to rank projects are as follows:

- Public Health and Safety
- Degree of Street Flooding
- Construction Impacts
- Problems Identified in 1966, But Not Solved
- Implementation Constraints
- Watershed Impact
- Infiltration and Inflow (I&I) Problems
- Water Quality

For each of these criteria, a scoring system of 0 through 5 was developed. Criteria such as public health and safety and street flooding severity were evaluated based on observations and knowledge obtained from recent past rain events.

Table 4-1 presents the prioritization criteria and rationale for scoring or ranking each project. The rankings were based on a 0 to 5 scoring system. Different weighting factors were then assigned to each criteria, with the reason being that some criteria were judged to be more important (higher weighting) than others. Weight factors of 10, 6, and 3 were assigned as follows:

Weight Factor	Criteria
10	Public Health & Safety Degree of Street Flooding
6	Implementation Constraints Construction Impacts Problem Area in 1966 Study
3	Watershed Impact Water Quality Impact I&I Problem Areas

Table 4-1 Project Prioritization Criteria

Category	General Description	Score	Evaluation Criteria
Public Health and Safety	Evaluates potential impact of flooding on public health and safety. Generally refers to flooding in and around buildings	5	<ul style="list-style-type: none"> Flood water depth and velocity completely surrounds or threatens the structural integrity of buildings and/or vehicles Streets have the potential to ice over in the winter Combined sewer flooding observed
		3	<ul style="list-style-type: none"> Flood waters surround buildings but no imminent danger to structure
		1	<ul style="list-style-type: none"> Flood waters near building facilities but not surrounding or inundating
		0	<ul style="list-style-type: none"> Building facilities generally not directly affected
Degree of Street Flooding	Evaluates impact of flood depths on access to or through an area	5	<ul style="list-style-type: none"> Streets impassable and flood waters up into yards near buildings on both sides of street Flooding noted on arterial streets
		3	<ul style="list-style-type: none"> Flooding depth up to crown of street and up to sidewalks Vehicles can pass through on center of street Flooding noted on collector streets and local streets
		1	<ul style="list-style-type: none"> Street flooding minor nuisance for traffic Depth below curb and/or sidewalk
		0	<ul style="list-style-type: none"> Flow restricted to gutters and inlets
Construction Impacts	Evaluates relative impacts of construction on adjacent third parties and on traffic movement through construction area	5	<ul style="list-style-type: none"> Construction in open ground Limited or no impact on adjacent populated areas
		3	<ul style="list-style-type: none"> Construction will require partial street closure for short periods
		1	<ul style="list-style-type: none"> Construction will require complete street closure for extended period
Problem Area in 1966 Study	Considers the recommendations of the 1966 study. If recommendations for improvements still exist from 1966 study they are given a higher weight	5	<ul style="list-style-type: none"> Area has specified improvements recommended Area was developed before the 1966 study
		3	<ul style="list-style-type: none"> Area had general area improvements Area had recommended improvements in a portion of the area Area may have not been developed
		1	<ul style="list-style-type: none"> Area was not addressed in the 1966 study

Category	General Description	Score	Evaluation Criteria
Implementation Constraints	Considers potential implementation constraints or obstacles that may delay or make the project difficult to construct. Examples include extensive permitting issues, difficult right-of-way or easement acquisition, the need to coordinate with other projects that are not ready to construct.	5	<ul style="list-style-type: none"> No known permits or just local permits required Improvements completely within existing right-of-way Project can proceed independently from other projects
		3	<ul style="list-style-type: none"> Local and state permits required Limited additional right-of-way acquisition required Improvements will need to coordinate with one or more other projects but delays not anticipated
		1	<ul style="list-style-type: none"> One or more federal permits required Extensive right-of-way acquisition required Improvements will need to coordinate with one or more other projects which will likely cause some delay Areas located outside of City limits
Watershed Impact	Rates the importance of each project relative to its impact on the major watersheds of Decatur	5	<ul style="list-style-type: none"> Project will have a significant positive impact on the most densely populated watersheds i.e. Sangamon River, Spring Creek North
		3	<ul style="list-style-type: none"> Project will have a significant impact on the less populated watersheds (i.e. Stevens Creek)
		1	<ul style="list-style-type: none"> Project will have a limited impact on the watershed. Major watershed is primarily undeveloped i.e. Ward Branch, Sand Creek, Finley Creek
I&I Problems	Considers if the problem area has known sanitary I&I problems. Sanitary sewer problems may be improved by stormwater improvements in the area. Combined sewers would benefit by direct improvements.	5	<ul style="list-style-type: none"> I&I is known to be problem in this area Problem is in combined sewer area
		3	<ul style="list-style-type: none"> I&I is known to be problem in this area Problem area is in separate sewer area
		1	<ul style="list-style-type: none"> I&I is not known to be a problem in this area, but may still exist
Water Quality	Considers potential effects problem area improvements may have on water quality. A 5 score may also include 3 score criteria.	5	<ul style="list-style-type: none"> Erosion Problems Storage or wetland options (besides standard BMPs)
		3	<ul style="list-style-type: none"> Manufactured BMPs units could be added to storm sewers Green solution retrofits are an option
		1	<ul style="list-style-type: none"> Improvements will have minimal impact on water quality

4.2 Prioritization Matrix

A spreadsheet matrix was developed to compute the total weighted scores for each project. A complete list of prioritized problem areas is presented in Appendix D. Scores were given in each category based on the information obtained for each area. Criteria scores were multiplied by the weighing factor to arrive at the weighted scores. Criteria scores and weighted scores were then added to arrive at the final scoring for each project.

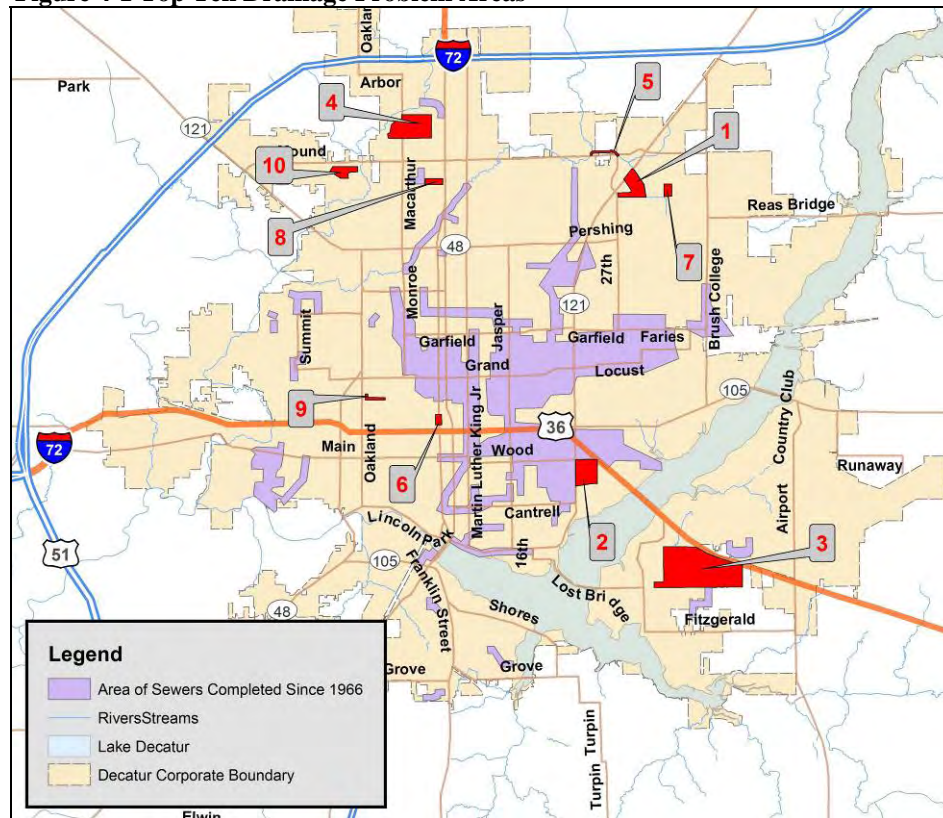
The City of Decatur has asked for evaluation of projects on a normalized scale. To obtain this score the total weighted score was divided by 235 and the multiplied by 100. The 235 points is a result from the calculation of obtaining the highest marks in all categories multiplied by their respective weighting factors. This normalized score is an attempt to relate the scoring of the projects to a scale of 100.

The projects were then ranked from highest score to lowest score. The total normalized scores ranged from 87 to 31. Table 4-2 shows the 20 highest rated drainage problem areas and Figure 4-1 shows their locations in the City (as a red polygon).

Table 4-2 Top Priority Areas

Priority Ranking	Improvement Project	Project Area (Acres)	Normalized Score
1	Meadowlark Subdivision	37.3	87
2	Nelson Park	8.2	81
3	32nd & Fulton	235.8	79
4	Southampton and Buckingham	11.8	77
5	Mound Road	5.8	74
6	Main Street Underpass	5.5	74
7	L&A Industrial Court Pond	8.0	74
8	Karen Drive	8.8	70
9	Marietta Street	5.1	69
10	Woodridge and Manor	6.5	69
11	File Drive	41.8	68
12	Phillips Drive	63.6	68
13	William Street	19.4	68
14	Fitzgerald & Fontenac	56.7	66
15	Montgomery Hills	32.1	66
16	Greenridge & Josephine	8.3	65
17	Garfield Avenue	6.7	63
18	Lakewood Avenue	9.7	63
19	Masters Drive	22.0	63
20	Scovill Court	10.4	63

Figure 4-1 Top Ten Drainage Problem Areas



All but one of the projects (Karen Drive) listed in Table 4-2 scored the highest scores (5) in either Public Health and Safety or Degree of Street Flooding. The top three projects scored a 5 in both categories. In addition to these top priority drainage problem areas, other areas that scored the highest score on either Public Health and Safety or Degree of Street Flooding are shown in Table 4-3 Additional Areas with High Health and Safety or Degree of Flooding Concerns.

Table 4-3 Additional Areas with High Health and Safety or Degree of Flooding Concerns

Priority Ranking	Improvement Project	Project Area (Acres)	Public Safety and Health	Degree of Flooding
12	Phillips Drive	63.6	1	5
14	Fitzgerald & Fontenac	56.7	3	5
15	Montgomery Hills	32.1	3	5
17	Garfield Avenue	6.7	5	3
18	Lakewood Avenue	9.7	5	3
19	Masters Drive	22.0	3	5
20	Scovill Court	10.4	3	5
21	Sims & West Mounds Apts.	76.7	3	5
22	Ramsey & Foster	10.0	5	1
23	34th & Prairie	62.0	5	3
24	Lake Beach Addition (Hardy Street, etc.)	15.1	5	3
27	Delmar and Woodale	11.2	5	1
33	Constant View and Warren	57.9	1	5

4.3 Cost Estimating Approach for Capital Projects

Future phases of the Stormwater Master Plan will need to be completed to more accurately identify project solutions and costs. These future phases will require additional data collection, hydrologic/hydraulic modeling, alternatives analysis, costs estimating, and solution recommendations.

It is possible to identify order of magnitude costs for capital projects based on experience on similar past stormwater improvement projects. This order of magnitude cost is important in demonstrating that there are significant funding needs that must be met if the City is to solve these problems.

Table 4-4 shows total project costs for ten neighborhood drainage improvement projects that Clark Dietz completed preliminary engineering studies on over the past three years. Improvements in these projects generally included new storm sewers and/or ditch and culvert reconstruction. The area served by each project was computed to develop a cost per acre for installing drainage improvements. As shown in Table 4-4, the costs for the 10 projects ranged from approximately \$6,000 per acre to nearly \$175,000 per acre. The larger projects involved installing a new major trunk line and outfall. An average cost was computed after eliminating the largest and smallest project. The resulting figure was \$45,000 per acre.

The approximate area for each problem area identified in Chapter 3 was estimated based on the polygons shown on the Problem Area Map provided in Exhibit 1 to this report. The total area computed for all projects is approximately 1,260 acres. At \$45,000 per acre, this would indicate an order of magnitude cost for all needed capital projects of \$57 million. Obviously not all of these projects will likely be completed in the next ten years, but even if half are, a significant investment in stormwater will be needed to address these problems.

Table 4-4 Drainage Improvement Cost Data

Previous Clark Dietz Drainage Projects	Total Cost	Project Area (Acres)	\$/Acre
1. Hickoryvale Subdivision, New Albany, Indiana	\$338,000	14.5	\$23,310
2. Reno Avenue, New Albany, Indiana	\$1,600,000	9.2	\$173,913
3. Oakwood Subdivision, New Albany, Indiana	\$2,700,000	23.6	\$114,407
4. Zirschmeide Drive, New Albany, Indiana	\$191,000	4.5	\$42,444
5. Pine Mills Drainage Improvements, Fort Wayne, Indiana	\$151,200	7.5	\$20,160
6. Tupie Street, Fort Wayne, Indiana	\$336,000	4.6	\$73,043
7. Turpie-Fruehauf Alley, Fort Wayne, Indiana	\$576,000	13.4	\$42,985
8. Fleming and Washington, Indianapolis, IN	\$3,600,000	135.0	\$26,667
9. Mustins Subdivision, Fort Wayne, Indiana	\$2,040,000	100.0	\$20,400
10. Chanterelle Drainage Improvements, Fort Wayne, Indiana	\$51,600	9.0	\$5,733
Note: 1. Highest and lowest removed from average. 2. Costs included construction and non-construction costs. 3. Costs based on 2008 dollars.			Average Cost Per Acre⁽¹⁾ \$45,427

It should be noted that the costs listed in Table 4-4 were based on final drainage improvement project areas. These areas were used for the calculation which includes the parcels adjacent to the improvements. The drainage problem areas indicated in this report cover a broad area, thus the actual drainage improvements may or may not be needed over the entire area.

4.4 Future Capital Improvement Projects

The drainage problem map (Exhibit 1) in this report and associated descriptions (Table 3-1 Drainage Problem Area Inventory) provide a good starting point for capital improvement projects. The project prioritization matrix can be used to focus on projects with the most severe drainage problems. Table 4-5 shows the top 20 out of 46 problem areas identified. It is expected these top 20 projects will cost approximately \$27.5M to complete in 2009 dollars.

Table 4-5 Future Capital Improvements

Priority	Drainage Problem Area	Area (Acres)	Order of Magnitude Cost (\$ M)
1	Meadowlark Subdivision	37.2	1.69
2	Nelson Park	8.2	0.37
3	32nd and Fulton	235.8	10.71
4	Southampton and Buckingham	11.8	0.54
5	Mound Road	5.8	0.26
6	Main Street Underpass	5.5	0.25
7	L&A Industrial Court Pond	8.0	0.36
8	Karen Drive	8.8	0.40
9	Marietta Street	5.1	0.23
10	Woodridge and Manor	6.5	0.30
11	File Drive	41.8	1.90
12	Phillips Drive	63.6	2.89
13	William Street	19.4	0.88
14	Fitzgerald & Fontenac	56.7	2.58
15	Montgomery Hills	32.1	1.46
16	Greenridge & Josephine	8.3	0.38
17	Garfield Avenue	6.7	0.30
18	Lakewood Avenue	9.7	0.44
19	Masters Drive	22.0	1.00
20	Scovill Court	10.4	0.47
Total =			\$27.5 M

4.5 Early Action Projects

The prioritization matrix was used as a guideline to develop a list of early action projects (the top five projects listed in Table 4-5). The early action projects are described in greater detail on the following pages. The complete listing of all 46 identified projects and their rankings are shown in Appendix D. It is recommended a preliminary design report be completed for each of the following projects to detail the appropriate solution and a more accurate cost estimate for budgeting purposes.

4.5.1 Meadowlark Subdivision



Rank	#1
Priority Score	87
Area	37.3 Acres
# of CSR Complaints	4
Flooding Photographs	App. C Pg. C-29, C-45
Order of Magnitude Cost	\$1.69 M

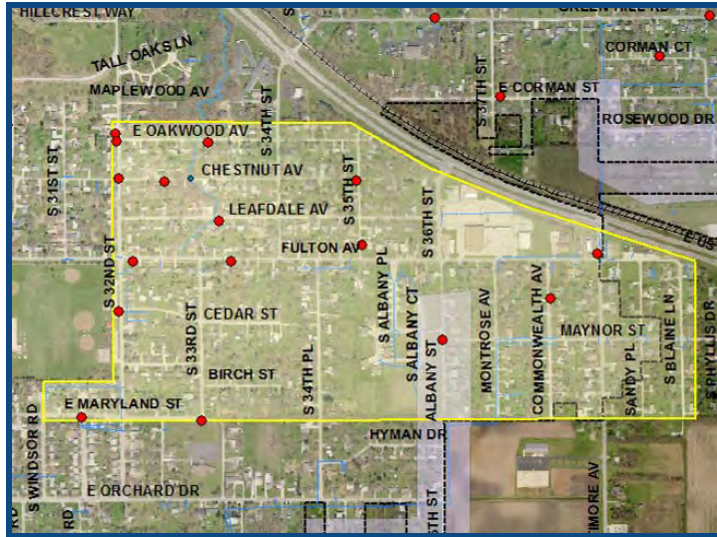
Drainage Problem

The neighborhood appears to have poor drainage. Drainage related complaints have been received throughout the area. The intersection of Meadowlark and Whippoorwill has the potential to flood when the creek rises. One home could be flooded if this occurs. Erosion appears to be a possible problem along the creek. A culvert beneath State Road 48 becomes clogged and is prone to debris blockages. Overall, problems appear to be related to creek flooding and poor local neighborhood drainage.

Potential Solution

A detailed analysis of the area should be completed. Solutions may involve: maintaining the culvert beneath State Road 48, providing intersection drainage improvements, channel improvements, or regional detention. Possible related drainage problem – Industrial Park Pond.

4.5.3 32nd & Fulton



Rank	#3
Priority Score	79
Area	235.8
# of CSR Complaints	16
Flooding Photographs	Appendix C Pg. C-32, C-57
Order of Magnitude Cost	\$10.7 M

Drainage Problem

32nd and Fulton consists of a large area with numerous problems which range from local neighborhood drainage problems to overgrown or inadequate drainage channels to relieve flooding. Deep flooding occurs around a gas station which causes unsafe roadway conditions and possibly property damage. Poor neighborhood drainage causes flooding.

Potential Solution

A detailed analysis of the areas should be completed likely including hydraulic modeling of the area. Solutions may involve providing a positive storm outlet and improving neighborhood drainage. The order of magnitude cost reflects the broad spread drainage problem in this area.

4.5.4 Southampton and Buckingham



Rank	#4
Priority Score	77
Area	11.8 Acres
# of CSR Complaints	8
Flooding Photographs	App. C Pg. C-22
Order of Magnitude Cost	\$0.54 M

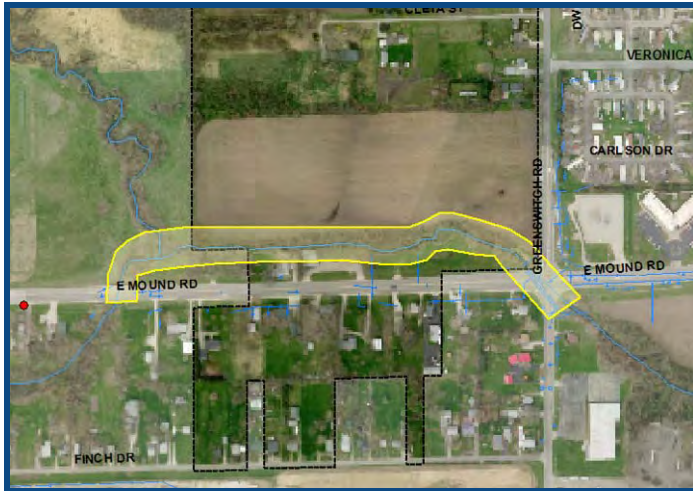
Drainage Problem

Multiple drainage complaints through the neighborhood have been received documenting local street flooding causing property damage. Several complaints on Southampton Drive have been received due to street flooding and it is known to be a problem in this area. Drainage problems appear to be due to the lack of storm sewers.

Potential Solution

A detailed analysis of the areas should be completed likely including hydraulic modeling of the area. Solutions may involve providing a positive storm outlet and improving neighborhood drainage.

4.5.5 Mound Road



Rank	#5
Priority Score	74
Area	5.8
# of CSR Complaints	11
Flooding Photographs	App. C Pg. C-7
Order of Magnitude Cost	\$0.26 M

Drainage Problem

Flooding associated with this drainage problem area is related to stream flooding. Flooding has the potential to damage property and cause safety concerns.

Potential Solution

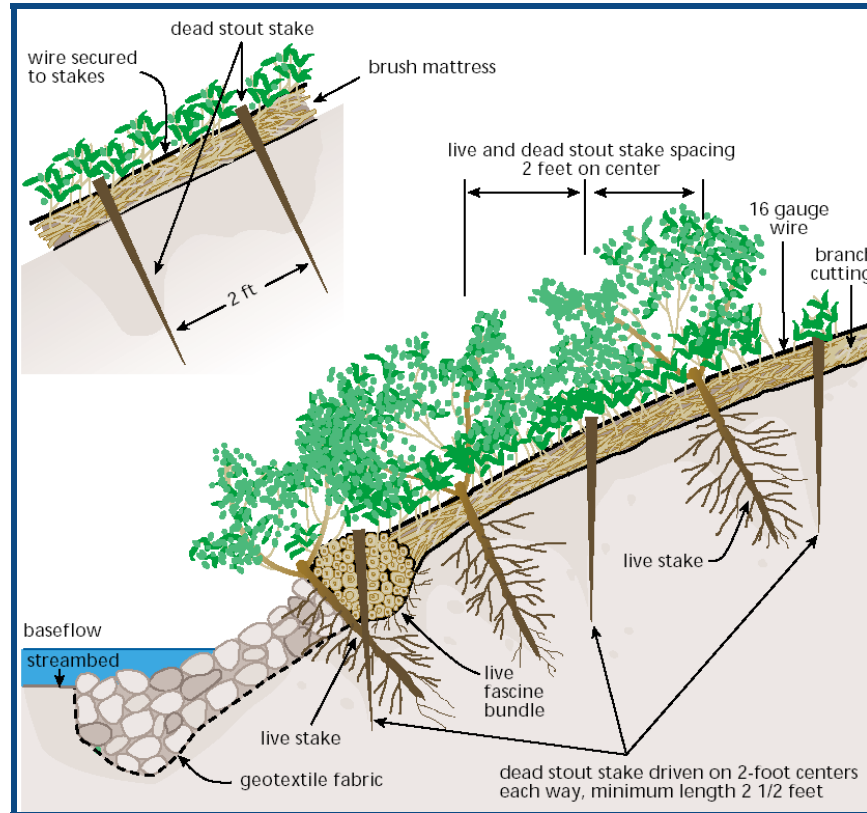
Hydraulic modeling of the stream would need to be performed to find the source of the stream flooding which could be an undersized structure in the area.

4.6 Additional Capital Improvement Projects

4.6.1 Erosion Control Capital Improvements

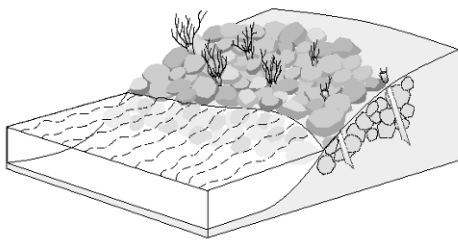
Areas identified in 2002 as erosion problems should be reinspected and if erosion problems are still present a preliminary report identifying an appropriate solution should be prepared. Exhibit 1 indicates the erosion control problem areas. Section 5.2.2 discusses stream and ditch inspection further.

Solutions for erosion control problems can range from minor regrading and seeding (for areas experiencing moderate flow velocities) to more intensive improvements such as riprap, geotextile fabric, woody plantings, vegetated geogrids, etc. for areas experiencing high flow velocities or containing steep channel sideslopes. Whenever possible, streambank stabilization should employ vegetative measures, so as to maintain the natural state of the channel corridor and to enhance instream water quality. In some instances of severe erosion, a more structural solution such as gabion baskets or revetment may be a more appropriate solution. The following illustrations show some examples of streambank stabilization techniques.



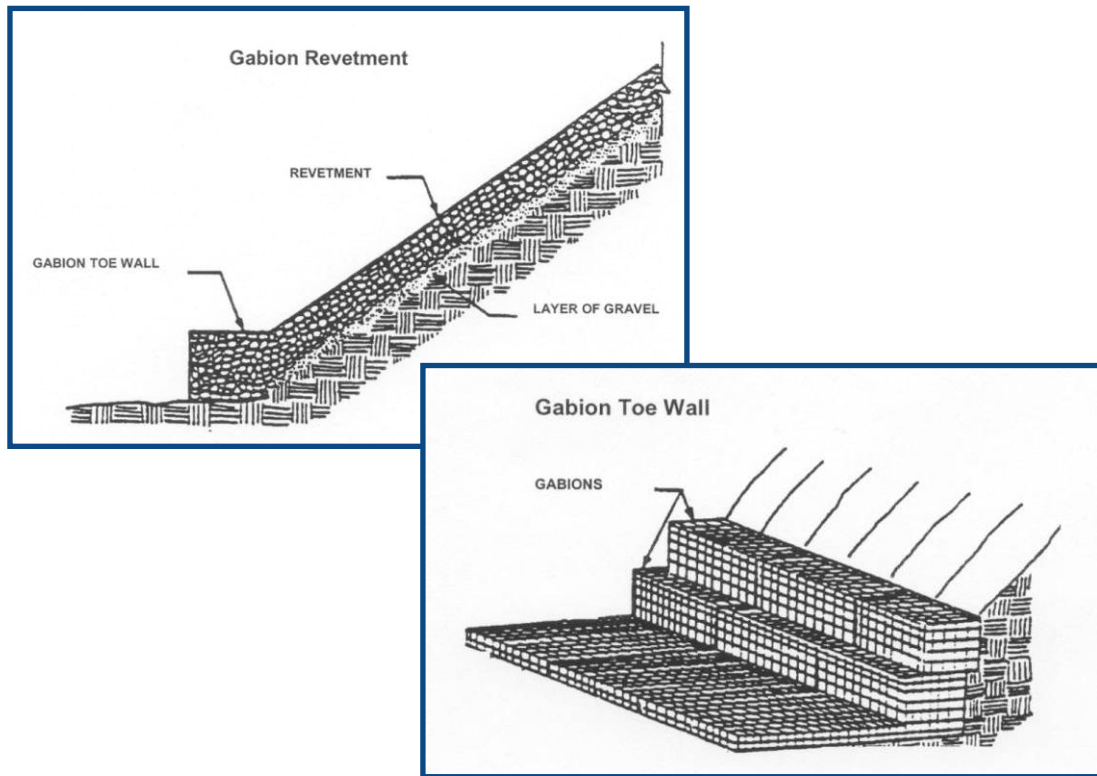
Brushmattress Technique (Source: USDA-NRCS 1996)

Joint Plantings

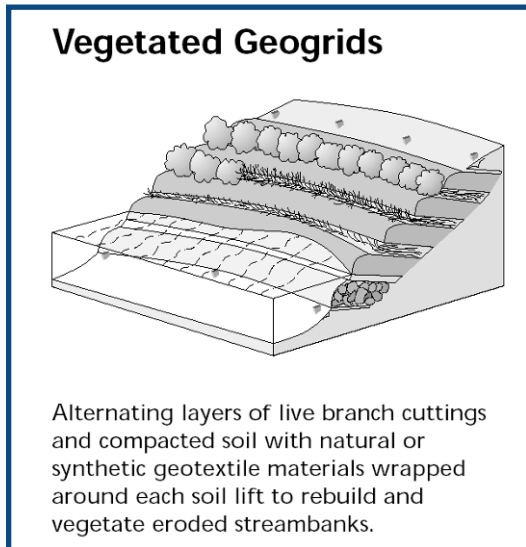


Live stakes tamped into joints or openings between rock which have previously been installed on a slope or while rock is being placed on the slope face.

*Riprap and Live Stakes (Joint Plantings)
(Source: Federal Interagency Stream
Restoration Working Group, 1998)*



Gabion Revetment (Source: Chattanooga Public Works Department)



Vegetated Geogrids can also consist of branch cuttings and live stakes, as opposed to large diameter tree trunks, as depicted in the photos below. (Source: Federal Interagency Stream Restoration Working Group, 1998)



Geogrid Installation



Geogrid after establishment of vegetation

Upon choosing specific streambank restoration sites, detailed information will need to be collected and analyzed. Information needed for a final design would include:

- Channel cross sections, including location of private features, property corners, and nearby utilities.
- Hydraulic analysis for each restoration site, including velocity and shear stress calculations for more frequent (i.e. 1-year, 2-year) recurrence interval rainfall events.
- Soil analysis.
- Determination of land availability (i.e. easements, right-of-way, and land acquisition) for proposed grading.
- Determination of construction access points.
- Public input on proposed improvements (most important when improvements are immediately adjacent to existing homes)

4.6.2 Underpasses

Several underpasses (including the Main Street underpass mentioned previously) have been constructed to allow traffic to pass beneath railroad traffic. Undersized drainage facilities (including stormwater pump stations) can result in flooding of the below grade underpasses. These create a public safety hazard due to the depth of flooding that can occur.

All of the major underpasses should be thoroughly analyzed to verify that an adequate outlet has been provided and that it is maintained properly. A program should also be established to fund the repair or replacement of pump station components.

4.6.3 Miscellaneous

The Jasper Street viaduct is a cause for concern. The drainage area is served by a partially blocked outlet. This outlet measures 11 feet wide and 2.5 feet tall. Over time this outlet has filled with silt, debris and sediment. The City currently has undertaken a project to clean this structure to its original capacity. This site should undergo yearly cleaning to maintain its full flow capacity.

5.0 REGULATIONS, STANDARDS, AND POLICIES

This section summarizes current ordinances, policies, and standards that address stormwater and drainage issues. Over the years, the City's practices have been inconsistent in some areas and further evaluation is needed.

5.1 Standards and Policies

5.1.1 Storm Drainage Policy

The "City of Decatur Storm Drainage Policy" (adopted 1993) provides design standards for allowable runoff, drainage plan requirements, design methodologies and basic standards. The current City standard is to control the 100-year storm event at a release rate of 1 cfs/acres for developments two acres or less and three-year existing flow rate for sites larger than two acres. The document specifies Modified Rational Method and rainfall data from U.S. Weather Bureau Technical Paper No. 70. No policies and limited guidance on BMPs are included in the document. The document also has no policy and design criteria for storm sewers, swales, inlets, culverts, and channels. The focus of the document is on stormwater detention facilities.

5.1.2 Development Guide for Commercial Building Projects

The second guidance document is "Development Guide for Commercial Building Projects" (Revised May 2008). This document contains a brief section on stormwater under Site Plan Requirements. This section states the proposed drainage for the development shall conform to the requirements set forth in the City of Decatur's Storm Drainage Policy adopted 1993. Surface drainage shall be collected in an approved detention/retention basin and disposed into an existing storm sewer structure or a roadside ditch or open swale through properly designed facilities. This section also requires that roof or footing drains shall not be connected to any sanitary or combination sewer and that no footing drainage shall be discharged onto the surface where it could freeze but shall be connected directly into the site drainage system.

5.1.3 Standards and Policies Recommendations

The Storm Drainage Policy should be updated to incorporate more information on stormwater quantity and quality. Specific considerations for updates/modifications include:

- Include design criteria (10-year storm recommended) for storm sewer systems and inlets.
- Include design criteria for swales, channels, culverts (design storm will vary).
- Update design rainfall information (recommend Illinois State Water Survey Bulletin 71).
- Include requirements for rear yard swales (underdrains, slopes, etc.) and spacing of storm inlets (i.e. how much roadway flooding encroachment is allowed).
- Include positive overland flow path analysis for 100-year storm events to make sure structures are not damaged.
- Include BMP design information or reference to Illinois Urban Manual
- Consider specifying performance criteria for BMPs (examples: 80% total suspended solids removal, infiltrating the first ½ or 1 inch of runoff).
- Include green infrastructure techniques identified in the IEPA's new MS4 general permit.

5.2 Stream and Ditch Maintenance

5.2.1 Current Stream and Ditch Maintenance

The City's sewer maintenance staff currently does not maintain stream channels due to the lack of legal authority to enter stream areas and lack of drainage way easements. Therefore the City has limited control over residents who fill or build fences in drainage ways.

The Urban Forestry Division attempts to clean some flood prone portions of the streams in the City of Decatur that affect many residents. They clean Spring Creek in Larkdale Court just south of Mound Road and east of SR-121 until it intersects Stevens Creek. At that point Stevens Creek is cleaned starting at Arbor Drive and MacArthur Road downstream until it meets Spring Creek. All together about 27 miles of streams may be cleaned. Creek cleaning is only done during the winter months and is heavily affected by weather and ground conditions.

Many of the stormwater problems areas identified in Chapter 4.0 are related to poor roadside drainage, especially in areas served by ditch and culvert systems. Many of these ditches have been filled naturally with sediment over the years or intentionally by residents. An enhanced ditch maintenance program would solve many drainage complaints.

The City of Decatur's subdivision ordinance provides some language regarding drainage easement requirements for new subdivisions.

7-3-1. Easements for public utilities and surface water drainage shall be provided in such manner as to furnish convenient access therefore to each lot. All easements shall be aligned such that existing, and any future, utilities or drainage facilities can be extended beyond the boundaries of the subdivision.

7-3-2. Whenever any stream or important surface drainage course is located in any area which is being subdivided, the subdivide shall dedicate and convey drainage easements as approved by the Director of the Department of Public Works for the purpose of widening, deepening, sloping, improving or protecting and maintaining the stream or surface drainage course.

However, the subdivision ordinance became effective in 1980 and many of the older subdivisions were likely built without adequate easements.

Sections 21 and 22 of the City's Stormwater Ordinance (Chapter 38) also appear to provide the City with some legal authority to regulate existing developments and locations at which land disturbing activities have occurred *prior* to the enactment of the stormwater ordinance. Section 21(d) states that "Trash, junk, rubbish, etc. shall be cleared from drainage ways." Section 21(f) provides that the City Engineer can notify existing land owners with written orders to correct drainage, erosion, and sediment problems within a reasonable time frame. Section 22 provides the City Engineer with the authority (to the extent allowed by State and Federal law) to inspect stormwater management facilities.

The City's Floodplain Ordinance (Chapter 67.1) also provides regulation of land alteration including construction of walls or fences, storage of materials, and channel modifications or any other activity that might change the direction, height or velocity of flood surface waters. This ordinance applies only to those streams that have FEMA mapped floodplains.

City legal staff should be consulted to determine whether the above ordinance sections provide the City with adequate authority to inspect and require that private property owners remove obstructions placed in ditches, ravines, and other drainage ways. Easements would likely still be required for City initiated drainage improvement capital projects, such as restoring ditch/culvert systems or channel improvements outside of City right of way or easements.

In general, small isolated private property drainage problems should be the responsibility of the property owner. Larger, more regional problems involving several contiguous property owners should be initiated by the City, so proper solutions are implemented and easements obtained for future inspection and maintenance.

5.2.2 Stream and Ditch Maintenance Recommendations

Regular maintenance of the streams and ditches is important for flood control and water quality. Access to drainage ways (through use of perpetual easements) is needed to allow for inspections and any associated improvements. Inspections should be performed regularly and include streams, ditches, channels, ponds and other facilities.

Past practices for work on private drainage ways has been mixed and inconsistent. The City should evaluate past practices and existing ordinances that allow access to drainage ways to perform maintenance and improvements as needed. Recurring problems in these drainage ways include fence obstructions, illegal dumping, silt build-up, debris, overgrown vegetation, and/or streambank erosion.

Inspection and maintenance of specific stormwater system components are summarized as follows:

- **Ditch (Manmade Channel) Maintenance.** Removal of silt, debris and overgrown vegetation helps to maintain the flood control capacity of drainage ditches. Sediment and debris removal may also improve water quality downstream by removing the pollutants contained in those deposits. However, leaving some vegetation in place helps to prevent erosion, trap sediment, and filter stormwater. Maintenance frequency for ditches will vary and should be based on problems identified during inspection.
- **Natural Stream and Channel maintenance.** Like ditches, removal of silt, debris, trash, and overgrown vegetation helps to maintain the flood control capacity of stream channels. Sediment and debris removal may also improve water quality downstream by removing the pollutants contained in those deposits. However, leaving some vegetation in place can help prevent erosion, trap sediment, and filter stormwater. Care should be taken not to disturb wildlife or aquatic life in the stream, including any riparian vegetation which is needed for the wildlife to survive. Agencies usually clean stream channels in response to complaints or a field staff's observation of a problem. Much of the maintenance work in natural streams is done by hand. When necessary, large sediment deposits may need to be removed by heavy machinery.

5.3 Sewer System (Inlets, Catch Basins, and Sewers) Maintenance

5.3.1 Current Sewer System (Inlets, Catch Basins, and Sewers) Maintenance

The City currently cleans 300 catch basins per year and jets lines at the catch basins on an as needed basis. The City has two jetting trucks however usually is only able to run one truck at a time due to limited staff resources. Jetting is usually limited to sanitary sewers unless a problem is a storm sewer identified. Therefore, the jetting of storm sewer is usually in response to a flooding problem.

Street sweeping helps prevent silt buildup in the sewer system. The City currently performs street sweeping that includes each curb and gutter street and is performed twice a year. Streets in older neighborhoods with a lot of mature trees are swept more than twice a year. The City currently has four street sweepers.

5.3.2 Sewer System (Inlets, Catch Basins, and Sewers) Maintenance Recommendations

Regular maintenance of the storm sewers is important for flood control, structural integrity, and for water quality reasons. The City already performs catch basin cleaning. In addition to cleaning, regular inspection of the inlets, catch basins, and storm sewer should be performed.

Problems such as clogged inlets or sewers can be addressed before they cause serious damage or harm. Other problems that routine inspections might uncover are collapsed pipe and leaking joints. Both of these situations can saturate soils and cause sinkholes and flooding. Failing pipes can also allow dirt and sediment to enter stormwater, which carries the material out to streams and rivers.

A good rule of thumb is to conduct inspection of inlets and catch basins at least once a year. Catch basins should be inspected at least once every six months. Sewer pipes and culverts should be inspected every three to five years, or in response to a reported problem. Most agencies inspect their sewer pipes six inches or larger with a TV camera, and pipes 36 inches or larger with a walk-through inspection. All other parts of the system are inspected visually.

Inspection and maintenance of specific stormwater system components are summarized as follows:

- **Culvert and Pipe Cleaning and Repair.** Culvert and pipe cleaning is usually done in response to flooding complaints; however, they should be inspected at least every 5 years. The main sources of maintenance problems in culverts and pipes are sediment accumulation, entry roots and infiltration and inflow. Perform maintenance on the culverts and pipes that really need it. Most sewers that are sized and placed properly can go years without cleaning. If sewer slopes are too gradual then the sewers are at risk of clogging.
- **Catchbasin/Inlet Cleaning and Repair.** Catchbasin and inlet cleaning and repair have traditionally been performed to respond to localized flooding problems in streets. Catchbasins are inlets at the curb with a small trap (usually six inches to one foot deep) below the sewer pipe. These devices help to clean stormwater because particles in street runoff settle into the trap before the water enters the storm sewers. For this reason many communities have stopped installing catch basins. Unlike inlets, catchbasins need to be cleaned even if they are not plugged, in order to receive the water quality benefits. Catchbasins in higher traffic areas or near construction sites may need more frequent cleaning. Additional cleaning may also be needed in the fall time.

5.4 Floodplain Management

5.4.1 Floodplain Buyout Program

The City should evaluate flood-prone properties for potential purchase as part of a floodplain buyout program. This program involves purchase of flood-prone properties and conversion to multi-use open space. The sites can be enhanced to provide additional stormwater storage to mitigate flood damage, to preserve environmental resources or restore to the natural purposes, and to develop contiguous open space.

Appendix E includes an excerpt from *The 1993 Great Midwest Flood: Voices 10 Years Later* (U.S. Department of Homeland Security, Federal Emergency Management Agency, May 2003) discussing Illinois's Winning Formula in Floodplain Management.

Illinois Emergency Management Agency (IEMA) assists in floodplain buyouts with its Flood Mitigation Assistance Program. The following summarizes the program.

Illinois Emergency Management Agency's Flood Mitigation Assistance Program

The Flood Mitigation Assistance program (FMA) is a cost-share program (75% federal, 25% local match) through which communities can receive grants for the development of a comprehensive flood mitigation plan and the implementation of flood mitigation projects.

Funding Guidelines

- Communities must belong to the National Flood Insurance Program (NFIP) to receive FMA funds.
- To receive a FMA project grant a community must have an approved flood mitigation plan. Typically, funded FMA projects are for the acquisition and demolition of repetitively flooded structures insured by the National Flood Insurance Program (NFIP).

Goals of the Program

- The overall goal of FMA is to fund cost-effective measures that reduce or eliminate the long-term risk of flood damage to NFIP-insured buildings, manufactured homes and other structures.
- Reduce the number of repetitively or substantially damaged structures and the associated claims on the NFIP
- Encourage long-term, comprehensive mitigation planning
- Respond to the needs of communities participating in the NFIP
- Complement other federal and state mitigation programs with similar goals

There are two types of FMA grants available: planning grants and project grants. The funds allocated to the state are based on the number of flood insurance policies in place statewide as well as the number of identified repetitive loss properties. A repetitive loss property is any insured structure that has two or more flood insurance claims of at least \$1,000 each.

Source: Illinois Emergency Management Agency, 2009

5.4.2 Floodplain Management Recommendation

It is recommended that the City develop and implement a floodplain buyout program, working with partners such as IEMA, FEMA, Macon County, other communities in the County, park districts and other agencies for potential funding opportunities. This recommendation includes the preparation of a Floodplain Mitigation Plan to qualify for the Flood Mitigation Assistance Program.

5.5 NPDES MS4 Regulations

IEPA's previous NPDES MS4 General Permit (ILR40) was re-issued on February 20, 2009 and became effective April 1, 2009. The new permit adopts recent guidance from US EPA regarding the use of "green infrastructure". Green infrastructure approaches infiltrate, evapotranspire or reuse stormwater, with significant utilization of soils and vegetation rather than traditional hardscape collection, conveyance and storage structures. These approaches include green roofs, trees and tree boxes, rain gardens, vegetated swales, pocket wetlands, infiltration planters, vegetated median strips, reforestation, and protection and enhancement of riparian buffers and floodplains. The intent of green infrastructure is to attempt to mimic natural processes that also recharge groundwater, preserve baseflows, moderate temperature impacts, and protect hydrologic and hydraulic stability.

The new IEPA ILR40 permit requires public education on green infrastructure and incorporation of green approaches in its construction and post-construction runoff control programs.

Compliance with the MS4 permit requires the submittal of a Notice of Intent (NOI) and implementation of Best Management Practices (BMPs) to address six minimum control measures that the City must address through the implementation of Best Management Practices (BMPs). These control measures and the BMPs that the City has selected to implement are summarized below (BMP, measurable goal, and milestone). *These measurable goals will need to be updated in the future to reflect the new requirements for green infrastructure.*

Major cost items for the BMPs identified below include storm sewer mapping, outfall screening (for illicit discharges), enhanced stormwater system maintenance, public outreach materials, developer and staff training, inspection and enforcement of construction and post-construction runoff controls, and additional staff time for managing the program.

5.5.1 Public Education and Outreach

- A. Public Service Announcement
 - Prepare and produce public service announcements on radio, television, billboards, or a combination of these media.
 - One announcement each year of the 5-year permit term
- B. Classroom Education Material
 - Present two education sessions on stormwater quality at area schools each year in conjunction with the City's Public Works Week program.
 - Two presentations in area schools each year of the 5-year permit term

5.5.2 Public Participation/Involvement

- A. Public Hearing
 - Present any necessary changes to the City’s stormwater ordinance to the City Council for public discussion as required by law.
 - Each year if applicable
 - Provide City contact numbers and e-mail addresses on informational materials and advertisements provided by the City and on the City’s website to report information on illicit discharges or dumping.
 - Solicit and respond to public inquiries and complaints through the permit term

5.5.3 Illicit Discharge Detection and Elimination

- A. Storm Sewer Map Preparation
 - Gather GPS data on all storm system structures and plot the system on the City’s GIS map.
 - Year 1 – Gather GPS data
 - Year 2 – Plot separate storm sewer system on GIS Map and gather GPS data on all stormwater outfalls
 - Year 3 – Plot GPS information for outfalls on City’s GIS
 - Years 4 and 5 – Update map as needed
- B. Program Evaluation and Assessment
 - Inspect half of the City’s MS4 discharge points (outfalls) on a yearly basis. Receive and respond to public complaints.
 - Inspect or re-inspect 50% of outfalls each year and eliminate any illicit discharges
- C. Visual Dry Weather Screening
 - Visually inspect dry weather flows on half of the City’s separate storm sewer discharge points on a yearly basis. Eliminate all illicit discharges discovered.
 - Inspect or re-inspect 50% of outfalls each year and eliminate any illicit discharges

5.5.4 Construction Site Runoff Control

- A. Regulatory Control Program
 - Require Stormwater Pollution Prevention Plans (SWPPPs) on all site plans disturbing more than one acre of land. Verify that all sites have a valid IEPA permit. Inspect each development site at least once during construction.
 - Implement continually throughout the permit term
- B. Erosion and Sediment Control BMPs
 - Require Storm Water Pollution Prevention Plans (SWPPP) detailing sediment and erosion control on all site plans disturbing more than one acre of land. Require the use of sediment and erosion control Best Management Practices (BMPs) to promote erosion and sediment control on construction sites.
 - Implement continually throughout the permit term

C. Site Plan Review Procedures

- Review and approve the required Storm Water Pollution Prevention Plans (SWPPP) on all site plans disturbing more than one acre of land.
 - Implement continually throughout the permit term

D. Site Inspection/Enforcement Procedures

- Perform construction site inspections to verify and enforce storm water code compliance.
 - Inspect all construction sites at least once during construction.

5.5.5 Post-Construction Runoff Control

A. Regulatory Control Program

- Enforce the City's Storm Water Ordinance. Update and modify as necessary.
 - Provide and continue internal policies to enforce the City's Storm Water Ordinance.

B. Pre-Construction Review of BMP Designs

- Require a Storm Water Pollution Prevention Plan (SWPPP) on all site plans disturbing more than one acre of land. Review BMPs for appropriate use and application.
 - Implement continually throughout the permit term

C. Site Inspections During Construction

- Provide construction site inspections for storm water code compliance.
 - Inspect all construction sites at least once during construction.

D. Post-Construction Inspections

- Provide post-construction site inspections to assure compliance with the City's storm water regulations and the approved site plan. Complete post-construction site inspections prior to releasing site bonds to assure that sites are constructed in accordance with the approved site plan and City regulations.
 - Complete post-construction site inspections prior to releasing the site bond.

5.5.6 Pollution Prevention/Good Housekeeping

A. Employee Training Program

- Provide training and direction to employees on the efficient application of salt on roadways for winter snow / ice removal operations.
 - Provide salt application training prior to snow / ice removal operations and direction as to application amounts during operations.

B. Inspection and Maintenance Program

- Sweep City Streets in order to reduce potential pollutants. Sweep each City street with curb and gutter twice each year.
 - Implement continually throughout the permit term
- Clean catch basins within the separate storm water collection system in order to reduce potential pollutants. Clean 300 catch basins each year.
 - Implement continually throughout the permit term

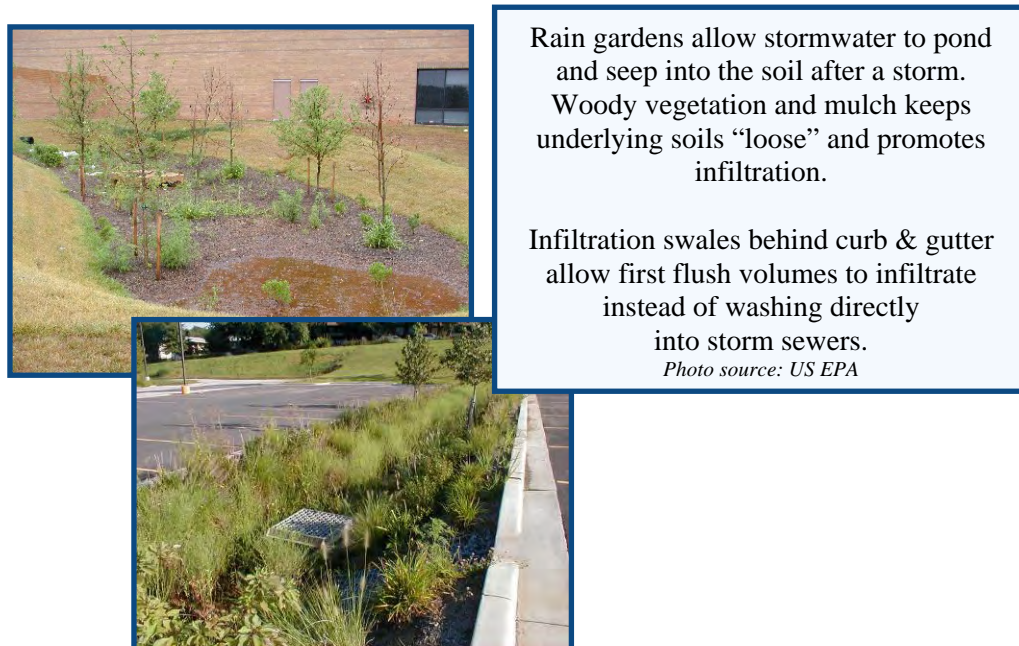
C. Other Municipal Operations Controls

- Control the application of salt placed on City Streets by using metering devices on the spreaders to monitor the amount of salt placed on City streets during ice and snow removal operations. Provide yearly training of City maintenance staff on salt application control procedures.
 - Implement continually throughout the permit term

5.5.7 NPDES MS4 Compliance Recommendations

Since the stormwater engineering staff position was filled, the City appears to be significantly improving implementation of its measurable goals. Public service announcements are planned for the future. In addition, classroom activities (generally elementary) will provide good public outreach and should continue to be pursued. The City should also consider hosting a page on its website dedicated to the MS4 program.

Post-construction runoff controls utilizing the Illinois Urban Manual are relatively new to the City and should be strongly encouraged for new development. At a minimum, Best Management Practices (BMPs) for the “first flush” storm should be constructed, as applicable. These include sediment removal devices, permeable pavement, green roofs, filtration devices, wet detention basins, infiltration swales, and rain gardens (see representative photos below). Public awareness regarding green roofs and rain gardens continues to grow. *The new IEPA ILR40 requires the use of green infrastructure approaches in its construction and post-construction runoff control programs as well as in its public outreach efforts.*



The City should continue to make mapping of its storm sewer system a high priority so that its illicit discharge program can be better implemented.

The City should continue to explore ways to improve its municipal housekeeping and pollution prevention practices, such as controlling the application of road salts through salt regulators, proper salt storage, exploring roadway de-icing alternatives, and maintaining clean facilities.

5.6 City of Decatur Stormwater Related Regulations

5.6.1 Chapter 38 - Stormwater Ordinance

Since the Pre-Final 2002 SMP was completed, the City of Decatur adopted a new comprehensive Stormwater Ordinance. Chapter 38 (Ordinance No. 2006-13) was adopted on March 6, 2006. The purpose of the ordinance is

“...to protect, maintain and enhance the environment of the City of Decatur and the public health, safety and welfare of the citizens of the City of Decatur by controlling discharges of pollutants to the City of Decatur’s storm water system, by maintaining and improving the quality of the receiving waters into which the storm water outfalls flow, including, with limitation, lakes, rivers, streams, ponds, wetlands and groundwater of the City of Decatur and to enable the City of Decatur to comply with the National Pollution Discharge Elimination System permit (NPDES) and applicable regulations for storm water discharges in 40 CFR Sect. 122.26.”

Major elements of the ordinance include construction and post-construction runoff controls, stormwater management plan requirements, and erosion and sediment control, stormwater pollution prevention plans, construction inspection and reporting, and administrative details on complying with the permit. BMPs identified in the ordinance include ponds, constructed wetlands, infiltration systems, filtering systems and open channel swales. The ordinance also includes a section prohibiting illicit discharges.

The ordinance adopts the Illinois Urban Manual as its BMP manual for stormwater pollution prevention plans, along with the “Green Book”, IDOT Erosion Control/NPDES Guidelines, and the City of Decatur Stormwater Policy.

5.6.2 Chapter 67.1 Flood Plains

This ordinance outlines requirements for development in the floodplain. Development within the floodway is generally not allowed except for aerial or buried utility lines, outfall structures, and ditch outlets, and bank stabilization projects. Development in the flood fringe (area of flood plain outside of floodway) requires flood protection for buildings. The Economic and Urban Development Director may require an evaluation of the effects of the proposed project upon flood flows and flood plain storage.

5.6.3 Zoning Ordinance/Land Development Code

The Zoning Ordinance general information on stormwater (must comply with City standards). The ordinance also contains a section on Floodplain Management (Section XXVI). This section has nearly identical requirements to Chapter 67.1, but appears to update as it refers to the Director of Economic and Urban Development Department as being responsible for the regulation of floodplains.

5.6.4 Subdivision Ordinance

The Subdivision Ordinance outlines requirements for subdividing land and platting along with design and construction standards. The ordinance requires proper drainage of the area being subdivided, including a system of disposing of stormwater which must be approved by the Department of Public Works. The ordinance states that the drainage system shall be designated in conformity with the “Report on Storm

Drainage for the City of Decatur, Illinois, 1966.” The ordinance also identifies requirements for easements for public utilities and surface water drainage facilities.

5.6.5 Other Ordinances

The Pre-Final 2002 SMP also reviewed and recommended updating to several miscellaneous ordinances to help address illicit discharges. These ordinances included: 40 – Care of Streets; 47 – Control of Animals, Fowl and Dogs; 48 – Nuisances; 49 – Removal of Garbage, Junk, Rubbish or Trash; 56 – Refuse Removal; 66 – Regulation of Lake Decatur; 72 – Sewer User Charge; 74 – Sewer Connections; and 75 – Water and Sewer Services and Connections. In general, many of the Pre-Final 2002 SMP recommended modifications to these ordinances are now covered by the recently enacted 38 – Stormwater Ordinance.

5.6.6 Ordinance Recommendations

The Chapter 38 - Stormwater Ordinance (March 2006) is a comprehensive ordinance on stormwater quantity and quality that provides the regulatory authority to comply with the City’s NPDES MS4 permit. The ordinance adopts the Illinois Urban Manual and the Storm Drainage Policy for BMP and drainage design. The Illinois Urban Manual is an excellent source for planning, design, and construction of BMPs. The ordinance does not provide any specific performance criteria, such as targeted pollutant removals. In general these should be left to guidance/policy documents so the ordinance does not have to be updated as stormwater control technologies change. No changes to the Stormwater Ordinance are recommended at this time.

The Subdivision Ordinance refers to conformity with the “Report on Storm Drainage for the City of Decatur, Illinois, 1966.” Though there is a lot of useful information in the 1966 study, it should not be used as a basis for design. For example, the document specifies storm sewers for residential areas to be sized for the 2-year storm. Many communities now have a 10-year design storm standard for storm sewers. References to the 1966 study should be removed from the ordinance.

The other ordinances reviewed in this document appear to be adequate and no updates/modifications are recommended at this time.

5.7 GIS Inventory and Maintenance Records

5.7.1 Current GIS Inventory and Maintenance

Currently, the City utilizes the CRS system to document needed maintenance work. In addition the City is in the process of implementing a GIS program to map the sanitary and storm sewer system. The CRS system notifies the City when a drainage complaint is received. Maintenance crews are dispatched if the problem is correctable and within their abilities. The drainage problem resolution is documented in the CRS system (resolved or if it needs further engineering analysis).

5.7.2 GIS Inventory and Routine Maintenance Recommendations

To efficiently manage and maintain the stormwater system, a comprehensive inventory and accurate mapping of facilities are required. The City’s GIS should be used for documenting the location, condition and maintenance history of stormwater system components. Resources should be dedicated to obtaining, inputting, maintaining and updating the GIS system. This City should also consider obtaining better topographical data which would assist with future planning and design efforts.

5.8 Total Maximum Daily Load (TMDL) Regulations

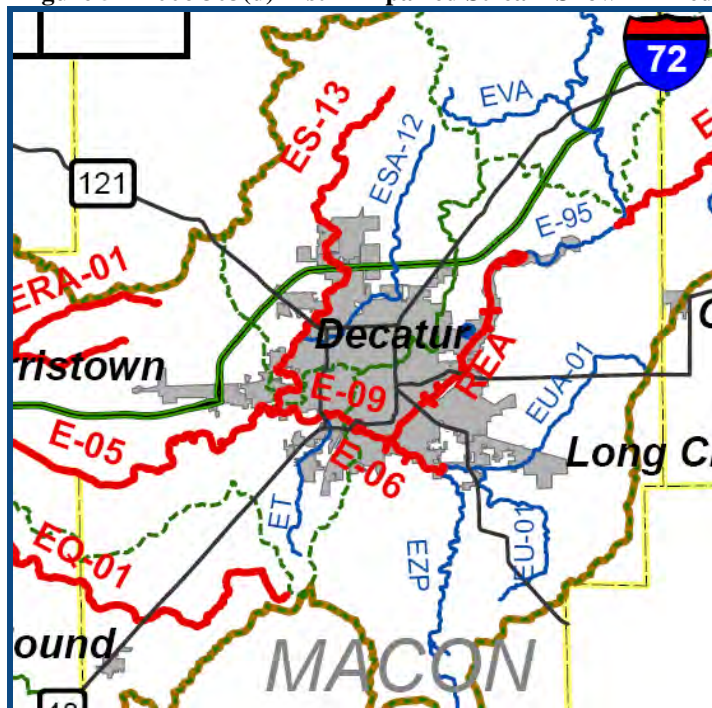
5.8.1 Existing TMDL Regulations

Section 303(d) of the federal Clean Water Act requires states to identify waters that do not meet applicable water quality standards or do not fully support their designated uses. States are required to submit a prioritized list of impaired waters, known as the 303(d) List, to the U.S. Environmental Protection Agency for review and approval. The CWA also requires that a TMDL be developed for each pollutant of an impaired water body. Illinois EPA is responsible for carrying out the mandates of the Clean Water Act for the state of Illinois.

The establishment of a TMDL sets the pollutant reduction goal necessary to improve impaired waters. A TMDL determines the load, or quantity, of any given pollutant that can be allowed in a particular water body. A TMDL must consider all potential sources of pollutants, whether point or nonpoint. It also takes into account a margin of safety, which reflects scientific uncertainty, as well as the effects of seasonal variation.

The 2008 US EPA Partially Approved 303(d) list includes the Sangamon River (aquatic life impairment due to variety of potential causes) and Stevens Creek (aquatic life impairment due to methoxychlor, an insecticide). All are listed as medium priority. Figure 5-1 shows the water bodies on the 303(d) listing in Red.

Figure 5-1 2006 303(d) List – Impaired Stream Shown in Red



The Special Conditions of the City's NPDES MS4 General Permit (ILR40, Part III.C) requires that if a TMDL is approved for any water body into which you discharge, you must review your stormwater management program to determine whether the TMDL includes requirements for control of stormwater discharges, determine whether the TMDL is for a pollutant likely to be found in stormwater discharges from your MS4, determine whether the TMDL includes a pollutant wasteload allocation specifically for

“Future growth is not discussed as part of these TMDLs, because the City of Decatur, which comprises approximately half the population of the watershed, has had a declining population between 1990 and 2006.”

The report does mention the dredging project for Lake Decatur that began in 2004, a \$25M project that is projected to last for 12 years and remove approximately 10 million cubic yards of sediment from the lake, with a goal of removing sediment and virgin soil to a depth of 10.5 feet below the current lake level. The report also mentions the Macon County Soil and Water Conservation District and their funding of nutrient management plans in the County and assistance on two streambank restoration projects in Friends and Big Creeks.

For total phosphorus, high concentrations were determined to be from nonpoint source runoff, particularly from agricultural runoff. Alternative BMPs mentioned included nutrient management, conservation buffers, sediment control structures, streambank and shoreline enhancement and protection, wetland restoration, and grassed waterways. Similar BMPs are mentioned for nitrate.

The report does not specifically mention the Decatur MS4 as a major contributor, nor does it identify a wasteload allocation or other performance requirement specifically for stormwater discharge from Decatur’s MS4. As such, the TMDL should not have a major impact on the City’s NPDES MS4 permit compliance.

However, the City may wish to target the drainage area tributary to Lake Decatur (see figure on previous page) for pamphlets or other outreach materials regarding residential fertilizer application, and encourage the use of fertilizers that are free of phosphorus. Many communities across the U.S. have enacted ordinances banning the use of fertilizers that contain phosphorus.

5.8.2 TMDL Recommendations

The southwest portion of the City is in an approved TMDL watershed, with total phosphorus and nitrates being the pollutant impairment. Though there are no specific recommendations regarding Decatur’s MS4 discharges, the City should encourage proper fertilizer through public education and consider enacting an ordinance that bans phosphorus in fertilizers used locally (several communities across the U.S. have enacted such legislation). Though the impact may be minor given the large upstream agricultural watershed, it would set an example for the largest population concentration in the Upper Sangamon watershed.

6.0 STORMWATER EXPENDITURES AND FUNDING MECHANISMS

6.1 Typical Stormwater Program Revenue Requirements

Revenue requirements for stormwater management can be defined as the sum of capital and operating costs required to achieve program goals. Revenue requirements reflect the condition of existing infrastructure and land use, local goals and objectives, and community priorities and preferences.

The key stormwater funding needs for the City include:

- Improve existing drainage problems
- Maintain and manage the drainage system

Stormwater management policies have also evolved. Historically, public concern about stormwater runoff was limited to drainage and flood control. The objectives of drainage programs were to convey runoff away from structures and property and to get it to receiving waters as quickly as possible. Objectives related to flood control were to minimize damage on downstream structures and property.

As understanding of the hydrologic effects of urbanization has increased, new programs aimed at controlling the effects of runoff have been initiated, most of which involve regulation of development and requirements that developers build and maintain detention and retention facilities. More recently, as the effects of runoff on water quality and aquatic habitat have become better understood, programs aimed at mitigating the ecological effects of runoff have been developed. Many programs to manage the effects of stormwater now are linked to or incorporate infrastructure rehabilitation and retrofitting, land use controls, habitat restoration, and public education.

The City of Decatur is faced with these challenges and is in need of a comprehensive stormwater program to fund needed improvements, implement a more proactive maintenance program and comply with the State and Federal regulations regarding the quality of its stormwater discharges (discussed in Section 5.5).

6.2 Stormwater Expenditures

City expenditures for stormwater management are included in budgets assigned to the Department of Public Works. These budgets are funded by the *General Fund* of the City of Decatur. The Department of Public Works includes five divisions. These divisions along with their budgets for the previous and current Fiscal Years are summarized as follows:

<u>Division</u>	<u>2008-09 Budget</u>	<u>2009-10 Budget</u>
Public Works Administration	\$502,708	\$515,919
Engineering	\$1,286,851	\$1,213,905
Municipal Services, Streets, Fleets	\$3,837,200	\$3,984,970
Traffic and Parking	\$1,975,455	\$2,093,992
Urban Forestry	<u>\$1,614,263</u>	<u>\$1,617,932</u>
Total Budget	\$9,216,477	\$9,426,718

The Fleet Division is also housed under the Department of Public Works and has an annual budget for FY 2009-10 of \$4,014,913 (including operations and inventory). This Division is funded under the Fleet Maintenance Fund (which receives most of its revenue from a transfer from the General Fund).

For each division, only a portion of the total expenditures are stormwater related. In the Pre-Final 2002 SMP, it was estimated that 15% of the **Engineering Division** is allocable to stormwater management. The Department recently added an engineering position dedicated to stormwater management. Hence it is now assumed the Engineering Division (excluding Administration) allocates 25% of its budget to stormwater, for a total **\$303,500** in 2009-10, (rounded to nearest 100).

The **Municipal Services/Streets Division** also has a portion of their budget dedicated to stormwater related activities. In the Pre-Final 2002 SMP, the stormwater portion of the total budget was estimated to be 13.4% of the Municipal Services/Streets Division budget. In this updated SMP, this stormwater portion is assumed to be 15% of this Division's budget, due to additional duties related to NPDES stormwater compliance (municipal pollution prevention and good housekeeping practices). The Municipal Services/Streets/Fleets Division is therefore assumed to have **\$597,700** in 2009-10, of budget allocated to stormwater. This includes personnel services, maintenance of stormwater pumping stations, motor vehicle expense, material to maintain culverts and storm sewers, and stormwater pro-rated portions of other items (contractual services, commodities, etc.).

The Traffic and Parking and Fleet Divisions are assumed to have no budget related to stormwater (vehicle expenses are included in Municipal Services/Streets Division budget). The **Urban Forestry Division** maintains approximately 27 miles of stream. Assuming a cost of \$5000 per mile to clear, remove and haul debris, it is estimated the Urban Forestry Division spends **\$135,000** per year to maintain streams.

In summary, the three main Public Works Divisions responsible for managing, operating, and maintaining the City's stormwater infrastructure spend approximately **\$1,036,200** for 2009-10, based on yearly budgets.

6.2.1 Stormwater Capital Improvements

In addition to funds allocated to the Department of Public Works, funds are set aside for stormwater capital improvements, which are funded through the Capital Project Fund, which receives most of its revenue from local sales tax and intergovernmental revenue transfers. The current Capital Improvement Plan dedicated to stormwater is presented in Table 6-1.

Table 6-1 Stormwater Capital Improvement Projects FY 2009 to FY 2013

Project	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014
Annual Storm Drainage Improvements	\$ 153,020	\$ 211,980	\$ 200,000	\$ 200,000	\$ 210,000	\$ 210,000
Culvert Replacements – Various	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0
Storm Drainage NPDES Phase 2	\$ 20,000	\$ 20,000	\$ 20,000	\$ 20,000	\$ 20,000	\$ 20,000
Stormwater Master Plan	\$ 46,540	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000
Storm Sewer TV Inspection	\$ 0	\$ 150,000	\$ 100,000	\$ 150,000	\$ 150,000	\$ 150,000
Storm Sewer Investigation and Mapping	\$ 30,000	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0
TOTAL	\$ 249,960	\$ 481,980	\$ 420,000	\$ 470,000	\$ 480,000	\$ 480,000

On average, the City is programming approximately **\$197,500 per year** on stormwater capital improvement projects (first line item in Table 6-1).

6.2.2 Debt Service

The City currently has no outstanding bonds or other forms of debt for storm drainage projects and no annual debt service costs. While the City has no outstanding debt for storm drainage improvements, General Obligation Bonds have historically been used by the City for major drainage projects. The City issued a total of \$19.75 million in three separate Surface Water Drainage Bond issues in 1970, 1975 and 1982. Bond proceeds were used to address many of the high priority needs identified in the 1966 study. These bonds were refunded in 1983 and the debt was retired in 1993.

6.3 Alternative Funding Mechanisms

There are various funding mechanisms available to fund a stormwater program, as outlined in the following sections.

6.3.1 Sales and Other Consumer Taxes

An additional percentage can be added to the sales or other consumer taxes to support a local stormwater program. These systems provides a reliable source of income, but place the entire burden on local consumers, as opposed to property owners with larger impervious areas that generate more stormwater runoff. Furthermore, these would represent a tax increase and may be perceived more negatively than a user fee.

The following summarizes these taxes for Decatur and other downstate communities. Decatur is near the high end in some of these categories already.

<u>Community</u>	<u>Sales Tax</u>
<i>Decatur</i>	8.00%
Bloomington	7.75%
Springfield	7.75%
Peoria	8.00%
Lincoln	7.25%
Tuscola	6.75%
Mattoon	6.75-7.75%
Effingham	6.50-7.50%
Champaign	7.75%

<u>Community</u>	<u>Food & Beverage Tax Rate</u>
<i>Decatur</i>	2.00%
Bloomington	2.00%
Champaign	0.50%
Peoria	2.00%
Springfield	0.00%
Average	1.60%

<u>Community</u>	<u>Utility Tax Rate</u>
<i>Decatur</i>	1.25%
Bloomington	2.50%
Champaign	2.75%
Peoria	5.00%
Springfield	0.00%
Average	2.90%

<u>Community</u>	<u>Telecommunications Tax Rate</u>
<i>Decatur</i>	6.00%
Bloomington	3.50%
Champaign	6.00%
Peoria	6.00%
Springfield	1.00%
Average	4.50%

6.3.2 Property and Other Taxes

Property taxes can be used to fund stormwater improvements. However, competition for tax dollars to fund public safety, schools, roads, etc. is significant, and stormwater is often neglected. Also, there is often not a clear connection between the value of a property and the impact on the stormwater system. For example, a vacant property with a parking lot or other large impervious area could have relatively low property value but have a significant impact on the drainage system. The same can be said for tax exempt properties. There is often reluctance to raise property taxes to adequately fund a program as property taxes are already perceived as being high. The overlapping tax rate (direct City property taxes plus special taxing districts per dollar of assessed valuation) is higher in Decatur than other downstate communities, as summarized below. This leaves little room for tax increases to fund stormwater improvements.

<u>Community</u>	2008
	<u>Overlapping Tax Rate</u>
<i>Decatur</i>	8.9036%
Bloomington	7.6198%
Champaign	7.2227%
Peoria	8.2270%
Springfield	7.3841%
Average	7.8714%

6.3.3 Special Assessments

Special assessments target those properties directly benefiting by a given project, but are very time-consuming to establish. The administrative effort necessary to establish assessment districts often makes this an unattractive alternative. Special assessments involve a judicial process to place assessments on properties.

6.3.4 Stormwater Utility

The Stormwater Utility creates a consistent dedicated b source by the implementation of a Stormwater User Fee. The Stormwater User Fee can be based upon multiple billing methods or rate bases that vary in complexity and ease of implementation.

There are currently over 650 Stormwater Utilities in the United States, including eight (8) in Illinois. Several other Illinois communities are currently considering establishment of a Stormwater Utility. The sizes of these programs, as well as their respective billing structures, vary significantly. Table 6-2 provides a sampling of rates and community size inside and outside of Illinois.

Table 6-2 Stormwater Utilities - Nationwide Examples

	Municipality	Population	Monthly Billing Rate per Equivalent Residential Unit (ERU)	Non-Residential Rate Basis
Illinois Communities				
1	Rock Island, IL	40,000	\$2.63 - \$4.39	Impervious surface as compared to typical residential lot
2	Moline, IL	45,000	\$1.33 - \$3.95	Multiply total acreage by the runoff coefficient
3	Bloomington, IL	65,000	\$2.90 - \$7.25	\$1.45 per month per 1,000 square feet of impervious surface
4	Rolling Meadows, IL	25,000	\$1.65	\$1.65 per month per 3,600 square feet of impervious surface
5	Normal, IL	45,000	\$4.60	Impervious surface as compared to typical residential lot
Other Midwest Communities				
6	Ann Arbor, MI	110,000	\$5.00	Impervious surface as compared to typical residential lot
7	Berkley, MI	15,500	\$12.71	Impervious surface as compared to typical residential lot
8	Fishers, IN	66,000	\$5.00	Impervious surface as compared to typical residential lot
9	Anderson, IN	60,000	\$3.50	Impervious surface as compared to typical residential lot
Other State's Communities				
10	Greensboro, NC	220,000	\$1.50 - \$3.90	Impervious surface as compared to typical residential lot
11	Winston-Salem, NC	185,000	\$3.00	\$264 per impervious acre per year
12	Griffin, GA	150,000	\$3.50	Impervious surface as compared to typical residential lot
13	Olympia, WA	27,000	\$6.00	Impervious surface as compared to typical residential lot
14	Fort Collins, CO	108,000	~\$9.00 (based on property size)	Development category: multipliers used for non-residential development. Development fees charged for new developments. Fees vary by watershed.

6.4 Recommendation

Revenue requirements for achieving stormwater goals are significant and stormwater program needs have increased in complexity over the years due to additional regulations and the growing need for drainage improvements. Therefore, it is recommended that the City pursue a dedicated funding source to meet its stormwater program needs.

A growing solution for many communities is to form a dedicated stormwater utility. A Stormwater Utility can be implemented with relative ease given this program funding structure has been used in the other communities across the nation which provides a basis for implementation. Unlike a water or sewer department, a Stormwater Utility does not necessarily require a separate administrative structure. The concept of utilizing an existing infrastructure board to manage a stormwater program can be beneficial to the City.

Establishing a stormwater utility program requires a number of steps and an upfront investment to set up the program, measure impervious areas, complete a cost of service and rate study, and conduct appropriate public outreach. It is recommended that the City investigate the steps required to form a stormwater utility.

7.0 SUMMARY OF RECOMMENDATIONS

As the City continues with its stormwater program, future phases of the master planning process will be required. These phases are needed to better define the scope of each problem area, either individually or on a watershed basis. A dedicated funding source is needed if the projects identified in future master planning efforts are to be implemented over a reasonable period of time.

7.1 Recommended Funding Approach

The City of Decatur has lacked the resources to effectively address its remaining flooding problem areas. Other utilities, such as water and sanitary sewer have dedicated user fees based on the amount of water used or demand placed on the system. Stormwater is no different. Different properties have varying impacts on the drainage utilities (storm sewers, ditches, and channels) depending on the amount of impervious area.

Stormwater utilities or user fees have become increasingly more common as communities face significant competition for limited tax revenues. The City of Decatur has significant stormwater improvement needs (as documented in this report) and will likely be unable to make the needed capital improvements without a dedicated funding source. A stormwater user fee provides a fair, equitable, stable source of revenue to improve the level of service and quality of life in neighborhoods impacted by flooding problems. It will also ensure the City stays in compliance with increasing regulatory initiatives to protect and improve water quality.

It is recommended that the City pursue a dedicated funding source to meet its stormwater program needs and investigate the steps required to form a stormwater utility. Other recommendations made in this report hinge on making funding available for a dedicated stormwater program. The cost of setting up and establishing a stormwater utility is significant; however, those costs can be recouped by revenue generated once the utility is in place.

7.2 SMP Phases and Watershed Studies

It is recommended that the future phases of the Stormwater Master Plan completed on a watershed basis where appropriate. This will help to spread out the funding needed and break out areas into more manageable parts. This phase of the SMP could act as an entire watershed study or only study the portion of the watershed that lies within the City limits. If an entire watershed study is desired, other communities and the County would have to be willing to fulfill monetary, as well as, operation and maintenance obligations that result from the watershed study. However, given that the City makes up small portion of the various watersheds, future phases of the SMP may focus only on a portion of a watershed.

Based on the amount of drainage problem areas, the Sangamon River South Watershed would be a good candidate for future SMP phasing, followed by Stevens Creek and Spring Creek Watersheds, Ward Branch and Sand Creek Watersheds, and finally Sangamon River North Watershed.

Watershed studies involve more complex hydrologic/hydraulic computer modeling typically performed with models such as HEC-HMS (hydrology) and HEC-RAS (hydraulics). Dynamic models, such as SWMM, are sometimes used, particularly if there are backwater effects from the stream system on tributary storm sewer systems. The flow charts in Appendix A illustrate the steps involved in completing a comprehensive watershed-based stormwater master plan. This report is Phase I, future SMP updates

could include Phases II through IV for a given watershed area. Design projects could then follow the completion of the SMP for a given area.

The cost of performing a watershed study varies widely, depending on the size of the watershed, the amount of existing data available (i.e. GIS data, previous studies and models, etc.), the goals of the study (water quantity, water quality, or both), and number of problems and solutions to be developed. For planning purposes, a cost range of \$150,000 to \$200,000 would be reasonable to budget for a watershed the size of Spring Creek. Smaller watershed studies would be less.

7.3 Individual Scoping Reports

Scoping reports are used to analyze individual neighborhood problems areas and provide a more targeted solution, typically with a goal of moving quickly into design and construction of the project. **The early actions projects identified in Section 4.5 of this report would be good candidates for a preliminary design report.** Preliminary design reports generally involve some limited field work, limited modeling or use of Rational formula for flow computations, development of one or two alternatives, preliminary layout of improvements, cost estimates, and a recommended drainage improvement project. The intent of a scoping report is to provide a document with sufficient detail to convey the project intent and layout to the project designer. Field surveys will still need to be performed by the designer to ensure the project can be built (i.e. no irresolvable utility conflicts, lack of sufficient cover, etc.). Preliminary design reports typically cost in the \$5,000 to \$10,000 each range. If several are completed at one time, efficiencies will be realized by grouping field visits and meetings.

7.4 Summary of Recommendations Regulations, Standards, and Policies

The City of Decatur has policies and maintenance practices that are used to enforce compliance with the MS4 program as well as to enforce proper drainage design for new development. However, some of these policies and standards are dated and/or incomplete. The following changes are recommended:

Regulatory Recommendations

- Provide public and MS4 employee education on green infrastructure
- Incorporate green approaches in its construction and post-construction runoff programs

Ordinance/Policy Recommendations

- The Storm Drainage Policy should be updated to incorporate more information on stormwater quantity and quality
- Consider enacting an ordinance that bans phosphorus in fertilizers

Maintenance Recommendations

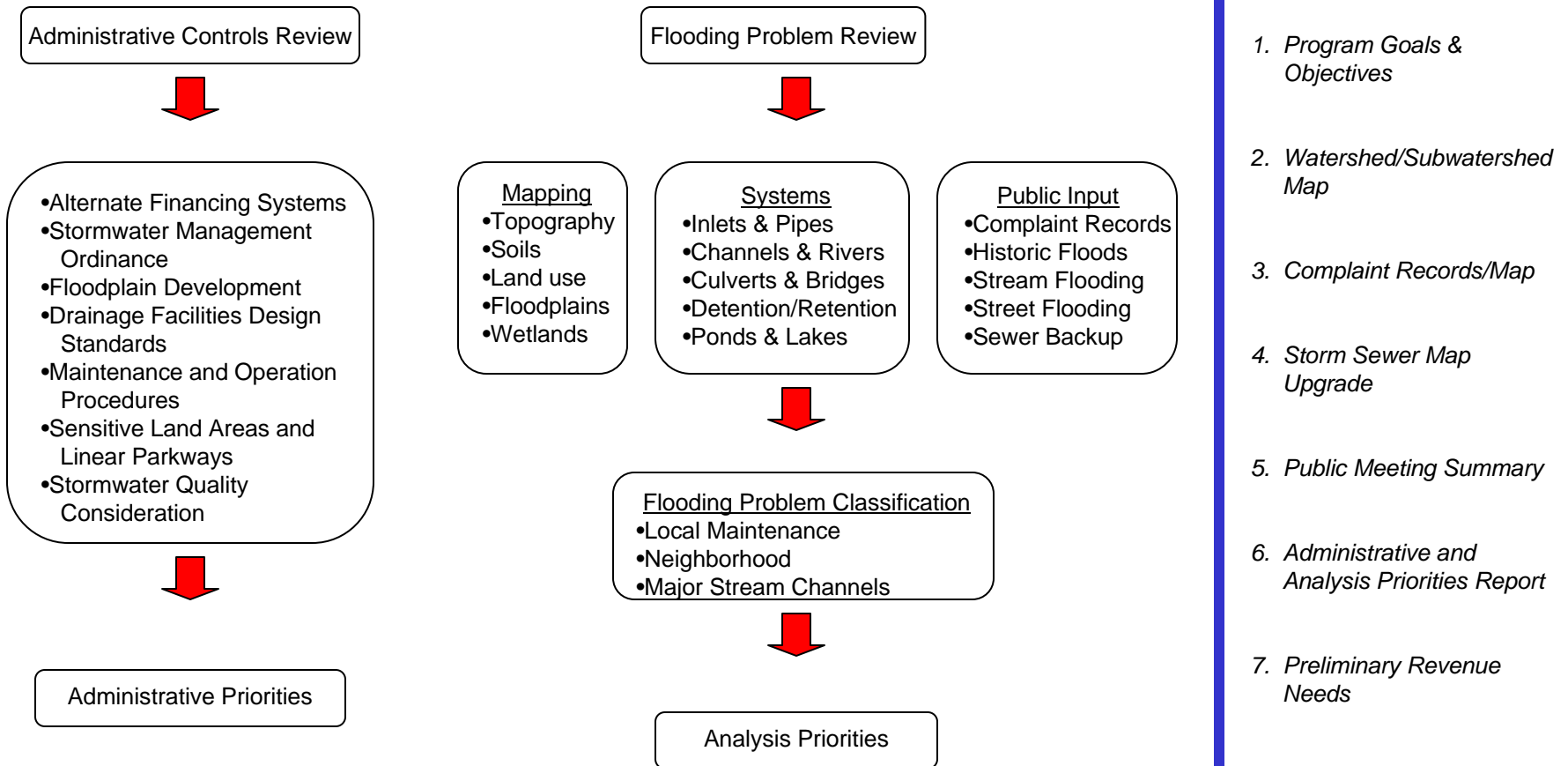
- Dedicate resources to obtaining, inputting, maintaining and updating the GIS system
- Perform inspections, clean, and/or repair the following items as part of the stormwater program:
 - Culverts and Pipes
 - Catchbasins and Inlets
 - Ditches (Manmade Channels)
 - Natural Streams and Channels
 - Evaluate flood-prone properties for potential purchase as part of a floodplain buyout program

Appendix A - Phased Approach Schematics

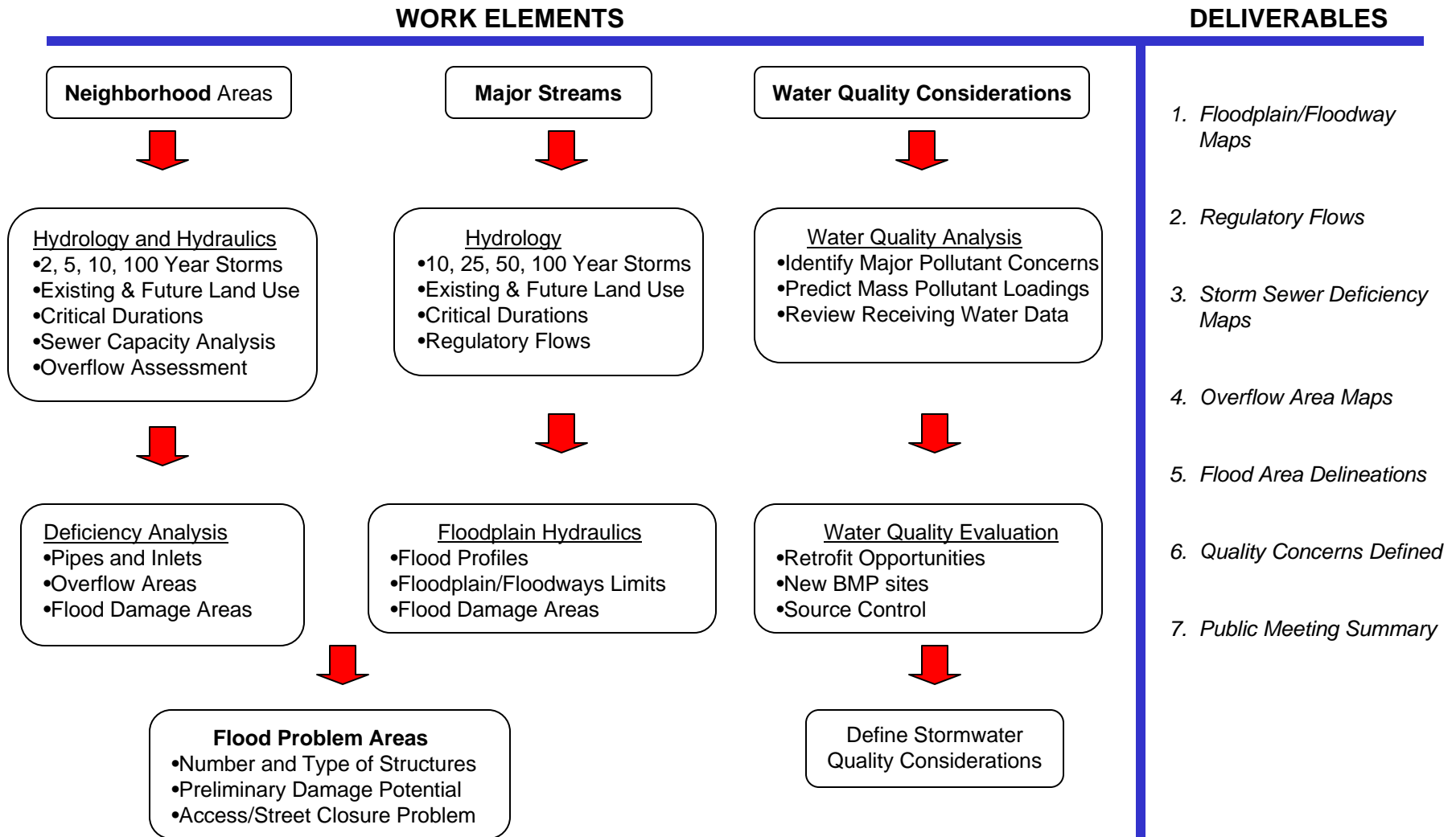
City of Decatur
STORMWATER MASTER PLAN
PHASE I - INVENTORY & PROBLEM IDENTIFICATION

WORK ELEMENTS

DELIVERABLES



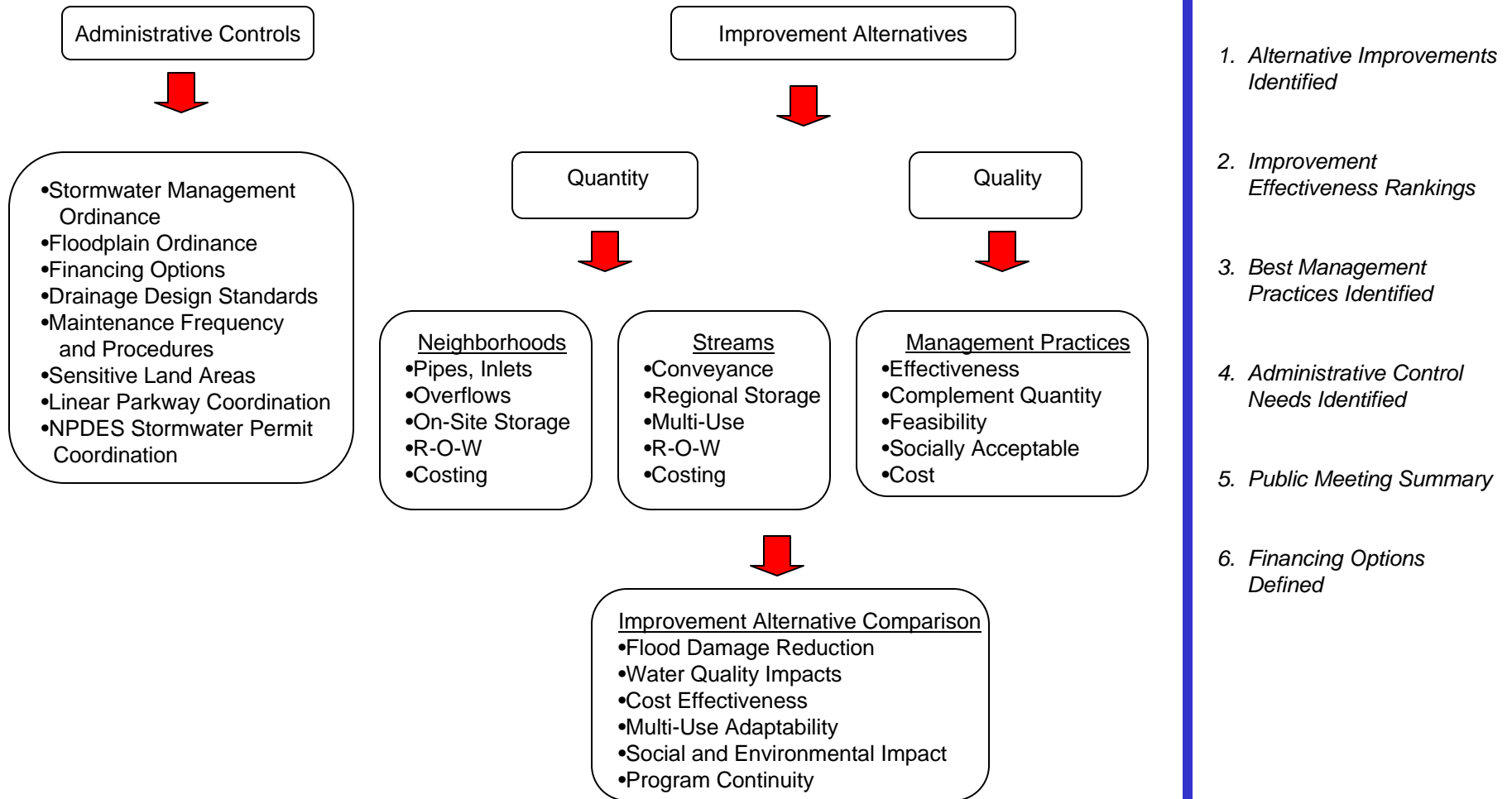
City of Decatur
STORMWATER MASTER PLAN
PHASE II - FLOOD PROBLEM ANALYSIS



City of Decatur
STORMWATER MASTER PLAN
PHASE III - SOLUTION DEVELOPMENT

WORK ELEMENTS

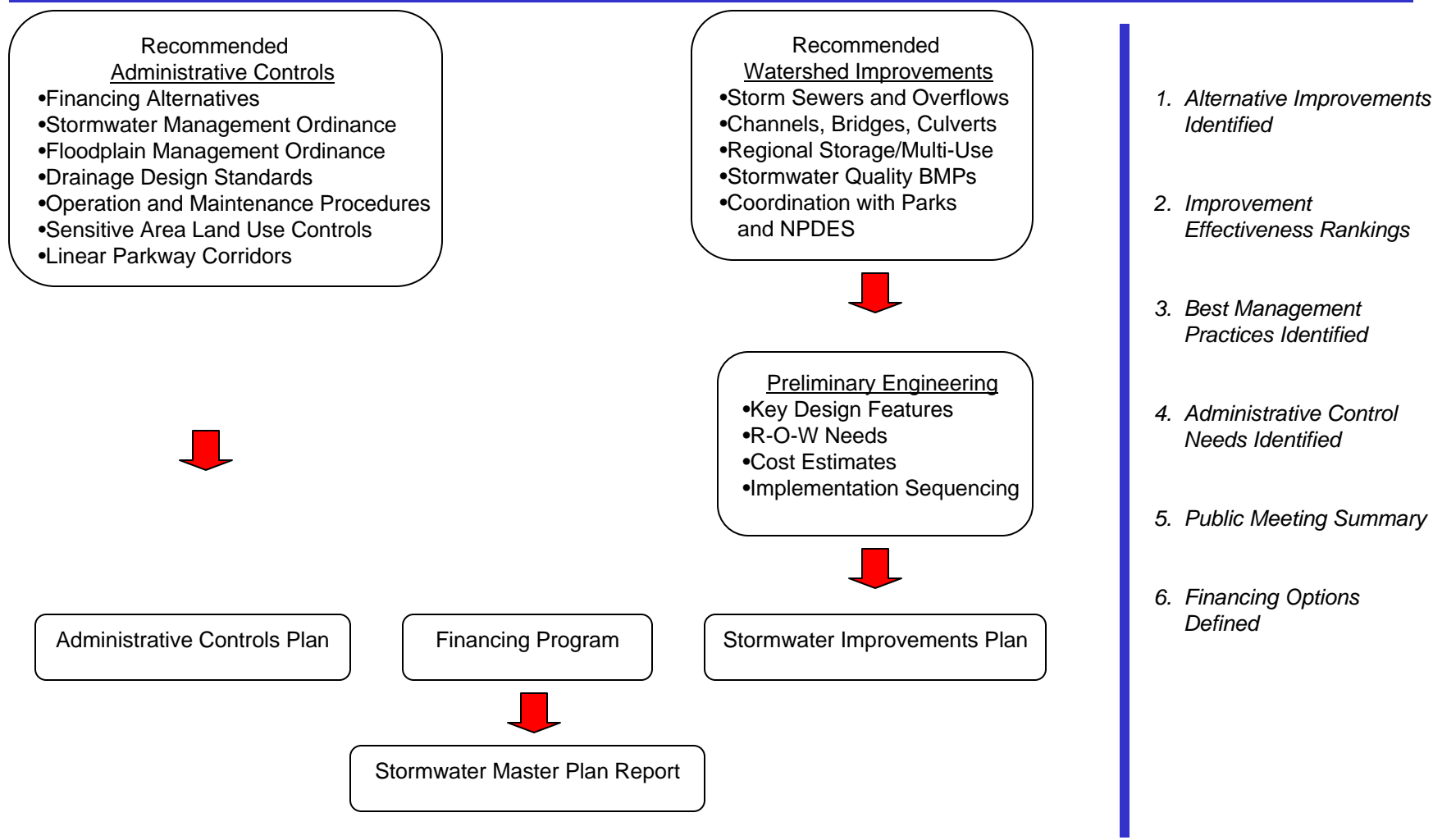
DELIVERABLES



City of Decatur
STORMWATER MASTER PLAN
PHASE IV - RECOMMENDATIONS AND IMPLEMENTATIONS

WORK ELEMENTS

DELIVERABLES



Appendix B - References

APPENDIX B
City of Decatur Stormwater Masterplan
REFERENCES

- Bainbridge, Gee, Milanski & Associates, Inc., Kaydon-Imboden Sewer Study, October 2002
- Bainbridge, Gee, Milanski & Associates, Inc., Lost Bridge Sanitary Sewer Study, August 2004
- Bainbridge, Gee, Milanski & Associates, Inc., Report on the Oak Grove Sewer Drainage Area, December 1992
- Bainbridge, Gee, Milanski & Associates, Inc., Ridgeway/Bay Shore Area Sanitary Sewer Study, September 2003
- Bainbridge, Gee, Milanski & Associates, Inc., Sanitary District of Decatur Facility Map, August 1988
- Bainbridge, Gee, Milanski & Associates, Inc., Shadow Lane Sanitary Sewer Outfall Study, September 2002
- City of Decatur, City Code Chapter 66, Regulations of Lake Decatur, July 1975
- City of Decatur, City Code Chapter 38, Regulations of the Soil Erosion Control Ordinance
- City of Decatur, Storm Drainage Possibility
- City of Decatur Community Development Department, Public Works Department, Guide to the Development Process in Decatur, Illinois, June 1997
- Clark Engineers, MW Inc., Decatur Metro Area Greenway Plan, March 1998
- Illinois Water Survey, Watershed Monitoring and Land Use Evaluation for the Lake Decatur Watershed Technical Report, Miscellaneous Publication 169, January 1996
- Lohan Associates, Lake Decatur Area Development Study, Phase I Final Draft, October 26, 1993
- Macon County/Decatur Comprehensive Plan Steering Committee, Macon County/Decatur Comprehensive Plan, July 28, 2008
- Southwestern Illinois Planning Commission, A Model Ordinance Providing for the Control of Stormwater Drainage and Detention, Soil Erosion and Sediment Control, June 1997
- U.S. Department of Agriculture, Soil Conservation Service, Soil Survey of Macon County, Illinois, March 1985
- U.S. Geological Survey, 15 Minute Quadrangle Map, Agrenta Quad, 1975
- U.S. Geological Survey, 15 Minute Quadrangle Map, Decatur Quad, 1975
- U.S. Geological Survey, 15 Minute Quadrangle Map, Forsyth Quad, 1975
- U.S. Geological Survey, 15 Minute Quadrangle Map, Harristown Quad, 1982

U.S. Geological Survey, 15 Minute Quadrangle Map, Long Creek Quad, 1975

U.S. Geological Survey, 15 Minute Quadrangle Map, Warrensburgh Quad, 1982

U.S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Insurance Study, City of Decatur, Illinois, Macon County, February 1979

U.S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Insurance Rate Map, City of Decatur, Illinois, Macon County Community Panel Numbers 170429 0001-0020, August 1, 1979

Warren and Van Pragg, Inc., City of Decatur, Illinois Report on Storm Drainage, June 1966

Appendix C - Photographs of Flooding

LIST OF PHOTOS

<u>Title</u>	<u>Page No.</u>
1535 N Lake Shore - September, 2008.....	2
Crescent and Hickorywood.....	4
E Mound by Mound Park.....	7
3560 E Leafdale Avenue.....	8
L&A Industrial Court.....	9
Lincoln Park Rd.....	11
Sims Dr & N. Haven Ct - June 3, 2008.....	12
139 Point Bluff - June 4, 2008.....	15
Franzy Drive.....	16
Karen Ct.....	17
2452 Marquette Ct - September 4, 2008.....	19
MacArthur and Ash.....	22
Neely Avenue.....	23
34 th And Fitzgerald.....	26
Tanager Drive.....	29
Yorktown - September 4, 2008.....	31
Rt 36, Baltimore Ave and Fulton Ave.....	32
Lost Bridge Road.....	33
Main Street.....	34
Fairview Park.....	35
3691 E Hardy Street.....	36
1308 Manor Drive.....	40
3275 Cherry Drive.....	41
File Drive.....	43
Meadowlark Drive.....	45
1861 Garfield Avenue.....	47
Phillips Drive.....	49
Scovill Park Ct.....	51
Westlawn Avenue.....	53
445 S Nelson Blvd.....	56
1385 S 32 nd Street.....	57
2270 E Decatur Street (Sept08).....	59
Lakeshore Avenue.....	62

1535 N Lake Shore - September, 2008





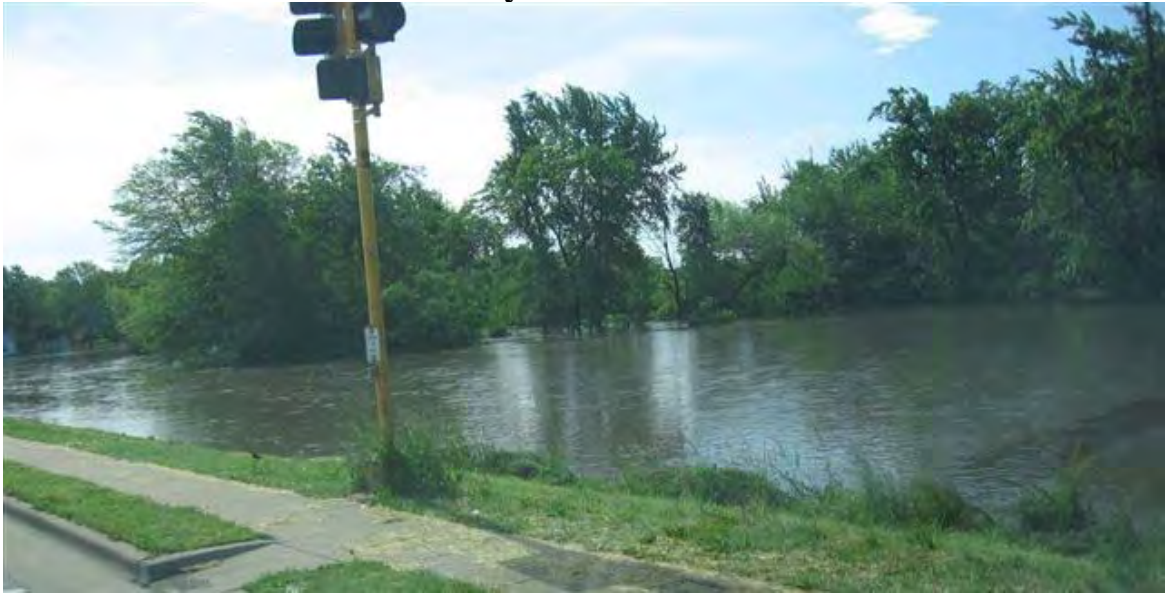
Crescent and Hickorywood



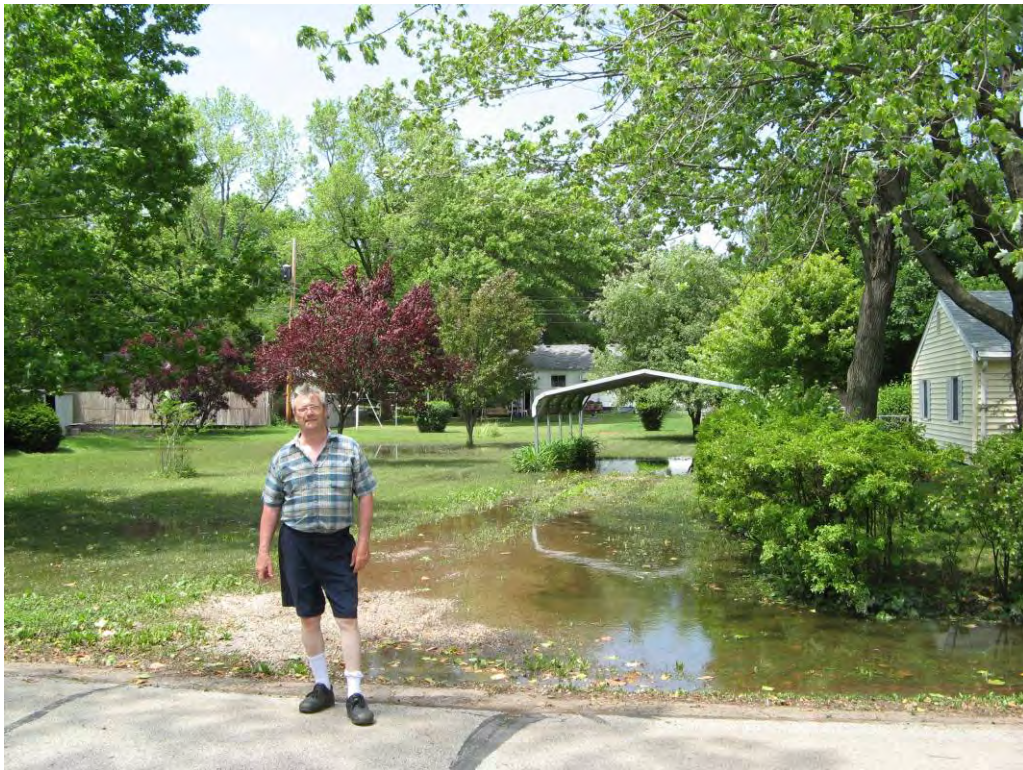




E Mound by Mound Park



3560 E Leafdale Avenue



L&A Industrial Court



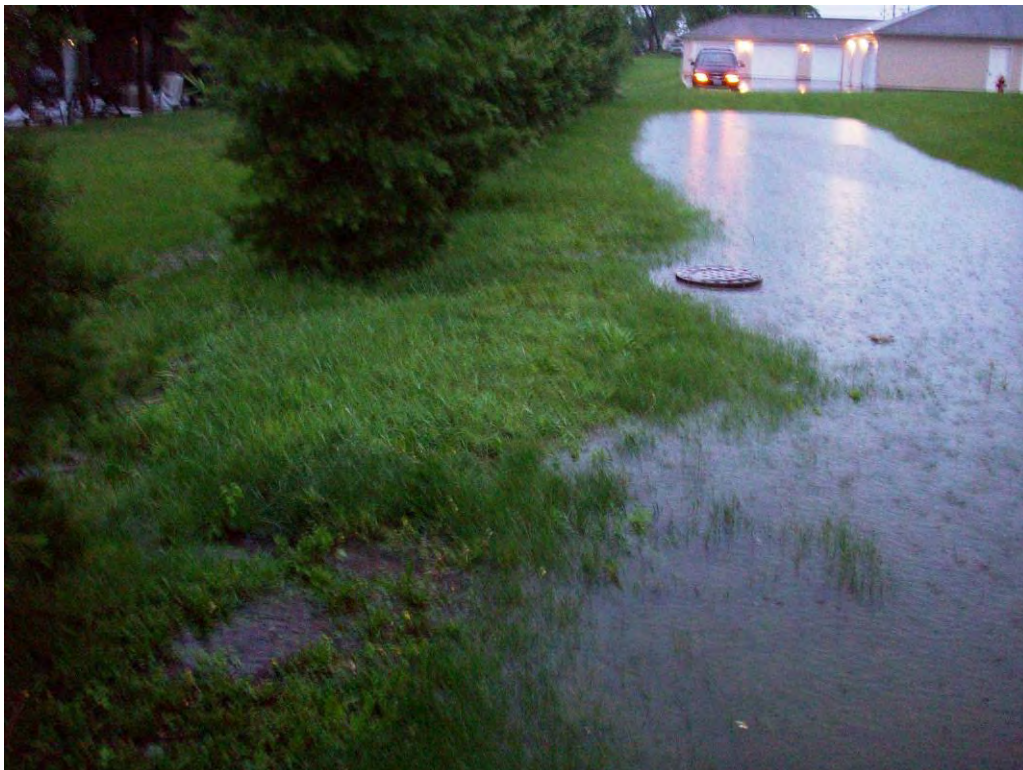


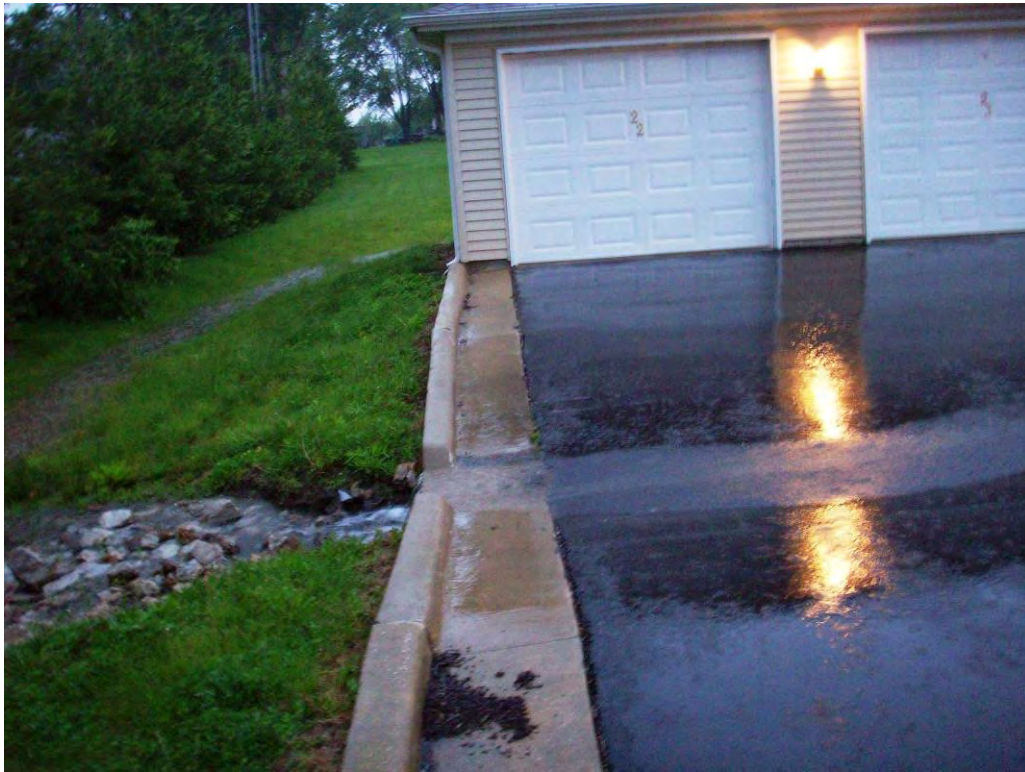
Lincoln Park Rd



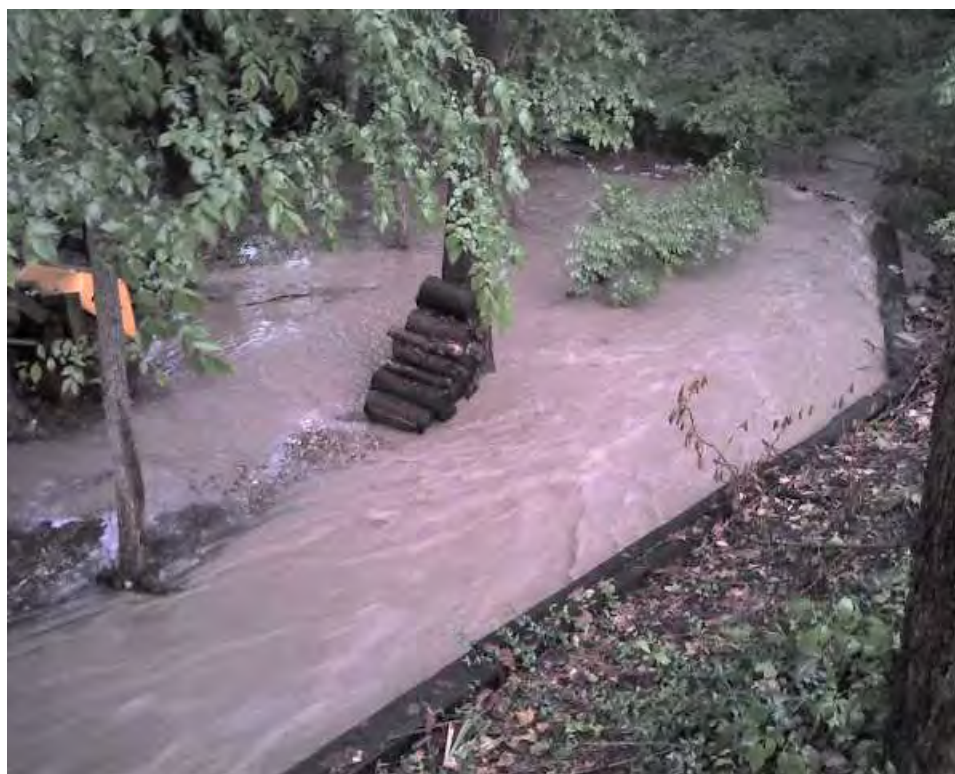
Sims Dr & N. Haven Ct - June 3, 2008



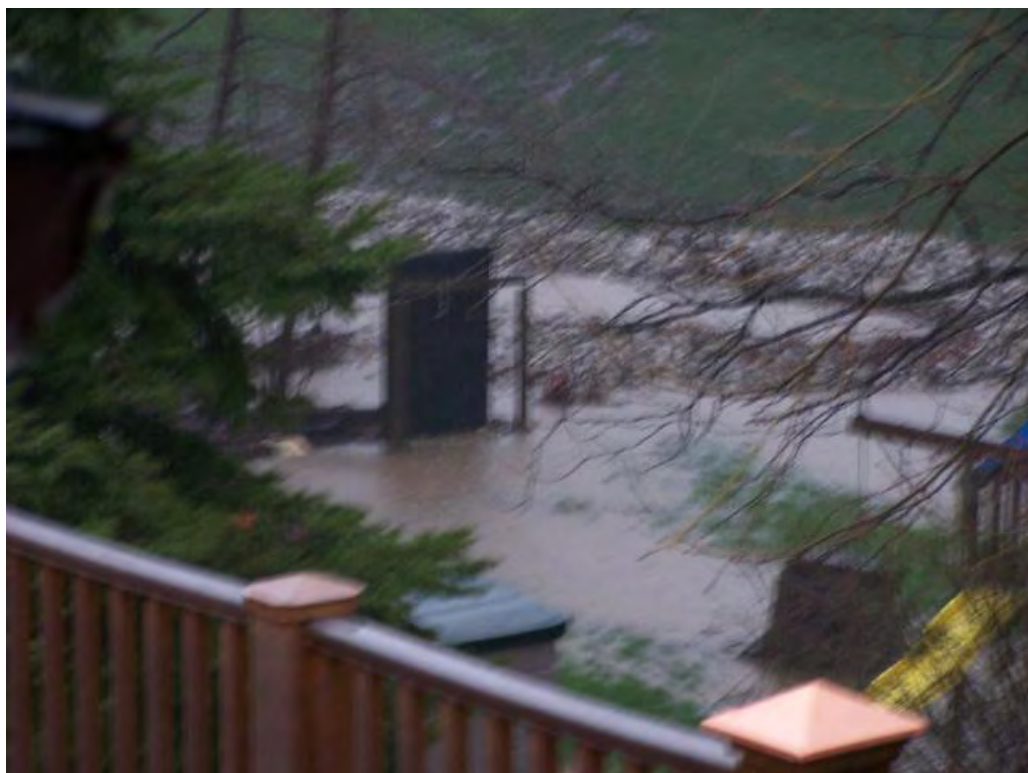




139 Point Bluff - June 4, 2008



Franzy Drive



Karen Ct





2452 Marquette Ct - September 4, 2008







MacArthur and Ash



Note: The flooding in these pictures is on W Arthur Court and isolates a few homes, but flood waters encroaching the park is acceptable.



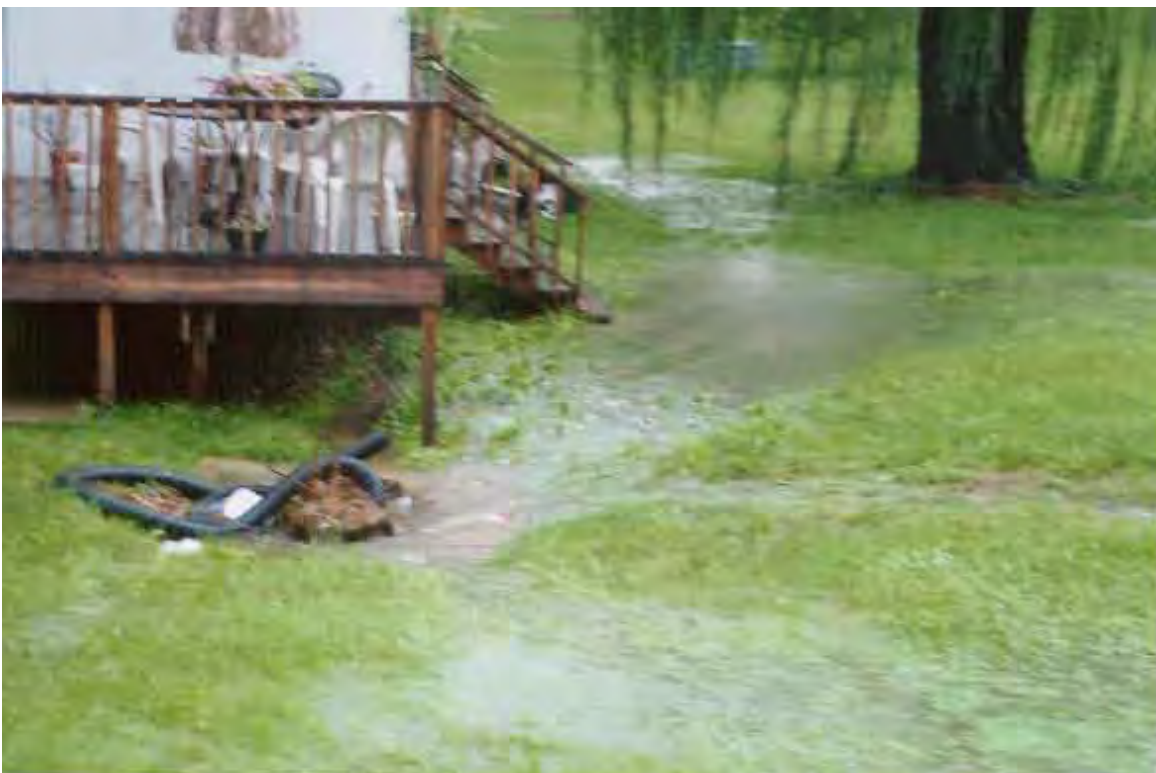
Neely Avenue







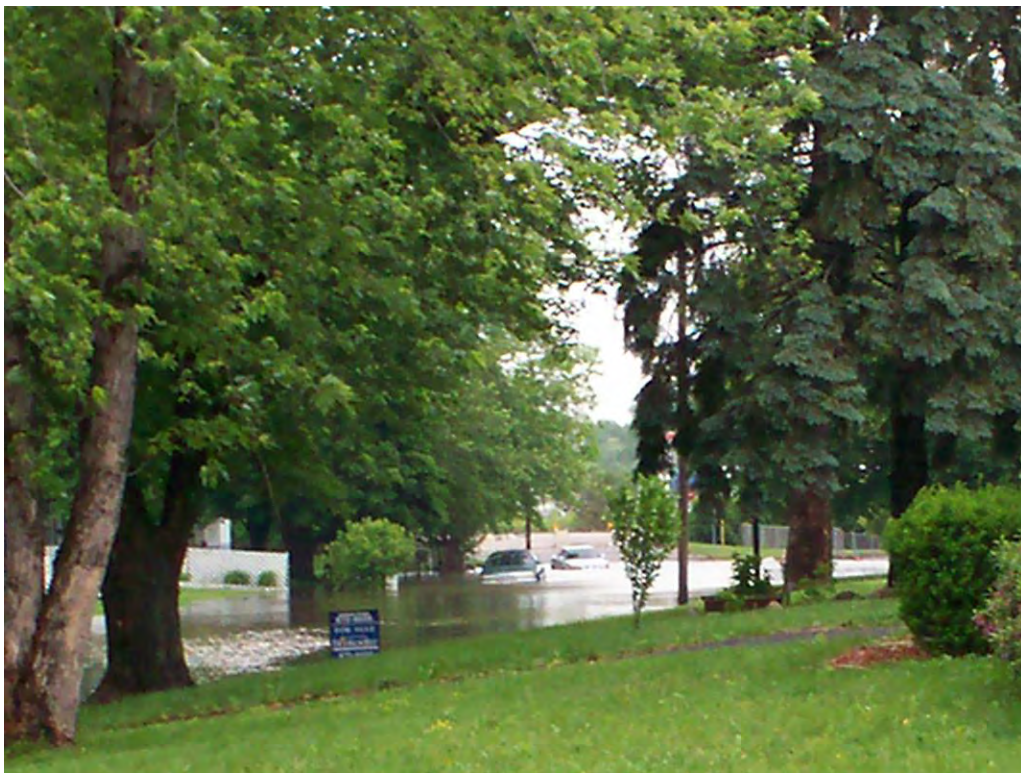
34th And Fitzgerald







Tanager Drive





Yorktown - September 4, 2008



Rt 36, Baltimore Ave and Fulton Ave



Lost Bridge Road



Main Street
(flooding at railroad underpass)



Fairview Park



3691 E Hardy Street

Note: These flooding pictures and comments provided by the home owner.



Note: These flooding pictures and comments provided by the home owner.



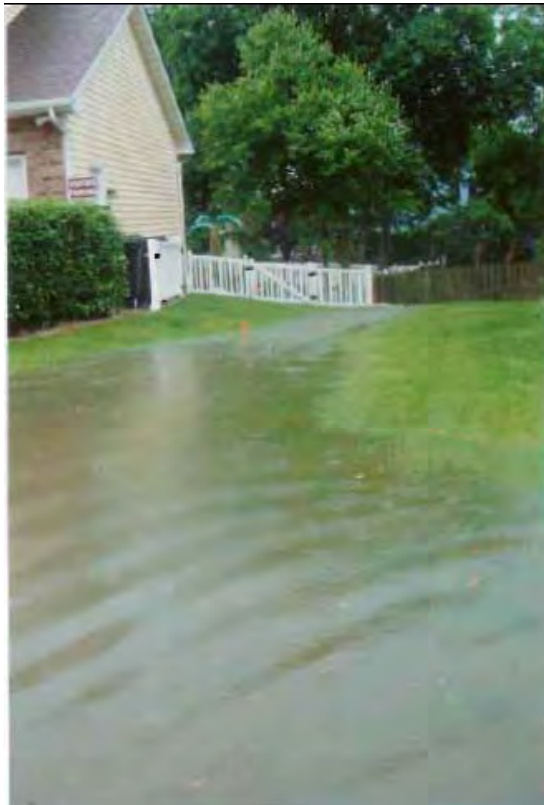
Note: These flooding pictures and comments provided by the home owner.



Note: These pictures were provided by the home owner.



1308 Manor Drive



3275 Cherry Drive



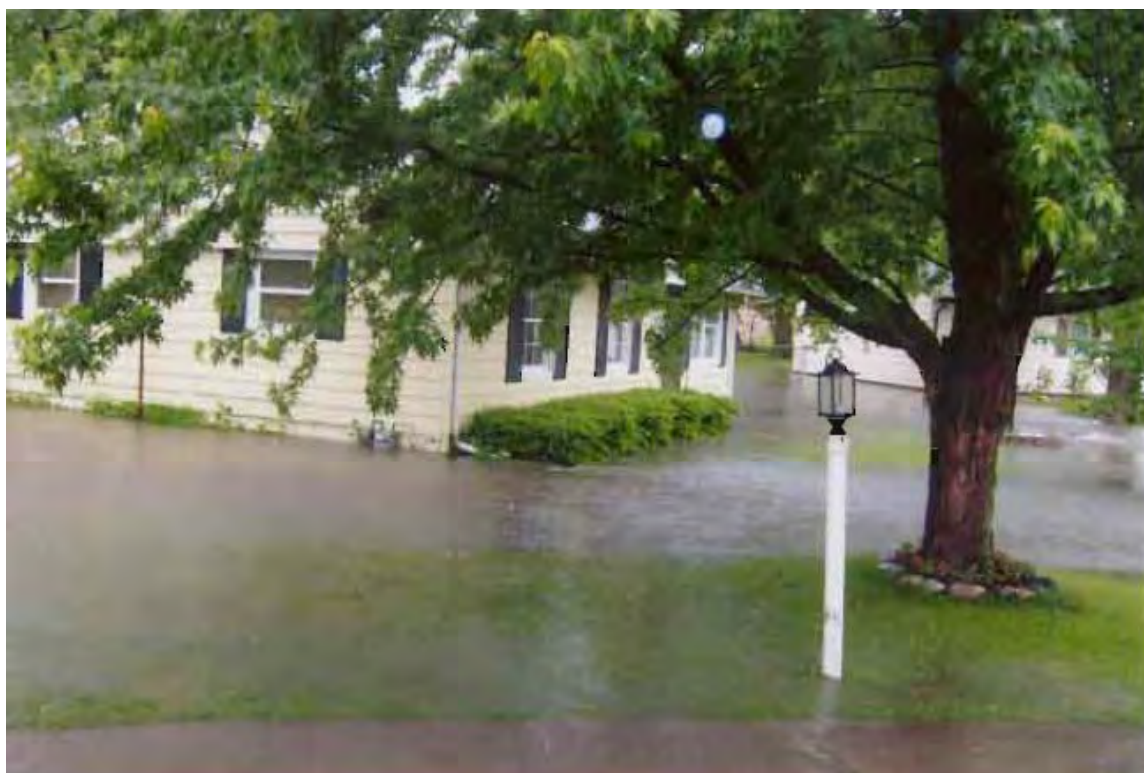


File Drive





Meadowlark Drive





1861 Garfield Avenue





Phillips Drive





Scovill Park Ct





Westlawn Avenue

Note: A portion of the flooding in these pictures lies inside the City and a portion is located in the township







445 S Nelson Blvd



1385 S 32nd Street





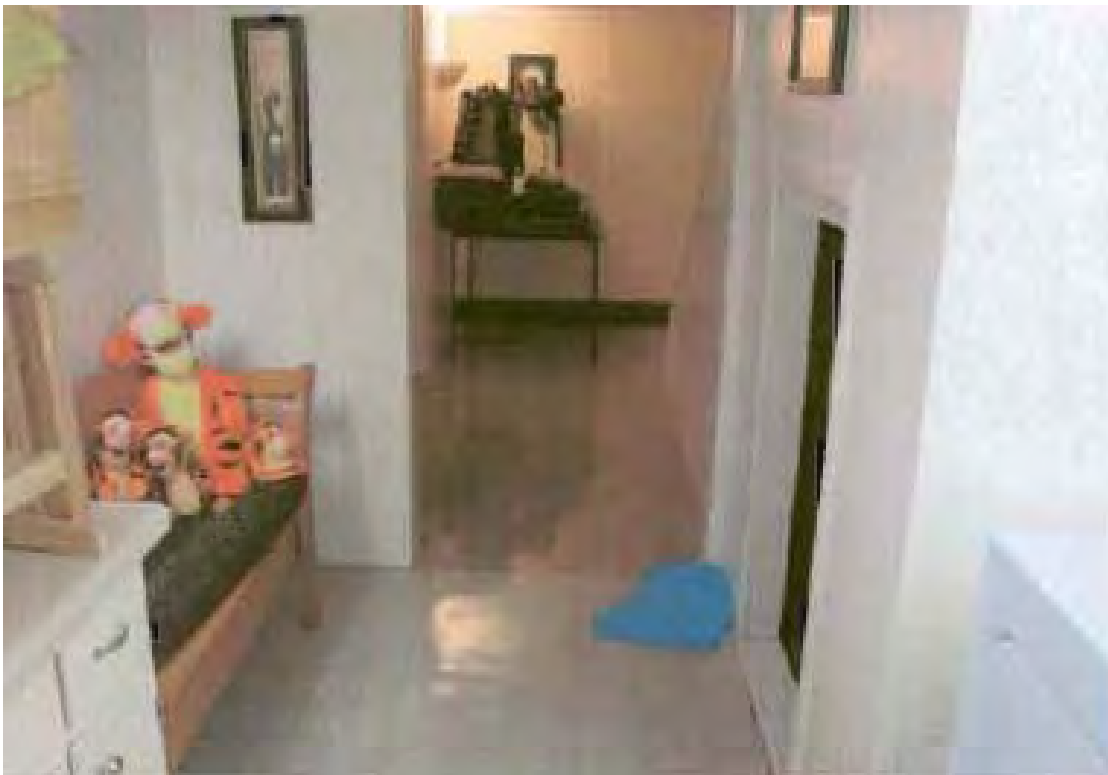
2270 E Decatur Street (Sept08)



(22nd and Decatur)







Lakeshore Avenue





Appendix D - Project Prioritization

City of Decatur, Illinois
2009 Stormwater Master Plan
Project Prioritization Matrix

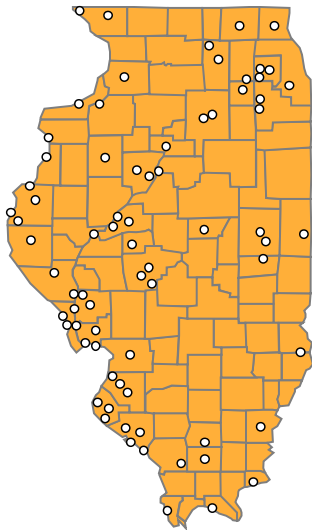
				Weight Factor = 10				Weight Factor = 6						Weight Factor = 3						Total Score			Order of Magnitude Cost
				Public Health & Safety		Degree of Street Flooding		Implementation Constraints		Construction Impacts		Recommended Improvement in 1966		Watershed Impact		Water Quality		I&I Related					
Item No. (in Table 2-1)	Priority No.	Improvement Project	Project Area (Acres)	Criteria Score	Weighted Score	Criteria Score	Weighted Score	Criteria Score	Weighted Score	Criteria Score	Weighted Score	Criteria Score	Weighted Score	Criteria Score	Weighted Score	Criteria Score	Weighted Score	Criteria Score	Weighted Score	Criteria Score	Weighted Score	Normalized Score	
26	1	Meadowlark Subdivision	37.3	5	50	5	50	5	30	3	18	5	30	3	9	5	15	1	3	32	205	87	\$ 1,700,000
30	2	Nelson Park	8.2	5	50	3	30	5	30	3	18	5	30	3	9	3	9	5	15	32	191	81	\$ 380,000
1	3	32nd & Fulton	235.8	3	30	5	50	5	30	3	18	5	30	3	9	3	9	3	9	30	185	79	\$ 10,720,000
38	4	Southampton and Buckingham	11.8	5	50	5	50	3	18	3	18	3	18	3	9	3	9	3	9	28	181	77	\$ 540,000
28	5	Mound Road	5.8	3	30	5	50	1	6	5	30	5	30	5	15	3	9	1	3	28	173	74	\$ 270,000
23	6	Main Street Underpass	5.5	5	50	5	50	3	18	3	18	5	30	1	3	1	3	1	3	24	175	74	\$ 260,000
20	7	L&A Industrial Court Pond	8.0	3	30	5	50	3	18	5	30	3	18	3	9	5	15	1	3	28	173	74	\$ 370,000
18	8	Karen Drive	8.8	3	30	3	30	5	30	5	30	5	30	1	3	3	9	1	3	26	165	70	\$ 400,000
24	9	Marietta Street	5.1	5	50	3	30	5	30	1	6	5	30	1	3	3	9	1	3	24	161	69	\$ 240,000
44	10	Woodridge and Manor	6.5	3	30	5	50	5	30	3	18	1	6	5	15	3	9	1	3	26	161	69	\$ 300,000
12	11	File Drive	41.8	3	30	3	30	5	30	3	18	5	30	3	9	3	9	1	3	26	159	68	\$ 1,900,000
32	12	Phillips Drive	63.6	1	10	5	50	3	18	5	30	5	30	3	9	1	3	3	9	26	159	68	\$ 2,890,000
43	13	William Street	19.4	3	30	3	30	5	30	3	18	5	30	5	15	1	3	1	3	26	159	68	\$ 890,000
13	14	Fitzgerald & Fontenac	56.7	3	30	5	50	3	18	3	18	1	6	5	15	3	9	3	9	26	155	66	\$ 2,580,000
27	15	Montgomery Hills	32.1	3	30	5	50	5	30	3	18	1	6	3	9	3	9	1	3	24	155	66	\$ 1,460,000
16	16	Greenridge & Josephine	8.3	3	30	3	30	3	18	3	18	5	30	5	15	3	9	1	3	26	153	65	\$ 380,000
15	17	Garfield Avenue	6.7	5	50	3	30	5	30	3	18	1	6	1	3	3	9	1	3	22	149	63	\$ 310,000
22	18	Lakewood Avenue	9.7	5	50	3	30	5	30	3	18	1	6	1	3	3	9	1	3	22	149	63	\$ 440,000
25	19	Masters Drive	22.0	3	30	5	50	3	18	3	18	3	18	1	3	3	9	1	3	22	149	63	\$ 1,000,000
36	20	Scovill Court	10.4	3	30	5	50	5	30	3	18	1	6	1	3	3	9	1	3	22	149	63	\$ 480,000
37	21	Sims & West Mounds Apts.	76.7	3	30	5	50	5	30	3	18	1	6	1	3	3	9	1	3	22	149	63	\$ 3,490,000
33	22	Ramsey & Foster	10.0	5	50	1	10	5	30	3	18	3	18	1	3	3	9	3	9	24	147	63	\$ 460,000
2	23	34th & Prairie	62.0	5	50	3	30	3	18	3	18	1	6	3	9	3	9	1	3	22	143	61	\$ 2,820,000
21	24	Lake Beach Addition (Hardy Street, etc)	15.1	5	50	3	30	5	30	3	18	0	0	3	9	1	3	1	3	21	143	61	\$ 690,000
35	25	Riverview & Sunset	5.2	3	30	3	30	5	30	3	18	1	6	1	3	3	9	5	15	24	141	60	\$ 240,000
6	26	Columbus & Greenridge	4.3	1	10	3	30	5	30	3	18	5	30	3	9	3	9	1	3	24	139	59	\$ 200,000
8	27	Delmar and Woodale	11.2	5	50	1	10	3	18	1	6	5	30	1	3	3	9	3	9	22	135	57	\$ 510,000
5	28	Cherry and Rainwater	29.3	1	10	3	30	5	30	5	30	1	6	5	15	3	9	1	3	24	133	57	\$ 1,340,000
41	29	Summit & Harrison	23.2	3	30	1	10	5	30	5	30	1	6	3	9	3	9	3	9	24	133	57	\$ 1,060,000
34	30	Richland & Cornell	50.2	3	30	3	30	5	30	3	18	1	6	1	3	3	9	1	3	20	129	55	\$ 2,290,000
42	31	Westminster & Moffet	18.6	3	30	3	30	5	30	3	18	1	6	1	3	3	9	1	3	20	129	55	\$ 850,000
39	32	Spring Creek at MLK/Yaegel Bridge	37.3	3	30	1	10	3	18	5	30	1	6	5	15	5	15	1	3	24	127	54	\$ 1,700,000
7	33	Constant View and Warren	57.9	1	10	5	50	3	18	3	18	1	6	3	9	3	9	1	3	20	123	52	\$ 2,640,000
46	34	Yorktown Court	46.3	3	30	1	10	3	18	3	18	5	30	1	3	3	9	1	3	20	121	51	\$ 2,110,000
17	35	Hawthorne Drive	12.8	3	30	1	10	5	30	3	18	1	6	3	9	3	9	1	3	20	115	49	\$ 590,000
10	36	East Court & North Court	42.7	0	0	1	10	5	30	3	18	5	30	3	9	3	9	1	3	21	109	46	\$ 1,940,000
9	37	Dennis & Kenwood	44.1	1	10	1	10	5	30	3	18	1	6	3	9	3	9	3	9	20	101	43	\$ 2,010,000
3	38	Airport Road	25.0	1	10	3	30	3	18	3	18	1	6	3	9	1	3	1	3	16	97	41	\$ 1,140,000
40	39	Sullivan & Elizabeth	4.7	1	10	3	30	1	6	3	18	3	18	1	3	3	9	1	3	16	97	41	\$ 220,000
4	40	Bowshier Lane	1.5	1	10	1	10	5	30	5	30	1	6	1	3	1	3	1	3	16	95	40	\$ 70,000
14	41	Franzy & Point Bluff ditch	17.1	1	10	0	0	3	18	3	18	1	6	5	15	5	15	3	9	21	91	39	\$ 780,000
19	42	King Arthur Dr. & Nottingham	30.1	1	10	1	10	5	30	3	18	1	6	1	3	3	9	1	3	16	89	38	\$ 1,370,000
29	43	Moundford Ave	8.1	1	10	1	10	5	30	3	18	1	6	3	9	1	3	1	3	16	89	38	\$ 370,000
31	44	Pershing Road	13.2	1	10	1	10	3	18	3	18	1	6	3	9	3	9	1	3	16	83	35	\$ 600,000
45	45	Wyckles and Main	7.1	1	10	1	10	3	18	3	18	1	6	3	9	1	3	1	3	14	77	33	\$ 330,000
11	46	Excelsior Road	2.6	0	0	1	10	5	30	3	18	1	6	1	3	1	3	1	3	13	73	31	\$ 120,000
Total =																						\$ 57,500,000	

Appendix E – Illinois Winning Formula in Floodplain Management

Illinois's Winning Formula in Floodplain Management

After many Illinois river communities experienced the devastation of the Great Midwest Flood of 1993, it became obvious that floodplains are easily reclaimed by rivers during and after severe weather events. With a combined formula to enforce local floodplain regulations and return the floodplain to its natural purposes, the State of Illinois has succeeded in reducing damage from the most frequent cause of disaster declarations in Illinois.

Flooding has been a constant drain on emergency response and recovery resources in Illinois. The state's geography includes 900 rivers and waterways with a combined length of 13,200 miles. The state is bordered



Each dot on this Illinois map represents one of 74 acquisition project sites.

by 880 miles of the Mississippi, Wabash, and Ohio Rivers. The state's mitigation initiatives have resulted in the purchase of more than 3,500 flood-prone structures and some adjacent vacant lots (as of July 2002).

Communities benefit when these parcels are returned to their natural functions. Using voluntary acquisition grant programs, the Illinois Emergency Management Agency (IEMA) has approved and administered more than \$100 million in project activities including flood mitigation,

ice storm preparedness, and wind-resistant construction.

IEMA and the Illinois Department of Natural Resources/Office of Water Resources (IDNR/OWR) are aggressively pursuing the reduction of flooded properties, having proactively completed a detailed analysis of the National Flood Insurance Program repetitive loss structure inventory. More than 30 percent of these properties have already been removed from this list through voluntary buyouts.

A Winning Recipe

The recipe for reducing flood damage can be attributed to the two-fold approach of eliminating existing flood problems and of controlling new development in the floodplain, according to Paul Osman, Floodplain Management Program Coordinator, IDNR/OWR.

The success of the acquisition and floodplain management programs along the Illinois and Sangamon Rivers became evident during a recent flood event in the spring of 2002. (The table on page 5 details the acquisition projects.) The Sangamon River reached 10 feet over flood stage, and the Illinois River topped at 15 feet over flood stage. County emergency managers and local floodplain administrators reported that, had the buyouts not taken place, many more houses would have been inundated with floodwaters.

Jan Horton, Illinois State Mitigation Officer, remarked that, at the confluence of the Illinois and Mississippi Rivers at the City of Grafton, an estimated 200 more people

would have faced the trauma of cleaning up had not 88 structures been removed from the floodplain by a successful buyout project.

When you are committed to the challenge of reducing persistent flood damage, it requires a staff with creativity and determination, according to Horton. “To be successful, you have to think outside of the box, have a can-do work ethic, and avoid getting discouraged,” said Horton. “Thinking creatively means keeping a positive attitude and strategizing to look at challenges in new ways to assist communities within the limits of the law.”

After the 1993 floods and subsequent acquisition program, IEMA organized the Interagency Mitigation Advisory Group (IMAG) to facilitate the implementation of various mitigation programs. In addition to IEMA, the group is composed of a variety of agencies, including the IDNR/OWR, Illinois Historic Preservation, Department of Commerce and Community Affairs, FEMA, and the American Red Cross, with staff who can provide expertise in acquisition and elevation projects.

“When you get the people out of the floodplain, you don’t have to boat in and rescue residents. You don’t have to evacuate, put up road blocks, and rebuild where the floodwaters will surely be back.”

Jan Horton, Illinois State Mitigation Officer

“With the IMAG, we can bring in all the agencies involved in the mitigation conversation,” explained Horton. “Together, we conduct reviews, research, and evaluations, and make prioritizations and recommendations.”

In addition to the creation and use of the strong partnerships developed in the IMAG, Horton attributes the success of the state’s acquisition program to several factors:

- support from the Governor’s Office;
- a close relationship with FEMA, a partner on the IMAG;
- an appraisal review process at the state level to ensure reliability and consistency; and
- dedicated state staff and the involvement of local officials.

Acquisitions are a very visible and tangible example of success. “We’ve made a dent in getting people out of the way of floodwaters. The more houses we buy out in an acquisition program, the more the river can do what it wants and flooding becomes a non-event,” said Bob Sherman, IEMA Mitigation Planner.

In working toward the goal of damage prevention and the decrease of subsequent recovery dollars, in that one area of risk called the floodplain, IEMA is leading the way in making Illinois a better place.

Funding for Acquisition Projects in
the Illinois and Sangamon River Watersheds

	<u>Acquired Units</u>	<u>FEMA HMGP¹ Funds</u>	<u>DCCA/IDNR² Match Funds</u>	<u>Total Cost</u>
Illinois River Watershed	672	\$11,114,035	\$7,750,218	\$18,864,253
Sangamon River Watershed	156	\$2,613,276	\$993,853	\$3,607,129
TOTAL	828	\$13,727,311	\$8,744,071	\$22,471,382

¹Federal Emergency Management Agency's Hazard Mitigation Grant Program

²Illinois Department of Commerce and Community Affairs/Illinois Department of Natural Resources