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FLOODPLAIN MANAGEMENT PLAN

CITY OF LOUISVILLE & JEFFERSON COUNTY, KY

JUNE 25, 2001

FLOODPLAIN MANAGEMENT PLAN MISSION STATEMENT

The mission of the Louisville/Jefferson County Community Rating System (CRS) and Project Impact is to develop a process to guide the community in a coordinated effort to reduce flood damages to life and property and protect the natural and beneficial functions of the floodplain. Moreover, the overall goal of the Floodplain Management Plan is to guide the community in a holistic, coordinated effort to raise the consciousness of the flood risk and to reduce flood damages to life and property.

I. INTRODUCTION OF CRS PROGRAM

Nationwide there are nearly 900 communities that are implementing local mitigation, outreach, and educational activities through the Community Rating System (CRS) program. These communities also are carrying out activities that save lives and reduce property damage due to the CRS guidelines.



The CRS program rates communities by a point system for performing floodplain management activities. The CRS is designed on a rating system. Each of the 10 classes (with a Class 1 being the highest rating) awards the community with a 5% reduction in flood insurance rate premiums.

Although flood insurance rate reduction is a major benefit of the CRS program, the improvement in floodplain, stormwater, watershed and emergency management provides greater benefits to the entire community.

The Louisville and Jefferson County Metropolitan Sewer District (MSD) is the coordinator of the City of Louisville and Jefferson County's (CRS) Program. MSD submitted applications for both the city and county for a class rating improvement earlier in 2000 from a Class 5 Rating. As a result, on October 1, 2000, our community is classified a Class 6. The Class 6 Rating rewards our residents with a 20% reduction in their flood insurance premiums. Nationwide, the City of Louisville and Jefferson County CRS program rank in the top 3.5% in the nation, with only six communities ranking higher.

The CRS Program

The Federal Emergency Management Agency (FEMA) and the National Flood Insurance Program (NFIP) are the administrators of the CRS Program.

The CRS program recognizes and encourages community floodplain management activities that exceed the minimum NFIP standards. Initiated in 1990, the CRS program reduces flood insurance premiums to reflect what a community does above and beyond the minimum NFIP standards for floodplain regulations.

The CRS program gives incentive to communities to be more proactive in floodplain management activities and to incorporate mitigation techniques within their planning hierarchy. A community receives a CRS "classification" based upon the total score for its activities.

II. PARTNERSHIP WITH PROJECT IMPACT

On June 3, 1998, FEMA and the Commonwealth of KY Division of Emergency Management officials announced a partnership with Louisville/Jefferson County for Project Impact. Jefferson County and the City of Louisville were selected as one of the first 50 communities to participate in FEMA's nationwide project.



Project Impact is designed to help communities build a disaster resistant community. It is intended to help protect the community, the residents, organizations, businesses, infrastructure, and the stability and growth of the economy as much as possible against the impact of natural disasters BEFORE they happen. The nationwide initiative operates on a common sense damage-reduction approach, basing itself on the premise that the local community must design and implement a plan geared toward its own needs.

The official signing of the Project Impact agreement was June 1, 1999 and thus began a two-year effort. The Louisville/Jefferson County Emergency Management Agency (EMA), in partnership with MSD, will coordinate the Project Impact program. Under a Cooperative Compact between the City of Louisville and Jefferson County governments, EMA, a joint agency with emergency planning and coordination, is the implementing agency for Project Impact, on behalf of both governments and MSD.

Project Impact

Breaking the disaster-rebuild-disaster cycle in the United States is FEMA's top priority.

Project Impact is FEMA's initiative to change the way America deals with natural disasters. The goal of Project Impact is to reduce the personal and economic costs of disasters by bringing together community leaders, citizens, and businesses to protect themselves against the ravages of nature.

III. COMMITMENT TO A CURRENT FLOODPLAIN MANAGEMENT PLAN

The City of Louisville Board of Alderman adopted a Floodplain Management Plan in April 1996 followed by Jefferson County Fiscal Court in June 1996. However, the 1996 Floodplain Management Plan (FPMP) was developed in accordance with the 1994 CRS planning guidelines. Due to participation in the CRS program, our community is due for a five-year cycle verification visit by FEMA in 2000. With this verification comes the requirement to have all activities updated to the current CRS guidelines. The current CRS guidelines for a floodplain plan require the community to involve the public, coordinate with other agencies, and seek stakeholder participation. Further, the guidelines require a community to utilize public and stakeholder involvement to develop a viable floodplain management plan.

Project Impact and the CRS program both require:

- Identifying the hazards and problems;
- Assessing the community's vulnerability; and
- Designing a mitigation plan through partnerships with local agencies and citizens.

Moreover, research shows that to be effective, a floodplain management program should be locally developed from the ground up. With that in mind, during January 2000, MSD and Project Impact staff began to coordinate the development of a dual-purpose floodplain management plan.

Project Impact's guidelines and the required CRS floodplain management plan are closely related to several other programs already in place or under development in Louisville and Jefferson County.

Some of the agencies and organizations that require a mitigation plan include: U.S. Army Corp of Engineers (USACE), Environmental Protection Agency (EPA) (Clean Water Act), and the American Red Cross. The mitigation plans mentioned all require that public agencies, private business, private citizens and industry help to design their mitigation plan.

Planning Process

MSD and Project Impact staff relied on the Community Rating System (CRS) Team to help keep the process going and organized. The CRS Team helped MSD and Project Impact staff from the beginning in designing the planning process for Louisville and Jefferson County, according to the CRS guidelines. The CRS floodplain management plan follows a 10-step process:

1. Organize to Prepare the Plan
2. Involve the Public
3. Coordinate with Other Agencies
4. Assess the Hazard
5. Assess the Problem
6. Set Goals
7. Review Possible Activities
8. Draft an Action Plan
9. Adopt the Plan
10. Implement, Evaluate and Revise

According to CRS guidelines, the members of the committee should be comprised of staff who will be implementing the plan, as well as citizens and organizations. During January 2000, the CRS Team began organizing a committee representative of a variety of local stakeholders. Inquiries were made to several agencies and organizations asking for the nomination of representatives. There were also citizens and business owners with flood experience nominated by MSD Area Team Leaders.

In February 2000, a letter of invitation was sent to prospective members along with a FPMP summary, the FPMP schedule, and an Information Form. The Information Form requested the committee member to name an alternate for the committee and a signature of commitment to the yearlong process. The form also listed six categories of floodplain management activities that members were requested to prioritize by personal interest. From the level of interest shown on the form, the committee members were separated into five work groups. The FPMP schedule, overall topics, and work group assignments were all developed according to the following five categories:

<p><u>Regulations and Preventive Measures</u></p> <ul style="list-style-type: none">➤ Planning and zoning➤ Permit process➤ Stormwater management activities➤ Drainage and stream system maintenance➤ Land Use and Floodplain regulations including Floodplain Ordinance, subdivision regulations, erosion and sediment control ordinance, etc➤ Stream dumping regulations➤ Building and floodproofing codes➤ Revised floodplain mapping using LOJIC	<p><u>Natural Resource Protection</u></p> <ul style="list-style-type: none">➤ Open space and wetlands protection and preservation➤ Greenways projects➤ Erosion and sediment control➤ Water quality➤ Cornerstone 2020 land use
<p><u>Property Protection and Structural Projects</u></p> <ul style="list-style-type: none">➤ Acquisitions, grants and buyout programs➤ Retrofitting/floodproofing (sewer backup protection and backwater valves)➤ Reservoirs and levees➤ Detention and retention basins➤ Capital improvement projects➤ Flood bank compensation➤ Channel modifications	<p><u>Public Outreach and Information</u></p> <ul style="list-style-type: none">➤ Mapping and hazard information➤ Greenways projects➤ Environmental education➤ Technical assistance➤ Outreach for CRS Ten Topics➤ Acquisitions, grants and buyout program
	<p><u>Emergency Services</u></p> <ul style="list-style-type: none">➤ Flood warning➤ Emergency and flood response➤ Disaster assistance➤ Critical facilities protection➤ Health and safety during an emergency

IV. FLOODPLAIN MANAGEMENT PLAN ADVISORY COMMITTEE

The Louisville and Jefferson County Floodplain Management Plan Advisory Committee represents flood-related agencies, government, business, neighborhoods, and citizens. Over 25 Advisory Committee members serve on the committee, many of whom are the local agency/organization staff who will implement the Action Plan.

Table IV-1. Floodplain Management Plan Advisory Committee Representation

North County Area Citizen	Jefferson County Judge/Executive's Office
Mill Creek Area Citizen	City of Louisville Mayor's Office
Beargrass Creek Area Citizen	Home Builders Assoc. of Louisville
Pond Creek Area Citizens	Jefferson County Public Works
Jefferson County Citizen	Greater Louisville Association of Realtors
Environmental Organization (KY Waterways Alliance)	American Red Cross
Environmental Business (PTRL Environmental)	Jefferson County Code Enforcement
U of L Center for Hazards Research and Policy Development	Jefferson County Fire Department
Jefferson County Planning and Development Services	MSD Chief Engineer
City of Louisville Inspections, Permits and License	MSD Developmental Team Engineer
Louisville and Jefferson County Metro Parks Department	MSD Area Team Leader - Pond Creek
Jefferson County Public Schools	MSD Emergency Services Department
City of Louisville Fire Department	MSD Wet Weather Department
MSD Stormwater Department	

(See Appendix 1 for the list of FPMP Advisory Committee and CRS Team Members.)

MSD Board Resolution Recognizes Advisory Committee

The MSD Board officially passed a Resolution in July 2000 formerly recognizing the efforts of the Louisville/Jefferson County Floodplain Management Advisory Committee. The Advisory Committee's pledge is to design a "disaster resistant community" through the guidance of Project Impact and the CRS program. The Resolution reads that the CRS Administrator, MSD, and Project Impact will guide the planning process and assist the committee in developing new "possible activities" to resolve the flooding hazards inherent to our community.

The Resolution recognizes Dick Bartlett, Director of EMA, as chair of the Advisory Committee meetings. Through consensus building the committee pledges to develop an action plan and a comprehensive floodplain management plan that will complement the community's existing floodplain programs.

(See Appendix 2 for the FPMP Advisory Committee Resolution passed by the MSD Board.)

V. SCHEDULE AND AGENDA FOR THE ADVISORY COMMITTEE

During the planning process, the CRS Team developed a schedule for the Advisory Committee for a series of meetings from March through September 2000. Topics, speakers and agendas were designed according to the five categories listed in Section III. The Advisory Committee met approximately every three weeks throughout this timeframe, as well as going on two field trips.

The stage was set for the Advisory Committee with a Kickoff Meeting conducted on March 27, 2000 with participation from the Regional FEMA representative and the National Flood Insurance Program (NFIP) State Coordinator introducing the concepts of a floodplain management plan. In addition, our local Insurance Service Office (ISO) CRS representative spoke to the committee about the comprehensive nature of a floodplain management plan and a need for the committee to consider repetitive losses as a key element to the plan.

As the meetings proceeded, our community's local flooding history, causes and concerns were clearly defined. Every meeting thereafter was focused around a series of speakers who addressed such topics as, current programs, numerous ongoing mitigation activities, regulations, outreach projects, structural programs and land use. (For a complete list of topics see below.)

In July 2000, the Advisory Committee went on two, day -long field trips that gave them a first hand chance to see flood prone areas and flood protection measures in place. The Advisory Committee also had a chance to tour a flood pumping station on both days as well as view flood prone properties, structural projects, acquired floodprone sites, a regional detention basin and wetlands.

(See Appendix 3 for the Field Trip Tour Agendas.)

The following are the dates of the meetings and the topics presented to the Advisory Committee:

MARCH 27: Kick-Off Meeting.

- Welcome (Bud Schardein, MSD)
- Introduction to NFIP/CRS (Rose Austin, Region IV FEMA)
- Introduction to Project Impact (Dick Bartlett, EMA)
- Introduction to CRS and the FPMP plan concept (Jack Clark and Tim Brooks, State NFIP)
- **What are the Causes of Flooding in Jefferson County?**
Review Louisville/Jefferson County's causes of flooding, on-going problems, and history, include data from 1997 flood

APRIL 10: What is at Risk? What are the Hazards? Identify Problems to Assess Hazards.

- Introduce Six Categories to be inventoried
- Identify Advisory Committee by five Work Groups (designed from Six Categories)
Topic: Hazard Inventory for City and County
- Introduce MSD's five area teams
- Review countywide hazard inventory data and maps by watershed
Topics: Repetitive Loss; Emergency Measures and Flood Warning Plan
- Review county's repetitive loss properties and areas
- Review countywide flood response plan
- Review emergency operations and visit EOC (Emergency Operations Center). Identify flood warning and explain dissemination measures, sirens, 911 system

MAY 8: What is Being Done to Protect the Community and Problem Areas?

Topics: Floodplain Regulations, Property Protection/Floodproofing, Structural Projects and Water Quality

- Review Floodplain Regulations, floodplain permit process, Floodplain Ordinance, Haz-Mat Ordinance, Erosion Sediment Control Ordinance, and State and local hazard disclosure
- Review KPDES Stormwater Permit process. Discuss water quality and treatment plants
- Introduction to floodproofing measures and backwater valves
- Review structural projects, capital improvement program and flood compensation banks
- Discuss Challenge XXI and USACE flood protection programs
Topics: Hazard and Risk Identification and Mitigation Measures
- CRS 10 topics, annual outreaches
- Red Cross, emergency measures and public information
- Project Impact projects to-date
- MSD public information projects

JUNE 5: Land Use, Preservation, and Natural Resources

Topics: Open Space, Land Use, and Preservation and Regulations

- Introduction to open space, greenways
- Review Cornerstone 2020 and planning process
- Local efforts to preserve open space
Topics: Acquisitions, Funding, and State Programs
- Overview of acquisitions to-date, how acquisitions work, pitfalls, lessons learned by county
- Introduce HMGP and FMA by State EMA representative
- State mitigation measures, possible funding

JUNE 26: Review Problems and Assess Hazards (Work groups)

- Identify community's problems, determine solutions, and design mitigation strategy

JULY 17: Outline and Set Priorities for Possible Activities for an Action Plan (Work groups)

- Topic: Set priorities, timelines and define implementation
- Topic: How to implement and fund an Action Plan

AUGUST: (No meeting)

- Write a draft Action Plan. CRS Team staff to write a draft Action Plan with the committee's recommendations.

SEPTEMBER 18: Review Draft Action Plan

- Work groups to review Action Plan and make clarifications and further recommendations.

OCTOBER:

- Draft Action Plan and FPMP document to public and other flood-related agencies for 30-day review. Advisory Committee to participate in three public meetings.

NOVEMBER:

- Incorporate public comment into FPMP. Submit plan to Fiscal Court, Board of Alderman and MSD Board for Adoption.

During the June and July meetings, the Advisory Committee identified the community's hazards and life risks inherent to a river city community. Possible solutions were reviewed and recommendations were developed for an Action Plan. Once the recommendations for mitigation were complete, the CRS Team drafted an Action Plan from committee recommendations and prepared it for their review.

VI. COORDINATION WITH OTHER AGENCIES AND THE PUBLIC

To receive direct feedback from flood-related agencies and the public, the Advisory Committee sponsored an open meeting at the American Red Cross on Monday, May 22 from 3:30pm to 4:30pm. The meeting began with a brief presentation of the FPMP planning process (10-steps) and an introduction of the Advisory Committee members. The intent of the meeting was to provide local agencies, organizations and citizens a chance to give input on what they see as the flooding problems in the community and to share any programs or projects their agency or association may have in place that could complement the Floodplain Management Plan. *(See the press release to the public, the May 22, 2000 agenda, and a list of flood-related agencies contacted in Appendix 4.)*

Also, in coordination with other local agencies, several flood-related agencies and organizations were asked to present topics at the Advisory Committee meetings (see list of topics in Section V). Presentations by several speakers allowed the Advisory Committee to receive a comprehensive overview of the flood reduction activities and projects within the city and county.

VII. HISTORICAL DATA AND HAZARD IDENTIFICATION

The following is historical information about three of Louisville/Jefferson County's worst floods. This historical data substantiates the vulnerability of our community to flooding and puts into perspective which areas of the community are most at risk.

History of Flooding in Louisville/Jefferson County

Jefferson County is the largest populated county in Kentucky, with a total population of 664,937 according to 1990 census data. The county encompasses an area of 375 square miles. The Ohio River shoreline is approximately 37.5 miles in length and extends along over 20% of the county.

Louisville was founded on the banks of the Ohio River over 200 years ago and the Louisville metropolitan area has grown steadily over the years. In Louisville's early days, the Falls of the Ohio River were a natural barrier to navigation. River traffic had to detour over land around the falls to continue upriver or downriver. This demanded portage activities around the falls. Historically, the area's growth was based on river related commerce. With changes in Louisville's economy, came changes in the way its citizens tried to harness the forces of the Ohio River. The first major attempt to bring some stability to the river came in 1830, with the construction of the first canal at the Falls of the Ohio. The canal was constructed to raise and lower riverboats from the upper river above the falls to the lower river below the falls. The first dam and new locks at the falls, which was constructed in 1909, along with enlargements to the locks in 1927 and 1964 helped improve water traffic, but did very little to control river flooding.

Newspaper accounts and historical records show that during the 19th century large floods occurred in 1832, 1847, 1859, 1867, 1883 and 1884. Major floods in the 20th century have occurred in 1907, 1913, 1933, 1937, 1945, 1948, 1964 and 1997. Thus, it can be seen that serious flooding has occurred in the Louisville area on the average of about once every 10 years.

The normal elevation of the upper pool of the Ohio River is approximately 420' above mean sea level (NGVD). Overbank flooding occurs at approximate elevation 431', and the base flood elevation (BFE) varies between 449' and 452'.

Ten Greatest Recorded Flood Events of the Ohio River NGVD Elevation		
Month	Year	Upper Gauge
February	1883	447.5
February	1884	449.7
January	1907	444.4
January	1913	442.5
April	1933	447.4
January	1937	460.2
March	1945	450.1
April	1948	444.0
March	1964	449.2
March	1997	445.1

The major flooding problem in Louisville/Jefferson County is related to out-of-bank flooding. Out-of-bank flooding is defined as flooding that occurs when the natural embankments of a watercourse are breached.

In general, there are two types of flooding situations in Jefferson County: Ohio River flooding and flash flooding. Additionally, ponding also may result in certain areas, at their lowest elevations. The community is also vulnerable to other flooding situations due to street runoff, erosion, and sewer and drainage problems.

The main flood season for the Ohio River is between the months of January and May. All of the highest floods on record have resulted from general heavy rains throughout the Ohio River Basin. In both summer and fall, intense local thunderstorms also can contribute significantly to local flash flooding and interior drainage problems.

The average duration of Ohio River floods of record in Jefferson County is about 12 days. However, the sustained flood duration in 1937 was 23 days, in 1945 it was 18 days, and in 1964 and 1997 it was 14 days. The rate of rise at levels above flood stage varies in relation to rainfall and runoff rates for specific storms. Typical rates of rise for the Ohio River, at levels above flood stage, range from 2.5 to 5 inches per hour with the record rate of rise being 4.7 feet in 12 hours and 8.4 feet in 24 hours in 1964.

1937 Flood

The flooding of January 1937 was the greatest and most destructive in the history of Louisville. Rainfall during January averaged 10 inches throughout the Ohio River Basin, exceeded 22 inches in some locations, with Louisville receiving 19.2 inches. Fed by heavy winter snows and heavy rains in early January, the Ohio River rose above the flood stage just before midnight on January 15. On January 27, the river reached its crest at 460 feet above sea level or 40 feet above its normal level, which is well over a 100-year event.

Property damage was estimated at \$53,000,000 (approximately \$960 million in 2000 dollars based on the Engineering News Record building cost index data). The number of flood-related deaths rose to 190.

The flood completely disrupted the life of the community, inundating 60% of the city and 65 square miles in Jefferson County.

River Flood Protection Project: Immediately following the 1937 flood, local officials appointed a Flood Protection Committee to assess damages from the flood and to make recommendations for construction of a flood protection system. Working with the USACE, the Flood Protection Committee recommended a plan that included a concrete wall to be constructed in the downtown area, portable gate closures at street crossings and flood pumping stations at sewer outlets and creeks as they flowed to the river.

The U.S. Congress authorized the flood protection project, and in 1940 voters approved a bond issue to be used along with federal funding to construct the first phase of Louisville's flood protection system. The first portion was constructed from 1947 to 1954, running approximately from Beargrass Creek to Mill Creek, and provided protection for the downtown areas and the developed southwestern areas in Jefferson County, as they existed at that time.

In July 1954, the project was completed and turned over to the City of Louisville to operate and maintain. The project stretched over 16 miles and included 13 miles of earthen levee; 4 miles of concrete walls; 50 movable closures; 21 sandbag closures and 13 flood pumping stations. Protection was based on the 1937 flood event plus three feet of freeboard. Freeboard is defined as a factor of safety usually expressed in feet above a flood level for purposes of floodplain management. Several river-related industries were left outside of the protection works and remained vulnerable, but knowledgeable, of flood risks.

1964 Flood

In 1964 the community experienced its third greatest flood of the 20th century. This flood approximated the 100-year base flood. Most of the flood damage occurred in the southwest section of the county with about 1,200 homes being flooded. Property damage was estimated at \$3,600,000 (approximately \$21 million in 2000 dollars based on Engineering News Record building cost index data).

River Flood Protection Project – Southwest: During the 1970's, Congress authorized a new addition to the flood protection project for the southwest section of Jefferson County. This addition extended downstream from Mill Creek nearly to the county line. Most of the damage from the 1964 flood occurred in this area. This project was completed in September 1989 and was designed to provide protection to the 1937 level plus three feet of freeboard similar to the older section. In January 1991, FEMA issued a letter of map revision (LOMR) reflecting the impact of the flood protection project. The flood protection project was designed to protect those properties from the flood of record (1937) plus three feet.

The City and the County are now protected against Ohio River inundation by a 29-mile long floodwall and appurtenances. The Louisville Local Flood Protection Project (LLFPP) was completed in 1954, and the Southwest Jefferson County Flood Protection Project (SJCFFP) was completed in 1989. Approximately 92% of the land that was originally in the Ohio River floodplain were now protected, leaving only the Upper River Road area and several beach areas along Dixie Highway in southwest Jefferson County vulnerable to Ohio River flooding.

1997 Flood

Beginning on the night of February 28, 1997, a succession of storms created the heaviest 24-hour rainstorm amounts in Jefferson County's history and later caused the largest flood since 1964. Flash flooding almost filled the 100-year floodplains along the County's streams and spread beyond the floodplain boundaries in some areas. More than 12 inches of rain caused both inland flash flooding and the seventh worst Ohio River flood on record in Jefferson County. Flood damage was estimated at more than \$200 million in 1997 (approximately \$210 million based on Engineering News Record building cost index data.)

(See the March 1997 Flood Event Map in Appendix 5.)

The rainfall produced two flooding scenarios: inland ponding in floodplains and Ohio River flood stage.

Inland Ponding: The hardest hit areas were in the southwestern section of Jefferson County along the Ohio River. Two other inland areas hit hard were in the Pond Creek watershed south of Louisville and along Floyds Fork in the east. More than 50,000 residences experienced some level of flooding. In addition, high water briefly closed Interstates 64 and 65, as well as scores of secondary roads. The pump

station at the mouth of Pond Creek alone moved 2.6 billion gallons of water a day, draining the flood-ravaged neighborhoods of Okolona and Fairdale. During the first few days of the flood, MSD received more than 7,000 calls mostly about sewer backups and surface flooding. MSD estimated that as many as 25,000 customers may not have reported basement backups during the March 1997 flood.

Ohio River Flood: As floodwaters began receding in southern Jefferson County, the flood stage of the river became a threat. A week after the rains, the Ohio River crested in Louisville 15.8 feet above flood stage. Flooding along the Ohio River continued for two weeks throughout Kentucky. President Clinton declared over 101 of the 120 counties in Kentucky federal disaster areas eligible for federal aid statewide.

The southwest floodwall closures passed their first test and protected many areas that flooded in 1964. MSD employees worked around the clock closing the floodwall gates, sandbagging, and working pump stations. Massive pumps were put into place to lift water from flood-filled creeks and push it into the Ohio River. Many of MSD's wastewater pumping stations and treatment plants were overloaded; many were knocked out of service and damaged.

Emergency Operation Procedures: The Louisville / Jefferson County Emergency Operation Procedures (EOP) worked as planned during the 1997 flood event. MSD ordered floodgates to be installed during this period and ensured roads were closed. Local, state and federal agencies and private relief organizations provided a full-scale disaster response by March 1, and continued for several weeks. Kentucky Governor Paul Patton declared a state of emergency and called out the Kentucky National Guard for assistance. Military vehicles made their way to the neighborhoods of Okolona and Fairdale to rescue and evacuate people trapped in their homes during the inland flooding.

The Louisville and Jefferson County Information Consortium (LOJIC) was a valuable community shared resource for response coordination and rapid damage assessment. The LOJIC computer modeling was very accurate in depicting flooding given the rainfall and duration. Maps produced by LOJIC aided EMA and MSD in their emergency efforts by modeling which areas, streets and addresses received the worst flooding. LOJIC generated more than 60 types of maps and more than 3,000 individual maps during the flood event. In addition, LOJIC fielded requests from FEMA, EMA, City and County officials, fire departments, police, Louisville Gas and Electric, the Health Department and the *Courier Journal* newspaper.

Emergency efforts went without incident throughout Jefferson County. For example, the LOJIC system generated data that helped with the orderly evacuation of a trailer park along Dixie Highway hours before access roads were closed. However, a fatal drowning occurred in the floodwaters of Chenoweth Run when an automobile passenger attempted to cross an over-topped roadway.

Repetitive Loss Problems

According to FEMA and the NFIP, a property is officially considered a repetitive loss when more than one flood insurance claim is filed for over \$1,000 in damage to a structure within a 10-year period. These repetitive loss structures are a trigger to the community that other adjacent properties may be at-risk, and can provide the community an opportunity to designate a repetitive loss area that reflects the vulnerability of a street or neighborhood.

Jefferson County Repetitive Loss Statistics	
North County	81
Pond Creek	33
Beargrass Creek	24
Floyds Fork	3
Mill Creek	3
Total	144

Currently, the City of Louisville and Jefferson County have 144 official repetitive loss properties. Because much of River Road lies outside the protection of the floodwall it is obviously considered a repetitive loss area. Other areas within the community are also at-risk due to tributaries, ponding and drainage problems.

(See NFIP Repetitive Loss Sites Map in Appendix 5 for details.)

VIII. MANAGING JEFFERSON COUNTY'S WATERSHEDS

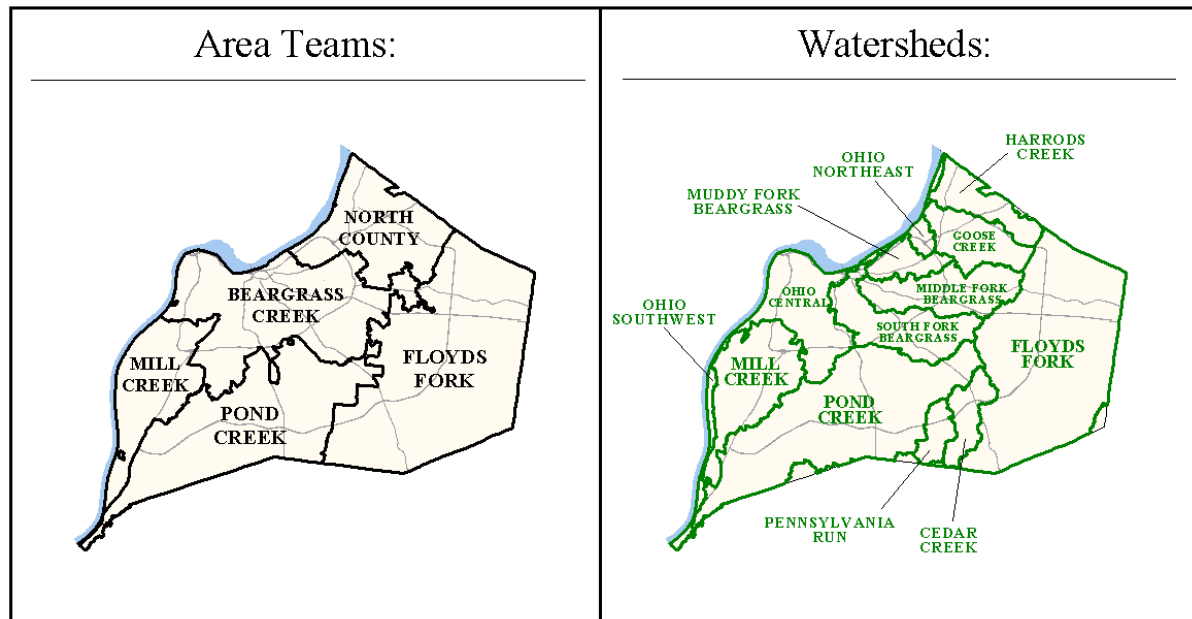
Natural Watersheds vs. "Area Team" Watershed Management

A watershed is a geographic area defined by boundaries that eventually drains into a single outlet, such as a stream or a creek. Water falling in any part of the watershed eventually finds its way through drainage swales, storm sewers and ditches, and into a tributary or major stream that flows out of the watershed. In Jefferson County, all streams eventually drain into the Ohio River.

In June 1997, MSD launched a watershed-based approach to managing its wastewater and stormwater programs. MSD's holistic overview of watershed management integrates service activities such as planning, enforcement, emergency management, best management practices, preservation, hydrology, hydraulics, and geography. The watershed approach also allows for a comprehensive effort to address multiple causes of water quality and habitat degradation in a watershed. MSD recognizes that each watershed area presents its own set of challenges.

The watershed approach is a process that emphasizes prioritizing problem areas and developing comprehensive, integrated solutions by involving stakeholders from both inside and outside government. MSD consolidated Jefferson County's natural watersheds into five main management areas. The five areas are as follows: Pond Creek; Beargrass Creek (City of Louisville); Floyds Fork; Mill Creek, and North County (see maps below).

During 1998, MSD formed watershed management teams called Area Teams. The mission of the Area Teams is to become more responsive to MSD customers and to streamline the process of planning, design and construction of capital wastewater and stormwater projects. The entire county is further divided into 51 neighborhood areas defined by geographic boundaries and natural features.



IX. FLOOD HAZARD INVENTORY OF WATERSHEDS

MSD manages Jefferson County through a watershed management approach by dividing the county into five Area Team Watersheds. Each Area Team Watershed is assigned staff who is then better able to focus specific priorities on the individual watershed's needs. By assessing the hazards in each watershed independently but with similar agendas, the FPMP Advisory Committee and each Area Team staff can come up with varied solutions and potentially remedy problems in a specific watershed. The Area Team Hazard Inventory is listed in the following order:

- Pond Creek Watershed
- Beargrass Creek Watershed
- Floyds Fork Watershed
- Mill Creek Watershed
- North County Watershed

(See the Hazard Inventory Map for the City of Louisville and Jefferson County in Appendix 5.)

The following is an explanation of the flood hazard inventory characteristics detailed within each of the five Area Team Watersheds sections.

Floodprone Buildings: An indicator of risk for potential loss of life and property damage is the number of buildings within the floodplain. This section provides descriptions, for each area team watershed, of the number of residential and non-residential structures located in the FEMA 100-year floodplain. The table also lists the number of primary and repetitive loss structures. The data shows that each developed parcel generally has one primary structure, which is typically the main building and carries the physical address. Repetitive loss properties are determined by whether the structure has had more than one flood insurance claim for a minimum of \$1,000 in damage within a 10-year period.

Development Trends: This section describes the projected development trends in each of the various area team watersheds. Included in this information is the projected change in population and number of new buildings started. The source of information is from the Jefferson County Planning Commission publication, Cornerstone 2020.

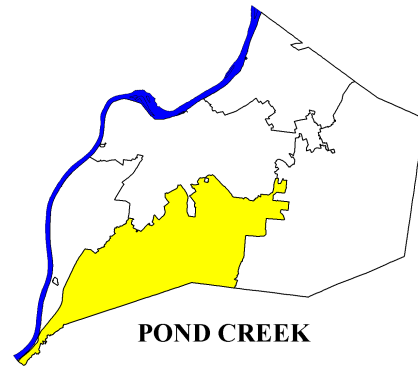
Development Constraint: One indicator of constraint on development may be the type of regulatory controls a community has on sensitive areas such as floodplains and floodways. This section presents the total number of acres of floodplain and ratio of floodplain compared to watershed area. This comparison will show the amount of floodway or floodplain that exists within the watershed.

Critical Facilities: This section describes the type and number of critical facilities located in the respective watershed. Critical facilities include but are not limited to hospitals, police stations, schools and hazardous material sites. This section also provides the numbers of critical facilities located within the FEMA 100-year floodplain. The primary source of this data is LOJIC. The hazardous material sites list includes only those sites that are registered with MSD as storing the minimum specified quantities of various hazardous materials. The number as presented does not include Superfund or RCRA sites.

Natural and Beneficial Functions: This section presents the estimated number of wetland acreage within each respective watershed. Wetlands provide unique, natural habitats and are considered beneficial based on their ability to remove water pollutants and to store floodwaters during flood events.

Basic Watershed Flood Information: This section describes basic watershed flood information such as the cause of flooding, source of flooding, velocity of floodwaters, and other pertinent information about the watershed.

Watershed: Pond Creek Area Team



Floodprone Buildings

Table IX-1

Pond Creek Watershed Area	Total Number	Total In Floodplain	% In Floodplain
All Buildings	71,217	11,722	16.5
▪ Residential		10,455	14.7
▪ Non-Residential		1,267	1.8
Primary Structures (Residential / Non-residential)	38,275	5,943	15

Repetitive Loss: Of the 5,943 primary structures within Pond Creek, there are 33 repetitive loss properties.

The following information is based on NFIP data as well as the 100-year flood event. Five major areas of high flooding are found within the Pond Creek watershed. The five major areas are as follows:

- Indian Trail Subdivision bound by Preston Hwy, I-65, Marigold Ave and Greasy Ditch;
- Confederate Acres, Yorktown Subdivision, Scottsdale Subdivision, and Candlelight Subdivision, which all lie north of Northern Ditch and have a substantial number of residences within the 100 year floodplain;
- Glengarry Subdivision lies at the confluence of Wilson Creek and Southern Ditch, just south of Outer Loop;
- Woodland Manor and Timber Glen lie at the confluence of Fishpool Creek and Southern Ditch with some residences lying within the 100-year floodplain;
- Windsor Place lies north of Pond Creek and south of Third Street Road. Flooding is less in this area than other Pond Creek areas but still significant.

Development Trends

The north central region of Pond Creek has the highest potential for new development within the watershed. Development in this watershed will consist primarily of industrial and commercial development with minimal population growth expected. Population is expected to increase slightly within the south central and northeastern portions of the watershed. These areas of the watershed also have the greatest potential for residential development. Southwestern sections of the area have lower potential for residential, commercial, or industrial development. The Pond Creek watershed population growth is not projected to be significant over the next 20 years to 50 years. (Source: Cornerstone 2020 Report)

Population increases between year 2000 to 2020 as well as between 2020 and 2050 are projected at 12%, respectively. Year 2020 population for the Pond Creek watershed is projected at 134,587.

Development Constraints

Table IX-2

Development Constraints	Pond Creek
Area Team Watershed Area (acres)	55,819
Area Team Floodplain Area (acres)	10,823
Ratio Floodplain / Watershed Area (%)	19

Source: LOJIC. April 2000

Critical Facilities

Table IX-3

Pond Creek Critical Facilities	Number	Number within 100-Year Floodplain
Civil Defense Sirens	14	1
Fire Stations	11	0
Hazardous Material Sites	508	109
Hospital	1	0
Nursing Homes	5	0
Schools	44	4
Treatment Plants	7	4
Police Stations	2	0
Total Number of Critical Facilities	592	118 (20%)

Source: LOJIC. April 2000

Natural and Beneficial Functions

Table IX-4

Natural and Beneficial Functions	Pond Creek
Area Team Watershed Area (acres)	55,819
Wetlands Area (acres)	1,171
Ratio Wetlands / Watershed Area (%)	2.1

Source: LOJIC. April 2000

Existing Structural Flood Control

Major flood control structures within the watershed include the Vulcan Quarry Basin, the Waste Management wetlands restoration site, and the Okolona Wetlands Restoration Site. Other upcoming structural controls include the Melco Detention Basin, and the Pond Creek Channel improvements. In addition, projects may be proposed under the Pond Creek Watershed Restoration Program, which is an MSD-sponsored effort, to restore the watershed to a more natural state and create additional floodwater storage. *(For more information see Appendix 7.)*

Basic Watershed Flood Information

Sources of Water: The Pond Creek watershed has many major tributaries that flow into Pond Creek, which ultimately flows into the Ohio River. Northern and Southern Ditch are man-made, major conveyance streams with very straight alignments. Wet Woods Creek (formerly Slop Ditch), Roberson Run, Filson Fork and Mud Creek are also major tributaries that have flood issues associated with them. Other tributaries affected by flooding include Bee Lick Creek, Fern Creek and Fishpool Creek.

Depth of Water: Flood frequency in Pond Creek has been recognized as the worst in Jefferson County. Depths for the Flood of 1997 reached over three feet in many areas. Inundation in this watershed caused approximately 80 million dollars in estimated damage during the flood. This represents 40 percent of the damage estimated for the entire county.

Velocity of Water: As implied by its name, Pond Creek displays rather low flow velocities. For a storm with a 100-year frequency, velocities would range from three to four feet per second on average.

Soils: A significant portion of Pond Creek soil is a silty clay. Wet Woods Creek, Northern Ditch and Southern Ditch generally bound this area. This type of soil minimizes the amount of rainfall infiltration into the ground; therefore, more runoff is produced in this area than in areas with more permeable soils.

Causes of Flooding: Originally, much of Pond Creek was a wetland area, but in the 1920's the wetlands were drained in order to allow room for farming and other development. Over time the watershed has become heavily developed in areas with flat terrain and a wide floodplain. The increase in impervious area in the watershed has also increased runoff times and discharge levels.

Historical Flood Damage: Since Pond Creek was not heavily developed until the 1950's; the 1937 flood did not severely affect the area. However, as the area became developed flooding arose as a very serious problem for residents and business owners. The 1964 flood had a greater effect on Pond Creek than earlier floods due to new development. In 1997, a flood dramatically affected the Pond Creek area; in fact, MSD received more than 7,000 calls countywide regarding sewer back-ups and surface flooding, most of which came from the Pond Creek area. Less damaging floods occurred on June 28, 1999 and January 3, 2000.

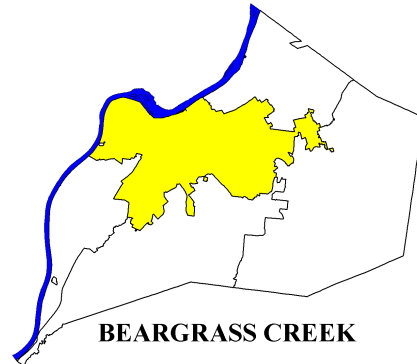
Natural Features: The most floodprone areas in Pond Creek are located in the center of the watershed. This area displays a flat topography over most of its area along with a wide floodplain.

(See the Pond Creek Hazard Inventory Map in Appendix 5.)

Sources:

1. FEMA Flood Insurance Study for Jefferson County, February 2, 1994.
2. Official MSD Website at www.msdlouky.org

Watershed: Beargrass Creek Area Team



Floodprone Buildings

Table IX-5

Beargrass Creek Watershed Area	Total Number	Total In Floodplain	% In Floodplain
All Buildings	176,433	4,136	2.34
▪ Residential		3,328	1.89
▪ Non-Residential		808	0.46
Primary Structures (Residential / Non-residential)	106,501	2,339	2.20

Repetitive Loss: Of the 2,339 primary structures within Beargrass Creek, there are 24 repetitive loss properties.

The following information is based on NFIP data as well as the 100-year flood event. Most of the Beargrass Creek Watershed is within the City of Louisville. The highest density of flooding occurs within the I-264 and the Newburg Road area:

- From Sutherland Drive south to Leith Lane along S. Fork Beargrass Creek;
- From Gerald Court east to Starton Court, along S. Fork Beargrass Creek;
- Blossom Drive east to Mt. Vernon Road, along Weicher Creek.

Development Trends

The eastern section of the Beargrass Area Team watershed is expected to have the lowest population growth as compared to the other watersheds. This projection is appropriate because most of the watershed is in the City of Louisville, which essentially has a stable population curve. New development within Beargrass Creek is also estimated to be very low since most of the watershed is already developed. (Source: Cornerstone 2020 Report)

Population increases between years are projected at 1%. Year 2020 population for the Beargrass Creek watershed is projected at 320,137.

Development Constraints

Table IX-6

Development Constraint	Beargrass
Area Team Watershed Area (acres)	54,433
Area Team Floodplain Area (acres)	3,817
Ratio Floodplain / Watershed Area (%)	7

Source: LOJIC. April 2000

Critical Facilities

Table IX-7

Beargrass Creek Critical Facilities	Number	Number within 100-Year Floodplain
Civil Defense Sirens	27	2
Fire Districts	29	0
Hazardous Material Sites	1,276	50
Hospital	11	0
Nursing Homes	38	2
Schools / Colleges	144	5
Wastewater Treatment Plants	2	0
Police Stations	5	5
Total Number of Critical Facilities	1,532	64 (4%)

Source: LOJIC. April 2000

Natural and Beneficial Functions

Table IX-8

Natural and Beneficial Functions	Beargrass
Area Team Watershed Area (acres)	54,433
Wetlands Area (acres)	154
Ratio Wetlands / Watershed Area (%)	0.28

Source: LOJIC. April 2000

Existing Structural Flood Control

The City of Louisville is protected by the Ohio River Flood Protection System, which includes floodwalls, levees, pump stations and other structural controls. Many of the detention basin sites within the Beargrass Creek area are associated with private developments; these include basins found at the Kentucky Fair and Expo Center, Bashford Manor Mall, and the Royal Crown Bottling Company. Another proposed USACE project is awaiting federal funding. MSD already owns the site for the project. (Source: MSD's Detbasin Layer from LOJIC, April 2000)

Basic Watershed Flood Information

Sources of Water: Major streams contributing to flow in this watershed are the Muddy, South and Middle Forks of Beargrass Creek as well as the Buechel Branch and the Ohio River.

Depth of Water: Flood depths in Beargrass Creek reach between one and three feet during severe flood events.

Velocities: Flood velocities in this watershed can reach as high as six to eight feet per second for a 100-year storm.

Soils: Soil types in this watershed do not significantly affect runoff amounts.

Cause of Flooding: The Beargrass Creek watershed has a high level of residential and commercial development. This development has created large amounts of impervious area and adversely affected water quality. Structures along the Ohio River outside of the protective floodwall run a high risk of flooding.

Historical Flood Damage: Beargrass Creek has experienced severe damage from historical floods. The flood of 1937 inundated almost 50% of the watershed. The flood of 1997 caused the Ohio River (outside of the Flood Protection System) to rise as far as Mellwood Avenue for a 3 to 4 day period.

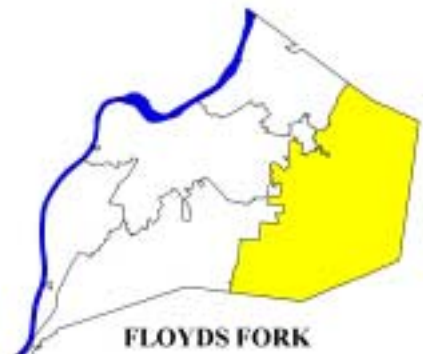
Natural Features: Beargrass Creek exhibits a sloping terrain and close proximity to the Ohio River. Much of this watershed is developed, but areas, such as Cherokee Park in the Highlands, are good example of sloping, variable open space that is surrounded by development.

(See the Beargrass Creek Hazard Inventory Map in Appendix 5.)

Sources:

1. FEMA Flood Insurance Study for Jefferson County, February 2, 1994.
2. Official MSD Website at www.msdlouky.org

Watershed: Floyds Fork Area Team



Floodprone Buildings

Table IX-9

Floyds Fork Watershed Area	Total Number	Total In Floodplain	% In Floodplain
All Buildings	39,858	918	2.30
▪ Residential		735	1.84
▪ Non-Residential		183	0.46
Primary Structures (Residential / Non-residential)	22,323	434	1.94

Repetitive Loss: Of the 434 primary structures within Floyds Fork, there are 3 repetitive loss properties.

Development Trends

Floyds Fork has the greatest forecasted population increases within the county. Currently, Floyds Fork is the least densely settled area in the county. A majority of the area's population is projected to increase between 1990-2020. Sewer and water capacity has recently been removed as a constraint on development. A newly constructed Floyds Fork wastewater treatment facility has been receiving wastewater since late 1999.

Year 2020 population for the Floyds Fork watershed is projected at 98,329.

Development Constraints

Table IX-10

Development Constraints	Floyds Fork
Area Team Watershed Area (acres)	81,774
Area Team Floodplain Area (acres)	7,566

Ratio Floodplain / Watershed Area (%)	9
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Source: LOJIC. April 2000

Critical Facilities

Table IX-11

Floyds Fork Critical Facilities	Number	Number within 100-Year Floodplain
Civil Defense Sirens	10	0
Fire Districts	9	0
Hazardous Material Sites	269	14
Hospital	0	0
Nursing Homes	4	0
Schools / Colleges	21	0
Treatment Plants	20	10
Police Stations	2	0
Total Number of Critical Facilities	335	24 (7%)

Source: LOJIC. April 2000

Natural and Beneficial Functions

Table IX-12

Natural and Beneficial Functions	Floyds Fork
Area Team Watershed Area (acres)	81,774
Wetlands Area (acres)	1,048
Ratio Wetlands / Watershed Area (%)	1.3

Source: LOJIC. April 2000

Existing Structural Flood Control

Basins within the watershed tend to be located in the central eastern region. Basins present are located in Jeffersontown and the Cedar Springs area. (Source: MSD's Detbasin Layer from LOJIC, April 2000)

Basic Watershed Flood Information

Sources of Water: The main streams in this watershed are Floyds Fork, Chenoweth Run, the Long Run tributaries and Pope Lick Creek.

Depth of Water: Flood depths in this watershed are not very severe outside the floodplain. Floyds Fork, however, carries a very large flow and can produce flood depths of four to six feet or more within its floodplain.

Velocity of Water: Velocities in the Floyds Fork floodplain during a 100-year flood can be severe, up to seven or eight feet per second. Normal flow velocities, however, are in the range of three to five feet per second.

Soils: This watershed has areas of silty clay, but not enough to significantly impact runoff amounts.

Cause of Flooding: Flood effects in Floyds Fork are minimal because large areas have not been developed along streams and offer natural corridors. Many of the streams in this watershed have steep banks. This is the least developed watershed in Jefferson County.

Historical Flood Damage: Flood damage in this watershed has been minimal. There was one death during the 1997 event, and it was within this watershed.

Natural Features: This watershed offers vast natural open space in many areas. Steep bank slopes along many streams can contain floodwaters, and the sloping terrain quickly conveys water into channels and downstream.

(See the Floyds Fork Hazard Inventory Map in Appendix 5.)

Sources:

1. FEMA Flood Insurance Study for Jefferson County, February 2, 1994.
2. Official MSD Website at www.msdlouky.org

Watershed: Mill Creek Area Team



Floodprone Structures

Table IX-13

Mill Creek Watershed Area	Total Number	Total In Floodplain	% In Floodplain
All Buildings	52,645	3,619	6.88
▪ Residential		3,383	6.43
▪ Non-Residential		236	0.45
Primary Structures (Residential / Non-residential)	27,386	1,716	6

Repetitive Loss: Of the 1,716 primary structures within Mill Creek floodplain there are three repetitive loss properties.

The following information is based on NFIP data as well as the 100-year flood event. There are flooding complaints throughout the watershed with no one-area dominating. Three major areas in the Mill Creek Watershed have had the greatest amount of flooding. Those areas include:

- Stephan Ditch, between Paramount Drive and Barksdale Drive (complaints are fairly sparse compared to other sites in the county).
- Boxwood Ditch, East Branch Boxwood Ditch, Lynnview Ditch and Upper Mill Creek south of I-264 and west of Dixie Highway.
- Big Run in the St. Andrew Church area.

Development Trends

The watershed is expected to have a small population increase between 1990-2020. Development trends are slightly less for the northeastern segment of the area. There is little land available for residential development. It is expected that there will be strong growth in service and government sector jobs and that this will help offset the continuing loss of manufacturing jobs in the area. (Source: Cornerstone 2020 Report)

Year 2020 population for the Mill Creek watershed is projected at 73,149.

Development Constraints

Table IX-14

Development Constraints	Mill Creek
Area Team Watershed Area (acres)	24,650
Area Team Floodplain Area (acres)	3,565
Ratio Floodplain / Watershed Area (%)	14

Critical Facilities

Table IX-15

Mill Creek Critical Facilities	Number	Number within 100-Year Floodplain
Civil Defense Sirens	13	2
Fire Districts	13	2
Hazardous Material Sites	228	11
Hospital	0	0
Nursing Homes	3	0
Schools / Colleges	38	0
Treatment Plants	4	2
Police Stations	1	0
Total Number of Critical Facilities	300	17 (6%)

Source: LOJIC. April 2000

Natural and Beneficial Functions

Table IX-16

Natural and Beneficial Functions	Mill Creek
Area Team Watershed Area (acres)	24,650
Wetlands Area (acres)	447
Ratio Wetlands / Watershed Area (%)	1.81

Source: LOJIC. April 2000

Existing Structural Flood Control

In addition to the USACE designed Flood Protection System and other structural controls located along the Ohio River, the area contains several detention basins, including the American Synthetic Rubber Company and basins located at the Greenwood Place Apartments.

Basic Watershed Flood Information

Sources of Water: The main streams that contribute to the overall flow in this watershed are the, Upper and Lower Mill Creek, Stephan Ditch, Valley Creek, Blackbird Creek, Lynnview Ditch and Cane Run which all drain into the Ohio River.

Depth of Water: Flood depths for the 1997 flood ranged from 1 to 2 feet.

Velocity of Water: Stream velocities range from 4 to 6 feet per second on average for a 100-year storm.

Soils: The only area where soil type affects runoff is around Big Run Diversion and Stephan Ditch. This area contains silty clay with limited infiltration potential.

Cause of Flooding: Much of the flooding in this area is caused by ponding of floodwater near the Ohio River. Many of the other reported flood issues occur from the surcharge of streams in residential and commercial areas.

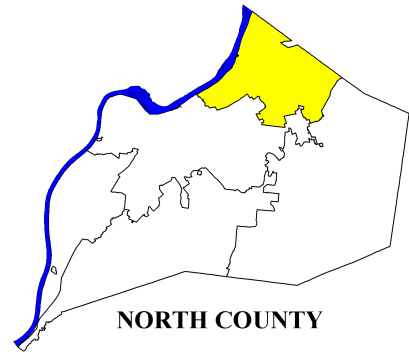
Historical Flood Damage: The Mill Creek watershed experienced severe flooding in the 1937, 1964 and 1997 floods near the Ohio River. Other areas experienced flooding but floodwaters receded quickly.

Natural Features: This watershed is very flat but exhibits sufficient slopes for draining runoff in most areas. Proximity to the Ohio River is the biggest threat for flooding issues, but the area is protected by the floodwall.

Sources:

1. FEMA Flood Insurance Study for Jefferson County, February 2, 1994.
2. Official MSD Website at www.msdlouky.org

Watershed: North County Area Team



Floodprone Buildings

Table IX-17

North County Watershed Area	Total Number	Total In Floodplain	% In Floodplain
All Buildings	23,781	758	3.2
▪ Residential		622	2.62
▪ Non-Residential		138	0.58
Primary Structures (Residential / Non-residential)	17,290	505	3

Repetitive Loss: Of the 505 primary structures within North County floodplain there are 81 repetitive loss properties.

The following information is based on NFIP data as well as the 100-year flood event.

- The Ohio River floodplain receives the most frequent flooding in Jefferson County.

Development Trends

The majority of the watershed is expected to have relatively high population increase between 1990 and 2020. The highest residential and commercial growth is anticipated to occur in the vicinity of the intersection of Interstate 71 and the Gene Snyder Expressway. (Source: Cornerstone 2020 Report)

Population increases between year 2000 to 2020 as well as between 2020 and 2050 are projected at 26% and 18%, respectively. Year 2020 population for the North County watershed is projected at 105,824.

Development Constraints

Table IX-18

Development Constraints	North County
Area Team Watershed Area (acres)	29,114
Area Team Floodplain Area (acres)	3,316
Ratio Floodplain / Watershed Area (%)	11

Source: LOJIC. April 2000

Critical Facilities

Table IX-19

North County Critical Facilities	Number	Number within 100-Year Floodplain
Civil Defense Sirens	10	1
Fire Districts	7	1
Hazardous Material Sites	93	1
Hospital	0	0
Nursing Homes	3	0
Schools / Colleges	22	0
Treatment Plants	9	5
Police Stations	1	0
Total Number of Critical Facilities	145	8 (6%)

Source: LOJIC. April 2000

Natural and Beneficial Functions

Table IX-20

Natural and Beneficial Functions	North County
Area Team Watershed Area (acres)	29,114
Wetlands Area (acres)	319
Ratio Wetlands / Watershed Area (%)	1

Source: LOJIC. April 2000

Existing Structural Flood Control

Many of the detention basins located in North County are industrial, commercial, or associated with private residential neighborhoods. (Source: MSD's Detbasin Layer from LOJIC, April 2000)

Basic Watershed Flood Information

Sources of Water: Major streams in this watershed are Goose Creek, Little Goose Creek, Hite Creek, Harrods Creek. In addition, the Ohio River is the major source of flooding.

Depth of Water: Flood depths in the susceptible areas may reach between one and two feet. Ohio River flooding can exceed 20'.

Velocity of Water: Flood velocities in this watershed are likely between four and seven feet per second for a 100-year flood.

Soils: Soil types in this watershed do not significantly affect runoff amounts.

Cause of Flooding: Flooding in this watershed is attributed to the Ohio River, and the surcharge of the major streams mentioned above.

Historical Flood Damage: Similar to the Beargrass Creek watershed, this area normally receives the worst of its flood damage from the Ohio River. Most damage occurs along the low-lying, unprotected areas of River Road that annually suffers flood damage.

Natural Features: This watershed has sufficient drainage slopes. The watershed's proximity to the Ohio River is a serious flood threat along with the surcharge of the natural and man-made streams near structural elements and roads.

(See the North County Hazard Inventory Map in Appendix 5.)

Sources:

1. FEMA Flood Insurance Study for Jefferson County, February 2, 1994.
2. Official MSD Website at www.msdlouky.org

Summary of Five Watershed's Hazard Inventory

The following tables present a summary of data from the various watersheds. These summary tables allow comparisons and presents rankings of the various watersheds based on key indicators.

Floodprone Buildings: The following table presents a summary of the total number of buildings and primary structures located within the floodplain. Based on an analysis of the relative number of buildings and primary structures within each respective floodplain, Pond Creek, Beargrass Creek and Mill Creek are indicated as the watersheds with the greatest risk for loss of life and/or property damage. North County watershed based on an analysis of repetitive loss sites appears to, although having a relatively low total number of structures in the floodplain, represent an area of extraordinary high risk.

Table IX-21

Floodprone Buildings	Total Bldg. In Floodplain	Total Primary Structures in Floodplain	Repetitive Loss Properties	Rank w/ Bldg. in Floodplain
Pond Creek	11,722	5,943	33	1
Beargrass Creek	4,136	2,339	24	2
Mill Creek	3,619	1,716	3	3
Floyds Fork	918	434	3	4
North County	758	505	81	5
<i>Totals</i>	<i>21,153</i>	<i>10,937</i>	<i>144</i>	<i>-</i>

Development Constraints: The following table presents a summary of the total area of floodplain that exists within the various watershed areas. Based on an analysis of this data, the greatest impacts on development and redevelopment should be occurring and will likely continue within the Pond Creek and Floyds Fork watersheds.

Table IX-22

Development Constraints	Area Team Watershed Area (acres)	Area Team Floodplain Area (acres)	Ratio Floodplain / Watershed Area (%)	Ranking w/ Total Floodplain Area
Pond Creek	55,820	10,822	19	1
Floyds Fork	81,733	7,566	9	2
Beargrass	54,433	3,816	7	3
North County	29,113	3,316	11	4
Mill Creek	24,650	447	2	5
<i>Totals</i>	<i>245,749</i>	<i>25,967</i>	<i>10</i>	<i>-</i>

Natural and Beneficial Functions: The following table presents a summary of the total area of wetlands within each of the various watersheds. Wetlands provide a broad array of wildlife habitat and water quality related benefits. The higher the ratio of wetlands to watershed area the better the watershed is at buffering the impacts of urbanization. Based on this table, Pond Creek and Floyds Fork watersheds have the best potential for managing the impacts of urbanization. It is important that the wetlands to watershed ratios be protected and whenever and wherever possible increased.

Table IX-23

Natural and Beneficial Functions	Area Team Watershed Area (acres)	Wetlands Area (acres)	Ratio Wetlands / Watershed Area (%)	Ranking w/ Total Wetlands Area
Pond Creek	55,820	1,171	2.10	1
Floyds Fork	81,733	1,048	1.28	2
Mill Creek	24,650	447	1.81	3
North County	29,113	319	1.10	4
Beargrass	54,433	154	0.28	5
<i>Totals</i>	<i>245,749</i>	<i>3,139</i>	<i>1.28</i>	<i>-</i>

Critical Facilities: The following table presents a summary of the total number of critical facilities located in each watershed's flood hazard area. This table also indicates the relative need for special procedures to be in place for all floodprone critical facilities to be able to carry out their intended functions.

Table IX-24

Critical Facilities In Floodplain	Fire Stations	Haz-mat Sites	Hos-pitals	Nursing Homes	Schools	WWTP /WTPs	Police Stations	Total Facilities	Rank w/ Total No.
Pond Creek	0	109	0	0	4	4	0	117	1
Beargrass	0	50	0	2	5	0	5	62	2
Floyds Fork	0	14	0	0	0	10	0	24	3
Mills Creek	2	11	0	0	0	2	0	15	4
North County	1	1	0	0	0	5	0	7	5
<i>Totals</i>	3	185	0	2	9	21	5	225	-

X. ADVISORY COMMITTEE IDENTIFICATION OF HAZARDS AND PROBLEM DESCRIPTION

During the June and July meetings the FPMP Advisory Committee broke into five work groups to begin the process of reviewing the watershed inventory, identifying hazards, problems and possible mitigation solutions. As the Advisory Committee entered into the work groups they were armed with knowledge of the nature of the community’s comprehensive floodplain management programs and standard mitigation activities. As a result, the committee developed the most appropriate approaches to solve the problems.

Repetitive losses to the community were uniformly recognized as an area of critical concern within all of the Advisory Committee’s work groups. Work groups recognized the priority to reduce flooding in these areas of the community. The priority goal is to mitigate these 144 structures if the opportunity arises.

The following are the hazards and problems that were identified by the five work groups:

1. Regulations and Preventive Measures Identified Hazards / Problems

This work group identified the need for clarification of existing regulations as the best preventive measure, especially in the Louisville/Jefferson County Floodplain and the Hazardous Material Ordinances. The following were identified as needing further clarification.

- Parking Lots in the floodplain – Hazards to life and property result particularly in flash flooding situations on streams.
 - Current regulations do not restrict or address parking in the floodplain.
 - Signs warning of the risk need to be placed at vulnerable locations.
- Substantial Damage – Current regulations do not separate substantial damage issues from substantial improvement. County has revised floodplain ordinance to look at substantial damage/improvements on annual basis versus lifetime cumulative damage/improvement in City of Louisville. Need to separate issues and make regulations consistent between City, County and State.
- Floodplain filling in Ohio River – Although regulations require compensatory excavation to offset filling, many situations in the Ohio River floodplain have been or will be granted variances. There is a need to provide an alternative to fill compensation such as payment of Regional Fee, which could fund relocation/retrofitting efforts in the Ohio River floodplain.
- Repetitive Losses – Repetitive Loss structures must be made a priority for relocation/retrofitting projects as they are implemented.
- Document, Codify Technical Requirements – There is no local stormwater management ordinance in place to require development to mitigate impacts of increased runoff. Although MSD has been successfully requiring mitigation, the requirements need to be documented and the technical requirements established.
- Enforcement – Adequate, trained and dedicated staff must be provided to enforce all of the regulations including floodplain, erosion control, stormwater management, building code and zoning enforcement.
- Enclosures Below the Flood Level – Current regulations allow enclosures with certain restrictions below the flood elevation. Enclosures are to be left as open space with deed restrictions, and have

adequate openings to allow floodwater to equalize inside and outside the enclosure. Enforcement of the deed restrictions is almost impossible due to inability to inspect the enclosed area after initial construction. Need to restrict size of enclosures to minimize chances of future modifications to create living space.

- Substantial Improvement – Discussed previously under Damage. Need to separate damage from improvement issues and make local and state regulations consistent regarding cumulative improvement restrictions.
- Hazardous Materials Ordinance – Floodplain regulations are effective in controlling new development in the floodplain but do not impact existing developed sites. Hazmat Ordinance should be revised to address storage of hazardous materials in the floodplain for existing sites.
- Maintenance Inspection Frequency – MSD is responsible for inspecting and maintaining stormwater facilities in Jefferson County. Inspection frequency must be documented and carried out to make sure that facilities are able to function during storms.
- Sinkhole Regulations – Protection of sinkholes as drainage facilities and environmental features is necessary to insure their continued existence and functionality. Current regulations are not adequate. This should be part of Document, Codify Technical Requirements item above.
- Creation of Water Quality Regulations – Federal and state regulations will require Jefferson County to regulate the quality of runoff from new development. These regulations should be part of Document, Codify Technical Requirements item above.
- Foundation Standards/Inspections – Floodplain regulations require certain criteria for design, construction and inspection of foundations. These same criteria should be applied to all foundations constructed on fill in or outside of the floodplain to protect homeowners from future problems.
- Open Space/Deed Restrictions – Numerous agencies define “open space” differently. In order to document and inventory open space, which is restricted from development in the floodplain, these definitions must be made consistent.

2. Property Protection and Structural Projects Identified Hazard / Problems

This work group identified areas within the community that are at-risk and in need of mitigation measures. Problems and concerns are displayed by area of the county.

River Properties

- 1% of Properties in NFIP Account for 30% of the Claim Dollars
- Potential Funding possible loans to comply and bring homes into compliance
- Property Owners Rights vs. Tax Payer Cost
- Relocation/Acquisition
 - Repetitive Loss
 - Potential Buyout Target Areas
 - Plan for Next Event
 - Strategy for Properties Listed “For Sale”

Pond Creek

- USACE \$25M Projects
- Potential Diversion
- Regional Detention Basins to alleviate flooding
- Regional Detention Banking
- Relocation/Acquisition

Individual (Stand Alone) Properties

- Identify Properties That Would Not Fit in Traditional Flood Control Projects
- Develop a Floodproofing Component of the Capital Improvement Program
- Prepare Examples on What Works Locally

South Fork Beargrass Creek

- Proposed USACE Projects – Awaiting Funding

Overall Concerns

- Property Owner's Rights
- Funding of Projects
- NFIP Rates and Coverage
- NIFP Potential Reduction in CRS Rating
- Water Quantity vs. Water Quality (The Most Effective Engineering Solution is Seldom the Most Effective Environmental or Overall Solution)
- Coordination With Federal Agencies
- Public Acceptance of Acquisition and Relocation

3. Natural Resource Protection Identified Hazards / Problems

This work group focused on the need for watershed planning, water quality and water quantity coordination and open space issues.

Watershed Planning

- Wetland Preservation
- EPSC (Erosion Protection and Sediment Control)
- BMP (Best Management Practices)
- Flood Compensation Banking
- Open Space
- Greenways
- Work with USACE

Flood Mitigation

- Volume and Speed (velocity)

Water Quality Basins

- Loss of base stream flow from groundwater and the rate of runoff
- Other watersheds that affect Jefferson County
- Modeling watersheds throughout the County
- Lack of community involvement and lack of general knowledge of the issues
- Public using creeks as waste disposals
- Identification of conservation properties
- Lack of being eco-sensitive (ex. mowing right down to the edge of the creek)
- Water quality excluded from floodplain management
- Need a planning process and land development code that considers WQ impacts
- No hierarchy established for floodplain management methodologies – no watershed plans.

4. Public Information and Outreach Program Identified Hazards / Problems

This work group focused on the educational needs for the community to understand the hazards and life risks.

Overall Education Issues

- Water Quality – the community needs information about drinking water & safety during a disaster.
- Food Storage and Safety -- information is needed during and after a disaster about contamination of food, cosmetics and household goods and the potential health hazards.
- Mental Health – is an issue during and after a disaster for disaster victims and their families.
- Utilities & Transportation is an issue during and after a disaster. For instance, downed power lines, gas lines are utility issues. Transportation issues include planning evacuation routes and alternate routes during a disaster and driving safely through floodwaters.

- Public Health & Safety Issues is an issue for the community. For instance, residents should know about the contamination of floodwaters and the dangers of walking through flowing floodwater.
- Debris (handling and removal) is an issue after a disaster. Information is needed by disaster victims about how to handle and remove debris and the health and safety concerns of flood-damaged items.
- Domestic Animals (care and housing) – animals cannot be taken to a shelter and families should have a plan for the care and shelter of domestic animals during a disaster.
- Housing & Public Assistance Programs – is an issue for post-disaster victims as they recover from a disaster and look for housing assistance.
- Code Enforcement, Permits & Repair to Housing is a regulatory issue for homeowners who have a damaged home in a floodplain.
- Drainage system maintenance – streams should be kept clear of debris so clogged tributaries do not cause flooding. For instance, residents can be informed to not mow to the stream banks and not dump anything in streams, etc.
- Protecting streams, wetlands and fish & wildlife – protecting the natural and beneficial functions of a floodplain or stream is imperative to the holistic aquatic system and well being of wetlands.
- Flood insurance – can be the first line of defense for homeowners. Flood insurance can also make recovering from a flood much easier than relying on public assistance funding.
- Mitigation & retrofitting programs – information on programs and methods should be made available to the public for floodproofing a building to reduce the amount of potential damage.

5. Emergency Measures Identified Hazards / Problems

This work group focused on the emergency measures that would reduce the life risks during a disaster.

Communications/Warning Systems

- Sirens, Cable TV, EAS Receivers, Radio Stations, MSD Gauge System

Public Agency Response

- Rescues (Boat/swift water); Joint/Regional Agency Coordination

Drill Response

- Swift Water Rescue; Communications

Addressing of Properties

- GPS; Local Databases

Resource Allocation

- Use of Memorandum of Understanding (MOU's) with Contractors; Citizen Organizations; MSD Monitoring

Education

- Driving; Sirens; Evacuation; Availability of Emergency Services

XI. CURRENT AND ONGOING COMMUNITY MITIGATION ACTIVITIES

Regulations and Preventive Measures – Ongoing Mitigation Activities

Elevation Certificates

Before final approval can be obtained for floodplain construction, MSD must certify that the lowest floor of any building in the special flood hazard area (SFHA) meets minimum requirements to be elevated to or above the base flood elevation (BFE). Floodproofing on non-residential buildings may be permitted as an alternative to elevating to or above BFE. MSD maintains elevation and floodproofing certificates on file and in a database for buildings in the SFHA.

1997 Revised Floodplain Ordinance

The revised Jefferson County Floodplain Ordinance was adopted by Jefferson County Fiscal Court, September 9, 1997. Upon adoption, MSD became the administering agency for the ordinance. The revised ordinance clarifies floodplain development and permitting, strengthens enforcement, and plans for future development impacts to floodplain.

The ordinance also more clearly defines restrictions on development in floodplains. The ordinance, based on the concept of a fully developed watershed, establishes the criteria to determine a Local Regulatory Floodplain (LRF) that more accurately defines the boundaries of Jefferson County's floodplains. By using LOJIC, MSD can establish an LRF that integrates computer data to model a fully developed watershed. As a result, MSD can use FEMA's process to update Jefferson County's FIRM (Flood Insurance Rate Maps), through a LOMR or LOMA, to show more accurate floodplain boundaries.

Storm Water Drainage Master Plan

In January 1987, the City of Louisville and Jefferson County combined stormwater services under one governmental jurisdiction, MSD. Before this merger the City and County were responsible for providing their own drainage services. When MSD was established as the regional drainage utility it initiated the Storm Water Drainage Master Plan (SWDMP), a comprehensive approach to address stormwater drainage and flood protection and to guide the future improvement and development of the drainage system.

MSD uses the SWDMP to direct its own future improvement program of the public drainage system, as well as to evaluate the proposals of private development. Stormwater is managed through several tools in Louisville and Jefferson County. All development, regardless of size, is regulated through the planning commission and the development code. MSD has the responsibility for reviewing and approving all development plans in the City of Louisville and Jefferson County.

MSD Design Manual

To facilitate satisfactory performance of drainage design, construction, operation and maintenance in Jefferson County, MSD has prepared a Design Manual that is distributed throughout the development community. The manual is maintained and distributed by MSD and is updated continuously. The manual also reviews erosion and sediment control and design storage and is updated for post-construction, permitting and BMP's.

MSD KPDES Stormwater Discharge Permit

MSD filed the application for the Kentucky Pollutant Discharge Elimination System Stormwater Discharge Permit in 1992 on behalf of the City of Louisville and the Jefferson County, both of which were named in the Federal Regulations of 1990 as requiring permits. MSD continues to manage the City and County's KPDES municipal stormwater permit. As the applicant, MSD was made the permittee and all of the 6 incorporated municipalities became co-permittees. MSD was issued the permit in January 1994 and submits progress reports annually to the Kentucky State Division of Water. An application for the second five-year period was submitted to DOW in July 1998 and became effective February 1, 1999.

Combined Sewer Operational Plan (CSOP)

MSD annually updates its Combined Sewer Operational Plan (CSOP) which features program elements that comply with United States Environmental Protection Agency (USEPA) CSO policy. MSD has submitted documentation of compliance with the Nine Minimum Controls (NMC) to the KDOW. Through the CSOP, MSD is working to make system improvements and enhancements to minimize impacts from overflows, evaluate flooding impacts to the CSO system, install backflow prevention devices, and conduct additional flow monitoring and sampling. To be in compliance with the NMC, MSD had several major system upgrades and demonstration projects in 1999.

Mapping and LOJIC

Mapping of a floodplain or a floodprone area is a good tool to regulate and prevent flooding. The Louisville and Jefferson County Information Consortium (LOJIC) is the proprietor of a countywide geographic information system (GIS) built using ESRI's (Environmental Systems Research Initiative) ArcInfo and ArcView software. LOJIC represents a multi-agency effort to build and manage a comprehensive GIS. Presently participants include the City of Louisville, Jefferson County, MSD, the Property Valuation Administrator (PVA) and the Louisville Water Company, as well as over a dozen licensees that include the University of Louisville, LG&E Real Estate, Right-of-Way Department, Greater Louisville, Inc., and several suburban cities and county fire districts. LOJIC's technical support staff is housed at MSD as part of MSD's commitment to the consortium.



The LOJIC system maintains current data on parcel information, site addresses, floodplains, elevation reference marks, streets, contours (2'), zoning and all political districts. The LOJIC system is also used by local Police / Fire / EMS to provide all geodata for the community's Emergency 911 system. All data are locally maintained and updated on a regular basis for map accuracy.

LOJIC also has cooperative agreements and provides services to the following agencies: Louisville Board of Alderman; Community Services Office (CityCall and Operation Brightside); Planning and Development Services; Board of Elections; Emergency Management Agency; City/County Public Works; Office of Health and the Environment; Housing and Urban Development; Revenue Commission; City/County Police, Fire, and EMS; and the Cities of Anchorage, Shively and Jeffersontown.

Cooperating Technical Community (CTC) Project

MSD and FEMA have committed to provide more accurate mapping and quicker updates. FEMA began an initiative called Cooperating Technical Community to partner with local communities to modernize the floodplain maps. FEMA hoped to have 30 community agreements in place nationwide by the end of 1999. On September 13, 1999 MSD, FEMA and the KY Division of Water executed the CTC partnering agreement.

Hazard Mitigation Grant Program (HMGP)

Due to flooding in KY earlier this year, \$1.5 million in disaster assistance mitigation monies became available to any county in KY. As a result, MSD submitted an application to acquire floodprone properties. MSD is currently waiting on the Commonwealth of KY Division of Emergency Management State EMA officials to make a final decision about how to allocate funds. MSD hopes to use funding to acquire contiguous properties that can be deed restricted and used for open space or a detention basin.

Property Protection and Structural Projects – Ongoing Mitigation Activities

Acquisition and Relocation

MSD's floodproofing policy was approved by the MSD Board on July 11, 1994 and is included in the MSD Design Manual. According to the policy, MSD will implement the most cost-effective flood reduction solution whenever feasible. In addition to standard and traditional alternatives, such as floodproofing or retrofitting of structures, acquisition and relocation shall be routinely considered in evaluating solution alternatives. If acquisition and relocation of affected structures is identified as the most cost-effective solution alternative for a drainage problem, then the MSD Board will consider the specific situation and decide on the alternative to be used.

In Jefferson County, HUD Disaster Recovery monies were used to acquire and demolish nine houses on Kulmers Beach along the Ohio River floodway after the flood of 1997. During December 1998, county officials dedicated the park, which occupies 18 acres between Dixie Highway and the Ohio River. The narrow park, called Kulmer Reserve, extends about 4,400 feet from Abbots Beach to the Salt River.

Additional Jefferson County HUD Disaster Recovery monies were used to acquire and demolish several homes on Abbots Beach, along the Ohio River floodway on Abbots Beach Rd. Project Impact has used funds to acquire two more homes on Abbots Beach during 2000.

(See the Acquisitions Map in Appendix 5.)

Retrofitting

As stated in the previous section, MSD revised its policy on design of stormwater projects with regard to floodproofing floodprone properties in 1994. The policy now states that during evaluation of solution alternatives for drainage problems, floodproofing of at-risk structures must be considered along with more traditional approaches.

Basement Backup Elimination

MSD also continues its Combined Sewer Overflow abatement program that began in 1991. As a part of this program, MSD is installing backflow prevention devices in homes that are prone to basement flooding. MSD initiated the program to resolve basement flooding by installing backwater valves in properties with a history of basement flooding. Under the program, MSD pays most of the cost of the plumbing devices and changes needed to keep the sewers from backing up into basements or other living spaces.

In its first pilot year (1993), MSD placed 100 devices in floodprone properties. Beginning in 1995, MSD began holding training sessions for local plumbers to install the devices easily and efficiently. The MSD Board agreed to expand the program in September 1997 by allocating \$4.7 million to pay for backup devices. As of September 1999, 4,044 backflow prevention devices had been installed, and it is anticipated that 50 to 75 devices will be installed per month for the next several years.

(See the Backflow Valve Installation Sites in Appendix 5.)

Private/Public Flood Compensation Banks

To enhance the overall stormwater management effort of the Jefferson County watersheds, MSD has investigated establishing a flood "banking" system. This system allows new developments in specified areas to satisfy stormwater or floodplain compensation requirements by purchasing storage from a privately owned Flood Compensation Bank. Designed to alleviate drainage problems before they occur, a Flood Compensation Bank additionally will help MSD better manage stormwater needs for future growth and development in the service area.

Partnering Agencies and Projects

(See a complete list of Ongoing Structural Projects in Appendix 7.)

MSD and USACE

MSD has a long, established history of developing a partnership with the USACE. MSD has worked with the Louisville District USACE on floodplain modeling, FIS studies, greenway projects, flood storage programs, and wetlands banking programs.



The following are the current projects with the USACE:

- Pond Creek Flood Prevention Project
- Melco Greer Detention Basin
- Environmental Restoration South of Southern Ditch
- Vulcan Quarry Detention Basin
- Pond Creek Channel Improvement
- Pond Creek Watershed Restoration Plan
- South Fork of Beargrass Creek
- Mill Creek Basin Project
- Southwest Louisville Project
- Floodplain Studies of Floyds Fork and Harrods Creek

MSD and USEPA Initiatives

MSD has several initiatives being coordinated with the EPA that relate to the floodplain management program. These include:



- Watershed Permitting
- Bio-Criteria
- Stormwater Indicators
- EMPAC Grant
- Chenoweth Run Sub-Basin Project Area

Natural Resource Protection – Ongoing Mitigation Activities

Cornerstone 2020

Cornerstone 2020, a countywide comprehensive plan update, is changing the way land use planning is conducted and will impact the future quality of storm water and streams in Jefferson County. The goals and objectives in this comprehensive plan provide for specific land-use and regulatory programs to improve water quality. The planning process of the County wide Comprehensive Plan Update, Cornerstone 2020 Plan, is a partnership between the City of Louisville, Jefferson County, the Planning Commission, the Louisville Area Chamber of Commerce, and numerous entities such as MSD, Louisville Development Authority, LG&E, University of Louisville, the Office of Economic Development, Louisville Water Company and others.

The range of issues debated included standards for floodplain protection, creation of vegetative buffers, tree protection, Air Quality Improvement and a host of other issues. Various performance standards designed to protect, conserve or manage environmental resources were analyzed and suggestions were made for implementation. Performance standards rather than prescriptive standards will be used.

In 1998, Cornerstone 2020 goals and objectives were adopted by the Louisville Board of Alderman, the Jefferson County Fiscal Court, and legislative bodies with zoning power, which include third and fourth class cities in Jefferson County. The county's planning process continues with Cornerstone 2020 to develop plan elements and a development code. Issues in the plan will significantly impact the floodplain management program. Examples of issues include: floodplain protection; erosion control; vegetative buffer; tree protection; steep slope development controls; and open space protection. In 2000, Jefferson County Fiscal Court approved the Cornerstone 2020 plan.

Open Space Preservation and Greenways

The Greenway Plan for Jefferson County has been in existence since 1998. The Greenways Program and MSD are making plans to address the issues related to the governance of greenways in the County. The objective is to establish a formal system of management for stewardship of stream corridor / greenways and open spaces. Preliminary discussions with the Trust for Public Lands (TPL), MSD, Metro Parks, Jefferson County Government, and River Fields are currently underway.

(See the current draft Open Space Map in Appendix 5.)

Public Information and Outreach Projects – Ongoing Mitigation Activities

Map Determinations / Information & Floodplain Technical Assistance

MSD staff serves the public at no charge by using LOJIC to provide floodplain information on an MSD form. Staff also provides a detailed map showing the property and floodplain boundaries to inquirers. The MSD form provides basic data from the Flood Insurance Rate Map (FIRM).

MSD assists residential and commercial property owners who need technical advice and direction in protecting their property from flooding. The advice may include any of the following information: flood elevations; building elevations; flood protection levels; and drainage plans. Staff also provides information about retrofitting, regrading, berms, barriers, sewer backup protection and backwater valves.

Flood Protection Library

Because the library is an obvious source for residents seeking information on flooding, MSD assists the Louisville Free Public Library maintain a collection of documents related to floodplain management, flood protection, flood safety, flood insurance, and the natural and beneficial functions of floodplains.

MSD Web-Site

In August 1998, the MSD Board voted to have an Internet Web site developed. In 1999, MSD opened a website on the Internet. Information is categorized on the MSD home page by: environmental commitment; your home; environmental education; business; and watersheds. Among other features, the site contains answers to frequently asked questions and provides forms and permit applications that can be downloaded or printed. Additionally, a search engine will help users find specific information anywhere on the site. The website is to be updated regularly and provides a space on the home page for announcements. The site address is: www.msdlouky.org.

LOJIC Web-Site

LOJIC recognizes the potential of the Internet as a primary means of empowering the public through access to local GIS data. As a result, LOJIC has created a robust website (www.lojic.org) that contains a lot of information on the background, purpose, organization, available products and varied uses of GIS throughout the community. The LOJIC website also contains extensive on-line documentation and metadata about every map layer and database in the LOJIC GIS. The website also provides links to GIS applications that provide voter polling locations, lists of elected officials and a general map browser tool. The LOJIC application is running successfully and will be expanded.

Hazard Disclosure

The objective of hazard disclosure is to prevent all the troubles that can arise from failing to advise potential purchasers of a flood hazard and the flood insurance purchase requirement. Current federal law requires only that a lender advise a person of the flood hazard 10 days before closing on the loan. In October 1992, the Greater Louisville Association of Realtors (GLAR) decided to include floodplain status with each new property listing. The present multiple listing (MLS) form used by GLAR provides a box for the real estate agent to check indicating whether the property is in the floodplain.

Emergency Measures – Ongoing Mitigation Activities

Maintenance of the Flood Protection System

The flood protection system was built by the federal government through the USACE with the City and County assuming responsibility for the operation and maintenance. Currently, the flood protection systems consist of approximately 24.5 miles of earthen levee, 4.6 miles of concrete floodwall, and a large collection of associated appurtenances. In January 1987, MSD assumed full responsibility for the system when the agency formed the new Stormwater Drainage and Flood Protection Utility. MSD activities range from simple maintenance like levee mowing to operation of flood pumping stations.

All areas of the floodwall system have specific operational schedules that include individual operation plans for each pumping station and a schedule for installing the closures. MSD maintenance crews practice drills on a year round basis to make sure floodgates and street closures will be in place when the Ohio River rises to flood stage. The operational plans also include schedules for maintaining and inspecting the facilities. The operational plans for the floodwall extension in southwest Jefferson County also have time estimates for erection of closures.

All planned actions, such as floodgates and street closures, are triggered by actual and predicted rises in stage at the Upper Gage at the McAlpine Lock and Dam. The National Weather Service (NWS) in Louisville, Kentucky furnishes this data.

In addition, Louisville and Jefferson County's EMA has applied for a supplemental hazard mitigation grant to expand its outdoor warning system to improve the accuracy and reliability of a vital warning system.

(For a complete description of the Flood Warning Program see Appendix 8.)

XII. ACTION PLAN

The Action Plan for the Louisville/Jefferson County Floodplain Management Plan was developed by the Advisory Committee during the June – September meetings. The plan is designed as appropriate actions for the community's resource, flood hazard and vulnerable properties. The attached Action Plan identifies the mitigation category, type of activity, activity description, responsible support agency, priority, schedule and funding sources, in a spreadsheet format. The Action Plan mitigation activities are outlined by the five work group categories.

1. Regulations and Preventative Measures
2. Property Protection and Structural Projects
3. Natural Resources Protection Projects
4. Public Outreach and Information Projects
5. Emergency Services and Flood Preparedness Measures

The Action Plan recommendations are designated by a high, medium, and low priority schedule. Therefore, projects/actions are slated for implementation from 2001 through 2005 with varying agencies and citizens as implementers or partnering/support.

The proposed budget or funding column indicates the source of project dollars as well as activities not financed with normal operating budget/funds (NOB). The Advisory Committee will address the proposed activities and the accompanying budget in their 2001 Advisory committee meetings. Further, the action plan is a flexible tool for the use of the community and will be updated on an annual basis.

(Please see the FPMP Action Plan in Appendix 9 for specific action items.)

XIII. AGENCY INPUT, PUBLIC MEETINGS AND FINAL ADOPTION

Partnering Agreement

To show commitment to the overall Action Plan, the Advisory Committee signed a Partnering Agreement during the September 18th advisory committee meeting. The partnering agreement, signed by all members, substantiates the committee's pledge to partner in the goal to build:

- A Disaster Resistant Community
- An Appropriate Hazard Mitigation Plan
- Regulatory Participation
- Provide Support to the Action Plan

(See Advisory Committee Partnering Agreement in Appendix 10.)

Draft FPMP for Review by Public and Coordinating Flood-Related Agencies

Recognizing the need to consider all possible ways to reduce flood damages and protect the natural functions of floodplains, the Advisory Committee requested the assistance of the community and the appropriate agencies in commenting on the floodplain management plan.

Over 100 flood-related agencies and organizations directly received the FPMP for a 30-day review. Public review for comment was from October 9 through November 8, 2000. The FPMP and Action Plan also were available for review and comment at 24 easily accessible locations in the community, such as local government centers, the public library and branches, etc. In addition, the plan was posted on the MSD, City, County, EMA and the Planning Commissions' websites, where visitors could see color maps and leave comments via e-mail.

The following locations posted the FPMP for public review and comment for 30-days: Jefferson County Environment and Community Planning Department; Louisville/Jefferson County Emergency Management Agency; Louisville/Jefferson County MSD; the American Red Cross; Louisville Main Free Public Library and 16 branches, and three local government centers.

(See a list of agencies and organizations who received the draft FPMP and Action Plan in Appendix 11.)

Public Meetings

Three public meetings held throughout the county allowed the public to review and comment during October and November 2000. The general public was notified of the public meeting dates and times through the media.

The public meeting dates were:

- October 26, 2000 at 11:30am to 1:30pm at the Central Government Center on the Outer Loop.
- October 26, 2000 at 6:00pm to 8:00pm at the Southwest Government Center on Dixie Highway.
- November 2, 2000 from 6:00pm to 8:00pm at the Air Pollution Board 850 Barret Avenue.

Public meetings were held in an "open house" format so that the public could directly approach the Advisory Committee with questions and comments. Tables or booths were set up according to the five work groups (mitigation categories), providing visitors a chance to specify which part of the plan they had inquiries or comments.

(See the official comments received for the draft FPMP and Action Plan in Appendix 12.)

Adoption by Governing Bodies

The FPMP and the Action Plan are being submitted for adoption to:

- MSD Board,
- Jefferson County Fiscal Court,
- The City of Louisville Board of Aldermen.

The FPMP and Action Plan will be submitted to the governing bodies docket for consideration in December 2000.

XIV. ADVISORY COMMITTEE SCHEDULE TO IMPLEMENT, EVALUATE AND REVISE

To keep the Action Plan a living document and a credible plan, the Advisory Committee will reconvene quarterly to discuss progress on the Action Plan projects. An annual progress report is required by the CRS program on the status of all action items, due October 1 of every year to FEMA.

Advisory Committee meetings are slated to occur quarterly in February, May, August and November 2001 and every year hereafter. At the meetings the Advisory Committee will keep apprised on the status of current projects, determine a budget for proposed current projects, research new projects and build new recommendations into the future.

GLOSSARY OF ACRONYMS

EMA	Louisville/Jefferson County Emergency Management Agency
ARC/INFO	Geographic Information System Software from Environmental Systems Research, Inc.
BFE	Base Flood Elevation
BMP	Best Management Practice
CRS	Community Rating System
CSO	Combined Sewer Overflow
CSOP	Combined Sewer Operational Plan
CTC	Cooperating Technical Community
EOC	Emergency Operation Center
FEMA	Federal Emergency Management Agency
FIA	Federal Insurance Administration
FIRM	Flood Insurance Rate Map
FIS	Flood Insurance Study
FMA	Flood Mitigation Assistance
FPMP	Floodplain Management Plan
FY	Fiscal Year
GIS	Geographic Information System
GLAR	Greater Louisville Association of REALTORS
HAZMAT	Hazardous Materials
HBAL	Home Builders Association of Louisville
HMGP	Hazard Mitigation Grant Program
I/I	Infiltration and Inflow
ISO	Insurance Services Office
JCPS	Jefferson County Public Schools
KDOW	Kentucky Division of Water
KIPDA	Kentucky Indiana Planning Development Agency
KPDES	Kentucky Pollutant Discharge Elimination System
KRS	Kentucky Revised Statute
KWA	Kentucky Waterways alliance
LLFPP	Louisville Local Flood Protection Project
LOJIC	Louisville and Jefferson County Information Consortium
LRCZ	Local Regulatory Conveyance Zone
LRF	Local Regulatory Floodplain
MLS	Multiple Listing Form
MS4	Municipal Separate Storm Sewer Systems
MSD	Metropolitan Sewer District
NEXRAD	Next Generation Doppler Radar
NFIP	National Flood Insurance Program
NGVD	National Geodetic Vertical Datum
NWS	National Weather Service
NRCS	Natural Resource Conservation Service
ORSANCO	Ohio River Valley Water Sanitation Commission
RFC	River Forecast System
SFHA	Special Flood Hazard Area
SJCFPP	Southwest Jefferson County Flood Protection Project
SWDMP	Storm Water Drainage Master Plan
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
WDR	Wastewater Discharge Regulations
WQ	Water Quality
WWAP	Wet Weather Action Plan