

Milwaukee County Pre-Disaster Mitigation Plan

(Approved by Federal Emergency Management Agency December 2011)

**MILWAUKEE COUNTY WISCONSIN
PRE-DISASTER MITIGATION PLAN**

Milwaukee County Emergency Management
9225 S. 68th Street
Franklin, WI 53132

June 2011

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LIST OF ACRONYMS

COE	U.S. Army Corps of Engineers
DMA	Disaster Mitigation Act
FEMA	Federal Emergency Management Agency
GIS	Geographic Information Systems
HUD	U.S. Department of Housing and Urban Development
FIRM	Flood Insurance Rate Maps
MMSD	Milwaukee Metropolitan Sewer District
NFIP	National Flood Insurance Program
NOAA	National Oceanic and Atmospheric Administration
NRCS	Natural Resource Conservation Service
NWS	National Weather Service
PDM	Pre-Disaster Mitigation Plan
SEWRPC	Southeast Wisconsin Regional Planning Commission
USFS	United States Forest Service
USGS	United States Geological Survey
WCGAP	Wisconsin Coastal GIS Applications Project
WEM	Wisconsin Emergency Management
WDNR	Wisconsin Department of Natural Resources

1.0 INTRODUCTION

The effects from natural hazards directly impact the safety and well being of Milwaukee County residents. Historically, county residents have dealt with floods, high winds, and severe summer storms with damaging thunderstorms, hail, and tornadoes, harsh winter storms with extreme cold and blizzards, and drought. While most hazards cannot be eliminated, the effects from them can be mitigated. Milwaukee County, working in conjunction with Wisconsin Emergency Management (WEM) and Maxim Technologies (Maxim), prepared this Pre-Disaster Mitigation (PDM) Plan (the Plan) to help guide and focus hazard mitigation activities.

In 2010, Pre-Emergency Planning assisted Milwaukee County with the updating of this mitigation plan. The Milwaukee County Pre-Disaster Mitigation Plan profiles significant hazards to the community and identifies mitigation projects that can reduce their future impacts. The purpose of the Plan is to promote sound public policy designed to protect citizens, critical facilities, infrastructure, private property, and the environment from natural hazards. The Milwaukee County Pre-Disaster Mitigation Plan includes resources and information to assist county residents, organizations, local government, and others interested in participating in planning for natural hazards. The mitigation plan provides a list of mitigation projects that will assist Milwaukee County in reducing risk and preventing loss from future hazard events.

1.1 AUTHORITY

The Disaster Mitigation Act (DMA) of 2000 amends the Robert T. Stafford Disaster Relief and Emergency Assistance Act by adding a new section: Section 322 – Mitigation Planning. It requires all local governments to have an approved Pre-Disaster Mitigation Plan in place by November 1, 2004 to be eligible to receive Hazard Mitigation Grant Program project funding.

The following table shows participation for both the original 2004 Pre-Disaster Mitigation Plan and the 2010 (updated) Pre-Disaster Mitigation Plan.

Table 1.1 Pre-Disaster Mitigation Plan Participating Municipalities

Municipality	Participated in 2004	Participated in 2010
Bayside	■	■
Brown Deer	■	■
Cudahy	■	■
Fox Point	■	■
Franklin	■	■
Glendale	■	■
Greendale	■	■
Greenfield	■	■
Hales Corners	■	■
Oak Creek	■	■
River Hills	■	■

St. Francis	■	■
Shorewood	■	■
South Milwaukee	■	■
Wauwatosa	■	■
West Allis	■	■
West Milwaukee	■	■
Whitefish Bay	■	■
Milwaukee County	■	■
City of Milwaukee	■	■

Milwaukee County and the cities of Bayside, Brown Deer, Cudahy, Fox Point, Franklin, Glendale, Greendale, Greenfield, Hales Corners, Oak Creek, River Hills, St. Francis, Shorewood, South Milwaukee, Wauwatosa, West Allis, West Milwaukee, and Whitefish Bay participated in the creation of this Pre-Disaster Mitigation Plan. Once Milwaukee County receives a “Meets Requirements” letter from Federal Emergency Management Agency (FEMA), each municipality will adopt the plan.

The City of Milwaukee has a separate mitigation plan, and is therefore, not included in this plan. These governing bodies have the authority to promote sound public policy regarding natural hazards. Once Milwaukee County receives a “Meets Requirements” letter from FEMA, copies of the signed Resolutions from these jurisdictions will be included in *Appendix A* to this plan. The Plan will be presented and adopted at the regularly scheduled municipal board meetings for the cities and villages of Bayside, Brown Deer, Cudahy, Fox Point, Franklin, Glendale, Greendale, Greenfield, Hales Corners, Oak Creek, River Hills, St. Francis, Shorewood, South Milwaukee, Wauwatosa, West Allis, West Milwaukee, Whitefish Bay Boards, as well as the Milwaukee County Board. All meetings will be open to the public and advertised through the communities’ typical process for publicizing public meetings.

The Milwaukee County Emergency Management Bureau Administrator will submit the updated Plan to the State Hazard Mitigation Office in Madison, Wisconsin. The State Hazard Mitigation Officer will review the plan and offer feedback and required revisions. Milwaukee County will make all required revisions. Once the plan is approved by the State Hazard Mitigation Office, the plan will then be submitted to FEMA for review. This review addresses the federal criteria outlined in FEMA Interim Final Rule 44 CFR Part 201. Upon acceptance by FEMA, Milwaukee County and the other Plan signatories will gain eligibility for local mitigation project grants and post-disaster hazard mitigation grant projects (HMGP).

1.2 ACKNOWLEDGEMENTS

Many groups and individuals have contributed to development of the Milwaukee County Pre-Disaster Mitigation Plan. The Milwaukee County Emergency Management Bureau, Regional Director of Emergency Management, and the Wisconsin State Hazard Mitigation Officer provided significant guidance and support to all aspects of plan development. The National Weather Service (NWS) provided historic newspaper accounts of severe weather events and other weather data. Numerous elected officials, city and county personnel, and the local

communities participated in the planning process and contributed significantly to the Plan's development.

1.3 PROJECT AREA LOCATION

Milwaukee County is located in southeast Wisconsin and has a land area of about 154,879 acres or 242 square miles (U.S. Bureau of the Census, 2001). The County is unique to Wisconsin, as 19 jurisdictions within the County encompass the total land area of the County. Milwaukee County is bounded by Lake Michigan on the east, Racine County to the south, Waukesha County to the west, and Ozaukee and Washington Counties to the north. Milwaukee is the county seat and other cities include Bayside, Brown Deer, Cudahy, Fox Point, Franklin, Glendale, Greendale, Greenfield, Hales Corners, Oak Creek, River Hills, St. Francis, Shorewood, South Milwaukee, Wauwatosa, West Allis, West Milwaukee and Whitefish Bay. The Menomonee, Milwaukee, Root, Kinnickinnic Rivers, and Oak Creek are the major rivers that flow through Milwaukee County and into Lake Michigan. *Map 1-1* is a general reference map of the county.

Land use in Milwaukee County is primarily residential, followed by open lands, transportation, and agricultural. Croplands primarily produce fruits and vegetables and there is some limited dairy production.

According to the 2008 population estimates, the population of Milwaukee County is 953,328. This represents a 1.4 percent decline in population since the 2000 Census. The median age in Milwaukee County is 35.7 years (U.S. Bureau of the Census, 2010).

Milwaukee County is located within the region generally classified as continental with some modification for the Great Lakes. The weather can be quite variable with large day-to-day temperature variations, particularly during the fall and the spring. Normal annual precipitation is 34 inches, with over 68 percent of the precipitation falling from March through September. Winter temperatures can vary between 13 to 28 degrees Fahrenheit. The average annual temperature for summer, June – August, is 78.8 degrees Fahrenheit. (Wisconsin State Climatology Office)

For the purposes of this hazard assessment and mitigation plan, weather is of interest when it threatens property or life and thus becomes a hazard. The NWS provides short-term forecasts of hazardous weather to the public, in addition to issuing severe weather watches and warnings. The NWS also produces regularly scheduled severe weather outlooks and updates on various forms of hazardous weather including heavy rain and winter storms. Descriptions of historic weather related hazard events and documentation of the frequency, severity, and impact of hazardous weather are presented in Section 3.0 of this plan.

1.4 REGIONAL ECONOMY

The major source of income in Milwaukee County is educational, health, and social services (22.4 Percent), followed by manufacturing (18.5 percent). The average annual unemployment rate in 2000 in the county was 4.5 percent. (U.S. Census Bureau, 2000).

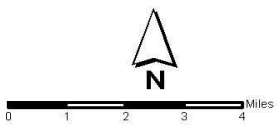
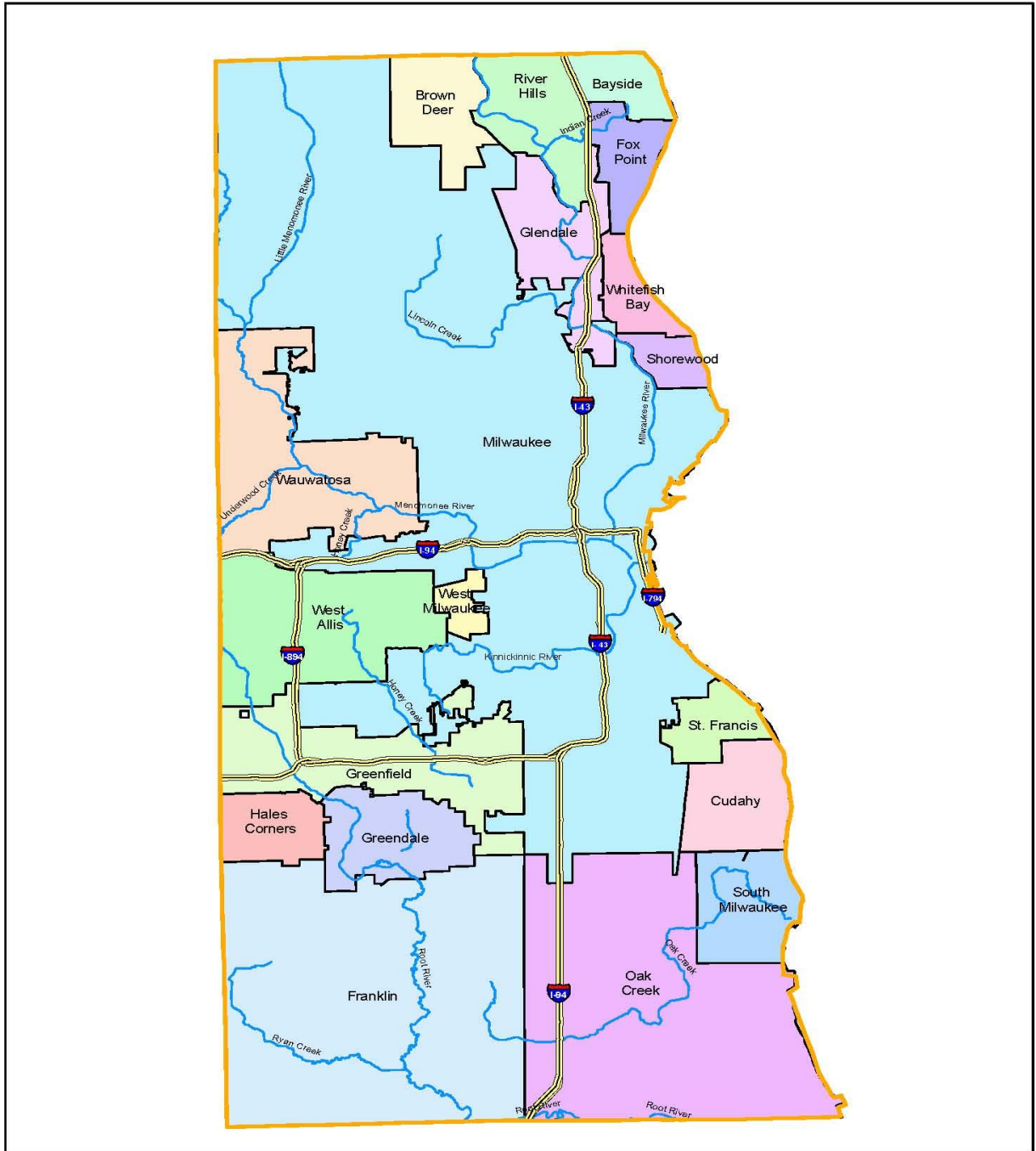
The estimated percent of people of all ages in poverty in the state was 8.7 percent in April of 2000. Milwaukee County has a poverty rate of 15.3 percent for the same time frame (U.S. Bureau of the Census, 2001a).

1.5 SCOPE AND PLAN ORGANIZATION

The scope of the Milwaukee County Pre-Disaster Mitigation Plan includes the following:

- Identify and prioritize disaster events that are most probable and destructive,
- Identify critical facilities,
- Identify areas within the community that are most vulnerable,
- Develop goals for reducing the effects of a disaster event,
- Develop specific projects to be implemented for each goal,
- Develop procedures for monitoring progress and updating the Plan, and
- Officially adopt the Plan.

The Plan is organized into sections that describe the planning process (Section 2.0), risk assessment (Section 3.0), mitigation strategies (Section 4.0), and plan maintenance (Section 5.0). Appendices containing supporting information are included at the end of the Plan.



- Rivers
- Interstate
- County Boundary

Location Map
Milwaukee County
Southeast Wisconsin
Pre-disaster Mitigation
Map 1-1

2.0 PLANNING PROCESS

The Milwaukee County Pre-Disaster Mitigation (PDM) Plan is the result of a collaborative effort between Milwaukee County citizens, public agencies, and regional, state, and federal organizations. Public participation played a key role in development of goals and mitigation projects.

2.1 PLANNING PROCESS 2004

Interviews were conducted with the Milwaukee County Emergency Management Administrator, Representatives from each Jurisdiction, and six public meetings were held to include the input of Milwaukee County residents.

Contact List

The PDM planning process was initiated by preparing a contact list of individuals whose input was needed to help develop the Plan. On the County level, these persons included elected officials (County Commissioners) and the Emergency Management Administrator and Coordinators. Councilpersons from each jurisdiction (Bayside, Brown Deer, Cudahy, Fox Point, Franklin, Glendale, Greendale, Greenfield, Hales Corners, Oak Creek, River Hills, St. Francis, Shorewood, South Milwaukee, Wauwatosa, West Allis, West Milwaukee, and Whitefish Bay) were contacted, as well as the mayors, fire chiefs and public works directors. Federal and State agencies on the contact list included the Wisconsin Emergency Management, and Wisconsin Department of Natural Resources. Persons and entities on the contact list received a variety of information during the planning process, including project maps and documents for review, meeting notifications, and mitigation strategy documents.

Stakeholder Interviews and Meetings

Interviews were conducted with individuals and specialists from organizations interested in hazard mitigation planning. The interviews identified common concerns related to natural hazards and identified key long-term and short-term activities to reduce risk. Stakeholders interviewed for the plan included representatives from local government, fire departments, and police departments. A list of meetings and interviews with Milwaukee County stakeholders is presented in *Appendix B*.

Formal Public Meetings

Six public meetings were conducted in Milwaukee County during initial plan development. The meetings were in Wauwatosa on May 24th, 2004, in Brown Deer May 25th, 2004, Milwaukee on May 25th and June 4th, 2004 and in Franklin and Cudahy on May 26th, 2004. The purpose of the meetings was to gather information on historic disasters, update the list of critical facilities, and gather ideas from citizens about mitigation planning and priorities for mitigation goals.

Sign-in sheets from the Milwaukee County public meetings and meeting summaries are presented in *Appendix B*.

In advance of the public meetings, a press release was distributed to local and regional newspapers including the Milwaukee Journal, the Milwaukee Labor Press, the Business Journal,

The Community Newspaper, and the periodical called This Week. Local TV stations who received copies of the press release as public service announcements included WISN, WDJT, WITI, and WTMJ. Notices of public meetings were sent in advance, via fax and email, to all jurisdictions participating in the planning process including Bayside, Brown Deer, Cudahy, Fox Point, Franklin, Glendale, Greendale, Greenfield, Hales Corners, Oak Creek, River Hills, St. Francis, Shorewood, South Milwaukee, Wauwatosa, West Allis, West Milwaukee, and Whitefish Bay, and Milwaukee County. A copy of the press release and media distribution list is included in **Appendix B**. **Appendix B** also contains copies of the press release as it appeared in several local newspapers.

The city councils and county commission meetings at which the resolutions adopting the Plan were passed provided the public with the opportunity to review the final version of the plan.

Plan Review

Review copies of the draft Plan were provided to the Emergency Management Administrator for distribution in hard copy. Plan reviewers included the County Board, mayors of the various jurisdictions, and other federal, state, and local officials. The Emergency Management Administrator provided review copies of the Plan to all jurisdictions involved in the planning process including Bayside, Brown Deer, Cudahy, Fox Point, Franklin, Glendale, Greendale, Greenfield, Hales Corners, Oak Creek, River Hills, Saint Francis, Shorewood, South Milwaukee, Wauwatosa, West Allis, West Milwaukee, Whitefish Bay, and Milwaukee County. Public comments collected during a 30-day review period were submitted to the Emergency Management Administrator. The Emergency Management Administrator reviewed the comments and submitted a consolidated list to Maxim.

A review of the Plan for completeness was conducted after the initial comments were addressed. Plan copies were submitted to the Wisconsin State Hazard Mitigation Officer and the Wisconsin FEMA representative for review. The review period lasted 30 days. Upon receipt of comments, the Plan was finalized and taken to the county commissioners and jurisdictions for adoption.

2.2 UPDATE PLANNING PROCESS 2010

In 2010, Pre-Emergency Planning was contracted to assist Milwaukee County with the updating the Milwaukee County Pre-Disaster Mitigation Plan.

Planning Participants

The following municipalities participated in the 2010 update process: Bayside, Brown Deer, Cudahy, Fox Point, Franklin, Glendale, Greendale, Greenfield, Hales Corners, Oak Creek, River Hills, St. Francis, Shorewood, South Milwaukee, Wauwatosa, West Allis, West Milwaukee, Whitefish Bay, and Milwaukee County. The City of Milwaukee has created a separate mitigation plan, and therefore, is not directly included in this plan.

At the beginning of the planning process, multiple representatives from each municipality were contacted, and provided with a draft of the 2004 Pre-Disaster Mitigation Plan, for review. Comments were solicited via email, phone and interviews from each municipality on an individual basis. The primary contacts for each municipality served as that municipality's representatives in the planning process. The planning team included representatives from

administration, public works, fire, police, and public health. In addition, representatives from the University of Wisconsin Madison and Wisconsin DNR, and Wisconsin Emergency Management, were also consulted in this update. The National Weather Service provided historic newspaper accounts of severe weather events and other weather data. A detailed list of planning participants is included in ***Appendix B; Planning Documentation***.

Three municipal planning meetings were held to discuss the hazard mitigation planning process. The meetings were divided by zone. The first meeting was held for all municipalities in Zone C (Wauwatosa, West Milwaukee, and West Allis) on Tuesday, May, 11, 2010 in West Allis, Wisconsin. The second meeting was held for all municipalities in Zone A (Brown Deer, River Hills, Bayside, Fox Point, Glendale, Whitefish Bay, and Shorewood), on Thursday, May 13, 2010. The third meeting was held on Friday, May 14, 2010 for Zones D & E (Greenfield, Greendale, Hales Corners, Franklin, St. Francis, Cudahy, Oak Creek, and South Milwaukee). At each municipal meeting, the municipalities were presented with an overview with the hazard mitigation planning process and plan changes and updates were reviewed. Each municipality reviewed their critical facilities and made updates. In addition, the mitigation strategy, goals and objectives, and individual mitigation actions were reviewed and appropriate changes were made. To conclude the meeting, the local plan adoption process was reviewed, and questions were fielded by both Milwaukee County Emergency Management and Pre-Emergency Planning.

Those municipalities not in attendance were sent a copy of the PowerPoint presentation, and were contacted individually for a one on one interview to discuss the topics reviewed at the municipal meetings.

On June 24, 2010, Milwaukee County Emergency Management held a Pre-Disaster Mitigation Plan public meeting to solicit public comment on the plan.

A second public meeting was held on Friday, March 25, 2011 at the Milwaukee County Sheriff's Office Training Academy, 9225 S. 68th Street, Franklin, WI 53132

Sign in sheets, agendas, and applicable meeting minutes for all meetings held are located in **Appendix B: Planning Documentation. The updated listing of critical facilities is located in Appendix C: Relevant Plans and Documents.*

Plan Review and Distribution

A copy of the 2010 Milwaukee County Pre-Disaster Mitigation Plan was shared with the following organizations:

Southeast Wisconsin Homeland Security Partnership

WE Energies

M&I Corporation

Kindred Hospital Milwaukee

National Security Network, Inc.

GE Healthcare

AMERITECH

American Red Cross
 Wisconsin Emergency Management
 Johnson Controls, Inc.
 Robert W. Baird & Co.
 Northwestern Mutual Life

Citizens and Organizations Active in Disaster (COAD)

American Red Cross in Southeastern Wisconsin
 ARES/RACES
 COAD Executive Committee
 Hearst Communications/ WISN-TV
 IMPACT, Inc.
 Interfaith Senior Programs, Inc.
 Milwaukee County Department on Aging
 Milwaukee County emergency Management
 Public Health Consortium, Region 11 (Milwaukee/Waukesha Counties)
 Salvation Army
 Volunteer Center of Milwaukee
 WI Hospital Emergency Preparedness and Planning Region 7

Review copies of the draft Plan were provided to the Emergency Management Administrator for distribution in hard copy. Plan reviewers included the County Board, mayors of the various jurisdictions, and other federal, state, and local officials. The Emergency Management Administrator provided review copies of the Plan to all jurisdictions involved in the planning process including Bayside, Brown Deer, Cudahy, Fox Point, Franklin, Glendale, Greendale, Greenfield, Hales Corners, Oak Creek, River Hills, Saint Francis, Shorewood, South Milwaukee, Wauwatosa, West Allis, West Milwaukee, Whitefish Bay, and Milwaukee County and to neighboring counties consisting of Waukesha, Ozaukee, Racine, Kenosha, Walworth, Washington and Jefferson county.

The Milwaukee County Planning Committee consisted of all Milwaukee County Emergency Management personnel. A review of the Plan for completeness was conducted after the initial comments were addressed. Plan copies were submitted to the Wisconsin State Hazard Mitigation Officer. The State Hazard Mitigation office provided feedback to Milwaukee County.

Milwaukee County is currently in the process of making the required changes. Once this process is complete, the State Hazard Mitigation office will submit the plan to the Wisconsin FEMA representative for review. The review period will last 30 days.

Upon receipt of comments, the Plan will be finalized and taken to the county commissioners and jurisdictions for adoption.

Summary of Update Plan Changes 2010

The following is a listing of the major changes made to the Milwaukee County Pre Disaster Mitigation Plan in 2010.

Title Page: Milwaukee County Emergency Management location updated.

Updated Table of Acronyms

Section 1:

1. Removed City of Milwaukee from listing of participating municipalities
2. Updated project area location to reflect data estimates from the 2008 Census Estimates where available.

Section 2:

3. Updated the Pre-Disaster Mitigation Plan Contact list to reflect new leadership in each municipality and Milwaukee County.

Section 3:

4. Updated all hazard listings for Milwaukee County to include additional flood, severe thunderstorm, winter events, coastal erosion events, high wind, and heat wave events.
5. Updated Table 3-2: PUBLIC PROPERTY DAMAGE FROM MILWAUKEE COUNTY FLOODS to include 2005-2009 figures
6. Added Table 3-3a: TOP HAZARDS AS IDENTIFIED BY MUNICIPALITY
7. Updated listing of critical facilities for each municipality. Extensive additions were made to this list and now include a broader scope of critical facilities as identified by each municipality to include shelters, infrastructure such as critical roads and bridges, and structures which house large numbers of vulnerable persons.
8. Future Growth and Land Use Trends section was updated to reflect more complete information, specifically in those municipalities which are still have large areas of undeveloped land.
9. Vulnerable Populations Section was changed to reflect a more effective calculation for mapping vulnerabilities.
10. Hazard Profiles were updated to reflect the hazards which have occurred since the original plan in 2004.
11. Additional information regarding economic and building loss dollar estimates for flooding, tornadoes, and coastal erosion was added.
12. All maps were updated to reflect FEMA's Flood Insurance Rate Mapping (FIRM) changes. Maps will be updated again once new census information and a current vulnerability assessment are conducted.

Section 4:

13. Goals were reevaluated by each municipality and the county. One additional mitigation goal was identified and added to this list.
14. Mitigation actions were evaluated and corrections were made to reflect those projects that have been completed, which projects are no longer application to each jurisdiction, and any new projects identified for each jurisdiction.

15. The Mitigation Action Plan (in spreadsheet format) was fully updated to reflect all mitigation objective and action changes).

Section 7

16. Section 7 (record of annual review) was added.

Appendix B

17. 2010 Update Municipal Meeting Agendas, Sign In Sheets, and Meeting Summaries were added
18. Updated contact list was added

Appendix F was omitted.

Future comments on this Plan should be addressed to:

Emergency Management Bureau
Milwaukee County Sheriff's Office
9225 S. 68th Street
Franklin, WI 53132

3.0 HAZARD EVALUATION AND RISK ASSESSMENT

A risk assessment was conducted to address requirements of the Disaster and Mitigation Act of 2000 (DMA 2000) for evaluating the risk to the community from the highest priority hazards. DMA 2000 requires measuring potential losses to critical facilities and property resulting from natural hazards by assessing the vulnerability of buildings and critical infrastructure to natural hazards. In addition to the requirements of DMA 2000, the risk assessment approach taken in this study evaluated risks to vulnerable populations and examined the risk presented by natural hazards. The goal of the risk assessment process is to determine which hazards present the greatest risk and what areas are cumulatively the most vulnerable to hazards.

The hazard risk assessment requires information about what hazards have historically impacted the community and what hazards may present risks in the future. Identifying historical and possible future hazards was primarily accomplished in two phases. The first phase entailed interviewing local government officials and staff, local emergency planning and response staff, and the general public. Plan Section 2.0 describes the interview/public input process in detail. The second phase entailed researching government records and news publications for records of previous hazard events. The results of the initial hazard evaluation were used to focus further risk assessment on hazards that have historically caused the most problems and those judged to be of future concern.

The risk assessment approach used for the Milwaukee County Pre-Disaster Mitigation Plan entailed using GIS software and data to develop vulnerability models for people, structures, and critical facilities and evaluating those vulnerabilities in relation to hazard profiles that model where hazards exist. This type of approach to risk assessment is very dependent on the detail and accuracy of the data used during the analysis. The schedule and resources available for conducting this risk assessment dictated that existing data be used to perform the assessment. The existing information is extensive but also has many limitations. The results of risk assessment allow hazards to be compared and relative comparisons to be made of areas within the jurisdiction. It is worth noting, when reviewing the following hazard information that all jurisdictions could be affected by winter storms, severe storms, and excessive heat. Hazards such as flooding and coastal erosion have specific areas that have higher risks. To the most accurate extent possible, specific geographic areas for flooding and coastal erosion have been identified geographically.

Census data will be used in the next update to determine change and risk and vulnerability with updated data.

3.1 HISTORICAL HAZARDS

Many types of natural hazards may affect Milwaukee County. Examples of natural hazards that have impacted the region include flooding, severe winter storms, tornados, and heat waves, among others. Milwaukee County has decided not to profile drought or earthquakes as a natural hazard which could impact the area, because data does not support this area being impacted by these hazards.

The hazards most likely to affect Milwaukee County were derived from a number of sources. Hazard information was compiled by examining data from WEM, FEMA, the U.S. Coast Guard, and the NWS, reviewing historical newspaper articles, and interviewing local experts. Most importantly, the residents of Milwaukee County voiced their opinions about what hazards had affected their lives and their communities during the public meetings. Table 3-1 lists the historical occurrence of natural disasters affecting Milwaukee County, including State and Federal declared disasters.

3.1.1 Floods

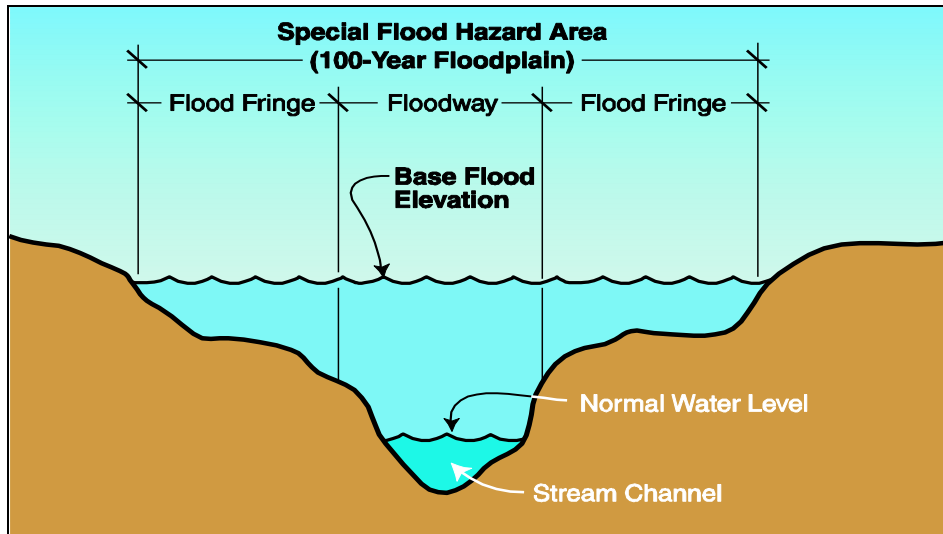
A flood is a natural event for rivers and streams. Excess water from snowmelt and rainfall accumulates and overflows onto the banks and adjacent floodplains. Floodplains are lowlands, adjacent to rivers and lakes that are subject to recurring floods. A flash flood generally results from a torrential rain (short duration) or cloudburst on a relatively small drainage area.

Hundreds of floods occur each year, making it one of the most common hazards in all 50 states. Floods kill an average of 150 people per year nationwide. Three fatalities have occurred due to flooding in the Kinnickinnic, Menomonee, Milwaukee, Oak Creek, and Root River watersheds. Two occurred in the August 1986 event and the other in July 1964. Typically, flood victims were attempting to cross flooded roads and underestimated the power of the water. Most property damage results from inundation by sediment-laden floodwater. Faster moving floodwater can wash buildings off their foundations and sweep vehicles downstream. Pipelines, bridges, and other infrastructure can be damaged when high water combines with flood debris. Basement flooding can cause extensive damage.

Several factors determine the severity of floods, including rainfall intensity and duration, topography, presence of snow, or the rapid changes in weather. The area most prone to flooding in Milwaukee County is the Milwaukee River. History indicates that major flooding by the Milwaukee River in Milwaukee County has been primarily the result of excessive rainfall. A large amount of rainfall over a short time span can result in flash flood conditions. Flash flooding can also occur when water that is held back by an accumulation of debris or floating ice is suddenly released downstream.

Magnitude and Severity

Terms commonly used when referring to flooding are "100-year flood" and "flood plain." A "100-year flood" is defined as the flood water level that can be expected to occur or to be exceeded in a given location once every 100 years. There is a one percent chance of a flood of such magnitude or greater occurring in any given year. The DNR, working with local zoning offices, has designated flood plain areas as those places where there is the greatest potential for flooding.



FEMA, August 2001

3.1.1.1 Location and Extent of Previous Flood Events

Five watersheds and Lake Michigan are located wholly or partially in Milwaukee County. These watersheds include the Kinnickinnic River, Menomonee River, Milwaukee River, Oak Creek, and Root River. Communities that lie wholly or partially within the Kinnickinnic River watershed are Cudahy, Greenfield, Milwaukee, West Allis, and West Milwaukee. The cities of Greendale, Greenfield, Milwaukee, Wauwatosa, West Allis, and West Milwaukee lie wholly or partially within the Menomonee River watershed. The Milwaukee River watershed wholly or partially includes Bayside, Brown Deer, Fox Point, Glendale, Milwaukee, River Hills, Shorewood and Whitefish Bay. The Oak Creek watershed contains Cudahy, Franklin, Milwaukee, Oak Creek, and South Milwaukee. The Root River watershed wholly or partially contains Greendale, Greenfield, Franklin, Hales Corners, Milwaukee, and Oak Creek. Communities that border Lake Michigan are Bayside, Cudahy, Fox Point, Milwaukee, Oak Creek, St. Francis, Shorewood, and South Milwaukee. Milwaukee is the municipality that has suffered the greatest damage. Since the flooding of 1997 and 1998, extensive mitigation projects have been undertaken to reduce the impact of flooding in all communities within Milwaukee County.

Milwaukee County received 9 disaster declarations for flooding to date. They were declared in August 1986, September 1986, June 1993, June and July 1997, August 1998, May-June 2004, June 2008, and June 2009. A summary of major flood-events in the region are discussed below as found in the Flood Mitigation Plans for the Milwaukee, Oak Creek, Wauwatosa, Milwaukee County Hazard Assessment, and NWS Monthly Write-ups.

June 1917 –This flood caused extensive damage in the lower Menomonee river watershed, particularly in the Menomonee River industrial valley. The Menomonee river floodplain, below what is now the Wisconsin Avenue viaduct, was subject to serious flooding that drove almost

every resident from the area, and damaged several businesses including the Chicago, Milwaukee, St. Paul, and Pacific Railroad, and the Faulk Corporation.

June 1940 –Flooding occurred in the Menomonee River watershed, causing damage to areas along the Menomonee River as well as to scattered areas along the Honey Creek, Underwood Creek, and the Little Menomonee River. In the Milwaukee, the South 84th bridge over Honey Creek was washed out. Near the confluence of the Menomonee and Little Menomonee Rivers in Milwaukee, rising floodwaters forced close segments of N. Mayfair road and W. Hampton Avenue.

March/April 1960 –Serious flooding occurred in the Kinnickinnic and Menomonee River watersheds in late March early April of 1960 due to a snowmelt rainfall event. There was widespread damage in Milwaukee along the Kinnickinnic River and scattered problems in Milwaukee along Wilson Park Creek. The flood caused problems along the Kinnickinnic River as far west as S. 43rd Street and along Wilson Park Creek as far south as General Mitchell Field (now General Mitchell Airport). Basements of residential and commercial buildings were flooded collapsing walls in some cases. The Chicago and North Railway were overtopped, and sidewalks were washed out in some areas.

August 1960 –Extensive flooding took place along the Kinnickinnic River downstream of S. 43rd Street. The S. 12th Street Bridge was overtopped and sidewalks were damaged. A portion of the flood flow was diverted from the stream at W. Montana Street extended and flowed 5 blocks in an easterly direction along the Chicago and North Western Railway right-of-way to S. 12th Street where it turned northward and ran for 2 blocks along S. 12th Street where it rejoined the Kinnickinnic River. W. Lincoln Avenue and S. 37th Street were also flooded. Considerable flood damage to basements occurred in these areas.

September 1972 –A relatively large amount of rainfall under the high antecedent moisture conditions caused the flooding event of September 1972. This flood resulted in significant flood damage and disruption in the Kinnickinnic River watershed in Milwaukee. Most of the damage was confined to the reach of the Kinnickinnic River between S. 6th Street and S. 16th Street. The flood problems were restricted to this area mainly because of the considerable channel modifications that had been completed by this time. Floodwaters overtopped the low point of the roadways of the 10 bridges that then crossed the Kinnickinnic River beginning with and including S. 7th Street. Overland flooding occurred on both sides of the river between S. 6th Street and S. 15th Street extending as much as 1 city block away from the river. Floodwaters overtopped the S. 43rd Street Bridge crossing the Kinnickinnic River. Damage occurred to residential and commercial buildings.

April 1973 –This flood was the most severe flood event recorded up to that time for Milwaukee County. Certain areas along the Kinnickinnic and Menomonee River watersheds experienced severe flooding which extended more than 1 city block from the river and overtopped all 11 bridges then crossing the Kinnickinnic. Within the watershed, major damages attributed to the flood were confined to the Kinnickinnic River in Milwaukee. The flooding that occurred was somewhat more serious than what would be expected under the relatively moderate levels of

rainfall involved, because of the existence of very wet antecedent moisture conditions, and thus illustrated the extreme sensitivity of rainfall-induced floods.

August 1986 –An August 1986 storm event centered in a 1 to 4 mile wide band extending northwesterly from the City of Oak Creek through the General Mitchell International Airport to the northern portion of the City of Wauwatosa. It resulted in a total rainfall of 6.84 inches in 24 hours, the single day record at the General Mitchell International Airport recording station. Widespread flooding occurred at the airport and was shut down. Severe damage occurred especially along the reach of the Kinnickinnic River between S. 6th Street and S. 16th Street in Milwaukee. Flooding impacts occurred in other areas including along Wilson Park Creek, located in the Kinnickinnic watershed, the near northwestern portion of Milwaukee along the Menomonee River and Wood Creek, where severe basement flooding occurred due to sewer backup.

June 1997 – Severe flash flooding occurred in Milwaukee County as a result of heavy rainfall amounts of up to nearly 10 inches over a 30-hour period. This flash flooding was greater than a "100 year rainfall" based on rainfall frequency maps. No one was injured or killed by the floodwaters, thanks to superb rescue efforts by local law enforcement officials and firefighters. Firefighters in boats rescued 20 people from their flooded homes. Besides public sector damage in county/city parks, there was widespread private and business damages. The hardest hit areas were the cities of Brown Deer, Wauwatosa, and the Piggsville, Lincoln Creek, Sherman Park, and Menomonee Valley areas of Milwaukee. The earliest flash flooding occurred in Fox Point, with other northern Milwaukee County locations experiencing flash flooding there after. On July 7th, Milwaukee County was officially declared a Federal Disaster Area, making county residents and business owners eligible for Federal disaster aid.

A description of the June 1997 flood recounted by the NWS is presented below.

About 9,600 homes in the county had minor damage, 137 with major damage, and 15 were destroyed. Monetary value of reported residential damage was \$53.365 million. In the business sector, 7 had minor damage, 22 had major damage, and 3 were destroyed. Several hundred more businesses had some damage, but never reported it to county emergency managers. Total reported business losses were pegged at \$9.665 million. Three farms in the extreme southern part of the county reported flood damages of \$18,000. Public sector damages were \$1.451 for debris clearance, \$309,400 for protective measures, \$1.544 million for road systems, \$395,000 for water control, \$3.397 million for buildings, \$1.555 million for utilities, and \$7.0 million for "other." Total public sector damages were pegged at \$15.651 million.

Combining Milwaukee County and the surrounding counties in the metro area, about 25,000 customers lost electrical power due to damaged power lines. About 15,000 natural gas customers lost natural gas service and about 4000 homes or businesses had their telephone service disrupted. Hundreds of people were forced from their homes until repairs or cleanups could be completed. Basement flooding countywide severely damaged or wiped out much personal property. Several hospitals were adversely affected either by lower floor flooding or the loss of electrical service. Many car dealerships and repair shops suffered much damage to new and used vehicles. At least 20 schools sustained major structural damage. Storm sewers simply could not

keep up with the deluge and overflowed/backed up in many locations. Raw sewage from sanitary sewers backed up in thousands of homes. Raw sewage also made its way into Lake Michigan due to failure of sanitary sewers. The loss of electrical service prevented the use of sump pumps, which compounded the flooding problems. In the days following this historical flood, the local Red Cross ran out of clean-up kits.

Many roads and underpasses across the county were flooded with several feet of water, resulting in many road closures. Many drivers had to be rescued after their vehicles that were swept away by deep, fast water currents over roads. Interstate 43 in extreme northern Milwaukee County was closed for 14 hours. At one point the water depth on the road was 12 feet. In Milwaukee, a sewer line collapsed in front of the Harley Davidson Motorcycle plant, resulting in a sinkhole 30 feet deep and 60 feet wide.

The Milwaukee Brewers baseball game scheduled for the evening hours was canceled due to water flooding the playing field to a depth of 2 to 3 feet. The last time this happened was in 1986. For the first time in memory, Brown Deer and Green Bay roads in the City of Brown Deer flooded, and fish were observed to be swimming on these roads. A portion of a bluff collapsed in Juneau Park along the Lake Michigan shoreline after soils became saturated. A 50-foot section of the lakeside bluff at Klode Park, in Whitefish Bay, slid into Lake Michigan, taking trees with it. North of Klode Park, a 200-foot strip of private land slid into the lake. There was other scattered damage to stairs along the Lake Michigan bluffs. In addition, many roads in the county had sections of asphalt washed away by the water currents.

Fast flowing, high waters on the Kinnickinnic River in the southern parts of Milwaukee resulted in 4 500ton barges breaking loose. These barges then drifted downriver and smashed into 21 pleasure crafts just west of 1st Street. Damage to the pleasure craft amounted to \$1.2 million. Honey Creek in Wauwatosa reached the highest levels that local residents could ever remember. Water depths on nearby roads and River Parkway reached at least 5 feet. One hundred nearby homes were evacuated. Lowland flooding also occurred along the Root River in the southern part of the county.

Rainfall totals for the 30-hour period were 9.78 inches in Brown Deer (TV-6 studio), 8.99 inches in the northwest corner of Milwaukee, 7.25 inches in Greenfield, and 7.20 inches in Wauwatosa. Nearly all of the remainder of the northern half of Milwaukee County had 6 to 7 inches of rain, while the southern fourth had 3 to 6 inch totals. Mitchell Field recorded 5.25 inches. The bulk of these rainfall totals occurred during a 14 hour period on July 20 and 21st.

The Menomonee River in Wauwatosa crested at a new record level of 16.63 feet on July 21st, or 7.63 feet over flood stage (greater than a 100-year flood). Major flooding occurred near and along its banks. The River went below flood stage mid-morning on July 22nd. The Milwaukee River in Milwaukee crested at a new record level of 10.0 feet during the morning of July 21st, or 3 feet over flood stage (greater than a 100 year flood). The River went below flood stage during the evening hours on July 21st. Lincoln Creek in Milwaukee crested at 20.09 feet on July 21st or 7.09 feet above flood stage. Flooding on this creek was rated as major. Oak Creek in the southern part of Milwaukee crested at 9.72 feet on July 21st, or 2.72 feet above flood stage (approx. 40-year flood). Flooding along this creek was rated as moderate.

August 1998 – In the event of August 6 over 6 inches of rain fell in northwestern Milwaukee County and eastern Waukesha County, resulting in severe direct overland flooding in a second consecutive year along Lincoln Creek in Milwaukee as well as along South Branch Creek in the Village of Brown Deer. Significant property damage resulted from over bank flooding. There were numerous occurrences of storm water drainage and sanitary sewer backup problems.

The NWS Monthly write-up from July 1998 summarizes the event as follows:

The flash flooding quickly exhausted the local resources available in the City of Brown Deer, while the Red Cross opened shelters. One hundred and twenty people in Milwaukee County became homeless due to home damage, while another 215 were evacuated. All together, 3,517 residential structures sustained damage in the county: 3,308 minor, 206 had major damage, and 3 destroyed. Five businesses reported minor damage, and 18 had major damage. Two private utility structures had minor damage, and 7 had major damage. These 3 categories collectively had damage amounts of \$20.05 million. There was an additional \$2.092 million in damage to the public sector such as road systems, buildings, water control, etc. About 6,500 residential and 50 business places lost power due to various outages.

One 13 year-old boy was injured as he was swept by floodwaters into a culvert and submerged for 15 minutes. Many roads were flooded and closed with water levels reaching 3 to 5 feet. Boats were needed to rescue several people. Highway 45 was closed, while Timmerman Field had minor flooding. A retaining wall in northwest Milwaukee collapsed due to high water levels. As a result of the event, the City of Wauwatosa has decided to purchase homes in the Menomonee River flood plain, and the City of Brown Deer will purchase some homes in the South Branch Creek flood plain to mitigate future damage. Damage estimates were placed at \$11.0 million.

July 2000 – During the flood of July 2000, as much as 6.5 inches of rain fell on portions of eastern Waukesha and southern Milwaukee Counties, including 4.42 inches recorded at Mitchell International Airport. The storm associated with this event also produced 1 tornado in southern Milwaukee County, which moved east/northeast through the City of Oak Creek and into Racine County. The most severe flooding occurred in the communities south of Milwaukee, including the cities of Franklin and Oak Creek, and the villages of Greendale and Hales Corners. In Milwaukee reported damages occurred mainly in the Kinnickinnic River and the Oak Creek watersheds, with damages mostly limited to basement flooding due to either sewer backup or inoperable sump pumps caused by power outages. Estimated flood damages were \$6.8 million in Milwaukee County.

May/June 2004 – Scattered to widespread heavy rains fell across south-central and southeast Wisconsin during the period of June 9-12, 2004 kept many rivers and streams at or above flood stage for most of the month. Monthly rainfall totals generally ranged from 4 to 7 inches across south-central and southeast Wisconsin. In some cases, stretches of some rivers actually went above flood stage in May, 2004. During June, 2004, the high water levels kept much of the low, bottom-land under water near rivers and streams; closed some major state highways; forced water into basements; damaged corn, soy bean, and alfalfa crops; delayed planting of entire fields; washed out gravel road shoulders; or damaged foundations of homes and businesses. In

general, the June flooding was the worst since 1993 on a widespread basis, but locally it was the worst in the past 25 to 30 years.

Federal Disaster Declaration 1526 covered all 20 counties in south-central and southeast Wisconsin for storms, tornadoes, and flooding for the period of May 19-July 3, 2004. All counties qualified for "individual assistance". In Milwaukee County, \$236,000 worth of damage was done due to basement flooding. Estimated private property damage was \$1M.

June 2008 – Heavy rains resulted in flash flooding across much of Milwaukee County. Water depths on some roads reached 3 to 4 feet and many cars stalled. Water entered many homes and businesses. Two other flash flood events occurred in Milwaukee County on June 7th. Collectively, these 3 flash floods resulted in home and business damage along with some crop losses. It was nearly impossible to break down the damages by flash flood event. Therefore, the collective breakdown for the 3 flash flood events is provided in the June 8th Storm Data entry for Milwaukee County. The collective breakdown for residential home losses were: 3957 minimally affected, 2583 with minor damage, and 1135 with major damage (total of \$32/301 million for home losses). The total business losses were \$5.855 million. Crop losses were \$15.5 thousand. Public sector damage was about \$40.814 million. Several roads and bridges sustained damage.

On June 7th, 4.93 inches of rain fell at Milwaukee Mitchell Field, breaking the old record rainfall for the date which was 2.44 inches (June 7, 1916). On June 8th, 2.25 inches of rain broke the old record rainfall for the date which was 1.24 inches (June 8, 1974). Combined, these two days of rainfall broke the 48-hour all-time rainfall record at Milwaukee. The previous record was 6.84 inches, which was recorded on August 5-6, 1986. On June 7-8, 2008, Milwaukee observed 7.18 inches of rain. A slow-moving surface boundary, nearly parallel with the mid-level flow affected southern Wisconsin during the period of June 7th through June 9th. A strengthening low-level jet and strong moisture advection produced several rounds of thunderstorms during the period in the vicinity of this boundary. The atmosphere was very moist with perceptible water values around 2 inches. Low to mid-level wind flow supported training of flood-producing thunderstorms. A weak cool front pushed through southern Wisconsin late on the 8th/early on the 9th, finally ending the heavy rainfall. The heavy rain axis for June 7-9th ran from Sauk County southeast to Milwaukee County, where generally 6 to 9 inches fell on a ground that was totally saturated due to record-setting winter snowfalls and a wet April, 2008. Several locations topped 10 inches, and Watertown (Jefferson Co.) came in with 13.5 inches, 11.35 inches was measured in Oak Creek (Milwaukee Co.), and Elm Grove in Waukesha County picked up 10.8 inches.

June 2009 – Heavy rains resulted in flash flooding in parts of Milwaukee County, especially in the West Allis to Wauwatosa area east to the Downtown Milwaukee area. Many roads were covered with water to a depth of 1 to 3 feet. Basement flooding was reported. Milwaukee Mitchell Field measured 3.65 inches of rain in the 24-hour period ending 2000 CST. Doppler radar rainfall estimates were in the 3 to 5 inch range over parts of Milwaukee County. The City of Milwaukee sewer system was overwhelmed. High water levels on the Menomonee River just east of Miller Park resulted in part of an earthen berm being washed away. The subsequent flood water moved west to Miller Park and extensively flooded the lower service area, clubhouses, and part of the dugouts and warehouse. The playing field wasn't affected. Milwaukee Brewer

executives said damage was in the millions, but they would not specify an amount. Therefore, for the purpose of this StormData documentation, a value of \$5 Million was assigned. A Uniform Disaster Situation Report generated by the Milwaukee County Emergency Management indicated that at least 1227 homes sustained minor flood damage, and at least 2 homes had major damage, for a monetary loss of about \$7,079,000. Also, at least 12 businesses sustained minor flood damage and 1 had major damage for a business loss estimate of \$215,000. The total estimated private sector damage in this report was \$7,294,000. Additionally, damage in the public sector amounted to about \$40,000 to road systems, about \$25,000 to water control facilities, about \$269,000 to public buildings & related equipment, and about \$5,000 to public utility systems. The total public sector damage estimate is about \$339,000. Other costs in the report included about \$24,000 in debris clearance, about \$21,385 for protective measures, and about \$107,718 in miscellaneous expenses. However, the last three values are not considered direct property damage. Flood damage to Miller Park is not included in the Uniform report.

The final in a series of upper level disturbances propagated northeastward across southern Wisconsin during the afternoon and evening of June 19th. This impulse, combined with strong upper level jet dynamics and a very moist, unstable atmosphere, allowed for storms to redevelop across southern Wisconsin. A series of short thunderstorm lines moved through southern Wisconsin. The result was wind damage, a tornado in Kenosha County, and widespread flash flooding. Due to the heavy rainfall from earlier storms, some locations received 3 to almost 7 inches of rain in less than 24 hours. Flash flooding occurred in Kenosha, Walworth, Waukesha, Milwaukee, and Racine counties.

July 2010 – Heavy rains moved through the metropolitan area and a flash flood resulted. General Mitchell International Airport, the official weather observation for Milwaukee County as designated by the National Weather Service, recorded 5.79 inches of rain within a 24 hour period, which resulted in a record breaking rainfall amount for the date. During the afternoon, a persistent band of strong to severe thunderstorms developed and moved very slowly over southeast Wisconsin through the evening hours, with storms repeatedly training over the same area. Widespread 3 to 4 inches of water were reported along and either side of the I-94 corridor, with locally higher amounts of 6 to 8 inches. Portions of the Interstate flooded and a massive sink hole opened up at an intersection north of downtown Milwaukee and swallowed an SUV and a stop light. Widespread reports of flooding and flash flooding associated with the heavy rain were received sending rivers and streams above flood level and water flowing over roads and stalling vehicles. In addition, traffic was halted on various stretches of the interstate system throughout Milwaukee County during rush hour. Many motorists were stranded in their vehicles until the waters receded.

The original Preliminary Damage Assessment was completed in late July and the impacted counties uncovered additional damages to the private sector. The results of the second damage assessment, which began on August 31 and concluded on September 2, combined with the original assessments figures, indicate that in all counties a total of 7 homes were destroyed, 247 had incurred major damage, 366 had minor damage and 219 were affected. In July, Milwaukee County's first assessment indicated that there were 6 homes destroyed, 47 had incurred major damage, 218 had minor damages and 169 were affected. As a result of the second damage

assessment, Milwaukee County had 6 homes destroyed, 184 homes with major damage, 126 were minor and 23 were affected.

As a result of input from FEMA and Wisconsin Emergency Management, the second Preliminary Damage Assessment (PDA) was intended to focus upon homes which would qualify as having “major” damage, specifically those with two or more feet of water in a basement where a household member regularly slept. Roughly 1200 residents who had completed survey forms indicating damage to sleeping space in the basement were again contacted via a door-to-door canvass and a telephone call center by City of Milwaukee staff and community partners. In reviewing only a segment of the population that had household members regularly sleeping in the basement, 366 residents had their water heater destroyed and 304 residents had a destroyed furnace.

The magnitude of devastation from the July 22-23, 2010 flood can also be demonstrated through local clean-up efforts, call volume and needs assessments that occurred during the emergency response and recovery phases. The countywide volunteer effort cleaned 121 homes of special needs, elderly and disabled residents who were unable to perform these tasks. Four weeks after the flood, hundreds of homes still needed assistance.

The area with the highest amount of backwater and service calls had a median income of less than \$25,000 per year. The same low-income area reflects that 80-100% of the area is minority and a fair share of the backwater calls came from areas that represent either 9-12% or 12-32% of seniors (defined as 65 years of age and older) within the impacted areas. These same neighborhoods were affected by flooding incidents in 2008, 2009, and 2010. These incidents generated a combined total of 13,442 calls (in 2008 there were 2,066 calls; in 2009 there were 673 calls and the combined total of the two incidents in July of 2010 resulting in 13,442 calls).

Date	Event	Area Affected	State Disaster Declaration	Federal Disaster Declaration	Remarks
June 2009 (4)	Flooding	County wide	Yes	Yes	Over \$7Million in damages
June 2008 (4)	Flooding	County wide	Yes	Yes	\$45 Million+ in damages, over 13 inches of rain
March 2008 (4)	Excessive Snow	County Wide	Yes	Yes	17 inches of snow
February 2008	Excessive Snow	County Wide	Yes	Yes	12-19 Inches of Snow, Gusting Winds
April 2006	Hailstorm	County Wide	No	No	
December 2006 (4)	Winter Storm	County wide	No	No	1 fatality
April 2004 (4)	Hailstorm	County Wide	No	No	Over \$7 Million in damages
June 2004 (4)	Flooding	County wide	Yes	Yes	4-7 inches of rain and over \$1M in damages
June 2002(4)	Heat wave	County wide	No	No	2 Fatalities
April 2002(4)	Heat wave	County wide	No	No	1 Fatality
December 2000(3)	Excessive Snow	County wide	No	Yes	53 Inches of snow during the month
July 2000(4,5)	Tornado	Franklin, Oak Creek	No	Yes	\$9 million in damages
July 2000(1,5)	Flooding	Franklin, Oak Creek, Greendale, Hales Corners, and South Milwaukee	Yes	No	6.5 inches of Rain and \$6.8 million in damages.
March 2000(4)	Tornado	St. Francis	No	No	\$4.6 million in damages
January 2000(3)	Blizzard	County wide	No	No	15.4 inches of

					snow in 24 hours
July 1999(4)	Heat wave	County wide	No	No	8 Fatalities
November 1998(4)	High Wind	County wide	No	No	1 Fatality
Table 3-1 HISTORIC HAZARDS, DECLARED DISASTERS, AND WEATHER – RELATED FATALITIES IN MILWAUKEE COUNTY					
Date	Event	Area Affected	State Disaster Declaration	Federal Disaster Declaration	Remarks
August 1998(1,2,3)	Flooding	County wide	Yes	Yes	Over 6 inches of rain. \$11 million in damages
May 1998	High Winds	County wide	No	No	\$19.2 million in damages
November 1997(4)	Extreme Cold	County wide	No	No	1 Fatality
July 1997(4)	Heat wave	County wide	No	No	1 Fatality
July 1997(1,2)	Flooding	County wide	Yes	Yes	Over 4 inches of rain
June 1997(1,2,3)	Flooding	County wide	Yes	Yes	Over \$78 million in damages
February 1996(4)	Extreme Cold	County wide	No	No	4 Fatalities
January 1996(4)	Extreme Wind Chill	County wide	No	No	
December 1995(4)	Cold	County wide	No	No	2 Fatality
November 1995(4)	Cold	County wide	No	No	1 Fatality
November 1995(3)	Blizzard	County wide	No	No	
July 1995(3,4)	Heat wave	County wide	No	No	85 Fatalities
June 1993(1,3)	Flooding /Wind Damage	County wide	No	Yes	
May 1989(4)	Tornado	City of Milwaukee	No	No	\$250 thousand in damages
December 1987(3)	Blizzard	City of Milwaukee	No	No	10 Fatalities
September 1986(1,2)	Flooding	County wide	No	Yes	\$6 million in damages
August 1986(1,2,3)	Flooding	County wide	No	Yes	\$20 million in damages. 2

					fatalities(3)
July 1985(4)	Tornado	City of Milwaukee	No	No	
July 1981(4)	Tornado	City of Milwaukee	No	No	
August 1980(4)	Tornado	City of Milwaukee	No	No	\$250 thousand in damages
Table 3-1					
HISTORIC HAZARDS, DECLARED DISASTERS, AND WEATHER – RELATED FATALITIES IN MILWAUKEE COUNTY					
Date	Event	Area Affected	State Disaster Declaration	Federal Disaster Declaration	Remarks
December 1978-January 1979(3)	Blizzard	County wide	No	No	
August 1977(4)	Tornado	City of Milwaukee	No	No	
August 1975(4)	Tornado	City of Milwaukee	No	No	
August 1975(4)	Tornado	City of Milwaukee	No	No	
April 1973(3)	Blizzard	County wide	No	No	
April 1973(1,2)	Flooding	County wide	No	No	
September 1972(1,2)	Flooding	City of Milwaukee Village of Elm Grove	No	No	
August 1969(4)	Tornado	City of Milwaukee	No	No	
July 1964(2)	Flooding	Wauwatosa West Allis	No	No	1 Fatality
August 1964(4)	Tornado	City of Milwaukee	No	No	\$250 thousand in damages
September 1964(4)	Tornado	City of Milwaukee	No	No	\$250 thousand in damages
July 1962(4)	Tornado	City of Milwaukee	No	No	
October 1962(4)	Tornado	City of Milwaukee	No	No	
August 1960(1)	Flooding	City of Milwaukee	No	No	
March-April 1960(1,2)	Flooding	City of Milwaukee Wauwatosa	No	No	
September 1959(4)	Tornado	City of Milwaukee	No	No	\$250 thousand in damages
October 1958(4)	Tornado	City of Milwaukee	No	No	
January 1947(3)	Blizzard	County wide	No	No	
June 1940(1,2)	Flooding	City of Milwaukee Wauwatosa	No	No	
February 1924(3)	Blizzard	County wide	No	No	3 Fatalities
June 1917(1,2)	Flooding	City of Milwaukee Wauwatosa	No	No	
March 1912(1)	Flooding	City of Milwaukee	No	No	
March 1897(1,2)	Flooding	County wide	No	No	

(1) City of Milwaukee Flood Mitigation Plan; (2) Flood Mitigation Plan for the City of Wauwatosa; (3) Milwaukee County Hazard Analysis Study; (4) State of Wisconsin Hazard Analysis; (5) National Weather Service

Table 3-2 presents a summary of dollars spent to repair public property damaged from flooding in Milwaukee County.

TABLE 3-2 PUBLIC PROPERTY DAMAGE FROM MILWAUKEE COUNTY FLOODS		
Year	Total Damages	Inflation Adjusted Dollars (2009)
1986	\$20,000,000	\$38,615,442
1997	\$78,000,000	\$103,810,593
1998	\$11,000,000	\$14,409,405
2000	\$6,800,000	\$8,3882,486
2008	\$31,000,000	\$31,000,000
2009	\$500,000	\$500,000
Inflation Adjustor http://www.westegg.com/inflation/		

3.1.1.2 Flood Hazard and Storm water Mitigation Plans

Currently within Milwaukee County, 12 municipalities have either a Flood Mitigation Plan or a Storm water Plan. Oak Creek, Wauwatosa and Brown Deer hold flood Mitigation Plans. Bayside, Brown Deer, Fox Point, Franklin, Glendale, South Milwaukee, West Allis, West Milwaukee, and Whitefish Bay hold Storm water Plans. These plans were used in the preparation of this Plan and are listed in the reference section of this Plan.

Approximate flood hazard boundaries in Milwaukee County were mapped by the Federal Insurance Administration of the U.S. Department of Housing and Urban Development (HUD). Previous maps for Milwaukee County were from the 1970's, lack detail, and are sometimes inaccurate; however, most flood hazard areas in the County were mapped. The Wisconsin Department of Natural Resources received a grant from FEMA to update floodplain maps for the entire State of Wisconsin. FEMA has now updated the Flood Insurance Study (FIS) and digital Flood Insurance Rate Maps (FIRM) for Milwaukee County. The effective date is September 26, 2008. All municipalities within Milwaukee community participate in the National Flood Insurance program and have adopted the FIS and FIRM panels into their floodplain zoning ordinances.

Although Milwaukee County is not enrolled in the National Flood Insurance Program (NFIP), which encourages the principles of floodplain management, all 19 Jurisdictions within Milwaukee County are enrolled.

3.1.2 Winter Storms

Winter storms and blizzards follow a seasonal pattern that begins in late fall and lasts until early spring. These storms have the potential to destroy property and kill people. Winter storms may be categorized as sleet, ice storms or freezing rain, heavy snowfall or blizzards, and low temperatures. Blizzards are characterized by low visibility caused by high winds and blowing snow.

A severe winter storm is generally a prolonged event involving snow or ice accumulation and extreme cold. The characteristics of severe winter storms are determined by the amount and extent of snow or ice, air temperature, wind speed, and event duration. Severe winter storms create conditions that disrupt essential regional systems such as public utilities, telecommunications, and transportation routes. Ice storms accompanied by high winds can have destructive impacts, especially to trees, power lines, and utility services.

Winter storms are frequently the precursors to spring flooding; the more snow, the better the chances of floods if a quick warm-up occurs. The NWS reports that to date, a total of 19 lives have been lost due to extreme cold and snow in Milwaukee County.

The National Weather Service descriptions of winter storm elements are:

- Heavy snowfall - Accumulation of six or more inches of snow in a 12-hour period or eight or more inches in a 24-hour period.
- Blizzard - An occurrence of sustained wind speeds in excess of 35 miles per hour (mph) accompanied by heavy snowfall or large amounts of blowing or drifting snow.
- Ice storm - An occurrence of rain falling from warmer upper layers of the atmosphere to the colder ground, freezing upon contact with the ground and exposed objects near the ground.
- Freezing drizzle/freezing rain - Effect of drizzle or rain freezing upon impact on objects with a temperature of 32 degrees Fahrenheit or below.
- Sleet - Solid grains or pellets of ice formed by the freezing of raindrops or the refreezing of largely melted snowflakes. This ice does not cling to surfaces.
- Wind chill - An apparent temperature that incorporates the combined effect of wind and low air temperatures on exposed skin.

In Wisconsin, the winter storm season generally runs from November through March and Wisconsin residents are most familiar with heavy snowstorms, blizzards, sleet and ice storms. The majority of Wisconsin snowfalls are between one and three inches per occurrence, although heavy snowfalls that produce at least ten inches may occur four or five times per season. Northwestern Wisconsin encounters more blizzards than the southeastern portions of the state.

Damage from ice storms can occur when more than half an inch of rain freezes on trees and utility wires, especially if the rain is accompanied by high winds. Another danger comes from accumulation of frozen rain pellets on the ground during a sleet storm, which can make driving hazardous.

Frequency of Occurrence

Annual snowfall in Wisconsin varies between thirty inches in southern counties to one hundred inches in the north. Ozaukee County averages approximately 45 inches of snow annually. Storm tracks originating in the southern Rockies or Plains states that move northeastward produce the heaviest precipitation, usually six to twelve inches. Low pressure systems originating in the northwest (Alberta) tend to produce only light snowfalls of two to four inches. Snowfalls associated with Alberta lows occur more frequently with colder weather.

Although massive blizzards are rare in Wisconsin, blizzard-like conditions often exist during heavy snowstorms when gusty winds cause blowing and drifting of snow. Near blizzard conditions existed in Wisconsin in January 1979 when record snowfalls were recorded in many areas and wind speeds gusted to over thirty miles per hour.

Both ice and sleet storms can occur at any time throughout the winter season from November to April. Ice storms of disastrous proportions occurred in central Wisconsin in February 1922 and in southern Wisconsin in March 1976. A Presidential Disaster Declaration occurred as a result of the 1976 storm. Utility crews from surrounding states were called in to restore power, which was off for up to ten days in some areas. Other storms of lesser magnitude caused power outages and treacherous highway conditions.

3.1.2.1 Location and Extent of Previous Winter Storm Events

A synopsis of some of the severe winter storms that have affected the area, as described in the Milwaukee County Hazard Analysis Report and the NWS Memorable Snowstorms in Milwaukee is presented below:

November 5, 1896. 14.6 inches. This was the heaviest snowfall on record for so early in the season. Snow had all melted within 5 days.

January 12, 1908. 16.0 inches. Heavy snow accompanied by high north winds prevailed all day. Snow stuck to trees and wires causing many to break. Streetcar service was crippled.

April 15-16, 1921. 15.0 inches. Snowstorm accompanied by very high winds, which was quite unusual because of the lateness of the season. Three days after the storm had ended only a trace remained on the ground due to rapid melting from warmer temperatures.

March 12, 1923. 13.0 inches. Ranks as third heaviest March snowstorm. Up to \$1 million in damages occurred. The lowest barometric pressure reading during the storm was 28.82 inches. Freezing rain occurred with the snowstorm downing wires, awnings, signs, and branches. All objects were coated with ice up to 1-inch thick causing telephone/telegraph poles to go down.

February 4-5, 1924. 20.3 inches. This storm ranks as the most snowfall in a 24-hour period since 1884. This was the most paralyzing blizzard up to that time. There was over \$1 million damage caused by the storm. Communication with the outside world was said at the time to be back to the days of the "Indian signal fire". Streetcar and train service was crippled. There were snowdrifts 8 to 10 feet high and considerable ice on trees and wires. Car ferries remained in port. Schools were closed and several plate glass windows broken. Dozens of people were injured and 3 deaths were related to the storm.

February 3-4, 1936. 9.6 inches. This snowfall on top of nearly 10 inches already on the ground was blown about by very high winds, which caused huge drifts. In some neighboring communities complete abandonment of snow removal work occurred. Trains were stalled for periods of more than 24 hours and there were reports of automobile travelers being marooned in farm homes for more than a week.

January 28-30, 1947. 18.0 inches. This was arguably the worst snowstorm that ever struck Milwaukee. The 3-day snowfall total from records was 18 inches but this amount is likely to be far below the actual amount that fell due to the considerable blowing and drifting. During the height of the storm the winds were northeast at 25 to 45 mph and visibilities were near zero. Huge snowdrifts as high as 15 feet brought all traffic to a standstill and not until January 31st was partial train and streetcar service restored. All stores, factories, offices, and schools were closed from 2 to 4 days with many people stranded in cars, buses, trains, railroad depots, and hotel lobbies. This snowstorm was perhaps the longest and most costly in Milwaukee history.

March 8, 1961. 11.2 inches. A heavy wet snow fell that accumulated very rapidly during the first several hours and was accompanied by northeast winds well in excess of 30 mph. This caused very serious traffic problems.

April 9, 1973. 13.0 inches. After a relatively mild and snow-less winter, a major early spring snowstorm struck with about 1 foot of heavy, wet snow accompanied by thunder, lightning and winds gusting in excess of 50 mph. The city was virtually shutdown. The storm led to an overhaul in plowing strategy and equipment. (Twelve days later heavy rains on top of snowmelt runoff brought rivers and streams over their banks. Severe flooding occurred along the Root and Fox rivers in Milwaukee, Waukesha and Racine counties).

December 31, 1978 to January 1, 1979. 4.6 inches. Major snowstorm hit during the New Year's holiday. Winds gusting to 40 mph caused drifts to 6 feet blocking many rural roads.

January 12-13, 1979. 4.3 inches. Another major snowstorm followed the New Year's storm by 2 weeks. Winds gusted to 40 mph caused near blizzard conditions with drifts to 6 to 8 feet blocking many roads. Travel became nearly impossible with many snow plows pulled off the roads.

January 23-24, 1979. 9.5 inches. Less than 2 weeks after the January 12-13 storm, another major snowstorm struck the area with near blizzard conditions and blocked roads. After this storm,

record snow depths of nearly 3 feet were measured. Accumulated snow on roofs of houses, barns, and other buildings caused the roofs to sag greatly or collapse during the month.

January 3-4, 1982. 8.6 inches. An intense "Lower Mississippi Valley" type winter storm produced very heavy snow in the Milwaukee metro area from the evening of January 3rd to the late morning on January 4th. Temperatures just a few degrees below freezing produced a very high water-content snow, which coupled with accompanying northeast winds of 30 to 60 mph, caused considerable damage to trees and power lines. Severe drifting snow produced 3 to 5 foot drifts that closed virtually all roads in the metro area. Thunder and lightning occurred for several hours centered around midnight. Total snow amounts included 15 inches on the northwest side of Milwaukee and 8 inches on the southeast side.

December 15, 1987. 13.1 inches. A powerful winter storm caused schools, businesses, airports, and most government offices to close. Numerous accidents were reported along with widespread power outages. The storm began early in the morning and continued for much of the day. At the height of the storm thunder and lightning was observed and winds gusted up to 73 mph. A Greek cargo ship whipped by 10 to 15 foot waves inflicted \$100,000 in damage to a Milwaukee harbor pier by repeatedly striking it. Ten people died of heart attacks and there were dozens of cases of severed fingertips caused by people trying to unclog the heavy wet snow from snow blowers.

November 27, 1995. 9.7 inches. A major winter storm struck during the afternoon and evening hours of November 27th. Thunder, lightning, and winds gusting to 50 mph and near zero visibility created the worst traffic "gridlock" in 40 years. What normally would have been a 30-minute commute turned into a 3 to 4 hour nightmare. There were over 1,000 vehicle accidents in the metro area and Milwaukee's Mitchell International was closed for over 12 hours, which added to the burden of travelers. This was the third worst November snowstorm in Milwaukee on record dating back to 1884.

Late January – February 4th, 1996. – Milwaukee had a string of 73 hours below zero. Adding to the misery, wind chills were in the minus 35 to minus 60-degree range many times during this event. There were 4 cold-weather hypothermia deaths reported in Milwaukee County. In addition, 15 people sustained frostbite injuries. Numerous water main pipes burst, and fiber optic cables froze disrupting telephone service. Schools were closed on February 2nd, and 8,000 homes in Southeast Wisconsin lost electrical service as power companies cut back on output. Service stations and AAA were overwhelmed with requests for assistance. New minimum temperature records follow: -20 degrees Fahrenheit in Milwaukee (daily record) on February 2nd, -26 degrees Fahrenheit in Milwaukee (new daily record and tied all-time record anytime) on February 3rd, and -19 degrees Fahrenheit in Milwaukee (daily record) on February 4th.

January 2-3, 2000. 15.4 inches. With the dreaded Y2K "Bug" having come and gone without much fanfare, Milwaukee County turned its attention to the first snowstorm of the millennium, which almost beat the January record for snowfall in a 24-hour period set back in 1918.

December 11-15, 2000. 49.5 inches. This was a major event, which resulted in a Presidential Snow Emergency declaration for Milwaukee County. Milwaukee registered a whopping 49.5

inches for the month of December (old one was 30.7 inches in 1951), and on December 21st, set a new December snow depth record of 32 inches (old record was 18 inches in 1978). The 49.5 inches was 430 percent of normal and 105 percent of the average winter snowfall.

December 7, 2006 In the wake of a major winter storm on December 1st, cold weather settled in over southern Wisconsin, with daily temperature averages well below normal. December 7th was an unseasonably cold day in Milwaukee with a maximum temperature of 17 and a low temperature of 8 above zero (-16 degree departure for daily average temperature). As a result, a 41 year old male was found dead, frozen to a sidewalk (directly-related death).

February 2008 – 21 Inches. A long-duration, massive winter storm with near blizzard conditions pounded southern Wisconsin with snow accumulations of 10 to 21 inches. Arguably, this was the worst storm on such a widespread basis since the memorable storms of the late 1970s. The storm started overnight February 5th, and by daybreak February 6th accumulations ranged from 2 to 3 inches from the Madison area to Milwaukee on up to 5 to 7 inches near the Illinois border. Some roads became impassable due to vehicles getting stuck in deep snow drifts on inclines. There was one fatality (indirectly-related) just south of Milwaukee Mitchell Field when the driver lost control of their vehicle and slid into a semi. Numerous civic functions, schools, and businesses were closed on February 6th and 7th. Milwaukee Mitchell Field measured 11.6 on the calendar day of February 6th, breaking the old daily record of 8.3 set back in 1974. Due in large part to this snowstorm, many locations in south-central and southeast Wisconsin eventually broke their all-time winter snowfall records.

3.1.3 Severe Thunderstorms

The NWS estimates that over 100,000 thunderstorms occur each year in the U.S. Approximately 10 percent are classified as severe. Thunderstorms can produce deadly and damaging tornados, hailstorms, intense downbursts, microbursts, winds, lightning, and flash floods. Thunderstorms spawn as many as 1,000 tornados each year. Since 1975, severe thunderstorms were involved in 327 Federal disaster declarations.

Hailstorms can also develop from severe thunderstorms. Hailstorms are frequent during the summer months in Wisconsin and the most common severe weather category in Milwaukee County. Nationally, hailstorms cause nearly \$1 billion in property and crop damage annually, as peak activity coincides with peak agricultural seasons. Severe hailstorms also cause considerable damage to buildings and automobiles, but rarely result in loss of life. NWS data indicate 70 hail reports over 0.75 inches were recorded in Milwaukee County over the 47 year period of record, with the largest hailstones at 2 inches in diameter falling in July 6, 1987 and September 9, 1991.

Severe thunderstorms can produce damaging straight-line winds in excess of 58 mph. High winds associated with thunderstorms affect areas with significant tree stands, as well as areas with exposed property, major infrastructure, and aboveground utility lines.

Tornados are the most concentrated and violent storms produced by the earth’s atmosphere. They are created by a vortex of rotating wind and strong vertical motion, which possess remarkable strength and can cause widespread damage. The most violent tornados are capable of tremendous destruction with wind speeds of 250 mph or more. Southeast Wisconsin experiences tornados, which can produce significant damage and occasionally cause injury or death. According to the NWS records 26 tornados have been verified in Milwaukee County. (Department of Military Affairs)

Tornado damage severity is measured by the Enhanced Fujita Tornado Scale, which assigns an “F” (“Fujita”) value from 0 – 5 to denote the wind speed.

The Enhanced Fujita Tornado Scale		
Category	Wind Speed	Description of Damage
F0	40-72 mph	Light damage. Some damage to chimneys; break branches off trees; push over shallow-rooted trees; damage to sign boards.
F1	73-112 mph	Moderate damage. The lower limit is the beginning of hurricane speed. Roof surfaces peeled off; mobile homes pushed off foundations or overturned; moving autos pushed off roads.
F2	113-157 mph	Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light-object missiles generated.
F3	158-206 mph	Severe damage. Roofs and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted; cars lifted off ground and thrown.
F4	207-260 mph	Devastating damage. Well-constructed houses leveled; structures with weak foundations blown off; cars thrown and large missiles generated.
F5	261-318 mph	Incredible damage. Strong frame houses lifted off foundations and carried considerable distance to disintegrate; automobile-sized missiles fly through the air in excess of 100-yards; trees debarked.

On 1 February 2007, the National Weather Service began rating tornadoes using the EF-scale. It is considerably more complicated than the F-scale and it will allow surveyors to create more precise assessments of tornado severity. Below is a comparison between the Enhanced Fujita Scale and the EF Scale:

Fujita Scale			Derived EF Scale		Operational EF Scale	
F Number	Fastest ¼ mile (mph)	3 Second Gust (mph)	EF Number	3 Second Gust (mph)	EF Number	3 Second Gust (mph)
0	40-72	45-78	0	65-85	0	65-85
1	73-112	79-117	1	86-109	1	86-110
2	113-157	118-161	2	110-137	2	111-135
3	158-207	162-209	3	138-167	3	136-165
4	208-260	210-261	4	168-199	4	166-200
5	261-318	262-317	5	200-234	5	Over 200

3.1.3.1 Location and Extent of Previous Severe Thunderstorm Events

Numerous severe thunderstorms, hail, and tornado events have affected Milwaukee County. A brief synopsis of selected events as chronicled by local newspapers and NWS monthly write-ups is presented below.

August 1986 – An August 1986 storm event centered in a 1 to 4 mile wide band extending northwesterly from the City of Oak Creek through the General Mitchell International Airport to the northern portion of the City of Wauwatosa. An 11-year-old boy drowned after falling into the Kinnickinnic River. It resulted in a total rainfall of 6.84 inches in 24 hours, the single day record at the General Mitchell International Airport recording station. (Year was City's 3rd wettest on Record, Milwaukee Sentinel, 1986).

April 1997 – Strong gradient winds, enhanced by higher gusts associated with scattered rain and snow showers, periodically resulted in wind damage reports across Milwaukee County. The wind gusts were estimated in the 60 to 65 mph range. Throughout the county, hundreds of trees and some power lines were toppled by the high winds. At the Milwaukee County Stadium, a partially built roof section was blown off into the parking lot. In northern Milwaukee, a new home under construction was completely destroyed by the high winds. In West Allis, a portion of a credit union's roof was torn off and thrown into traffic. In Whitefish Bay, a toppled tree fell against a home, damaging its siding and awning. In Greenfield, shingles were peeled off a building, a police car's windows were blown in, traffic lights were damaged, and a willow tree fell against a home. Elsewhere, the high winds tore roofing material off a building onto the freeway. (NWS April 1997 Write-up).

May 1998– On Sunday May 31st a strong downburst wind event known as a “derecho” occurred in south central and southeastern Wisconsin. Milwaukee County had the greatest monetary value of storm damage (\$19.2 million) in all of south central and southeastern Wisconsin. All county cities had some tree or structural damage, but the hardest hit areas were Brown Deer, Greendale, Greenfield, River Hills, South Milwaukee, and Wauwatosa. Peak gusts of 103 mph was measured in Greenfield, 100 mph at the WITI TV-6 station in Brown Deer, 71 mph at the WTMJ TV-12 station on Capitol Drive, and 61 mph at Mitchell International Field. Based on damage, peak gusts were estimated at 110 -115 mph in isolated spots. At Mitchell International Field, overhead doors on some of the hangers were blown in and a heating unit was blown off the roof of an airport fire department building. About 300 power poles were downed in the county with power outages lasting 5 to 6 days in some locations. More than 2,000 people were evacuated from their homes in South Milwaukee after a fallen tree branch punctured a 1 inch hole in a large propane tank. In Cudahy, stripped roof shingles were found to be embedded edge-first in nearby garage siding. (NWS May 1998 Write-up.)

March 2000 – Milwaukee recorded its earliest tornado ever and an extremely large number of reports of large hail from 0.75 to 1.75 inches in diameter were relayed to the NWS Sullivan office. Most of the thunderstorms developed gusty winds on the order of 30 to 50 mph, but one managed to generate a gust of 58 knots (67 mph) at the TV-4 station on the north side of Milwaukee.

The tornado touched down about 0.5-mile east/northeast of the terminal building of General Mitchell International Airport, just east of Runway 19. It then moved northeast and crossed East Layton Avenue just east of South Pennsylvania Avenue in Cudahy. From there it continued northeast through St. Francis and dissipated over the northwest corner of Nathanael Greene Park. The tornado caused considerable damage in Cudahy and St. Francis. Fifty-three residential homes sustained minor damage and 11 had major damage. Eight businesses sustained major damage. Many motor vehicles were overturned, several roofs were partially peeled off of homes, power lines and trees were toppled, and gas leaks were reported. Sixteen people were injured enough to require medical treatment, but there were no fatalities. Most of the people who were injured were in their vehicles. Based on this damage, it is estimated that maximum wind speeds of this tornado were 105 to 110 mph. Preceding the tornado, there were reports of large hail and some tree damage in the parent thunderstorm over St. Francis and the southern part of Milwaukee. The last time a tornado was documented in Milwaukee County was in May 1989. (NWS March 2000 Write up).

July 2000 – A super cell moved across southeast Wisconsin producing hail and heavy rainfall, but once it moved over the City of Franklin in southwestern Milwaukee County, a tornado touched down about 0.75 miles northwest of the intersection of Highways 41 and 100 (27th St. & Ryan Rd.). This tornado tore east/southeast through Oak Creek, and then exited Milwaukee County where Highway 32 goes south into Racine County. It intensified to an F1 rating as it damaged buildings, and turned over several semi-tractor trailers at a truck stop at the intersection of I-94 and Ryan Rd. This tornado damaged at least 1 dozen homes in Franklin and Oak Creek, as well as 1 business and 1 utility building. Hundreds of trees were uprooted and blown over, but luckily many of them fell between buildings. Sixty power poles were snapped by the tornadic winds in Oak Creek. In Franklin, a 40-foot TV antenna was pushed over into a neighboring home, and a 20-foot camper was severely damaged. An estimated \$9 million in damaged was caused and a Presidential Disaster was declared for Milwaukee County.

Twenty-four hour rainfall totals in Milwaukee County were impressive: 6.50 inches in Greenfield, 5.05 inches south side of Milwaukee, 4.75 inches in West Allis, 4 to 6 inches in Franklin, and 4.22 inches at Milwaukee Mitchell International Airport. The 4.42 inches of rain recorded at Milwaukee General Mitchell International Airport on July 2nd set a new record for the day and a new daily record for any day in July. This was also the sixth wettest day for Milwaukee since 1871. Milwaukee would finish the month of July 2000 with 7.12 inches of rain, the third wettest July on record. (NWS July 2000 Write up).

August 2002 – The severe weather and flooding that affected much of south-central and southeast Wisconsin on August 21, 2002, into the pre-dawn hours of the 22nd, was probably the most widespread and significant outbreak for the 2002 warm-season. Just about every type of weather phenomena was observed: a tornado; a funnel cloud; powerful, hurricane-force, downburst winds that uprooted trees and damaged buildings; torrential rains reducing visibilities to 100 feet; urban and small stream flooding; numerous lightning strikes - some that resulted in fire damage; and the early stages of a ground-based vortex that never made it to tornado status. Clusters and short lines of thunderstorms ahead of a cold front eventually merged into a single complex that moved west to east across southern Wisconsin. At least 56,000 customers in southeast Wisconsin lost electrical power thanks to lightning strikes, and tree damage to power

lines. One of the worst lightning strikes was in Fox Point (Milwaukee Co.), where a lightning fire burned a home to the ground.

The powerful winds caused damage in Milwaukee County hard. An estimated wind gust of at least 70 kts (80 mph) ripped a 100-foot long blimp from its mooring at Timmerman Field, allowing the blimp to fly about 6 blocks and damage 4 homes on impact. The winds blew water through the flaps that cover the edges of the retractable roof panels of Miller Park in Milwaukee, resulting in a saturated playing field, and some wet spectators. In Cudahy an eight-car garage's roof was removed by the winds, and 3 stalls collapsed, based on Amateur Radio reports. A picnic shelter and several other garages and businesses on College Ave. near Lake Michigan also sustained some damage. In the city of South Milwaukee, a business's sign and fence were destroyed by the winds.

November 2003 - Strong winds occurred over parts of south-central and southeast Wisconsin. Maximum wind gusts were generally in the 39 to 49 kts range (45 to 57 mph). Some large trees or large tree branches toppled onto power lines, resulting in loss of commercial power for a couple of hours. The gusts caused a construction crane to be pushed against the wall of a hospital in Milwaukee (Milwaukee Co.), resulting in window and trim damage. At least 6200 customers in southeast Wisconsin lost electrical power, but there were no serious fires, injuries, or deaths.

April 2004 – Strong gradient winds affected south-central and southeast Wisconsin for many hours. Maximum wind gusts were generally in the 40 to 49 kt range (46 to 57 mph). There were numerous newspaper reports of broken tree branches hitting power lines with a resultant power outage. Strong cross winds may have been indirectly responsible for the death of a motorcyclist who lost control and crashed in a farm field in the Town of Yorkville of Racine County. Electrical companies estimated that about 20,000 customers in south-central and southeast Wisconsin lost power at one time or another.

November 2005 – Powerful southwest to west winds gusts up to 55 knots (63 mph) raked parts of south-central and southeast Wisconsin after a cold front had passed through the area. The usual reports of wind-broken tree branches falling on power lines were noted in newspapers. The estimated power-line damage in each of the other south-central and southeast counties was around \$10,000. Specific peak wind gusts include 55 knots (63 mph) on the UW-Milwaukee campus in Milwaukee County.

January 2006 – Strong post, cold-frontal northwest winds, gusting to 39 to 44 knots (45 to 51 mph), affected south-central and southeast Wisconsin. Scattered power outages were noted due to broken tree branches hitting power-lines. Some of the broken tree branches littered road surfaces, and the usual garbage cans across the street prevailed.

April 2006 – On April 13, three hail-producing severe thunderstorms occurred in southern Wisconsin. Hail up to 4.25 inches in diameter fell across a large swath from Mineral Point to north of Milwaukee. Based on insurance company information, the April 13 hailstorm resulted in total damage of approximately \$420 million, making it the most costly hailstorm day in Wisconsin history. Statewide, over 50,000 vehicle claims, 40,000 residential claims, and about 6,400 business/farm claims were filed. The first of the three hailstorms was the single costliest

thunderstorm in Wisconsin weather history, with damage estimated at \$300 million, far exceeding anything related to tornados. Two main hailstorms affected Milwaukee County. The first hailstorm left a swath of hail and hail damage from southern Iowa County, through central Dane County, through northern Jefferson County, through northern Waukesha County, to northern Milwaukee County by. This storm produced mainly 1 to 4 inch diameter hail. The second storm produced hailstones up to 1.5 inch in diameter. Damage was widespread and extensive with the hailstorms. Thousands of motor vehicles, residential homes, businesses, and farms sustained hail damage, but luckily, there were no reports of injuries or deaths. Vehicle damage consisted of broken windows and dented sheet metal. Roofs, windows, and siding of buildings were damaged. Many water-birds were killed on several inland lakes. This hailstorm on April 13th was the most costly hailstorm to affect Wisconsin. Insurance company numbers, as provided to the Milwaukee/Sullivan WFO (monetary value of claims and number of claims), were not broken down by county. Therefore, estimated county-by-county breakdowns were derived - based on area affected in each county by hailstones 1.0 inches or larger, county population density, and relative sizes of the 20 largest insurance companies in Wisconsin. \$7.93 million in losses were reported in Milwaukee County.

June 2006 – Trees and power lines down on Potter Rd. Numerous thunderstorms developed during the early morning hours of June 21st, producing mainly damaging straight line winds. Trees and power lines were reported down across many areas of south-central and southeast Wisconsin. A funnel cloud was also reported in Dane County and a hail report was received from Rock County. Synoptically, thunderstorms developed along a warm front that extended from northeast Iowa, into southern Wisconsin and across Lake Michigan into Lower Michigan. A layer of drier air aloft contributed to the cause for wind damaging thunderstorms.

3.1.4 Drought

A drought is an extended period of unusually dry weather. Drought is a special type of disaster because its occurrence does not require evacuation of an area nor does it constitute an immediate threat to life or property. People are not suddenly rendered homeless or without food and clothing. The basic effect of a drought is economic hardship, but it does, in the end, resemble other types of disasters in that victims can be deprived of their livelihoods and communities can suffer economic decline.

The effects of drought become apparent with a longer duration because more and more moisture-related activities are affected. Non-irrigated croplands are most susceptible to moisture shortages. Rangeland and irrigated agricultural lands do not feel the effects as quickly as the non-irrigated, cultivated acreage, but their yields can also be greatly reduced due to drought. Reductions in yields due to moisture shortages are often aggravated by wind-induced soil erosion. Under extreme drought conditions, lakes, reservoirs, and rivers can also be subject to severe water shortages, which greatly restrict the use of their water supplies. In periods of severe drought, range fires can destroy the economic potential of the livestock industry, and wildlife habitat in, and adjacent to, the fire areas.

The understanding that a deficit of precipitation has different impacts on groundwater, reservoir storage, soil moisture, snowpack and streamflow led to the development of the Standardized Precipitation Index (SPI) in 1993. The SPI quantifies the precipitation deficit for multiple time scales. These time scales reflect the impact of drought on the availability of the different water resources. Soil moisture conditions respond to precipitation anomalies on a relatively short scale. Groundwater, streamflow, and reservoir storage reflect longer-term precipitation anomalies. For these reasons, the SPI is calculated for 3-, 6-, 12-, 24- and 48-month time scales.

The SPI calculation for any location is based on the long-term precipitation record for a desired period. This long-term record is fitted to a probability distribution, which is then transformed into a normal distribution so that the mean SPI for the location and desired period is zero. Positive SPI values indicate greater than median precipitation and negative values indicate less than median precipitation. Because the SPI is normalized, wetter and drier climates can be represented in the same way and wet periods can also be monitored using the SPI.

The classification system shown in the SPI values table (below) defines drought intensities resulting from the SPI. The criteria for a drought event are also defined for any of the time scales. A drought event occurs any time the SPI is continuously negative and reaches an intensity of -1.0 or less. The event ends when the SPI becomes positive. Each drought event, therefore, has a duration defined by its beginning and end and an intensity for each month that the event continues. The positive sum of the SPI for all the months within a drought event can be termed the drought's "magnitude." Current SPI maps for the United States can be found at <http://www.drought.unl.edu/monitor/spi.htm>.

SPI Values	
2.0+	Extremely wet
1.5 to 1.99	Very wet
1.0 to 1.49	Moderately wet
-0.99 to 0.99	Near normal
-1.0 to 1.49	Moderately dry
-1.5 to -1.99	Severely dry
-2.0 and less	Extremely dry

<http://www.drought.unl.edu/whatis/indices.htm#spi>

The Palmer Index is an older scale and is used more often by governmental organizations. It is effective in determining long-term drought (i.e., over several months) and is not as good with short-term forecasts (i.e., weeks.) It uses a zero as normal; drought is shown in terms of negative numbers and excess moisture is reflected by positive figures. The future incidence of drought is highly unpredictable and may also be localized, making it difficult to determine probability with any accuracy.

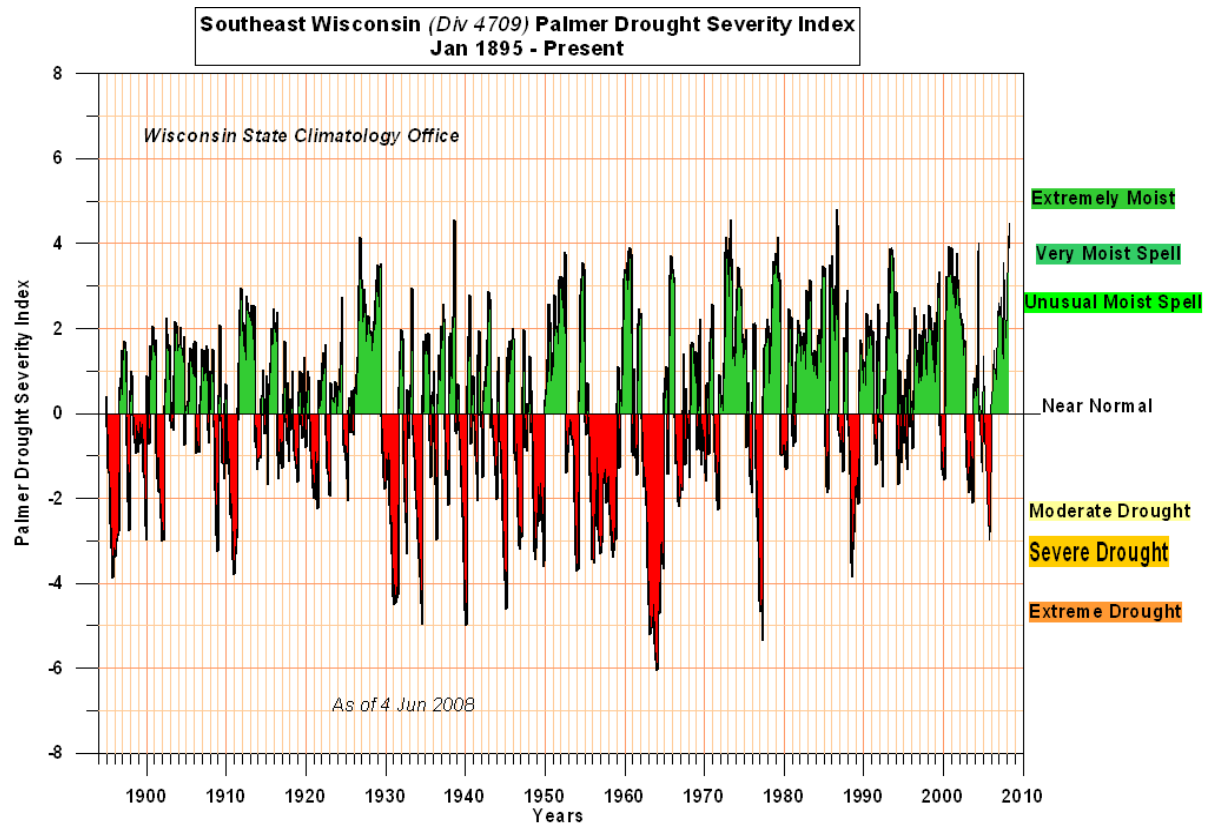
Drought conditions may vary from below-normal precipitation for a few weeks to a severe lack of normal precipitation for several months. Drought primarily affects agricultural areas because the amount and timing of rainfall has a significant impact

on crop production. The severity of a drought cannot therefore be completely measured in terms of precipitation alone but must include crop yields.

Frequency of Occurrence

Drought is a relatively common phenomenon in Wisconsin and has occurred statewide in 1895, 1910, 1939, 1948, 1958, 1976, 1988, 1992, 2003 and 2005. The 1976 drought received a Presidential Emergency Declaration with damage to 64 Wisconsin counties, including Ozaukee. Estimated losses of \$624 million primarily affected the agricultural sector. Reports show that Ozaukee County was as affected as the rest of the state in this drought, receiving money for emergency feed programs for livestock and for increased fire protection of its wilderness areas. It should be noted that only 19% (\$119,434,924) of this loss was compensated by any federal program.

The Palmer Index chart for the years between January, 1895 and December, 2006 in Southeastern Wisconsin, which includes Ozaukee County follows:



<http://www.aos.wisc.edu/~sco/clim-watch/graphics/pdsi-ts-09-l.gif>

3.1.4.1 Description of Previous Drought Events

Small droughts of short duration have occurred in Wisconsin at an interval of about every 1 to 10 years since the 1930's. Extended, widespread droughts have been infrequent in Wisconsin. The 5 most significant droughts, in terms of severity and duration, are: 1987-1988, 1976-1977, 1955-1959, 1948-1950 and 1929-1934. The history of drought in Wisconsin, as presented in the State of Wisconsin Natural Hazards Mitigation Plan (State of Wisconsin, 2002) is summarized below:

1929-1934 – This drought probably was the most significant in Wisconsin history, considering its duration as well as its severity. This drought had at least a 75-year recurrence interval in most of the state and over a 100-year recurrence interval in certain areas. The austere economic aspects of the Depression compounded its effects. The drought continued with somewhat decreased effect until the early 1940's in some parts of the state.

1948-1950 – Drought was most significant in the northern part of the state. In the most severely affected areas, the drought had a recurrence interval of greater than 70 years.

1955-1959 – This drought had a recurrence interval of between 30 and 70 years in all but the northwestern corner of Wisconsin.

1976-1977 – This drought was most severe in a wide band stretching from north to south across the state. Stream flow measuring stations recorded recurrence intervals from 10 to 30 years. Agricultural losses during this drought were set at \$624 million. Sixty-four counties were declared federal drought areas and deemed eligible for assistance under the Federal Disaster Relief Act. Additionally, numerous private and municipal wells went dry. Federal assistance was used to help communities drill new wells and obtain new water supplies.

1987-1988 – Some believe this drought was the most severe ever experienced in Wisconsin and much of the Midwest. It was characterized not only by below normal precipitation, but also by persistent dry air and above normal temperatures. Stream flow measuring stations indicated a recurrence interval of between 75 and 100 years. Its effects were most severe in north-central and northeastern Wisconsin. The drought occurred early in the growing season and resulted in a 30-60 percent crop loss, with agricultural losses set at \$1.3 billion. Fifty-two percent of the state's 81,000 farms were estimated to have crop losses of 50 percent or more, with 14 percent estimated having losses of 70 percent or more. A combination of state and federal drought assistance programs helped the state's farmers recover a portion of their losses. All Wisconsin counties were designated eligible for this drought assistance. The effect of this drought on municipal and private water supplies was not as severe, with only a few reports of individual wells drying up. A number of municipal water utilities experienced maximum use of their water delivery systems. Many water utilities imposed some type of water-use reduction rules or restrictions, usually involving the limitation of lawn sprinkling and yard watering.

3.1.5 *Earthquakes*

An earthquake is a trembling of the ground that results from the sudden shifting of plates beneath the earth's crust. Earthquakes occur along geologic faults in the earth's crust, which are fractures or fracture zones in the earth across which there may be relative motion. The nearest fault to Wisconsin is the New Madrid fault, which stretches along the central Mississippi Valley

in Missouri. Earthquakes may cause landslides and rupture dams. Severe earthquakes destroy power and telephone lines, gas, sewer, or water mains, which, in turn, may set off fires and/or hinder firefighting or rescue efforts. Earthquakes also may cause buildings and bridges to collapse.

The likelihood of an area to experience an earthquake is expressed as a Seismic Risk Zone Value. Seismic Risk Zones are numbered 0 to 4, with a 4 representing the highest likelihood of a serious earthquake. Milwaukee County is rated a 0 on the Seismic Risk Zone scale.

Six earthquakes have occurred in Milwaukee County since 1906 with the last one occurring in 1987. Three have ranged in the magnitude from 3.0 – 3.9 on the Richter scale and the other three have been in the 4.0-4.9 range. A magnitude 4.0 earthquake, centered just south of Milwaukee, shook Milwaukee County on May 6, 1947. Some residents that felt the quake ran into the streets thinking there was a major explosion, damage was limited to some broken windows and glassware that fell from shelves. (State of Wisconsin, 2002).

3.1.6 Heat Waves

A heat wave is an extended period of high temperatures or high temperatures and elevated humidity. This natural hazard has become the most deadly disaster in Wisconsin in recent times. During extended periods of very high temperatures individuals can suffer a variety of ailments including heat exhaustion and heat stroke. Heat stroke in particular is a life threatening condition that requires immediate medical attention, and the majority of deaths during a heat wave are a result of heat stroke. The elderly, disabled and the debilitated are most susceptible to heat stroke. Large and highly urbanized cities, such as those in Milwaukee County, can create an island of heat that can raise the temperature by 3 to 5 degrees Fahrenheit. Therefore, communities with large populations of elderly, disabled and debilitated people can face a significant medical emergency. In addition to posing a public health hazard, periods of excessive heat usually result in high electrical consumption for air conditioning, which can cause power outages or brown outs. (State of Wisconsin, 2002).

The Heat Index estimates the relationship between these two conditions and reports them as a danger category, as can be seen in the following table.

Heat Index and Disorders Table			
Danger Category		Heat Disorders	Apparent Temperatures [°F]
IV	Extreme Danger	Heatstroke or sunstroke imminent.	>130
III	Danger	Sunstroke, heat cramps, or heat exhaustion likely; heat stroke possible with prolonged exposure and physical activity.	105-130
II	Extreme Caution	Sunstroke, heat cramps, and heat exhaustion possible with prolonged exposure and physical activity.	90-105
I	Caution	Fatigue possible with prolonged exposure and physical activity.	89-90

FEMA, 1997; NWS, 1997

The major risks to people due to extreme heat are:

Heatstroke – a potentially lethal medical emergency where the ability of a person to thermo-regulate is compromised resulting in the rise of the body’s core temperature to above 105°F (Fahrenheit).

Heat Exhaustion – a less threatening medical condition where the victim complains of dizziness, weakness and/or fatigue. The victim may have a normal or slightly elevated temperature and usually can be successfully treated with fluids.

Heat Syncope – a sudden “faint” or loss of consciousness usually brought on by exercising in warmer weather than one is accustomed to, usually no lasting effect.

Heat Cramps – muscular cramping brought on by exercising in warmer weather than one is accustomed to, no lasting effect.

Extreme heat conditions may also affect pets and livestock, decreasing agricultural output by the latter. Crops may suffer reduced yield due to extremely hot conditions.

The most deadly heat wave that occurred in Milwaukee County was during the week of July 15th, 1995. This was a natural disaster in terms of illness and deaths caused by excessive heat and humidity. According to the County Medical Examiner, 85 deaths were attributed directly to the heat and humidity. This would make this event one of the highest death counts caused by natural phenomena in Milwaukee's history. (Milwaukee County Hazard Analysis, 2003). In response to this disaster, Milwaukee has developed and instituted a plan for excessive heat conditions. This Plan is included in *Appendix C*.

3.1.7 Coastal Erosion

Coastal erosion is defined as the wearing away of land and the loss of beach, shoreline, or dune material over a period of time as a result of natural coastal processes or human influences. Characteristics such as supply of sand and processes such as lake level change currents, tides, waves, and wind are natural factors that contribute to the rate of erosion. Human-caused contributors to erosion include dredging tidal entrances, jetty and groin construction, hardening shorelines with seawall, revetments, beach nourishment, construction of harbors, and sediment-trapping dams in the river tributaries. (State of Wisconsin Hazard Mitigation Plan, 2008).

Coastal erosion is a naturally occurring process that can accelerate during times of high water or wave action. For example, bluff erosion is more likely to occur during a major storm event due to strong wave action upon the shoreline or from heavy precipitation. The effect of erosion is usually greater during times when water levels are high. The freezing and thawing of lake ice can also contribute to erosion. There are 3 types of coastal hazards that can affect Milwaukee County:

- Erosion of coastal bluffs, banks, beaches and near shore lake beds,
- Flooding from upland runoff, high lake levels and storm induced surge,
- Damage to shoreline structures from storm waves

Coastal erosion affects Wisconsin along the shoreline of Lakes Michigan and Superior. Along the Great Lakes, cyclical changes in lake levels, disruption of long shore transport of beach building material and storms all influence the rate of erosion. According to the National Research Council, a congressionally chartered, non-profit organization that provides science and technology advice, annual variability in wave climate and lake levels causes the rates of bluff and dune erosion along the shores of the Great Lakes to vary from near zero to tens of feet per year.

As high-lake levels increase, bluff recession rates also increase. Increasing assaults by wave action against the base of the bluff cause erosion and beach-building sediments. Navigational improvements and dredge-material disposal practices deplete both tributary and shore land sources of sediment. Removing these sediments from the shore system contributes to erosion. Ice ridges that form and break up each winter along the shoreline cause erosion by trapping sand in floating fragments of ice that are carried offshore into deep water. This continual natural process is one of the principal mechanisms by which sand is lost from the near shore system [USGS, 1992].

3.1.7.1 Location and Extent of Previous Coastal Hazards Events

Coastal communities in Milwaukee County include Bayside, Cudahy, Fox Point, Milwaukee, Oak Creek, Shorewood, South Milwaukee, St. Francis, and Whitefish Bay. Below is a list of some of the coastal events that have happened in Milwaukee County as chronicled in local newspapers and by the NWS.

March 1987. Northeast winds of 55 to 60 mph created 10-foot high waves that pounded the Lake Michigan shoreline. There was significant shoreline and bluff erosion all along the coast. Waves crashed over Lincoln Memorial Drive leaving up to 1 foot of water over the road in some spots. The new sewage treatment plant at Jones Island was closed due to flooding in the tunnels below the plant. (Storm Pounds Lakeshore. Milwaukee Journal, March 9, 1987).

June 1997. During one of the largest rainfall events to ever occur in Milwaukee, a portion of a bluff collapsed in Juneau Park along the Lake Michigan shoreline after soils became over saturated. A 50-foot section of the lakeside bluff at Klode Park, in Whitefish Bay, slid into Lake Michigan, taking trees with it. North of Klode Park, a 200-foot strip of private land slid into the lake. There was other scattered damage to stairways located along the Lake Michigan bluffs.

3.2 HAZARD PRIORITIZATION

Between 1986 and the present, 15 federal and/or state disasters have been declared in Milwaukee County. Declared disasters have included 10 floods, 1 tornado, 1 ice storm, and 3 excessive snowfall events. Further information on these disaster events is presented in subsequent sections of this Plan.

Hazard prioritization was discussed at public meetings held in the Milwaukee County communities of Brown Deer, Cudahy, Franklin, and Wauwatosa. Generally, communities of Milwaukee County identified flooding as the hazard of primary concern, followed by tornados.

Hazards discussed and evaluated during the interviews and public meetings are presented in **Table 3-3**.

TABLE 3-3 HAZARDS EVALUATED DURING PDM PLAN DEVELOPMENT	
Natural Hazards	Geologic Hazards
Thunderstorms & Lightning	Earthquakes
Tornados	
Windstorms	Hydrologic Hazards
Hailstorms	Floods
Severe Winter Storms	
Extreme Heat & Cold	

Hazard prioritization was accomplished by determining which hazards had caused prior fatalities, resulted in property damage, had the potential to cause the most economic hardship within the County, and had the potential to affect Milwaukee County residents in the future. Based on review of the historical record and local knowledge, Milwaukee County identified 4 major hazards that consistently affect this geographic area – flooding, severe winter storms, excessive heat, and severe thunderstorms including high winds, hail and tornados. In addition, municipalities were asked to rate hazards based on frequency of occurrence, damage, cost of damages, and several other factors. The table below shows which hazards were identified as possessing the most risk, based on these factors, for each municipality. The completed Natural Hazard Identification and Risk Assessment Matrices are included in **Appendix A** of this plan.

The table below identifies which municipalities are at risk for the identified hazards in this plan.

Table 3-3a

Top Hazards as Identified by Municipality									
HAZARD	Bayside	Brown Deer	Cudahy	Fox Point	Franklin	Glendale	Greenfield	Hales Corners	Oak Creek
Hail Storms			X						
Lightening Storms			X						
Thunderstorms			X		X				
Tornado/High Winds								X	
Flash Flooding					X				
Riverline Flooding	X	X		X		X			X
Lake Flooding									
Storm water Flooding					X			X	
Forest Fires									
Wildland Fires									

Coastal Hazards									
Heavy Snow Storms						X			
Ice Storm	X	X		X	X	X	X	X	X
Blizzard	X	X		X	X	X	X	X	X
Extreme Cold	X	X		X	X	X	X	X	X
Extreme Heat									
Agriculture									
Fog									

Top Hazards as Identified by Municipality

HAZARD	River Hills	Shorewood	South Milwaukee	St. Francis	Wauwatosa	West Allis	West Milwaukee	Whitefish Bay
Hail Storms								
Lightening Storms				X				
Thunderstorms			X	X				
Tornado/High Winds			X	X				
Flash Flooding			X					
Riverline Flooding	X	X						X
Lake Flooding								
Storm water Flooding			X	X				
Forest Fires								
Wildland Fires								
Coastal Hazards								
Heavy Snow Storms	X	X	X	X	X	X	X	X
Ice Storm	X	X	X	X	X	X	X	X
Blizzard	X	X	X	X	X	X	X	X
Extreme Cold			X					
Extreme Heat								
Agriculture								
Fog			X					
Landslide								
Subsidence								

3.3 ASSESSING VULNERABILITY: IDENTIFYING ASSETS & VULNERABLE POPULATIONS

Assessing vulnerability requires understanding the location and importance of those things that the community value most. For purposes of this risk assessment, building structural values: buildings that house people and critical services to the community were identified as the most valued community resources. To assess the vulnerability of these community assets, a model of

their locations and characteristics was developed to be used in conjunction with hazard profiles for performing the risk assessment.

3.3.1 Building Values

Analysis of building stock values is based on the building stock data available from the FEMA HAZUS software. Building stock data available in HAZUS was compiled at the census block level. *Map 3-1A* through *Map 3-1E* show building stock values by census block.

3.3.2 Critical Facilities and Infrastructure

Critical facilities are of particular concern because they provide, or are used to provide, essential products and services that are necessary to preserve the welfare and quality of life and fulfill important public safety, emergency response, and/or disaster recovery functions.

Critical facilities are defined as facilities critical to government response and recovery activities (i.e., life safety and property and environmental protection). Critical facilities include: 911 emergency call centers, emergency operations centers, police and fire stations, public works facilities, sewer and water facilities, hospitals, bridges and roads, shelters, and facilities that, if damaged, could cause serious secondary impacts (i.e., hazardous material facility). Critical facilities also include those facilities that are vital to the uninterrupted delivery of community services or have large vulnerable populations. These facilities may include: buildings such as the jail, law enforcement centers, public services buildings, community corrections center, courthouses, and juvenile service buildings and other public facilities such as hospitals. *Appendix D* lists critical facilities in Milwaukee County.

Critical facilities data were obtained by mapping the FEMA HAZUS critical facilities data and Milwaukee County's Special Facilities database, in addition to soliciting the input of each municipality. The maps were reviewed, corrected, and enhanced during public meetings.

3.3.3 Future Growth and Land Use Trends

Milwaukee County has been slowly losing population since 1970. The U.S. Census indicates that Milwaukee County lost 2 percent of its population between 1990 and 2000. According to U.S. Census Bureau, the projected population for Milwaukee County in 2020 is 1,014,293. Manufacturing and retail play a major role in the economy of Milwaukee County and this trend is not expected to change in the future.

Most citizens in Milwaukee County and surrounding communities believe that substantial social, economic and environmental change will occur over the next fifty years. Whether they foresee positive or negative changes ahead, all seemed to want acquisition and protection of green and open space to bring them closer to their vision of a sustainable, desirable Wisconsin for their children. Some of the changes that appear likely over the next fifty years are:

- An increasing urban population, with a continuing trend in land being divided into smaller and smaller parcels;
- Land continuing to increase in value at a rate far greater than inflation;
- Far fewer small farming operations;
- More private land closed to public access, and more pressure on the recreational use of public lands as the population increases and more private land is closed to public access;
- An increase in the number and distribution of invasive species;
- More ecological fragmentation;
- More problems managing rapidly growing populations of urban game animals;
- Climate change altering species composition and distribution;
- More demand for a variety of non-motorized recreational activities on public lands, and more conflicts between user groups of public lands.

(Milwaukee County LWRMP, April 2006)

Many communities within Milwaukee County have reached the point that no new development can occur. The exceptions to this would be Bayside, River Hills, Franklin and Oak Creek where there are large areas of undeveloped land.

Bayside

The land in Bayside is used for housing, commercial businesses, public facilities, transportation and recreation. About 81% of the total acreage is zoned for residential use; 15% is natural conservancy (the 225 acre Schlitz Audubon Nature Center and the northern ravines of Nature Conservancy); and 4% comprises commercial, recreational and transportation use. The existing land pattern has developed over time largely because of the Village's proximity to Lake Michigan, as well as the focused residential-only development.

The Village is nearly built-out in terms of possible new development. At this time, the main area open for possible redevelopment would be the western corridor of the Village. Currently zoned for business, as well as commercial overlay, the area serves several purposes. Perhaps the greatest indicator of possible development would be the amount of vacant land within the Village. With less than ten (10) acres of total residential and commercial vacant land, the opportunity to build becomes much more limited. Land Demand

Because the Village is a fully-built community, there is only a small percentage of total acreage that can be considered for development of redevelopment. Growth forecasts indicated a stable residential population through the year 2035. Perhaps the greatest potential lies within the opportunity for existing homes to be razed to make way for new (and possibly larger) single-family homes. Regional land supply and demands will most likely be met in adjacent suburban communities that have yet to experience full build-out. (Village of Bayside Comprehensive Plan 2010)

River Hills

While types and intensities of land use in the Village of River Hills is expected to change very little over the next two decades, there is expected to be an increase in the urban population and the continued subBureau of land into smaller parcels throughout Milwaukee County. Urban and suburban development in the form of residential, commercial, and industrial, and highway

expansion in neighboring communities may impact the village and its natural resources (e.g. in the form of storm water runoff, water quality, traffic, etc.) (River Hills Comprehensive Plan, 2009)

Franklin

Growth pressures in Milwaukee County and surrounding areas has influenced Franklin over the past 20 years. In particular, much of the agricultural land that existed 20 years ago in Franklin has been converted to residential, commercial, or industrial uses.

A comparison of the 1985 City of Franklin land use inventory (to the 2005 land use inventory indicates that the amount of the City comprised of undeveloped lands decreased, from about 73 percent in 1985 to about 61 percent in 2005; and correspondingly, the amount of the City comprised of developed lands increased, from about 27 percent in 1985 to about 39 percent in 2005. More specifically: agricultural and other undeveloped lands decreased by about 3,400 acres or about 20 percent; residential uses increased by about 1,300 acres or about 40 percent; commercial uses increased by about 500 acres or about 280 percent; and industrial uses increased by about 700 acres or about 470 percent. (City of Franklin Comprehensive Plan, 2009)

According to the Wisconsin Department of Administration's Demographic Services Center, the population growth between 2005 and 2025 is expected to slow down, but still increase by about 24 percent, or an average of about 12 percent per decade (this is about half the rate of growth that the City experienced per decade between 1960 and 2000, but is still greater than all but one other community in Milwaukee County). Furthermore, the amount of this growth (about 7,900 persons), is anticipated to be greater than any other community in Milwaukee County.

This growth will have a significant impact on land uses in the City and the demands for services and will exert an influence on the character of the community. Predicting which trends will continue, and which will change, is very difficult. For instance, within the City of Franklin (as with most suburban communities) the single family house has historically increased in size, while subBureaus have decreased in density. If these two trends continue, and no other trends change, fewer residential units would be constructed, and the population of the City at full build-out would be less. On the other hand, if residential density increased (through such means as traditional neighborhood design, mixed-use design, greater amounts of multi-family development, redevelopment, or market factors such as increases in the price of land and/or building supplies), and other trends remained the same, more residential units would be constructed, and the population of the City at full build-out would be greater.

3.3.4 Vulnerable Populations

Score = societal variable value for census tract / highest societal variable value occurring in region*

Example (Age Less than 18 years):

21.3% (or 694 out of 3265 individuals) in tract 55079101300 are under 18 years of age. Normalizing this value relative to the maximum value found in the region (tract 55079090500: 101 out of 341, or 29.6%) results in a score of 0.72 (or 21.3% divided by 29.6%) on a unitless scale of 0 to 1.

This formula scores each tract's societal variable relative to the highest value found in the region, normalizing values to a scale that is uniform across all variables for all tracts in a region. This allows direct comparisons between each tract in a region.

Societal Variables:

- Population Density
- Age > 64 (SF1 P12 table)
- Age < 18 (SF1 P12 table)
- Income < Poverty Level (SF4 PCT141 table)
- No High School Diploma (SF2 PCT25 table)
- Population with Disabilities (SF3 P119 table)
- Population on Public Assistance (SF3 P64 table)

The average societal vulnerability score was assigned to each tract by summing the individual societal vulnerability scores and dividing by 7, the total number of societal variables that were evaluated.

**Regions:*

- Bayside, Brown Deer, Fox Point, Glendale, River Hills, Shorewood, and Whitefish Bay
- Wauwatosa, West Allis and West Milwaukee
- Franklin, Greendale, Greenfield, and Hales Corners
- Cudahy, Oak Creek, South Milwaukee and St. Francis

3.4 HAZARD PROFILES

Hazard profiles define the frequency, location, and intensity of hazards that may impact a community. Profiles were developed for hazards that historically have had the most effect on the community and those that the community identified during public meetings as being of the most concern.

3.4.1 Hazard Frequency

The frequency of past hazard events was calculated to determine the probability of future hazards occurring. Accurate and consistent records have not been kept for many hazards. Data from the National Oceanic and Atmospheric Administration (NOAA) National Climate Data Center

Storm Events database was used to compile frequencies of natural hazards. *Table 3-4* summarizes this data for Milwaukee County.

Hazard	Number of Events	Period of Record (In Years)	Frequency (In Years)
Flooding	29	9	3.2
Winter Storms/Extreme Cold	35	10	3.5
Tornados	19	45	0.42
Wind/Thunderstorms/Hail	219	46	4.8
Extreme Heat	24	45	0.45
Coastal Erosion	2	10	0.20

3.4.2 Hazard Impact Areas

Hazard impact areas describe the geographic extent a hazard can impact a jurisdiction and are uniquely defined on a hazard-by-hazard basis as discussed below. For purposes of conducting the risk analysis, all the hazard impact areas were defined as the percentage of area in each census block that would be affected.

3.4.2.1 Flooding

The types of floodplain maps required to model flooding in a GIS are vector representations of the floodplain boundaries like the FEMA Q3 maps. The Q3 maps were obtained from Milwaukee County in a GIS format. The flood map area was intersected with the census blocks in the GIS to define area of impact by block. *Map 3-3A* through *Map 3-3E* depicts the percentage of area potentially impacted by flooding by census block. The same technique was used in determining the building and societal exposure. Critical facilities exposure was determined by geo-locating facilities via GIS and then selecting those facilities that lay within the floodplain.

Results are shown in Table 3-5. This information will be updated when a new risk analysis is conducted for Milwaukee County.

Additional information was obtained from the State of Wisconsin Hazard Mitigation Plan, which performed a loss estimation for each county in Wisconsin using the HAZUS-MH. The HAZUS-MH flood modeling was performed one county at a time. A stream network was delineated for every square mile within the county. The HAZUS-MH flood model performs an area weighted assessment of flood damage.

Milwaukee County is the county with the highest total of building exposure: **\$78,904,721**. The sheer volume of structures and the number of rivers within Milwaukee County allow for such a high building exposure amount.

The following figures detail the building loss and economic loss for Milwaukee County, in addition to short term shelter requirements.

Estimated Total Buildings:	256,229
Total Damaged Buildings:	1,059
Total Building Exposure X1000:	\$78,904,721
Total Economic Loss X1000:	\$286,370
Short Term Shelter:	13,038 persons

Source: State of Wisconsin Hazard Mitigation Plan

The following is a list of things that may be adversely affected by a flooding.

- Infrastructure – flooded public facilities and schools
- Utilities – flooded pumping stations, down electric lines/poles/transformers, telephone lines, lost radio communication
- Roadways – washouts, inundated roadways, debris clean-up
- Residential structures – flooded basements, damaged septic systems
- Businesses – loss of commerce

Repetitive Loss Structures

There are 268 repetitive loss structures within Milwaukee County. The following is a list of the municipalities within Milwaukee County with identified repetitive loss structures.

Bayside	2
Brown Deer	9
Glendale	9
Milwaukee	220
Oak Creek	1
River Hills	2
Wauwatosa	23
West Allis	2

3.4.2.2 Winter Storms

The entire project area is in a single climate region (Dfb) according to the Köppen Climate Classification for the Conterminous United States modified by Glen Trewartha of the University of Wisconsin – Madison. (Introducing Physical Geography, 2003). Characteristics of the Dfb classification are:

- ☐ Humid
- No Dry Season
- Coldest Average Temp Less than 26.6 degrees Fahrenheit
- Warmest Average Temp is Less than 71.6 degrees Fahrenheit

Topographically there are no significant features that generate localized climate conditions and present significant changes in hazard risk in the project area. Therefore the hazard profile area for winter storms is uniform over the entire project area.

Estimates for building exposure were obtained by summing up the building stock values from FEMA. For societal exposure the sum of the population from the census tracts was used. Critical Facilities were obtained from the Milwaukee County Special Facilities Database and from direct input from each municipality. These Results are also located in Table 3-5.

The following is a list of things that may be adversely affected by a winter storm.

- Infrastructure – operation of emergency services, operation of public facilities and schools
- Utilities – down power and telephone lines
- Transportation – automobile accidents, roadway plowing, salting/sanding
- Residential – roofs
- Businesses –commerce

3.4.2.3 Severe Thunderstorms

According to FEMA's wind zone classifications, the entire project area is in Zone III (200 mph Design Wind Speeds). FEMA also lists Milwaukee County as a single classification for tornado frequency (6-10 per 1,000 square miles). Based on review of weather data and the determinations made for tornados, windstorms and winter storms, the entire project area has been classified with a uniform risk for severe thunderstorms including tornados and hail.

The State of Wisconsin Hazard Mitigation Plan offers additional information regarding Tornado Loss Estimation for Structural and Contents Damage within Milwaukee County. According to the State's Mitigation Plan, Milwaukee County has a potential loss estimation of **\$171,688,144**. This takes into account the types of housing (i.e. manufactured housing, non-engineered wood frame, etc.) to determine the loss estimate for structures and contents. Total annual damage and total future risk for moth manufactured and non-engineered wood frame homes for Milwaukee County has been determined to: **\$2,130,649, 871**.

The following information details tornado loss estimates by total damages (death, injury, and property damage).

Total # of Injuries (1950-5/31/2008):	176
Annual Probability of an Injury:	3.0662
Estimated annual loss (injury):	\$32,358
Estimated annual loss (property damage):	\$135,070
Estimated annual lost (injury, death, and property)	\$167,428

Source: State of Wisconsin Hazard Mitigation Plan, 2008.

3.4.2.4 Coastal Erosion

The entire lake shore of Milwaukee County is vulnerable to coastal erosion. This includes the cities of Bayside, Cudahy, Fox Point, Oak Creek, Shorewood, South Milwaukee, St. Francis, and Whitefish Bay. The most damage occurs during periods of high lake levels and appears to occur in cycles. (WCGAP)

Exposure for vulnerability was determined by using GIS. Census blocks that were within 500 feet of the Lake Michigan shoreline were identified. Population and building stock values were then summarized to obtain the societal exposure and building exposure. Critical facilities that were within 500 feet of the shoreline were also selected. Table 3-5 shows the results of these analyses.

The following is a list of things that may be adversely affected by coastal erosion.

- Community facilities – schools
- Public Service - police and fire departments
- Utilities - power lines, telephone lines, water in takes, wastewater outflows
- Transportation – loss of roads

The State of Wisconsin Hazard Mitigation Plan offers further information regarding potential damage and loss from coastal hazards in Milwaukee County. This plan identifies both high and low coastal erosion risk. The data used for the coastal erosion analysis were derived from existing maps depicting rates of coastal erosion and the FEMA HAZUS-MH inventory of structures in the coastal zone.

High erosion risk is defined as the area within one quarter mile of the coast and low erosion risk is defined as the area within a half mile. Residential, commercial, and governmental structures within the high or low erosion risk area are included in the following figures:

High Erosion Risk

Total Structures in Boundary: 6,513

Residential Structures at Risk: 6,446

Commercial: 67

Government: 0

Loss Estimation: \$313,488,140

Residential Loss: \$309,670,740

Commercial Loss: \$3,817,400

Government: \$0.00

Low Erosion Risk

Total Structures in Boundary: 15,977 H

Residential Structures at Risk: 15,669

Commercial: 302

Government: 6

Loss Estimation: \$1,243,893,400

Residential Loss: \$1,221,789,640

Commercial Loss: \$21,579,320

Government: \$524,440

3.4.2.5 Excessive Heat

On average more than 1,500 people die every summer from heat related events (EPA). During extended periods of excessive heat, Milwaukee County acts as a Heat Island due to its urbanization. In response to previous excessive heat events, Milwaukee County has developed a Plan for Excessive heat Conditions. This has been included in Appendix C. Based on review of weather data and the determinations made for tornados, windstorms and winter storms, the entire project area has been classified with a uniform risk for Excessive Heat.

Estimates for building exposure were obtained by summing up the building stock values from FEMA. For societal exposure the sum of the population from the census blocks was used. Critical Facilities were obtained from the Milwaukee County Special Facilities Database. These Results are also located in Table 3-5.

The following is a list of things that may be adversely affected by coastal erosion.

- Community facilities – Hospitals, Public Service - police and fire departments
- Utilities – Power plants, power lines,
- Transportation – creation of pot holes from pavement exploding due to heat.

3.4.2.6 Drought

Drought will not be profiled in this report. This is due to there being very few agricultural operations within the county, that most of the county residents draw their drinking water from Lake Michigan, and that the community did not identify drought as a major concern.

3.4.2.7 Earthquakes

Earthquakes will not be profiled in this report. This is due to the distance from closest known fault line, the New Madrid Fault in Missouri, that no major damage from earthquakes has historically occurred in the community, and that the community did not identify earthquakes as a major concern

3.5 ASSESSING VULNERABILITY: ESTIMATING POTENTIAL LOSSES

3.5.1 *Hazard Magnitudes*

The percentage of structures or people exposed to a hazard that are negatively impacted, and the amount they are impacted, is related to the nature of the hazard and intensity of the event and is expressed as the hazard magnitude. Estimates of hazard magnitude were based on researching historical disaster records and other relevant data. Hazard magnitudes are expressed as a percent of structures or population impacted.

3.5.2 *Risk Calculations*

Risk calculations present a quantitative assessment of the vulnerability of structures, populations, and critical facilities to individual hazards and cumulatively to all hazards. The equation used to develop the overall risk values is:

- □ Overall Risk = Exposure x Frequency x Hazard Loss Magnitude

Where:

- □ Exposure = structures, vulnerable populations, or critical facilities at risk as determined in *Plan Section 3.4.2*
- Frequency = annual number of events determined by calculating the number of hazard events dividing by the period of record as described in *Plan Section 3.4.1*
- □ Magnitude = percent of damage expected as described in *Plan Section 3.5.1* and presented in *Table 3-5*

Table 3-5 presents the results of the risk calculations. While the results are presented as dollar values for Building Dollar Risk, numbers of people affected for Societal Risk, and numbers of facilities affected, they should not be interpreted literally as estimates of actual values. Due to data and modeling limitations the values presented are more appropriately used to evaluate the relative risk posed by the different hazard types.

Hazard	Risk Parameters					Overall Risk		
	Frequency	Magnitude	Building Exposure ¹	Societal Exposure ²	Critical Facilities Exposure ³	Building Risk	Societal Risk	Critical Facilities Risk
Flooding	3.22	30.00%	\$15,617,207,000	34467	13	\$15,086,221,962	33295.12	12.56
Winter Storms	1.9	2.00%	\$54,015,693,000	1920587	103	\$2,052,596,334	72982.31	3.91
Tornados	0.21	0.50%	\$54,015,693,000	1920587	103	\$56,716,478	2016.62	0.11
Wind/Hail Thunderstorms	1.7	0.10%	\$54,015,693,000	1920587	103	\$91,826,678	3265	0.18
Excessive Heat	0.45	1.00%	\$54,015,693,000	1920587	103	\$243,070,619	8642.64	0.46
Costal Erosion	0.2	5.00%	\$658,974	104950	2	\$6,590	1049.50	0.2
Cumulative	NA	NA	\$231,680,637,974	7,821,765	427	\$17,530,438,660	121,251.18	17.24

1. Estimated dollar value of all buildings at risk for experiencing the corresponding hazard.

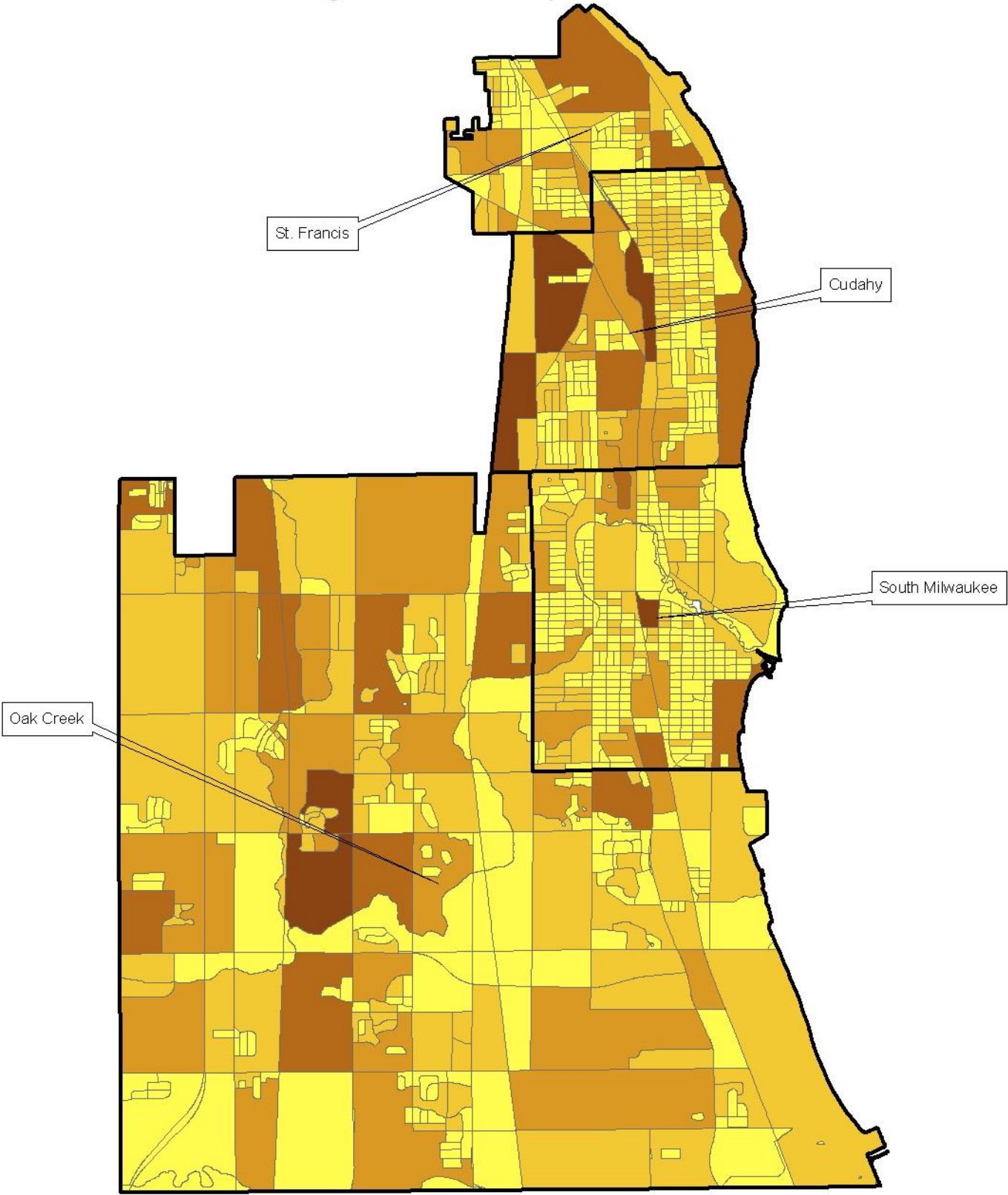
2. Estimated number of people at risk for experiencing the corresponding hazard.

3. Estimated number of critical facilities at risk for experiencing the corresponding hazard.

NA Not Applicable

NOTE: This information will be updated when Milwaukee County conducts a new vulnerability assessment for the County.

Communities of Cudahy, Oak Creek, South Milwaukee and St. Francis Building Stock Values by Census Block

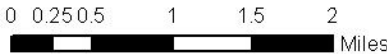


Building Stock Dollar Exposure

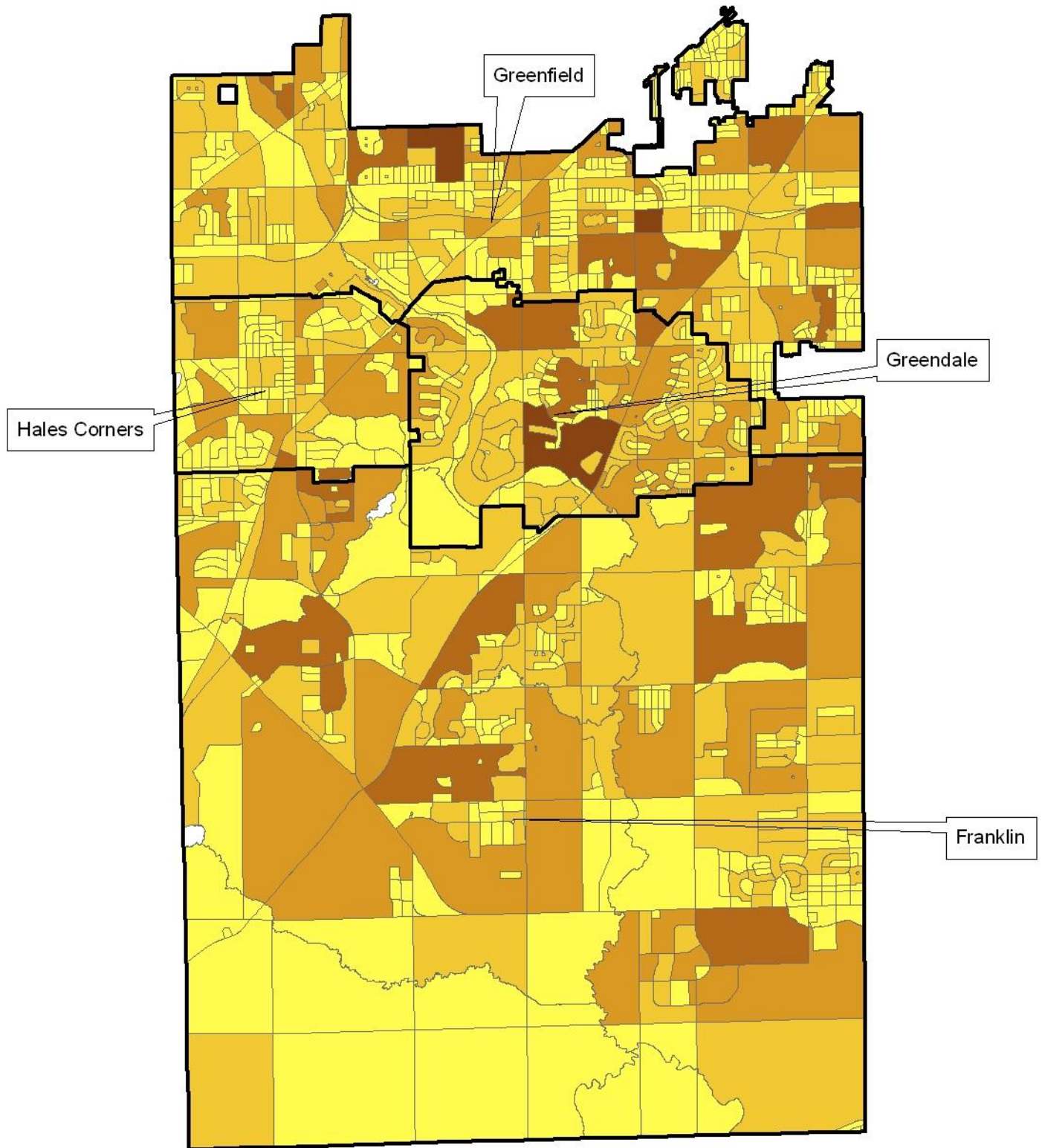
	\$0 - \$5,210,000		\$38,539,000 - \$89,586,000
	\$5,211,000 - \$15,635,000		\$89,587,000 - \$214,113,000
	\$15,636,000 - \$38,538,000		\$214,114,000 - \$510,397,000



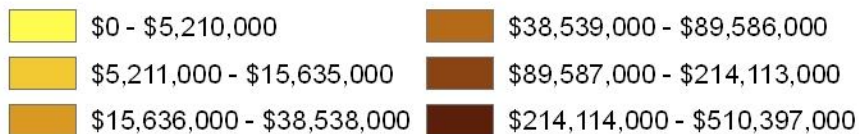
Milwaukee County
Land Information Office



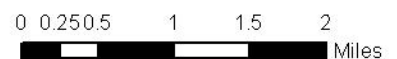
Communities of Franklin, Greendale, Greenfield, and Hales Corners Building Stock Values by Census Block



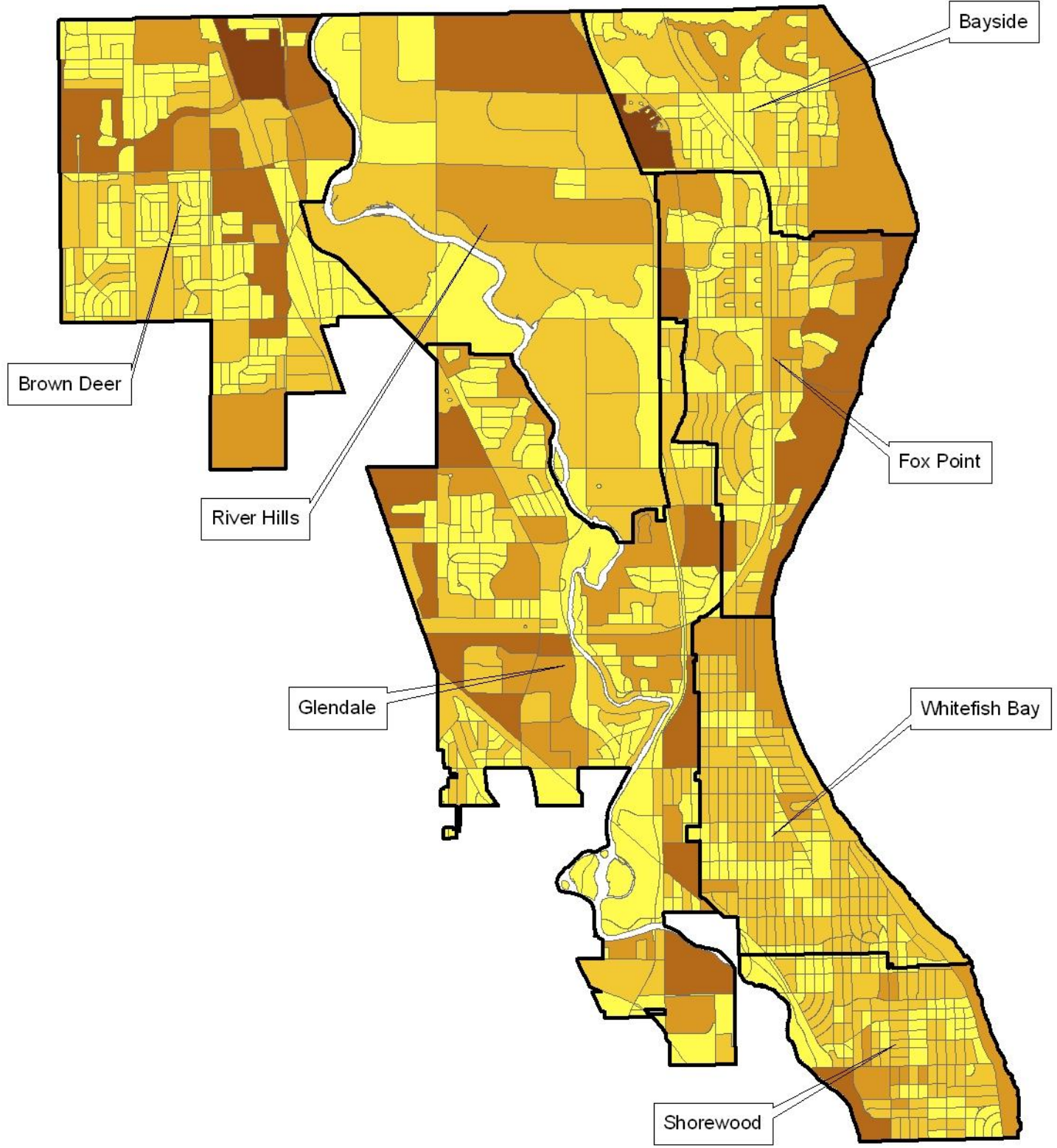
Building Stock Dollar Exposure



Milwaukee County
Land Information Office



Communities of Bayside, Brown Deer, Fox Point, Glendale, River Hills, Shorewood, and Whitefish Bay Building Stock Values by Census Block



Building Stock Dollar Exposure

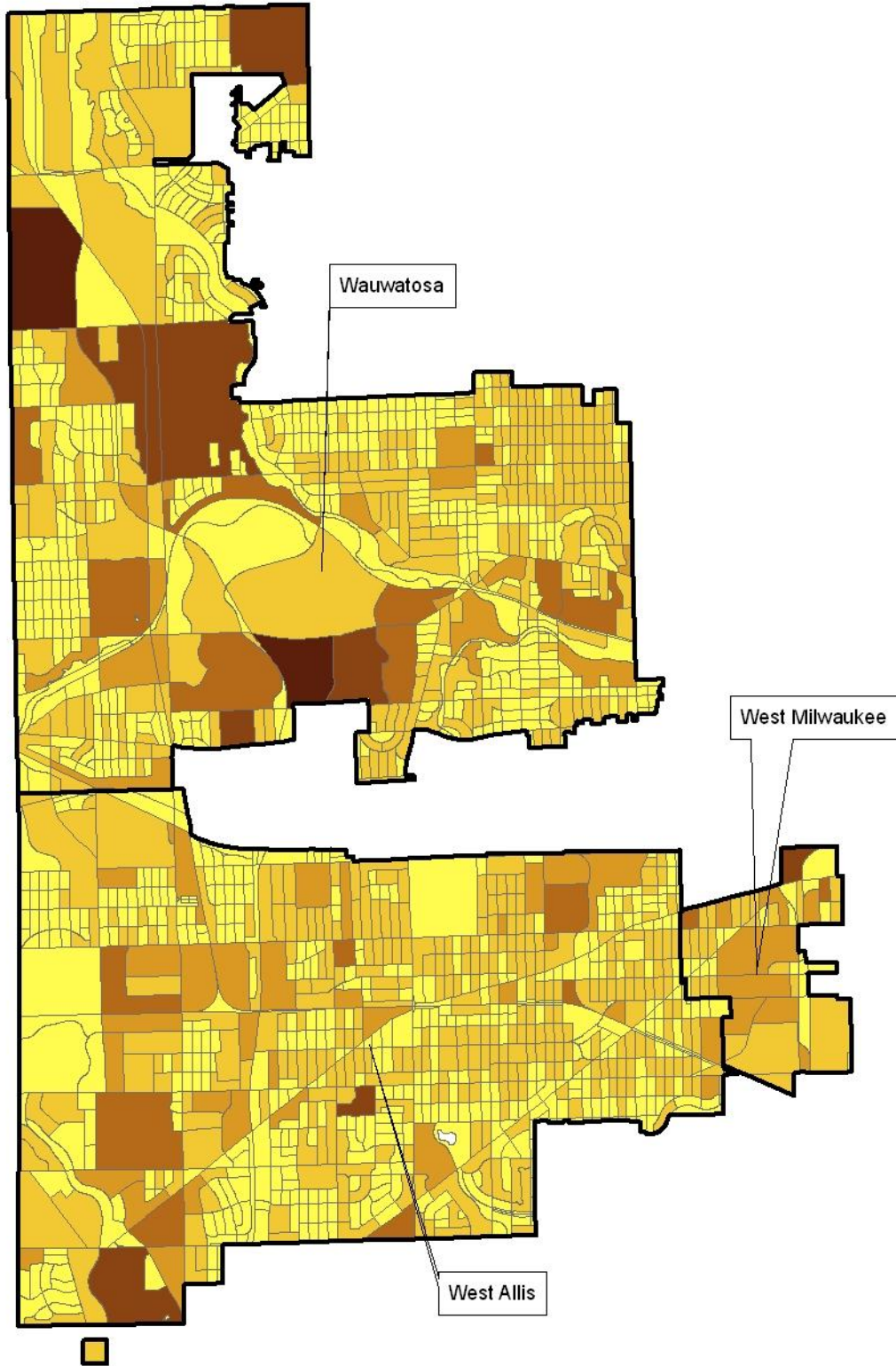
	\$0 - \$5,210,000		\$38,539,000 - \$89,586,000
	\$5,211,000 - \$15,635,000		\$89,587,000 - \$214,113,000
	\$15,636,000 - \$38,538,000		\$214,114,000 - \$510,397,000



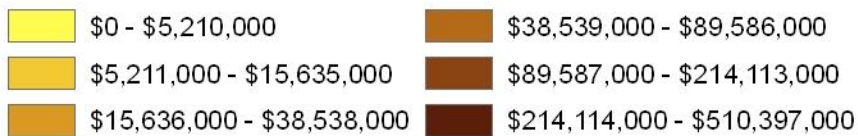
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Communities of Wauwatosa, West Allis and West Milwaukee Building Stock Values by Census Block



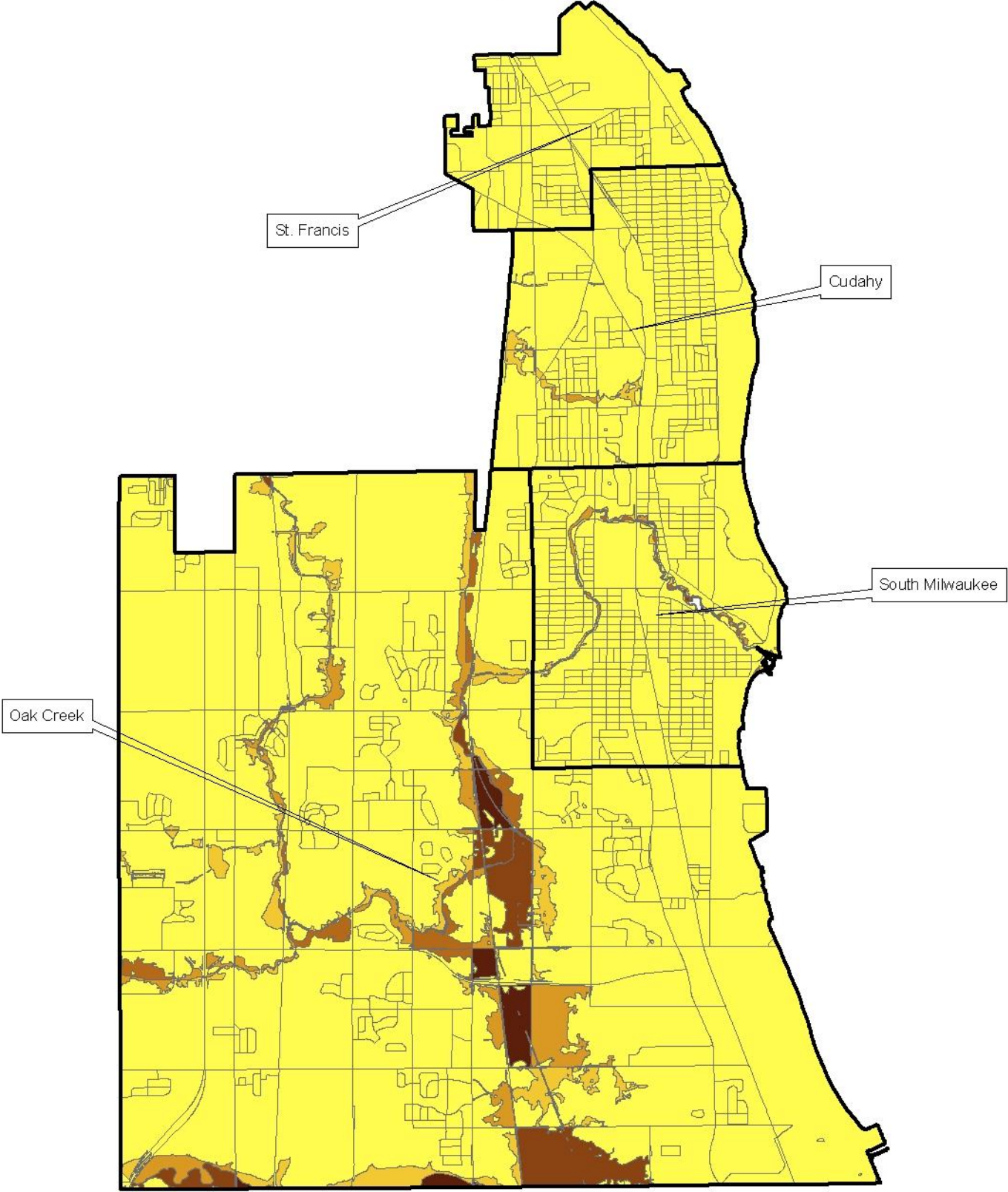
Building Stock Dollar Exposure



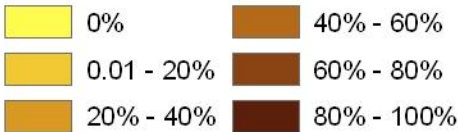
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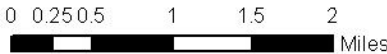
Communities of Cudahy, Oak Creek, South Milwaukee and St. Francis Flood Hazard by Census Block



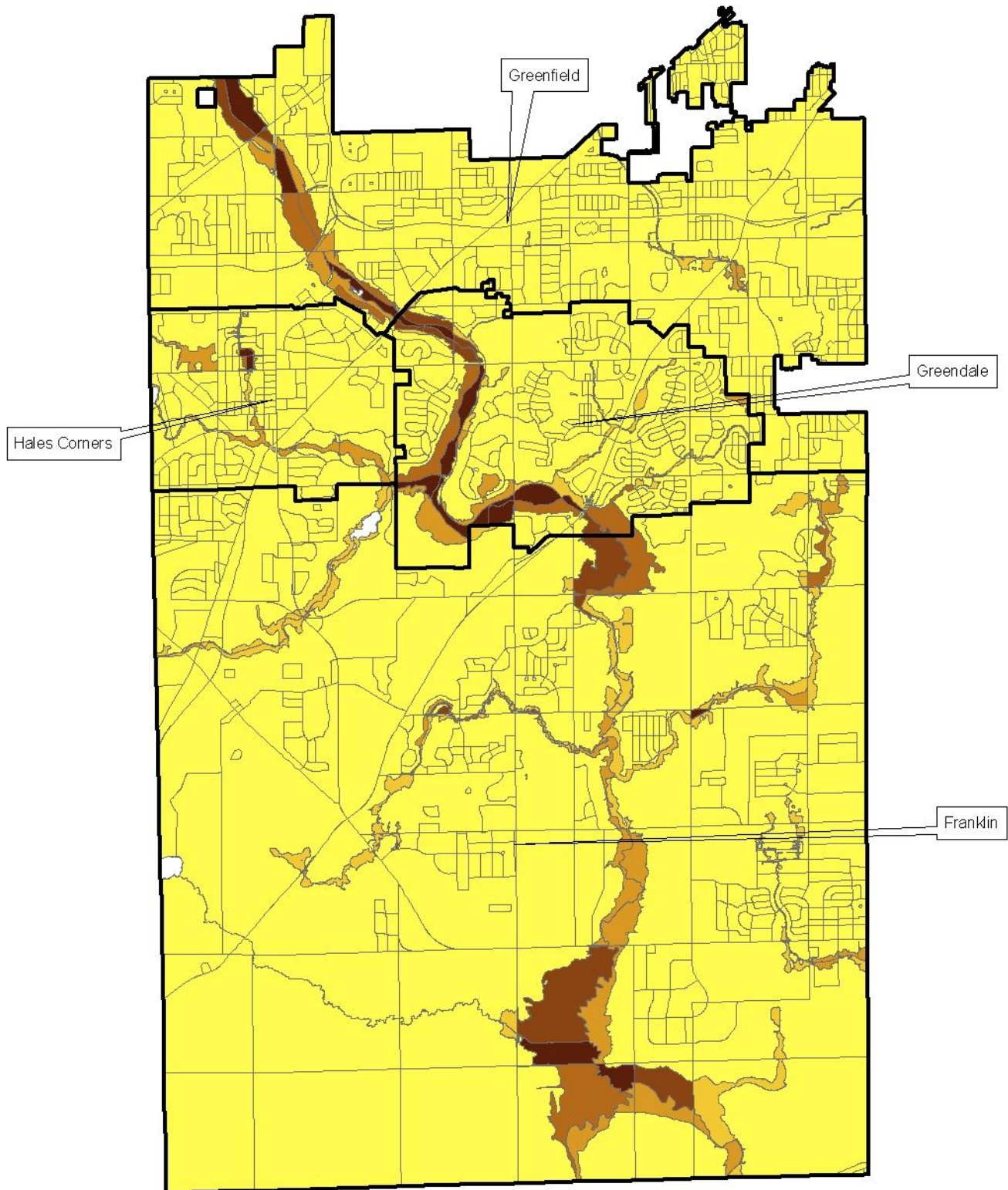
Area by Block



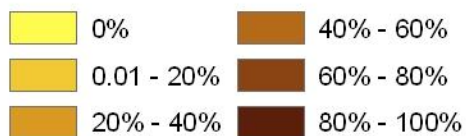
Milwaukee County
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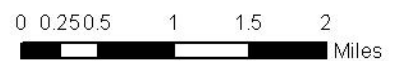
Communities of Franklin, Greendale, Greenfield, and Hales Corners Flood Hazard by Census Block



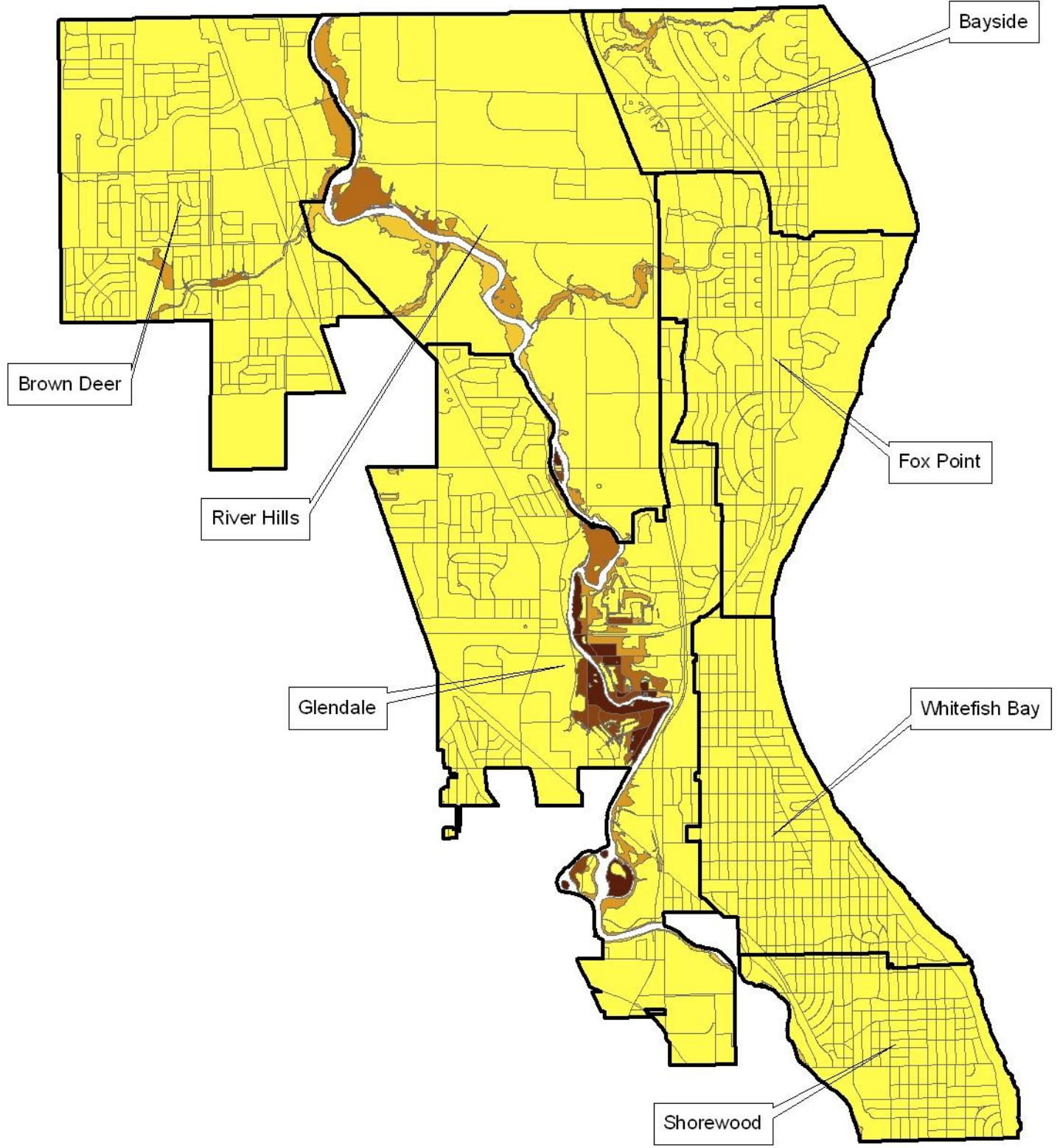
Area by Block



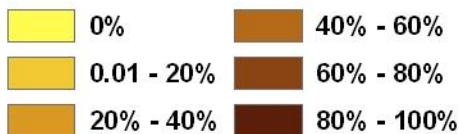
Milwaukee County
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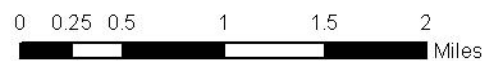
Communities of Bayside, Brown Deer, Fox Point, Glendale, River Hills, Shorewood, and Whitefish Bay Flood Hazard by Census Block



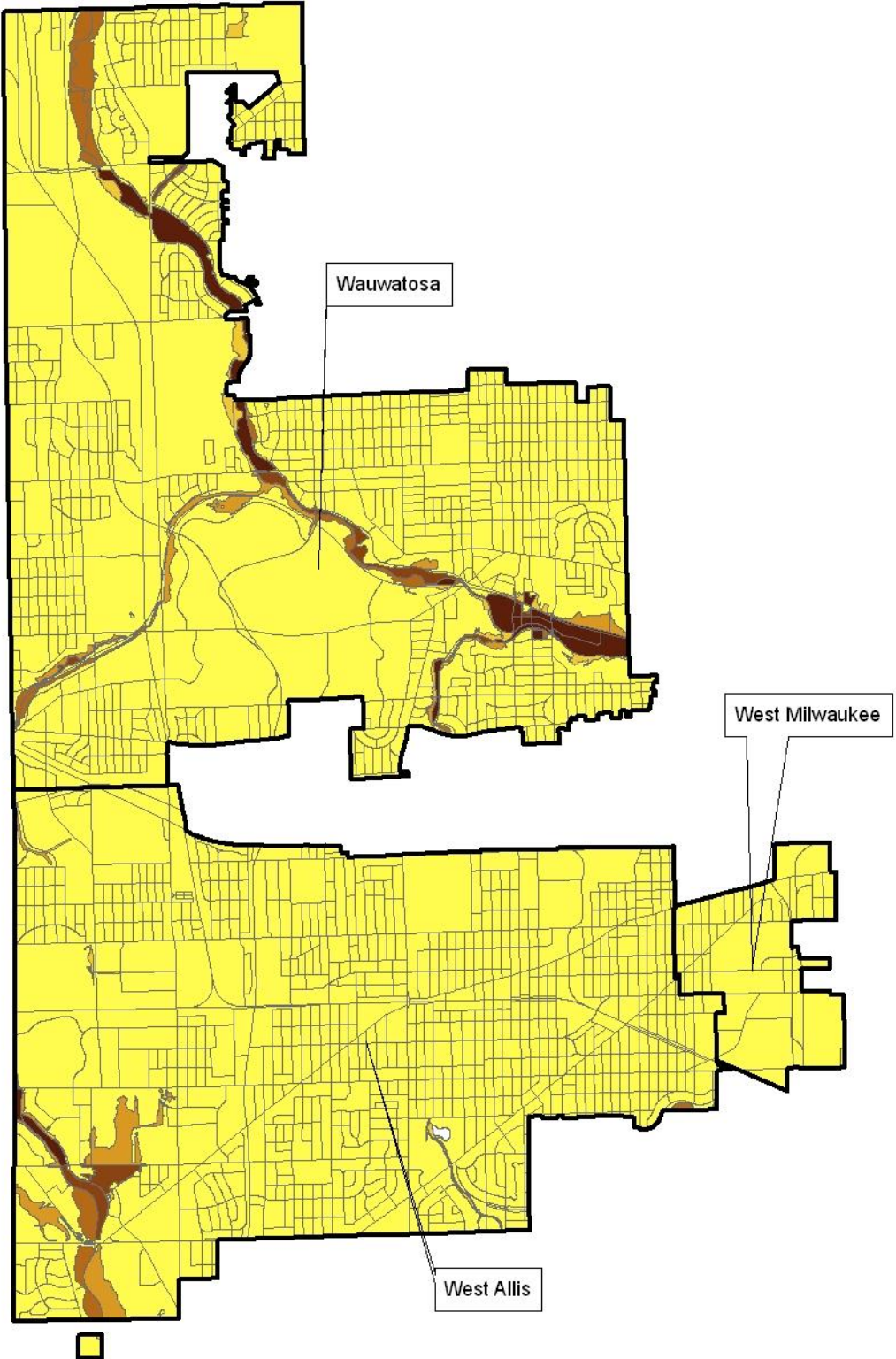
Area by Block



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Communities of Wauwatosa, West Allis and West Milwaukee Flood Hazard by Census Block



Area by Block

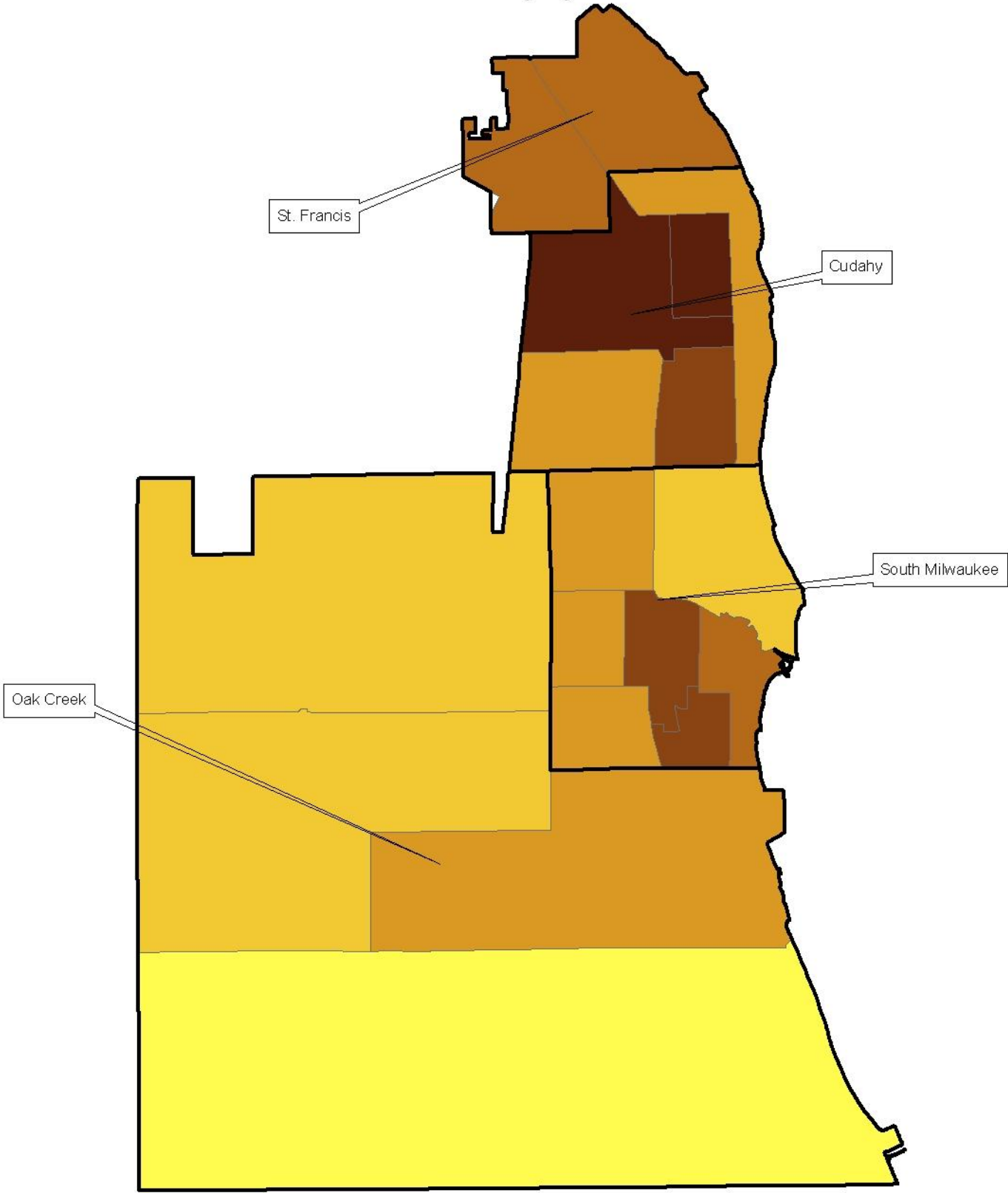
0%	40% - 60%
0.01 - 20%	60% - 80%
20% - 40%	80% - 100%



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Communities of Cudahy, Oak Creek, South Milwaukee and St. Francis Societal Vulnerability by Census Tract

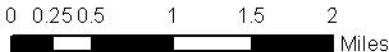


Societal Vulnerability Score

0.29 - 0.38	0.58 - 0.66
0.39 - 0.48	0.67 - 0.75
0.49 - 0.57	0.76 - 0.85

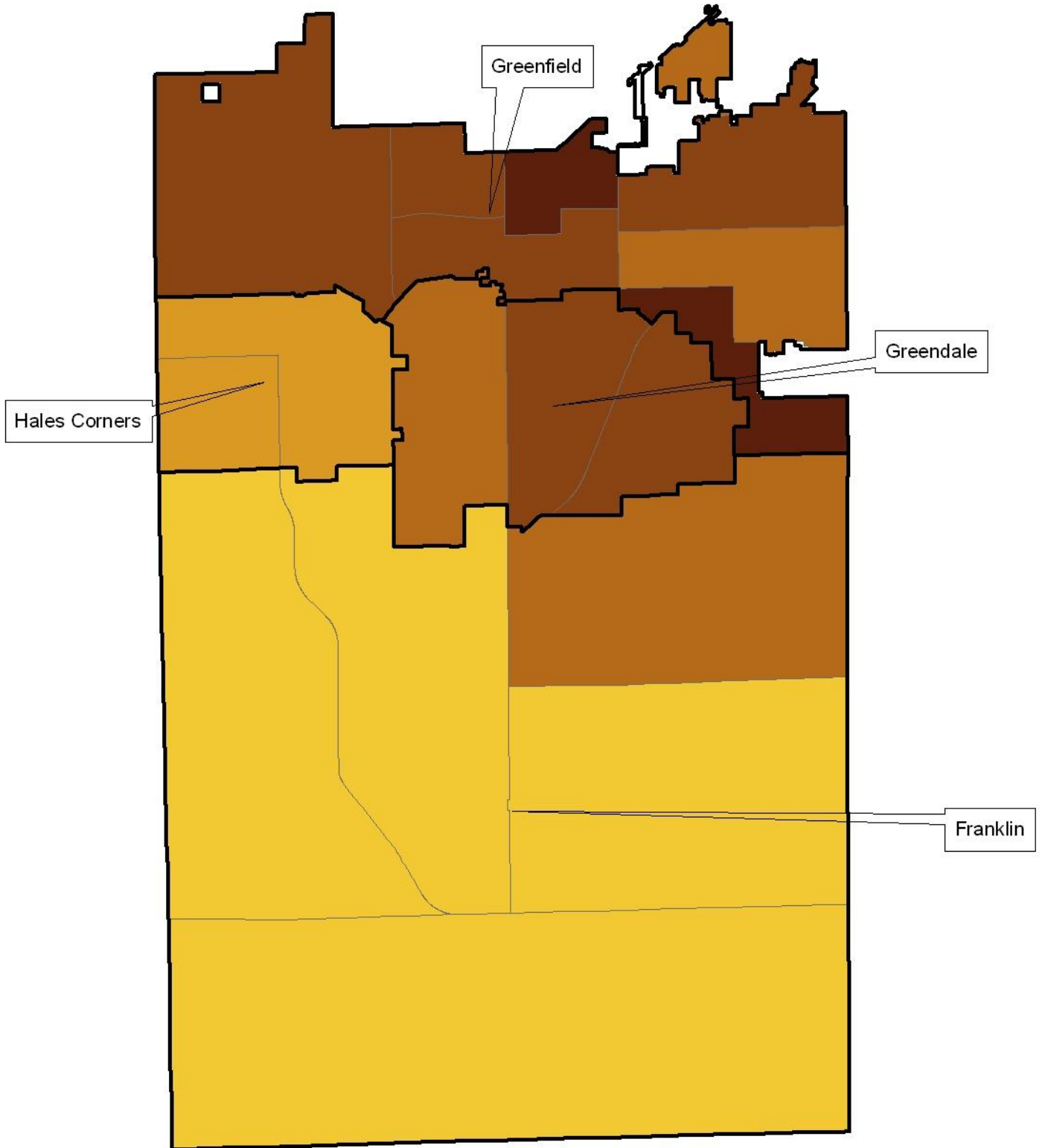


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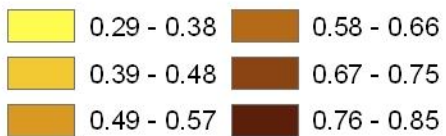


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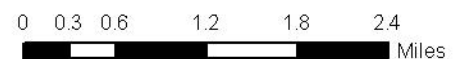
Communities of Franklin, Greendale, Greenfield, and Hales Corners Societal Vulnerability by Census Tract



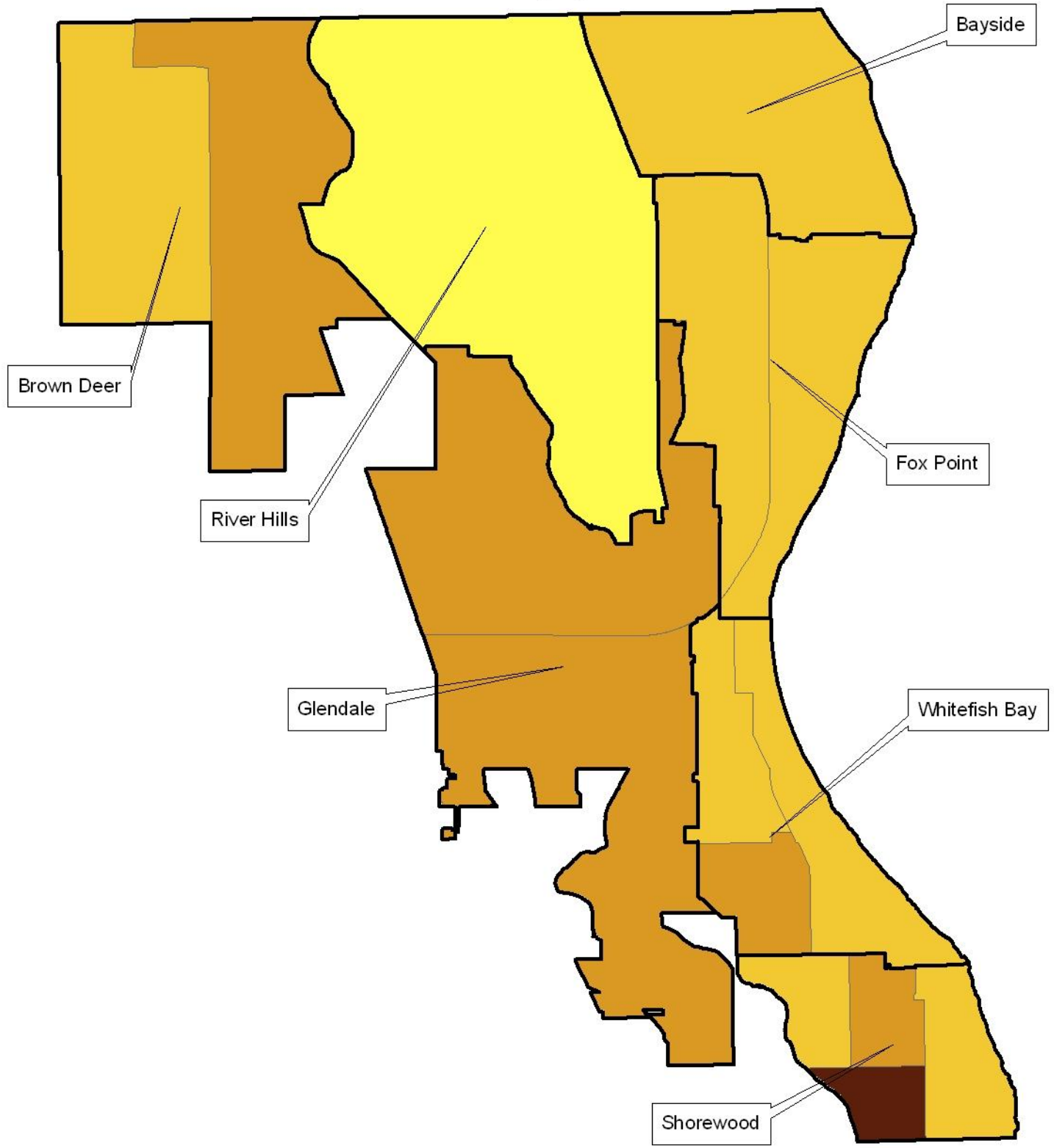
Societal Vulnerability Score



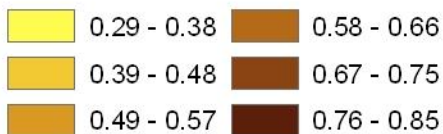
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Communities of Bayside, Brown Deer, Fox Point, Glendale, River Hills, Shorewood, and Whitefish Bay Societal Vulnerability by Census Tract



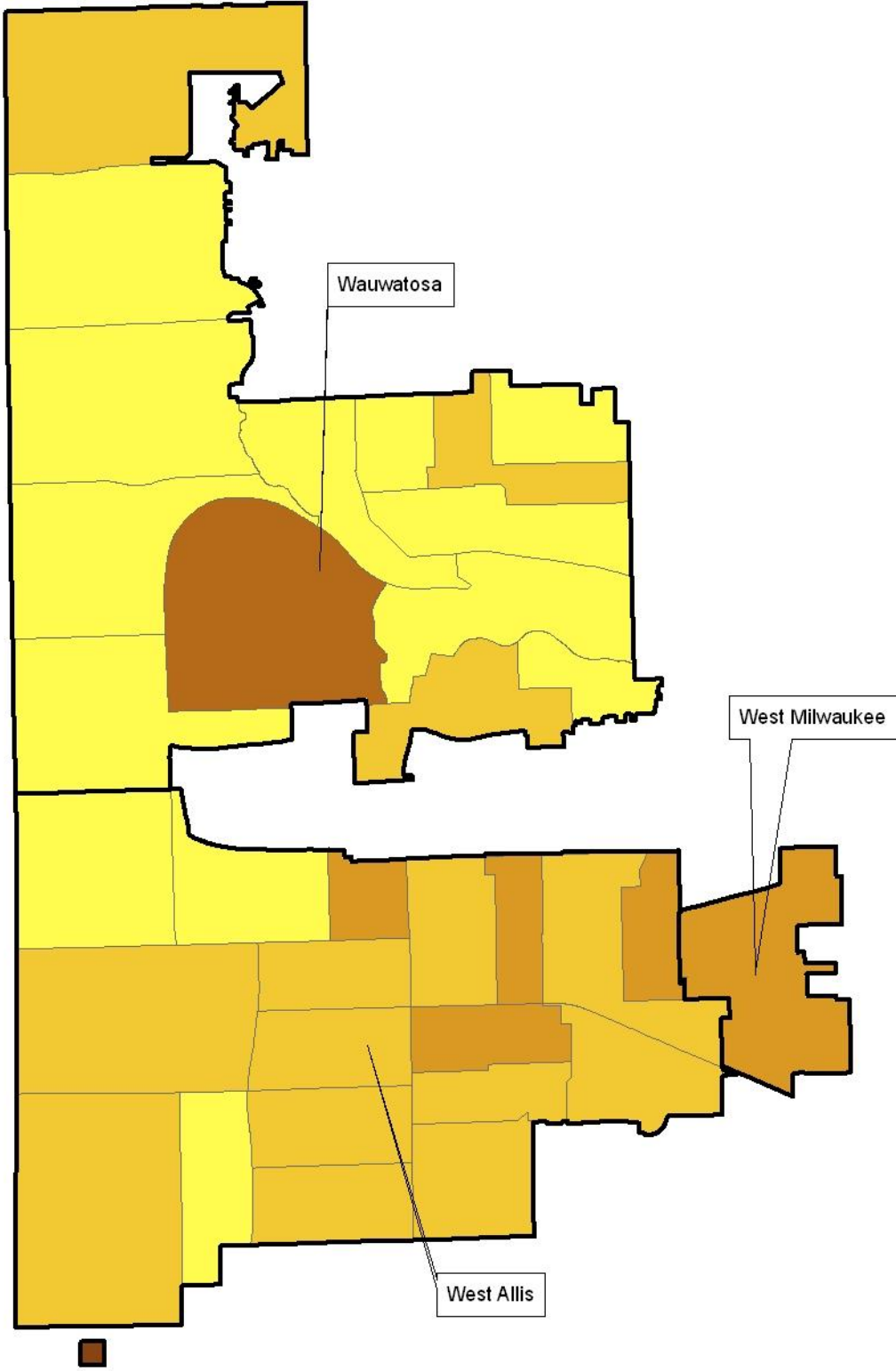
Societal Vulnerability Score



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Communities of Wauwatosa, West Allis and West Milwaukee Societal Vulnerability by Census Tract



Societal Vulnerability Score

0.29 - 0.38	0.58 - 0.66
0.39 - 0.48	0.67 - 0.75
0.49 - 0.57	0.76 - 0.85



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0 0.25 0.5 1 1.5 2 Miles



Figure 11. Map of Lake Michigan showing shoreline classification and average recession rates. (Source: Pope et al., 1999).

Threats to Structures on the Coast

As the regional climate changes, it is possible that future levels of lakes Michigan, Huron and Superior will move beyond the historic ranges of levels recorded since 1860. Most scenarios predict continued lower water levels on the Great Lakes due primarily due to reduced ice cover resulting in increased evaporation (Croley 2007; Angel and Kunkel in press). However, some of the plausible scenarios include higher water levels – water levels beyond the range of levels for which Wisconsin cities, coastal infrastructure, harbor structures, navigation channels and coastal buildings were designed and built. Under either the low or high water level scenarios coastal areas are at risk of serious damages and serious disruptions as lake levels change in response to climate changes.

4.0 MITIGATION STRATEGY

Specific mitigation goals and projects were developed for Milwaukee County in conjunction with public meetings and stakeholder interviews. A matrix developed for project ranking emphasizing cost-benefit and input from local officials was used to determine project prioritization. The following is a description of goals and objectives used to mitigate natural and technological hazards that build on the community's existing capabilities. Project implementation and legal framework are discussed at the conclusion of this section.

4.1 LOCAL HAZARD MITIGATION GOALS

The Plan goals describe the overall direction that Milwaukee County agencies, organizations, and citizens can take to work toward mitigating risk from natural and technological hazards. Goals and objectives of the Plan were developed during interviews and meetings with public officials and at public meetings held in Brown Deer, Milwaukee, Cudahy, Franklin and Wauwatosa. Milwaukee County hazard mitigation goals are identified below. These goals were reevaluated in 2010 by each municipality through correspondence and at a series of municipal meetings.

- Reduce Impacts from Flooding
- Enhance Early Warning Systems
- Enhance Emergency Response Capabilities
- Reduce Impacts of Coastal Erosion
- Reduce Impacts from Winter Storms and Wind Storms

4.2 MITIGATION OBJECTIVES AND ACTIONS

A range of potential mitigation activities were considered and is presented in Appendix E. Below is a list of mitigation objectives and the actions (projects) identified by Milwaukee County. Projects marked with an asterisk are response-related actions identified as county priorities. Although these projects may not be eligible for FEMA funding, Milwaukee County may secure alternate funding sources to implement these projects in the future. Mitigation projects specific to individual jurisdictions are noted within the list.

GOAL 1: Reduce Impacts from Flooding

- 1.1 Action: Work with local businesses to install storm water detention in large parking lots
- 1.2 Action: Purchase of repetitive loss structures in Glendale, and River Hills.
- 1.3 Action: Purchase houses within floodplain in Oak Creek.
- 1.4 Action: Install new culverts where needed in Oak Creek.
- 1.5 Action: Installation of wet detention ponds in Oak Creek.
- 1.6 Action: Maintain sewer outlets in Oak Creek.
- 1.7 Action: Install larger culverts at Laramie Lane at Ironwood intersection in Bayside.
- 1.8 Action: Provide overland flow from Laramie Lane to Fish Creek in Bayside.
- 1.9 Action: Replace culvert on Santa Monica Blvd. at N. Regent Rd. intersection in Bayside.

- 1.10 Action: Construct channel along property lines between Broadmoor Rd. and Fairway Circle in Bayside.
- 1.11 Action: Construct channel along property lines between Regent Rd. and Fairway Dr. in Bayside.
- 1.12 Action: Install bypass storm sewer to river in Glendale.
- 1.13 Action: Remove sediment and debris from Bender Creek in Glendale.
- 1.14 Action: Increase height of the west bank along Bender Creek to control backyard flooding in Glendale.
- 1.15 Action: Install and maintain flap gate on the Acacia Rd. storm sewer outlet headwall in Glendale.
- 1.16 Action: Inspect and clean channel in wooded ravine north of Fairfield Court in Glendale.
- 1.17 Action: Clean, remove, or replace Milwaukee's grate on Crestwood Creek on the downstream end of the Silver Spring culvert in Glendale.
- 1.18 Action: Add flap gates to river outlets along Riverview Dr., River Forest Dr., and LaSalle Ave. in Glendale.
- 1.18 Action: Remove accumulated rocks on Crestwood Creek on the downstream end of the Silver Spring culvert in Glendale.
- 1.19 Action: Replace retaining wall on the Blanchard Street pumping Station.*
- 1.20 Action: Flood proofing of 3 repetitive loss structures in Wauwatosa.
- 1.21 Action: Sanitary Sewer project relocation of relay Lakeshore Blvd., Montana Avenue to Lift Station
- 1.22 Action: Acquire repetitive loss structures in the Root River Drive Area (Village of Greendale)

GOAL 2: Enhance Early Warning Capabilities

- 2.1 Action: Reverse 911 Systems for Franklin and Oak Creek
- 2.3 Action: Purchase additional siren for the Martins area in Franklin.*

GOAL 3: Enhance Emergency Response Systems

- 3.1 Action: List of Contractors with heavy equipment in all jurisdictions except Bayside.*
- 3.2 Action: List of equipment in each Municipality in all jurisdictions except Bayside.*
- 3.3 Action: Include Public Works Departments in the County wide emergency communications network.*
- 3.4 Action: Pre-established mutual aid agreements between Municipalities for equipment in all jurisdictions.*
- 3.5 Action: Migrate Special Facilities database from Excel to Internet application.*
- 3.6 Action: Locate vulnerable facilities in GIS for South Milwaukee.

GOAL 4: Prevent Coastal Erosion

- 4.1 Action: Enhance slope stability for South Milwaukee.

GOAL 5: Reduce Impacts from Winter Storms and Wind Storms

- 5.1 Action: Establish tree management program for public property

4.3 PROJECT RANKING AND PRIORITIZATION

A cost-benefit matrix was developed to rank the mitigation projects using the following criteria. Each project was assigned a “high”, “medium”, or “low” rank for Population Impacted, Property Impacted, and Cost. For the Population Impacted category, a “high” rank represents greater than 50 percent of county residents; a “medium” rank represents 20 to 50 percent of county residents; and a “low” rank represents less than 20 percent of county residents. For the Property Impacted and Project Cost categories, a “high” rank represents greater than \$1,000,000, a “medium” rank represents between \$500,000 and \$1,000,000, and a “low” rank is less than \$500,000. The matrix was completed by assigning each rank a numeric value as follows:

	Population Impacted	Property Impacted	Cost
High	5	5	1
Medium	3	3	3
Low	1	1	5

The overall cost-benefit was then calculated by summing the total score for each project. *Table 4-2* presents the Hazard Mitigation Project Cost-Benefit Matrix for Milwaukee County.

Milwaukee County’s Emergency Management Administrator, consulting with the Local Emergency Management Directors, also ranked each mitigation project as “high”, “medium”, and “low” based on community priorities. Projects identified by Milwaukee County as top priorities and their cost/benefit ranking, are presented in *Table 4-3*.

4.4 PROJECT IMPLEMENTATION AND LEGAL FRAMEWORK

Once the Milwaukee County PDM Plan is formally adopted, the county will use the cost-benefit analysis in the Plan to focus project prioritization. Mitigation projects will be considered for funding through federal and state grant programs, and when other funds are made available through the county. The Milwaukee County Sheriff’s Emergency Management Bureau will be the coordinating agency for project implementation. The Emergency Management Bureau has the capacity to organize resources, prepare grant applications, and oversee project implementation, monitoring, and evaluation. Coordinating organizations may include local, county, or regional agencies that are capable of, or responsible for, implementing activities and programs. The Emergency Management Bureau Administrator will be responsible for mitigation project administration.

A number of state and local regulations and policies form the legal framework available to implement Milwaukee County’s hazard mitigation goals and projects. A list of these regulations and plans are presented below.

State of Wisconsin

- Wisconsin Smart Growth Comprehensive Planning
- Wisconsin Floodplain Management
- Wisconsin Building Codes
- Wisconsin Shoreland Management Program

Local

- Jurisdictional Flood Hazard Mitigation Plan (Milwaukee County Municipalities)
- Jurisdictional Flood Plain Regulations (Milwaukee County Municipalities)
- Jurisdictional Storm water Management Plans (Milwaukee County Municipalities)
- Jurisdictional Zoning Ordinances (Milwaukee County Municipalities)
- Milwaukee Metropolitan Sewer District (MMSD) Rainfall Reduction Program
- MMSD Downspout Disconnect Program (Milwaukee County Municipalities)
- Franklin, WI: The City's 2025 Comprehensive Master Plan adopted October 21, 2009. Provides a framework for the future growth and development of the City and was enacted to meet the requirements of Wisconsin's Comprehensive Planning Legislation. The 2025 plan focuses on the following elements: Issues and Opportunities; Land Use; Agricultural, Natural and Cultural Resources; Economic Development; Housing; Transportation; Utilities & Community Facilities; and Intergovernmental Cooperation.
- Greenfield, WI: The City of Greenfield Comprehensive Land Use Plan, 2008 was adopted November 18, 2008. The plan focuses on the following elements: Issues and Opportunities; Land Use; Agricultural, Natural and Cultural Resources; Economic Development; Housing; Transportation; Utilities & Community Facilities; and Intergovernmental Cooperation.
- Greendale, WI: Village of Greendale Comprehensive Plan: 2010-2035 was adopted November 17, 2009. The plan focuses on the following elements: Issues and Opportunities; Land Use; Agricultural, Natural and Cultural Resources; Economic Development; Housing; Transportation; Utilities & Community Facilities; and Intergovernmental Cooperation.
- Brown Deer, WI: Village of Brown Deer adopted the Village of Brown Deer Comprehensive Plan 2030, November 2009. The plan focuses on the following elements: Issues and Opportunities; Land Use; Agricultural, Natural and Cultural Resources; Economic Development; Housing; Transportation; Utilities & Community Facilities; and Intergovernmental Cooperation.
- West Milwaukee, WI: The Village of West Milwaukee adopted their Comprehensive Plan in November 2009. The plan focuses on the following elements: Issues and Opportunities; Land Use; Agricultural, Natural and Cultural Resources; Economic Development; Housing; Transportation; Utilities & Community Facilities; and Intergovernmental Cooperation.
- West Allis, WI: The City of West Allis Comprehensive Plan 2030 was adopted February 15, 2011. The plan focuses on the following elements: Issues and Opportunities; Land Use; Agricultural, Natural and Cultural Resources; Economic Development; Housing; Transportation; Utilities & Community Facilities; and Intergovernmental Cooperation.

- Wauwatosa, WI: The City of Wauwatosa Comprehensive Plan 2008-2030 was adopted December 2008. The plan focuses on the following elements: Issues and Opportunities; Land Use; Agricultural, Natural and Cultural Resources; Economic Development; Housing; Transportation; Utilities & Community Facilities; and Intergovernmental Cooperation.
- Cudahy, WI: The city's 2020 Comprehensive Plan was adopted December 16, 2009. The plan focuses on the following elements: Issues and Opportunities; Land Use; Agricultural, Natural and Cultural Resources; Economic Development; Housing; Transportation; Utilities & Community Facilities; and Intergovernmental Cooperation.
- St. Francis, WI: The city's 2003 Comprehensive plan was adopted June 17, 2003. The plan focuses on the following elements: Issues and Opportunities; Land Use; Agricultural, Natural and Cultural Resources; Economic Development; Housing; Transportation; Utilities & Community Facilities; and Intergovernmental Cooperation.
- Oak Creek, WI: The City of Oak Creek Comprehensive Plan was adopted September 11, 2000. The plan focuses on the following elements: Issues and Opportunities; Land Use; Agricultural, Natural and Cultural Resources; Economic Development; Housing; Transportation; Utilities & Community Facilities; and Intergovernmental Cooperation.
- South Milwaukee, WI: The City of South Milwaukee Comprehensive Plan 2020 was adopted January 27, 2003. The plan focuses on the following elements: Issues and Opportunities; Land Use; Agricultural, Natural and Cultural Resources; Economic Development; Housing; Transportation; Utilities & Community Facilities; and Intergovernmental Cooperation.
- Whitefish Bay, WI: The Village of Whitefish Bay adopted their Comprehensive "Smart Growth" Plan October 19, 2009. The plan focuses on the following elements: Issues and Opportunities; Land Use; Agricultural, Natural and Cultural Resources; Economic Development; Housing; Transportation; Utilities & Community Facilities; and Intergovernmental Cooperation.
- River Hills, WI: The Village of River Hills Comprehensive Plan was adopted October 13, 2009. The plan focuses on the following elements: Issues and Opportunities; Land Use; Agricultural, Natural and Cultural Resources; Economic Development; Housing; Transportation; Utilities & Community Facilities; and Intergovernmental Cooperation.
- Bayside, WI: The Village of Bayside Comprehensive Plan was adopted September 10, 2009. The plan focuses on the following elements: Issues and Opportunities; Land Use; Agricultural, Natural and Cultural Resources; Economic Development; Housing; Transportation; Utilities & Community Facilities; and Intergovernmental Cooperation.
- Fox Point, WI: The Village of Fox Point 2035 Comprehensive Plan was adopted February, 23, 2010. The plan focuses on the following elements: Issues and Opportunities; Land Use; Agricultural, Natural and Cultural Resources; Economic Development; Housing; Transportation; Utilities & Community Facilities; and Intergovernmental Cooperation.
- Shorewood, WI: The Village of Shorewood Comprehensive Plan 2030 was adopted January 18, 2011. The plan focuses on the following elements: Issues and Opportunities; Land Use; Agricultural, Natural and Cultural Resources; Economic Development; Housing; Transportation; Utilities & Community Facilities; and Intergovernmental Cooperation.

- Glendale, WI: The City of Glendale will adopt its Smart Growth Comprehensive Plan in 2012. The plan focuses on the following elements: Issues and Opportunities; Land Use; Agricultural, Natural and Cultural Resources; Economic Development; Housing; Transportation; Utilities & Community Facilities; and Intergovernmental Cooperation.

A summary of how the PDM Plan can be integrated into this legal framework is presented below. Of all the means currently available to implement comprehensive plans, the most important and versatile may be municipal zoning ordinances.

- Integrate each jurisdiction's Flood Mitigation Plan and floodplain ordinances into the PDM Plan to help minimize the impacts from flooding.
- Integrate each jurisdiction's Storm water Management Plan into the PDM Plan to help minimize the impacts from flooding.
- Initiate zoning ordinances in conjunction with flood mitigation projects to prevent development in flood-prone areas.
- Partner with other organizations and agencies with similar goals to promote building codes that are more disaster resistant on the state level.
- Develop incentives for local governments, citizens, and businesses to pursue hazard mitigation projects.
- Allocate county resources and assistance for mitigation projects.
- Partner with other organizations and agencies in southeast Wisconsin to support hazard mitigation activities
- Franklin, Wisconsin is integrating their Comprehensive Master Plan into their Unified Development Ordinance. Ordinances to revise the 2025 Comprehensive Master Plan include: Incorporating the Milwaukee County Trails Network, Changing proposed use from commercial to institutional, incorporating minor technical corrections and designating parcel 1 of CSM 6612 for Agricultural Use.
- Greenfield, Wisconsin has adopted an "Erosion Control" ordinance. The purpose is to minimize the amount of sediment and other pollutants carried to lakes, streams, storm sewers, roads, adjacent properties, and wetlands. These measures are in accordance with Wisconsin Department of Natural Resources technical standards. Local ordinance states there are to be no obstruction of natural watercourses and drainage ways.
- Greendale, Wisconsin the Land Use Plan is used in conjunction with the "Natural Conditions that may Limit Building Site Development" and "Other Environmentally Sensitive Lands" components to the Village's Land Use element. Natural Conditions that may Limit Building Site Development include 100 year floodplain, hydric soils, surface water, and wetlands.
- Hales Corners, Wisconsin has proposed ordinance to amend the Village of Hales Corners Comprehensive Plan 2025 to incorporate a separate floodplain map.
- Brown Deer, Wisconsin has adopted "Storm water not to enter sanitary sewer system" ordinance that state no subsoil, foundation, footing, window and door well or yard drains, unroofed basement excavations, cistern overflows, roof conductors or drains from areas exposed to rainfall shall be connected directly to the sanitary sewer, nor shall they be permitted to discharge indirectly into said sanitary sewer. "Sump pump required" ordinance states whenever drain tile is used, a sump pump must be used to discharge the water, but under no circumstances may said water be discharged into the sanitary sewer

system. “Downspouts extended” ordinance states all downspouts must be extended from the building at least two feet. The Village adopted the Wisconsin Department of Natural Resources Model Floodplain Zoning Ordinance labeling theirs, “Floodplain ordinance adopted by reference.”

- West Milwaukee, WI exhibits intergovernmental cooperation with storm water management and water quality aspects. Drainage basins, groundwater and stream courses seldom respect municipal boundaries. West Milwaukee and its neighbors share common concerns related to storm water management and water quality. These issues will be effectively addressed on a regional level, through coordinated planning and action. The Village has implemented a Floodplain Zoning Ordinance and identifying floodplain districts within the community.
- West Allis, WI has adopted floodplain regulations intended to regulate floodplain development to, but not limited to protecting life, health and property, minimizing expenditures of public funds for flood control projects, minimize damage to public facilities in the floodplain, minimize the occurrence of future flood blight areas in the floodplain, prevent increases in flood heights that could increase flood damage and result in conflicts between property owners; and discourage development in a floodplain if there is any practicable alternative to locate the activity, use or structure outside of the floodplain.
- Wauwatosa, WI has implemented a storm water management system to conserve water, control discharges necessitated by rainfall events, incorporate methods to collect, convey, store, absorb, inhibit, treat, use or reuse water to prevent or reduce flooding, over-drainage, environmental degradation and water pollution or otherwise affect the quality and quantity of discharge from such system.
- Cudahy, WI has implemented floodplain district boundaries that do not conflict with the applicable rules and regulations of the Wisconsin Department of Natural Resources and the Federal Emergency Management Agency. Shoreland C-1 zoning regulations stating no wetland in a shoreland portion of a C-1 District shall be rezoned if the zoning may result in a significant adverse impact on storm or floodwater storage capacity. In addition to implementing floodplain zoning ordinance.
- St. Francis, WI has a floodplain zoning and storm water management system to mitigate the effects of the flooding within the community.
- Oak Creek, WI has implemented wetland and floodplain districts, shoreland wetland conservancy districts, floodway districts, floodfringe districts, general floodplain districts and C-1 shoreland wetland conservancy districts, drainage and storm water management systems in order to mitigate the effects of flooding.
- South Milwaukee, WI has wetland ordinance, shoreland districts, storm water management ordinances and flood plain regulation, and construction site erosion control measures, to mitigate the effects of flooding.
- Whitefish Bay, WI has implemented a storm and drainage water ordinance that states whenever storm or drainage water flows from the property of one owner or owners onto the property of another owner or owners to the damage of the latter property, the owner or owners of the property first mentioned shall connect his or their property with the storm sewer or with the street gutter in such manner as the Village Manager shall require.

- River Hills, WI has adopted zoning ordinance, erosion control ordinance, storm water management ordinance, floodplain ordinance and wetland zoning in order to mitigate effects of flooding.
- Bayside, WI has implemented the stormwater management system provides for the regulation, collection and disposal of storm and surface water discharge. As a rural community, Bayside operates under a ditch and culvert drainage system. The only area within Village limits with a curb and gutter stormwater system is Port Washington Road, which is owned Milwaukee County. With several drainage easements in the community, the Village works continuously to rectify any issues that adversely affect properties. Most of the Village's stormwater eventually terminates in Lake Michigan, with several tributaries and infiltration areas to lessen the impact of heavy rain falls on the ravines and the Lake. In 1998 the Village completed its first stormwater management plan. Currently, the Village is in the process of updating that plan with the consulting assistance of Mead & Hunt. As a part of the update, Mead & Hunt will examine the feasibility of a Stormwater Management utility. With this, the Village may examine, acquire, and manage facilities that may be necessary to effectively run a storm and surface water management system.
- Fox Point, WI has adopted ordinance "flood damage prevention" in compliance with Milwaukee Metropolitan Sewerage District and Wisconsin Department of Natural Resources.
- Shroewood, WI has a Capacity, Management, Operations and Maintenance (CMOM) Plan, which was finalized in 2010. The overall intent of the plan is to reduce sanitary sewer overflows in accordance with regulations. Including a Proposed Comprehensive Storm Sewer, Sanitary Sewer, and Combined Sewer Facility Plan, 2010. Over the past 13 years the area has experienced six heavy rainfall events, the most recent two in July 2010, causing property damage to homes and businesses. The Village is developing a comprehensive storm and sanitary sewer facility plan for recommendations required to establish infrastructure improvement priorities and costs, holding three public information meetings in late 2010.
- Glendale, WI currently implements a wetlands development cautionary program. It issues a notice to property owners stating they are responsible for complying with state and federal laws concerning construction near or on wetlands, lakes and streams, in order to mitigate the effects of flooding and land disturbing activities.

4.5 PAST MITIGATION PROJECTS IMPLEMENTED

The Milwaukee Metropolitan Sewerage District (MMSD) is responsible for providing flood control and management of open channel flow in the streams and rivers within most of Milwaukee County. They are also responsible for stabilizing and restoring streams within their jurisdiction.

The Milwaukee Metropolitan Sewerage District has completed three of its four largest Menomonee River flood control projects now that floodwater storage basins at the Milwaukee County Grounds are ready for use.

Flood Management on the County Grounds

The completion of this \$99 million project captures and stores potential floodwater in one large basin that construction crews will dig on 91-acres of land. The actual basin will cover about 65 acres, straddling Swan Blvd. south of the Menomonee River Parkway. A large underground tunnel that's 17 feet in diameter and about a half-mile long will channel excess water from Underwood Creek into the basin. From there, it will slowly release into the Menomonee River. The basin will hold approximately 315 million gallons of water and may only be needed for storage a few times a year. During extreme storms, the basin could fill in about four hours. If completely filled, it will take approximately four days to drain into the river. The County Grounds basin is designed to protect against the one-percent probability flood, commonly called the 100 year flood. It's estimated that it would take 4.7 inches of rain over six hours in the Underwood Creek subwatershed to create a one-percent probability flood event. Construction of the \$99 million county grounds flood management project started in 2006.

Hart Park Project

MMSD has completed flood projects at Hart Park in Wauwatosa, Wisconsin. The \$48 million project reducing risk of flooding in Wauwatosa and Milwaukee was completed in the spring of 2007. This flood management project physically increased the size of Hart Park dramatically from around 20 acres to 50 acres. Together the bigger park and a series of flood levees help temporarily store floodwater which could otherwise damage homes and businesses or get into the sewer system, raising the treatment of basement backups and sewage overflows. To provide room in the parkway for floodwater storage, construction crews removed one-to-three feet of earth from the storage area and haul it away. The Hart Park flood management system is designed to harness and protect against the one percent probability flood, commonly called the 100 year flood.

The final flood control project is under way on Milwaukee's west side. MMSD will spend \$55 million to acquire 11 industrial buildings, build flood walls and lower the floodplain along the Menomonee River and W. State Street, and west of Hawley Road. To date, eight buildings have been purchased. Construction of flood walls and other work along a one-mile stretch of the river is scheduled from 2013 to 2015.

*Successful Acquisitions**Brown Deer, Wisconsin*

The Village of Brown Deer, Wisconsin has been impacted by flooding several times. The village has low-lying areas and two tributaries, Beaver Creek and South Branch Creek, which funnel down to the Milwaukee River.

Two significant flood events, 1997 and 1998, heightened the need for flood-mitigation activities. Wisconsin Emergency Management (WEM) and the Federal Emergency Management Agency (FEMA) offered a solution: to use Hazard Mitigation Grant Program (HMGP) funds to execute a buyout of nine flood-prone homes. HMGP provides grants to states and local governments to implement long-term hazard mitigation measures after a major disaster declaration. The purpose of the HMGP is to reduce the loss of life and property due to natural disasters and to enable mitigation measures to be implemented during the immediate recovery from a disaster.

At a total cost of \$1,018,830.86 (\$764,123.14 federal, \$127,353.86 each state and local), nine repetitive loss properties were acquired. Following removal of the homes, a storm water detention basin was created with funding from the Metropolitan Sewage District (MMSD).

Three other detention basins were also constructed with funding from MMSD. A 2.5-acre detention pond was built adjacent to the public library. The pond is capable of holding approximately 5.5 million gallons of water during a rainstorm. After a rain event, water captured in the basin goes back to South Branch Creek. Another 5-acre basin was constructed to hold approximately 4 million gallons of water. A third basin was built upstream and is capable of holding 6.2 million gallons of storm water.

The village also executed two additional initiatives to assist residents in the battle to manage storm water. The “Early Out Project” involved reducing the volume of storm water runoff flowing to one of the village’s neighborhoods by rerouting water flow. “Operation Flood Fix” was funded through a Community Development Block Grant and involved low-and moderate-income households having flood-proofing improvements made to their homes, such as installation of back-flow prevention valves in basement floor drains and glass-block basement windows.

In July 2010, powerful thunderstorms caused massive flooding in Milwaukee County with some areas receiving up to 7.5 inches of rain. Portions of the Interstate flooded and a massive sink hole opened up at an intersection north of downtown Milwaukee and swallowed an SUV and a stop light. There were reports of people stranded, basements becoming ponds, and homes suffering extensive damage in portions of the county. The Village of Brown Deer had up to 5 inches of rain; however; there were no reports of major destruction from the flood event.

Wauwatosa, Wisconsin

Located at the confluence of the Menomonee River and Underwood Creek, the city of Wauwatosa has had a history of flooding since it was settled in the 1850s. After being inundated by floodwaters for 2 consecutive years (1997 and 1998), the city initiated an acquisition (buyout) project that not only moved residents out of harm's way, but also expanded a widely used park.

In 1998, as a result of a flooding disaster, funding through the Federal Emergency Management Agency's (FEMA's) Hazard Mitigation Grant Program (HMGP) became available to a number of counties in the State of Wisconsin. Wisconsin Emergency Management (WEM) approached the city to see if they would be interested in a mitigation project. The city of Wauwatosa applied for \$1,897,085 in HMGP funds to acquire and demolish 23 properties along State Street. FEMA provided \$1,626,073 in federal funds with the WEM and the city each providing \$271,012. The total project cost was \$2,168,097. The project was initiated in July 1998 and completed in July 2001.

The purpose of HMGP is to reduce the loss of life and property in future disasters by funding mitigation measures during the recovery phase of a disaster. FEMA provides up to 75 percent of the funding, with the remainder coming from the state or applicant or both. The state administers the program and selects the projects with approval by FEMA. Applicants, which must have FEMA-approved hazard mitigation plans, may be states, local governments, Indian tribes, or certain nonprofits. Funds can be used for long-term mitigation measures, including protection of public or private property.

Mitigation measures did not come to a halt with the acquisition funded by FEMA. The Milwaukee Metropolitan Sewage District (MMSD) acquired an additional 65 properties along State Street and created a berm around the park. Pervious driveways and walkways were also added.

Commonly referred to as the Hart Park Project, mitigation measures in Hart Park resulted in the park more than doubling in size from its original 33 acres. With the removal of the structures, residents now enjoy the newly created performance stage, picnic shelters, baseball field, skateboard park, and rain garden.

Heavy rainfall in July 2010 brought floodwaters once more to the same area along State Street in the city of Wauwatosa. Hart Park, designed to hold a 100-year flood event at bay, had no problem with the reported 2 feet of floodwaters.

Under the Stafford Act, any land purchased with HMGP funds must be restricted to open space, recreational, and wetlands management uses in perpetuity. Most often, a local government takes responsibility but, even if a state or federal agency takes ownership of the land, the deed restrictions still apply. Property acquisition is one of many forms of hazard mitigation, but it is the most permanent form. It removes people from harm's way forever.

Bayside	Goal	Hazard Mitigation Projects	Haz. Mit.	Pop Imp.	Prop Imp.	Proj. Cost	Cost/Benefit Ranking	Responsible Agency	Funding Sources	Timeline
	Floodplain Management	Continue to enforce municipal ordinances which require no development in the Floodplain.*	Flooding	High	High	Low	High	Municipal DPW	Village Budget	Ongoing
	New Building and Infrastructure	Continue to enforce local building codes for existing and new construction, based on the 2006 International Building Codes*	All Hazards	High	High	Low	High	Building Inspection/ Neighborhood Services	Village Budget	Ongoing
	Enhance emergency response	Pre-established mutual aid agreements between municipalities for equipment	Flooding, winter storms, tornados	High	High	Low	High	Municipal DPW	No Cost	COMPLETED
	Reduce impacts from flooding	Install larger culvert across Laramie Lane at Laramie Lane and Ironwood Lane intersection	Flooding	Low	Low	Low	Medium	Municipal DPW	FEMA	COMPLETED
	Reduce impacts from flooding	Provide overland flow from Laramie Lane to Fish Creek*	Flooding	Low	Low	Low	Medium	Municipal DPW	FEMA	Deferred; Other mitigation addressing issue
	Reduce impacts from flooding	Construct channel along property lines between Braidmoor Rd and Fairway Circle*	Flooding	Low	Low	Low	Medium	Municipal DPW	FEMA	Deferred; Other mitigation addressing issue
	Reduce impacts from flooding	Construct channel along property lines between Regent Rd and Fairway Drive*	Flooding	Low	Low	Low	Medium	Municipal DPW	FEMA	Deferred; Other mitigation addressing issue
	Reduce impacts from flooding	Replace culvert across Santa Monica Blvd. at N. Regent Rd intersection	Flooding	Low	Low	Low	Medium	Municipal DPW	FEMA	Completed
Brown Deer	Goal	Hazard Mitigation Projects	Haz. Mit.	Pop Imp.	Prop Imp.	Proj. Cost	Cost/Benefit Ranking	Responsible Agency	Funding Sources	Timeline
	Floodplain Management	Continue to enforce municipal ordinances which require no development in the Floodplain.*	Flooding	High	High	Low	High	Municipal DPW	Village Budget	Ongoing
	New Building and Infrastructure	Continue to enforce local building codes for existing and new construction, based on the 2006 International Building Codes*	All Hazards	High	High	Low	High	Building Inspection/ Neighborhood Services	Village Budget	Ongoing
	Enhance emergency response	Contractor list of equipment	Flooding, winter storms, tornados	High	High	Low	High	Municipal DPW	No Cost	COMPLETED
	Enhance emergency response	Equipment list by municipality	Flooding, winter storms, tornados	High	High	Low	High	Municipal DPW	No Cost	COMPLETED
	Enhance emergency response	Pre-established mutual aid agreements between municipalities for equipment	Flooding, winter storms, tornados	High	High	Low	High	Municipal DPW	No Cost	COMPLETED
Cudahy	Goal	Hazard Mitigation Projects	Haz. Mit.	Pop Imp.	Prop Imp.	Proj. Cost	Cost/Benefit Ranking	Responsible Agency	Funding Sources	Timeline
	Floodplain Management	Continue to enforce municipal ordinances which require no	Flooding	High	High	Low	High	Municipal DPW	City Budget	Ongoing

		development in the Floodplain.*								
	New Building and Infrastructure	Continue to enforce local building codes for existing and new construction, based on the 2006* International Building Codes	All Hazards	High	High	Low	High	Building Inspection/ Neighborhood Services	City Budget	Ongoing
	Enhance emergency response	Contractor list of equipment	Flooding, winter storms, tornados	High	High	Low	High	Municipal DPW	No Cost	COMPLETED
	Enhance emergency response	Equipment list by municipality	Flooding, winter storms, tornados	High	High	Low	High	Municipal DPW	No Cost	COMPLETED
	Enhance emergency response	Pre-established mutual aid agreements between municipalities for equipment	Flooding, winter storms, tornados	High	High	Low	High	Municipal DPW	No Cost	COMPLETED
	Enhance preparedness	Creation of emergency plans with senior housing, CBRFs, and day care centers*	Flooding, winter storms, tornados	High	High	Low	High	Cudahy Health Dept.	City & State Funding	3 Years – Project has already begun with State Grant Funding.
	Reduce impacts from flooding	Access contracts for and mitigate all Cudahy detention ponds*	Flooding	Low	High	Medium	Medium	Municipal DPW	Wisconsin DNR/City Budget	3 Years
	Enhance emergency response	Maintain launch site at bottom of S curve at Sheridan Park*	All hazards	Low	Low	Medium	Medium	Municipal DPW	Wisconsin DNR/City Budget	3-4 Years
	Enhance emergency response	Access to beach from Pulaski Avenue Pump Station*	All hazards	Low	Low	Medium	Medium	Municipal DPW	Wisconsin DNR/City Budget	3-4 Years
	Reduce impacts from flooding	Acquisition and demolition of two repetitive loss structures*	Flood	Low	Medium	Low	High	City Engineering	State grant, City Budget, Storm Water Utility Funds	1-2 YEARS
	Reduce impacts from flooding	Acquisition and demolition of five repetitive loss structures *	Flood	Low	High	High	High	City Engineering	State grant, City Budget, Storm Water Utility Funds	1-2 YEARS
	Reduce impacts from flooding	Easement of two repetitive loss structures*	Flood	Low	Medium	Medium	High	City Engineering	State grant, City Budget, Storm Water Utility Funds	4-5 YEARS
	Reduce impacts from flooding	Development of channel*	Flood	Low	Medium	Low	High	City Engineering	State grant, City Budget, Storm Water Utility Funds	1-2 YEARS
Fox Point	Goal	Hazard Mitigation Projects	Haz. Mit.	Pop Imp.	Prop Imp.	Proj. Cost	Cost/Benefit Ranking	Responsible Agency	Funding Sources	Timeline
	Floodplain Management	Continue to enforce municipal ordinances which require no development in the Floodplain.*	Flooding	High	High	Low	High	Municipal DPW	Village Budget	Ongoing
	New Building and Infrastructure	Continue to enforce local building codes for existing and new construction, based on the 2006 International Building Codes*	All Hazards	High	High	Low	High	Building Inspection/ Neighborhood Services	Village Budget	Ongoing
	Reduce Impacts From	Clear debris from ravine ditch between Fox Lane to Beach Drive;	Flooding	Low	Low	Low	Medium	Municipal DPW	Wisconsin DNR/Village Budget	5 - 10 Years

	Flooding	Replace rip rap and re-establish channel*								
	Reduce Impacts From Flooding	Create and expand ditches along West side of Beach Drive from 7600-7900 Block*	Flooding	Low	Medium	Medium	Low	Municipal DPW	Wisconsin DNR/Village Budget	10 Years
	Reduce Impacts From Flooding	Place catchment systems in various ravines to catch debris that floats downstream in heavy rain events*	Flooding	Medium	Medium	Medium	Medium	Municipal DPW	Wisconsin DNR/Village Budget	10 Years
	Reduce Impacts From Flooding	Upsize drainage pipes in select locations throughout the Village to alleviate blockage*	Flooding	Medium	Low	Low	Medium	Municipal DPW	Wisconsin DNR/Village Budget	5 - 10 Years
	Reduce Impacts From Flooding	Address erosion issue on North side of Beach Drive Hill*	Flooding	Low	Low	Low	Low	Municipal DPW	Wisconsin DNR/City Budget/FEMA	1 - 3 Years
	Reduce Impacts From Flooding	Remove and replace undersized drainage pipe throughout the village*	Flooding	High	High	High	Medium	Municipal DPW	Village Budget	5 - 10 Years
	Reduce Impacts From Flooding	Remove obstructions in drainage channels at Regent Road / Regent Court and Indian Creek and Seneca*	Flooding	Low	Medium	Low	Low	Municipal DPW	Village Budget	5 Years
	Enhance emergency response	Contractor list of equipment	Flooding, winter storms, tornados	High	High	Low	Medium	Police Dept.	No Cost	COMPLETED and annual update
	Enhance emergency response	Equipment list by municipality	Flooding, winter storms, tornados	High	High	Low	High	Police Dept.	No Cost	COMPLETED and annual update
	Enhance emergency response	Pre-established mutual aid agreements between municipalities for equipment	Flooding, winter storms, tornados	High	High	Low	High	Police Dept.	No Cost	COMPLETED
Franklin	Goal	Hazard Mitigation Projects	Haz. Mit.	Pop Imp.	Prop Imp.	Proj. Cost	Cost/Benefit Ranking	Responsible Agency	Funding Sources	Timeline
	Floodplain Management	Continue to enforce municipal ordinances which require no development in the Floodplain.*	Flooding	High	High	Low	High	DPW	City Budget	Ongoing
	New Building and Infrastructure	Continue to enforce local building codes for existing and new construction, based on the 2006* International Building Codes	All Hazards	High	High	Low	High	Building Inspection/ Neighborhood Services	City Budget	Ongoing
	Enhance emergency response	Contractor list of equipment	Flooding, winter storms, tornados	High	High	Low	High	Municipal DPW	No Cost	COMPLETED and annual update
	Enhance emergency response	Equipment list by municipality	Flooding, winter storms, tornados	High	High	Low	High	Municipal DPW	No Cost	COMPLETED and annual update
	Enhance emergency response	Pre-established mutual aid agreements between municipalities for equipment	Flooding, winter storms,	High	High	Low	High	Fire Dept. & Emerg. Management	No Cost	COMPLETED

			tornados							
	Enhance early warning	Add new siren at St Martins	Flooding, winter storms, tornados	High	High	Low	High	Milw. County & State	City Budget	COMPLETED
	Enhance early warning	Reverse 911	Flooding, winter storms, tornados	High	High	Medium	High	Police Dept.	City Budget	COMPLETED

Glendale	Goal	Hazard Mitigation Projects	Haz. Mit.	Pop Imp.	Prop Imp.	Proj. Cost	Cost/Benefit Ranking	Responsible Agency	Funding Sources	Timeline
	Floodplain Management	Continue to enforce municipal ordinances which require no development in the Floodplain.*	Flooding	High	High	Low	High	Municipal DPW	City Budget	Ongoing
	New Building and Infrastructure	Continue to enforce local building codes for existing and new construction, based on the 2006 International Building Codes*	All Hazards	High	High	Low	High	Building Inspection/ Neighborhood Services	City Budget	Ongoing
	Enhance emergency response	Contractor list of equipment	Flooding, winter storms, tornados	High	High	Low	High	Municipal DPW	No Cost	COMPLETE
	Enhance emergency response	Equipment list by municipality	Flooding, winter storms, tornados	High	High	Low	High	Municipal DPW	No Cost	COMPLETE
	Enhance emergency response	Pre-established mutual aid agreements between municipalities for equipment	Flooding, winter storms, tornados	High	High	Low	High	Municipal DPW	No Cost	COMPLETE
	Reduce impacts from flooding	Impact and clean channel in wooded ravine north of Fairfield Court	Flooding	Low	Low	Low	Low	Municipal DPW	Local Storm Water Utility funding	Ongoing due to cost issues
	Reduce impacts from flooding	Remove sediment and debris from Bender Creek	Flooding	Low	Low	Low	Low	Municipal DPW	Local Storm Water Utility funding	Ongoing, cost issues and some of the land is on private property and they need permission from the owners to continue. 50% completed.
	Reduce Impacts	Continue to work in developing	Flooding	High	High	Low	High	Floodplain	FEMA,	Ongoing,

	from Flooding	and implementing a water course system plan for the Milwaukee River, as it relates to floodplain ordinances, enforcement, and flood mitigation planning.*						Administrator Southeastern Wisconsin Regional Planning Commission Milwaukee Metropolitan Sewerage District Wisconsin DNR	State of Wisconsin , and MMSD	Updated Annually
	Reduce impacts from flooding	Removal of accumulated rocks downstream of the Silver Spring Drive culvert	Flooding	Low	Low	Low	Low	Municipal DPW	Local Storm Water Utility funding	Ongoing, due to cooperation needed by the City of Milwaukee, because half of it is their property
	Reduce impacts from flooding	Purchase and install of backflow preventer valves in 50 residences*	Flooding	Low	Low	Low	Medium	Municipal DPW	State/FEMA Grants/City Funds	1-2 YEARS
Greendale	Goal	Hazard Mitigation Projects	Haz. Mit.	Pop Imp.	Prop Imp.	Proj. Cost	Cost/Benefit Ranking	Responsible Agency	Funding Sources	Timeline
	Floodplain Management	Continue to enforce municipal ordinances which require no development in the Floodplain.*	Flooding	High	High	Low	High	Municipal DPW	Village Budget	Ongoing
	New Building and Infrastructure	Continue to enforce local building codes for existing and new construction, based on the 2006 International Building Codes*	All Hazards	High	High	Low	High	Building Inspection/ Neighborhood Services	Village Funds	Ongoing
	Enhance emergency response	Contractor list of equipment	Flooding, winter storms, tornados	High	High	Low	High	Municipal DPW	No Cost	COMPLETE
	Enhance emergency response	Equipment list by municipality	Flooding, winter storms, tornados	High	High	Low	High	Municipal DPW	No Cost	COMPLETE
	Enhance emergency response	Pre-established mutual aid agreements between municipalities for equipment	Flooding, winter storms, tornados	High	High	Low	High	Municipal DPW	No Cost	COMPLETE
	Reduce impacts from flooding	Clean channel along 43rd St. near Ramsey Ave.	Flooding	Low	Low	Low	Low	Municipal DPW	Storm Water Utility Funds	Ongoing; maintenance project; Updated yearly
	Reduce impacts from flooding	Regular cleaning and inspection of storm inlets	Flooding	Low	Medium	Low	Low	Municipal DPW	Storm Water Utility Funds	Ongoing; maintenance project; Updated yearly
	Reduce impacts from flooding	Work with Milwaukee County to keep Dale Creek free of obstructions	Flooding	Low	Medium	Low	Low	Municipal DPW	Storm Water Utility Funds	Ongoing; maintenance project; Updated yearly
	Reduce impacts	Continue and expand shared	Flooding	Low	Low	Low	Low	Municipal DPW		Ongoing;

	from flooding	services with Greendale School District							Storm Water Utility Funds	maintenance project; Updated yearly
	Reduce impacts from flooding	Clean and straighten drainage channels	Flooding	Low	Medium	Low	Low	Municipal DPW	Storm Water Utility Funds	Ongoing; maintenance project; Updated yearly
	Reduce impacts from flooding	Encourage residents to report concerns early	Flooding	Low	Low	Low	Low	Municipal DPW	Storm Water Utility Funds	Ongoing; maintenance project; Updated yearly
	Reduce impacts from flooding	Educate residents about dumping into storm sewers	Flooding	Low	Low	Low	Low	Municipal DPW	Storm Water Utility Funds	Ongoing; maintenance project; Updated yearly
	Reduce impacts from flooding	Acquire repetitive loss structures in the Root River Drive Area*	Flooding	Low	Medium	Low	High	Municipal DPW	State Mitigation/Village Funds	3 YRS
Greenfield	Goal	Hazard Mitigation Projects	Haz. Mit.	Pop Imp.	Prop Imp.	Proj. Cost	Cost/Benefit Ranking	Responsible Agency	Funding Sources	Timeline
	Floodplain Management	Continue to enforce municipal ordinances which require no development in the Floodplain.*	Flooding	High	High	Low	High	Municipal DPW	City Budget	Ongoing
	New Building and Infrastructure	Continue to enforce local building codes for existing and new construction, based on the 2006 International Building Codes*	All Hazards	High	High	Low	High	Building Inspection/ Neighborhood Services	City Budget	Ongoing
	Enhance emergency response	Contractor list of equipment	Flooding, winter storms, tornados	High	High	Low	High	Municipal DPW	No Cost	COMPLETE
	Enhance emergency response	Equipment list by municipality	Flooding, winter storms, tornados	High	High	Low	High	Municipal DPW	No Cost	COMPLETE
	Enhance emergency response	Pre-established mutual aid agreements between municipalities for equipment	Flooding, winter storms, tornados	High	High	Low	High	Municipal DPW	No Cost	COMPLETE
Hales Corner	Goal	Hazard Mitigation Projects	Haz. Mit.	Pop Imp.	Prop Imp.	Proj. Cost	Cost/Benefit Ranking	Responsible Agency	Funding Sources	Timeline
	Floodplain Management	Continue to enforce municipal ordinances which require no development in the Floodplain.*	Flooding	High	High	Low	High	Municipal DPW	Village Budget	Ongoing
	New Building and Infrastructure	Continue to enforce local building codes for existing and new construction, based on the 2006 International Building Codes*	All Hazards	High	High	Low	High	Building Inspection/ Neighborhood Services	City Budget	Ongoing
	Enhance emergency response	Contractor list of equipment	Flooding, winter storms, tornados	High	High	Low	High	Municipal DPW	No Cost	Completed, Updated Annually
	Enhance emergency response	Equipment list by municipality	Flooding, winter storms, tornados	High	High	Low	High	Municipal DPW	No Cost	Completed, Updated Annually
	Enhance emergency	Pre-established mutual aid	Flooding, winter storms,	High	High	Low	High	Municipal DPW	No Cost	Completed,

response	agreements between municipalities for equipment	tornados								Resolution No. 06-07
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Oak Creek	Goal	Hazard Mitigation Projects	Haz. Mit.	Pop Imp.	Prop Imp.	Proj. Cost	Cost/Benefit Ranking	Responsible Agency	Funding Sources	Timeline
	Floodplain Management	Continue to enforce municipal ordinances which require no development in the Floodplain.*	Flooding	High	High	Low	High	Municipal DPW	City Budget	Ongoing
	New Building and Infrastructure	Continue to enforce local building codes for existing and new construction, based on the 2006 International Building Codes*	All Hazards	High	High	Low	High	Building Inspection/ Neighborhood Services	City Budget	Ongoing
	Enhance emergency response	Contractor list of equipment	Flooding, winter storms, tornados	High	High	Low	High	Municipal DPW	No Cost	COMPLETED 2005
	Enhance emergency response	Equipment list by municipality	Flooding, winter storms, tornados	High	High	Low	High	Municipal DPW	No Cost	COMPLETED 2007
	Enhance emergency response	Pre-established mutual aid agreements between municipalities for equipment	Flooding, winter storms, tornados	High	High	Low	High	Municipal DPW	No Cost	COMPLETED 2007
	Enhance early warning	Reverse 911	Flooding, winter storms, tornados	High	High	Medium	High	Administration	Grants	COMPLETED 2008
	Reduce impacts from flooding	Install wet detention ponds*	Flooding	High	High	High	High	Private Developer	Developer	On going
	Reduce impacts from flooding	Maintain storm sewer outlets*	Flooding	High	High	Low	High	City Public Works	Budget	On going
	Reduce impacts from flooding	Acquisition of 1.0 acres of a 6.613 acres mobile home park*	Flooding	Low	Medium	Medium	High	City Engineering	State/FEMA grants/City Funds	1-2 YEARS
	Reduce impacts from flooding	Acquire repetitive loss structure*	Flooding	Low	Medium	Medium	High	City Community Development	State/FEMA grants/City Funds	1-2 YEARS
	Reduce impacts from flooding	Vacating mobile homes sites in Oak Creek Estates and acquisition of the underlying real estate*	Flooding	Low	High	Medium	High	City Engineering	State/FEMA grants/City Funds	1-3 YEARS
River Hills	Goal	Hazard Mitigation Projects	Haz. Mit.	Pop Imp.	Prop Imp.	Proj. Cost	Cost/Benefit Ranking	Responsible Agency	Funding Sources	Timeline
	Floodplain Management	Continue to enforce municipal ordinances which require no development in the Floodplain.*	Flooding	High	High	Low	High	Municipal DPW	Village Budget	Ongoing
	New Building and Infrastructure	Continue to enforce local building codes for existing and new construction, based on the 2006 International Building	All Hazards	High	High	Low	High	Building Inspection/ Neighborhood Services	Village Budget	Ongoing

		Codes*								
	Enhance emergency response	Contractor list of equipment	Flooding, winter storms, tornados	High	High	Low	High	Municipal DPW	No Cost	Completed
	Enhance emergency response	Equipment list by municipality	Flooding, winter storms, tornados	High	High	Low	High	Municipal DPW	No Cost	COMPLETE
	Enhance emergency response	Pre-established mutual aid agreements between municipalities for equipment	Flooding, winter storms, tornados	High	High	Low	High	Municipal DPW	No Cost	COMPLETE
	Reduce impacts from flooding	Acquire repetitive loss structures*	Flooding	Low	Low	Medium	Low	Village	State/FEMA Grant	1-2 YEARS
Shorewood	Goal	Hazard Mitigation Projects	Haz. Mit.	Pop Imp.	Prop Imp.	Proj. Cost	Cost/Benefit Ranking	Responsible Agency	Funding Sources	Timeline
	Floodplain Management	Continue to enforce municipal ordinances which require no development in the Floodplain.*	Flooding	High	High	Low	High	Municipal DPW	City Budget	Ongoing
	New Building and Infrastructure	Continue to enforce local building codes for existing and new construction, based on the 2006 International Building Codes*	All Hazards	High	High	Low	High	Building Inspection/ Neighborhood Services	City Budget	Ongoing
	Enhance emergency response	Contractor list of equipment	Flooding, winter storms, tornados	High	High	Low	High	Municipal DPW	No Cost	Completed in 2010 and Annual Update
	Enhance emergency response	Equipment list by municipality	Flooding, winter storms, tornados	High	High	Low	High	Municipal DPW	No Cost	COMPLETED
	Enhance emergency response	Pre-established mutual aid agreements between municipalities for equipment	Flooding, winter storms, tornados	High	High	Low	High	Municipal DPW	No Cost	COMPLETED
	Reduce impacts from flooding	Acquire backflow valves, iron gate valves, sewer ejector systems, sump pumps w/backup power for 100 residences*	Flooding	Low	Low	Low	High	Municipal DPW	State/FEMA grant/Storm Water utility funds	2 YEARS

South Milwaukee	Goal	Hazard Mitigation Projects	Haz. Mit.	Pop Imp.	Prop Imp.	Proj. Cost	Cost/Benefit Ranking	Responsible Agency	Funding Sources	Timeline
	Floodplain Management	Continue to enforce municipal ordinances which require no development in the Floodplain.*	Flooding	High	High	Low	High	Municipal DPW	City Budget	Ongoing
	Enhance emergency response	Contractor list of equipment	Flooding, winter storms, tornados	High	High	Low	High	Municipal DPW	No Cost	Completed
	Enhance emergency response	Equipment list by municipality located with Insurance Clerk	Flooding, winter storms, tornados	High	High	Low	High	City	City Budget	2010 Ongoing
	Enhance emergency response	Pre-established mutual aid agreements between municipalities for equipment Fire, Health, & Police established., statewide DPW	Flooding, winter storms, tornados	High	High	Low	High	Municipal DPW	No Cost	Ongoing
	Enhance emergency response	Locating vulnerable facilities in GIS	Flooding, winter storms, tornados	Low	Low	Low	Low	City	City Budget	2007 Ongoing
	Enhance early warning system	Replace or repair siren	Flooding, winter storms, tornados	High	High	Low	High	City	FEMA, Grant, Capital Budget	2009 Completed
	Enhance early warning system	Reverse 911 Emergency Notification System (MyStateUSA)	Flooding, winter storms, tornados	High	Low	High	High	County and City	UASI Grant, City	2010 Purchased 2011 , maintain, ongoing costs
	Reduce effects of coastal erosion	Repair slope stability *	Coastal erosion	Low	Medium	Low	Low	City and County Parks Department	FEMA, Grant, Capital Budget	2009, One Project being done 2010-2011, ongoing
	Reduce impacts from flooding	Parkway Drive Storm Sewer work*	Flooding	Low	Low	Low	High	City	Storm Sewer/ Capital	2009 Completed one project re-eval, Due to flooding. Ongoing.
	Reduce impacts from flooding	Brookdale Court Storm Sewer work*	Flooding	Low	Low	Low	High	City	Storm Sewer/ Capital	2010, ongoing
	Reduce impacts from flooding	Research barriers for wastewater lift stations to prevent sewer backups if flooding of Oak creek*	Flooding	High	High	High	High	City	N/A	ongoing
	Reduce impacts from flooding/ coastal erosion	Severe Channel Erosion and slope stabilization at Wastewater Treatment Plant Project*	Flooding, Coastal erosion	Low	Low	Medium	High	City	FEMA/ State Grant, City	2010 Project 2010-2011 completion

	Reduce impacts from flooding	Slope stability Michigan Avenue to Oak Creek Parkway Repair*	Flooding, winter storms, tornados	Low	Low	Low	Low	City	City Budget	2008 Completed, Re-eval stabilized, ongoing.
	Reduce impacts from flooding	Slope Stability Hawthorne Avenue Repair*	Flooding, winter storms, tornados	Low	Low	Low	Low	City	City Budget	2008 Completed, Re-eval stabilized, ongoing.
	Reduce impacts from flooding	Slope Stability Mill Pond Bridge Road Repair*	Flooding, winter storms, tornados	Low	Low	Medium	Medium	County	County	2008 Completed
	Reduce impacts from flooding	Dredging of Oak Creek to remove overgrowth.*	Flooding, winter storms, tornados	Low	High	Low	Low	County, City	Not presently funded	Not presently funded
	Reduce impacts from flooding	Dredging of the Mill Pond *	Flooding, winter storms, tornados	Low	High	Low	Low	County, City Parks Department	Not presently funded	1-2 YEARS
	Reduce impacts from Winter storms/wind storms	Tree management program for public property*	winter storms, severe weather, high winds	Low	Low	Low	Low	City	Not presently funded	1-2 YEARS
	Reduce impacts from flooding/decrease backflow hazardous waste	Sanitary Sewer project relocation of relay Lakeshore Blvd. Montana Ave. to Lift Station*	Flooding, sanitary sewer back-ups/hazardous materials	Low	Medium	Medium	Medium	City	Not presently funded	2-4 YEARS
	Reduce impacts from flooding	Sanitary Sewer pipe lining to eliminate clear water intrusion from heavy rainfall*	Flooding	High	High	High	Low	City	Not presently funded	1-5 YEARS
	Enhance early warning system	Repair, Replace, Relocate siren currently behind SM Fire Dept.*	Flooding, winter storms, tornados	High	High	Low	High	City	Not presently funded	1-2 YEARS
	Enhance emergency response/ interoperability	Replace Police radios both portables and radios in squads*	Flooding, winter storms, tornados	High	Low	High	High	City	City Budget	3 YEARS
	Reduce impacts of flooding/ enhance emergency response capacity	Back up Generation installation Project at Wastewater Treatment Facility *	Flooding, winter storms, tornados	High	High	High	High	City	City Budget	1-2 YEARS
	New Building and Infrastructure	Continue to enforce local building codes for existing and new construction, based on the 2006 International Building Codes*	All Hazards	High	High	Low	High	Building Inspection/ Neighborhood Services	City Budget	Ongoing
	Enhance emergency response/ interoperability	Bidirectional Amplifier for Water Department for Radio Communication.*	Flooding, winter storms, tornados	High	Low	High	High	City	Not presently funded	1-2 YEARS

St Francis	Goal	Hazard Mitigation Projects	Haz. Mit.	Pop Imp.	Prop Imp.	Proj. Cost	Cost/Benefit Ranking	Responsible Agency	Funding Sources	Timeline
	Floodplain Management	Continue to enforce municipal ordinances which require no development in the Floodplain.*	Flooding	High	High	Low	High	Municipal DPW	City Budget	Ongoing
	New Building and Infrastructure	Continue to enforce local building codes for existing and new construction, based on the 2006 International Building Codes.*	All Hazards	High	High	Low	High	Building Inspection/ Neighborhood Services	Existing municipal funds	Ongoing
	Enhance emergency response	Contractor list of equipment	Flooding, winter storms, tornados	High	High	Low	High	Municipal DPW	No Cost	COMPLETED
	Enhance emergency response	Equipment list by municipality	Flooding, winter storms, tornados	High	High	Low	High	Municipal DPW	No Cost	COMPLETED
	Enhance emergency response	Pre-established mutual aid agreements between municipalities for equipment	Flooding, winter storms, tornados	High	High	Low	High	Municipal DPW	No Cost	COMPLETED
Wauwatosa	Goal	Hazard Mitigation Projects	Haz. Mit.	Pop Imp.	Prop Imp.	Proj. Cost	Cost/Benefit Ranking	Responsible Agency	Funding Sources	Timeline
	Floodplain Management	Continue to enforce municipal ordinances which require no development in the Floodplain.*	Flooding	High	High	Low	High	Municipal DPW	City Budget	Ongoing
	New Building and Infrastructure	Continue to enforce local building codes for existing and new construction, based on the 2006 International Building Codes.*	All Hazards	High	High	Low	High	Building Inspection/ Neighborhood Services	Existing municipal funds	Ongoing
	Enhance emergency response	County wide emergency communication system	Flooding, winter storms, tornados	High	High	Medium	High	Emergency Mgmt	Grants UASI or interope rability	COMPLETED
	Enhance emergency response	Contractor list of equipment	Flooding, winter storms, tornados	High	High	Low	High	Public Works	No Cost	COMPLETED
	Enhance emergency response	Equipment list by municipality	Flooding, winter storms, tornados	High	High	Low	High	Public Works	No Cost	COMPLETED
	Enhance emergency response	Pre-established mutual aid agreements between municipalities for equipment	Flooding, winter storms, tornados	High	High	Low	High	Public works / Fire / Police	No Cost	COMPLETED 2007
	Reduce impacts from flooding	Replacement of retaining wall on Blanchard Street pumping station*	Flooding	High	High	Medium	High	Wauwatosa Water Dept.	State/ FEMA grants/ City Budget	No later than 2010
	Reduce impacts from	Flood proofing of 3 repetitive loss structures*	Flooding	Low	Low	Medium	Low	Public Works	MMSD	No later than 2010

flooding										
West Allis	Goal	Hazard Mitigation Projects	Haz. Mit.	Pop Imp.	Prop Imp.	Proj. Cost	Cost/Benefit Ranking	Responsible Agency	Funding Sources	Timeline
	Floodplain Management	Continue to enforce municipal ordinances which require no development in the Floodplain. *	Flooding	High	High	Low	High	Municipal DPW	City Budget	Ongoing
	Enhance emergency response	Contractor list of equipment	Flooding, winter storms, tornados	High	High	Low	High	Municipal DPW	No Cost	COMPLETED
	Enhance emergency response	Equipment list by municipality	Flooding, winter storms, tornados	High	High	Low	High	Municipal DPW	No Cost	COMPLETED
	Reduce Flooding	Work with local businesses to install storm water detention in large parking lots *	Flooding	High	High	High	High	Municipal Public Works	No Cost	1 year – No progress due to lack of funds.
	New Building and Infrastructure	Continue to enforce local building codes for existing and new construction, based on the 2006 International Building Codes.*	All Hazards	High	High	Low	High	Building Inspection/ Neighborhood Services	Existing municipal funds	Ongoing
	Enhance emergency response	Pre-established mutual aid agreements between municipalities for equipment	Flooding, winter storms, tornados	High	High	Low	High	Individual Departments	No Cost	COMPLETED
West Milwaukee	Goal	Hazard Mitigation Projects	Haz. Mit.	Pop Imp.	Prop Imp.	Proj. Cost	Cost/Benefit Ranking	Responsible Agency	Funding Sources	Timeline
	Floodplain Management	Continue to enforce municipal ordinances which require no development in the Floodplain. *	Flooding	High	High	Low	High	Municipal DPW	Village Budget	Ongoing
	New Building and Infrastructure	Continue to enforce local building codes for existing and new construction, based on the 2006 International Building Codes.*	All Hazards	High	High	Low	High	Building Inspection/ Neighborhood Services	Existing municipal funds	Ongoing
	Enhance emergency response	Contractor list of equipment	Flooding, winter storms, tornados	High	High	Low	High	Municipal DPW	No Cost	COMPLETED
	Enhance emergency response	Equipment list by municipality	Flooding, winter storms, tornados	High	High	Low	High	Municipal DPW	No Cost	COMPLETED
	Enhance emergency response	Pre-established mutual aid agreements between municipalities for equipment	Flooding, winter storms, tornados	High	High	Low	High	Municipal DPW	No Cost	COMPLETED
Whitefish Bay	Goal	Hazard Mitigation Projects	Haz. Mit.	Pop Imp.	Prop Imp.	Proj. Cost	Cost/Benefit Ranking	Responsible Agency	Funding Sources	Timeline
	Floodplain Management	Continue to enforce municipal ordinances which require no development in the Floodplain. *	Flooding	High	High	Low	High	Public Works, Engineering	City Budget	Ongoing
	New Building and Infrastructure	Continue to enforce local building codes for existing and new construction, based on the 2006 International Building Codes.*	All Hazards	High	High	Low	High	Building Inspection/ Neighborhood Services	Existing municipal funds	Ongoing
	Enhance	Contractor list of equipment	Flooding, winter storms, tornados	High	High	Low	High	Municipal	No Cost	In place and

	emergency response							Public Works, Engineering		annual update
	Enhance emergency response	Equipment list by municipality	Flooding, winter storms, tornados	High	High	Low	High	Public Works, Engineering, Police Dept.	No Cost	In place and annual update
	Enhance emergency response	Mutual aid agreements between municipalities for equipment	Flooding, winter storms, tornados	High	High	Low	High	Public Works, Engineering, Police Dept.	No Cost	COMPLETE D 2005
	Reduce impacts from flooding	Storm sewer replacement where needed	Flooding	Medium	Medium	High	Medium	Engineering	City annual budget/ Borrow	Continous
	Reduce impacts from flooding	Storm sewer replacement where needed	Flooding	Medium	Medium	High	Medium	Engineering	City annual budget/ Borrow	Continous
	Reduce impacts from flooding	Storm sewer replacement from Monrovia & Lake Dr. Ct.*	Flooding	Medium	Medium	High	Medium	Engineering	City Annual budget/ borrowing	COMPLETE
	Reduce impacts from flooding	Storm sewer upgrade and replacement from Birch Ave (Marlborough to Lake) *	Flooding	Low	Medium	Medium	Medium	Engineering	City Annual budget/ borrowing	COMPLETE
	Reduce impacts from flooding	Storm sewer replacement for Bay Ridge Ave. (Monclaire to Devon)*	Flooding	Low	Medium	Low	High	Engineering	City Annual budget/ borrowing	COMPLETE
	Reduce impacts from flooding	Storm sewer replacement for Lydell Ave. (Devon to Water Tower Park)*	Flooding	Low	Medium	Low	High	Engineering	City Annual budget/ borrowing	COMPLETE
	Reduce impacts from flooding	Storm water management plan for localized southwest drainage basin flooding*	Flooding	Low	Medium	Medium	High	Engineering	FEMA/ State grant/ Village funds	3-7 YEARS
	Reduce impacts from flooding	Update public information/ put on website	Flooding	High	Medium	Low	High	Administration	City Included in dept. budget	COMPLETE

Milwaukee County	Goal	Hazard Mitigation Projects	Haz. Mit.	Pop Imp.	Prop Imp.	Proj. Cost	Cost/Benefit Ranking	Responsible Agency	Funding Sources	Timeline
	Enhance emergency response	Contractor list of equipment	Flooding, winter storms, tornados	High	High	Low	High	Emergency Management	Cost to be determined	COMPLETED – Annual updated
	Enhance emergency response	Equipment list by municipality	Flooding, winter storms, tornados	High	High	Low	High	Emergency Management	Cost to be determined	COMPLETED
	Enhance emergency response	Pre-established mutual aid agreements between municipalities for equipment	Flooding, winter storms, tornados	High	High	Low	High	Emergency Management	Cost to be determined	COMPLETED
	Enhance emergency response	Migrate special facilities database from excel to internet application	Flooding, winter storms, tornados	High	High	Low	High	Emergency Management	Cost to be determined	COMPLETED – utilizing CAMOE in lieu of an internet application, updated annually
	Enhance emergency response	Include Public Works Dept. in County wide communication network	Flooding, winter storms, tornados	High	High	Low	High	Emergency Management	Cost to be determined	COMPLETED

POPULATION IMPACTED

High = > 50% of Jurisdiction residents

Medium = 20 to 50% of Jurisdiction residents

Low = < 20% of Jurisdiction residents

PROPERTY IMPACTED & PROJECT COST

High = > \$1,000,000

Medium = \$500,000 to \$1,000,000

Low = < \$500,000

COST BENEFIT FORMULA

High = "5" for Population Impacted & Property

Medium = "3" for Population Impacted & Property

Low = "1" for Population Impacted & Property

COST/BENEFIT RANKING

High = 11 to 15

Medium = 6 to 10

Low = 0 to 5

- (*) DENOTES a NEW Mitigation project.
- Items in **RED** denote strategies to maintain compliance with the National Flood Insurance Program

TABLE 4-3 MILWAUKEE COUNTY HIGH PRIORITY HAZARD MITIGATION PROJECTS GOAL	HAZARD MITIGATION PROJECTS	HAZARDS MITIGATED	COUNTY PRIORITY	COST/BENEFIT RANKING	RESPONSIBLE AGENCY	FUNDING SOURCES	TIMELINE
Enhance Emergency Response Systems	Contractor List of equipment	Fire, Flooding, Winter Storms, Tornadoes	High	High	By Jurisdiction	By Jurisdiction	COMPLETED
Enhance Emergency Response Systems	Equipment list by municipality.	Fire, Flooding, Winter Storms, Tornadoes	High	High	By Jurisdiction	By Jurisdiction	By Jurisdiction
Enhance Emergency Response Systems	Pre-established mutual aid agreements between municipalities for equipment.	Fire, Flooding, Winter Storms, Tornadoes	High	High	By Jurisdiction	By Jurisdiction	By Jurisdiction
Enhance Emergency Response Systems	Include Public Works Department in County wide communication network.	Fire, Flooding, Winter Storms, Tornadoes	High	High	Milwaukee County Emergency Management	Cost to be determined	2 Years
Enhance Emergency Response Systems	Migrate Special Facilities database from excel to internet application (now using an internet application as opposed to the internet).	Fire, Flooding, Winter Storms, Tornadoes	High	High	Milwaukee County Emergency Management	Cost to be determined	COMPLETED – utilizing CAMEO; updated annually
Enhance Early Warning System	Repair or replace siren in South Milwaukee.	Fire, Flooding, Winter Storms, Tornadoes	High	High	South Milwaukee	FEMA, Grant, Capital	COMPLETED
Enhance Early Warning System	Purchase additional siren for the St. Martins area in Franklin	Fire, Flooding, Winter Storms, Tornadoes	High	High	Milwaukee County & State	State/Grants	Unknown
Reduce Impacts from Flooding	Replacement of retaining wall on Blanchard Street pumping station.	Flooding	High	High	Wauwatosa Water Dept.	Grants or long-term debt	no later than 2010

The following Mitigation Projects have been COMPLETED:

Hazard Mitigated	HAZARD MITIGATION PROJECTS	JURISDICTION
All Hazards	Pre-establish mutual aid agreements between municipalities	Multiple Municipalities
Flooding	Install larger culvert across Laramie Lane at Laramie Lane and Ironwood Lane Intersection	Bayside
All Hazards	Contractor List of Equipment	All Municipalities
All Hazards	Equipment List by Municipality	All municipalities
Flooding, Winter Storms	Reverse 911	Oak Creek
All Hazards	Repair/Replace Siren	South Milwaukee
Flooding	Parkway Drive Storm Sewer Work	South Milwaukee

5.0 PLAN MAINTENANCE PROCEDURES

The Plan maintenance section of this document details the formal process that will ensure that the Milwaukee County Pre-Disaster Mitigation Plan remains an active and relevant document. The Plan maintenance process includes a schedule for monitoring and evaluating the Plan and producing a Plan revision every 5 years. This section describes how Milwaukee County will integrate public participation throughout the Plan maintenance process. Also included in this section is an explanation of how Milwaukee County government intends to incorporate the mitigation strategies outlined in this Plan into existing planning mechanisms.

5.1 MONITORING, EVALUATING AND UPDATING THE PLAN

The Milwaukee County Pre-Disaster Mitigation Plan will be reviewed annually to update hazard information, contact information, and to note any significant developments needed. In addition, the plan will be formally updated a minimum of once every 5 years or as deemed necessary by knowledge of new hazards, vulnerabilities, or other pertinent reasons, and updated accordingly. The Plan review will identify new mitigation projects and evaluate the effectiveness of mitigation priorities and existing programs. ***A record for annual review is included at the end of this plan.***

The Emergency Management Bureau Administrator will be responsible for scheduling a meeting of the Milwaukee County Board to review and update the Plan. The meeting will be open to the public and advertised in the local newspaper to solicit public input. The Board, assisted by the Emergency Management Bureau and the public will review the goals and mitigation projects to determine their relevance to changing situations in the county, as well as changes in state or federal policy, and to ensure they are addressing current and expected conditions. The Board and the public will also review the risk assessment portion of the Plan to determine if this information should be updated or modified, given any new available data. The list of critical facilities will also be reviewed and enhanced with additional details. The Emergency Management Bureau Administrator will give a status report detailing the success of various mitigation projects, difficulties encountered, success of coordination efforts, and which strategies should be revised. The status report will be published in the local newspaper to update local citizens.

The Emergency Management Bureau Administrator will be responsible for the 5 year Plan update of the Plan, and will have 6 months to make appropriate changes to the Plan before submitting it to the Board and public for review and approval. Before the end of the 5-year period, the updated Plan will be submitted to the State Hazard Mitigation Officer and FEMA for acceptance. The Emergency Management Bureau Administrator will notify all holders of the county Plan when changes have been made.

5.2 IMPLEMENTATION THROUGH EXISTING PROGRAMS

Milwaukee County will have the opportunity to implement hazard mitigation projects through existing programs and procedures. Local officials will work with the County departments to ensure hazard mitigation projects are consistent with planning goals and integrate them, where appropriate.

Meetings of the Board will provide an opportunity for local officials to report back on the progress made on the integration of mitigation planning elements into county planning documents and procedures.

To date the Milwaukee County Pre-Disaster Hazard Mitigation Plan has yet to be incorporated into municipal comprehensive plans. However, implementation will take place within the next five years according to FEMA guidelines.

5.3 CONTINUED PUBLIC INVOLVEMENT

Milwaukee County is dedicated to involving the public directly in review and updates of the Pre-Disaster Mitigation Plan. The public will have many opportunities to provide feedback about the Plan. Copies of the Plan will be catalogued and kept at all appropriate agencies in the county as well as at the public library. The existence and location of these copies will be publicized in the local newspapers. Section 2.0 of the Plan includes the address and the phone number of the Emergency Management Bureau Administrator responsible for keeping track of public comments on the Plan.

A series of public meetings will also be held prior to each 5-year update, or at lesser intervals when deemed necessary by the Emergency Management Bureau Administrator. The meetings will provide the public a forum for which they can express its concerns, opinions, or ideas about the Plan. The Emergency Management Bureau Administrator will be responsible for using county resources to publicize the annual public meetings and maintain public involvement through the newspapers and radio.

6.0 REFERENCES

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7.0 RECORD OF ANNUAL REVIEW

_____	_____	_____
(Name of Reviewer)	(Title)	(Date)

_____	_____	_____
(Name of Reviewer)	(Title)	(Date)

_____	_____	_____
(Name of Reviewer)	(Title)	(Date)

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(Name of Reviewer)	(Title)	(Date)

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(Name of Reviewer)	(Title)	(Date)

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(Name of Reviewer)	(Title)	(Date)

_____	_____	_____
(Name of Reviewer)	(Title)	(Date)

_____	_____	_____
(Name of Reviewer)	(Title)	(Date)

APPENDIX A

LETTERS AND RESOLUTIONS

**Milwaukee County Wisconsin
Pre-Disaster Mitigation Plan**

APPENDIX B

PLANNING DOCUMENTATION

Milwaukee County Wisconsin Pre-Disaster Mitigation Plan

- **Milwaukee County Contact List**
- **List of Stakeholder Interviews/Meetings**
- **2010/2011 Update Municipal Meeting Agendas, Sign In Sheets, and Meeting Summaries**
- **Copy of Press Release and Media Contact List**
- **Public Meeting Sign-In Sheet and Summaries**

Milwaukee County Contact List – Updated 2010

A	River Hills DPW	Kurt Fredrickson	414-352-0080	kfredrickson@vil.river-hills.wi.us
A	River Hills Village Manager	Tom Tollaksen	414-352-8213	ttollaksen@aol.com
A	Shorewood Health Officer	Cindy Tomasello	414-847-2710	ctomasello@villageofshorewood.org
A	Whitefish Bay Police Chief	Robert Jacobs	414-962-3830	policechief@wfbvillage.org
A	Whitefish Bay Village Manager	James Grassman	414-423-2100	j.grassman@wfbvillage.org
A	North Shore Fire Department	Robert Whitaker	414-357-0113 ext. 117	rwhitaker@nsfire.org
C	Wauwatosa Fire Chief	Dean Redman	414-471-8490	dredman@wauwatosa.net
C	West Allis Fire Chief	Steven Hook	414-302-8900	shook@ci.west-allis.wi.us
C	West Milwaukee DPW	James Stenzel, Super.	414-645-6238	james.stenzel@westmilwaukee.org
C	West Milwaukee Police Chief	Dennis Nasci	414-645-2151	dennisnasci@westmilwaukee.org
D	Franklin Fire Chief	James Martins	414-425-1420	jmartins@franklinwi.gov
D	Greendale Fire Chief	Tim Saidler	414-423-2131	tsaidler@Greendale.org
D	Greenfield Fire Chief	Russ Spahn	414 545 7946	russ_s@ci.greenfield.wi.us
D	Hales Corners Fire Chief	Mike Jankowski	414-529-6168	mjankowski@halescornersfire.org
E	Cudahy Fire Chief	Daniel Mayer	414-769-2231	mayerd@ci.cudahy.wi.us
E	Cudahy Health	Carol Wantuch	414-769-2239 ext. 301	wantuchc@ci.cudahy.wi.us
E	Cudahy Mayor	Ryan McCue	414-769-2222	mccuer@ci.cudahy.wi.us
E	Oak Creek Fire Chief	Brian Satula	414-570-5630	bsatula@oakcreekwi.org
E	So. Milw. Fire Chief	Jay Behling	414-768-8191	behling@ci.south-milwaukee.wi.us
E	So. Milw. Health	Jackie Ove	414-768-8055	ove@ci.south-milwaukee.wi.us
E	St. Francis Fire Chief	Frank Lockwood	414-978-2112	firechief@stfranwi.org
County				
	Milwaukee County EM	Lisa Sherman	414-525-5770	lisa.sherman@milwcnty.com
	Milwaukee County EM	Barry Mitchell	414-525-5770	barry.mitchell@milwcnty.com
	Milwaukee County EM	Carl Stenbol	414-525-5770	carl.stenbol@milwcnty.com
	Milwaukee County DPW	Fay Roberts	278-4835	fay.roberts@milwcnty.com
	Milwaukee County DPW/GIS	Bill Shaw	414.278.2176	bill.shaw@milwcnty.com
Other				
	Askageologist U. of Wisconsin	Thomas J. Evans	(608) 263-4125	tevans@wisc.edu
	Wisconsin DNR	James Fratrack	(414)263-8632	james.fratrack@wisconsin.gov

MILWAUKEE COUNTY PRE-DISASTER MITIGATION PLAN STAKEHOLDER INTERVIEW/MEETING LIST			
Date	Persons	Affiliation	Purpose
April 15, 2004	Carol Wantuch	City of Cudahy	Project overview, hazard review, possible mitigation projects
April 15, 2004	Debbie Schier Jerry Hammernik	City Oak Creek	Project overview, hazard review, possible mitigation projects
April 15, 2004	April EagleBoy	City of Milwaukee	Project overview, hazard review, possible mitigation projects
April 15, 2004	Jackie Ove Robert Delgadillo	City of South Milwaukee	Project overview, hazard review, possible mitigation projects
April 15, 2004	Carl Stenbol Rick Hetchler	Milwaukee County	Project overview, hazard review, possible mitigation projects
April 15, 2004	Patrick J. O'Conner	South East Region WEM	Project overview, hazard review, possible mitigation projects
April 15, 2004	Patrick Nook Dean Redman	City of Wauwatosa	Project overview, hazard review, possible mitigation projects
April 15, 2004	Frank Lockwood	City of St.Francis	Project overview, hazard review, possible mitigation projects
April 15, 2004	Mark Ferguson	City of Glendale	Project overview, hazard review, possible mitigation projects
April 15, 2004	Kent Bieganski	Village of Hales Corner	Project overview, hazard review, possible mitigation projects
April 15, 2004	Tom Tollansen	Village of River Hills	Project overview, hazard review, possible mitigation projects
April 15, 2004	Robert Bina	Village of Bayside	Project overview, hazard review, possible mitigation projects
April 15, 2004	Roland Poppy	City of Greenfield	Project overview, hazard review, possible mitigation projects
April 15, 2004	Richard Durica	Village of West Milwaukee	Project overview, hazard review, possible mitigation projects

April 15, 2004	George King Anoy Pederson	Village of Brown Deer	Project overview, hazard review, possible mitigation projects
April 15, 2004	Tom Czaja	Village of Fox Point	Project overview, hazard review, possible mitigation projects
April 15, 2004	Ron Sudfeld	Village of White Fish Bay	Project overview , hazard review, possible mitigation projects
April 15, 2004	Carl Tisonik Rob Dams Randy Pruss Gary Fedder	Village of Greendale	Project overview, hazard review, possible mitigation projects
April 15, 2004	Martin M. King	City of West Allis	Project overview, hazard review, possible mitigation projects
April 15, 2004	Charlie Myers	North Shore	Project overview, hazard review, possible mitigation projects
April 15, 2004	Cynthia Tomasello	Village of Shorewood	Project overview, hazard review, possible mitigation projects
June 10, 2004	Bill Kappel	Wauwatosa Director of Public Works	Project overview, hazard review, possible mitigation projects
June 11, 2004	Jim Wojohowicz	Wauwatosa Water Department	Project overview, hazard review, possible mitigation projects

LOCATION: MCSO EM DIV.

FUNCTION: MUNICIPAL REVIEW OF HAZARD MITIGATION PLAN UPDATES

	NAME	AGENCY/TITLE	PHONE	DATE	
1	Math Schweske	Whitefish Bay	(414) 962-6690	6/13/2011	WJS
2	LEANN PUSCHUK	Shorewood	414-847-2050	6/20/11	WJS
3	Darren Rausch	Greenfield	414-329-5264	6/16/2011	WJS
4	Rob Hagan	Wauwatosa	414-840-7294	6-22-11	WJS
5	DENNIS NASCI	West Milwaukee	414-645-2151	6-23-11	WJS
6	Dave Erdman	Glendale	414 228-1746	6-20-11	WJS

**MILWAUKEE COUNTY HAZARD MITIGATION PROJECT
SUMMARY OF THE WAUWATOSA LIBRARY PUBLIC MEETING
CITY OF WAUWATOSA
6:00 PM MONDAY MAY 24, 2004**

HISTORIC DISASTERS

The List of federal and state disasters declarations was presented. Public input was requested on additional historic hazards in the area. No additional weather disasters were identified.

CRITICAL FACILITIES & VULNERABLE POPULATIONS

No additional Facilities or Vulnerable Populations to add.

MITIGATION GOAL & PROPOSED MITIGATION PROJECTS

None Given

OTHER CONCERNS

Informed of the Milwaukee County Excessive Heat Plan

**MILWAUKEE COUNTY HAZARD MITIGATION PROJECT
SUMMARY OF THE BROWN DEER PUBLIC LIBRARY PUBLIC MEETING
VILLAGE OF BROWN DEER
10:30 AM TUESDAY MAY 25, 2004**

HISTORIC DISASTERS

The List of federal and state disasters declarations was presented. Public input was requested on additional historic hazards in the area. No additional weather disasters were identified.

CRITICAL FACILITIES & VULNERABLE POPULATIONS

Public meeting participants identified the following critical facilities/Vulnerable populations, in addition to those listed in the FEMA and Milwaukee County Special Facilities Database.

- West Allis Fire Station #1
- West Allis Fire Station #3
- West Allis Fire Department Administration Building
- Cassy's Family Day Care, West Allis
- Cathy Littlest Angels, West Allis
- Debbies Den, West Allis
- 107th Street House, West Allis
- Jubilee, West Allis
- Next Step in Community Living 10303 W Manitoba St, West Allis
- Nest Step in Community Living 98th St, West Allis
- Options for Community Growth, West Allis
- My School, West Allis
- Little Learner Pre-School, West Allis
- First class Child Care Center, West Allis
- First United Methodist Church Pre Palymates, West Allis
- Karen's Kids Family Day Care, West Allis
- Kids Just Want to Have Fun, West Allis
- Kinder Care Learning Centers, West Allis
- Klose Family Day Care, West Allis
- The Learning Years, West Allis
- Little Learners Nursery School, West Allis
- My School, West Allis
- Luv-n-Hugs Family Child Care, West Allis
- Magical Memories Home Child Care, West Allis
- Milwaukee School of Arts Enrichment Center, West Allis
- Mt. Calvary's Kids Come First, West Allis
- Nanny's Nursery, West Allis
- SDC HeadStart 2354 S 61st Street, West Allis
- Small Treasures Children's Center 1210 S 61st St, West Allis
- Small Treasures Children's Center 1302 S 60st St, West Allis
- Trinity Evangelical Lutheran Church Early Child Care, West Allis
- Brotoloc West Allis, West Allis
- Crestview IA, West Allis
- Ohio House, West Allis
- Village at Manor Park, West Allis
- West Allis Castle, West Allis
- West park Place, West Allis

Changes to Milwaukee County critical facility list

- Omit West Allis Police Station at 11301 W Lincoln
-

MITIGATION GOAL & PROPOSED MITIGATION PROJECTS

None given

**MILWAUKEE COUNTY HAZARD MITIGATION PROJECT
SUMMARY OF THE RED CROSS HEADQUARTERS PUBLIC MEETING
CITY OF MILWAUKEE
6:00 PM TUESDAY MAY 25, 2004**

No Attendance

**MILWAUKEE COUNTY HAZARD MITIGATION PROJECT
SUMMARY OF THE FRANKLIN PUBLIC LIBRARY PUBLIC MEETING
CITY OF FRANKLIN
1:00 PM WEDNESDAY MAY 26, 2004**

HISTORIC DISASTERS

The List of federal and state disasters declarations was presented. Public input was requested on additional historic hazards in the area. No additional weather disasters were identified.

CRITICAL FACILITIES & VULNERABLE POPULATIONS

Public meeting participants identified the following critical facilities/vulnerable populations, in addition to those listed in the FEMA and Milwaukee County Special Facilities Database.

- Oak Creek fire Station #2
- Oak Creek Power Plant
- CBRF Facility, Oak Creek
- Meadow Mere Elderly Complex, Oak Creek
- Mitchell Manor Assisted Living, Oak Creek
- Centennial Park Elderly, Oak Creek
- The Cornerstone Elderly Care, Oak Creek
- Booth Manor Elderly, Oak Creek
- The Courts Elderly, Oak Creek
- Lake Forest Apartments, Oak Creek

Changes to Milwaukee County critical facility list

- Change Address of Oak Creek Police Department to 301 W Ryan Rd

MITIGATION GOAL & PROPOSED MITIGATION PROJECTS

- 1) Enhance Emergency Warning Capabilities
 - Add new siren at St Martins in Franklin
 - Reverse 911 for Franklin, Oak Creek and South Milwaukee
 - Enhance or repair siren in South Milwaukee
- 2) Enhance Emergency Response System
 - Locate Vulnerable Facilities in GIS for South Milwaukee

**MILWAUKEE COUNTY HAZARD MITIGATION PROJECT
SUMMARY OF THE CUDAHY PUBLIC LIBRARY PUBLIC MEETING
CITY OF CUDAHY
6:00 PM WEDNESDAY MAY 26, 2004**

No Attendance

**MILWAUKEE COUNTY HAZARD MITIGATION PROJECT
SUMMARY OF THE LINCOLN PARK PUBLIC MEETING
CITY OF MILWAUKEE 2:00 PM WEDNESDAY JUNE 9, 2004**

HISTORIC DISASTERS

The List of federal and state disasters declarations was presented. Public input was requested on additional historic hazards in the area. No additional weather disasters were identified.

CRITICAL FACILITIES & VULNERABLE POPULATIONS

No additions or changes.

MITIGATION GOAL & PROPOSED MITIGATION PROJECTS

I) Reduce the Impacts of Flooding

- Renovate Sewers
- Dredging of Milwaukee River at River Park
- More frequent debris pick up at Estrabrook Park

PRE-EMERGENCY PLANNING, LLC

Milwaukee County Pre-Disaster Mitigation Plan Update

ZONE A

AGENDA

Date: Thursday, May 13, 2010
Time: 1:00 p.m. – 3:00 p.m.
Location: Fox Point Police Department
Padway Room
7300 N. Santa Monica
Fox Point, WI

- I. Welcome and Introductions**
- II. Overview: Hazard Mitigation Planning Process, Changes, and Updates**
- III. Update: Critical Facilities**
- IV. Update: Mitigation Action Plan**
- V. Plan Adoption Process**
 - a. Sample Resolution**
- VI. Questions, Additions, Changes**

PRE-EMERGENCY PLANNING, LLC

Milwaukee County Pre-Disaster Mitigation Plan Update ZONE A

Date: Thursday, May 13, 2010
Time: 1:00 p.m. – 3:00 p.m.
Location: Fox Point Police Department
 Padway Room
 7300 N. Santa Monica
 Fox Point, WI

	Name	Department/Agency Name	Email Address
1.	Allison Johnson	Pre-Emergency Planning	allik.johnson@gmail.com
2.	Larry Metzel	Vil. of Brown Deer Public Works	vbdpol@larrye.sbcsjds.net
3.	Jesse Thyes	Vil. of Brown Deer / Community Services	jthy@browndeerwi.org
4.	Lisa Sherman	Milw. Co. Sheriff's Office	Lisa.Sherman@milw.co.wi.us
5.	Andrew Harris	NSFD	aharris@nsfire.org
6.	Brian Caddock	Brown Deer Police	stoperime@bdpolice.org
7.	Bois Halverson	Brown Deer P.D.	RHALVERSON@BDPOLICE
8.	John Graeber	Brown Deer PD	jgraeb@bdpolice.org
9.	Scott McConnell	Bayside PD	smcconnell@bayside-wi.gov
10.	Tom Czaja	Fox Point PD	tczaja@vil.fox-point.wi.us
11.	Tom Toukiss	Village of Milwaukee	ttoukiss@ACL.Co
12.			
13.			

PRE-EMERGENCY PLANNING, LLC

Pre-Disaster Mitigation Plan Update

Zone A Meeting Summary

- Date:** Thursday, May 13, 2010
- Time:** 1:00 p.m. – 3:00 p.m.
- Location:** Fox Point Police Department
Padway Room
7300 N. Santa Monica
Fox Point, WI
- Invitees:** Municipal Officials from Brown Deer, River Hills, Bayside, Fox Point, Glendale, Whitefish Bay, and Shorewood
- Attendees:** Allison Johnson, Pre-Emergency Planning, LLC
Lisa Sherman, MCSO Emergency Management
Larry Neitzel, Village of Brown Deer Public Works
Jesse Thyges, Village of Brown Deer Community Services
Andrew Harris, North Shore Fire Department
Brad Caddock, Brown Deer Police Department
Bob Halverson, Brown Deer Police Department
John Graeber, Brown Deer Police Department
Scott McConnell, Bayside Police Department
Tom Czaja, Fox Point Police Department
Tom Tollaksen, Village of River Hills

Municipalities not in attendance included Glendale, Whitefish Bay, and Shorewood.

1. Welcome and Introductions

2. Overview: Hazard Mitigation Planning Process, Changes, and Updates

A PowerPoint presentation was given which detailed the current mitigation update process. Changes to the 2004 plan were detailed. In addition, the mitigation goals identified in 2004 were reviewed for their relevancy. No changes were made to the identified mitigation goals.

3. Update: Critical Facilities

An explanation of what constitutes critical facilities was given. Each municipality in attendance identified that they would submit any additional changes to their critical facilities by May 30, 2010.

PRE-EMERGENCY PLANNING, LLC



Milwaukee County Pre-Disaster Mitigation Plan Update

ZONE C

AGENDA

Date: Tuesday, May 11, 2010
Time: 1:00 p.m. – 3:00 p.m.
Location: West Allis Fire Department
7332 West National Avenue
West Allis, WI 53214

- I. Welcome and Introductions**
- II. Overview: Hazard Mitigation Planning Process, Changes, and Updates**
- III. Update: Critical Facilities**
- IV. Update: Mitigation Action Plan**
- V. Plan Adoption Process**
 - a. Sample Resolution
- VI. Questions, Additions, Changes**

4. Update: Mitigation Action Plan

Each municipality reviewed the mitigation projects listed in the plan. Additional input from various departments was needed to adequately update the status of these projects. Each municipality agreed to contact relevant departments, and submit all changes by May 30, 2010.

5. Plan Adoption Process

An overview of the plan adoption process, from the municipal to Federal level was reviewed. Each municipality was given a sample resolution that may be used for adoption of the plan at the municipal level. Each municipality was encouraged to adopt the plan by June 30, 2010.

PRE-EMERGENCY PLANNING, LLC

Milwaukee County Pre-Disaster Mitigation Plan Update

Zone C Meeting Summary

- Date:** Tuesday, May 11, 2010
- Time:** 1:00 p.m. – 3:00 p.m.
- Location:** West Allis Fire Department
7332 West National Avenue
West Allis, WI 53214
- Invitees:** Municipal Officials from Wauwatosa, West Milwaukee, and West Allis
- Attendees:** Allison Johnson, Pre-Emergency Planning, LLC
Gary Streicher, West Allis Fire Department
Barry Mitchell, MCSO Emergency Management

Municipalities not in attendance included Wauwatosa and West Milwaukee.

1. Welcome and Introductions

2. Overview: Hazard Mitigation Planning Process, Changes, and Updates

A PowerPoint presentation was given which detailed the current mitigation update process. Changes to the 2004 plan were detailed. In addition, the mitigation goals identified in 2004 were reviewed for their relevancy. No changes were made to the identified mitigation goals.

3. Update: Critical Facilities

West Allis made some corrections to the current listing of critical facilities. In addition, they identified several additional critical facilities they would like included in the plan. These additions were incorporated into the plan.

4. Update: Mitigation Action Plan

West Allis reviewed the mitigation projects listed in the plan. Additional input from various West Allis departments was needed to adequately update the status of these projects. West Allis Fire agreed to contact relevant departments, and submit all changes by May 30, 2010.

5. Plan Adoption Process

An overview of the plan adoption process, from the municipal to Federal level was reviewed. West Allis was given a sample resolution that may be used for adoption of the plan at the municipal level. Each municipality was encouraged to adopt the plan by June 30, 2010.

PRE-EMERGENCY PLANNING, LLC



Milwaukee County Pre-Disaster Mitigation Plan Update

ZONES D & E

AGENDA

Date: Friday, May 14, 2010
Time: 2:30 p.m. – 4:30 p.m.
Location: Milwaukee County Sheriff's Office Training Academy
9225 S. 68th Street
Franklin, WI 53132

- I. Welcome and Introductions**
- II. Overview: Hazard Mitigation Planning Process, Changes, and Updates**
- III. Update: Critical Facilities**
- IV. Update: Mitigation Action Plan**
- V. Plan Adoption Process**
 - a. Sample Resolution**
- VI. Questions, Additions, Changes**

PRE-EMERGENCY PLANNING, LLC

Milwaukee County Pre-Disaster Mitigation Plan Update Zones D & E

Date: Friday, May 14, 2010
Time: 2:30 p.m. – 4:30 p.m.
Location: Milwaukee County Sheriff's Office Training Academy
 9225 S. 68th Street
 Franklin, WI 53132

	Name	Department/Agency Name	Email Address
1.	Allison Johnson	Pre-Emergency Planning	alli.k.johnson@gmail.com
2.	LISA SHERMAN	Milwaukee County Emerg. Mgmt.	LISA.SHERMAN@milwcounty.com
3.	CAROL WANTSUTH	Cudahy HD	wantsuth@ci.cudahy.wi.us
4.	THOMAS POELLOT	CUDAHY PD	CHIEFPOELLOT@ci.cudahy.wi.us
5.	JACKIE OVE	South Milwaukee HD	ove@ci.south-milwaukee.wi.us
6.	JAMES MARTIN	CITY OF FRANKLIN	JMARTIN@FRANKLINWI.GOV
7.	GENENE HIBBLER	MILW. CO. EMERG. MGMT.	genene.hibbler@milwcounty.com
8.	Bill Wucherer	City of Franklin	bwucherer@franklinwi.gov
9.	Barry Mitchell	MCSO Emerg. Manage	B.Mitchell@milwcounty.com
10.	DEONNA JOHNSON	MCSO EPM	deonna.johnson@milwcounty.com
11.	RICK OLIVA	FRANKLIN Police Dept	roliva@franklinwi.com
12.	Joe Pulvermacher	Oak Creek, WI	jpulvermacher@oakcreekwi.org
13.			

HAZARD MITIGATION PUBLIC MEETING
March 25, 2011
MCSO Training Academy

DATE: March 25, 2011 ; 1:00 - 2 pm

MEETING SIGN-IN SHEET

NAME	AGENCY/COMPANY	TITLE
Mat Walters	MHD	Pandemic Flu Coordinator
Tom Rosandich	Cock Creek Fire/EM	ASSISTANT Chief
ERIC CERA	HalesCorners P.D.	Acting Chief
MIKE MARTIN	HALES CORNERS	DPW DIR.
KURT FREDRICKSON	RIVER Hills	Super -DPW
Desirée Metel-Anderson	Milwaukee	OHS
Andrew Boese	Milwaukee	OHS
CARL TISOVIK	GREENDALE	DIRECTOR DPW
Carl Stenbol	MCSO EM DIV	Administrator
DEONNA Johnson	MCSO EM DIVISION	Coordinator

PRE-EMERGENCY PLANNING, LLC

Milwaukee County Pre-Disaster Mitigation Plan Update

Zones D and E Meeting Summary

- Date:** Friday May 14, 2010
- Time:** 2:30 p.m. – 4:30 p.m.
- Location:** Milwaukee County Sheriff's Office Training Academy
9225 S. 68th Street
Franklin, WI 53132
- Invitees:** Municipal Officials from Greenfield, Greendale, Hales Corners, Franklin, St. Francis, Cudahy, Oak Creek, and South Milwaukee
- Attendees:** Allison Johnson, Pre-Emergency Planning, LLC
Lisa Sherman, MCSO Emergency Management
Carol Wantuch, Cudahy Health Department
Thomas Poellot, Cudahy Police Department
Jackie Ove, South Milwaukee Health Department
James Martins, City of Franklin
Gene Hibbler, MCSO Emergency Management
Bill Wucherer, City of Franklin
Barry Mitchell, MCSO Emergency Management
Deonna Johnson, MCSO Emergency Management
Rick Oliva, Franklin Police Department
Joe Pulvermacher, Oak Creek

Municipalities not in attendance included Hales Corners, St. Francis, Greenfield, and Greendale

1. Welcome and Introductions

2. Overview: Hazard Mitigation Planning Process, Changes, and Updates

A PowerPoint presentation was given which detailed the current mitigation update process. Changes to the 2004 plan were detailed. In addition, the mitigation goals identified in 2004 were reviewed for their relevancy. No changes were made to the identified mitigation goals.

3. Update: Critical Facilities

An explanation of what constitutes critical facilities was given. Each municipality in attendance identified that they would submit any additional changes to their critical facilities by May 30, 2010.

PRE-EMERGENCY PLANNING, LLC

4. Update: Mitigation Action Plan

Each municipality reviewed the mitigation projects listed in the plan. Additional input from various departments was needed to adequately update the status of these projects. Each municipality agreed to contact relevant departments, and submit all changes by May 30, 2010.

5. Plan Adoption Process

An overview of the plan adoption process, from the municipal to Federal level was reviewed. Each municipality was given a sample resolution that may be used for adoption of the plan at the municipal level. Each municipality was encouraged to adopt the plan by June 30, 2010.

Some of the municipalities indicated that the plan adoption process will be more streamlined if an executive summary detailing the changes of the plan is distributed, to eliminate the need for councils to review a lengthy document. Each municipality will be sent a summary along with the final Draft Plan.

PRE-EMERGENCY PLANNING, LLC

Milwaukee County Pre-Disaster Mitigation Plan Update

Zone C Meeting Summary

Date: Tuesday, May 11, 2010

Time: 1:00 p.m. – 3:00 p.m.

Location: West Allis Fire Department
7332 West National Avenue
West Allis, WI 53214

Invitees: Municipal Officials from Wauwatosa, West Milwaukee, and West Allis

Attendees: Allison Johnson, Pre-Emergency Planning, LLC
Gary Streicher, West Allis Fire Department
Barry Mitchell, MCSO Emergency Management

Municipalities not in attendance included Wauwatosa and West Milwaukee.

1. Welcome and Introductions

2. Overview: Hazard Mitigation Planning Process, Changes, and Updates

A PowerPoint presentation was given which detailed the current mitigation update process. Changes to the 2004 plan were detailed. In addition, the mitigation goals identified in 2004 were reviewed for their relevancy. No changes were made to the identified mitigation goals.

3. Update: Critical Facilities

West Allis made some corrections to the current listing of critical facilities. In addition, they identified several additional critical facilities they would like included in the plan. These additions were incorporated into the plan.

4. Update: Mitigation Action Plan

West Allis reviewed the mitigation projects listed in the plan. Additional input from various West Allis departments was needed to adequately update the status of these projects. West Allis Fire agreed to contact relevant departments, and submit all changes by May 30, 2010.

5. Plan Adoption Process

An overview of the plan adoption process, from the municipal to Federal level was reviewed. West Allis was given a sample resolution that may be used for adoption of the plan at the municipal level. Each municipality was encouraged to adopt the plan by June 30, 2010.



MILWAUKEE COUNTY SHERIFF'S OFFICE

OFFICE OF THE SHERIFF
821 WEST STATE STREET
MILWAUKEE, WISCONSIN 53233
PHONE: (414) 278-4700
WEBSITE: <http://www.mksheriff.org>



David A. Clarke, Jr.
Sheriff

NEWS RELEASE

Contacts:
Carl Stenbol
Rick Hetchler
Emergency Mgmt Bureau
Office: (414) 278-4709
Email: MCSOEM@milwcnty.com

May 14, 2004

For Immediate Release

Milwaukee County Emergency Management Schedules

Public Meetings For Disaster Mitigation Planning

Residents of Milwaukee County have an opportunity to participate in the development of a Pre-Disaster Mitigation Plan that will reduce the impact on the community if a disaster strikes. Five Public Meetings have been scheduled throughout the County to allow for public participation in plan development. Milwaukee County is vulnerable to a wide range of hazards. Natural hazards such as floods, tornadoes, and storms have caused injuries, loss of life, disruption of services, and property damage. Technological Hazards can cause man-made disasters at industrial or commercial facilities that use, store, or produce hazardous materials. Transportation (highway, railroad, pipelines and airlines) related incidents may cause a hazardous materials emergency that may include exposure to chemicals, explosions, major fires and environmental contamination.

The first phase of developing a Pre-Disaster Mitigation Plan involves a "risk assessment." Understanding the community's "vulnerability" is the second phase of the planning process. The final phase of the Pre-Disaster Mitigation Plan involves identifying specific projects that will reduce the effect of known hazards. Projects may include floodwater retention ponds, flood control structures and developing strategies to minimize danger from known hazards. The Federal Emergency Management Agency (FEMA) can fund up to 75% of the costs of hazard mitigation projects for a County that has an approved Pre-Disaster Mitigation Plan.

Please plan to attend one of the scheduled meetings below and share your ideas with the planning team. We will discuss what types of disasters have occurred in the past? What damage occurred and where? Could it occur again? What damage would it cause now? What's the most serious hazard in the area? What types of facilities are located in the hazard area and how much would it cost to replace them? And what types of new facilities being planned in the area and how much would it cost to replace them?

- May 24th 6:00PM (Monday): Wauwatosa Public Library, Firefly Room, 7635 W. North Avenue, Wauwatosa, WI 53213
- May 25th 10:30AM (Tuesday): Brown Deer Public Library, 5600 W. Bradley Rd., Brown Deer, WI 53223
- May 25th 6:00PM (Tuesday): Red Cross Headquarters, 2600 W. Wisconsin Ave., Milwaukee, WI 53233
- May 26th 1:00PM (Wednesday): Franklin Public Library*, 9151 W. Loomis Rd., Franklin, WI 53132
- May 26th 6:00PM (Wednesday): Cudahy Public Library, 3500 Library Drive, Cudahy, WI 53110

*This event is not sponsored by the Franklin Public Library.

**Milwaukee County Office of the Sheriff
Emergency Management Bureau
Public Meeting For Disaster Mitigation Planning Scheduled**

Residents of Milwaukee County have an opportunity to participate in the development of a Pre-Disaster Mitigation Plan that will reduce the impact on the community if a disaster strikes. A Public Meeting has been scheduled to allow for public participation in plan development. Milwaukee County is vulnerable to a wide range of natural hazards.

The first phase of developing a Pre-Disaster Mitigation Plan involves a "risk assessment." Understanding the community's "vulnerability" is the second phase of the planning process. The final phase of the Pre-Disaster Mitigation Plan involves identifying specific projects that will reduce the effect of known hazards. Projects may include floodwater retention ponds, flood control structures and developing strategies to minimize danger from known hazards. The Federal Emergency Management Agency (FEMA) can fund up to 75% of the costs of hazard mitigation projects for a County that has an approved Pre-Disaster Mitigation Plan.

Please plan to attend the meeting listed below and share your ideas with the planning team. We will discuss what types of disasters have occurred in the past? What damage occurred and where? Could it occur again? What damage would it cause now? What's the most serious hazard in the area? What types of facilities are located in the hazard area and how much would it cost to replace them? And what types of new facilities are being planned in the area and how much would it cost to replace them? Please refer any questions to the Emergency Management Office at 278-4709.

MEETING DATE AND LOCATION

Wednesday, June 9, 2004, 2PM – 4PM, Blatz Pavilion in Lincoln Park, 1301 W. Hampton Avenue, Milwaukee, WI

June 6, 2004
 Milwaukee
 Journal/Sentinel

1 hour N. of Milwaukee
 JB Realty (920)876-1357

Bar & Grill NW Milwaukee.
 Must See! Too Many
 updates to list! Turn-key
 \$275,000 (414)303-9414

Cabinet (Custom)/
 Woodworking Shop in
 Central WI, \$275,000
 (920)915-5495

Carpet Cleaning Van
 1991 Chevrolet 1 ton,
 low miles, truck mount
 Hydramaster 4.3, P.D.S.
 \$7300 OBO. (414)329-7350

CARWASHES: 14 LOCS
 Full service & Self serve
 PAUL
 920-826-2415

CATERING
 High profit, Gross Sales
 \$1,000,000+. Owner retir-
 ing. Greg FNBC 979-0900

CELLULAR PHONE STORE:
 Satside, prime location,
 near UWM, heavy traffic
 must sell... (414)324-5744

CHILD DEVELOPMENT
 Growing Franchise.
 Great suburban location.
 Gary FNBC 414-979-0900

great history, profitable,
 lease FNBC 414-979-0900

LANDSCAPING
 Commercial Accounts,
 Many Contracts, RE Incl.
 Steve FNBC 414-979-0900

MACHINE SHOP
 Business is booming! Ni-
 one market. RE included
 Greg FNBC 414-979-0900

MARTINI BAR
 Trendy downtown loca-
 tion. Net \$500k + Call
 Steve FNBC 414-979-0900

MOTEL - 1 hour north of
 Milwaukee. Turn-key op-
 eration. 17 rooms + liv-
 ing quarters. Excellent
 Condition. \$239,900
 JB REALTY 920-876-1357

National Automotive
 Franchise
 Turn-Key operating cen-
 ter w/employees avail.
 in Milwaukee area. No
 prior exp. needed. Free
 brochure. 1-800-935-8863

OFFICE & Rental space.
 7630 W. Center St. Great
 location! 5 BR, 2.5 BA,
 \$224,900. Call for more
 details 262-695-9130.

PAZ SHOP
 Business equipment
 contracts. \$1,25K/obj
 Call Jeff at 262-355-0970

TAVERN-BRILL
 Southside near Allen
 Bradley block tower,
 seats 54, great food!
 Kujath & Assoc., Inc.
 414-453-3434

Vacuum Cleaner &
 Carpet Store Wauwatosa
 since 1973, low rent!
 Retiring 414-771-4972

175 Legal Notices

Milwaukee County Office
 of the Sheriff
 Emergency Management
 Bureau
 Public Meeting for Disas-
 ter Mitigation Planning
 Scheduled

Residents of Milwaukee
 County have an opportu-
 nity to participate in the
 development of a Pre-
 Disaster Mitigation Plan
 that will reduce the im-
 pact on the community if
 a disaster strikes. A Pub-
 lic Meeting has been
 scheduled to allow for
 public participation in
 plan development. Mil-
 waukee County is vulner-
 able to a wide range of
 natural hazards.

The claims are provided by
 Title 18, United States
 Code, Section
 983(a)(4)(A) and Rule C
 of the Supplemental
 Rules for Certain Admir-
 alty and Maritime Claims
 or suffer entry of judg-
 ment by default.
 Additional procedures
 and regulations regard-
 ing this forfeiture action
 are found at 18 U.S.C.
 §§1502-1619. All persons
 and entities who have an
 interest in the defendant
 properties may, in addi-
 tion to filing a claim or in
 lieu of the filing of a
 claim, submit a Petition
 for Admission or Mitiga-
 tion of the forfeiture for
 a non-judicial determina-
 tion of this action pur-
 suant to 28 C.F.R. Part 9.
 Steven M. Biskupic,
 United States Attorney,
 530 Federal Building,
 517 East Wisconsin
 Avenue, Milwaukee,
 Wisconsin 53202,
 telephone 414/297-1700,
 Attorney for Plaintiff.

MILWAUKEE COUNTY
 DEPARTMENT OF HUMAN
 SERVICES REQUEST FOR
 PROPOSALS

The Milwaukee County
 Department of Health
 and Human Services De-
 linquency and Court Ser-
 vices Division is request-
 ing proposals from qual-
 ified agencies and organi-
 zations to participate in
 the Request for Proposal
 (RFP) process for the
 Firearms Program.
 Application materials
 will be available for pick-
 up beginning Monday,
 June 14, 2004 at the Mil-
 waukee County Child-
 ren's Court Center recep-
 tion desk, 10201 West Wat-
 ertown Plank Road, Wau-
 watosa, WI 53226. Com-
 pleted applications in re-
 sponse to the RFP must
 be received at the above
 address no later than
 4:30 p.m., Monday, Au-
 gust 2, 2004.
 A public RFP information
 session will be held on
 Thursday, June 24, 2004
 from 3 p.m. to 4:30 p.m.
 at Room 1230 of the Child-
 ren's Court Center, 10201
 West Water town Plank
 Road, Milwaukee, WI
 53226.

PRIVATE INDUSTRY
 COUNCIL OF
 MILWAUKEE COUNTY

Announces a Meeting of
 its Board of Directors to
 be held at Noon on
 Tuesday, June 8, 2004
 Youth Services Bldg.
 2342 N 27th St.
 Milwaukee, WI 53210

If you have questions re-
 garding the meeting,
 please call (414) 225-2360
 Disabled persons need-
 ing accommodation
 should call the number
 listed above as soon as
 possible. The agenda
 and packet are available
 for public review at the
 Private Industry Council.
 NOTE: Pursuant to the
 Wisconsin open meet-
 ings law, Wis. Stat.
 Section 19.85 (1), the
 Committee reserves the
 right to go into
 closed session to dis-
 cuss personnel mat-
 ters which require se-
 crecy.

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hazards. The Federal
 Emergency Management
 Agency (FEMA) can fund
 up to 75% of the costs of
 hazard mitigation proj-
 ects for a County that
 has an approved Pre-
 Disaster Mitigation Plan.
 Please plan to attend the
 meeting listed below
 and share your ideas
 with the planning team.
 We will discuss what
 types of disasters have
 occurred in the past?
 What damage occurred
 and where? Could it oc-
 cur again? What dam-
 age would it cause now?
 What's the most serious
 hazard in the area?
 What types of facilities
 are located in the hazard
 area and how much
 would it cost to replace
 them? and what types
 of new facilities are be-
 ing planned in the area
 and how much would it
 cost to replace them?
 Please refer any ques-
 tions to the Emergency
 Management Office at
 278-4709.

MEETING DATE AND
 LOCATION
 Wednesday, June 9, 2004,
 2PM - 4PM, Blatz Pavilion
 in Lincoln Park, 1301 W.
 Hampton Avenue, Mil-
 waukee, WI

advertising items
 crocks, old toys, furni-
 ture, old guns, tools, etc.
 THE OLD STORE
 3955 W. Forest Home
 414-529-2936
 Elkhorn Antique
 Flea Market dates at
 nicromotionsllc.com

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 China Cabinets
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 cards-Stereoviews
 Jewelry-Old Purse
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 414-640-3940
 References Available

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 Revell, etc (414)481-7706

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 We Pick Up (414)305-6844

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 eras, bookcases, post-
 cards, magazines, jewel-
 ry, estates. 259-1031.

BAND INSTRUMENTS:
 CASCIO 262-786-6249

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 Accordions, All Musical
 Instruments 414-353-3223

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 tube amps, etc.
 Toy and real train items:
 \$8Cash\$ (414)643-8512

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 magazines, bought-sold.
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 Renaissance Books, 8344
 N Plankinton 271-6850

BUYING bats, jerseys,
 Braves, Brewers, Bucks,
 Packers, Older Sports
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 4034 W National 672-7777

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 Silver, and Gold Coins
 Derzon Coin Co.
 2069 S. 108 St. 543-8833

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 Working or not. 1991 or
 newer. 7201 W. Green-
 field. 414-258-9292

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STEIN'S
 715 W. Wisconsin

DIAMONDS, GOLD, GEM-
POWERS TOP CASH
 240 W Wisconsin
 272-4510

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 and selling dolls, Barbie
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GREENFIELD GALLERY
 4201 S. 108th St. 427-4555

Fishing Lures & Tackle
 Collector Chris Hausen
 TOP 5 262-360-1004 TOP 5

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PUBLIC MEETING SIGN-IN SHEET

Meeting Location: FRANKLIN LIBRARY

Date: 5/26/04

Name	Address	Phone/email	AFFILIATION
Tami Mayzuk	South Milwaukee 2424 15th Ave	414/768-8047	SOUTH MILK
Tom Rosandich	7000 S. 6TH ST O.K Brook	414/768-6554	CARLEAR
Dan Mayer	8901 W. Drexel Av. Frankl.	414/425-1420	Franklin
James MARTINS	" " "	" "	"

PUBLIC MEETING SIGN-IN SHEET

Meeting Location: MTA LINCOLN PARK COMMUNITY CENTER
1116 WAUKEE

Date: 6/9/07

Name	Address	Affiliation	Phone/email
Calvin Glenn	3863 N 44 th St		(414) 873-6316
Joseph Williams	6435 N Traction		414 247-1878
Barbara	3863 Wash 44		(414) 873-6316
Shirley Calbreath	5714 N 99 th		(414) 535-7263
LISA FEARS	9047 N 75 th #6		(414) 365-3138
Thomas Galbreath	4405 W Spencer Pl		(414) 447-7412
David GUYTON	5061 N. 53rd street		(414) 393-1146
Catherine Vickas	2115 W. Villard Ave		(414) 536-1118
Tracy Merritt	2107 W. Villard Ave		414-393-0825
Mildred Turner	5104 N. 19th PLACE	Sew Backup	(414) 228-0797
Bill Kottler	7725 W. Waukegan Ave	City of Waukegan	414 - 479-3933

Special Event

Neighborhood Strategic Planning SEWER BACK-UP

Lincoln Park Community Center, Inc.
P. O. Box 090225

Lincoln Park Community Center, Inc.

MONTH **JUNE 9** Community Sign-in Sheet **CDBG 2004**

Milwaukee

	Name	Address	Phone	Date	Purpose
1	Jimmy McCloud	105 W. Silver Spring	616-0547	6/9/04	
2	Superintendent for Matt Flynn	2223 S. 59th Ave	628-7343	6/9/04	Matt Flynn
3	Willie Johnson	3809 N Humboldt Blvd	962-8856	6/9/04	County Supervisor
4	Connie Krum	1437 W. Loran Ave	228-6799	6/8/04	meeting
5	Janice	1503 W. Loran Ave	228-1183	6/9/04	meeting
6	Wes Bender				
7	Joseph C Henderson	1631 W. Custer	392-4476	6/9/04	Meeting
8	Ashanti Hamilton	200 E. Wells	442-286-2228	6/9/04	meeting
9	Lynn Burks	5051 N. 19th St	351-8443	6/9/04	Flooding
10	CASSANDRA BARNES	5020 N. 19th St.	228-9478	6-9-04	Flood
11	Johnnie P. Barnes	5070 N. 19th St	228-9478	6-9-04	Flooding
12	Ronald & Ann Brown	5105 N. 19th	228-8580	6-9-04	Flood
13	Miss Shunard	6710 N. 78th	278-4709	11	M.P.D. Co. E.M.
14	Bob Bina	9075 N. Regent Rd	247-7711	11	BAYSIDE DFL
15	Cynthia Minott	5200 N. 57th	461-1655	11	
16	Janice	5043 N. 19th St	247-0159		Flooding
17	Janice	5043 N. 19th St	247-0159		Flooding
18	David Townsend	3050 N. 39	(414) 732-5982	6-9-04	Flooding
19	Monty Shadd & Supervisor White	Court House	278-4257	6-9-04	County Supervisor
20	Sandra Glenn	4137 N. 162 St.	462-3712	6/9/04	Flooding
21	Annette McElay Rolin	4207 W. Birch	461-2605	6/9/04	Flooding
22					

Special Event

Neighborhood Strategic Planning

SEWER
BACK-UP.

1301 West Hampton Avenue
Milwaukee, WI 53209

Lincoln Park Community Center, Inc.

MONTH: **JUNE** Community Sign-in Sheet **CDBG 2004**

Name	Address	Phone	Date	Purpose
1. Michael Turner	5104 N. 19th Place	(414) 228-0777	6/9/04	Sew Backup
2. Kathy Singer	5104 N. 19th Place	(414) 228-0777	6/9/04	Sew Backup
3. Gertude Spivey	1914 W. Eggert Pl	(414) 228-1499	6-9-04	Sew Backup
4. Barbara Sander	3863 N 44th St	8736316		
5. Shirley Calbreath	5714 N 99th	(414) 535-7263	6-9-04	Sew Backup
6. Stephanie Williams	6935 N Teutonic	414-247-1878	6-9-04	Sew Backup
7. Thomas Galbreath	4405 W Spencen Pl.	414-447-7912	6-9-94	Sew Backup
8. LISA FEARS	9047 N 75th St	414 365-3138	6-9-04	Sew Backup
9. CAVIN Glenn	3863 N 44th St	414-873-6316	6-9-04	Sew-Backup
10. JOE Moyer	1962 W Hampton		6-9-04	
11. Curtis	MC50 EMB	414-278-4709		
12. Lick Hatcher	MC50/EMB	"	6-9-04	Mitigation
13. Tim TARRS	MAXIM TECHNOLOGIES	715-845-4100	6-9-04	MEDICATED MITIGATION
14. Tracy Merriett	2107 W. Villard Ave	414-393-0825	6-9-04	Sew Backup
15. Catherine Vickie's	2115 W. Villard Ave	414-536-4181	6/9/04	Sew Backup
16. Enoch Dukes	4200 N. 15	(414) 265-3275	6/9/04	Information
17. Sandy L. Johnson	4191 N. 14th St.	(414) 265-2274	6/9/04	Information
18. Kathie Murphy	1555 W. Chambers	263-7011	6-7-04	
19. Al Paleon White	504 E. W. 19th St	228-8804	6-9-04	Sew Backup
20. Judette Montgomery-Calkins	4863 N. 19th Place	372-0516	6/9/04	Information
21. Jim Wojceniowicz	7725 W. North Ave	479-8965	6-9-04	CITY OF WILKESVILLE
22. JOE WHITE	749 W STATE	935-7200	6-9-04	MILWAUKEE P.D.
23. DAN SMITH	1907 W. Eggert Pl	221-7346	6/9/04	

PUBLIC MEETING FOR COMMENT ON PRE-DISASTER MITIGATION PLANNING

THURSDAY, JUNE 24, 2010

1:00 P.M. TO 3:00 P.M.

MILWAUKEE COUNTY SHERIFF TRAINING ACADEMY

LECTURE HALL A

9225 SOUTH 68th STREET

FRANKLIN, WI 53132

Milwaukee County Emergency Management has a Pre-Disaster Mitigation Planning Program to help reduce the impact on the community if a disaster strikes. The public is encouraged to attend the meeting to comment on the Pre-Disaster Mitigation Plan. The plan addresses a wide range of natural hazards, technological hazards, and man-made disasters, including transportation related hazardous materials emergencies. A County with an approved Pre-Disaster Mitigation Plan on file may qualify for Federal Emergency Management Agency (FEMA) Hazard Mitigation Grants. The grant projects may include floodwater retention ponds, flood control structures and developing strategies to minimize dangers from known hazards. FEMA can fund up to 75% of the cost of hazard mitigation projects.

For questions contact Milwaukee County Emergency Management at (414) 525-5770.



David A. Clarke Jr.
Sheriff

County of Milwaukee

Office of the Sheriff

**PRE-DISASTER MITIGATION PLAN PUBLIC MEETING
THURSDAY, JUNE 24, 2010
1:00 P.M. TO 3:00 P.M.
MILWAUKEE COUNTY SHERIFF TRAINING ACADEMY
LECTURE HALL A
9225 SOUTH 68th STREET
FRANKLIN, WI 53132**

- 1. Welcome and Introductions**
- 2. Overview: Hazard Mitigation Planning Process**
- 3. Review: Plan Changes, and Updates**
- 4. Update: Critical Facilities Included**
- 5. Update: Mitigation Action Plans**
- 6. Local Plan Adoption Process**
- 7. Discussion, Questions, Additions and/or Changes**

Service to the Community Since 1835

Emergency Management Bureau
821 West State Street • Milwaukee, WI 53233
414-278-4709 • Fax 414-223-1265
Webpage: www.mksheriff.org

SIGN-IN SHEET

DATE: June 24, 2010

TIME: 1:00 P.M.

FUNCTION: MILWAUKEE COUNTY HAZARD MITIGATION PUBLIC MEETING

PLEASE PRINT • PLEASE PRINT • PLEASE PRINT

NAME	REPRESENTING	PHONE/FAX	EMAIL
Frank Lockwood	St. Francis Fine/EM	414-483-4424 481-2300	frank@stfrancis.org
Aime Lecker	City of St. Francis	481-6283	amele@stfrancis.org
Melinda Dejowski	City of St. Francis	481-2300 x146	melindad@stfrancis.org
Tom Rosendell	Oak Creek	414-768-6554	rosandell@oakcreekwi.org
Jay Behling	S. m. lw. WI	414-768-8191	behling@ci.south-milwaukee.wi.us
Lisa Stornardo	Milwaukee Co. E.M.	414- 535-5770 535-5770	lisa.stornardo@milwaukee.gov
AT. Estimoteur	WA Commerce/EVA	414-302-2828	est@milwaukee.gov
Carl Stork	WCEM / WRC E CD	414-525-5700	estork@milwaukee.gov

SIGN-IN SHEET

DATE: June 24, 2010

TIME: 1:00 P.M.

FUNCTION: MILWAUKEE COUNTY HAZARD MITIGATION PUBLIC MEETING

PLEASE PRINT • PLEASE PRINT • PLEASE PRINT

NAME	REPRESENTING	PHONE/FAX	EMAIL
Frank Lockwood	St. Francis Fire/EM	414-413-4424 481-2300	frank@stfranciswi.org
Anne Uecker	City of St. Francis	481-6483	anneu@stfranciswi.org
Melinda Dejowski	City of St. Francis	481-2300 x144	melindod@stfranciswi.org
Tom Rosandick	Oak Creek	414-768-6554	rosandick@oakcreekwi.org
Jay Bohling	S. Milwaukee WI	414-768-8191	bohling@ci.south-milwaukee.wi.gov
Lisa Steward	Milwaukee Co. E.M.	414- 535-5370 535-5370	lisa.steward@milwaukee.gov
AT. Estimoteur.	Commerce/DA	414-302-2828	ate@estimoteur.com
Carl Stumpf	MCEM / MRC E CD	414-525-5770	estumpf@milwaukee.gov

TABLE 1

Natural Hazard Identification and Risk Assessment Matrix
 Name of Community or Planning Area : **Cudahy**

For each hazard your community or planning area is vulnerable to in column one, assign a risk rating of 1-low, 2-medium, or 3-high for each of the risk assessment criterion (columns two through ten). Totalling each hazard's row should give you an appreciation of what hazards form the highest risk. This table is provided as a tool to help local governments and tribal organizations analyze their risks and should not be construed as a precise way for determining these risks. See the directions on Page 12 for further assistance in completing this table.

1 Hazard Identification	2 Hazard Frequency 1 2 3	3 Hazard Probability 1 2 3	4 Health & Public Safety 1 2 3	5 Home Damage 1 2 3	6 Business Disruption 1 2 3	7 Public Expenditures 1 2 3	8 Magnitude of Population At Risk 1 2 3	9 Mgnitude of Homes At Risk 1 2 3	10 Magnitude of Businesses At Risk 1 2 3	11 Adjustment	12 Risk Assessment Rating Tool
Natural Hazards	2	1	1	1	1	1	1	1	1		1
Hail Storms	2	1	1	1	1	1	1	1	1		1
Lightening Storms	4	2	2	2	2	2	2	2	2		2
Thunderstorms	0										
Tornado/High Winds	0										
Flash Flooding	0										
Riverine Flooding	0										
Lake Flooding	0										
Stormwater Flooding	4	2	2	2	2	2	2	2	2		2
Dam Failure Flooding	0										
Forest Fires	0										
Wildland Fires	0										
Coastal Hazards	0										
Heavy Snow Storm	2	2	2	2	2	2	2	2	2		2
Ice Storm	1	1	1	1	1	1	1	1	1		1
Blizzard	1	1	1	1	1	1	1	1	1		1
Extreme Cold	2	2	2	2	2	2	2	2	2		2
Earthquake	0										
Extreme Heat	2	2	2	2	2	2	2	2	2		2
Agricultural	0										
Drought	0										
Fog	2	2	2	2	2	2	2	2	2		2
Landslide	0										
Subsidence	0										

TABLE 1

Natural Hazard Identification and Risk Assessment Matrix
City of St Francis

Each hazard's year community or planning area is vulnerable to in column one, assign a risk rating of 1-low, 2-medium, or 3-high for each of the risk assessment criteria (columns two through ten). Totalling hazard's row should give you an appreciation of what hazards form the highest risk. This table is provided as a tool to help local governments and tribal organizations analyze their risks and should not be used as a precise way for determining these risks. See the directions on Page 72 for further assistance in completing this table.

1	2	3	4	5	6	7	8	9	10	11	12
Hazard Identification	Hazard Frequency	Hazard Probability	Health & Public Safety	Home Damage	Business Disruption	Public Expenditures	Magnitude of Population At Risk	Magnitude of Homes At Risk	Magnitude of Businesses At Risk	Adjustment	Risk Assessment Rating Total
	Frequency of past hazard occurrences 1 2 3	Probability of hazard occurring in the future 1 2 3	Degree of past hazard events causing injuries, sicknesses and/or deaths 1 2 3	Degree of past hazard events causing damage to homes 1 2 3	Degree of past hazard events causing damage to business and/or interruption of business trade 1 2 3	Amount of local, state, & federal funds expended on past hazard recovery activities 1 2 3	Amount of population still vulnerable to injury, sickness, and/or death from hazard 1 2 3	Amount of homes still vulnerable to damage from hazard 1 2 3	Amount of businesses still vulnerable to damage or interruption of business trade 1 2 3		
NATURAL HAZARDS											
10											
9											
8											
7											
6											
5											
4											
3											
2											
1											

TABLE 1

Natural Hazard Identification and Risk Assessment Matrix

Name of Community or Planning Area West Allis

For each hazard your community or planning area is vulnerable to in column one, assign a risk rating of 1-low, 2-medium, or 3-high for each of the risk assessment criteria (columns two through ten). Totalling each hazard's row should give you an appreciation of what hazards form the highest risk. This table is provided as a tool to help local governments and tribal organizations analyze their risks and should not be construed as a precise way for determining these risks. See the directions on Page 12 for further assistance in completing this table.

1 Hazard Identification	2 Hazard Frequency	3 Hazard Probability	4 Health & Public Safety	5 Home Damage	6 Business Disruption	7 Public Expenditures	8 Magnitude of Population At Risk	9 Magnitude of Homes At Risk	10 Magnitude of Businesses At Risk	11 Adjustment	12 Risk Assessment Rating Total
	Frequency of past hazard occurrences 1 2 3	Probability of hazard occurring in the future 1 2 3	Degree of past hazard events causing injuries, sickness and/or deaths 1 2 3	Degree of past hazard events causing damage to homes 1 2 3	Degree of past hazard events causing damage to business and/ or interruption of business trade 1 2 3	Amount of local, state, & federal funds expended on past hazard recovery activities 1 2 3	Amount of population still vulnerable to injury, sickness, and/or death from hazard 1 2 3	Amount of homes still vulnerable to damage from hazard 1 2 3	Amount of businesses still vulnerable to damage or interruption of business trade 1 2 3		
NATURAL HAZARDS											
Hail Storms	2	2	1	1	1	1	1	1	1		11
Lightening Storms	3	3	1	1	1	1	1	1	1		13
Thunderstorms	3	3	1	1	1	1	1	1	1		13
Tornado/High Winds	1	1	1	1	1	1	3	3	3		15
Fresh Flooding	1	1	1	1	1	1	1	1	1		10
Riverine Flooding	1	1	1	1	1	1	1	1	1		10
Lake Flooding	NA										-
Stormwater Flooding	3	3	1	2	2	2	1	2	2		18
Dam Failure Flooding	NA										-
Forest Fires	NA										-
Wildland Fires	1	1	1	1	1	1	1	1	1		10
Coastal Hazards	NA										-
Heavy Snow Storm	2	3	2	1	1	1	2	2	2		17
Ice Storm	1	1	1	2	2	1	1	1	1		11
Blizzard	1	2	2	1	1	1	2	2	2		14
Extreme Cold	2	2	1	2	2	1	2	2	2		15
Earthquake	1	1	1	1	1	1	3	3	3		15
Extreme Heat	1	2	2	1	1	1	2	1	1		12
Agricultural	NA										-
Drought	1	2	1	1	1	1	1	1	1		11
Fog	1	1	1	1	1	1	1	1	1		10
Landslide	1	1	1	1	1	1	1	1	1		10
Subsidence	1	1	1	1	1	1	1	1	1		10

Page 10
Resource Guide to All Hazards Mitigation Planning in Wisconsin

TABLE 1
Natural Hazard Identification and Risk Assessment Matrix
Name of Community or Planning Area: **Wauwatosa**

For each hazard your community or planning area is vulnerable to in column one, assign a risk rating of 1-low, 2-medium, or 3-high for each of the risk assessment criteria (columns two through ten). Taking each hazard's row should give you an appreciation of what hazards from the highest risk. This table is provided as a tool to help local governments and tribal organizations analyze their risks and should not be construed as a precise way for determining these risks. See the directions on Page 12 for further assistance in completing this table.

1	2	3	4	5	6	7	8	9	10	11	12
Hazard Identification	Hazard Frequency	Hazard Probability	Health & Public Safety	Home Damage	Business Disruption	Public Expenditures	Magnitude of Population At Risk	Magnitude of Homes At Risk	Magnitude of Businesses At Risk	Adjustment	Risk Assessment Rating Tool
Natural Hazards	Frequency of past hazard occurrences 1 2 3	Probability of hazard occurring in the future 1 2 3	Degree of past hazard events causing injuries, sickness and/or deaths 1 2 3	Degree of past hazard events causing damage to homes 1 2 3	Degree of past hazard events causing damage to business and/or interruption of business trade 1 2 3	Amount of local, state, & federal funds expended on past hazard recovery activities 1 2 3	Amount of population still vulnerable to injury, sickness, and/or death from hazard 1 2 3	Amount of homes still vulnerable to damage from hazard 1 2 3	Amount of businesses still vulnerable to damage or interruption of business trade 1 2 3		9
Hail Storms	1	1	1	1	1	1	1	1	1		9
Lightning Storms	2	2	1	1	1	1	1	2	1		12
Thunderstorms	2	2	1	2	1	1	2	2	1		14
Tornado/High Winds	2	2	1	2	1	1	1	2	1		13
Flash Flooding	2	3	1	3	2	2	1	2	2		15
Riverine Flooding	2	3	1	3	2	2	1	2	2		18
Lake Flooding	1	1	1	1	1	1	1	1	1		17
Stormwater Flooding	2	2	1	3	2	2	1	2	3		15
Dam Failure Flooding	1	1	1	1	1	1	3	1	1		9
Forest Fires	1	1	1	1	1	1	1	1	1		9
Wildland Fires	1	1	1	1	1	1	1	1	1		9
Coastal Hazards	1	1	1	1	1	1	1	1	1		18
Heavy Snow Storm	3	3	1	1	2	2	2	3	2		11
Ice Storm	3	3	1	1	2	2	2	3	2		11
Blizzard	3	3	1	1	2	2	2	3	2		11
Extreme Cold	1	2	1	1	1	1	1	1	1		9
Earthquake	1	1	1	1	1	1	1	1	1		9
Extreme Heat	1	1	1	1	1	1	1	1	1		9
Agricultural	1	1	1	1	1	1	1	1	1		11
Drought	1	1	1	1	1	1	1	1	1		11
Fog	1	1	1	1	1	1	1	1	1		11
Landslide	1	1	1	1	1	1	1	1	1		11
Subsidence	1	1	1	1	1	1	1	1	1		11

TABLE 1

Natural Hazard Identification and Risk Assessment Matrix
 Name of Community or Planning Area : **West Milwaukee**

For each hazard your community or planning area is vulnerable to in column one, assign a risk rating of 1-low, 2-medium, or 3-high for each of the risk assessment criterion (columns two through ten). Totalling each hazard's row should give you an appreciation of what hazards form the highest risk. This table is provided as a tool to help local governments and tribal organizations analyze their risks and should not be construed as a precise way for determining these risks. See the directions on Page 12 for further assistance in completing this table.

1	2	3	4	5	6	7	8	9	10	11	12
Hazard Identification	Hazard Frequency	Hazard Probability	Health & Public Safety	Home Damage	Business Disruption	Public Expenditures	Magnitude of Population At Risk	Magnitude of Homes At Risk	Magnitude of Businesses At Risk	Adjustment	Risk Assessment Rating Tool
	Frequency of past hazard occurrences 1 2 3	Probability of hazard occurring in the future 1 2 3	Degree of past hazard events, causing injuries, sickness and/or deaths 1 2 3	Degree of past hazard events causing damage to homes 1 2 3	Degree of past hazard events causing damage to business and/or interruption of business trade 1 2 3	Amount of local, state, & federal funds expended on past hazard recovery activities 1 2 3	Amount of population still vulnerable to injury, sickness, and/or death from hazard 1 2 3	Amount of homes still vulnerable to damage from hazard 1 2 3	Amount of businesses still vulnerable to damage or interruption of business trade 1 2 3		
Natural Hazards											
Hail Storms	2	2	1	1	1	1	1	1	1		11
Lightening Storms	3	3	1	1	1	1	1	1	1		13
Thunderstorms	3	3	1	1	1	1	1	1	1		13
Tornado/High Winds	1	1	1	1	1	1	3	3	3		15
Flash Flooding	1	1	1	1	1	1	1	1	1		9
Riverline Flooding	1	1	1	1	1	1	1	1	1		9
Lake Flooding	N/A										
Stormwater Flooding	3	3	1	2	2	2	1	1	1		16
Dam Failure Flooding	N/A										
Forest Fires	N/A										
Wildland Fires	1	1	1	1	1	1	1	1	1		9
Coastal Hazards	N/A										
Heavy Snow Storm	2	3	2	1	1	1	2	2	2		16
Ice Storm	1	1	1	2	2	1	1	1	1		11
Bizzard	1	2	2	1	1	1	2	2	2		14
Extreme Cold	2	2	1	2	2	1	1	2	2		15
Earthquake	N/A										
Extreme Heat	1	2	2	1	1	1	2	1	1		12
Agricultural	N/A										
Drought	1	2	1	1	1	1	1	1	1		10
Fog	1	1	1	1	1	1	1	1	1		9
Landslide	1	1	1	1	1	1	1	1	1		9
Subsidence	1	1	1	1	1	1	1	1	1		9

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TABLE 1
Natural Hazard Identification and Risk Assessment Matrix
Name of Community or Planning Area Village of Greendale

For each hazard your community or planning area is vulnerable to in column one, assign a risk rating of 1-low, 2-medium, or 3-high for each of the risk assessment criterion (columns two through ten). Totalling each hazard's row should give you an appreciation of what hazards form the highest risk. This table is provided as a tool to help local governments and tribal organizations analyze their risks and should not be construed as a precise way for determining these risks. See the directions on Page 12 for further assistance in completing this table.

1	2	3	4	5	6	7	8	9	10	11	12
Hazard Identification	Hazard Frequency	Hazard Probability	Health & Public Safety	Home Damage	Business Disruption	Public Expenditures	Magnitude of Population At Risk	Magnitude of Homes At Risk	Magnitude of Businesses At Risk	Adjustment	Risk Assessment Rating Total
	Frequency of past hazard occurrences 1 2 3	Probability of hazard occurring in the future 1 2 3	Degree of past hazard events causing injuries, sickness and/or deaths 1 2 3	Degree of past hazard events causing damage to homes 1 2 3	Degree of past hazard events causing damage to business and/or interruption of business trade 1 2 3	Amount of local, state, & federal funds expended on past hazard recovery activities 1 2 3	Amount of population still vulnerable to injury, sickness, and/or death from hazard 1 2 3	Amount of homes vulnerable to damage from hazard 1 2 3	Amount of businesses still vulnerable to damage or interruption of business trade 1 2 3		
NATURAL HAZARDS											
Hail Storms	2	2	1	1	1	1	1	1	1		11
Lightening Storms	2	2	1	1	1	1	1	1	1		11
Thunderstorms	2	2	1	1	1	1	1	1	1		11
Tornado/High Winds	2	2	1	1	1	1	1	1	1		11
Flash Flooding	2	2	1	2	1	1	1	1	1		12
Riverine Flooding	2	2	1	1	1	1	1	1	1		11
Lake Flooding	1	1	1	1	1	1	1	1	1		9
Stormwater Flooding	2	2	1	2	1	1	1	2	1		13
Dam Failure Flooding	1	1	1	1	1	1	1	1	1		9
Forest Fires	1	1	1	1	1	1	1	1	1		9
Wildland Fires	1	1	1	1	1	1	1	1	1		9
Coastal Hazards	1	1	1	1	1	1	1	1	1		9
Heavy Snow Storm	2	2	1	1	1	1	1	1	1		11
Ice Storm	2	2	1	1	1	1	1	1	1		11
Blizzard	2	2	1	1	1	1	1	1	1		11
Extreme Cold	1	1	1	1	1	1	1	1	1		9
Earthquake	1	1	1	1	1	1	1	1	1		9
Extreme Heat	1	1	1	1	1	1	1	1	1		9
Agricultural	1	1	1	1	1	1	1	1	1		9
Drought	1	1	1	1	1	1	1	1	1		9
Fog	1	1	1	1	1	1	1	1	1		9
Landslide	1	1	1	1	1	1	1	1	1		9
Subsidence	1	1	1	1	1	1	1	1	1		9

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TABLE 1

Natural Hazard Identification and Risk Assessment Matrix
 Name of Community or Planning Area : Hales Corners

For each hazard your community or planning area is vulnerable to in column one, assign a risk rating of 1-low, 2-medium, or 3-high for each of the risk assessment criterion (columns two through ten). Totalling each hazard's row should give you an appreciation of what hazards form the highest risk. This table is provided as a tool to help local governments and tribal organizations analyze their risks and should not be construed as a precise way for determining these risks. See the directions on Page 12 for further assistance in completing this table.

1	2	3	4	5	6	7	8	9	10	11	12
Hazard Identification	Hazard Frequency	Hazard Probability	Health & Public Safety	Home Damage	Business Disruption	Public Expenditures	Magnitude of Population At Risk	Magnitude of Homes At Risk	Magnitude of Businesses At Risk	Adjustment	Risk Assessment Rating Tool
	Frequency of past hazard occurrences	Probability of hazard occurring in the future	Degree of past hazard events, causing injuries, sickness and/or deaths	Degree of past hazard events causing damage to homes	Degree of past hazard events causing damage to business and/or interruption of business trade	Amount of local, state, & federal funds expended on past hazard recovery activities	Amount of population still vulnerable to injury, sickness, and/or death from hazard	Amount of homes still vulnerable to damage from hazard	Amount of businesses still vulnerable to damage or interruption of business trade		
Natural Hazards	3	3	2	2	2	2	1	1	1		
Hail Storms	1	3	1	1	1	1	1	1	1		11
Lightening Storms	3	3	1	1	1	1	1	1	1		13
Thunderstorms	2	3	1	1	1	1	1	1	1		12
Tornado/High Winds	2	3	1	2	1	2	2	2	2		17
Flash Flooding	2	3	1	1	1	1	1	1	1		12
Riverline Flooding	1	1	1	1	1	1	1	1	1		9
Lake Flooding	1	1	1	1	1	1	1	1	1		9
Stormwater Flooding	2	3	1	1	1	2	2	2	1		15
Dam Failure Flooding	1	1	1	1	1	1	1	1	1		9
Forest Fires	1	1	1	1	1	1	1	1	1		9
Wildland Fires	1	1	1	1	1	1	1	1	1		9
Coastal Hazards	1	1	1	1	1	1	1	1	1		9
Heavy Snow Storm	2	3	1	1	2	2	1	1	1		14
Ice Storm	2	3	1	1	3	1	1	1	1		14
Blizzard	2	3	1	1	3	1	2	1	1		14
Extreme Cold	1	3	1	1	2	1	1	1	1		12
Earthquake	1	1	1	1	1	1	1	1	1		9
Extreme Heat	1	2	1	1	1	1	1	1	1		10
Agricultural	1	1	1	1	1	1	1	1	1		9
Drought	1	1	1	1	1	1	1	1	1		9
Fog	1	1	1	1	1	1	1	1	1		9
Landslide	1	1	1	1	1	1	1	1	1		9
Subsidence	1	1	1	1	1	1	1	1	1		9

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TABLE 1
Natural Hazard Identification and Risk Assessment Matrix

Name of Community or Planning Area ~~Cudahy~~ Greenfield

For each hazard your community or planning area is vulnerable to in column one, assign a risk rating of 1-low, 2-medium, or 3-high for each of the risk assessment criterion (columns two through ten). Totalling each hazard's row should give you an appreciation of what hazards form the highest risk. This table is provided as a tool to help local governments and tribal organizations analyze their risks and should not be construed as a precise way for determining these risks. See the directions on Page 12 for further assistance in completing this table.

1	2	3	4	5	6	7	8	9	10	11	12
Hazard Identification	Hazard Frequency	Hazard Probability	Health & Public Safety	Home Damage	Business Disruption	Public Expenditures	Magnitude of Population At Risk	Magnitude of Homes At Risk	Magnitude of Businesses At Risk	Adjustment	Risk Assessment Rating Tool
	Frequency of past hazard occurrences 1 2 3	Probability of hazard occurring in the future 1 2 3	Degree of past hazard events, causing injuries, sickness and/or deaths 1 2 3	Degree of past hazard events causing damage to homes 1 2 3	Degree of past hazard events causing damage to business and/or interruption of business trade 1 2 3	Amount of local, state, & federal funds expended on past hazard recovery activities 1 2 3	Amount of population still vulnerable to injury, sickness, and/or death from hazard 1 2 3	Amount of homes still vulnerable to damage from hazard 1 2 3	Amount of businesses still vulnerable to damage or interruption of business trade 1 2 3		
Natural Hazards	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3		
Hail Storms	2	1	1	1	1	1	1	1	1		1
Lightening Storms	2	1	1	1	1	1	1	1	1		1
Thunderstorms	4	2	2	2	2	2	2	2	2		2
Tornado/High Winds	0										
Flash Flooding	0										
Riverline Flooding	0										
Lake Flooding	0										
Stormwater Flooding	4	2	2	2	2	2	2	2	2		2
Dam Failure Flooding	0										
Forest Fires	0										
Wildland Fires	0										
Coastal Hazards	0										
Heavy Snow Storm	2	2	2	2	2	2	2	2	2		2
Ice Storm	1	1	1	1	1	1	1	1	1		1
Blizzard	1	1	1	1	1	1	1	1	1		1
Extreme Cold	2	2	2	2	2	2	2	2	2		2
Earthquake	0										
Extreme Heat	2	2	2	2	2	2	2	2	2		2
Agricultural	0										
Drought	0										
Fog	2	2	2	2	2	2	2	2	2		2
Landslide	0										
Subsidence	0										

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TABLE 1
Natural Hazard Identification and Risk Assessment Matrix
Name of Community or Planning Area : Oak Creek

For each hazard your community or planning area is vulnerable to in column one, assign a risk rating of 1-low, 2-medium, or 3-high for each of the risk assessment criterion (columns two through ten). Totalling each hazard's row should give you an appreciation of what hazards form the highest risk. This table is provided as a tool to help local governments and tribal organizations analyze their risks and should not be construed as a precise way for determining these risks. See the directions on Page 12 for further assistance in completing this table.

1 Hazard Identification	2 Hazard Frequency	3 Hazard Probability	4 Health & Public Safety	5 Home Damage	6 Business Disruption	7 Public Expenditures	8 Magnitude of Population At Risk	9 Mgnitude of Homes At Risk	10 Magnitude of Businesses At Risk	11 Adjustment	12 Risk Assessment Rating Tool
	Frequency of past hazard occurrences 1 2 3	Probability of hazard occurring in the future 1 2 3	Degree of past hazard events, causing injuries, sickness and/or deaths 1 2 3	Degree of past hazard events causing damage to homes 1 2 3	Degree of past hazard events causing damage to business and/or interruption of business trade 1 2 3	Amount of local, state, & federal funds expended on past hazard recovery activities 1 2 3	Amount of population still vulnerable to injury, sickness, and/or death from hazard 1 2 3	Amount of homes still vulnerable to damage from hazard 1 2 3	Amount of businesses still vulnerable to damage or interruption of business trade 1 2 3		
Natural Hazards											
Extreme Cold	3	3	2	1	1	2	3	3	3	21	
Stormwater Flooding	2	2	2	2	2	2	2	1	2	17	
Blizzard	2	2	1	2	2	2	2	2	2	17	
Thunderstorms	2	2	2	2	1	1	2	2	2	16	
Heavy Snow Storm	2	2	1	2	1	2	2	2	2	16	
Lightening Storms	2	2	1	2	1	1	1	2	2	14	
Wildland Fires	2	2	1	1	1	1	1	2	2	13	
Extreme Heat	2	2	2	1	1	1	2	1	1	13	
Fog	2	2	2	1	1	1	2	1	1	13	
Flash Flooding	1	2	1	1	1	1	2	2	2	13	
Tornado/High Winds	1	1	1	2	1	1	1	2	2	12	
Ice Storm	1	1	1	1	1	1	2	2	2	12	
Hail Storms	2	2	1	1	1	1	1	1	1	11	
Riverline Flooding	2	2	1	1	1	1	1	1	1	11	
Lake Flooding	1	1	1	1	1	1	1	2	1	10	
Earthquake	1	1	1	1	1	1	1	2	1	10	
Dam Failure Flooding	1	1	1	1	1	1	1	1	1	9	
Forest Fires	1	1	1	1	1	1	1	1	1	9	
Coastal Hazards	1	1	1	1	1	1	1	1	1	9	
Agricultural	1	1	1	1	1	1	1	1	1	9	
Drought	1	1	1	1	1	1	1	1	1	9	
Landslide	1	1	1	1	1	1	1	1	1	9	
Subsidence	1	1	1	1	1	1	1	1	1	9	

TABLE 1
 Natural Hazard Identification and Risk Assessment Matrix
 Name of Community or Planning Area : **Brown Deer**

For each hazard your community or planning area is vulnerable to in column one, assign a risk rating of 1-low, 2-medium, or 3-high for each of the risk assessment criterion (columns two through ten). Totalling each hazard's row should give you an appreciation of what hazards form the highest risk. This table is provided as a tool to help local governments and tribal organizations analyze their risks and should not be construed as a precise way for determining these risks. See the directions on Page 12 for further assistance in completing this table.

1	2	3	4	5	6	7	8	9	10	11	12
Hazard Identification	Hazard Frequency	Hazard Probability	Health & Public Safety	Home Damage	Business Disruption	Public Expenditures	Magnitude of Population At Risk	Magnitude of Homes At Risk	Magnitude of Businesses At Risk	Adjustment	Risk Assessment Rating Tool
	Frequency of past hazard occurrences 1 2 3	Probability of hazard occurring in the future 1 2 3	Degree of past hazard events, causing injuries, sickness and/or deaths 1 2 3	Degree of past hazard events causing damage to homes 1 2 3	Degree of past hazard events causing damage to business and/or interruption of business trade 1 2 3	Amount of local, state, & federal funds expended on past hazard recovery activities 1 2 3	Amount of population still vulnerable to injury, sickness, and/or death from hazard 1 2 3	Amount of homes still vulnerable to damage from hazard 1 2 3	Amount of businesses still vulnerable to damage or interruption of business trade 1 2 3		
Natural Hazards											
Hail Storms	2	2	1	1	1	1	1	1	1		11
Lightening Storms	2	2	1	1	1	1	1	1	1		11
Thunderstorms	3	3	1	3	3	3	2	3	2		23
Tornado/High Winds	2	2	1	1	1	1	1	1	1		11
Flash Flooding	3	3	1	3	3	3	2	3	2		23
Riverline Flooding	1	1	1	1	1	1	1	1	1		9
Lake Flooding	1	1	1	1	1	1	1	1	1		9
Stormwater Flooding	3	3	1	3	3	3	2	3	2		23
Dam Failure Flooding	1	1	1	1	1	1	1	1	1		9
Forest Fires	1	1	1	1	1	1	1	1	1		9
Wildland Fires	1	1	1	1	1	1	1	1	1		9
Coastal Hazards	1	1	1	1	1	1	1	1	1		9
Heavy Snow Storm	2	2	1	1	1	2	1	1	1		12
Ice Storm	1	1	1	1	1	1	2	2	2		12
Blizzard	1	2	1	2	2	2	1	1	2		14
Extreme Cold	2	2	2	2	2	2	2	2	2		18
Earthquake	0	0	0	0	0	0	0	0	0		0
Extreme Heat	1	1	1	1	1	1	1	1	1		9
Agricultural	0	0	0	0	0	0	0	0	0		0
Drought	0	0	0	0	0	0	0	0	0		0
Fog	2	2	1	1	1	1	1	1	1		11
Landslide	1	1	1	1	1	1	1	1	1		9
Subsidence	1	1	1	1	1	1	1	1	1		9

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TABLE 1
 Natural Hazard Identification and Risk Assessment Matrix
 Name of Community or Planning Area : Shorewood

For each hazard your community or planning area is vulnerable to in column one, assign a risk rating of 1-low, 2-medium, or 3-high for each of the risk assessment criterion (columns two through ten). Totalling each hazard's row should give you an appreciation of what hazards form the highest risk. This table is provided as a tool to help local governments and tribal organizations analyze their risks and should not be construed as a precise way for determining these risks. See the directions on Page 12 for further assistance in completing this table.

1	2	3	4	5	6	7	8	9	10	11	12
Hazard Identification	Hazard Frequency	Hazard Probability	Health & Public Safety	Home Damage	Business Disruption	Public Expenditures	Magnitude of Population At Risk	Magnitude of Homes At Risk	Magnitude of Businesses At Risk	Adjustment	Risk Assessment Rating Tool
	Frequency of past hazard occurrences 1 2 3	Probability of hazard occurring in the future 1 2 3	Degree of past hazard events, causing injuries, sickness and/or deaths 1 2 3	Degree of past hazard events causing damage to homes 1 2 3	Degree of past hazard events causing damage to business and/or interruption of business trade 1 2 3	Amount of local, state, & federal funds expended on past hazard recovery activities 1 2 3	Amount of population still vulnerable to injury, sickness, and/or death from hazard 1 2 3	Amount of homes still vulnerable to damage from hazard 1 2 3	Amount of businesses still vulnerable to damage or interruption of business trade 1 2 3		
Natural Hazards											
Hail Storms	2	2	1	1	1	1	1	1	1		11
Lightening Storms	2	2	1	1	1	1	1	1	1		11
Thunderstorms	3	3	1	3	3	3	2	3	2		23
Tornado/High Winds	2	2	1	1	1	1	1	1	1		11
Flash Flooding	23	23	1	3	3	3	2	3	2		23
Riverline Flooding	1	1	1	1	1	1	1	1	1		9
Lake Flooding	1	1	1	1	1	1	1	1	1		9
Stormwater Flooding	3	3	1	3	3	3	2	3	2		23
Dam Failure Flooding	1	1	1	1	1	1	1	1	1		9
Forest Fires	1	1	1	1	1	1	1	1	1		9
Wildland Fires	1	1	1	1	1	1	1	1	1		9
Coastal Hazards	1	1	1	1	1	1	1	1	1		9
Heavy Snow Storm	2	2	1	1	1	2	1	1	1		12
Ice Storm	2	2	1	1	1	2	1	1	1		11
Blizzard	2	2	1	1	1	2	1	1	1		12
Extreme Cold	1	1	1	1	1	1	1	1	1		9
Earthquake	1	1	1	1	1	1	1	1	1		9
Extreme Heat	1	1	1	1	1	1	1	1	1		9
Agricultural	0	0	0	0	0	0	0	0	0		0
Drought	0	0	0	0	0	0	0	0	0		0
Fog	0	0	0	0	0	0	0	0	0		0
Landslide	0	0	0	0	0	0	0	0	0		0
Subsidence											

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TABLE 1
 Natural Hazard Identification and Risk Assessment Matrix
 Name of Community or Planning Area: Waukegan Bayside

For each hazard your community or planning area is vulnerable to in column one, assign a risk rating of 1-low, 2-medium, or 3-high for each of the risk assessment criterion (columns two through ten). Totalling each hazard's row should give you an appreciation of what hazards form the highest risk. This table is provided as a tool to help local governments and tribal organizations analyze their risks and should not be construed as a precise way for determining these risks. See the directions on Page 12 for further assistance in completing this table.

1	2	3	4	5	6	7	8	9	10	11	12
Hazard Identification	Hazard Frequency	Hazard Probability	Health & Public Safety	Home Damage	Business Disruption	Public Expenditures	Magnitude of Population At Risk	Magnitude of Homes At Risk	Magnitude of Businesses At Risk	Adjustment	Risk Assessment Rating Tool
	Frequency of past hazard occurrences	Probability of hazard occurring in the future	Degree of past hazard events, causing injuries, sickness and/or deaths	Degree of past hazard events causing damage to homes	Degree of past hazard events causing damage to business and/or interruption of business trade	Amount of local, state, & federal funds expended on past hazard recovery activities	Amount of population still vulnerable to injury, sickness, and/or death from hazard	Amount of homes still vulnerable to damage from hazard	Amount of businesses still vulnerable to damage or interruption of business trade		
Natural Hazards	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3		
Hail Storms	2	2	1	2	2	1	2	2	2		15
Lightening Storms	3	2	1	1	2	2	1	2	2		15
Thunderstorms	3	3	1	2	2	2	2	2	2		19
Tornado/High Winds	2	2	1	2	2	2	2	2	2		17
Flash Flooding	3	3	1	3	3	3	2	3	2		22
Riverline Flooding	1	1	1	1	1	1	1	1	1		9
Lake Flooding	1	1	1	1	1	1	1	1	1		9
Stormwater Flooding	3	3	1	3	3	3	2	2	2		22
Dam Failure Flooding	1	1	1	1	1	1	1	1	1		9
Forest Fires	1	1	1	1	1	1	1	1	1		9
Wildland Fires	1	1	1	1	1	1	1	1	1		9
Coastal Hazards	1	1	1	1	1	1	1	1	1		9
Heavy Snow Storm	3	3	1	1	1	2	2	1	1		14
Ice Storm	2	2	1	2	2	1	3	1	1		13
Blizzard	2	2	1	1	1	3	2	1	1		13
Extreme Cold	2	2	1	1	1	1	1	1	1		11
Earthquake	1	1	1	1	1	1	1	1	1		9
Extreme Heat	1	1	1	1	1	1	1	1	1		9
Agricultural	1	1	1	1	1	1	1	1	1		9
Drought	1	1	1	1	1	1	1	1	1		9
Fog	2	2	1	1	1	1	1	1	1		11
Landslide	1	1	1	1	1	1	1	1	1		9
Subsidence	1	1	1	1	1	1	1	1	1		9

Prepared by: [illegible]
 Resource: Guidelines for Hazard Mitigation Planning (WVSC0311)

TABLE 1
 Natural Hazard Identification and Risk Assessment Matrix
 Name of Community or Planning Area : River Hills

For each hazard your community or planning area is vulnerable to in column one, assign a risk rating of 1-low, 2-medium, or 3-high for each of the risk assessment criterion (columns two through ten). Totalling each hazard's row should give you an appreciation of what hazards form the highest risk. This table is provided as a tool to help local governments and tribal organizations analyze their risks and should not be construed as a precise way for determining these risks. See the directions on Page 12 for further assistance in completing this table.

1 Hazard Identification	2 Hazard Frequency	3 Hazard Probability	4 Health & Public Safety	5 Home Damage	6 Business Disruption	7 Public Expenditures	8 Magnitude of Population At Risk	9 Mgnitude of Homes At Risk	10 Magnitude of Businesses At Risk	11 Adjustment	12 Risk Assessment Rating Tool
	Frequency of past hazard occurrences 1 2 3	Probability of hazard occurring in the future 1 2 3	Degree of past hazard events, causing injuries, sickness and/or deaths 1 2 3	Degree of past hazard events causing damage to homes 1 2 3	Degree of past hazard events causing damage to business and/ or interruption of business trade 1 2 3	Amount of local, state, & federal funds expended on past hazard recovery activities 1 2 3	Amount of population still vulnerable to injury, sickness, and/or death from hazard 1 2 3	Amount of homes still vulnerable to damage from hazard 1 2 3	Amount of businesses still vulnerable to damage or interruption of business trade 1 2 3		
Natural Hazards											
Hail Storms	2	2	1	1	1	1	1	1	1		11
Lightening Storms	2	2	1	1	1	1	1	1	1		11
Thunderstorms	3	3	1	3	3	3	2	3	2		23
Tomado/High Winds	2	2	1	1	1	1	1	1	1		11
Flash Flooding	3	3	1	3	3	3	2	3	2		23
Riverline Flooding	1	1	1	1	1	1	1	1	1		9
Lake Flooding	1	1	1	1	1	1	1	1	1		9
Stormwater Flooding	3	3	1	3	3	3	2	3	2		23
Dam Failure Flooding	1	1	1	1	1	1	1	1	1		9
Forest Fires	1	1	1	1	1	1	1	1	1		9
Wildland Fires	1	1	1	1	1	1	1	1	1		9
Coastal Hazards	1	1	1	1	1	1	1	1	1		9
Heavy Snow Storm	2	2	1	1	1	2	1	1	1		12
Ice Storm	1	1	1	1	1	1	2	2	2		12
Blizzard	1	2	1	2	2	2	1	1	2		14
Extreme Cold	2	2	2	2	2	2	2	2	2		18
Earthquake	0	0	0	0	0	0	0	0	0		0
Extreme Heat	1	1	1	1	1	1	1	1	1		9
Agricultural	0	0	0	0	0	0	0	0	0		0
Drought	0	0	0	0	0	0	0	0	0		0
Fog	2	2	1	1	1	1	1	1	1		11
Landslide	1	1	1	1	1	1	1	1	1		9
Subsidence	1	1	1	1	1	1	1	1	1		9

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Resource Guide to All Hazards Mitigation Planning in Wisconsin

RECEIVED
FOX POINT POLICE DEPT.

JUN 27 2011

TABLE 1

Natural Hazard Identification and Risk Assessment Matrix

Name of Community or Planning Area: Whitefish Bay Fox Point

For each hazard your community or planning area is vulnerable to in column one, assign a risk rating of 1-low, 2-medium, or 3-high for each of the risk assessment criterion (columns two through ten). Totalling each hazard's risk should give an appreciation of what hazards form the highest risk. This table is provided as a tool to help local governments and tribal organizations analyze their risks and should not be construed as a precise way for determining these risks. See the directions on Page 12 for further assistance in completing this table.

1	2	3	4	5	6	7	8	9	10	11	12
Hazard Identification	Hazard Frequency	Hazard Probability	Health & Public Safety	Home Damage	Business Disruption	Public Expenditures	Magnitude of Population At Risk	Magnitude of Homes At Risk	Magnitude of Businesses At Risk	Adjustment	Risk Assessment Rating Tool
	Frequency of past hazard occurrences	Probability of hazard occurring in the future	Degree of past hazard events, causing injuries, sickness and/or deaths	Degree of past hazard events causing damage to homes	Degree of past hazard events causing damage to business and/or interruption of business trade	Amount of local, state, & federal funds expended on past hazard recovery activities	Amount of population still vulnerable to injury, sickness, and/or death from hazard	Amount of homes still vulnerable to damage from hazard	Amount of businesses still vulnerable to damage or interruption of business trade		
Natural Hazards	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3		
Hail Storms	2	2	0	0	0	0	1	2	2		9
Lightening Storms	2	2	0	1	1	0	1	2	2		11
Thunderstorms	3	3	0	2	1	0	1	2	2		14
Tornado/High Winds	2	2	0	2	1	1	2	3	3		16
Flash Flooding	3	2	0	2	1	2	1	3	3		17
Riverine Flooding	0	0	0	0	0	0	0	0	0		0
Lake Flooding	1	1	0	0	0	0	0	0	0		2
Stormwater Flooding	3	3	0	2	0	2	0	0	0		10
Dam Failure Flooding	0	0	0	0	0	0	0	0	0		0
Forest Fires	0	0	0	0	0	0	0	0	0		0
Wildland Fires	0	0	0	0	0	0	0	0	0		0
Coastal Hazards	1	1	0	0	0	0	0	0	0		2
Heavy Snow Storm	2	2	0	1	2	3	0	3	3		16
Ice Storm	2	2	0	1	1	0	0	3	3		12
Blizzard	2	2	0	1	2	2	0	3	3		16
Extreme Cold	1	1	0	0	0	0	0	0	0		2
Earthquake	0	0	0	0	0	0	0	0	0		0
Extreme Heat	1	1	0	0	0	0	0	0	0		2
Agricultural	0	0	0	0	0	0	0	0	0		0
Drought	1	1	0	0	0	0	0	0	0		2
Fog	2	2	0	0	0	0	0	0	0		4
Landslide	0	0	0	0	0	0	0	0	0		0
Subsidence	0	0	0	0	0	0	0	0	0		0

Resource Guide to All Hazard Mitigation Planning/Wisconsin

TABLE 1
 Natural Hazard Identification and Risk Assessment Matrix
 Name of Community or Planning Area : **Whitefish Bay**

For each hazard your community or planning area is vulnerable to in column one, assign a risk rating of 1-low, 2-medium, or 3-high for each of the risk assessment criterion (columns two through ten). Totalling each hazard's row should give you an appreciation of what hazards form the highest risk. This table is provided as a tool to help local governments and tribal organizations analyze their risks and should not be construed as a precise way for determining these risks. See the directions on Page 12 for further assistance in completing this table.

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Hazard Identification	Hazard Frequency	Hazard Probability	Health & Public Safety	Home Damage	Business Disruption	Public Expenditures	Magnitude of Population At Risk	Magnitude of Homes At Risk	Magnitude of Businesses At Risk	Adjustment	Risk Assessment Rating Tool
	Frequency of past hazard occurrences	Probability of hazard occurring in the future	Degree of past hazard events, causing injuries, sickness and/or deaths	Degree of past hazard events causing damage to homes	Degree of past hazard events causing damage to business and/or interruption of business trade	Amount of local, state, & federal funds expended on past hazard recovery activities	Amount of population still vulnerable to injury, sickness, and/or death from hazard	Amount of homes still vulnerable to damage from hazard	Amount of businesses still vulnerable to damage or interruption of business trade		
Natural Hazards	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3		
Hail Storms	2	2	1	2	2	1	1	2	2		15
Lightening Storms	3	2	1	1	2	2	1	2	2		16
Thunderstorms	3	3	1	2	2	2	2	2	2		19
Tornado/High Winds	2	2	1	2	2	2	2	2	2		17
Flash Flooding	3	3	1	3	3	3	2	2	2		22
Riverline Flooding	1	1	1	1	1	1	1	1	1		9
Lake Flooding	1	1	1	1	1	1	1	1	1		9
Stormwater Flooding	3	3	1	3	3	3	2	2	2		22
Dam Failure Flooding	1	1	1	1	1	1	1	1	1		9
Forest Fires	1	1	1	1	1	1	1	1	1		9
Wildland Fires	1	1	1	1	1	1	1	1	1		9
Coastal Hazards	1	1	1	1	1	1	1	1	1		14
Heavy Snow Storm	3	3	1	1	1	2	1	1	1		13
Ice Storm	2	2	1	2	2	1	1	1	1		13
Blizzard	2	2	1	1	1	3	1	1	1		11
Extreme Cold	2	2	1	1	1	1	1	1	1		9
Earthquake	1	1	1	1	1	1	1	1	1		9
Extreme Heat	1	1	1	1	1	1	1	1	1		9
Agricultural	1	1	1	1	1	1	1	1	1		9
Drought	1	1	1	1	1	1	1	1	1		9
Fog	2	2	1	1	1	1	1	1	1		11
Landslide	1	1	1	1	1	1	1	1	1		9
Subsidence	1	1	1	1	1	1	1	1	1		9

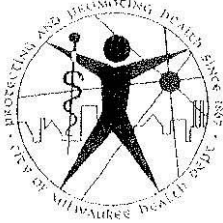
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Resource Guide to All Hazards Mitigation Planning in Wisconsin

APPENDIX C

RELEVANT PLANS AND DOCUMENTS

Milwaukee County Wisconsin Pre-Disaster Mitigation Plan



**MILWAUKEE HEALTH DEPARTMENT and
MILWAUKEE HEAT TASK FORCE**

PLAN FOR EXCESSIVE HEAT CONDITIONS 2004

GOAL

To reduce the incidence of morbidity and mortality associated with extreme heat events.

SPRING 2004

ROLES AND RESPONSIBILITIES

CITY OF MILWAUKEE HEALTH DEPARTMENT (MHD) WILL:

1. Bring together Task Force partners involved in heat response for a meeting to update the Heat Plan based on changes in capacities or learned strategies.
2. Distribute the updated Heat Plan to all Heat Task Force participants and to other agencies in the county.
3. Prepare and distribute a resource list specific to Milwaukee County regarding heat preparedness with local contacts for information or assistance. Partner organizations should feel free to duplicate and distribute this at will, or alter it for special needs.
4. Update contact lists and test broadcast fax capability for informing Heat Task Force partners of Heat Health Notices and prepare format of notification in advance.
5. Prepare and test Hot Line (286-3616) capability to include:
 - 1) after-hours continuity (recorded information line and City Hall Operator: 286-2150 or 286-3200)
 - 2) capacity to handle incoming traffic loads
 - 3) separate health professional access fax line (286-5164)
 - 4) capacity to transfer to another site if needed (e.g., County Emergency Management Command Center)
6. Update and maintain media contact list.
7. Prepare a list or map of congregate cooling sites (including public access sites such as shopping malls) that includes typical hours of operation and, when known, accessibility to disabled persons, for dissemination in a Heat Health Notice.

IMPACT WILL:

Provide 24-hour referral service.

DEPARTMENT ON AGING and INTERFAITH WILL:

1. Establish and promote the Gatekeeper Program and ELDERLINK phone line to sensitize and educate citizens who are routinely in contact with the elderly to their special needs and how to assist them in getting them addressed during heat health events.
2. Promote the enrollment of isolated elderly (especially among clients of agencies serving at-risk populations) into their telephone reassurance check-in system.
3. Assist MHD in outreach to elder day care, nutrition and home health services.

AGENCIES SERVING AT-RISK POPULATIONS, including but not limited to: Interfaith, The Salvation Army, Milwaukee County Department on Aging, Milwaukee County Office on Persons with Disabilities, Milwaukee County Adult Services Division, Milwaukee County Mental Health Division, agencies that serve the homeless and mentally ill, home health agencies, organizations with community outreach to low-income, disabled, and elderly **WILL:**

1. Distribute heat emergency preparedness information to staff, volunteers and clients. Modify the MHD information pamphlet to better serve target populations. Translations are encouraged.
2. If outreach or case management services are provided by the agency: seek to identify and enroll at-risk individuals into established and updated registries, if appropriate (see DEPARTMENT ON AGING, above), or establish procedures to log and check-in on at-risk individuals during Heat Health Events using staff or volunteers.
3. Update contact information with MHD to ensure receiving Heat Health Notices.
4. Establish planned response to Heat Health Notices, such as staff changes, extended hours at facilities or other needs specific for their clients.

DHFS – DIV. OF DISABILITY AND ELDER SERVICES – BUREAU OF QUALITY ASSURANCE WILL:

1. Monitor conditions in nursing homes and other licensed facilities on an ongoing basis.
2. Send out an annual communication regarding how these licensed facilities can meet the heat-related health needs of their residents.

WE ENERGIES WILL:

1. Maintain a registry of at-risk individuals dependent on electricity for electrically powered medical equipment.

GENERAL COMMUNITY OUTREACH ORGANIZATIONS including the Milwaukee Police **WILL:**

1. Distribute heat emergency preparedness information to staff, volunteers and clients. Modify the MHD information pamphlet to better serve target populations. Translations are encouraged.
2. Seek to identify and enroll at-risk individuals into established registries, if appropriate (see INTERFAITH and MILWAUKEE COUNTY DEPARTMENT ON AGING, above), or establish procedures to log and check-in on high-risk individuals during Heat Health Events using staff or volunteers.
3. Update contact information with MHD to ensure receiving Heat Health Notices.

THE MEDICAL SOCIETY OF MILWAUKEE COUNTY WILL:

Advise physicians regarding heat health hazards, the availability of check-in registries and encourage caretakers or at-risk individuals to prepare for heat emergencies and enroll in registries.

MEDIA METEOROLOGISTS ARE ENCOURAGED TO:

1. Run stories on heat illness and prevention.
2. Routinely use Heat Index during the summer so people may become as familiar with the concept as they are with the Wind Chill Factor.
3. Review internal systems to respond to Heat Health Notices, including methods to notify the public outside routine meteorological broadcasts.
4. Update contact information with MHD to ensure receiving Heat Health Notices

CITY OF MILWAUKEE DEPARTMENT OF PUBLIC WORKS WILL:

Cooperate with Milwaukee Public Schools on the school-based COOL SPOTS program.

RED CROSS WILL:

Activate 24-hour heat health tips information line for duration of summer.

AURORA BEHAVIORAL HEALTH WILL:

1. Educate inpatients about heat and medications prior to discharge.
2. Include information about heat health in newsletter to providers.
3. Develop crisis plans with patients/families to be discharged, including distribution of available resource handouts, to ensure return to an environment that is safe.

COVENANT BEHAVIORAL HEALTH WILL:

1. Post educational materials about heat health in the Emergency Departments.
2. Educate behavioral health outpatients about keeping cool during heat events. Notify outpatient clients about what to do during a heat event
3. Provide education to inpatients during their stay and prior to discharge.

HEAT HEALTH OUTLOOK
(triggered by NWS HEAT OUTLOOK threshold)

CITY OF MILWAUKEE HEALTH DEPARTMENT WILL:

1. Fax a Heat Health Outlook to all Task Force Participants informing them of the forecast and encouraging them to review the Heat Plan and prepare for implementation.
2. Ensure that all after-hours calls to the City Hall operator (286-2150, 286-3200) regarding critical heat issues are transferred to an appropriate individual 24 hours a day.
3. Establish fax line (414-286-5164) for Health Professionals to report heat related morbidity and mortality.

CITY OF MILWAUKEE DEPARTMENT OF PUBLIC WORKS WILL:

Advise all sponsors of outdoor special events scheduled during the forecast period to consider modifications of activities in light of possible heat.

HEAT HEALTH ADVISORY
(triggered by NWS HEAT ADVISORY)

CITY OF MILWAUKEE HEALTH DEPARTMENT WILL:

1. Issue a "Heat Health Advisory" for the Greater Milwaukee Metropolitan area. This will include public information for heat protective actions and will be distributed to the media.
2. Alert Heat Task Force members and other participating agencies with instructions to prepare for full plan implementation within 6 to 24 hours and to prepare to begin check-in procedures for at-risk groups.
3. Begin active surveillance of selected emergency departments and the Medical Examiners Office and encourage referrals by physicians to the Milwaukee County Department on Aging and the Milwaukee County Adult Services Division.
4. Request that the Medical Examiner, Emergency Rooms and Local Public Health Departments report heat-related injuries to MHD via EMSsystem or fax line (286-5164).
5. Continue to monitor fax line (286-5164) for Health Professionals to report heat related morbidity and mortality.
6. Open and publicize 24-hour Heat Hot Line (286-3616) to general public.
7. Post Advisory information on EMSsystem.
8. Alert State and County agencies that regulate Community-Based Residential Facilities (CBRFs).

EMERGENCY ROOMS, LOCAL HEALTH DEPARTMENTS AND MEDICAL EXAMINER WILL:

1. Report any cases of heat exhaustion, heat stroke or heat related illnesses (such as heat-related angina or exacerbation of chronic heart failure or chronic lung disease) to the MHD and make referrals to the Milwaukee County Department on Aging, Milwaukee County Adult Services Division or Milwaukee County Mental Health Division as appropriate.
2. Activate appropriate internal preparation and response procedures.

DIVISION OF EMERGENCY MANAGEMENT WILL:

1. Notify local communities of the Advisory using emergency management zone radio frequency and procedure.
2. Alert Red Cross to heighten awareness of heat-related needs and to plan for congregate cooling facility availability.
3. Prepare the Safety Building EOC for activation if needed.
4. Respond to requests for emergency assistance.

CITY OF MILWAUKEE DEPARTMENT OF PUBLIC WORKS WILL:

Monitor water usage and consumption in the community as appropriate.

AGENCIES SERVING AT-RISK POPULATIONS, including but not limited to: Interfaith, The Salvation Army, Milwaukee County Department on Aging, Milwaukee County Office on Persons With Disabilities, Milwaukee County Adult Services Division, Milwaukee County Mental Health Division, agencies that serve the homeless and mentally ill, home health agencies, organizations with community outreach to low-income, disabled, and elderly **WILL:**

1. Prepare to activate daily check-in with registered clients if this service is performed. Begin daily check-in if Heat Index reaches 105.
2. Communicate generally with their staff, volunteers and client base to ensure they are aware of the current weather situation and advise them of recommended protective actions and how to obtain further information or assistance.
3. Continue assessment of clients referred for safety risks and respond as needed.
4. Share information on the general condition of their client base with MHD.
5. Prepare to open any special Congregate Cooling Sites under their control, such as Senior Centers, and prepare for extended hours operations if the demand dictates (utilizing volunteer or Red Cross resources as indicated). Open centers if Heat Index reaches 105.
6. Plan for staff or volunteers to assist with cooling centers and/or transportation of persons to cooling centers if possible.

MILWAUKEE COUNTY MENTAL HEALTH WILL:

Respond to calls to psychiatric crisis line as needed.

RED CROSS WILL:

Plan for opening Congregate Cooling centers if they become necessary or to provide trained shelter staff to extend the hours of existing Congregate Cooling facilities.

WE ENERGIES WILL:

1. Temporarily cease shut-off of electric power for non-payment until Heat Advisories are ended.
2. Monitor power consumption patterns and availability.

HEAT HEALTH WATCH or WARNING
Based on NWS EXCESSIVE HEAT WATCH or WARNING

MILWAUKEE HEALTH DEPARTMENT WILL:

1. Issue a "Heat Health Warning" for the Greater Milwaukee Metropolitan area. This will include medical and health information for heat protective actions and will be distributed to the media.
2. Continue above activities and consider enhancing response as needed.
3. Continue to post information on the EMSystem.
4. Report unmet needs to County Emergency Government and State Division of Emergency Management and other Heat Task Force Partners and find ways to address them.
5. Consider establishing an Emergency Operations Center with representatives of relevant Task Force Agencies if greater cross-agency coordination is required.
6. Evaluate efficiency of Heat Health Plan and take corrective action as needed.

DIVISION OF EMERGENCY MANAGEMENT WILL:

1. Continue above activities.
2. Open EOC if needed.

RED CROSS WILL:

Perform surveys of possible additional emergency cooling sites if needed.

GENERAL OUTREACH PROGRAMS including the Milwaukee Police Department WILL:

Continue efforts to have block captains or local staff make more frequent contacts with vulnerable at-risk individuals in their areas.

WE ENERGIES WILL:

Continue to monitor power consumption patterns and availability.

ALL OTHER TASK FORCE PARTNERS WILL:

1. Continue above activities.
2. Report operations problems to MHD for possible cross-agency resolution.

APPENDIX D

CRITICAL FACILITIES

***Milwaukee County Wisconsin
Pre-Disaster Mitigation Plan***

MILWAUKEE COUNTY HAZARD MITIGATION PLAN
LISTING OF CRITICAL FACILITIES MILWAUKEE COUNTY

Updated 2010

Bayside

9075 W. Regent Rd
City Department of Public Works

9075 N. Regent Rd
Bayside Police Dept

665 E. Brown Deer Road
North Shore Fire Department Station #5

601 East Ellsworth Lane
Bayside Middle School

Brown Deer

8717 N. 43rd St.
Village Department of Public Works

4800 W. Green Brook Dr.
Brown Deer Police Department/Village Hall

4401 West River Lane
North Shore Fire Department Administrative Offices/Station #1

8060 N. 60th Street
Brown Deer High School

5757 West Dean Road
Brown Deer Middle School

Cudahy

5900 S. Lake Dr.
Saint Luke's South Shore Hospital

5050 S. Lake Dr.
Cudahy City Hall
Cudahy Police Department
Cudahy Health Department

5110 South Lake Drive
Cudahy Water Utility

4626 South Packard Avenue
Cudahy Fire Station #1

3115 East Ramsey Avenue
Cudahy Fire Station #2

3555 East Pabst Ave.

DPW

2915 East Ramsey Avenue
School District of Cudahy Administration Building

3570 East Plankinton Avenue
Cudahy Post Office

5481 South Packard Avenue
Ladish Drop Forge, Inc.

1 Sweet Applewood Lane
Patrick Cudahy, International

Cudahy Shelters:

4950 South Lake Drive
Cudahy High School

5530 South Barland Avenue
Cudahy Middle School

5950 South Illinois Avenue
General Mitchell School

6100 South Lake Drive
Kelly Senior Center

4416 South Packard Avenue
Lincoln School

Senior Housing Facilities:

4600 South Nicholson Ave,
Cottonwood Trails

3400 East Ramsey Avenue
Williamstown Bay

5555 South Kirkwood Avenue
Cifaldi Square

4816 South Packard Avenue
Washington Square

3717-37 East Ramsey Ave
Evergreen Square

Evacuation Routes:

East Ramsey Avenue
South Lake Drive
East Layton Avenue
East College Avenue
South Pennsylvania Avenue

Fox Point

7200 N. Santa Monica
Village Department of Public Works

Fox Point Village Hall

6807 N. Santa Monica Blvd
North Shore House Assisted Living

7450 N. Port Washington Road
Fox Point Manor Assisted Living

7300 N. Santa Monica
Fox Point Police Department

Fox Point Water Tower and Water Department

Franklin

7979 W. Ryan Rd.
City Department of Public Works

9229 W. Loomis Rd.
Franklin City Hall
Franklin Police

8885 S. 68th St.
Milwaukee County House of Correction

10101 S. 27th Street
Wheaton Franciscan Hopital

9455 W. Loomis Road
City of Franklin Law Enforcement Center

8901 W. Drexel Avenue
City of Franklin Fire Department Station #1

9911 S. 60th Street
City of Franklin Fire Department Station #2

4755 W. Drexel Avenue
City of Franklin Fire Department Station #3

3311 W. College Avenue
The Woods Complex

7700 S. 51st Street
Clare Meadows I

7760 S. 51st Street
Clare Meadows II

9501 W. Loomis Road
Brenwood Park

6000 W. Ryan Road
Milwaukee County Sports Complex

9225 S. 68th Street

Milwaukee County Sheriff's Department Training Academy

9575 W. Brenwood Park Drive
Franklin Post Office

7400 W. Rawson Avenue
Rawson Medical Center

9200 W. Loomis Road
Aurora Medical Center

8225 West Forest Hill Avenue
Forest Park Middle School

8222 South 51 Street
Franklin High School

9090 South 35th Street
Southwood Glen Elementary School

8930 W. Highland Park Avenue
9002 W. Highland Park Avenue
9075 W. Highland Park Avenue
9120 W. Highland Park Avenue
9170 W. Highland Park Avenue
Forest Hill Highlands Senior Housing

Glendale

5900 N. Glen Park Rd
City Department of Public Works

5909 N. Milwaukee River Pkwy
City Hall

5909 N. Milwaukee River Pkwy
Glendale Police

5901 N. Milwaukee River Parkway
North Shore Fire Department Station #2

400 W. Bender Road
North Shore Water Plant

7009 N. Range Line Road
Glendale Water Tower

3003 W. Good Hope Road
Aurora Advanced Healthcare

4425 N. Port Washington Road
Columbia/ St. Mary's

575 W. River Woods Parkway
Columbia/ St. Mary's

6701 N. Jean Nicolet Road
Nicolet High School

2600 W. Mill Road
Glen Hills Middle School

5910 N. Milwaukee River Parkway
Parkway Elementary School

Greendale

6351 Industrial Loop
City Department of Public Works

5911 W. Grange Ave
Greendale Police

6200 W. Loomis Road
Greendale Fire Department

Ridgedale Apts
7720, 7750 and 7780 W. Grange Ave

Harbour Village
5600, 5700, 5800 and 5900 Mockingbird Ln.

Southridge Mall
5300 S. 76th Street

Greendale High School
6801 Southway

Highland View School
5900 South 51st Street

Greendale Middle School
6800 Schoolway

Canterbury School
7000 Enfield Avenue

College Park School
5701 College Avenue

St. Alphonsus Grade School
6000 W. Loomis Road

Martin Luther High School
5201 S. 76th Street

5701 West College Avenue
College Park Elementary School

Greenfield

4120 W. Loomis Rd.

Gambro Health Care

4551 S. 52nd St.
City Department of Public Works

5330 W. Layton Ave.
Fire Station 1

4333 S. 92nd St
Fire Station 2

7325 W. Forest Home Ave.
Greenfield City Hall
Library

5300 W. Layton Ave
Greenfield Police

7353 W. Forest Home
Greenfield Post Office

6007 W. Layton Ave
Military Recruiting Office

4500 W. Loomis Rd.
Southpoint Care Center

5015 S. 110th St.
Vencor Milwaukee

Whitnall High School
5000 South 116th Street

Whitnall Middle School
5025 South 116th Street

Hales Corners

5635 S. New Berlin Rd
Hales Corners Police

5145 S. 116th Street
Edgerton Elementary School

11319 W. Godsell Avenue
Hales Corners Elementary School

7335 S. Hwy 100
Sacred Heart School of Theology

Milwaukee

949. 9th St
Milwaukee County Criminal Justice System

1004 N. 10th St

Milwaukee County HOC Adult Correction Center

245 W. Lincoln
Milwaukee 2nd District

4715 W. Vliet
Milwaukee 3rd District

6929 W. Silver Spring
Milwaukee 4th District

2920 N. 4th St.
Milwaukee 5th District

3006 S. 27th St.
Milwaukee 6th District

3626 W. Fond Du Lac
Milwaukee 7th District

Oak Creek

800 W. Puetz Rd
City Department of Public Works

8640 S. Horwell Ave\
City Hall

301 W Ryan Rd
Oak Creek Police Department

4801 E Elm Rd
Oak Creek Power Plant

240 E Puetz Rd
Oak Creek Fire Station 1

3950 E Oakwood Rd
Oak Creek Fire Station 2

7000 S 6th St
Oak Creek Fire Station 3

9325 S. 5th Avenue
Oak Creek Water Utility

11060 S. Chicago Road
WE Energies

Deerfield Elementary School
3871 Bluestern Drive

Oak Creek Senior High School
340 East Puetz Road

Oak Creek East Middle School
9330 South Shepard Avenue

Oak Creek West Middle School
8401 South 13th Street

Shepard Hills Elementary School

Auberry House
10320 S. Hummingbird Lane

Ivy Terrace
6606 S. Crane Drive

Mitchell Manor Oak Creek
8740 S. Oak Park Drive

Oak Crest Retirement Home
10507 S. Chicago Avenue

Oakwood Terrace
1110 W. Oakwood Road

Schmidt Memorial Home
10441 S. Nicholson Road

Shepard Avenue Group Home
8860 S. Shepard Avenue

Windsor House Oak Creek
7550 S. 13th Street

Woodcreek CBRF
8900 S. Woodcreek Drive

River Hills

7650 N. Pheasant Lane
River Hills Police

Saint Francis

4235 S. Nicholson Ave.
Saint Francis Police Department
Fire Department
City Hall

4230 South Nicholas Avenue
Emergency Operations Center (St. Francis Public Library)

2125 East Bolivar Avenue
Department of Public Works

Deer Creek Elementary School
3680 So. Kinnickinnick Avenue

St. Francis High School
4225 South Lake Drive

St. Francis Community Center
3476 E. Howard Avenue

St. Thomas More High School
2601 E. Morgan Avenue

St. Ann's Intergenerational Center
2801 E. Morgan Avenue

Willow Glen Elementary School
2600 Bolivar Avenue

Faircrest Apartments
1920 E. Tripoli

Howard Village
2500 E. Howard Avenue

Thompson Meadows
3120 E. Norwich Avenue

Canticle Courth
3109 S. Lake Drive

Juniper Court
3209 S. Lake Drike

Evacuation Routes:
Lake Drive
Howard Avenue
Layton Avenue
Bolivar Avenue
Whitnall Avenue
Nicholson Avenue
Pennsylvania Avenue
I-794

Shorewood
3801 N. Morris Rd.
City Department of Public Works

3920 N. Murray Avenue
Village Center
Health Department

3930 N. Murray Ave
Village Hall

3936 N. Murray Ave
Shorewood Police
North Shore Fire Department Station #3

1600 East Lake Bluff Blvd.
Lake Bluff Elementary School

1701 East Capitol Drive

Shorewood High School

3830 N. Morris Blvd
Shorewood Intermediate School

South Milwaukee

2425 15th Ave
City Hall
Department of Public Works
Senior Center
Police Department

2424 15th Ave
South Milwaukee Health Department
South Milwaukee Police

Fire Department
929 Marshal Ct.

Street Department
910 Marshall Ave.

City Library
1907 10th Avenue

Water Utility
100 Marshall Avenue

Wastewater Treatment Facility and related Life Stations
3003 5th Avenue

High School and Middle School
801--1001, 15th Ave.

Rawson Elementary School
1410 Rawson Ave.

Blakewood Elementary School
3501 Blakewood Ave.

E.W. Luther Elementary School
718 Hawthorne Ave.

Lakeview Elementary School
711 Marion Ave.

Devine Mercy School
695 College Ave.

Zion Lutheran School
3600 S. Chicago Ave.

Franciscan Villa Nursing Complex
3601 S. Chicago

Willow Crest Nursing Complex

3821 S. Chicago

Knights of Columbus
732 Badger Ave.

Bucyrus International
1100 Milwaukee Ave.

Cooper Power Systems
2800 9th Ave.

Everbrite
315 Marion Ave.

Appleton Electric
2105 5th Ave.

R/R Trestle
11th and Marquette Ave

Wauwatosa
7725 W. North Ave
City Hall
Health Department
Emergency Operations Center

10000 W. Bluemound Rd
Heart Hospital of Wisconsin

201 N. Mayfair Rd
St. Joseph's Outpatient Center

1465 Underwood Ave
Wauwatosa Fire Department Administration
Fire Station No. 1

4187 N. Mayfair Rd
Wauwatosa Fire Station No. 2

10525 Watertown Plank Rd
Wauwatosa Fire Station No. 3

7500 W Milwaukee Ave
Wauwatosa East High School (Red Cross Shelter)

7300 W. Blanchard St
Blanchard Street Pumping Station

108 N. Glenview Ave
Glenview Avenue Pumping Station

11000 W. Potter Rd
Potter Reservoir
Potter Road Pumping Station

2630 N. 64th St

N 64th Street Reservoir
N. 64th Street Pumping Station

11525 W. Burleigh
Burleigh Elevated Tank

12001 W. Feerick St
Feerick Elevated Tank

108 N. Glenview Ave
Glenview Elevated Tank

1502 N. Alice St
Alice Reservoir

11100 W. Walnut Rd
City Department of Public Works

9000 W. Wisconsin Ave
Children's Hospital of Wisconsin

9200 W. Wisconsin Ave
Froedtert Memorial Lutheran Hospital

8700 W. Wisconsin Ave
Milwaukee County Medical Complex

9455 Watertown Plank Rd
Milwaukee County Mental Health Complex

1200 Dewey Ave
Milwaukee Psychiatric Hospital

1700 N. 116th St.
Wauwatosa Police Administration and Station
Wauwatosa Police and Fire Dispatch Center

3535 North Mayfair Road
Currie Park Golf Club House

7600 W. North Avenue
Longfellow Middle School

2435 N. 89th Street
McKinley Elementary School

2535 N. 73rd Street
Roosevelt Elementary School

12130 W. Center Street
St. Joseph Church/ School

2166 N. 68th Street
Washington Elementary School

7500 Milwaukee Avenue

Wauwatosa East High School

2366 N. 80th Street
Wauwatosa Presbyterian Church

11400 West Center Street
Wauwatosa West High School

11100 W. Center Street
Whitman Middle School

West Allis

7525 West Greenfield
City Hall

8901 W. Lincoln Ave
West Allis Memorial Hospital

6300 W. McGeoch Ave
City Department of Public Works

11101 W. Lincoln Ave
Charter Hospital of Milwaukee

11301 W Lincoln Ave
West Allis Police Station/ 911 Call Center/ EOC

7300 W National Ave
West Allis Fire Station #1

10830 W Lapham St
West Allis Fire Station #3

7332 W National Ave
West Allis Fire Department Administration Building

3023 84th Street
Manor Park Nursing Home

5301 West Lincoln Ave.
St. Joseph's Nursing Home

150 S. 118th Street
RBP Chemical

640 South 84th Street
State Fair Park

8536 W. Lincoln Ave.
West Allis Central High School

11601 W. Lincoln Ave.
Nathan Hale High School

8400 West Beloit Road
Grace Community Church

2028 South 124 Street
Greenfield Park Pavillion

76th Street Bridge (1900 blk south) between W. National Avenue and W. Hicks

92nd Street Bridge (1900 blk south) between W Lapham and W. Rogers

Interstate - I-894 Bridge (1900 blk south) between W Maple and W. Rogers

West Milwaukee

4755 W. Beloit Rd
West Milwaukee Police

Whitefish Bay

5300 N. Marlborough Dr
Whitefish Bay Police/ Village Hall

825 East Lexington Blvd.
North Shore Fire Department Station #4

5420 N. Marlborough Drive
Library

5111 N. Lydell Avenue
DPW Yard/Storage
(Glendale)

DPW Garage (leased facility)
5055 N. Lydell Avenue
(Glendale)

6321 N. Lydell Avenue
Whitefish Bay Elevated Water Tank

1200 East Fairmount Avenue
Whitefish Bay High School

APPENDIX E

MITIGATION STRATEGIES AND PROJECT LISTS

***Milwaukee County Wisconsin
Pre-Disaster Mitigation Plan***

**PRE-DISASTER MITIGATION PLANNING
MILWAUKEE COUNTY
HAZARD MITIGATION MEASURES**

FLOODING

Prevention

- Create planning and zoning guidelines for development within the floodplain
- Create planning and zoning guidelines to preserve open space within the floodplain
- Create floodplain ordinances
- Develop stormwater management guidelines
- Perform maintenance on drainage systems

Property Protection

- Relocate residences outside floodplain
- Relocate furnaces, hot water heaters, and electrical panels from flood-prone areas
- Acquire and demolish residences in flood-prone areas
- Elevate residences above flood elevation on a new foundation
- Construct barriers and wet or dry floodproofing
- Create structural openings in foundation walls allowing floodwaters in and out, thus avoiding collapse
- Protect sewers from backing up by:
 - Installing backflow valves or plugs in drains and toilets to prevent floodwaters from entering home
 - Purchasing and installing sump pumps with back-up power
- Purchase National Flood Insurance or basement backup insurance

Natural Resource Protection

- Protect wetlands
- Employ erosion and sediment control
- Employ best management practices

Structural Projects

- Reservoirs
- Diversions
- Levees/floodwalls/seawalls
- Storm sewers
- Channel modifications, including:
 - Dredging
 - Drainage modifications

Emergency Services

- Develop flood warning system
- Establish flood response activities
 - Activate emergency operations center
 - Sandbag certain areas
 - Close streets or bridges
 - Shut off power to threatened areas
 - Release children from school
 - Order evacuation
 - Open evacuation shelters
 - Monitor water levels
 - Guard sandbag walls and other protection measures
- Protect critical facilities, including:
 - Locations vital to flood response effort
 - Locations that if flooded, would create secondary disasters
- Perform health and safety maintenance
 - Patrol evacuated areas to prevent looting
 - Provide safe drinking water
 - Vaccinate residents for tetanus
 - Clear streets
 - Clean up debris and garbage

Public Information

- Provide map information
- Create outreach projects, including:
 - Mass mailings or newsletters to all residents
 - Notices directed to floodplain residents
 - Displays in public buildings, shopping centers
 - Newspaper articles and special sections
 - Radio and TV news releases and interview shows
 - Local floodproofing video for cable TV programs or to loan to organizations
 - Detailed property owner handbook tailored for local conditions
 - Presentations at meetings of neighborhood groups
- Provide for real estate disclosure
- Provide technical assistance
- Provide environmental education
- Provide appropriate documents in library

From: Clancy Philipsborn, May 1996.

**PRE-DISASTER MITIGATION PLANNING
MILWAUKEE COUNTY
MITIGATION MEASURES**

TORNADO/WIND

- Develop strategies for managing overhead utility lines
 - Provide higher grade poles for electrical distribution
 - Provide guy wires on poles subject to failure
 - Protect traffic lights from high winds
- Analyze communication lines on power poles; if they cause unacceptable loads, remove when possible
- Support/encourage electrical utilities to use underground construction methods where possible to reduce power outages from windstorms
- Provide emergency back-up power to critical facilities; emergency generators, secondary feeds, portable generators with standard camlock connections
- Develop and implement programs to keep trees from threatening lives, property, and public infrastructure during windstorm events
 - Develop partnerships between utility providers and county & local agencies to identify potentially hazardous trees
 - Thin trees to reduce wind damages and plant species of plants that are more resistant to wind damage
 - Make sure right-of-way around power lines is free of trees or limbs that may cause damage
 - Develop strategies for clearing roads of fallen trees, and clearing debris from public and private property
- Structurally analyze all buildings or rooms identified as shelters and strengthen these as necessary
- Encourage development and enforcement of wind resistant buildings and construction codes
 - Evaluate current building codes for efficiency in protecting structures from wind damage
 - Install shutters on windows and doors or otherwise protect building openings from wind damage
 - Ensure that roof-mounted equipment is securely mounted
 - Install additional tie downs to resist wind loads
 - Reinforce existing unreinforced masonry walls with the addition of reinforced columns and bond beams
- Increase public awareness of windstorm mitigation activities
 - Map and publicize locations that have the highest incidence of extreme windstorms
 - Distribute educational materials to organizations and county residents regarding preparedness for no power situations

SEVERE WINTER STORMS

- Enhance strategies for debris management for severe winter storm events
 - Develop coordinated management strategies for de-icing roads, plowing snow, clearing roads of fallen trees, and clearing debris from public and private property
- Develop and implement programs to coordinate maintenance and mitigation activities to reduce risk to public infrastructure from severe winter storms
 - Partner with responsible agencies and organizations to design and implement programs that reduce risk to life, property, and utility systems
 - Develop partnerships between utility providers and county and local public works agencies to document known hazard areas
- Increase public awareness of severe winter storm mitigation activities
 - Collect information on public education materials for protecting life, property, and the environment from severe winter storm events
 - Distribute educational materials to county/tribal residents and public and private sector organizations regarding evacuation routes during road closures
 - Target the vulnerable populace for disseminating preparedness information
- Enhance weather monitoring to attain earlier severe winter storm warnings
- Increase public awareness of severe winter storm mitigation activities
 - Coordinate with appropriate organizations to evaluate the need for more weather stations and/or weather instrumentation

From: *Clancy Phillipsborn, May 1996 and
Clackamas County Oregon Natural Hazards Mitigation Plan, September 2002.*

**PRE-DISASTER MITIGATION PLANNING
MILWAUKEE COUNTY
MITIGATION MEASURES**

DROUGHT

➤ **Assessment Programs**

- Develop criteria or triggers for drought-related actions
- Develop early warning system/monitoring program
- Conduct inventories of data availability
- Establish new data collection networks
- Monitor vulnerable public water suppliers

➤ **Public Awareness/Education Programs**

- Organize drought information meetings for the public and media
- Implement water conservation awareness programs
- Publish and distribute pamphlets on water conservation techniques and agricultural drought management strategies
- Organize workshops on special drought-related topics
- Prepare sample ordinances on water conservation
- Establish a drought information center

➤ **Legislation/Public Policy**

- Prepare position papers for legislature on public policy issues
- Examine statutes governing water rights for possible modification during water shortages
- Pass legislation to protect instream flow
- Pass legislation providing guaranteed low-interest loans to farmers
- Impose limits on urban development

➤ **Technical Assistance**

- Provide advice on potential new sources of water
- Evaluate water quantity and quality from new sources
- Advise water suppliers on assessing vulnerability of existing supply systems
- Recommend that suppliers adopt water conservation measures

➤ **Water Supply Augmentation**

- Issue emergency permits for water use
- Provide pumps and pipes for distribution
- Propose and implement programs to rehabilitate reservoirs to operate at design capacity
- Undertake water supply vulnerability assessments
- Inventory self-supplied industrial water users for possible use of their supplies for emergency public water supplies
- Inventory and review reservoir operation plans

➤ **Emergency Response Programs**

- Establish alert procedures for water quality problems
- Stockpile pumps, pipes, water filters, and other equipment
- Establish water hauling programs for livestock
- List livestock watering locations
- Establish hay hotline
- Fund water system improvements, new systems, and new wells
- Fund drought recovery programs
- Lower well intakes on reservoirs for rural water supplies
- Extend boat ramps and docks in recreational areas
- Issue emergency irrigation permits for using state waters for irrigation
- Create low-interest loan and aid programs for agricultural sector
- Create drought property tax credit program for farmers

➤ **Demand Reduction/Water Conservation Programs**

- Establish stronger economic incentives for private investment in water conservation
- Encourage voluntary water conservation
- Improve water use and conveyance efficiencies
- Implement water metering and leak detection programs

➤ **Water Use Conflict Resolution**

- Resolve emerging water use conflict
- Negotiate with irrigators to gain voluntary restrictions on irrigation in areas where domestic wells are likely to be affected
- Clarify state law regarding sale of water
- Clarify state law on changes in water rights
- Suspend water use permits in watersheds with low water levels
- Investigate complaints of irrigation wells interfering with domestic wells

➤ **Drought Contingency Plans**

- Establish statewide contingency plan
- Recommend that water suppliers develop drought plans
- Evaluate worst-case drought scenarios for possible further actions
- Establish natural hazard mitigation council

**PRE-DISASTER MITIGATION PLANNING
MILWAUKEE COUNTY
MITIGATION MEASURES**

EARTHQUAKE

Prevention

- Develop planning and zoning guidelines to keep critical facilities away from fault line
- Develop planning/zoning ordinances and building codes for areas below steep slopes and soils subject to liquefaction
- Adopt building codes to prohibit loose masonry, overhangs,

Property Protection

- Acquire and clear high hazard areas
- Retrofit structures; add braces, remove overhangs, provide flexible utility connections and tie downs
- Structurally retrofit unreinforced masonry buildings
- Structurally retrofit roofs during re-roofing
- Replace brittle equipment in electrical substations
- Acquire earthquake insurance riders

Structural Projects

- Stabilize slopes
- Analyze/strengthen water towers
- Retrofit bridges, overpasses, and other critical transportation links
- Provide shut-off valves in distribution lines for water and gas service
- Add seismic connections such as bolting
- Add shearwalls in buildings
- Brace equipment that could block building exits or kill or injure people
- Brace parapet walls on buildings; brace or demolish outdoor shelters that pose collapse hazards
- Brace equipment (such as mechanical equipment, generators) whose failure may disrupt the operation of a critical facility such as a hospital.
- Brace equipment (such as sprinkler piping) whose failure could lead to increase building damages

Emergency Services

- Prepare earthquake response plans to account for secondary problems; fires and hazardous materials spills
- Provide emergency back-up power to critical facilities; emergency generators, secondary feeds
- Harden critical wireless emergency communication systems

Public Information

- Provide maps of vulnerable areas
- Create outreach projects on hazard mitigation measures
- Provide real estate disclosure
- Provide technical assistance on retrofitting