

Discovery Report

Milwaukee Watershed, HUC 04040003

Village of Adell, Village of Bayside, City of Brookfield, Village of Brown Deer, Village of Butler, Village of Campbellsport, Village of Cascade, City of Cedarburg, City of Cudahy, Village of Elm Grove, Village of Fox Point, Village of Fredonia, Village of Germantown, City of Glendale, Village of Grafton, Village of Greendale, City of Greenfield, Village of Jackson, Village of Kewaskum, Village of Lomira, Village of Menomonee Falls, City of Mequon, City of Milwaukee, City of New Berlin, Village of Newburg, City of Port Washington, Village of Random Lake, Village of Richfield, Village of River Hills, Village of Saukville, Village of Shorewood, Village of Slinger City of St. Francis, Village of Thiensville, City of Wauwatosa, City of West Allis, City of West Bend, Village of West Milwaukee, Village of Whitefish Bay, Dodge County, Fond du Lac County, Milwaukee County, Sheboygan County, Ozaukee County, Washington County, Waukesha County, WI

05/16/2013

06/12/2014 Updated with Action Discovery Results



FEMA

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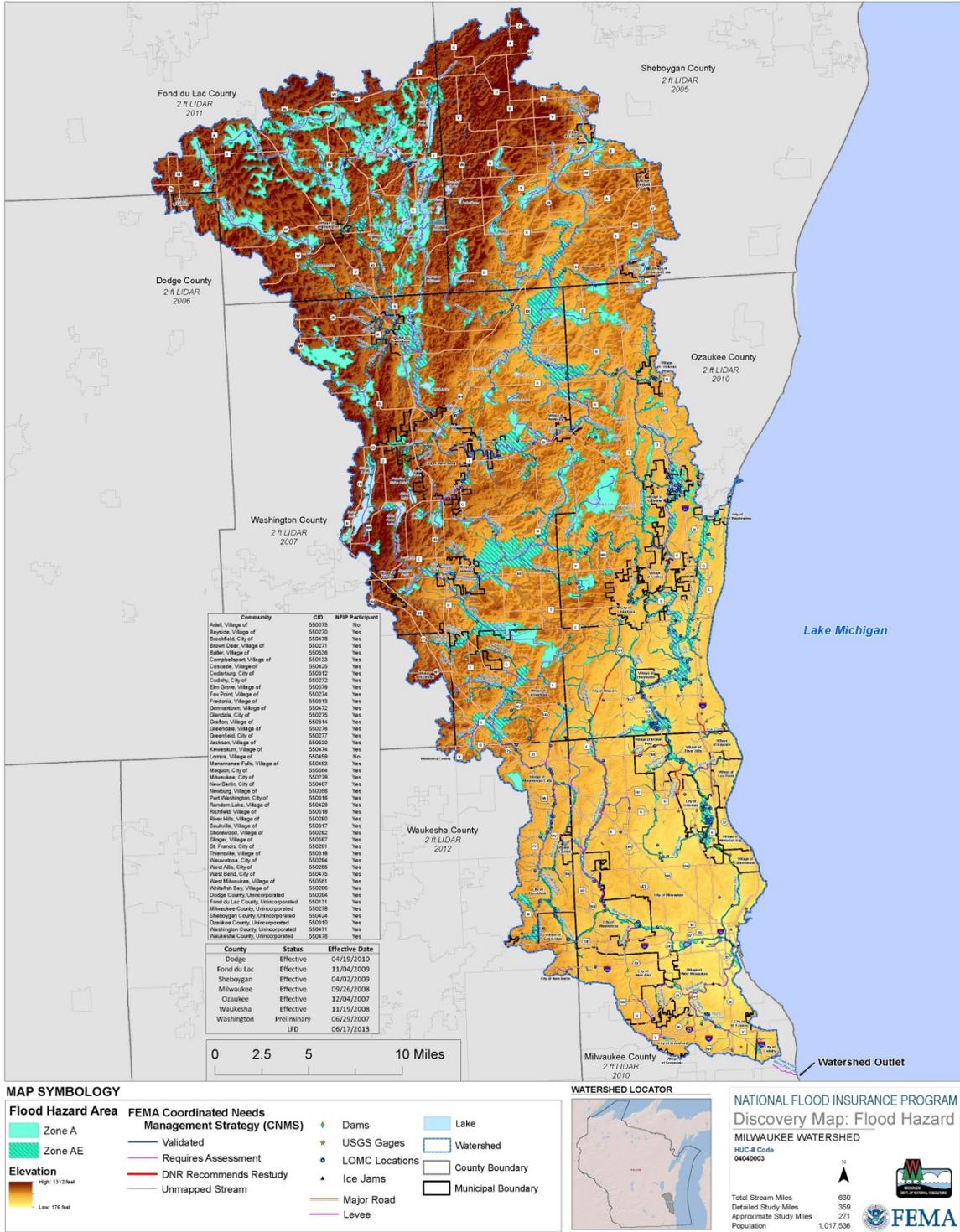
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I. Introduction

The Milwaukee River Watershed, HUC 04040003, is located in southeastern Wisconsin and covers portions of Dodge, Fond du Lac, Milwaukee, Sheboygan, Ozaukee, Washington and Waukesha counties. The Milwaukee River Basin drains over 879 square miles into Lake Michigan through the South Branch Wilson Park Creek watershed outlet. Major streams which comprise the Milwaukee Watershed include Cedar Creek, Menominee River, Kinnickinnic River, East Branch Milwaukee River, North Branch Milwaukee River and Milwaukee River. The watershed also has 35 miles of Lake Michigan shoreline and over 60 named lakes.

The Milwaukee River originates in southeastern Fond du Lac County and flows southeasterly through such cities as West Bend, Mequon, Glendale and Milwaukee. The watershed has a population of just over one million people, with the southern third of the watershed being the most densely populated.

Figure 1. Milwaukee Watershed Overview



There are 39 communities that lie either entirely or partially within the Milwaukee Watershed in Wisconsin and are listed with their populations from the US Census Bureau in Table 1 (U.S. Census Bureau, 2010).

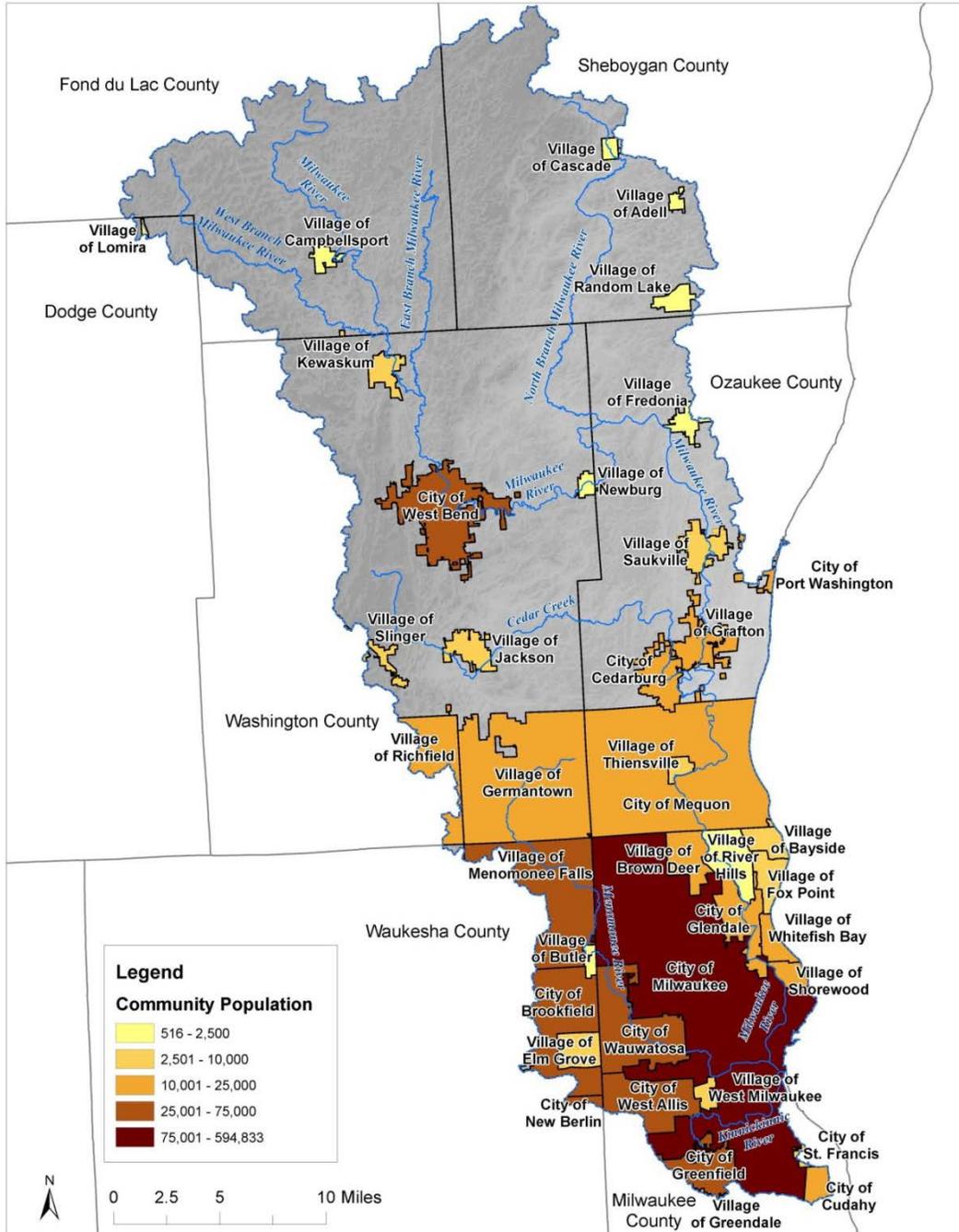
Table 1. NFIP Participation Status and Population

County	Name	Population (2010)	NFIP Participation
Dodge	Dodge County	88,759	Y
Dodge/Fond du Lac	Lomira (Village)	2,430	N
Fond du Lac	Campbellsport (Village)	2,016	Y
	Fond du Lac County	101,633	Y
Fond du Lac/Washington	Kewaskum (Village)	4,004	Y
Milwaukee	Brown Deer (Village)	11,999	Y
	Cudahy (City)	18,267	Y
	Fox Point (Village)	6,701	Y
	Glendale (City)	12,872	Y
	Greendale (Village)	14,046	Y
	Greenfield (City)	36,720	Y
	Milwaukee County	947,735	Y
	River Hills (Village)	1,597	Y
	Shorewood (Village)	13,162	Y
	St. Francis (City)	9,365	Y
	Wauwatosa (City)	46,396	Y
	West Allis (City)	60,411	Y
	West Milwaukee (Village)	4,206	Y
	Whitefish Bay (Village)	14,110	Y
Milwaukee/Ozaukee	Bayside (Village)	4,389	Y
Ozaukee	Cedarburg (City)	11,412	Y
	Fredonia (Village)	2,160	Y
	Grafton (Village)	11,459	Y
	Mequon (City)	23,132	Y
	Ozaukee County	86,395	Y
	Port Washington (City)	11,250	Y
	Saukville (Village)	4,451	Y

	Thiensville (Village)	3,235	Y
Milwaukee/Washington/Waukesha	Milwaukee (City)	594,833	Y
Sheboygan	Adell (Village)	516	N
	Cascade (Village)	709	Y
	Random Lake (Village)	1,594	Y
	Sheboygan County	115,507	Y
Ozaukee/Washington	Newburg (Village)	1,254	Y
Washington	Germantown (Village)	19,749	Y
	Jackson (Village)	6,753	Y
	Richfield (Village)	11,300	Y
	Slinger (Village)	5,068	Y
	Washington County	131,887	Y
	West Bend (City)	31,078	Y
Waukesha	Brookfield (City)	37,920	Y
	Butler (Village)	1,841	Y
	Elm Grove (Village)	5,934	Y
	Menomonee Falls (Village)	35,626	Y
	New Berlin (City)	39,584	Y
	Waukesha County	389,891	Y

Demographics

Figure 2. Milwaukee Watershed Community Populations, 2010 US Census



II. Watershed Stakeholder Coordination

A. Discovery Meeting Details

The Discovery phase included an investigation of existing terrain, flood hazard data, and flood risk data for development of an initial Discovery map, and detailed data collection to refine the Discovery map which was prepared by the Wisconsin Department of Natural Resources (WDNR). Watershed coordination meetings with community, state, and federal officials were held May 16, 2013, to share information concerning the watershed and its stakeholders.

The Milwaukee Watershed Stakeholder Coordination phase of Discovery was initiated through e-mail contact two months prior to the Discovery Meeting. A contacts database was developed from municipality's websites and the League of Wisconsin Municipalities Directory of City and Village Officials. After e-mail confirmation, this contacts database became the basis for the Discovery meeting invitation list.

Approximately four weeks prior to the meetings, WDNR mailed letters to all invited stakeholders providing a background of the Risk MAP program and an invitation to attend; a brief follow-up email was sent to all invitees. Stakeholders include the CEO of each community as well as the Zoning Administrator, Director of Public Works, City Engineers, County LIO and County Emergency Management and other key organizations such as Southeastern Wisconsin Regional Planning Commission (SEWRPC), Natural Resources Conservation Service (NRCS), U. S. Army Corps of Engineers (USACE) and the Flood Hazard Mitigation Team members. An example of the invitation is available in *Appendix B*.

The Discovery Meetings were hosted by the WDNR and were held at the following places, dates, and times:

Thursday, May 16, 2013, 10:00 AM
Radisson North Shore, Rm Venice I
7065 N. Port Washington Road
Glendale, WI

AND

Thursday, May 16, 2013, 3:00 PM
Public Agency Center, Rm 3224
333 East Washington Street
West Bend, WI

A total of 47 community stakeholders attended the meeting (see *Appendix C*). Each Discovery meeting lasted approximately 1.5 hours in length and consisted of introductions of the WDNR and Wisconsin Emergency Management staff. The list of DNR contacts for this watershed project can be found under *Appendix C*.

Presentations were given describing Risk MAP program goals and objectives, the Discovery meeting goals and objectives, the timeline moving forward, flood risk assessment products, and hazard mitigation projects, plans, grants and opportunities.

For the break-out session, stakeholders were invited to complete comment forms that included their contact information and any recommended areas for mitigation or other comments. Multiple Discovery Maps were available for attendees to also write on so the exact location of comments could be pinpointed. The comment forms submitted by meeting attendees can be found in *Appendix F*.

Communities were instructed to provide comments regarding the following:

- Flood mitigation projects completed or planned
- Technical data or studies that the community needs to help with mitigation projects.
- Inaccurate floodplain boundaries;
- Stream reaches where the effective study does not show existing conditions;
- Areas of development or new development in planning that could impact the watershed;
- Areas of frequent flooding, especially road closures/overtopped roads;
- Locations of new bridges, culverts, channel realignments;
- Streams where more detailed study data is needed; and
- Locations of observed ice jams.

An additional comment period was made available for stakeholders unable to attend a meeting and those comments were accepted until June 5, 2013, although some later comments were still incorporated. The presentations, maps and comment forms can be found on the WDNR website at <http://dnr.wi.gov/topic/floodplains/riskmap.html>.

Attendees at the Discovery Meetings submitted 58 comments concerning the Milwaukee Watershed, with another 29 comments provided afterwards during the two-week comment period. In addition, SEWRPC provided their projects list with of all the streams they have plans to study or have already studied.

After the meetings, a proposed scope of work was developed and the Discovery Maps were edited to include the location of community comments. Feature classes were created from the community-supplied comments. The maps along with comment descriptions were posted on the WDNR website. Communities were given additional time to weigh in on the proposed scope of work. WDNR then considered any additional comments according to the ranking method and stream reaches were then confirmed for the final scope of work.

B. Action Discovery Meeting Details

Eight months after the initial Discovery meetings, additional meetings for Action Discovery were initiated to further explore the results of the initial Discovery meetings with select communities within the Milwaukee Watershed. The main purpose for these follow-up Action Discovery Meetings was to make sure communities had identified all areas of mitigation interest and to discuss in detail how RiskMAP products, both regulatory and non-regulatory, can help

communities in their efforts to mitigate flooding and therefore limit loss of life and property. This focus on potential mitigation activities makes sense as the cost of creation of risk map products will be offset by the reduced cost of flooding damage over the long term. All Action Discovery meetings were run in accordance with FEMA's Guidelines and Specifications found in Appendix I and OG-4-11: Risk MAP Meetings Guidance.

The communities selected for Action Discovery, or Re-Discovery as it was used locally, were determined through analysis of the Community Action Potential Index (CAPI) scores. The CAPI scores are used as a tool to determine which communities have the highest risk of flood damage by looking at both quantitative and qualitative data. Some of the categories include what percent of the community is in the Special Flood Hazard Area (SFHA), how much money has been spent on Insurance claims, how many repetitive loss structures are present and what is the monetary assistance per person that FEMA pays out.

The CAPI scores were used to rank communities as Tier I, II or III, which in turn determined how we would re-engage certain communities within the watershed for Action Discovery. Tier I communities required an individual, one-on-one meeting whereas Tier II communities were met with in smaller groups. The top 5% of the total number of communities in the Milwaukee Watershed were selected using their CAPI scores as Tier I communities. Since there are 44 incorporated communities in the Milwaukee Watershed, this means the communities with the two highest CAPI scores were given a Tier I designation.

Considering Milwaukee is the most densely populated city in our state combined with significant miles of SFHA, the City of Milwaukee has the highest CAPI score of 91.10 (out of 100) of any community in Wisconsin. The community with the second highest CAPI score in the Milwaukee Watershed is the City of Brookfield, with a score of 64.86. These significantly high scores indicate these cities have a very high risk of flood damage and that action now through the RiskMAP process should be taken to help mitigate this risk.

The Tier II communities are the next 30% of communities, which resulted in 13 additional communities chosen for Action Discovery group meetings. The Tier II communities identified in the Milwaukee Watershed are: the Cities of New Berlin, Glendale, Mequon, Wauwatosa and West Bend, the Villages of Thiensville, Menomonee Falls, Elm Grove, Kewaskum and Newburg and the Counties of Waukesha, Ozaukee and Washington. The remaining 65% of communities were designated Tier III and are kept informed through our state's floodplain newsletter and website.

The Wisconsin DNR (WDNR) held a total of five Action Discovery meetings over the course of two different days, which allowed for at least one person from each Tier I and II community to attend a meeting. Scanned copies of the sign in sheets are located in *Appendix I*. Since most of these communities already attended the Discovery Meeting held within the past year, the WDNR wanted to avoid meeting fatigue and make it as easy as possible for them to attend the Action Discovery meetings so the WDNR hosted the meetings at the community's offices. Just like the initial Discovery Meetings and given the strong emphasis on mitigation potential, the WDNR teamed up with Wisconsin Emergency Management (WEM) again to host the Action Discovery Meetings.

Individual meetings were held with the Cities of Milwaukee and Brookfield and New Berlin. Even though the City of New Berlin is a Tier II community for this watershed, they rank as a Tier I community in an adjacent watershed. To prevent meeting fatigue the Action Discovery meetings for both watersheds were held concurrently. Below is a list of Tier I and II Action Discovery Meeting dates, times and locations.

Table 2. Action Discovery Meeting Details

Tier	Description	Date	Time	Location	Room
I	One-on-one	February 11, 2014	10am	Milwaukee City Hall 200 East Wells Street	Room 605
I	One-on-one	February 11, 2014	1pm	Brookfield City Hall 2000 North Calhoun Road	North Conference Room
II	Small Group	February 11, 2014	3pm	Menomonee Falls Village Hall W156 N8480 Pilgrim Road	Board Room (Rm 2245)
II	One-on-one	February 18, 2014	1pm	New Berlin City Hall 3805 South Casper Drive	Panther Conference Room
II	Small Group	February 18, 2014	3pm	New Berlin Public Library 15105 Library Lane	Community Meeting Room

The well-maintained database of community contacts from the initial Discovery Meetings was used to invite Tier I and II local officials, including Emergency Management Officers when applicable. For an example of one of the Action Discovery invitations, please see *Appendix H*.

It should be noted that several communities were confused why they were again being asked for Discovery-related information and inquired when survey work and subsequent updated maps would be produced. The WDNR reiterated that the goal of the Action Discovery meetings was to assure there was a good understanding of how RiskMAP can be applied to help communities mitigate flood risk. Therefore, the WDNR did receive a lot of feedback from the communities asking us to keep their initial Discovery comments in mind while determining which streams should be studied or restudied.

The Action Discovery meetings allowed for an excellent opportunity to engage the communities about risk and discuss mitigation opportunities in more detail. Every community was open to mitigation ideas and all wanted to know one thing – how they could fund the mitigation proposals they have already identified. Roxanne Gray, the State Hazard Mitigation Officer with WEM was able to explain different grant processes while being up-front about the fact that there is very limited funding for mitigation grant dollars right now to help these communities. Therefore, RiskMAP offers a great opportunity for these communities to be able to prioritize their mitigation projects. With the different Non-Regulatory Flood Risk Products, communities will be able to use different types of analysis such as HAZUS, Changes Since Last FIRM (CSLF) and depth grids to prioritize mitigation activities based on highest risk and highest potential damage. Since the Non-Regulatory Products can cover the entire watershed area, the results can be used by all 46

communities, creating very cost-effective mitigation tools for this densely populated area of the state.

Along with holding meetings with Tier I and II communities, the WDNR also continued to communicate with the Southeastern Wisconsin Regional Planning Commission (SEWRPC) and the Milwaukee Metropolitan Sewerage District (MMSD). Both SEWRPC and MMSD are regional agencies that are very active with communities in the Milwaukee River watershed. SEWRPC covers the four most densely populated counties in the Milwaukee Watershed (Milwaukee, Ozaukee, Washington and Waukesha) and plays a major role helping communities analyze flood risk and identify potential mitigation activities. MMSD has funded numerous structural and non-structural flood control measures throughout the Greater Milwaukee Area as part of their flood management services for 1.1 million customers. Therefore, the collaborative history among these two agencies and the WDNR was maintained throughout the Action Discovery process by email and one-on-one phone calls. Both agencies provided flood risk and mitigation information during the initial Discovery process and were notified of the initial Discovery report posted online by the DNR. Additionally, a separate meeting between SEWRPC and the WDNR was held after the initial Discovery meeting to discuss further how the two agencies can help each other by using modeling information by SEWRPC as potential leverage. This meeting was held at the SEWRPC Headquarters in Waukesha on June 27, 2013. For further information and analysis about community and agency engagement, please see the *Updates to Data* in Section IV.

IV. Mitigation Potential

A. Past Mitigation Highlights

The Milwaukee Watershed has great potential for mitigation, due not only to its large population and numerous streams, but also thanks to highly motivated organizations and government agencies such as SEWRPC and MMSD. Communities large and small throughout the watershed expressed to the WDNR a strong desire to get floodplain maps that more accurately reflect risk in order to help them prioritize mitigation. These communities in the Milwaukee River Watershed have been on the forefront of mitigation, placing an emphasis on mitigation for over two decades. They identified several recent mitigation activities and additional areas of potential mitigation interest during the Action Discovery meetings.

The City of Milwaukee, a Tier I community, identified a regional storm water detention project MMSD constructed at the County Grounds that reduced flooding of several properties adjacent to Underwood Creek. This project cost \$90 million with the flood water basin covering 65 acres. MMSD also removed concrete from Lincoln Creek to help reduce flooding. The City of Brookfield, the other Tier I community, stated that they have been very proactive in mitigation, from flood-proofing two properties along Honey Creek for \$197,000 to a number of home buyouts. Brookfield, like many other communities, has more homes remaining they would like to mitigate through buyout.

The City of Mequon, a Tier II community related the restoration and mitigation work they did along Trinity Creek, which has multiple LOMRs. Ozaukee County has applied for a municipal flood control grant to fund acquisition and demo of 1 property on Edgewater Drive.. Ozaukee County also recently updated their Hazard Mitigation Plan in 2014. Another Tier II community in this watershed that has been and will continue to be proactive with mitigation is the Village of Menomonee Falls. They dredged a dam’s millpond, replaced the gate structures and resealed the dam, resulting in a reduction in flooding of riparian properties. Stream bank restoration was also done along Lily Creek to help mitigate flooding.

The City of New Berlin identified a potential migration project to replace undersized culverts and mitigate a road overtopping along the South Branch of Underwood Creek. This community has been proactive in mitigation by purchasing property for \$160,000 in a previously flooded area and creating a safe green space as the Greenfield Park, a golf course. Another example of previous mitigation occurs in the City of Glendale where three properties were acquired and removed in a high flood risk area on Sunny Point Lane. Glendale is exploring further acquisition and demolition of high risk properties in this area.

There are several more examples of mitigation already occurring in this proactive watershed. For a complete list of past mitigation grants awarded for communities in the Milwaukee Watershed, please see Appendix J.

At the Discovery meetings, communities were asked to identify locations where mitigation projects could reduce the impacts of flooding and note it on the comment form and maps. Topics of mitigation interest included areas of mitigation success, areas in need of mitigation action to reduce flooding, overtopped roads during flood events, significant riverine erosion and at-risk essential facilities. Table 3 reflects the comments provided by the stakeholders during the initial Discovery meeting.

Table 3. Mitigation Projects ID’d during Initial Discovery

Reporting Community	Subject(s)	Project	Stream Name	Comment Number
Village of Bayside	Area in Need of Mitigation Action to Reduce Flooding; Significant Riverine Erosion	Several homes face potential loss of structure. Already experiencing loss of property.	Fish Creek and Trib; Indian Creek	3 - W
Village of Elm Grove	Areas of Mitigation Success		Dousman Ditch; Underwood Creek	8 - AA

Village of Fox Point	Area in Need of Mitigation Action to Reduce Flooding; Overtopped Road During Flood Events	The Village has significant ravines that are susceptible to high flows, erosion and overtopping of the roads.	Indian Creek	via e-mail (NA)
City of Glendale	Areas of Mitigation Success; Area in Need of Mitigation Action to Reduce Flooding	Sunny Point area includes unregulated dam areas of mitigation work (acquisition). Possible storm water improvements.	Milwaukee River	29 - Y
City of Glendale	Area in Need of Mitigation Action to Reduce Flooding; Overtopped Road During Flood Events	Lincoln Creek restoration work. Roadway overtopping during 2010 floods due to over-banking of Lincoln Creek.	Lincoln Creek	29 - Y
City of Greenfield	Areas of Mitigation Success	City stormsewer and street project has reduced/eliminated flood damage in S 43rd St and W Anthony Dr area.	Honey Creek	7B
City of Greenfield	Area in Need of Mitigation Action to Reduce Flooding; Levee or Dam; Significant Riverine Erosion	The City has recently dredged the Pondview Park Storm Water Basin and has addressed some areas of erosion upstream.	Honey Creek	7C
City of Mequon	Area in Need of Mitigation Action to Reduce Flooding; Overtopped Road During Flood Events	Eleven areas of concern reported.	Milwaukee River and Tribs; Ulao Creek	via e-mail (NA)
Town of Saukville	At-Risk Essential Facilities; Area in Need of Mitigation Action to Reduce Flooding	River corridors/tribs have filled in or eroded causing flooding for residents. Road and culvert washouts.	Indian Creek and Tribs; Brown Deer Park Creek; Trib to Milwaukee River; Fish Creek and Tribs	5 - X
City of West Allis	Area in Need of Mitigation Action to Reduce Flooding	Four areas of significant property damage reported.	Honey Creek	1 - U

Village of West Milwaukee	Area in Need of Mitigation Action to Reduce Flooding; Overtopping Road During Flood Events	Miller Park Way and north of W. Lincoln Ave.	43rd Street Ditch Trib; Kinnickinnic River	via e-mail (NA)
Ozaukee County	Area in Need of Mitigation Action to Reduce Flooding; At-Risk Essential Facilities	Edgewater Drive - recommended for County Park	Milwaukee River	53 - M
Ozaukee County	Area in Need of Mitigation Action to Reduce Flooding; At-Risk Essential Facilities	Rolling Glen Subdivision	Mud Lake Creek	53 - M

B. Mitigation Potential With RiskMAP

At the Action Discovery meetings, Tier I and II communities were asked to identify locations where mitigation projects could reduce the impacts of flooding. Prior to the meetings, the DNR worked closely with the Roxanne Gray, the State Hazard Mitigation Officer at Wisconsin Emergency Management (WEM), to data mine information previously identified by the communities in their Hazard Mitigation Plans (HMPs). The data from the HMPs were also presented to the communities at the meetings and used to facilitate potential mitigation discussion.

In total, fifteen communities from the Milwaukee Watershed joined participated in the Action Discovery meetings and expressed their strong desire to get updated maps, which would in turn help them mitigate flooding in the communities. Flooding is a real concern in this highly urbanized part of the state.

Potential areas of mitigation concern identified by communities participating in the Action Discovery process are listed in Table 4. They included but were not limited to areas in need of mitigation action to reduce flooding, overtopped roads during flood events, significant riverine erosion and at-risk essential facilities. Table 5 reflects additional data gathered from Tier III communities during the initial Discovery meetings which still remain relevant. The far left column in both tables lists which RiskMAP products will assist in making mitigation decisions for each identified area of concern. The products and how they will help in mitigation decisions are more fully described in Section C.

Table 4: Mitigation and RiskMAP Potential – Tier I and II Communities

Reporting Community	Mitigation Concern(s)	Comments	Stream Name	RiskMAP Product Assistance
Milwaukee, City of (Tier I)	Overtopped Road During Flood Event	Still concern about this area since death occurred there in 2010. HMP lists many repetitive loss structures in area.	Lincoln Creek	AOMI, Flood Depth & Analysis Grids, Flood Risk Report & Database; Flood Risk & Resilience Meetings
Milwaukee, City of (Tier I)	Overtopped Road During Flood Event	Center St. by Mt. Mary College	Menomonee River	AOMI, Flood Depth & Analysis Grids, Flood Risk Report & Database; Flood Risk & Resilience Meetings
Brookfield, City of (Tier I)	Overtopped Road During Flood Event; Effective Study No Longer Reflects Existing Conditions	Pilgrim Road. Could increase flood storage as way to mitigate. HMP lists repetitive loss structures in area.	Dousman Ditch	AOMI, CSLF, DFIRMs & FIS, Flood Depth & Analysis Grids, Flood Risk Report & Database, HAZUS Analysis; Flood Risk & Resilience Meetings
New Berlin, City of (Tier II)	Overtopped Road During Flood Event	2008 floods - 7 locations of road flooding. 7 locations of home flooding.	South Branch Underwood Creek	AOMI, Flood Depth & Analysis Grids, HAZUS Analysis; Flood Risk & Resilience Meetings
Glendale, City of (Tier II)	Area in Need of Mitigation Action to Reduce Flooding	Sunny Point area includes unregulated dam areas of mitigation work (acquisition).	Milwaukee River	AOMI, Flood Depth & Analysis Grids, HAZUS Analysis; Flood Risk & Resilience Meetings
Glendale, City of (Tier II)	Area in Need of Mitigation Action to Reduce Flooding; Overtopped Road During Flood Events	Lincoln Creek restoration work. Roadway overtopping during 2010 floods due to over-banking of Lincoln Creek.	Lincoln Creek	AOMI, Flood Depth & Analysis Grids; Flood Risk & Resilience Meetings
Glendale, City of (Tier II)	Area with Clusters of LOMCs; Effective Study No Longer Reflects Existing Conditions	The City stated it has over 430 potential mitigation projects...all residential properties and thought to be mapped incorrectly. Use of newer topo data would improve maps and clarify areas of true mitigation needed.	Milwaukee River	AOMI, CSLF, Flood Depth & Analysis Grids, DFIRMs & FIS, HAZUS Analysis; Flood Risk & Resilience Meetings

Reporting Community	Mitigation Concern(s)	Comments	Stream Name	RiskMAP Product Assistance
Glendale, City of (Tier II)	Dam; Effective Study No Longer Reflects Existing Conditions	Community very concerned the Estabrook Dam attenuates flow of water and causes flooding due to outflow restriction.	Milwaukee River	CSLF, Flood Depth & Analysis Grids, DFIRMs & FIS; Flood Risk & Resilience Meetings
Mequon, City of (Tier II)	Area in Need of Mitigation Action to Reduce Flooding; Overtopped Road During Flood Events	Eleven areas of concern reported.	Milwaukee River and Tribs; Ulao Creek	AOMI, Flood Depth & Analysis Grids, HAZUS Analysis; Flood Risk & Resilience Meetings
Mequon, City of (Tier II)	Effective Study No Longer Reflects Existing Conditions	Currently a Zone A but would like a Zone AE.	Little Menomonee Creek	CSLF, DFIRMs & FIS; Flood Risk & Resilience Meetings
Mequon, City of (Tier II)	Effective Study No Longer Reflects Existing Conditions	Elevation should be reduced due to mitigation work done.	Pigeon Creek	CSLF, Flood Depth & Analysis Grids, DFIRMs & FIS; Flood Risk & Resilience Meetings
Thiensville, Village of (Tier II)	Effective Study No Longer Reflects Existing Conditions	Floodway line drawn through 10 downtown buildings. Restricts commercial health of area.	Milwaukee River and Pigeon Creek	CSLF, Flood Depth & Analysis Grids, DFIRMs & FIS, HAZUS Analysis; Flood Risk & Resilience Meetings
Thiensville, Village of (Tier II)	Effective Study No Longer Reflects Existing Conditions	Outdated topo data has at least 4 structures erroneously in the floodplain, including the Village Hall.	Milwaukee River	CSLF, Flood Depth & Analysis Grids, DFIRMs & FIS, HAZUS Analysis; Flood Risk & Resilience Meetings
Thiensville, Village of (Tier II)	Effective Study No Longer Reflects Existing Conditions	Over 50 acre-feet of new storage available by the Village could reduce peak flows in the watershed.	Milwaukee River	CSLF, Flood Depth & Analysis Grids, DFIRMs & FIS, HAZUS Analysis; Flood Risk & Resilience Meetings
Menomonee Falls, Village of (Tier II)	Overtopped Road During Flood Events	Affects access to homes	Nor-Way-X channel	AOMI, Flood Depth & Analysis Grids; Flood Risk & Resilience Meetings
Menomonee Falls, Village of (Tier II)	Overtopped Road During Flood Events	Affects Industrial Area	Lilly Creek	AOMI, Flood Depth & Analysis Grids, HAZUS Analysis; Flood Risk & Resilience Meetings

Reporting Community	Mitigation Concern(s)	Comments	Stream Name	RiskMAP Product Assistance
Menomonee Falls, Village of (Tier II)	Effective Study No Longer Reflects Existing Conditions ; Significant Riverine Erosion	HMP suggests shoreline stabilization projects to mitigate further erosion and reduce flooding.	Menomonee River	AOMI, CSLF, Flood Depth & Analysis Grids, DFIRMs & FIS, HAZUS Analysis; Flood Risk & Resilience Meetings
Elm Grove, Village of (Tier II)	Effective Study No Longer Reflects Existing Conditions; Overtopped Road During Flood Events	Pilgrim Road (along border with City of Brookfield). Problematic for public safety	Dousman Ditch	AOMI, CSLF, Flood Depth & Analysis Grids, DFIRMs & FIS, HAZUS Analysis; Flood Risk & Resilience Meetings
Elm Grove, Village of (Tier II)	Effective Study No Longer Reflects Existing Conditions	HMP states there are 2 repetitive loss properties.	Underwood Creek	AOMI, Flood Depth & Analysis Grids, HAZUS Analysis; Flood Risk & Resilience Meetings
Wauwatosa, City of (Tier II)	Effective Study No Longer Reflects Existing Conditions	Potential Leverage by SWRPC	Honey, Grantosa and Underwood Creeks; Menomonee River	CSLF, DFIRMs & FIS; Flood Risk & Resilience Meetings
Ozaukee County (Tier II)	Area in Need of Mitigation Action to Reduce Flooding; At-Risk Essential Facilities	Edgewater Drive - recommended for County Park	Milwaukee River	AOMI, Flood Depth & Analysis Grids, HAZUS Analysis; Flood Risk & Resilience Meetings
Ozaukee County (Tier II)	Area in Need of Mitigation Action to Reduce Flooding; At-Risk Essential Facilities	Rolling Glen Subdivision	Mud Lake Creek	AOMI, Flood Depth & Analysis Grids, HAZUS Analysis; Flood Risk & Resilience Meetings
Ozaukee County (Tier II)	Effective Study No Longer Reflects Existing Conditions; Dam	Lime Kiln Dam removed. Working with WEM on a municipal flood control grant for the acquisition and demo of 1 property along Edgewater Drive.	Milwaukee River	CSLF, Flood Depth & Analysis Grids, DFIRMs & FIS, HAZUS Analysis; Flood Risk & Resilience Meetings

Reporting Community	Mitigation Concern(s)	Comments	Stream Name	RiskMAP Product Assistance
Ozaukee County (Town of Saukville)	At-Risk Essential Facilities; Area in Need of Mitigation Action to Reduce Flooding	River corridors/tribs have filled in or erroded causing flooding for residents. Road and culvert washouts.	Indian Creek and Tribs; Brown Deer Park Creek; Trib to Milwaukee River; Fish Creek & Tribs	AOMI, CSLF, Flood Depth & Analysis Grids, DFIRMs & FIS, HAZUS Analysis; Flood Risk & Resilience Meetings
Ozaukee County (Tier II)	Area with Clusters of LOMCs; Effective Study No Longer Reflects Existing Conditions	Outdated topo data.	Cedarburg Creek and Trib.	CSLF, Flood Depth & Analysis Grids, DFIRMs & FIS, HAZUS Analysis; Flood Risk & Resilience Meetings
Washington County (Tier II)	Effective Study No Longer Reflects Existing Conditions	Needs an HMP	Multiple streams for potential leverage	CSLF, Flood Depth & Analysis Grids, DFIRMs & FIS, HAZUS Analysis; Flood Risk & Resilience Meetings
West Bend, City of (Tier II)	Effective Study No Longer Reflects Existing Conditions; Dam	Young American Dam removed.	Milwaukee River	CSLF, Flood Depth & Analysis Grids, DFIRMs & FIS, HAZUS Analysis; Flood Risk & Resilience Meetings
West Bend, City of (Tier II)	Effective Study No Longer Reflects Existing Conditions	Potential growth on east side of City. Current maps could affect economic development. Needs a County HMP.	Milwaukee River & Tribs	AOMI, CSLF, Flood Depth & Analysis Grids, DFIRMs & FIS, HAZUS Analysis; Flood Risk & Resilience Meetings
Kewaskum, Village of (Tier II)	Effective Study No Longer Reflects Existing Conditions; Area with Clusters of LOMCs	Outdated topo data and needs a County HMP.	Kewaskum & North Creeks, and Tribs	AOMI, CSLF, Flood Depth & Analysis Grids, DFIRMs & FIS, HAZUS Analysis; Flood Risk & Resilience Meetings
Newburg, Village of (Tier II)	Effective Study No Longer Reflects Existing Conditions	CTH Y reconstructed but study doesn't reflect those changes.	Milwaukee River	CSLF, Flood Depth & Analysis Grids, DFIRMs & FIS; Flood Risk & Resilience Meetings

Reporting Community	Subject(s)	Project	Stream Name	RiskMAP Assistance
Southwest Regional Planning Commission (SWRPC) Tiers I & II	Area in Need of Mitigation Action to Reduce Flooding; Effective Study No Longer Reflects Existing Conditions	This highly involved Planning Commission has multiple mitigation projects currently active in the Milwaukee Watershed.	Multiple streams for potential leverage	AOMI, CSLF, Flood Depth & Analysis Grids, DFIRMs & FIS, HAZUS Analysis; Flood Risk & Resilience Meetings

Table 5: Mitigation and RiskMAP Potential – Tier III Communities

Reporting Community	Subject(s)	Project	Stream Name	RiskMAP Assistance
Bayside, Village of	Area in Need of Mitigation Action to Reduce Flooding; Significant Riverine Erosion	Several homes face potential loss of structure. Already experiencing loss of property.	Fish Creek and Trib; Indian Creek	AOMI, Flood Depth & Analysis Grids, HAZUS Analysis; Flood Risk & Resilience Meetings
Fox Point, Village of	Area in Need of Mitigation Action to Reduce Flooding; Overtopped Road During Flood Events	The Village has significant ravines that are susceptible to high flows, erosion and overtopping of the roads.	Indian Creek	AOMI, Flood Depth & Analysis Grids, HAZUS Analysis; Flood Risk & Resilience Meetings
Greenfield, City of	Area in Need of Mitigation Action to Reduce Flooding; Levee or Dam; Significant Riverine Erosion	The City has recently dredged the Pond View Park Storm Water Basin and has addressed some areas of erosion upstream.	Honey Creek	AOMI, CSLF, Flood Depth & Analysis Grids, DFIRMs & FIS; Flood Risk & Resilience Meetings
West Allis, City of	Area in Need of Mitigation Action to Reduce Flooding	Four areas of significant property damage reported.	Honey Creek	AOMI, Flood Depth & Analysis Grids, HAZUS Analysis; Flood Risk & Resilience Meetings
West Milwaukee, Village of	Area in Need of Mitigation Action to Reduce Flooding; Overtopping Road During Flood Events	Miller Park Way and north of W. Lincoln Ave.	43rd Street Ditch Trib; Kinnickinnic River	AOMI, Flood Depth & Analysis Grids, HAZUS Analysis; Flood Risk & Resilience Meetings

C. Direct Application of RiskMAP Products for Mitigation

The RiskMAP process can provide communities in the Milwaukee River watershed information that will be very valuable as they make future mitigation decisions. This section provides a listing of how each RiskMAP product would be valuable to mitigation decisions and action. Under each product is an identification of the potential mitigation activities identified during the Discovery process where this information would be useful and the communities and study reaches with these types of projects.

Areas of Mitigation Interest (AOMI)

- Easy to use data points illustrate where mitigation potential still exists for a community.
- Easily allows the ability to share this critical information with other agencies such as WEM.
- A community can track its progress of mitigation projects completed, which also allows for easy updates to the Mitigation Tracker.
- Uniform way of presenting data.
- Could show all communities in the watershed what their mitigation ideas are and therefore provide information to their neighboring communities and work together on some projects.

Table 6: AOMI Benefits to Community

AOMI Benefits to Community	Mitigation Concern	Reporting Community
These communities can easily pull up and keep track of road overtoppings during flooding events and quickly share with their constituents through such means as an interactive map on their community website.	Overtopped Road During Flood Event	Cities of Brookfield, Mequon, Milwaukee and New Berlin; Counties of Ozaukee and Washington; Villages of Elm Grove, Fox Point, Menomonee Falls and Milwaukee.
Important to have point-specific locations of all levees and dams in a community. Allows for the ability to easily track changes to the structures, such as removal, which can be shared with the DNR for further analysis.	Levee or Dam	Cities of Glendale, Greenfield and West Bend.
These at-risk facilities should be captured in this dataset to be closely monitored when a severe storm event is possible. The AOMI feature class accurately and quickly locates areas of great concern.	At-Risk Essential Facilities	County of Ozaukee
The AOMI feature class easily illustrates where there are spatially clusters of LOMCs, possibly signaling the need for a restudy. It is important to keep track of all LOMCs in the area.	Areas with Clusters of LOMCs	Cities of Glendale; County of Ozaukee; Village of Kewaskum.

The AOMI feature class easily illustrates where there are spatially clusters of LOMCs, possibly signaling the need for a restudy. It is important to keep track of all LOMCs in the area.	Effective Study No Longer Reflects Existing Conditions	Cities of Brookfield, Elm Grove, Glendale, Mequon, Wauwatosa, West Bend Counties of Ozaukee and Washington; Villages of Kewaskum, Menomonee Falls, Newburg and Thiensville.
This data can be quickly shared with WEM and FEMA whenever mitigation grant opportunities are available and for HMP updates.	Area in Need of Mitigation Action to Reduce Flooding	Cities of Glendale and Mequon; County of Ozaukee.

Changes Since Last FIRM (CSLF)

- Shows changes easily to the community.
- If significant changes are shown, it opens the door to discussion about better data.
- Illustrates how dam removals affect or don't affect flooding.
- Illustrates how using flood storage shrinks the floodplain and therefore can be encouraging for communities to think about storage as a mitigation tool.

Table 7: CSLF Benefits to Community

CSLF Benefits to Community	Mitigation Concern	Reporting Community
The CSLF will easily show communities if changes occurred to the floodplain if a dam was removed.	Levee or Dam	Cities of Glendale, Greenfield and West Bend.
If there is a cluster of LOMCs, it could indicate a new study or data is needed, which would be supported if the CSLF shows a decrease in the horizontal floodplain.	Areas with Clusters of LOMCs	Cities of Glendale; County of Ozaukee; Village of Kewaskum.
Communities want to see quickly how the proposed new DFIRMs have changed, especially in questioned areas. Regardless of whether the floodplain changed significantly or not, this is a very useful tool during meetings to facilitate why it is important to map floodplains.	Effective Study No Longer Reflects Existing Conditions	Cities of Brookfield, Elm Grove, Glendale, Mequon, Wauwatosa, West Bend Counties of Ozaukee and Washington; Villages of Kewaskum, Menomonee Falls, Newburg and Thiensville.

DFIRMs and FIS

- Accurate maps with refined data analysis will help direct communities to what areas actually have a strong probability of flooding. They will no longer spend time arguing about the correctness of the maps, but rather switch their focus to how to prevent flooding through mitigation.

- Citizens will have confidence in the new maps that represent current conditions and take the threat of flooding seriously.
- Eliminate time spend on LOMAs and LOMRs once the area is mapped with more accurate data, such as new survey and LIDAR.
- FIS clearly discusses study information and describes history of flooding in the area – useful to reiterate why mapping and mitigation is important in this area.

Table 8: DFIRMs and FIS Benefits to Community

DFIRMs and FIS Benefits to Community	Mitigation Concern	Reporting Community
New studies will provide more precise profiles showing how much these roads overtop and better plan for emergency services during high water	Overtopped Road During Flood Event	Cities of Brookfield, Mequon, Milwaukee and New Berlin; Counties of Ozaukee and Washington; Villages of Elm Grove, Fox Point, Menomonee Falls and Milwaukee.
Dams have been removed on the Milwaukee River that have not been submitted as a LOMR. Data development will remedy this situation and bring the communities into compliance.	Levee or Dam	Cities of Glendale, Greenfield and West Bend.
New studies on multiple tributary river corridors that have changed due to erosion will better define the BFE's on streams with current conditions.	At-Risk Essential Facilities	County of Ozaukee
New studies providing better BFE determinations will eliminate the need for many of the LOMC's that are currently being processed due to stream changes since the last study.	Areas with Clusters of LOMCs	Cities of Glendale; County of Ozaukee; Village of Kewaskum.
Many effective studies no longer reflect current conditions of the stream due to a number of factors including erosion and violations allowed to be mapped (Kewaskum) among other things. New studies will better define the current BFE and floodplain boundary.	Effective Study No Longer Reflects Existing Conditions	Cities of Brookfield, Elm Grove, Glendale, Mequon, Wauwatosa, West Bend Counties of Ozaukee and Washington; Villages of Kewaskum, Menomonee Falls, Newburg and Thiensville.

Flood Depth and Analysis Grids

- These products are very useful to determine how difficult road access will be during a severe flood, i.e. will residents get cut off from emergency services?
- The analysis grids such as the 30 year percent chance and annual percent chance of flooding will help communities prioritize new areas of potential mitigation that were never known before.

- If an area is known to repeatedly flood and can be illustrated to its residents, this would help move mitigation forward such as creating a park.

Table 9: Flood Depth and Analysis Benefits to Community

Flood Depth and Analysis Benefits to Community	Mitigation Concern	Reporting Community
Data used to show how deep the overtopping of roads will be at specific points. Will help communities determine if bigger culverts are in order or prepare for road closures ahead of time. If it is moving water, it won't take much velocity for this situation to become dangerous. Illustrating to citizens the depth of road overtopping will emphasize the need to mitigate for safety reasons.	Overtopped Road During Flood Event	Cities of Brookfield, Mequon, Milwaukee and New Berlin; Counties of Ozaukee and Washington; Villages of Elm Grove, Fox Point, Menomonee Falls and Milwaukee.
Shows if the removal of a dam really did affect the depth of flood water substantially. Could aid in dam failure analysis.	Levee or Dam	Cities of Glendale, Greenfield and West Bend.
Could be useful to know how deep the water could be in certain flood stages at these critical facilities. If there is substantial depth of flooding, these critical facilities will not be available for emergency services and therefore should be carefully considered for a change of location, particularly for staging areas.	At-Risk Essential Facilities	County of Ozaukee
If the community is wrong in their assumption that the floodplain data is not mapped properly, the depth grids are useful in reiterating not only the horizontal floodplain limits, but the vertical impact of the mapped area as well.	Effective Study No Longer Reflects Existing Conditions	Cities of Brookfield, Elm Grove, Glendale, Mequon, Wauwatosa, West Bend Counties of Ozaukee and Washington; Villages of Kewaskum, Menomonee Falls, Newburg and Thiensville.
The 30-year percent and annual chance grids could help highlight the most severe properties that should be the focus of mitigation first. Also useful to homeowners with a mortgage.	Area in Need of Mitigation Action to Reduce Flooding	Cities of Glendale and Mequon; County of Ozaukee.

Flood Risk Report and Flood Risk Database

- Useful for communities to have data about the CSLF and HAZAUS analysis pertinent just to their area. Communities regularly ask about how much the floodplain changed. They can easily deliver this information to their citizens.
- Community officials can compare the analysis of the entire watershed to their community planning and mitigation options. They can see if they have the highest HAZUS risk and what can be done to mitigate future potential damage.

- The database allows for seamless, consistent data throughout the watershed so that updates to the data by stakeholders, DNR or FEMA can be done with ease.
- The report goes into detail about mitigation ideas and how the non-regulatory products can be used for mitigation.

Table 10: Flood Risk Report and Flood Risk Database Benefits to Community

Flood Risk Report and Flood Risk Database Benefit to Community	Mitigation Concern	Reporting Community
The report and supporting geodatabase provided critical tools to help communities make decisions about their flood risk and potential mitigation opportunities. These products will be the primary source of the data gathered throughout this Risk MAP process, including the data already collected during Discovery and Action Discovery. The report easily provides communities with their specific HAZUS analysis, which can be used in their Hazard Mitigation Plans.	All	All

HAZUS Analysis

- SE Wisconsin is the most populated area in the state, with most of the watershed being in highly urbanized areas with residential and commercial properties.
- Some communities have expressed concerns about economic impact of flooding. HAZUS analysis would give them a starting point of what census blocks they need to focus their mitigation efforts on specifically.
- It is a useful tool to show board members and residents alike how much flooding could cost their community and why it is important and cost-effective to mitigate whenever possible.
- Communities can use this analysis when applying for updates to their Hazard Mitigation Plans (HMP's), which is very important for each community to create and maintain.

Table 11: HAZUS Analysis Benefits to Community

HAZUS Analysis Benefits to Community	Mitigation Concern	Reporting Community
The HAZUS analysis could be used in support of the communities with LOMC clusters, supporting their contention the floodplain needs to be restudied. However, HAZUS will also be able to show the homeowners and local officials that just because a house was removed from the floodplain by a LOMC doesn't mean they are no longer at risk.	Areas with Clusters of LOMCs	Cities of Glendale; County of Ozaukee; Village of Kewaskum.

This analysis will help reiterate the potential monetary costs to communities if mitigation is not implemented. It will support the new DFIRMs and move the conversation away from in-or-out of the floodplain and towards how one can reduce the risk.	Effective Study No Longer Reflects Existing Conditions	Cities of Brookfield, Elm Grove, Glendale, Mequon, Wauwatosa, West Bend Counties of Ozaukee and Washington; Villages of Kewaskum, Menomonee Falls, Newburg and Thiensville.
This Analysis will help communities narrow down what census block areas to mitigate.	Area in Need of Mitigation Action to Reduce Flooding	Cities of Glendale and Mequon; County of Ozaukee.

Flood Risk and Resilience Meetings – Community Engagement and Risk Communication (CERC) services

- These meetings are critical for continued discussion with stakeholders concerning information and ideas about mitigation.
- SE Wisconsin is very proactive with mitigation, thanks largely in part to SEWRPC and MMSD.
- Sharing of data about future mitigation plans and using the Risk MAP non-regulatory products will help eliminate wasted time of parallel work.
- Meeting with stakeholders and brainstorming about their local flooding concerns could create new ideas about how to implement mitigation in this region, which can then be shared throughout the state.

Table 12: Flood Risk and Resilience Meetings Benefits to Community

Flood Risk and Resilience Meetings Benefits to Community	Mitigation Concern	Reporting Community
Important to continue working with all communities in the watershed and build confidence in the Risk MAP program, especially since this is the first time this watershed will learn how to use the Non-Regulatory Products.	All	All

IV. Recommendations for Study and Action Needs

The project team presented the Discovery maps and discussed the results of the data collection and analysis with the watershed stakeholders in detail during the Discovery meetings. With the conclusion of Discovery, including the Action Discovery process, this section reflects recommendations for stream study priorities and the benefits and challenges associated with moving forward with data development for the watershed. It also further addresses how Risk MAP deliverables could help track and advance mitigation activities within the watershed.

A. Floodplain Studies

While DFIRMs have been produced for all of the counties in the watershed, additional study and mapping needs have been identified through the Discovery process, including many areas with potential mitigation needs to reduce repeated flooding. Using CNMS, the WDNR identified areas where new or updated studies rank highest in terms of need and risk relative to other locations in the Milwaukee HUC8 watershed. Other information collected through community officials during Discovery was considered in conjunction with the level of concern in preparing the final scope of work. Finally, WDNR assessed recently completed or in progress flood studies prepared by SEWRPC and Washington County to determine which would be ready to include in the Risk MAP project as leveraged studies.

An outcome of the Discovery process is to identify those streams where the communities' flood risk management efforts will most benefit from updated engineering analyses. The final list of streams for study includes local community identified areas of known flooding issues, WDNR determined areas of concern and all leveraged studies that were determined appropriate for inclusion. The WDNR developed a 6-level ranking method to prioritize streams of concern for inclusion in the final list:

1. Areas of mitigation interest where repeated flooding occurs resulting in loss of property, roads overtopping or essential facilities at-risk.
2. Streams currently mapped as Zone AE where the study has been deemed "Needs Validation" (CNMS).
3. Gaps between detailed studies that are either currently mapped as Zone A or not mapped at all.
4. Streams currently mapped as Zone A where a community request was made to study the reach in detail.
5. Streams currently mapped as Zone A that will be engineered, but remain mapped as Zone A.
6. Streams that are not currently mapped where a community request was made to study the reach in detail.

B. Summary of Findings

Three different types of study requirements were identified during the Discovery and Action Discovery Process. Over 240 miles of streams were highlighted as potential updates in one of the following categories: hydraulic and hydrologic analysis needed, just hydraulics needed and potential leverage needed. This results in 108.8 miles of new detailed study recommended for survey. A breakdown of different analysis required with stream names and mileage are listed in the three Tables below.

If funding and time allows, updating Approximate Zones in the Milwaukee Watershed would also be a priority. There are roughly 150 miles of A Zones in the watershed that are not backed by engineering models. There are also 200 miles of non-engineered Zone A's outside of the Milwaukee Watershed but still within the affected counties that could also be updated if funding allows.

Table 13. Hydraulic and Hydrologic Analysis Needed

Flooding Source	Study Length (Miles)
Cedar Creek-Cedarburg	1.3
Cedarburg Creek – Ozaukee County	2.3
Dousman Ditch	2.5
Edgewood Creek	0.4
Edgewood Creek Overflow	1
Indian Creek	2.6
Kewaskum Creek	5
Kewaskum Creek Overflow	0.6
Milwaukee River – Campbellsport	1.5
Milwaukee River - City of Glendale (Estabrook)	4.7
Milwaukee River – Newburg	3.6
Milwaukee River – Mequon/Thiensville	10.2
Milwaukee River - Village of Grafton (Lime Kiln Dam)	3.1
Milwaukee River - City of West Bend (Young America Dam)	2.7
Milwaukee River w/ Unnamed Streams (off CTH I & STH 33) - Washington County	6.7
Mud Lake Creek	6.5
Pigeon Creek	3.7
North Creek	2.3
Trib to Cedarburg Creek	0.8
Trib to Indian Creek	1.7
Trib to Milwaukee River	0.9
Trinity Creek	2.9
Ulao Creek	1.6
Total	68.6

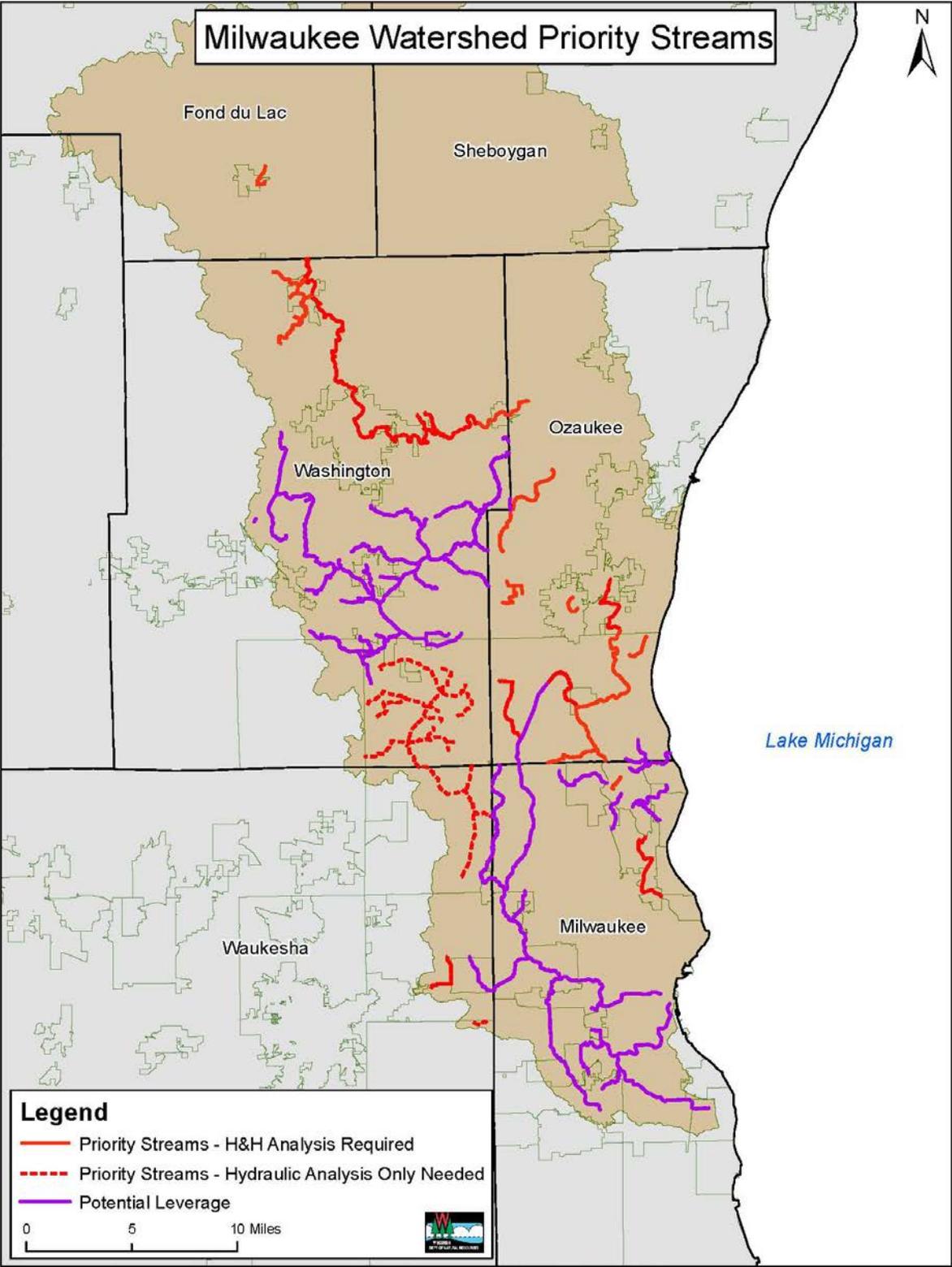
Table 14. Hydraulics only Analysis Needed

Flooding Source	Study Length (Miles)
Menomonee River – Waukesha/Washington County	11.8
North Branch Menomonee River	4.3
Nor-X-Way Channel	1.4
Lilly Creek	3.6
South Branch Underwood Creek	0.9
West Branch Menomonee River	3.6
Unnamed Tributary to West Branch Menomonee River	2.4
Willow Creek	2.7
Tributary No. 1(to Menomonee River)	2.6
Tributary No. 1A	0.8
Tributary No. 1B	0.6
Tributary No. 2	1.2
Tributary No. 3	0.6
Tributary No. 4	1.9
Tributary No. 5	1.8
Menomonee River – Waukesha/Washington County	11.8
Total	40.2

Table 15. Potential Leverage to Incorporate

Flooding Source	Study Length (Miles)
Beaver Creek	3.3
Brown Deer Park Tributary	2.2
Cedar Creek	20.6
Cedarburg Creek	3
Dretzka Park Tributary (2015 completion)	3
Edgerton Channel	0.8
Evergreen Creek	2
Fish Creek	3.4
Fish Creek Tributary	1.3
Fish Creek Tributary 2	1.2
Grantosa Creek (2015 completion)	1.7
Honey Creek	8.4
Kinnickinnic River	8
Kressen Branch Cedar Creek	1.35
Little Cedar Creek	6.05
Little Menomonee River	11.1
Little Menomonee Creek	3.3
Lyons Park Creek	1.5
Menomonee River up to Underwood Creek (submitted as LOMR)	8.5
Menomonee River (upstream of Underwood Creek to Waukesha County, 2015 completion)	9.8
North Branch Cedar Creek	3.5
Polk Springs Creek	1.23
South 43 rd Street Ditch	1.2
Underwood Creek	4.7
Unnamed Streams - Cedar Creek Tribs	13.41
Villa Mann Creek	0.9
Villa Mann Creek Tributary	0.8
Wilson Park Creek	5.3
Woods Creek	0.7
Total	132.24

Figure 3. Milwaukee Watershed Proposed Scope of Work



C. Challenges and Risks

There are inherent challenges and risk associated with undertaking any Risk MAP project. Following is a list of some the challenges and risks identified during the Discovery process.

- Over the course of the last 20+ years several adjustments have been made to the NAVD in the watershed. The current dFIRMs do not reflect the most current datum correction, which is to NAVD88. The mapping will need to be adjusted on a county-wide basis to make sure the most current vertical correction is reflected.
- Several of the SEWRPC and Washington County leveraged studies identified for inclusion are in progress as of the date of this report. While we have reasonable assurances from these entities that the studies will be completed in a timely manner, unforeseen circumstances could delay completion and therefore inclusion of a study.
- Washington County is eager to get their new surveyed data incorporated so if the Data Development Phase for the Milwaukee Watershed is delayed, they will likely move ahead and pursue the PMR option.
- WDNR will have reviewed all of the leveraged studies for technical appropriateness of the model but will not have necessarily reviewed the readiness of the data for meeting mapping standards. Some additional work may need to be done to make the data map ready.
- MMDS has multiple in-progress flood control projects in the watershed, several of which involve structures that may need to go through the levee certification process. The WDNR has been working with MMSD and SEWRPC on these projects and will make it a continued priority to work with them to keep these projects on the appropriate regulatory track.
- The resolution for mapping outstanding floodplain violations in the Village of Kewaskum will need to be rolled into the Milwaukee Watershed project.
- The Lake Michigan Coastal Mapping project is ongoing in the coastal areas of Milwaukee, Ozaukee and Sheboygan Counties. The watershed project will need to be coordinated with this work.

Meeting and adoption fatigue have been mentioned several times in this report and are definitely present in many communities within this watershed. However, numerous feedback from the communities throughout the Discovery process expressed the desire to receive more up-to-date dFIRMs. The benefit to the communities of receiving more accurate data and other RiskMAP products outweighs community concerns about time spent in mapping meetings and ordinance revisions.

D. Updates to Data

It is very important that mitigation potential in the Milwaukee Watershed is captured in both a qualitative and quantitative way. There are several different ways this mitigation data has been captured. First and foremost, FEMA's Mitigation Action Tracker has been updated online with

possible mitigation opportunities identified by the communities after the Risk MAP meetings, including the initial Discovery meeting and the follow-up Action Discovery meeting. Table 16 below shows what Wisconsin has listed in the Action Tracker for communities within the Milwaukee Watershed.

Spatial data representing the Areas of Mitigation Interest (AOMI) expressed by the communities during Discovery and Action Discovery was also updated and can be found as a feature class in the submitted Milwaukee Discovery geodatabase. This data represents the community’s comments during the Discovery and Action Discovery meetings as a point in GIS format.

Updates to the Coordinated Needs Management Strategy (CNMS) stream centerline shapefile will also be submitted to FEMA, which will show what stream reaches are suggested for re-validation.

1. Action Tracker and Potential Action Measure Increases

Mitigation potential identified during the Action Discovery meetings has been added to the Action Tracker online. Therefore, Wisconsin’s Action Measure 1 percentage will increase the next time the deployed footprint is updated. In all likelihood, this would put Wisconsin past the current 31.5% and ahead of the National Average of 33.3%.

Figure 4: Action Tracker – Action Measure 1 Results

Risk MAP Actions Identified				
For Deployed Footprints as of 11/26/2013				
The percentage of Risk MAP Deployment populations with Actions Identified or refined as a result of Risk MAP processes and collaboration. The Actions-Identified metric is the ratio between the portion of community populations residing within a Risk MAP Deployed area (numerator) over the total population where Risk MAP has been deployed (denominator).				
Region	State	Measure Population	Deployment Population	Action Measure 1
01		901734	5594356	16.1 %
02		9376315	20691954	45.3 %
03		5322592	15586777	34.1 %
04		14669042	40635060	36.1 %
05		8523847	24978569	34.1 %
	ILLINOIS	3970020	8928835	44.5 %
	INDIANA	2533896	3351180	75.6 %
	MICHIGAN	691620	4717268	14.7 %
	MINNESOTA	476710	2298719	20.7 %
	OHIO	55339	3154582	1.8 %
	WISCONSIN	796262	2527985	31.5 %
06		6197069	15090910	41.1 %
07		1908776	4080482	46.8 %
08		2000538	7037026	28.4 %
09		2156514	19643636	11.0 %
10		2544585	7762836	32.8 %
National		53601012	161101606	33.3 %

Table 16: Updated Action Tracker Data for Communities within the Milwaukee Watershed

CID	County Name	CID Name	Action Name	Is Risk Map Process	Risk Map Justification	Hazard Type	Source	Mitigation Action ID
550270	MILWAUKEE	BAYSIDE, VILLAGE OF	Riverine Erosion	TRUE	Action was ID'd during a RiskMAP meeting	Flood	RiskMAP Process	17172
550285	MILWAUKEE	WEST ALLIS, CITY OF	Repeated, significant flooding damage	TRUE	Action was ID'd during a RiskMAP meeting	Flood	RiskMAP Process	17171
550278	MILWAUKEE	MILWAUKEE, CITY OF	Overtopped road during flood event	TRUE	Action was ID'd during a RiskMAP meeting	Flood	RiskMAP Process	19252
550478	WAUKESHA	BROOKFIELD, CITY OF	Repeated flooding damage along Dousman Ditch	TRUE	Action was ID'd during a RiskMAP meeting	Flood	RiskMAP Process	19254
550278	MILWAUKEE	MILWAUKEE, CITY OF	Lincoln Creek Study	TRUE	Action was ID'd during a RiskMAP meeting	Flood	RiskMAP Process	19249
550487	WAUKESHA	NEW BERLIN, CITY OF	Repeated, significant flooding damage	TRUE	Action was ID'd during a RiskMAP meeting	Flood	RiskMAP Process	19256
550275	MILWAUKEE	GLENDALE, CITY OF	Lincoln Creek restoration work	TRUE	Action was ID'd during a RiskMAP meeting	Flood	RiskMAP Process	19257
550275	MILWAUKEE	GLENDALE, CITY OF	Effective study no longer reflects existing conditions	TRUE	Action was ID'd during a RiskMAP meeting	Flood	RiskMAP Process	19258

CID	County Name	CID Name	Action Name	Is Risk Map Process	Risk Map Justification	Hazard Type	Source	Mitigation Action ID
550275	MILWAUKEE	GLENDALE, CITY OF	Effective study no longer reflects existing conditions	TRUE	Action was ID'd during a RiskMAP meeting	Flood	RiskMAP Process	19259
555564	OZAUKEE	MEQUON, CITY OF	Repeated flooding damage	TRUE	Action was ID'd during a RiskMAP meeting	Flood	RiskMAP Process	19260
555564	OZAUKEE	MEQUON, CITY OF	Effective Study no longer reflects existing conditions	TRUE	Action was ID'd during a RiskMAP meeting	Flood	RiskMAP Process	19261
555564	OZAUKEE	MEQUON, CITY OF	Effective study no longer reflects existing conditions	TRUE	Action was ID'd during a RiskMAP meeting	Flood	RiskMAP Process	19262
550318	OZAUKEE	THIENSVILLE, VILLAGE OF	Effective study no longer reflects existing conditions	TRUE	Action was ID'd during a RiskMAP meeting	Flood	RiskMAP Process	19296
550310	OZAUKEE	OZAUKEE COUNTY *	Repeated, significant flooding damage	TRUE	Action was ID'd during a RiskMAP meeting	Flood	RiskMAP Process	19309
550310	OZAUKEE	OZAUKEE COUNTY *	Area with clusters of LOMCs	TRUE	Action was ID'd during a RiskMAP meeting	Flood	RiskMAP Process	19310

CID	County Name	CID Name	Action Name	Is Risk Map Process	Risk Map Justification	Hazard Type	Source	Mitigation Action ID
550471	WASHINGTON	WASHINGTON COUNTY *	Repeated, significant damage	TRUE	Action was ID'd during a RiskMAP meeting	Flood	RiskMAP Process	19311
550475	WASHINGTON	WEST BEND, CITY OF	Effective study no longer reflects existing conditions	TRUE	Action was ID'd during a RiskMAP meeting	Flood	RiskMAP Process	19312
550474	WASHINGTON	KEWASKUM, VILLAGE OF	Area with Clusters of LOMCs	TRUE	Action was ID'd during a RiskMAP meeting	Flood	RiskMAP Process	19314
550056	WASHINGTON	NEWBURG, VILLAGE OF	Effective study no longer reflects existing conditions	TRUE	Action was ID'd during a RiskMAP meeting	Flood	RiskMAP Process	19315
550471	WASHINGTON	WASHINGTON COUNTY *	Hazard Mitigation Plan needed	TRUE	Action was ID'd during a RiskMAP communication	Multiple Hazards	State Risk Mgmt Team (Silver Jackets)	19313
550483	WAUKESHA	MENOMONEE FALLS, VILLAGE OF	Overtopped roads during flood event	TRUE	Action was ID'd during a RiskMAP meeting	Flood	RiskMAP Process	19298
550483	WAUKESHA	MENOMONEE FALLS, VILLAGE OF	Overtopped Road during flood events.	TRUE	Action was ID'd during a RiskMAP meeting	Flood	RiskMAP Process	19300
550318	OZAUKEE	THIENSVILLE, VILLAGE OF	Effective study no longer reflects existing conditions	TRUE	Action was ID'd during a RiskMAP meeting	Flood	RiskMAP Process	19297

CID	County Name	CID Name	Action Name	Is Risk Map Process	Risk Map Justification	Hazard Type	Source	Mitigation Action ID
550483	WAUKESHA	MENOMONEE FALLS, VILLAGE OF	Riverine Erosion	TRUE	Action was ID'd during a RiskMAP meeting	Flood	RiskMAP Process	19301
550578	WAUKESHA	ELM GROVE, VILLAGE OF	Overtopped Road during flood event	TRUE	Action was ID'd during a RiskMAP meeting	Flood	RiskMAP Process	19322
550578	WAUKESHA	ELM GROVE, VILLAGE OF	Property Acquisition	TRUE	Action was ID'd during a RiskMAP meeting	Flood	RiskMAP Process	19323
550284	MILWAUKEE	WAUWATOSA, CITY OF	Effective study no longer reflects existing conditions	TRUE	Action was ID'd during a RiskMAP meeting	Flood	RiskMAP Process	19324
550310	OZAUKEE	OZAUKEE COUNTY *	Area in need of mitigation action to reduce flooding	TRUE	Action was ID'd during a RiskMAP meeting	Flood	RiskMAP Process	19325
550310	OZAUKEE	OZAUKEE COUNTY *	Area in need of mitigation action to reduce flooding	TRUE	Action was ID'd during a RiskMAP meeting	Flood	RiskMAP Process	19326
550310	OZAUKEE	OZAUKEE COUNTY *	Dam removal	TRUE	Action was ID'd during a RiskMAP meeting	Flood	State Risk Mgmt Team (Silver Jackets)	19327

Given the large population of communities in the Milwaukee Watershed, coupled with opportunities to mitigate using Risk MAP products in every community engaged in during Action Discovery, Wisconsin is in the position to surpass the National Action Measure 2 Percent average. Currently Wisconsin only has 5.2% of its population using mitigation techniques through Risk MAP. However, if Data Development is prompted in the Milwaukee Watershed, this would greatly bump up the population percentage involved with mitigation, provide quantitative data showing the region's effective and proactive stance on mitigating flood risk thanks to Risk MAP.

Figure 5: Action Tracker – Action Measure 2 Results

Risk MAP Actions Advanced				
For Deployed Footprints as of 11/26/2013				
The percentage of Risk MAP Deployment populations with Actions Advanced (i.e. scoped, in-progress or completed) as a result of Risk MAP processes and collaboration. The Actions-Advanced metric is the ratio between the portion of community populations residing within a Risk MAP Deployed area (numerator) over the total population where Risk MAP has been deployed (denominator).				
Region	State	Measure Population	Deployment Population	Action Measure 2
01		718643	5594356	12.8 %
02		9486125	20691954	45.8 %
03		3002839	15586777	19.3 %
04		14370005	40635060	35.4 %
05		1635314	24978569	6.5 %
	ILLINOIS	341258	8928835	3.8 %
	INDIANA	1046975	3351180	31.2 %
	MICHIGAN	30245	4717268	0.6 %
	MINNESOTA	84589	2298719	3.7 %
	OHIO	0	3154582	0.0 %
	WISCONSIN	132247	2527985	5.2 %
06		5046498	15090910	33.4 %
07		613462	4080482	15.0 %
08		1516426	7037026	21.5 %
09		0	19643636	0.0 %
10		177419	7762836	2.3 %
National		36566731	161101606	22.7 %

2. CAPI Analysis

Below is a list of the Tier I and II Communities the WDNR met with during Action Discovery. A couple communities with lower CAPI scores were designated as Tier II communities because they were very proactive in meeting with the DNR and had great potential for mitigation. Therefore the DNR used local knowledge and discretion in determining between some Tier II and III communities. Dodge County, for example, is officially in the Milwaukee Watershed but just barely and does not have any floodplain and would not have been appropriate as a Tier II designation.

Table 17: Updated Tier Analysis

FIPS	CIS NAME	CID	CAPI SCORE	DEPLOYED	HUC NAME	HUC 8	DNR TIER DESIGNATION
55079	MILWAUKEE, CITY OF	550278	91.10	Yes	Milwaukee	04040003	I
55133	BROOKFIELD, CITY OF	550478	64.86	No	Milwaukee	04040003	I
55133	NEW BERLIN, CITY OF	550487	63.04	No	Milwaukee	04040003	II
55079	GLENDALE, CITY OF	550275	62.86	No	Milwaukee	04040003	II
55089	MEQUON, CITY OF	555564	56.52	Yes	Milwaukee	04040003	II
55089	THIENSVILLE, VILLAGE OF	550318	53.08	No	Milwaukee	04040003	II
55133	MENOMONEE FALLS, VILLAGE OF	550483	52.56	No	Milwaukee	04040003	II
55133	ELM GROVE, VILLAGE OF	550578	51.89	No	Milwaukee	04040003	II
55133	WAUKESHA COUNTY*	550476	51.85	Yes	Milwaukee	04040003	II
55079	WAUWATOSA, CITY OF	550284	49.83	No	Milwaukee	04040003	II
55089	OZAUKEE COUNTY *	550310	48.87	Yes	Milwaukee	04040003	II
55131	WASHINGTON COUNTY *	550471	40.43	Yes	Milwaukee	04040003	II
55131	WEST BEND, CITY OF	550475	16.73	No	Milwaukee	04040003	II
55131	KEWASKUM, VILLAGE OF	550474	7.89	No	Milwaukee	04040003	II
55131	NEWBURG, VILLAGE OF	550056	3.06	No	Milwaukee	04040003	II
55079	WEST ALLIS, CITY OF	550285	42.48	No	Milwaukee	04040003	III
55133	BUTLER, VILLAGE OF	550536	42.19	No	Milwaukee	04040003	III
55027	DODGE COUNTY *	550094	40.81	Yes	Milwaukee	04040003	III
55039	FOND DU LAC COUNTY *	550131	39.74	Yes	Milwaukee	04040003	III
55079	RIVER HILLS, VILLAGE OF	550280	38.91	No	Milwaukee	04040003	III
55117	SHEBOYGAN COUNTY *	550424	37.78	Yes	Milwaukee	04040003	III
55079	BROWN DEER, VILLAGE OF	550271	36.22	No	Milwaukee	04040003	III
55089	SAUKVILLE, VILLAGE OF	550317	35.79	No	Milwaukee	04040003	III
55079	WHITEFISH BAY, VILLAGE OF	550286	34.92	Yes	Milwaukee	04040003	III
55079	FOX POINT, VILLAGE OF	550274	32.50	Yes	Milwaukee	04040003	III
55079	GREENDALE, VILLAGE OF	550276	29.50	No	Milwaukee	04040003	III

55079	BAYSIDE, VILLAGE OF	550270	28.48	Yes	Milwaukee	04040003	III
55079	SHOREWOOD, VILLAGE OF	550282	26.62	Yes	Milwaukee	04040003	III
55079	CUDAHY, CITY OF	550272	26.01	Yes	Milwaukee	04040003	III
55089	GRAFTON, VILLAGE OF	550314	21.21	No	Milwaukee	04040003	III
55079	GREENFIELD, CITY OF	550277	20.84	No	Milwaukee	04040003	III
55039	CAMPBELLSPORT, VILLAGE OF	550133	18.65	No	Milwaukee	04040003	III
55089	FREDONIA, VILLAGE OF	550313	18.43	No	Milwaukee	04040003	III
55089	CEDARBURG, CITY OF	550312	16.45	No	Milwaukee	04040003	III
55089	PORT WASHINGTON, CITY OF	550316	16.39	Yes	Milwaukee	04040003	III
55117	CASCADE, VILLAGE OF	550425	15.79	No	Milwaukee	04040003	III
55117	RANDOM LAKE, VILLAGE OF	550429	15.00	No	Milwaukee	04040003	III
55117	ADELL, VILLAGE OF	550075	10.05	No	Milwaukee	04040003	III
55079	WEST MILWAUKEE, VILLAGE OF	550561	6.75	No	Milwaukee	04040003	III
55131	SLINGER, VILLAGE OF	550587	5.61	Yes	Milwaukee	04040003	III
55027		550459	5.09	Yes	Milwaukee	04040003	III
55131	GERMANTOWN, VILLAGE OF	550472	4.50	No	Milwaukee	04040003	III
55131	JACKSON, VILLAGE OF	550530	1.62	No	Milwaukee	04040003	III
55079	ST. FRANCIS, CITY OF	550281	0.92	Yes	Milwaukee	04040003	III

E. Community Engagement and Risk Communication Services (CERC)

Coordination among the different state, regional and local entities in the Milwaukee Watershed is a great example of collaboration. With the renewed emphasis on mitigation through RiskMAP, the Wisconsin DNR and Wisconsin Emergency Management have worked closely together sharing information about Hazard Mitigation Plans, past and potential grant funding and study priorities. The WDNR is a partner with WEM in their substantial efforts to provide mitigation planning and implementation support services. The State Hazard Mitigation Team serves as the primary partner entity in the state work on issues related to flood preparedness, response, recovery and mitigation activities. These two separate state agencies are building a bridge between the flood hazard mapping and hazard mitigation planning sides in order to help local communities and agencies best use the potential of RiskMAP.

The DNR and WEM have worked closely with local officials and the general public in all of the communities within the Milwaukee Watershed over the years. The WDNR, through its floodplain management and floodplain mapping activities is routinely engaged with the communities in the Milwaukee Watershed on issues related to floodplain regulation, risk identification and basic flood insurance issues. Every county has gone through the MapMOD process and 42 out of the 44

communities participate in the NFIP. All but one county has a HMP and it should be noted that during the Action Discovery meetings, interest was expressed by local officials for Washington County to get their first HMP.

As discussed previously, both SEWRPC and MMSD lead the way in working with the communities as regional agencies. Their symbiotic relationships add a deeper level of effectiveness and reliability, allowing the state to seamlessly work with both the communities and the larger regional agencies. Due to many years of working together on flood risk project, both mapping and mitigation related, the DNR, WEM, local communities, SEWRPC and MMSD are in a great position to carry on the goals of RiskMAP together in the Milwaukee Watershed.

In order for RiskMAP to be effective in enhancing the public’s awareness of flood risk in order to reduce the loss of life and property, communication is key. Therefore, guidance set forth under the Statement of Objectives (SOO) regarding Community Engagement and Risk Communications (CERC) Services is vital to follow in order to build more resilient communities. CERC Performance Objective 1 lays out 10 design and implementation strategies the WDNR already conducts as part of its routine floodplain management activities. If data development for the Milwaukee Watershed is funded, the WDNR will lead or participate with all the requirements that are explicitly listed in Objective 2, as demonstrated with previous watersheds they have managed through the RiskMAP Data Development phase. As stated in the previous section, the WDNR in conjunction with WEM, will provide mitigation planning support services as listed in Objective 3 and the WDNR will continue to have the relationships with communities and other government agencies as explained in Objective 4.

Table 18 lists the different types of Community Consultation Officers (CCO) meetings the WDNR has held with the counties and communities within the Milwaukee Watershed. These communities are highly engaged with both the WDNR and WEM and will continue to proactively look to mitigate flood risk. RiskMAP tools could help communicate this risk and the need for action to their constituents.

Table 18. Previous CCO Meeting Dates

County	Meeting Date	Meeting Type/Topic
Dodge	07/10/2007	Scoping Meeting - Countywide
Dodge	01/15/2009	Open House Meeting - Countywide
Dodge	2/1/2011; 2/7/2011	Scoping Meeting - Upper Rock Watershed
Dodge	03/12/2013	Open House Meeting - Upper Rock Watershed
Dodge	05/16/2013	Discovery Meeting – Milwaukee Watershed
Dodge	01/22/2014	Resilience Meeting – Upper Rock Watershed
Fond du Lac	07/26/2005	Scoping Meeting - Countywide
Fond du Lac	06/12//2007	Open House Meeting - Countywide
Fond du Lac	05/16/2013	Discovery Meeting – Milwaukee Watershed
Milwaukee	06/27/2005	Scoping Meeting - Countywide
Milwaukee	12/11/2006	Open House Meeting - Countywide

Milwaukee	05/16/2013	Discovery Meeting – Milwaukee Watershed
Milwaukee	02/11/2014	Action Discovery Meeting – Milwaukee Watershed
Ozaukee	12/18/2003; 04/27/2004	Scoping Meeting - Countywide
Ozaukee	04/27/2006	Open House Meeting - Countywide
Ozaukee	05/16/2013	Discovery Meeting – Milwaukee Watershed
Ozaukee	02/11/2014	Action Discovery Meeting – Milwaukee Watershed
Sheboygan	07/28/2005	Scoping Meeting - Countywide
Sheboygan	04/10/2007	Open House Meeting - Countywide
Sheboygan	05/16/2013	Discovery Meeting – Milwaukee Watershed
Washington	2005	Scoping Meeting - Countywide
Washington	08/16/2007	Open House Meeting - Countywide
Washington	2/1/2011; 2/7/2011	Scoping Meeting – Upper & Lower Rock Watershed
Washington	05/16/2013	Discovery Meeting – Milwaukee Watershed
Washington	11/19/2013	Open House Meeting – Upper & Lower Rock Watershed
Washington	01/22/2014	Resilience Meeting – Upper & Lower Rock Watershed
Washington	02/11/2014	Action Discovery Meeting – Milwaukee Watershed
Waukesha	10/09/2003	Scoping Meeting - Countywide
Waukesha	03/06/2007	Open House Meeting - Countywide
Waukesha	2/1/2011; 2/7/2011	Scoping Meeting - Lower Rock Watershed
Waukesha	05/16/2013	Discovery Meeting – Milwaukee Watershed
Waukesha	07/29/2013	Open House Meeting - Lower Rock Watershed
Waukesha	01/22/2014	Resilience Meeting – Lower Rock Watershed
Waukesha	02/11/2014	Action Discovery Meeting – Milwaukee Watershed

V. Supporting Data for RiskMAP Analysis

Prior to the meetings, as part of the Discovery process, available existing data for the Milwaukee Watershed was identified and when applicable, displayed on the Discovery map. A list of the data collected, the deliverable or product in which the data are included and the source of the data are provided in Table 2. This information was discussed at both the Discovery and Action Discovery meetings.

A. Data from County Hazard Mitigation Plans

Mitigation Plans/Status

Hazard Mitigation Plans (HMPs) are prepared for unincorporated and incorporated communities to help them reduce long-term risk to life and property from natural hazards. The plans include

comprehensive mitigation strategies intended to promote flood-resilient communities. The project team reviewed the mitigation strategies in available HMPs to determine which, if any, were relevant for the Discovery process. Table 5 lists the HMPs, their status and availability for review.

Table 19. HMPs: Status and Availability

County	HMP	Hazus	Issue Date	Expiration Date	Available for Review	Draft in Progress
Dodge	N	Y	March 7, 2007	March 7, 2012	Y	Y
Fond du Lac	Y	Y	June 22, 2010	June 22, 2015	Y	
Milwaukee Co.	Y	Y	December 28, 2011	December 28, 2016	Y	
Milwaukee, City of	Y	Y	June 11, 2012	June 11, 2017	Y	
Ozaukee	Y	Y	March 18, 2009	March 18, 2014	Y	Y
Sheboygan	Y	Y	November 7, 2008	November 7, 2013	Y	Y
Washington	N	Y	NA	NA	NA	
Waukesha	Y	Y	March 15, 2011	March 15, 2016	Y	

Table 20. Mitigation Data Mined from Hazard Mitigation Plans

COMMUNITY /COUNTY	MITIGATION PROJECTS/AOMI	COMMENTS	PAGE #
Ozaukee HMP			
Ozaukee County	Dams	Small, uncontrolled agricultural dams that can't handle a 100- or 500-year flood without overtopping.	83, 84
Mequon (Ci)	Repetitive Loss	12 properties	90, 91
Port Washington (Ci)	Repetitive Loss	1 property	90, 91
Grafton (V)	Repetitive Loss	1 property	90, 91
Thiensville (V)	Repetitive Loss	11 properties	90, 91
Port Washington (Ci)	Mitigation	Canyon Creek flood recovery permanent repairs project (404 mitigation project grant application being filed(2008?))	96 & 214

Saukville (V & T)	Mitigation	Explore options to alleviate natural damming effect of debris in Ehlers Park area; floods Hwy. 33 and several homes/businesses, closes bridge and restricts main access	97
Thiensville (V)	Mitigation	Complete work on retention pond to prevent downtown flooding	98 & 215
Ozaukee and Communities	Mitigation	Look for acceptable permanent solutions for removing water and/or improved infrastructure and facilities from flood-prone areas. Seek out funding sources (grants) to execute solutions.	212
Ozaukee County (Town of Grafton)	Mitigation	Explore with approx. 16 homeowners in Edgewater Dr. area the feasibility of buyout or other flood mitigation program. Also, ensure the road is adequate height to escape flood damage. Worked with 8 landowners to buyout but cost-benefit analysis did not work; state grant explored, but county not eligible - town can apply, Buyout land would be converted to park land.	212
Fredonia (V)	Mitigation	Increase the size of culverts to reduce flooding at: Fredonia Ave./Co Hwy A near Fillmore St. and the railroad tracks; South Milwaukee St. by Meadow Brook Dr.	215
Fredonia (V)	Mitigation	Raise the pedestrian bridges to protect them from flooding. There are two bridges. One needs to be raised 2-3 ft. and one needs to be raised 1 ft.	215
Milwaukee HMP			
Bayside (V)	Repetitive Loss	2 properties	49
Glendale (Ci)	Repetitive Loss	9 properties	49
Milwaukee (Ci)	Repetitive Loss	220 properties	49
River Hills (V)	Repetitive Loss	2 properties	49
West Allis (Ci)	Repetitive Loss	2 properties	49
Cudahy (Ci)	Mitigation	Access contracts for and mitigate all Cudahy detention ponds	79
Cudahy (Ci)	Mitigation	Acquisition and demolition of 2 RL structures	79
Cudahy (Ci)	Mitigation	Acquisition and demolition of 5 RL structures	79
Cudahy (Ci)	Mitigation	Easement of 2 RL structures	79
Cudahy (Ci)	Mitigation	Development of channel	79

Fox Point (V)	Mitigation	Clear debris from ravine ditch between Fox Ln. to Beach Drive; replace rip rap and re-establish channel	80
Fox Point (V)	Mitigation	Create and expand ditches along West side of Beach Drive from 7600-7900 Block	80
Fox Point (V)	Mitigation	Place catchment systems in various ravines to catch debris that floats downstream in heavy rain events	80
Fox Point (V)	Mitigation	Upsize drainage pipes in select locations throughout the Village to alleviate blockage	80
Fox Point (V)	Mitigation	Address erosion issue on North side of Beach Drive Hill	80
Fox Point (V)	Mitigation	Remove and replace undersized drainage pipe throughout the village	80
Fox Point (V)	Mitigation	Remove obstructions in drainage channels at Regent Road / Regent Court and Indian Creek and Seneca	80
Glendale (Ci)	Mitigation	Impact and clean channel in wooded ravine north of Fairfield Court	81
Glendale (Ci)	Mitigation	Remove sediment and debris from Bender Creek	81
Glendale (Ci)	Mitigation	Continue to work in developing and implementing a water course system plan for the Milwaukee River, as it relates to floodplain ordinances, enforcement, and flood mitigation planning.	81-82
Glendale (Ci)	Mitigation	Removal of accumulated rocks downstream of the Silver Spring Drive culvert	82
Glendale (Ci)	Mitigation	Purchase and install of backflow preventer valves in 50 residences	82
River Hills (V)	Mitigation	Acquire repetitive loss structures	85
Wauwatosa (Ci)	Mitigation	Replacement of retaining wall on Blanchard Street pumping station	88
Wauwatosa (Ci)	Mitigation	Flood proofing of 3 repetitive loss structures	88
West Allis (Ci)	Mitigation	Work with local businesses to install storm water detention in large parking lots	89
Whitefish Bay (V)	Mitigation	Storm sewer replacement where needed	90
Waukesha HMP			
Waukesha County	Dams	Small, uncontrolled agricultural dams that can't handle a 100- or 500-year flood without overtopping.	75-77
Brookfield (Ci)	Repetitive Loss	7 RL properties	87
Butler (V)	Repetitive Loss	2 RL properties	87
Elm Grove (V)	Repetitive Loss	2 RL properties	88
Waukesha County	Mitigation	Targeting old structures for buy-out and convert the land to open, public lands. This also eliminates future damages by preventing building on this land.	93

Waukesha County	Mitigation	Pre-identifying infrastructure (roads, bridges, culverts, shoulders) prone to flooding and directing current and future budgetary dollars towards making the infrastructure disaster-resistant as it is scheduled for routine maintenance.	93
Waukesha County/com munities	Mitigation	Proposed road improvement projects (specific roads listed in table)	96
Waukesha County/com munities	Mitigation	Look for an acceptable (environmentally, socially, cost-benefit, politically, etc.) solution (e.g., pumping) for removing water from flood-prone areas, especially those that are basin/bowl shaped. Some of the potential solutions may include acquisitions, demolitions, flood proofing or moving water to surface streams.	97 & 241
Menomonee Falls (V)	Mitigation	Raise the road(s) and increase the flow capacity of the road(s) that service the Silver Meadows subdivision, which contains approximately 100 homes, on the west side of the village. There are only two access roads to the subdivision and the cross culverts are filled causing the roads to overtop by up to 1½ feet of water, which can close down the roads for over 24 hours. There is a child with special needs in the subdivision and all residents do not receive emergency services (fire, police, EMS) in floods. Residents have signed a petition to the village for assistance.	99 & 245
New Berlin (Ci)	Mitigation	Implement the mitigation measures in the City of New Berlin's Storm water Management Plan a possible. The plan contains mitigation measures such as an extensive stream bank stabilization project, creating retention ponds, waterway clearing and 13 homes that could be bought-out and converted to open space and/or retention ponds. The home buyouts were submitted for a mitigation grant but were denied except for one property (on Grange) that was bought-out.	100 & 246
Brookfield (Ci)	Mitigation	Buyout one repetitive loss residential property that, because of its topography, is prone to flooding. Demolish the structure and create a retention pond. The home, which is on Parkhurst Drive, is the only one in the area and it sits in a "bowl" that floods. Most recently, the home flooded on July 22, 2010 with the basement totally filling and six inches of water standing on the first floor living area.	101 & 246
Brookfield (Ci)	Mitigation	Purchase and raze repetitive loss structures from flood-prone areas or where properties are subject to surface water drainage up to and into the house. The project would also include re-grading property to provide detention of runoff to reduce drainage issues elsewhere in the neighborhood. The residential homes in the Imperial Estates subdivision and along urbanized creeks are subject to surface water flooding, some of which may impact the first floor living space. Others are subject to repetitive losses from sewer backups, which are likely receiving water from other flooded houses in the area.	101 & 247

Brookfield (Ci)	Mitigation	Flood proof repetitive loss structures adjacent to urbanized creeks or in or adjacent to low lying areas or floodplains. These residential properties have had flooding that may be “correctable” using flood proofing measures without purchasing the entire property or removing the house.	101 & 247
Brookfield (Ci)	Mitigation	Repair the severely eroded stream bank on Underwood Creek and replace driveway culverts over the creek upstream of this property with a bridge or box section. One property along this creek is experiencing significant property loss from erosion in this creek. Replacing the driveway culverts upstream of the property with a bridge or box section may reduce likelihood of repeated erosion.	101 & 247
Waukesha County (Town of Mukwonago)	Mitigation	Address flooding and roadway repairs associated with the Country Bliss subdivision. The preliminary solution is to install a force main and pumping station to take accumulated water out of a natural basin and pump it out. The accumulating water makes a few roads impassable and impacts a few properties. The flooding is primarily caused by elevated groundwater levels.	103 & 243
Menomonee Falls (V)	Mitigation	Purchase/raze and/or flood proof buildings susceptible to repeated flood damage. Bury utility distribution facilities wherever practical. Construct shoreline stabilization projects along rivers, streams, and channels prone to erosion during heavy storm events. Expand tree trimming and removal operations to maintain healthy trees within the community.	286
Waukesha County (Town of Mukwonago)	Mitigation	Our community has drafted a flood mitigation plan, but lacks funding for it.	287
City of Milwaukee HMP			
Milwaukee (Ci)	Mitigation	Milwaukee River ongoing work? Mitigate structures/flood proof 3 residential buildings	142 & 199

B. Data Available for Flood Risk Products

Data collected in preparation for the Discovery and Action Discovery meetings is contained in a file geodatabase named "Milwaukee_Discovery.mdb". The below data was updated as appropriate throughout the Discovery process, especially after talking with the Tier I and II communities where AOMIs were identified. The geodatabase containing all of this information was submitted to FEMA along with this report.

Table 21. Spatial Data Collected for Milwaukee Watershed

Data Types	Description	Source	Deliverable
Community Boundaries	Location of municipal boundaries	Wisconsin Department of Transportation	Discovery Map; Geodatabase
Community Comments	Points based on comments made at Discovery Meetings	Discovery	Discovery Map; Geodatabase
Coordinated Needs Management Strategy (CNMS)	Engineering study needs as defined by Phase 3 CNMS data	Region V CNMS inventory	Discovery Map; Geodatabase
County Boundaries	Location of county boundaries	USGS Topographic Maps	Discovery Map; Geodatabase
Dams	Location of dams	WDNR Inventory	Discovery Map; Geodatabase
Streams and Rivers	Streams included in the EPA 303(d) list of impaired streams	USGS Topographic Maps	Discovery Map; Geodatabase
FEMA Risk Ranking	Risk Ranking based on FEMA's 10 risk factors and population density (shown by Census Block Groups)	FEMA Risk MAP (Mapping, Assessment, and Planning)	Discovery Map; Geodatabase
Ice Jams	Location of ice jams	U.S. Army Corps of Engineers - Ice Jam Database	Discovery Map; Geodatabase
Letters of Map Change	Locations of letters of map change	FEMA Mapping Information Platform Database	Discovery Map; Geodatabase
Major Roads	Location of interstates and major highways	Wisconsin Department of Transportation	Discovery Map; Geodatabase
Special Flood Hazard Areas	Location of FEMA flood hazard areas	FEMA Digital Flood Insurance Rate Maps	Discovery Map; Geodatabase
Stream Gages	Location of stream gages operated by multiple agencies	USGS, National Weather Service - Advanced Hydrologic Prediction Service	Discovery Map; Geodatabase

Study Requests	Study requests taken from CNMS and local officials at Discovery meetings.	Discovery, Region V CNMS inventory	Discovery Map; Geodatabase
Watershed Boundaries	Hydrologic Unit Code-8, watershed boundaries	USGS National Hydrography Dataset	Discovery Map; Geodatabase

Topographic Data

Fond du Lac, Milwaukee and Waukesha counties acquired countywide LiDAR through a Community Development Block Grant (CDBG) as a result of severe flooding in 2008. This CDBG data is available to use for study and mapping purposes and has a vertical accuracy of 2 feet. The remaining counties of Dodge, Ozaukee, Sheboygan and Washington also have LiDAR data we can use for this project. Two additional communities, the Cities of Mequon and West Bend, have 1-foot vertically accurate LiDAR data. Milwaukee County will be acquiring new LiDAR data over the course of 2013 that they offered to share with us. We use the bare earth return points from the LiDAR dataset to create terrain data for the hydrologic, hydraulic and mapping processes.

Table 22. LiDAR Acquisition Dates

Community	Date Acquired
Dodge County	2006
Fond du Lac County	2011
Milwaukee County	2010; 2015 (projected)
Ozaukee County	2010
City of Mequon & Village of Thiensville	2010
Sheboygan County	2005
Washington County	2007
City of West Bend	2007
Waukesha County	2012

USGS Gages

The project team identified USGS stream gages in the watershed. The locations of the gages are shown on the Discovery map and listed below in Table 4.

Table 23. USGS Stream Gages

Gage Number	Station Name and Location
4086150	Milwaukee River At Kewaskum, WI
4086200	East Branch Milwaukee River At New Fane, WI
4086310	Mink Creek At County Trunk Hwy S Near Beechwood, WI
4086340	North Branch Milwaukee River Near Fillmore, WI
4086360	Milwaukee River At Waubeka, WI
4086400	Milwaukee River Tributary Nr Fredonia, WI
4086500	Cedar Creek Near Cedarburg, WI
4086600	Milwaukee River Near Cedarburg, WI

4087000	Milwaukee River At Milwaukee, WI
4087030	Menomonee River At Menomonee Falls, WI
4087050	Little Menomonee River Near Freistadt, WI
4087060	Noyes Creek At Milwaukee, WI
4087088	Underwood Creek At Wauwatosa, WI
4087100	Honey Creek At Milwaukee, WI
4087120	Menomonee River At Wauwatosa, WI
40871473	Wilson Park Creek @ Gmia Infall At Milwaukee, WI
40871476	Holmes Ave Ck Trb @ Gmia Outfall #1 @ Milwaukee, WI
40871488	Wilson Park Ck @ St. Lukes Hospital @ Milwaukee, WI
4087159	Kinnickinnic River @ S. 11Th Street @ Milwaukee, WI
4087160	Kinnickinnic River At Milwaukee, WI

Community Rating System (CRS)

The communities of New Berlin (City), Elm Grove (Village) and Ozaukee County participate in the CRS program. At the Discovery meeting Roxanne Gray, the State Hazard Mitigation Officer, spoke about the CRS program and its benefits to the community as well as its citizens. Given the State of Wisconsin’s stricter standards above federal regulations, it seems most communities would qualify for a Class 8 already (out of 10); therefore, the lower the class ranking, the higher the discount off flood insurance premium rates. For example, a Class 1 community would receive a 45% premium discount, while a Class 9 community would receive 5% off. A Class 10 community does not participate in the CRS. (FEMA website, National Flood Insurance Program Community Rating System.)

CNMS and NFIP Mapping Study Needs

There are a total of 630 stream miles mapped with Special Flood Hazard Areas (SFHA) shown on FEMA DFIRMS in the Milwaukee Watershed. Detailed SFHAs account for 359 miles, which was calculated from the Coordinated Needs Management System (CNMS) database. The CNMS database lists whether FEMA thinks each stream is “validated” or “requires assessment” depending on the type and age of study.

Levees

Table 24. Levees

Levee Name	Water Name	Community	Status
Hart Park Levee	Menomonee River	City of Milwaukee	TBD
Valley Park Levee	Menomonee River	City of Milwaukee	TBD

Floodplain Management/Community Assistance Visits (CAVs)

As the state coordinating agency for the National Flood Insurance Program, the Wisconsin Department of Natural Resources conducts Community Assistance Visits (CAVs) and Community Assisted Calls (CACs) as part of their floodplain management programs. A CAV/CAC typically consists of a tour of the floodplain to assess any recent construction activities, a review of the

local permitting process, and evaluation of the local floodplain ordinance. A meeting with the local floodplain official is held to discuss the NFIP, the local permitting process, any recent flood events, training opportunities, and any program deficiencies. Tables 7 and 8 list the communities in the watershed and the date of their latest CAV and/or CAC.

Table 25. Recent CACs

CID	Community	CAC Date	Closed Date	Agency
550270	Bayside, Village of	09/11/1995	12/03/2007	STATE
550271	Brown Deer, Village of	09/13/2005	07/11/2012	STATE
550271	Brown Deer, Village of	09/22/1993	12/03/2007	STATE
550425	Cascade, Village of	09/22/1993	12/03/2007	STATE
550578	Elm Grove, Village of	09/11/1995	12/04/2007	STATE
550274	Fox Point, Village of	09/15/1995	12/04/2007	STATE
550472	Germantown, Village of	10/10/2005	03/25/2013	STATE
550472	Germantown, Village of	08/19/1994	12/04/2007	STATE
550314	Grafton, Village of	09/27/1993	12/04/2007	STATE
550276	Greendale, Village of	08/16/1994	12/04/2007	STATE
550277	Greenfield, City of	09/08/1995	12/04/2007	STATE
550474	Kewaskum, Village of	09/15/1995	12/04/2007	STATE
550483	Menomonee Falls, Village of	12/27/1993	12/04/2007	STATE
550278	Milwaukee, City of	10/16/2012		STATE
550310	Ozaukee County	07/09/1993	07/09/1993	STATE
550316	Port Washington, City of	09/27/1993	12/04/2007	STATE
550429	Random Lake, Village of	09/19/1995	12/04/2007	STATE
550518	Richfield, Village of	09/28/2012	03/25/2013	STATE
550280	River Hills, Village of	09/28/1993	12/04/2007	STATE
550424	Sheboygan County	04/13/2011	12/01/2011	STATE
550424	Sheboygan County	09/21/1993	12/04/2007	STATE
550587	Slinger, Village of	12/27/1993	12/04/2007	STATE
550318	Thiensville, Village of	09/26/2005	03/25/2013	STATE
550318	Thiensville, Village of	09/18/1995	12/04/2007	STATE
550471	Washington County	09/08/1995	12/05/2007	STATE
550284	Wauwatosa, City of	09/28/2005	03/25/2013	STATE

Table 26. Recent CAVs

CID	Community	CAV Date	Closed Date	Agency
550270	Bayside, Village of	05/30/1986	05/01/2013	FEMA
550478	Brookfield, City of	05/24/2011		STATE
550478	Brookfield, City of	10/01/2003	07/19/2012	STATE
550478	Brookfield, City of	02/11/1999	07/19/2012	STATE
550478	Brookfield, City of	12/11/1991	12/04/2007	STATE
550271	Brown Deer, Village of	10/02/1997	09/14/2012	STATE
550425	Cascade, Village of	08/02/1994	12/05/2007	STATE
550094	Dodge County	03/17/1992	12/04/2007	STATE
550578	Elm Grove, Village of	08/17/2006	03/25/2013	STATE
550275	Glendale, City of	04/27/2010		STATE
550474	Kewaskum, Village of	08/09/2006		FEMA
550483	Menomonee Falls, Village of	05/19/1992	06/13/1994	STATE
550278	Milwaukee, City of	03/03/2011		STATE
550487	New Berlin, City of	02/01/1995	12/04/2007	STATE
550310	Ozaukee County	08/17/1994	12/04/2007	STATE
550424	Sheboygan County	06/30/1992	12/05/2007	FEMA
550587	Slinger, Village of	04/14/1992	12/05/2007	STATE
550285	West Allis, City of	08/17/1992	12/05/2007	STATE
550475	West Bend, City of	05/08/1992	12/05/2007	STATE

Regulatory Flood Study and Mapping

Countywide Digital Flood Insurance Rate Maps (DFIRMs) are available for all the affected counties except Washington (see Table 9). Washington County’s Letter of Final Determination (LFD) is June 17, 2013 and therefore will go effective December 17, 2013. At this moment, the most recent FIS is dated 2010 although Dodge, Washington and Waukesha Counties are scheduled to become effective again in late 2013 and early 2014 as part of the Upper and Lower Rock Watershed RiskMAP Projects. Table 10 has the dates for the previous Scoping and Open House meetings.

Table 27. Digital Flood Insurance Rate Map Status

County	Status	Effective Date
Dodge	Effective	04/19/2010
Fond du Lac	Effective	11/04/2009
Sheboygan	Effective	04/02/2009
Milwaukee	Effective	09/26/2008
Ozaukee	Effective	12/04/2007
Waukesha	Effective	11/19/2008
Waukesha	Future (Planned) Effective	11/05/2014
Washington	Effective	12/17/2013
Washington	Future (Planned) Effective	04/16/2015

VI. Final Assessment of Project Scope

The Milwaukee River Watershed is Wisconsin's highest priority for developing regulatory and non-regulatory RiskMAP products due to its large population, numerous streams which have flooding that places this population at risk, and proven track record successful mitigation projects. During the original Discovery process and again during Action Discovery to became very apparent that the communities in the Milwaukee River watershed have areas of significant concern related to flooding. The communities in the Milwaukee River Watershed have been on the forefront of mitigation, placing an emphasis on mitigation for over two decades. They identified several recent mitigation activities and additional areas of potential mitigation interest during the action discovery meetings and are looking for better data to use in the decision making process and justify projects. There are stream reaches where there the effective study no longer reflects the current flooding and others with development pressure and no detailed study available.

Two regional agencies, SEWRPC and MMSD also have a proven track record of helping communities assess and mitigate their flood risk. MMSD has coordinated and backed over \$270 of flood mitigation activities in the watershed and the data provided through the RISMAP process will help them prioritize future decision making and funding decisions. The Risk Map process will provide an opportunity to incorporate over 80 miles of floodplain analysis work done by SEWRPC into the dFIRMs. MMSD has been very active in identifying funding mitigation activities in the watershed

The results of the Discovery process indicate a strong recommendation to proceed with Data Development on all priority streams identified by the watershed stakeholders immediately while communities are fully engaged with the process started with Discovery two years ago.

V. Bibliography

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<http://mmsd.com/floodmanagement/county-grounds>

Southeastern Wisconsin Regional Planning Commission (SEWRPC), 2014.

<http://www.sewrpc.org/SEWRPC/Environment/FloodlandandStormwareManagemen.htm>

U.S. Census Bureau, 2010.

http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?_afpt=table

U.S. Environmental Protection Agency, Milwaukee Watershed, last edited June 2012.

https://wiki.epa.gov/watershed2/index.php/Milwaukee_Watershed

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<http://dnr.wi.gov/water/basin/milw/>

Appendix A: Discovery Meeting Presentation by Wisconsin Emergency Management



Why Plan?

Roxanne Gray
State Hazard Mitigation Officer

Millwaukee River Watershed Discovery
May 16, 2013





What is Mitigation?

"Mitigation is any sustained action taken to eliminate or reduce the long-term risk to human life and property from natural and technological hazards"






Break the Cycle





Why Do We Mitigate?

In Wisconsin

- \$3 billion in Disaster-related damages last 3 decades
- 12 Federal Disaster Declarations in the 90's compared to 6 in the 80's
- 2000, 2001, two in 2002, 2004, 2007, 2008, two in 2010, 2011, 2012
- 2 snow emergencies (2000 and 2008)






WEM Hazard Mitigation

- Over \$110 million in last 21 years through HMGP/FMA/PDM
- Acquisition and Demolition
- Floodproofing and elevation
- Relocation
- Wind Retrofit
- Safe Rooms
- River Gauges
- NOAA Weather Radios
- Mitigation of utilities
- Education
- Structural (detention ponds, stormwater management, etc.)
- All Hazard Mitigation Plans






HMA Project Highlights

WEM Grants Management by Activity (1990-2012)

Activity	Amount of Grant Funding (Million \$)
All Other Activities	\$20,308,992
Acquisition/Demolition/Elevation	\$75,809,511

- 698 property acquisitions
- 43 structures floodproofed and/or retrofit
- 25 structures elevated
- 1 structure relocated

Value of Mitigation



For every \$1 spent on mitigation, \$4 is saved in future damages.
(Per the National Institute of Building Sciences -2005)

Loss Avoidance

Evaluating Losses Avoided through Acquisition Projects, October 2010

- City of Wauwatosa
 - Actual event data and losses avoided
 - Project Cost: \$716,837
 - Losses Avoided: \$1,059,101
 - ROI: 148%

Loss Avoidance

- City of Milwaukee, Villages of Oak Creek and Brown Deer
 - HAZUS modeling and are based on a one-time, 100-year flood event
 - Project Costs: \$2,237,562
 - Losses Avoided: \$1,096,412
 - ROI: 49%
 - ROI will increase with subsequent events

Examples of Mitigation



Acquisition/Demolition



Communities acquire land, demolish structures and keep the land in open space designation

Images from Darlington, WI

Elevation



Elevation raises a structure out of the floodplain. Wisconsin has specific regulations to follow with elevation projects. See DNR for more information.

Image from Soldiers Grove, WI



Floodwall



Floodwalls can prevent water from inundating structures that cannot be elevated, relocated, or demolished.

Image from Darlington, WI



Community Safe Room

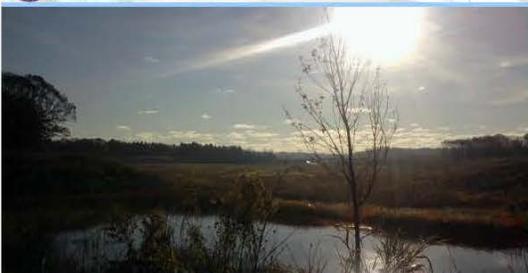


Community Safe Rooms built to FEMA-361 standards can withstand winds up to 250 MPH

Image from Town of Dunn, WI



Stormwater Detention



Detention ponds can store storm water runoff, decreasing flash flooding in urban areas.

Image from MMSD Stormwater Detention Project (Wauwatosa, WI)



Stormwater



Stream restoration allows watersheds to better manage flooding

Image from Thiensville, WI



River Warning Systems



River warning systems installed on conservation dams to warn county officials about expected dam breaching.

Images from Vernon County



Other Projects



- Raise appliances and utilities
- Install back-flow valves
- Retrofit for wind resistance
- Education and Public Awareness
- INSURANCE (flood and sewer)
- Land use planning

Benefits of Mitigation

- Protect the health/safety of citizens
- Preserve or expand tax base
- Attract or retain business/industry
- Revitalize a depressed area




Benefits of Mitigation

- Enhance recreation and tourism
 - Parks
 - Trails
- Increase Community Pride & improve quality of life
- Save Tax Dollars




Mitigation Planning






Disaster Mitigation Act of 2000

- Public Law 106-390 signed into law 10/30/00
- Establishes a national disaster hazard mitigation program
 - Section 203: Pre-Disaster Mitigation Program
 - Section 322: Mitigation Planning Requirement




Vision of DMA 2000

- To reduce disaster losses thru pre-disaster mitigation planning by pre-identifying, cost-effective mitigation.
- Mitigation planning would then streamline and speed up the recovery process



Mitigation Planning



- Describe actions to mitigate hazards, risks, and vulnerabilities
- Establish strategy to implement those actions
- Pre-identify projects to ensure comprehensive, integrated approach to hazard reduction

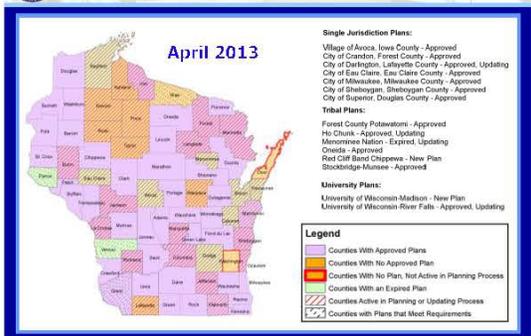
Local/Tribal Mitigation Plan Criteria

- Local Planning – 44 CFR Part 201.6
- Tribal Planning – 44 CFR Part 201.7
- Components
 - Planning Process
 - Risk Assessment
 - Mitigation Strategy
 - Plan Maintenance Process
 - Plan Adoption
 - Plan Review

Planning Deadlines

- Must have an approved All Hazards Mitigation Plan to receive PDM, HMGP, FMA, SRL (exception RFC)
- Local Plans have to be reviewed, updated, and re-approved every 5 years

Hazard Mitigation Planning in WI



Planning Status

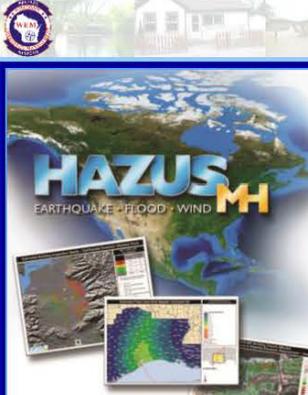
- Dodge County: Plan expired 3/7/12; update in process
- Fond du Lac County: Plan expires 6/22/15
- Milwaukee County: Plan expires 6/11/17
- Ozaukee County: Plan expires 3/18/14; update at FEMA for approval
- Sheboygan County: Plan expires 11/7/13; update in process

Planning Status

- Washington: Has no plan
- Waukesha County: Plan expires 3/15/16
- City of Milwaukee: Plan expires 6/11/17
- City of Sheboygan: Plan expires 8/30/17

Mitigation Actions

Mitigation actions identified through RiskMAP process need to be coordinated with the county hazard mitigation planning process.



HAZUS-MH

- FEMA's standardized risk assessment methodology to estimate potential losses from flood, wind, and earthquake hazards
- GIS-based software
 - Interfaces with ESRI
- Free to download
- Version 2.1 (2012)
 - Updated damage/loss functions
 - Hazard-specific data updated



Wisconsin HAZUS Risk Assessment

- FFY 07 Pre-Disaster Mitigation Grant
- Coordination with Land Information and Computer Graphics Facility (LICGF) at UW – Madison and The Polis Center at Indiana University – Purdue University at Indianapolis (IUPUI)
- State wide riverine runs for all 72 counties and coastal runs for counties along Lake Superior and Lake Michigan
- Uses Digital Elevation Maps (DEM)
 - DFIRMs where available
 - Better the data, better the ending product

Land Information & Computer Graphics Facility The Polis Center
We bring things into perspective.



HAZUS-MH WI Risk Assessment

- Results were a 100-year flood analysis for each county
- Data estimates are derived from census data incorporated into HAZUS



HAZUS-MH WI Risk Assessment

Occupancy	Estimated Total Buildings	Total Damaged Buildings	Total Building Exposure X 1000	Total Economic Loss X 1000	Building Loss X 1000
Agricultural	9	0	\$222,488	\$10,306	\$2,506
Commercial	1,778	34	\$6,950,225	\$158,492	\$38,671
Education	34	0	\$757,459	\$7,856	\$1,665
Government	157	3	\$470,664	\$8,638	\$932
Industrial	269	0	\$2,024,873	\$73,478	\$19,549
Religious/Non-Profit	74	0	\$627,954	\$13,646	\$1,851
Residential	117,741	551	\$26,888,748	\$188,061	\$115,171
Total	120,062	588	\$37,942,411	\$460,477	\$180,345



Public Assistance Program

Incorporate cost-effective mitigation measures when repairing damaged public facilities.




Black River Falls, WI



Unified Hazard Mitigation Assistance Program

- Hazard Mitigation Grant Program
- Pre-Disaster Mitigation Program
- Flood Mitigation Assistance Program
- Repetitive Flood Claims Program
- Severe Repetitive Loss Program

Eligible Sub-Applicants

Entity	Program Name				
	HAZARD MITIGATION GRANT PROGRAM	PDM	FMA	RFC	SEVERE REPETITIVE LOSS
State Agencies	✓	✓	✓	✓	✓
Tribal Governments	✓	✓	✓	✓	✓
Local Governments	✓	✓	✓	✓	✓
Private Non-Profit Organizations (PNPs)	✓				

Cost Sharing

Programs	Mitigation Activity Grant (Percent of Federal/Non-Federal Share)	Management Costs (Percent of Federal/Non-Federal Share)	
		Grantee	Sub-Grantee
HMGP	75/25	100/0	0/100
PDM	75/25	75/25	75/25
PDM – Sub-grantee is a small impoverished community	90/10	75/25	90/10
PDM – Tribal grantee is small impoverished community	90/10	90/10	90/10
FMA	75/25	75/25	75/25
FMA – severe repetitive loss property with Repetitive Loss Strategy	90/10	90/10	90/10
RFC	100/0	100/0	100/0
SRL	75/25	75/25	75/25
SRL – with Repetitive Loss Strategy	90/10	90/10	90/10

Requirements

- Participating in the NFIP and in good standing
- Cost-Beneficial
- Environmentally Sound
- Considered other alternatives
- Best alternative
- Independently solve the problem
- Plan requirement (except RFC)



Mitigation Program Priorities

- Substantially Damaged Properties
- Severe Repetitive Loss and Repetitive Loss Properties



RLP/SRL

- Dodge County: None
- Fond du Lac County: 5 RLP
- Milwaukee County: 251 RLP
- Ozaukee County: 25 RLP
- Sheboygan County: 1 RLP
- Washington County: 4 RLP and 2 SRL
- Waukesha County: 27 RLP

Dodge County

- HMGP:
 - Dodge County: \$34,508 NOAA Weather Radios
 - Dodge County: \$19,894 Planning
- PDM:
 - Dodge County: \$22,976 Planning
- TOTAL: \$77,378



Fond du Lac County

- HMGP
 - Oakfield School: \$202,216 reinforced walls in new school
 - Village of N. Fond du Lac: \$228,063 acquisition/demolition
 - City of Fond du Lac: \$1,342,410 acq/demo
- FMA
 - Village of N. Fond du Lac: \$119,132 acq/demo
 - Village of N. Fond du Lac: \$12,743 Planning



Fond du Lac County

- PDM
 - Fond du Lac County: \$73,154 Planning
 - Fond du Lac County: \$42,324 Planning
- TOTAL: \$2,020,042



Milwaukee County

- HMGP
 - City of Milwaukee: \$1,545,412 acq/demo & floodproofing
 - Milwaukee County: \$70,117 education/outreach
 - City of Oak Creek: \$112,182 acq/demo
 - City of Wauwatosa: \$2,168,097 acq/demo
 - City of Milwaukee: \$91,630 acq/demo
 - Village of Brown Deer: \$1,018,831 acq/demo
 - Milwaukee County: \$11,510 Planning
 - City of Glendale: \$930,686 acq/demo
 - Village of Whitefish Bay: \$4,191,375 stormwater



Milwaukee County

- FMA
 - City of Milwaukee: \$5,000 Planning
 - City of Oak Creek: \$5,000 Planning
- PDM
 - City of Milwaukee: \$23,000 Planning
 - Milwaukee County: \$27,927 Planning
 - City of Milwaukee: \$40,000 Planning
- TOTAL: \$10,240,767



Ozaukee County

- HMGP
 - Village of Thiensville: \$123,047 Detention Pond
- FMA
 - Ozaukee County: \$9,733 Planning
- PDM
 - Village of Thiensville: \$2,308,620 stormwater improvements
 - Ozaukee County: \$50,000 Planning
 - Ozaukee County: \$32,800 Planning
- TOTAL: \$2,524,200



Sheboygan County

- HMGP
 - City of Sheboygan: \$1,873,000 acq/demo
- PDM
 - City of Sheboygan: \$30,156 Planning
 - Sheboygan County: \$53,000 Planning
- TOTAL: \$1,956,156

 **Waukesha County**

- **HMGP**
 - City of Brookfield: \$139,203 acq/demo
 - City of Brookfield: \$140,060 acq/demo
 - Village of Elm Grove: \$921,601 acq/demo
 - Village of Elm Grove: \$721,319 acq/demo
 - Village of Elm Grove: \$281,351 acq/demo
 - Village of Menomonee Falls: \$1,969,799 acq/demo
 - Village of Menomonee Falls: \$397,396
 - Village of New Berlin: \$93,947 acq/demo

 **Waukesha County**

- **FMA**
 - City of Brookfield: \$10,000 planning
 - City of Brookfield: \$46,267 acq/demo
 - City of Brookfield: \$140,219 acq/demo
- **PDM**
 - Waukesha County: \$63,976 planning
 - Village of Elm Grove: \$4,369 planning
 - TOTAL: \$4,929,507

 **Community Rating System**

- New Berlin (7), Elm Grove (5-awesome!) and Ozaukee County (8) participating
- Discounts for property owners on flood insurance policies
- Levels 10 – 1
- Discounts in 5% increments depending on level
- Points for public information, mapping and regulations, flood damage reduction, flood preparation

 **Questions?**



Contact Info:

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 State Hazard Mitigation Officer
 (608) 242-3211
Roxanne.Gray@Wisconsin.gov

Appendix B: Discovery Meeting Presentation by Wisconsin DNR



Discovery Meeting: Milwaukee Watershed

May 16, 2013




Introductions

- Risk MAP Project Team
- Local partners and officials
- State partners and officials
- Other Federal Agency partner representatives
- Private-sector entity representatives



2



Agenda

- Communities in Milwaukee Watershed
- Risk MAP Program Overview
- Discovery Overview & Discussion
- Flood Risk Assessment Products Overview
- Mitigation Planning and Communication
- Questions to Consider
- Next Steps




3




Risk MAP Program and Project Overview




Program Overview

- **Risk MAP**
 - Mapping – Flood hazard and risk identification
 - Assessment – HAZUS and other risk assessment tools
 - Planning – Hazard mitigation planning and HMA grants
- **Risk MAP Vision**
 - Deliver quality data
 - Increase public awareness of flood risk
 - Encourage local/regional actions that reduce risk

RiskMAP
Increasing Resilience Together




4



Risk MAP Project Benefits

- **Flood risk products and flood hazard maps that are:**
 - Developed by FEMA in accordance with communities
 - Based on the best available data from the community and latest technologies
 - Conducted by watershed
 - Strengthened by partnerships
- **Risk MAP tools and data can be used to:**
 - Create or improve your Hazard Mitigation Plans
 - Make informed decisions about development, ordinances, and flood mitigation projects
 - Communicate with citizens about flood risk



5



Risk MAP Project Timeline



3-5 Year Process

*Kickoff and subsequent steps will only occur if a Risk MAP project is conducted.



7



Communities in Watershed

Milwaukee Watershed

- Counties: Dodge, Fond du Lac, Milwaukee, Ozaukee, Sheboygan, Washington and Waukesha
- 39 additional communities
- 630 total mapped stream miles
 - 359 miles of detailed studies
 - 271 miles of approximate studies

Focus Areas:

- Studied streams with outdated methodologies
- Unstudied streams with development pressure or other issues



8



Discovery Process

- Data Collection**
 - Collect information about the communities in the watershed
 - Develop draft Discovery Report and Map
- Discovery Meeting**
 - Present potential flood risk products and get feedback
 - Discuss and prioritize areas needing flood risk study
 - Discuss local planning and communication assistance
- Outcome**
 - Finalize Discovery Report and Map
 - Develop a scope of work and budget for Risk MAP project
 - Determine available local contributions



9



Floodplain Mapping

- FEMA funding determination**
 - September 2013
- Field Survey**
 - Spring/Summer 2014
- Hydrologic & Hydraulic Engineering**
 - Fall/Winter 2014-2015
- FIRM Mapping & Non-Regulatory Products**
 - Based upon availability of grants – Summer 2015

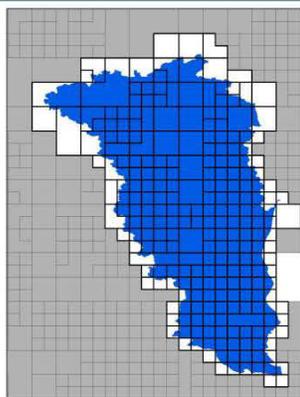


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Floodplain Mapping

- Physical Map Revision (PMR)**
 - Revised panels only for new studies
- Revised Map Panels & FIS Report**
 - Adopted by affected communities



11

Next Steps

- Based on today's discussion and WDNR 5-level ranking system, project scope is developed (areas to be studied)**
 - Streams currently mapped as Zone AE where the study has been deemed "Invalid" (CNMS).
 - Gaps between detailed studies that are either currently mapped as Zone A or not mapped at all.
 - Streams currently mapped as Zone A where a community request was made to study the reach in detail.
 - Streams currently mapped as Zone A that will be engineered, but remain mapped as Zone A.
 - Streams that are not currently mapped where a community request was made to study the reach in detail.



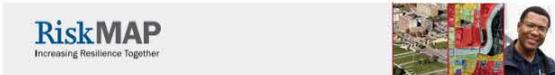
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Next Steps

- After Discovery Meeting:
 - Compile comments, update Discovery Map with community concerns
 - Results posted on WDNR Floodplain Mapping website
 - 2-week comment period for additional/missed issues
 - Update Discovery Report and map with results of the meeting and finalized scope of work

Flood Risk Assessment Products



Program Product Comparisons

Traditional Regulatory Products

DFIRM Database

Flood Insurance Study

*Subject to statutory due-process requirements

Non-Regulatory Products

Flood Risk Database

Flood Risk Report

*Not subject to statutory due-process requirements

Flood Risk Report

Flood Risk Report

The project area including: Watershed USA, Village of Cornwell, Village of Orleans, City of Franklin, Town of Franklin, County of Columbia, and County of...

Report Number: 003

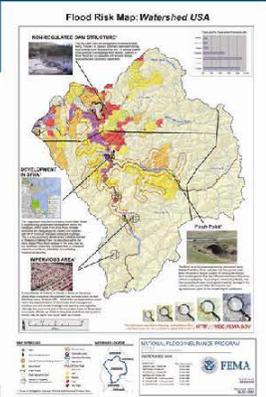
DATE: 01/11/11

FEMA RiskMAP

- **Background**
 - Purpose, Methods
 - Risk Reduction Practices
- **Project Results**
 - Changes Since Last FIRM
 - Depth & Analysis Grids
 - Flood Risk Assessment
 - Enhanced Analyses
- **Summarized by Locations**
 - Communities and Watersheds

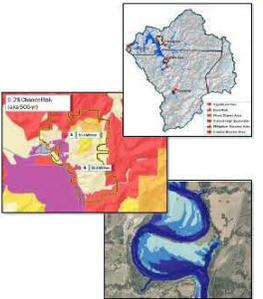
Flood Risk Map

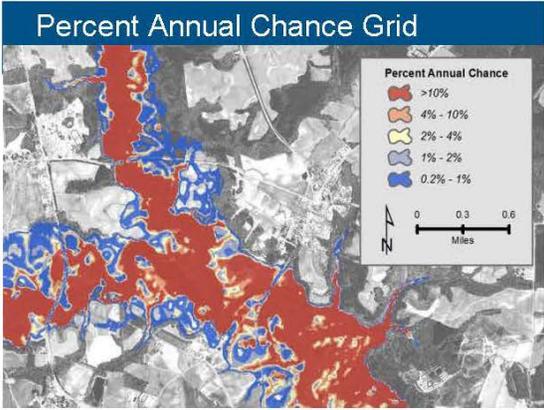
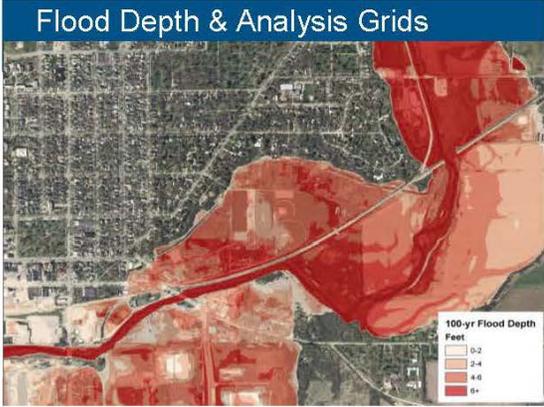
- **Visually Promotes Risk Awareness**
 - Contains results of Risk MAP project non-regulatory datasets
 - Promotes additional flood risk data not shown but located within the Flood Risk Database



Flood Risk Products

- Changes Since Last FIRM
- Depth and Analysis Maps
- Flood Risk Assessment (HAZUS)
- Areas of Mitigation Interest (if applicable)

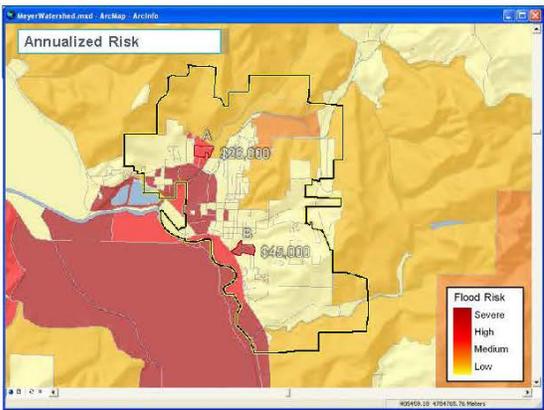
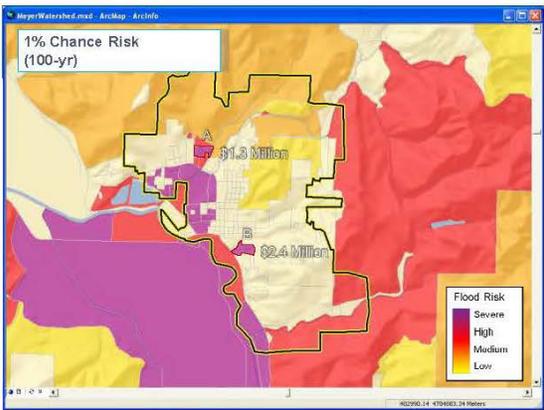




Flood Risk Assessment

- **HAZUS = GIS-based hazard loss estimation software**
- **Quantifies flood risk in dollars:**
 - Potential damage severity for different flood frequencies
 - Identify locations with possible cost effective mitigation options
- **Identifies areas of relative flood risk:**
 - Floodprone areas (census block)
 - Vulnerable people and property
- **Helps estimate potential losses due to flood risk:**
 - Losses from Average Annualized Loss (AAL) Study
 - Refined losses from new flood study depth grids, local building data

FEMA RiskMAP



Areas of Mitigation Interest (AOMI)

- **Opportunity for flood risk reduction:**
 - Community identified hot spots
 - Previous clusters of claims
 - Riverine and coastal flood control structures (dams, levees, berms)
 - Floodplain "pinch points" (undersized culverts and bridge openings)
 - Significant proposed and recent floodplain development
 - Locations of successful mitigation projects



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RiskMAP
Increasing Resilience Together



Mitigation Planning and Communication

RiskMAP
Increasing Resilience Together



Moving Beyond Floodplain Maps



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Flood Risk Data and Discovery Maps

RiskMAP
Increasing Resilience Together



Data Collection

- **From the communities we look for:**
 - Infrastructure information for levees and new bridges, dams, culverts, and road improvements
 - Building footprints or parcel data
 - Boundary, hydrography, and transportation layers
 - Elevation data



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RiskMAP
Increasing Resilience Together

County LiDAR Dates

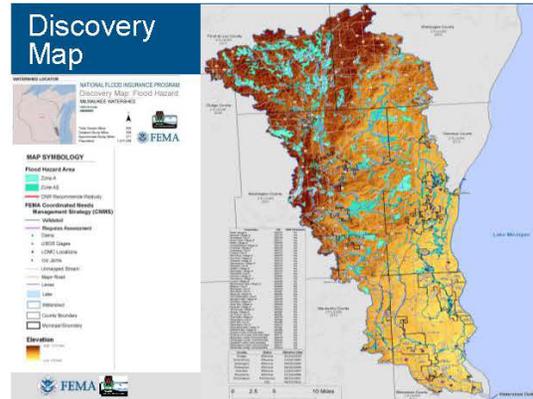
- Dodge – 2006 LiDAR available
- Fond du Lac – 2011 LiDAR available
- Milwaukee – 2010 LiDAR available
- Ozaukee – 2010 LiDAR available
- Sheboygan – 2005 LiDAR available
- Washington – 2007 LiDAR available
- Waukesha – 2012 LiDAR available



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RiskMAP
Increasing Resilience Together

Data Types	Description	Source
Average Annualized Loss	FEMA's Level 1 HAZUS Average Annualized Loss Analysis	FEMA & WEM
Community Boundaries	Location of municipal boundaries	Wisconsin Department of Transportation
Coordinated Needs Management Strategy (CNMS)	Engineering study needs as defined by Phase 3 CNMS data	Region V CNMS inventory
County Boundaries	Location of county boundaries	USGS Topographic Maps
Dams	Location of dams	WDNR Inventory
Streams and Rivers	Stream centerlines based on USGS topo quads	USGS Topographic Maps
HUC-8 Watershed	Watershed boundary	USGS Watershed Boundary Data
Ice Jams	Location of ice jams	U.S. Army Corps of Engineers - Ice Jam Database
Letters of Map Change	Locations of letters of map change	FEMA National Flood Hazard Log
Major Roads	Location of interstates and major highways	Wisconsin Department of Transportation
Special Flood Hazard Areas	Location of FEMA flood hazard areas	FEMA Digital Flood Insurance Rate Maps
Stream Gages	Location of stream gages operated by multiple agencies	USGS National Hydrography Dataset
Watershed Boundaries	Hydrologic Unit Code-8, watershed boundaries	USGS National Hydrography Dataset
Wetland	Wetland delineations digitized from 24K USGS topo quads	Wisconsin DNR



Examples of Areas of Concern

- Area of Concern #1 - Village of Kewaskum**
 - Potential study needs – Kewaskum Creek, Edgewood Creek, North Creek
- Area of Concern #2 – NE Milwaukee County/Southern Ozaukee County**
 - Potential study needs – Beaver Creek, Fish Creek, Brown Deer Park Creek, Indian Creek
 - Reason: Encroaching development in the mapped floodplain voids current study due to either change in topography or increase in the 100-yr elevation

The figure contains two maps. The top map shows a flood hazard area with a legend and scale. The bottom map shows a flood hazard area with a legend and scale. Both maps include the FEMA logo and the RiskMAP logo.

Break Out Session

The figure shows the FEMA logo and the RiskMAP logo.

Questions to Consider

- Do you have flood hazard data used for planning/management not reflected on the FIRM?
- Are there inaccuracies in the FIRMs for your community? Where?
- Are there new road crossings that are not reflected on the FIRM?
- Are there areas of high population (or population growth) where a Zone A exists on the FIRM?
- Are there areas of future development pressure where a mapped floodplain would be helpful to identify risk?
- Where are problem flooding areas?
- Where are areas of concern for emergency response, i.e., evacuation routing, critical facilities, other vulnerabilities?
- Do you agree with the identified requests and needs currently shown on FEMA's Discovery Map?
- How would you prioritize these issues and needs?

The figure shows the FEMA logo and the RiskMAP logo.

Appendix C: Discovery Project Team Contact Information

Colleen Hermans, GIS Project Lead
Wisconsin DNR – WT/3
101 South Webster Street
P.O. Box 7921
Madison, WI 53707-7921
Colleen.Hermans@Wisconsin.gov
608-264-8988

Tanya Lourigan, P.E., Regional
Engineer- Milwaukee & Ozaukee
Counties
3911 Fish Hatchery Road
Fitchburg, WI 53711
Tanya.Lourigan@Wisconsin.gov
608-275-3287

Meg Galloway, P.E., Section Chief
Wisconsin DNR – WT/3
101 South Webster Street
P.O. Box 7921
Madison, WI 53707-7921
Meg.Galloway@Wisconsin.gov
608-266-7014

Katie McMahan, Program Manager
Wisconsin DNR – WT/3
101 South Webster Street
P.O. Box 7921
Madison, WI 53707-7921
Katie.McMahan@Wisconsin.gov
608-264-9204

Chris Olds, P.E., Engineering Lead
Wisconsin DNR – WT/3
101 South Webster Street
P.O. Box 7921
Madison, WI 53707-7921
Christopher.Olds@Wisconsin.gov
608-266-5606

Michelle Hase, P.E., Regional Engineer-
Fond du Lac, Sheboygan, Washington &
Waukesha Counties
141 NW Barstow St, Room 180
Waukesha, WI 53188
Michelle.Hase@wisconsin.gov
262-574-2127

Rob Davis, P.E., Regional Engineer-
Dodge County
3911 Fish Hatcher Road
Fitchburg, WI 53711
Robert.Davis@Wisconsin.gov
608-275-3316

Gary Heinrichs, Senior
Planner/Insurance Policy Analyst
Wisconsin DNR – WT/3
101 South Webster Street
P.O. Box 7921
Madison, WI 53707-7921
Gary.Heinrichs@Wisconsin.gov
608-266-3093

Appendix D: Discovery Meeting Invitation Example

State of Wisconsin
DEPARTMENT OF NATURAL RESOURCES
101 S. Webster Street
Box 7921
Madison WI 53707-7921

Scott Walker, Governor
Cathy Stepp, Secretary
Telephone 608-266-2621
Toll Free 1-888-936-7463
TTY Access via relay - 711



April 17, 2013

Name
Title
Street
City, State ZIP

Dear Local Official:

On behalf of FEMA and the Wisconsin Department of Natural Resources (WDNR), we would like to invite you to attend a Discovery meeting on May 16, 2013 to discuss a new project in the Milwaukee watershed. Please plan to attend one of two meetings, whichever works best with your schedule, at 10:00 a.m. or 3:00 p.m. (details provided below). As part of FEMA's Risk Mapping, Assessment, and Planning (Risk MAP) program, the WDNR will be working with communities across the Milwaukee watershed to enhance understanding of flood risk and mitigation efforts.

The Discovery process is the first step in determining whether a Risk MAP project is needed within your watershed. The information exchanged between FEMA and the communities within your watershed during Discovery will improve our understanding of your flood hazard mapping, flood risk, mitigation planning, and communication needs. The purpose of this meeting is to:

- Provide an overview of the project.
- Discuss the project scope, including which individual streams may be studied.
- Collect your feedback on the project in order to finalize the scope of work.
- Gather data and study information and.
- Discuss the project timeline.

At the meeting, we will review the flood risk data we have gathered to date, discuss your community's flooding history, development plan, flood risk concerns, storm water and floodplain management activities and other daily operations that impact your flood risk (e.g., cleaning of drainage ditches, culverts).

The meetings will be held as follows:

May 16, 2013 at 10:00 a.m.
Radisson North Shore – Room Venice 1
7065 N. Port Washington Rd.
Glendale, WI

or

May 16, 2013 at 3:00 p.m.
Public Agency Center – Room 3224
333 E. Washington St.
West Bend, WI

We thank you for supporting this effort and encourage you to attend this important meeting, especially as a recent national survey showed that people expect to hear about flood risk from their local officials more than any other individual or organization. Elected officials, as well as floodplain managers, planners, engineers, building department staff, GIS staff and any other representatives you deem appropriate are all invited, and we ask that you pass along a copy of this invitation to whoever you feel should attend the meeting. The partnership between FEMA and your community is vital to our success in identifying flood risks and needs that may exist. To learn more, please contact me at (608) 264-8988 or colleen.hermans@wisconsin.gov. We look forward to seeing you at the meeting.

Sincerely,

Colleen Hermans
GIS Project Lead, Floodplain Management Program
Wisconsin DNR

Appendix E: Discovery Meeting Attendance Lists

Risk MAP Meeting Sign In

Date: 5/16/13 Time: 10am

Watershed: Milwaukee County: Glendale State: WI

Please provide us with the following information

Name: Todd Stuebe
 Title: Dir. of Community Dev
 Community: Glendale Organization / Office: _____
 Telephone: 414-228-1704 Email: T.Stuebe@Glendale-wi.org

Name: Dave Erdman
 Title: Director of City Services
 Community: Glendale Organization / Office: _____
 Telephone: 414 228-1746 Email: _____

Name: Tom JOHNSON
 Title: ZONING ADM.
 Community: GRAFTON Organization / Office: INSPECTION DEPT
 Telephone: 262-375-5305 Email: TJOHNSON@VILLAGE.GRAFTON.WI.US

Name: PATRICK WALKER
 Title: GIS SUPERVISOR
 Community: WEST ALLIS, WI Organization / Office: CITY HALL/IT
 Telephone: 414-302-8328 Email: PWALKER@CI.WEST-ALLIS.WI.US

Name: Terrence Tavera
 Title: Sn. Project Engineer
 Community: Thiensville Organization / Office: Ruebert Mielke
 Telephone: 262-542-5733 Email: Tavera@ruebert-mielke.com

Name: JAC ZADON
 Title: Assistant P.R. of Community Development
 Community: Mcquon Organization / Office: City of Mcquon
 Telephone: 262 236 2904 Email: JZADON@ci.mcquon.wi.us

Risk MAP Meeting Sign In

Date: 5/16/13 Time: 10am

Watershed: Milwaukee County: Glendale State: WI

Please provide us with the following information

Name: Theresa Caven, PE
Title: Project Engineer
Community: City of Brookfield Organization / Office: _____
Telephone: 262-787-3547 Email: CAVEN@ci.brookfield.wi.us

Name: BILL WEHRLEY
Title: CITY ENGINEER
Community: WAUWATOSA Organization / Office: _____
Telephone: 414-479-8929 Email: wwehrley@wauwatosa.net

Name: Roxanne Gray
Title: SHMO
Community: WEM / State Organization / Office: WEM
Telephone: 6082423211 Email: Roxanne.gray@wi.gov

Name: Choi Lear
Title: Village Mgr
Community: River Hills Organization / Office: _____
Telephone: 414-352-8213 Email: clear@vil.river-hills.wi.us

Name: David Fauler
Title: Senior Project Mgr
Community: MMSD Organization / Office: MMSD
Telephone: 414-277-6368 Email: DFauler@mmsd.com

Name: Michael A. West
Title: Village President MMSD community chair
Community: Fox Point MMSD Organization / Office: _____
Telephone: 352-2712 Email: MWest@csd-eng.com

Risk MAP Meeting Sign In

Date: 5/16/13 Time: 10:00

Watershed: Milwaukee County: but 6/10/13 State: WI

Please provide us with the following information

Name: Jack Morrison
Title: EM Director
Community: Sauville Organization / Office: Village
Telephone: 262-284 9423 Email: JMORRISON@VILLAGE.SAUVILLE.WI.US

Name: Ray Wilhelm
Title: DPE Engineer
Community: Sauville Organization / Office: _____
Telephone: 262 284 9423 Email: R.WILHELM@VILLAGE.SAUVILLE.WI.US

Name: Peter Daniels
Title: Principal Engineer
Community: West Allis Organization / Office: Engineering Dept
Telephone: 414 302-8274 Email: p.daniels@westallis.wi.gov

Name: Cindi DeBruine PE, CFM
Title: Sr Water Resources Engineer
Community: West Milwaukee Organization / Office: RASmithNational
Telephone: 262-317-3254 Email: cindi.debraine@rasmithnational.com

Name: Tammy Szudy
Title: Principal Planner
Community: Wauwatosa Organization / Office: Development
Telephone: 479-3521 Email: tszudy@wauwatosa.net

Name: Matthew Mrochinski
Title: Code Administrator
Community: Sheboygan County Organization / Office: Planning & Conservation
Telephone: 920 459 3060 Email: matthew.mrochinski@sheboygancounty.com

Risk MAP Meeting Sign In

Date: 5/16/13 Time: 10am

Watershed: Milwaukee River County: Glendale State: WI

Please provide us with the following information

Name: MIKE HAHN
Title: CHIEF ENVIRONMENTAL ENGINEER
Community: SEWRPC Organization / Office: _____
Telephone: 262-547-6722, Email: mhahn@sewrpc.org
ext. 243

Name: Maggie Anderson
Title: Civil Engineer
Community: Wauwatosa Organization / Office: Engineering
Telephone: 414-479-3444 Email: manderson@wauwatosa.net

Name: Alex Henderson
Title: Deputy Village Manager
Community: Boyside Organization / Office: _____
Telephone: 414-351-8812 Email: ahenderson@boyside-wi.gov

Name: Matt Carran
Title: Dir. of Community Development
Community: Menomonee Falls Organization / Office: _____
Telephone: 262-532-4274 Email: mcarran@menomonee-falls.org

Name: Kimberly Berginnis
Title: Disaster Planner
Community: WEM Organization / Office: _____
Telephone: 608-242-3219 Email: Kimberly.Berginnis@wi.gov

Name: _____
Title: _____
Community: _____ Organization / Office: _____
Telephone: _____ Email: _____

Risk MAP Meeting Sign In

Date: 5/16/13 Time: 10am

Watershed: Milwaukee County: Glendale State: WI

Please provide us with the following information

Name: Kathryn Fabian
Title: Zoning Administrator
Community: Sheboygan County Organization / Office: Planning + Conservation
Telephone: (920) 459-3753 Email: kathryn.fabian@sheboygancounty.com

Name: Tom Wliza
Title: Dir. of Public Works
Community: CITY OF CEDARBURG Organization / Office: CITY HALL
Telephone: 262-375-7610 Email: TWIZA @ Ci.CEDARBURG.WI.US

Name: KURT FREDRICKSON
Title: Supervisor of PW
Community: River Hills Organization / Office: _____
Telephone: 414 352-0080 Email: k.fredrickson@ci.river-hills.wi.us

Name: ROGER STROHM
Title: Dir of Public Works
Community: Fredonia Organization / Office: _____
Telephone: 262-268-0425 Email: rstrom@village-fredonia-wi.us

Name: Collin Johnson
Title: Floodplain Administrator
Community: City of Glendale Organization / Office: _____
Telephone: 414-228-1711 Email: cjohnson@glendale-wi.org

Name: _____
Title: _____
Community: _____ Organization / Office: _____
Telephone: _____ Email: _____

Risk MAP Meeting Sign In

Date: 5/16/13 Time: 10am

Watershed: Milwaukee County: Glendale State: WI

Please provide us with the following information

Name: Casey Griffiths
Title: Zoning & Planning Administrator
Community: Village of Elm Grove Organization / Office: _____
Telephone: 262-782-6700 Email: cgriffiths@elmgrovewi.org

Name: Jeff Tamblyn
Title: Sen. GIS Tech
Community: City of Greenfield Organization / Office: Engineering
Telephone: 414 329 5323 Email: jefft@greenfield.wi.us

Name: Dianne Robertson
Title: Administrator
Community: Thiensville Organization / Office: _____
Telephone: 262 242 3920 Email: d Robertson@village.thiensville.wi.us

Name: Van Mobley
Title: President
Community: Thiensville Organization / Office: _____
Telephone: _____ Email: _____

Name: Tom Chapman
Title: Watercourse Section Manager - MMSD
Community: _____ Organization / Office: MMSD
Telephone: 414 225 2154 Email: TChapman@mmsd.com

Name: _____
Title: _____
Community: _____ Organization / Office: _____
Telephone: _____ Email: _____

Risk MAP Meeting Sign In

Date: 05/16/13 Time: 3:00

Watershed: Milwaukee R. County: West Bend State: WI

Please provide us with the following information

Name: Dave Seils
Title: Inspector In Charge
Community: Washington Co. Organization / Office: Planning + Parks
Telephone: 202 335-4445 Email: Dave.Seils@co.washington.wi.us

Name: Judith Neu
Title: City Engineer
Community: City of West Bend Organization / Office: Eng.
Telephone: 262 335-5130 Email: neu.j@ci.west-bend.wi.us

Name: Joyce Diacco
Title: Illustrator
Community: Ridge Country Organization / Office: Land Resources + Parks
Telephone: 920-386-3960 Email: jdiacco@cs.dodge.wi.us

Name: Chad Cook
Title: Building Insp / zoning
Community: Kenosha Organization / Office: Village of Kenosha
Telephone: 262-626-8181 Email: ccook@village.kenosha.wi.us

Name: Benny Sullivan
Title: Sustainability and Zoning Specialist
Community: Ozaukee County Organization / Office: Land + Water Mgmt.
Telephone: (262)284-8318 Email: bsullivan@co.ozaukee.wi.us

Name: Eric Dankot
Title: GIS Manager / LTO
Community: Washington County Organization / Office: Planning & Parks
Telephone: 262-335-4445 Email: eric.dankot@co.washington.wi.us

Risk MAP Meeting Sign In

Date: 05/16/13 Time: 3:00

Watershed: Milwaukee R. ~~County:~~ West Bend State: WI

Please provide us with the following information

Name:	<u>Mark Piotrowicz</u>		
Title:	<u>City Planner</u>		
Community:	<u>City of West Bend</u>	Organization / Office:	<u>Dept. of Development</u>
Telephone:	<u>262-335-5122</u>	Email:	<u>piotrowm@ci.west-bend.wi.us</u>

Name:	<u>Shelley Brown Giebel</u>		
Title:	<u>EM Asst Planner</u>		
Community:	<u>Fond du Lac Cty</u>	Organization / Office:	<u>Fdl EM</u>
Telephone:	<u>920 906-4729</u>	Email:	<u>shelley.giebel@fdlco.wi.gov</u>

Name:	<u>Rick J Goeckner</u>		
Title:	<u>Village Administrator / Clerk</u>		
Community:	<u>Newburg</u>	Organization / Office:	
Telephone:	<u>262-675-2160</u>	Email:	<u>rgoeckner@village.newburg.wi.us</u>

Name:	<u>Judy Steiner</u>		
Title:	<u>Deputy EM</u>		
Community:	<u>Washington Co</u>	Organization / Office:	
Telephone:	<u>262-306-2200</u>	Email:	<u>judy.steiner@co.washington.wi.us</u>

Name:	<u>MIKE HAHN</u>		
Title:	<u>CHIEF ENVIRONMENTAL ENGINEER</u>		
Community:	<u>SEWRPC</u>	Organization / Office:	
Telephone:	<u>262-547-6722</u> <u>Ext. 243</u>	Email:	<u>mhahn@sewrpc.org</u>

Name:	<u>Phil Gaudet</u>		
Title:	<u>Land Resources Manager</u>		
Community:	<u>Washington Co.</u>	Organization / Office:	<u>Planning & Parks - Land Use</u>
Telephone:	<u>262-335-4445</u>	Email:	<u>Phil.Gaudet@co.washington.wi.us</u>

Risk MAP Meeting Sign In

Date: 05/16/13 Time: 3:00

Watershed: Milwaukee R. County: West Bend State: WI

Please provide us with the following information

Name: JIM HAGGERTY
Title: VILLAGE ENGINEER
Community: VILL OF SLINGER Organization / Office: _____
Telephone: 262-644-5265 Email: jhaggerty@vi.slinger.wi.gov

Name: Genard Schulz
Title: CITY Bd Supervisor Wash City
Community: _____ Organization / Office: _____
Telephone: 262-629-6416 Email: Schulz1@localnet.com

Name: Andy Holschbach
Title: DIRECTOR, LAND & WATER mgmt. Dept
Community: OSaukee County Organization / Office: DA
Telephone: 262-284-8271 Email: aholschbach@CO.OSAUKIE.WI.US

Name: Scott Schmidt
Title: WASH. CO ENGINEER/SURVEY
Community: WASH CO Organization / Office: _____
Telephone: 262-335-6881 Email: scott.schmidt@co.wash.wi.us

Name: Pat Twohig
Title: village President
Community: Campbellsport Organization / Office: _____
Telephone: 920-979-8210 Email: pattwohig@yahoo.com

Name: _____
Title: _____
Community: _____ Organization / Office: _____
Telephone: _____ Email: _____

Appendix F: Discovery Meeting Comment Forms

Milwaukee River Watershed Comment Form #1

Please provide the following information:		DATE: 5/16/13
COUNTY NAME: Milwaukee	COMMUNITY NAME: City West Allis	
NAME: Peter Daniels	TITLE: Principal Engineer	
ADDRESS: 7525 W Greenfield Ave.		
DAYTIME PHONE: (414)302-8374	E-MAIL: pdaniels@westall.wi.gov	

Use the space below to explain your comment and attach any necessary supporting documents/materials. Mark the location of your comment on the map by circling the area and writing the comment form number near the circle. If you have more than one comment, please use multiple forms. If necessary, please ask staff for assistance with formulating your comment.

<input type="checkbox"/> Levee or Dam	<input type="checkbox"/> Approximate Study or No Study on a Stream Where Development is Occurring or Likely To Be
<input type="checkbox"/> At-Risk Essential Facilities	<input type="checkbox"/> Stream Flow Constriction (including ice jams)
<input type="checkbox"/> Areas with Clusters of Letters Of Map Change (LOMC)	<input type="checkbox"/> Overtopped Road During Flood Events
<input type="checkbox"/> Significant Riverine Erosion	<input type="checkbox"/> Area in Need of Mitigation Action To Reduce Flooding
<input checked="" type="checkbox"/> Areas of Reoccurring Flooding Outside of Mapped Floodplain	<input type="checkbox"/> Areas of Mitigation Success
<input type="checkbox"/> Effective Study No Longer Reflects Existing Conditions	

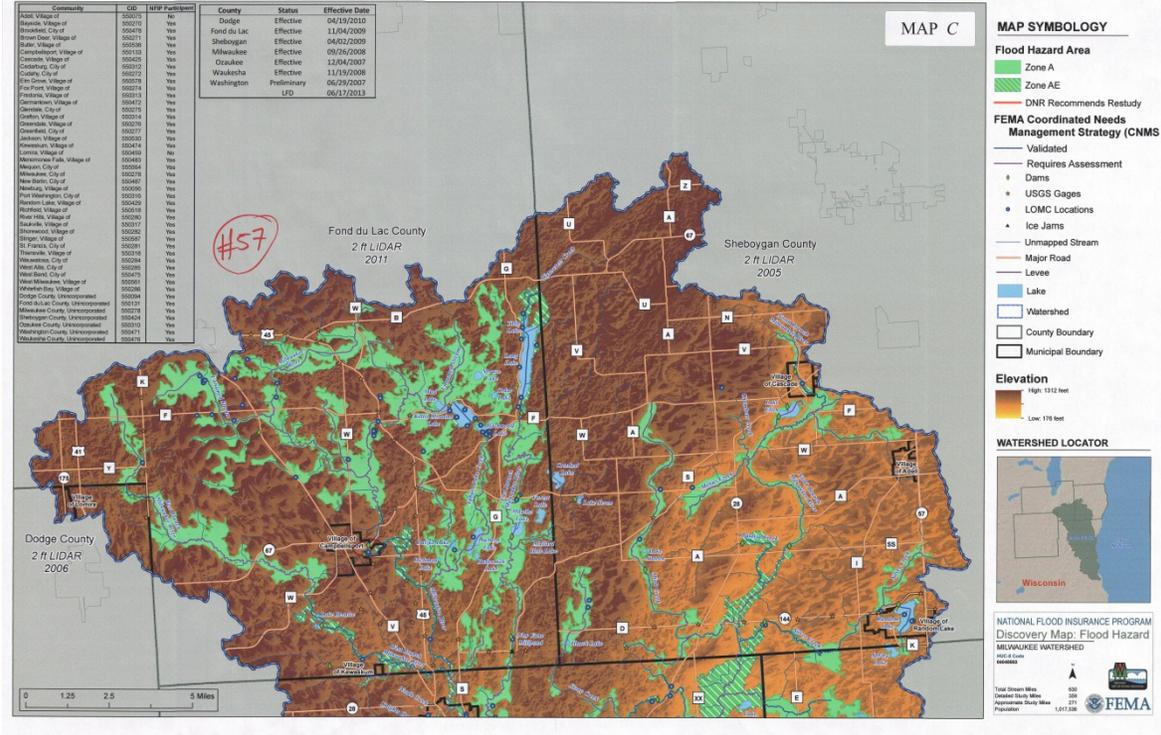
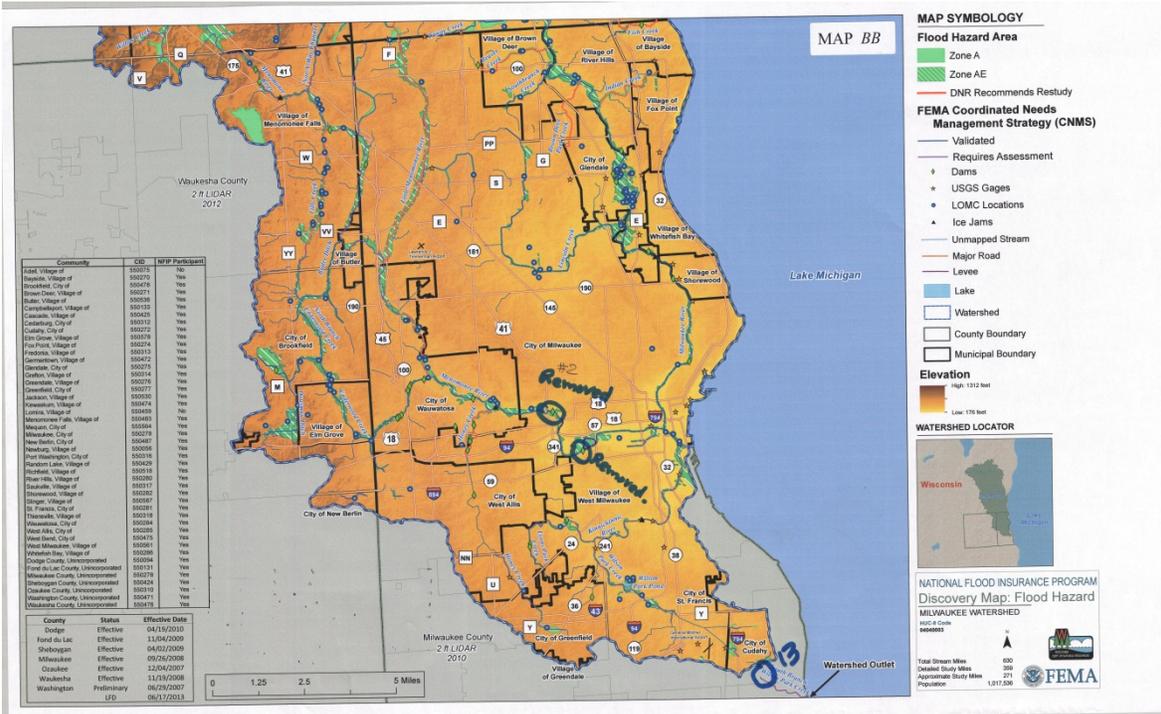
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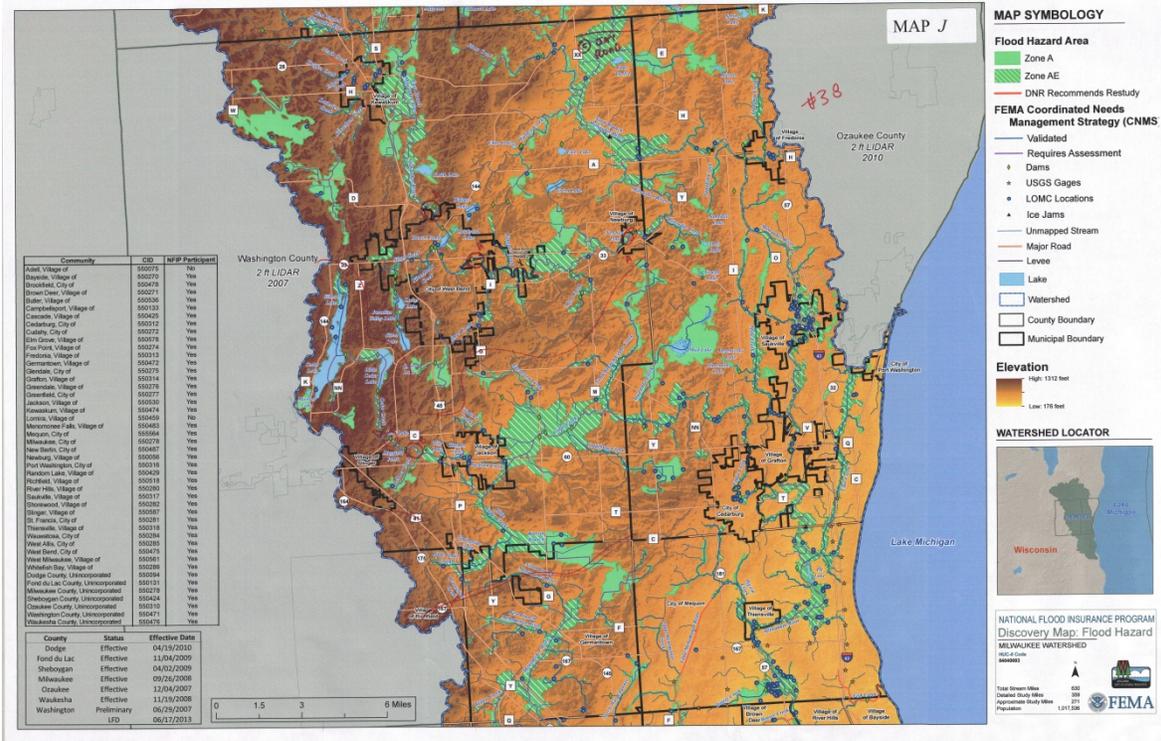
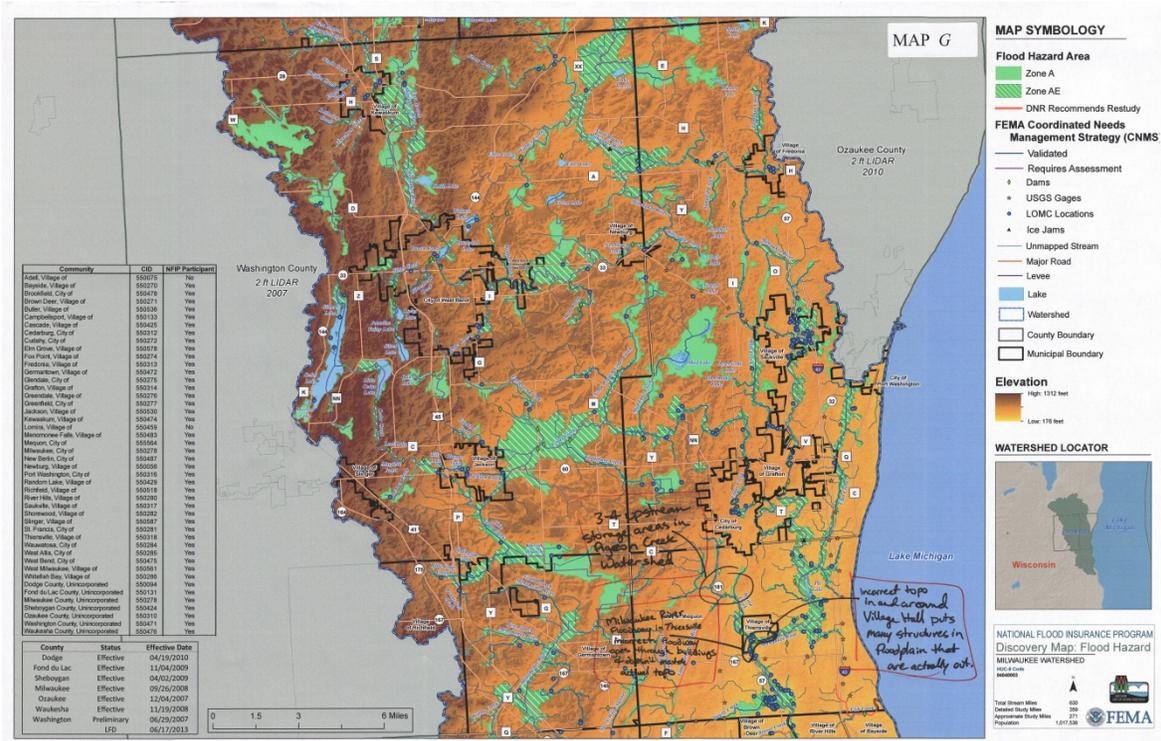
Discovery Map Letter U DFIRM Panel # _____ Other _____

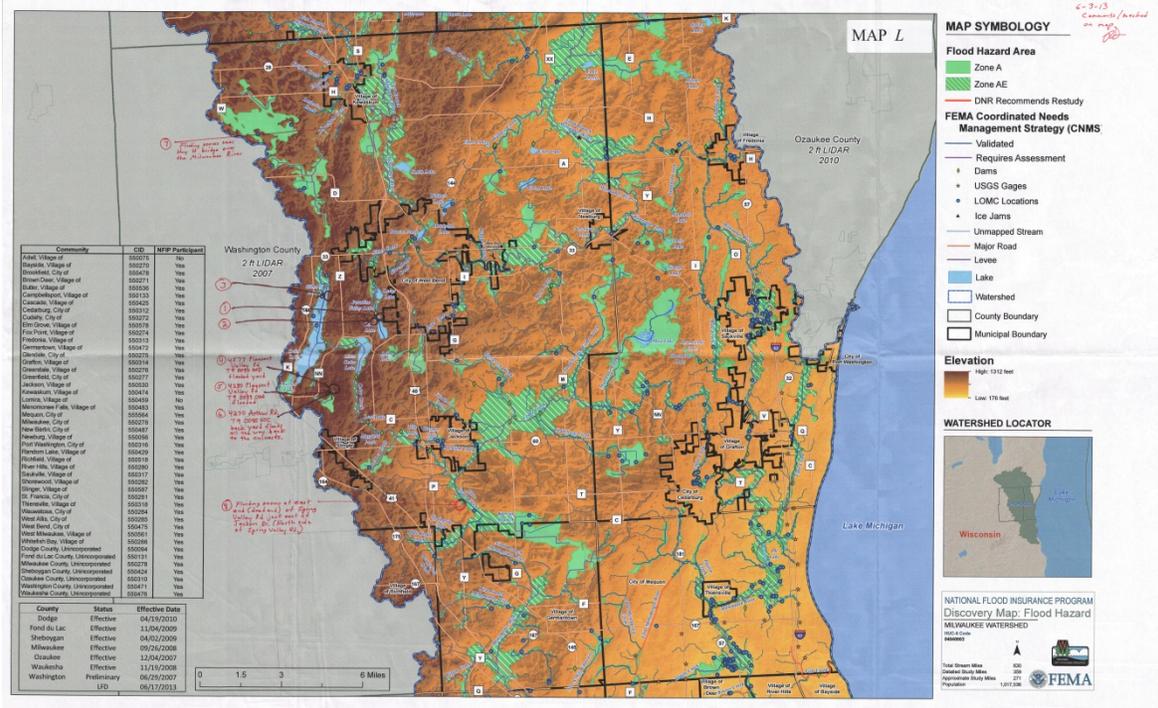
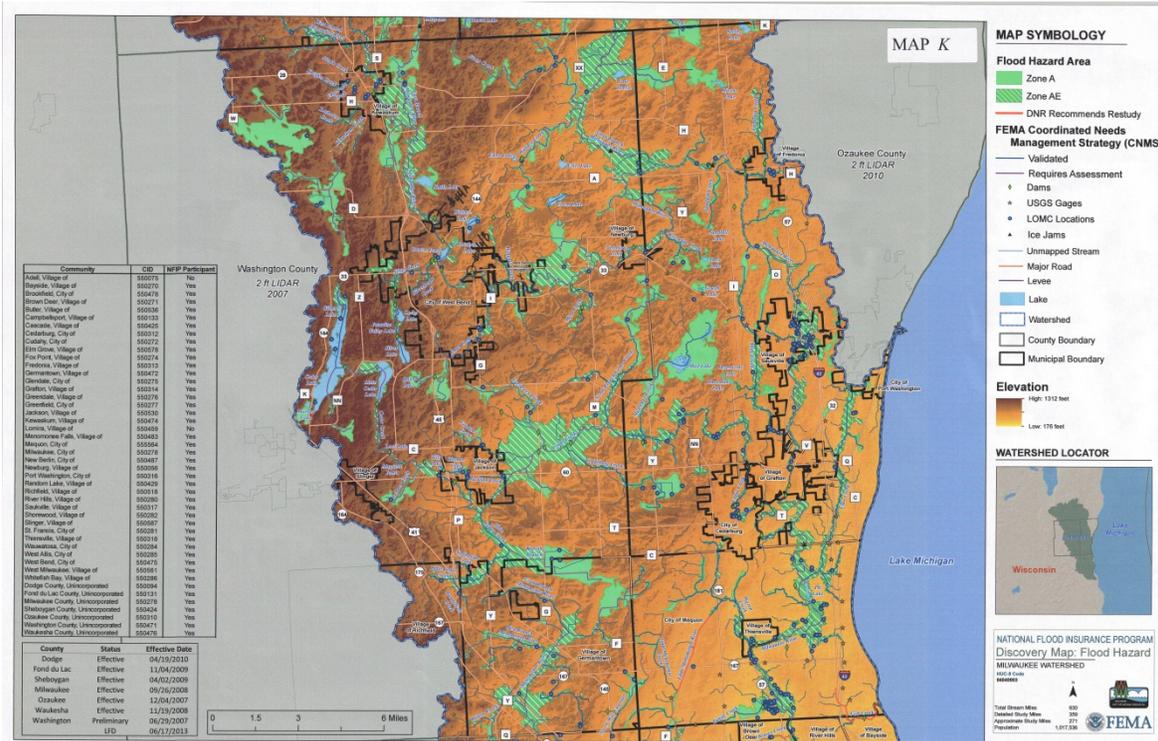
Please provide any additional information that might be helpful such as names of water bodies or addresses:

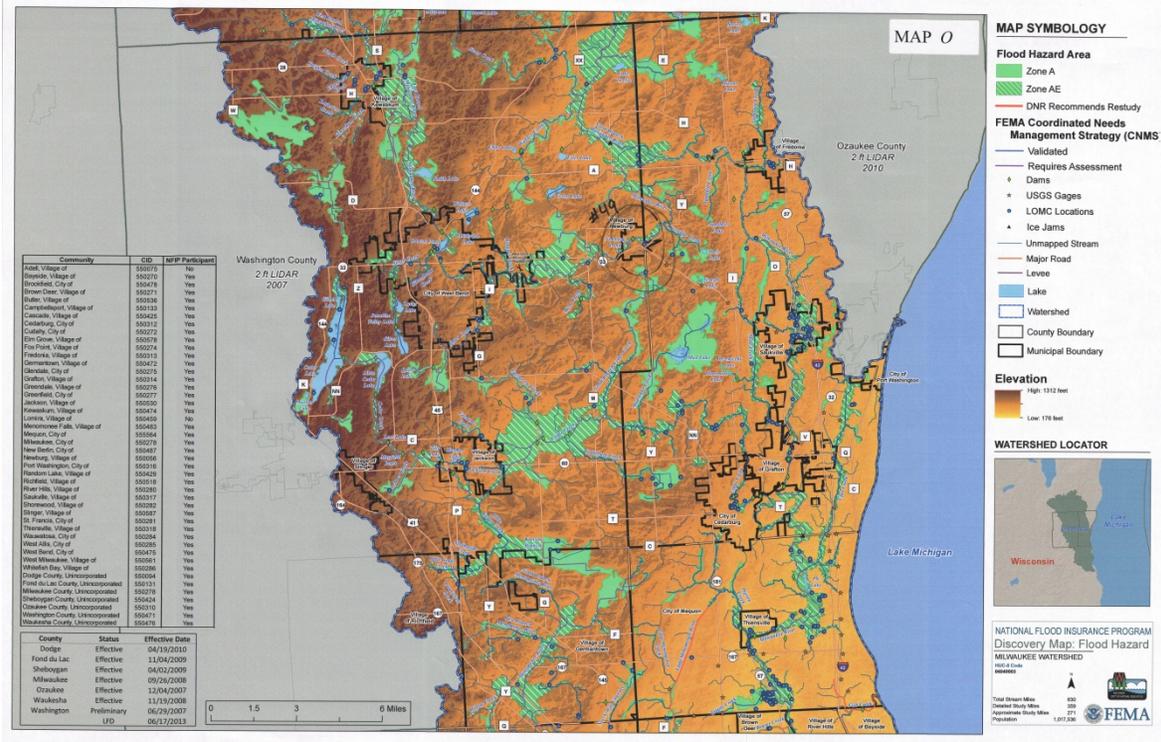
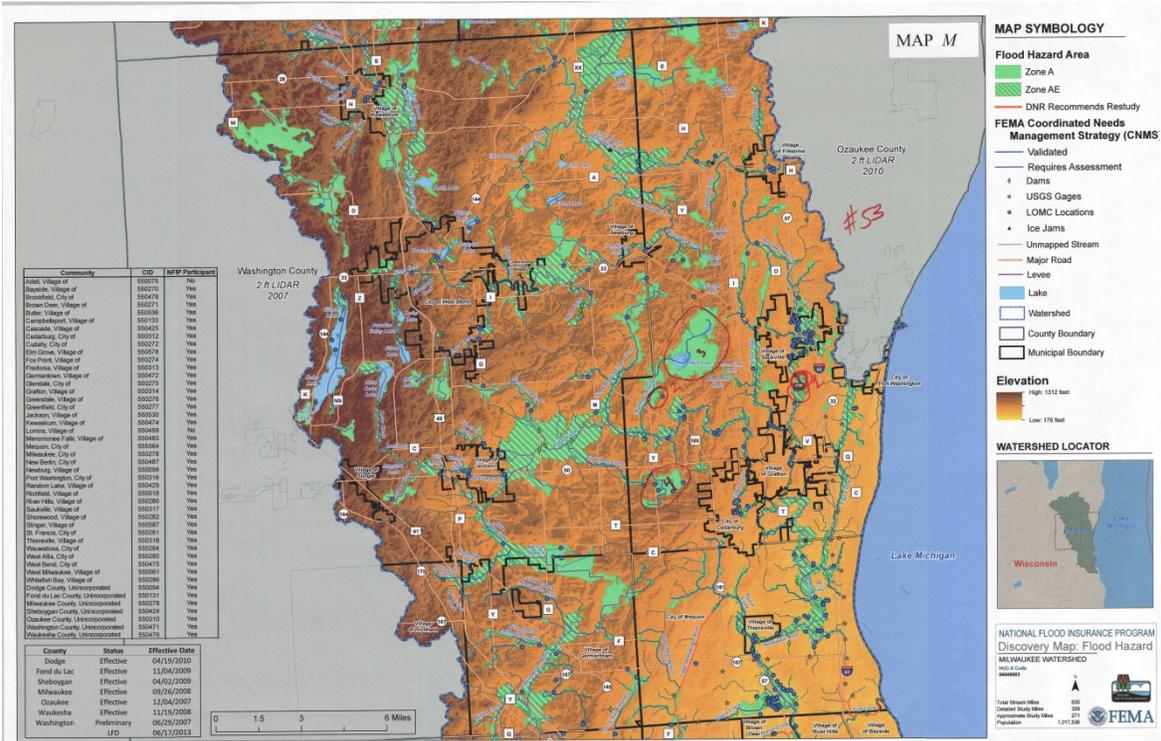
- ① Significant property damage from flooding (83rd St and Arthur Ave)
- ② Significant property damage from flooding (57th St & Mitchell)
- ③ Significant property damage from flooding (83rd & Orchard)
- ④ No dam, Honey Creek is located in MMSD underground culvert
- ⑤ Significant property damage from flooding (G1st & Burnham)

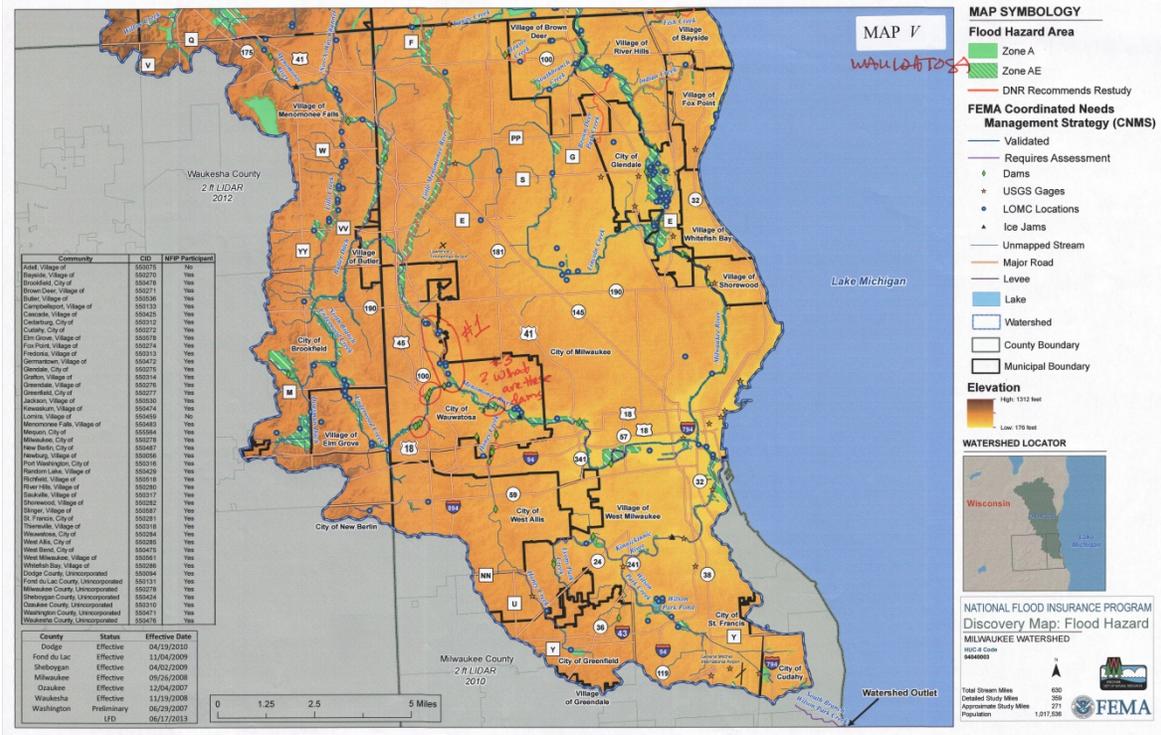
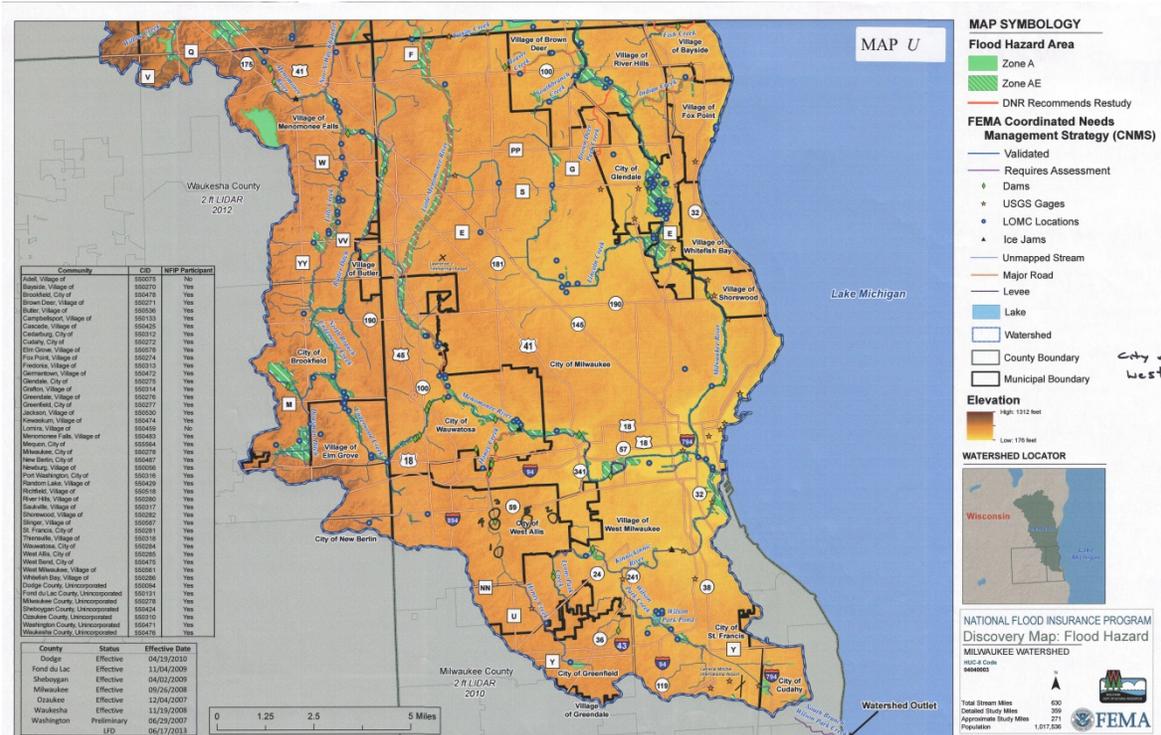
Continue on back side if necessary. Please return form to: Colleen Hermans, Wisconsin DNR, P. O. Box 7921, 101 S. Webster St., WT/3, Madison, WI 53707-7921. Form may be faxed to 608-267-2800 or e-mailed to colleen.hermans@wisconsin.gov.

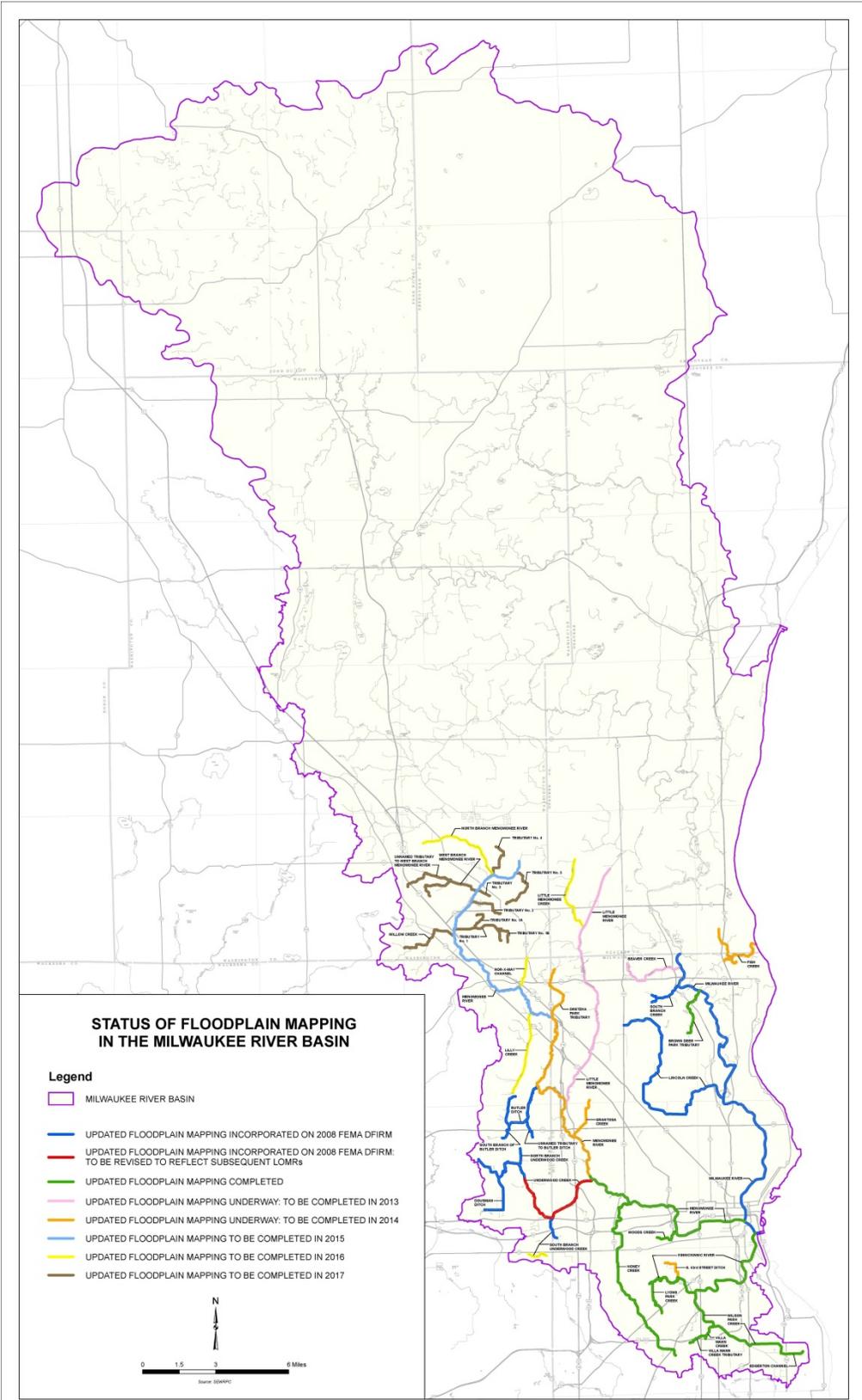




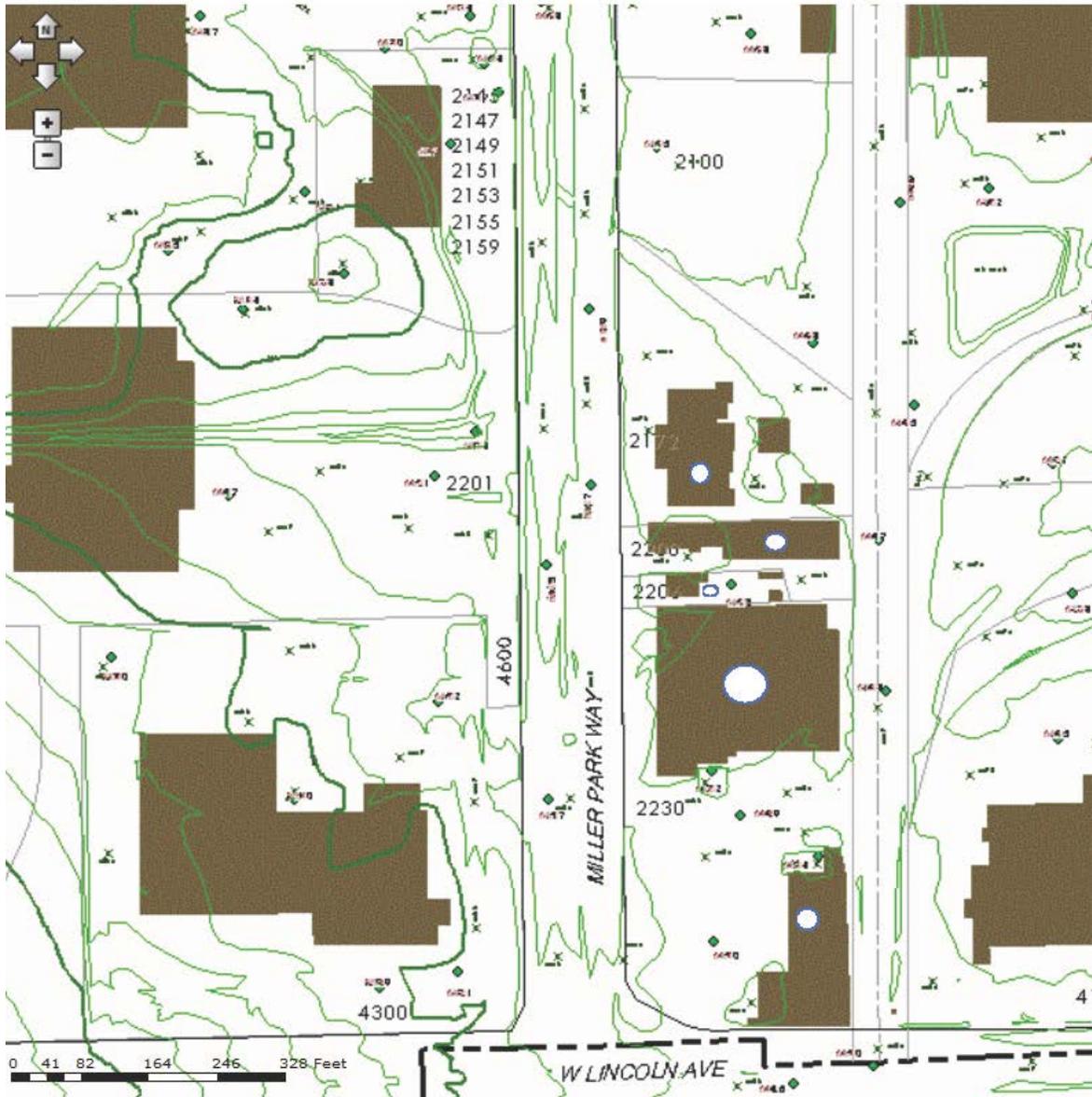








PROPERTIES WITH SOME FLOOD RELATED ISSUES DURING THE 2008 AND 2010 WET WEATHER EVENTS = 0



Appendix H: Action Discovery Meeting Invitation Examples

State of Wisconsin
DEPARTMENT OF NATURAL RESOURCES
101 S. Webster Street
Box 7921
Madison WI 53707-7921



January 21, 2014

Ed Richardson, A.I.C.P.
Principal Planner
Department of City Development
809 N. Broadway
Milwaukee, WI 53202

Dear Mr. Richardson:

I am writing to follow-up on my recent e-mail about the Wisconsin Department of Natural Resources' (WDNR's) upcoming Risk MAP Re-Discovery Meeting, confirm the meeting's schedule, and request your assistance in inviting attendees.

As you may know, the Re-Discovery process, just like the initial Discovery process, is critical in determining whether a Risk MAP project is needed within your watershed. The information exchanged between the DNR (as a cooperating partner with FEMA) and the City of Milwaukee within the Milwaukee Watershed during Re-Discovery will improve our understanding of your flood hazard mapping, flood risk, mitigation planning, and communication needs.

After e-mailing with you and other representatives from the City of Milwaukee, we have scheduled the Re-Discovery Meeting for **February 11, 2014 from 10-11am at the Milwaukee City Hall at 200 East Wells Street, Milwaukee in Room 605**. At the meeting, we will review the flood risk data we have gathered to date, discuss your community's flooding history, development plan, flood risk concerns, storm water and floodplain management activities and other daily operations that impact your flood risk (e.g., cleaning of drainage ditches, culverts).

We would like to request your help in inviting community leaders, emergency managers, GIS specialists, and local planners to the meeting. In addition, we recommend inviting others with a vested interest in your watershed's resources, floodplains, and flood risk.

We thank you for supporting this effort. The partnership between the WDNR and the City of Milwaukee will be vital to our success in identifying flood risks and needs that may exist. To learn more, please contact me at 608-264-8988 or Colleen.Hermans@Wisconsin.gov. Thank you again for your help.

Please RSVP by e-mail whether you plan on attending the meeting or not. The conference room holds 8-10 people.

Sincerely,

Colleen Hermans
GIS Project Lead, Floodplain Management Program
Wisconsin DNR

DNR's follow-up email example:

From: Hermans, Colleen A - DNR
Bcc: "MCarran@menomonee-falls.org"; "hoffman@menomonee-falls.org"; "ajohnson@menomonee-falls.org"; "Waukesha County - DMA"; "JFruth@waukeshacounty.gov"
Subject: Follow-up: Upper Fox & Milwaukee Re-Discovery
Date: Wednesday, February 26, 2014 12:24:00 PM

Good afternoon,

Thank you for meeting with me and my colleagues with the DNR and Wisconsin Emergency Management at the Re-Discovery meeting on Tuesday, February 11. I found it very useful to sit down and discuss with you in person your community's flooding concerns and mitigation ideas for both the Upper Fox and Milwaukee Watersheds. I will capture our discussion, along with any others you had with my colleagues, and pass it on to FEMA with the hopes we get funding to re-study and re-map some areas in these two watersheds.

My goal is to have an addendum written capturing your flooding and mitigation ideas by the end of April. I will add this to the original Discovery Report, found on our website here: <http://dnr.wi.gov/topic/floodplains/riskmap.html>. This webpage also has the initial Discovery meeting's maps and presentations for reference, along with the streams we initially singled out as potentially needing new studies.

If you think of any other flooding concerns or mitigation-related issues, please feel free to email me and I will be sure to pass your information on to FEMA. I will let you know once the addendum is written and then again when we learn about next year's funding.

In the meantime, please let me know if you have any questions. Thank you again for taking the time to attend the Re-Discovery meeting.

Sincerely,

Colleen



Colleen A. Hermans

GIS Project Manager
Bureau of Watershed Management
Wisconsin Department of Natural Resources
Phone: (608) 264-8988

E-mail: Colleen.Hermans@Wisconsin.gov
Website: <http://dnr.wis.gov/topic/Floodplains/>
Facebook: www.Facebook.com/WDNR
Twitter: www.Twitter.com/WDNR

Quality Customer Service is Important to Us. Tell Us How We Are Doing.

Water Division Customer Service Survey

<https://www.surveymonkey.com/s/WDNRWater>

Appendix I: Action Discovery Meeting Attendance Lists

Meetings on February 11, 2014

Community	Contact Name	Email	Watershed	Check In ✓
Village of Menomonee Falls (MF)	Matt Carran & colleagues	MCarran@menomonee-falls.org	Both	✓
Washington County	Scott Schmidt	Scott.Schmidt@co.washington.wi.us	Both	✓
Washington County	David Seils	Dave.Seils@co.washington.wi.us	Both	✓
Washington County	Phil Gaudet	Phil.Gaudet@co.washington.wi.us	Both	✓
Village of Newburg	Rick Goeckner	via David Seils	MKE	✓
Village of Newburg	Matthew Bednarski	Matthew.Bednarski@graef-usa.com	MKE	✓
Waukesha County	Bill Stolte	WStolte@waukesha-county.gov	Both	✓
Waukesha County	Jason Fruth	JFruth@waukesha-county.gov	Both	✓
City of Brookfield	Mike Theis & colleagues	theis@ci.brookfield.wi.us	Both	✓
City of Milwaukee	Steven Fronk	SFRONK@milwaukee.gov	MKE	✓
City of Milwaukee	Ed Richardson & colleagues	Ed.Richardson@milwaukee.gov	MKE	✓
City of Milwaukee	Chris Rute	Chris.Rute@milwaukee.gov	MKE	✓
City of New Berlin	Nicole Hewitt & colleagues	nhewitt@newberlin.org	Both	✓
City of Glendale	Collin Johnson	C.Johnson@glendale-wi.org	MKE	✓
Village of Thiensville	Michael Campbell	mcampbell@ruekert-mielke.com	MKE	✓
Village of Thiensville	Dianne Robertson	drobotson@village.thiensville.wi.us	MKE	✓
Ozaukee County	Barry Sullivan & colleagues	bsullivan@co.ozaukee.wi.us	MKE	X
Racine County	David Maack	David.Maack@goRacine.org	UF	
City of Muskego	David Simpson			
City of Muskego	Adam Trzebiatowski	ATrzebiatowski@cityofmuskego.org	UF	
City of Mequon	Jack Veder	jzader@ci.mequon.wi.us	MKE	✓
Village of Elm Grove	Casey Griffiths	cgriffiths@elmgrovetwi.org	MKE	✓
Walworth County	John Ennis	jennis@co.walworth.wi.us	UF	✓
City of Milw.	Nader Sabar	nader.sabar@milwaukee.gov		
" " "	Ed Richardson	erichard@milwaukee.gov		
City of Milwaukee	Steve Fronk	sfronk@milwaukee.gov	MKE	✓
City of Brookfield	Theresa Gaven	thgaven@ci.brookfield.wi.us		
City of Brookfield	Michael Theis	Theis@ci.brookfield.wi.us	MKE	
" " "	Larry Goudy	goudy@ci.brookfield.wi.us	"	
" " "	Tom Grisa	grisa@ci.brookfield.wi.us	"	
City of West Bend	Mick Piotrowski	piotrowski@ci.west-bend.wi.us	MKE	✓
City of West Bend	Max MARECHAL	marecham@ci.west-bend.wi.us	MKE	✓
City of West Bend	Chris Kunkel	ckunkel@kunkelengineering.com		
Village of Men. Falls	Tom Hoffman	thoffman@menomonee-falls.org	Both	✓
" " "	Ashly Johnson	ajohnson@menomonee-falls.org	Both	✓
NEWBURG	Ryan Klotz	Ryan.Klotz@graef-usa.com	M/W	✓
Village of Kewaskon	Chad Cook	ccook@village.kewaskon.wi.us	MKE	✓

Meetings on February 18, 2014

Community	CAPI Tier	Contact Name	Email	Watershed	Check In X
City of New Berlin	I	Nicole Hewitt & colleagues	nhewitt@newberlin.org	Both	✓
Racine County	II	David Maack	David.Maack@goRacine.org	UF	✓
City of Muskego	II	David Simpson			✓
City of Muskego	II	Adam Trzebiatowski	ATrzebiatowski@cityofmuskego.org	UF	✓
Kenosha County	II	Andy Buehler	Andy.Buehler@kenoshacounty.org	UF	
Kenosha County	II	Dan Treloar	Dan.Treloar@kenoshacounty.org	UF	✓
City of New Berlin		Greg Backsler		UF	✓

Appendix J: State Mitigation Grants

TABLE J-1 HAZARD MITIGATION GRANT PROGRAM (HMGP) PROJECTS FUNDED IN THE STATE

Disaster Number	Year	Community	County	Cost HMGP Funds	Project Description	Comments
DR-1180	1997	Brookfield, City	Waukesha	\$139,203	Acquisition of 1 residential structure	
DR-1180	1997	Menomonee Falls, Vil.	Waukesha	\$1,969,799	Acquisition of 11 residential structures	
DR-1180	1997	Milwaukee, City	Milwaukee	\$1,545,412	Acquisition of 19 residential structures; floodproofing of 35 residential structures	
DR-1180	1997	Milwaukee County	Milwaukee	\$70,117	Production of flood mitigation video and corresponding brochure; creation of a mitigation educational display for State Fair	
DR-1180	1997	Oak Creek, City	Milwaukee	\$112,182	Acquisition of 1 substantially damaged (SD) residential structure in Root River floodway	
DR-1180	1997	Wauwatosa, City	Milwaukee	\$2,168,097	Acquisition of 22 residential structures, 1 commercial structure, and 2 vacant parcels	\$831,325 provided by HUD Disaster Recovery; \$59,735 provided by CDBG; \$222,170
DR-1180	1997	West Allis, City	Milwaukee	\$273	Proposed acquisition of 1 residential structure	Owner refused to sell after prolonged
DR-1236	1998	Brookfield, City	Waukesha	\$140,060	Acquisition of 1 residential structure	
DR-1236	1998	Elm Grove, Village	Waukesha	\$921,601	Acquisition of 1 residential structure and 1 commercial structure	
DR-1236	1998	Menomonee Falls, Vil	Waukesha	\$397,396	Acquisition of 2 residential structures	Continuation of the DR-1180 project for Menomonee Falls
DR-1236	1998	Milwaukee, City	Milwaukee	\$91,630	Acquisition of 2 residential structures	Continuation of the DR-1180 project for
DR-1236	1998	New Berlin, City	Waukesha	\$93,947	Acquisition of 1 residential structure	
DR-1236	1998	Thiensville, Village	Ozaukee	\$123,047	Construction of a detention pond	
DR-1238	1998	Brown Deer, Village	Milwaukee	\$1,018,831	Acquisition of 9 residential structures	Local match provided by CDBG
DR-1238	1998	Thiensville, Village	Ozaukee	\$60,000	Construction of a detention pond	Supplements for project under 1236-
DR-1332	2000	Elm Grove, Village	Waukesha	\$721,319	Acquisition of 2 apartment buildings	
DR-1429	2002	Elm Grove, Village	Waukesha	\$281,351	Acquisition of 1 commercial structure	

TABLE J-2 HMGP PLANS FUNDED IN THE STATE

Disaster Number	Year	Community	County	Cost HMGP Funds	New Plan or 5-Year Update	Plan Status
DR-1768	2008	Milwaukee County	Milwaukee	\$11,510	Update	
DR-1933	2010	Ozaukee County	Ozaukee	\$32,800	Update	

\$74,273,863 in HMGP project and planning funds have been spent in or allocated to the State, as of June 30, 2011.

TABLE J-3 FLOOD MITIGATION ASSISTANCE (FMA) PROJECTS FUNDED IN THE STATE

Year	Community	County	Cost FMA Funds	Project Description	Comments
2000	Brookfield, City	Waukesha	\$46,267	Acquisition of 1 repetitive loss property	Supplemented by FMA 2001 funds
2001	Brookfield, City	Waukesha	\$140,219	See 2000, Brookfield, City above	

TABLE J-4 FMA PLANS FUNDED IN THE STATE

Year	Community	County	Cost FMA Funds	Plan Status
1996/1997	Ozaukee County	Ozaukee	\$9,733	Plan is approved
1999	Milwaukee, City	Milwaukee	\$5,000	Plan is approved
1999	Brookfield, City	Waukesha	\$10,000	Plan is approved

FMA planning grants can only be used for flood mitigation plans or plan sections. Because most counties in the state now use all-hazards mitigation plans which include flood hazards, planning funds that can only be used for flood mitigation plans are no longer applied for. \$2,021,058 in FMA project and planning funds have been spent in or allocated to the State as of June 30, 2011.

TABLE J-5 PRE-DISASTER MITIGATION (PDM) PROJECTS FUNDED IN THE STATE

Year	Community	County	Cost PDM Funds	Project Description	Comments
2003C	Thiensville, Village	Ozaukee	\$2,308,620	Channelization of flood area	
2003C	WEM	All	\$176,812	Technical assistance	Personnel, travel, and supplies

TABLE J-6 PDM PLANS FUNDED IN THE STATE

Year	Community	County	Cost PDM Funds	New Plan or 5-Year Update	Plan Status
2002	Elm Grove, Village	Waukesha	\$4,369	New	Plan is approved
2002	Milwaukee, City	Milwaukee	\$23,000	New	Plan is approved
2003	Milwaukee County	Milwaukee	\$27,927	New	Plan is approved
2005C	Ozaukee County	Ozaukee	\$50,000	New	Plan is approved
2007C	Waukesha	Waukesha	\$63,977	New	Plan is approved
2007C	WEM	All	\$402,574	Update	Agreement with UW for HAZUS flood risk assessment
2008C	Darlington, City	Lafayette	\$19,597	Update	Update is approved
2008C	Fond du Lac County	Fond du Lac	\$42,324	Update	Update is approved

2010C	Milwaukee, City	Milwaukee	\$40,000	Update	In planning process
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\$10,152,632 in PDM project and planning funds have been spent in or allocated to the State as of June 30, 2011.

TABLE J-7 COMMUNITY DEVELOPMENT BLOCK GRANT (CDBG) PUBLIC FACILITIES (PF) PROJECTS

Contract	Applicant	County	Award	Project Description
FY99-0504	Menomonee Falls, Vil.	Waukesha	\$171,261	Acquire two of ten floodplain properties (land and buildings)
FY04-10234	Shell Lake, City	Washburn	\$750,000	Construct a drainage pipe to lower lake levels to relieve the flooding

TABLE J-8 CDBG EMERGENCY ASSISTANCE PROGRAM (EAP) PROJECTS

Contract/ EAP #	Grantee Name	County	Award Amount	Project Description
87039	Fond du Lac County	Fond du Lac	\$500,000	Rehabilitation of damaged housing units, demolition and clearance of uninhabitable housing units, and construction of replacement housing units
87195.02	Germantown, Village	Washington	\$453,750	Rehabilitation of damaged housing units, demolition and clearance of uninhabitable housing units, and construction of replacement housing units
88195.02	Sheboygan County	Sheboygan	\$495,000	Rehabilitation of damaged housing units, replacement of wells/septic systems and water/sewer lines, demolition and clearance of hazardous structures
EAP #08-04	Fond du Lac County	Fond du Lac	\$700,000	Rehabilitation of damaged housing units, LiDAR
EAP #08-18	Bayside, Village	Milwaukee, Ozaukee	\$59,200	Storm sewer
EAP #08-20	West Allis, City	Milwaukee	\$6,227,000	Rehabilitation of damaged housing units, acquisition/demolition/relocation, public facilities, catch basin, relief sewer
EAP #08-25	Waukesha County	Waukesha	\$3,533,120	Rehabilitation of damaged housing units, stormwater management, dam repairs, detention pond,
EAP #08-30	Fond du Lac, City	Fond du Lac	\$208,300	Acquisition and demolition
EAP #08-34	Fox Point, Village	Milwaukee	\$75,000	Public facilities channel and storm grate installation
EAP #08-38	Milwaukee County	Milwaukee	\$94,380	LiDAR
EAP #08-51	Milwaukee, City	Milwaukee	\$8,450,000	Rehabilitation of damaged housing units, acquisition and demolition, flood mitigation
EAP #08-67	Thiensville, Village	Ozaukee	\$505,000	Detention pond improvements
EAP #08-71	Port Washington, City	Ozaukee	\$206,000	Drainage improvements

Approximately \$109,714,279 in CDBG funds for projects with mitigation components has been spent in or allocated to the State as of June 30, 2011. This list is only an estimate for two reasons: First, some of the award amounts listed include non-mitigation projects, but the amount spent on mitigation projects was inextricable so the entire amount is listed; Second, some projects were omitted from the list because the mitigation component was relatively small.

Table D.7 lists the CDBG-PF funds only through 2004 because relevant PF project awards are added into the EAP award amounts for

all subsequent years.

LiDAR stands for Light Detection and Ranging and is used to create accurate floodplain and other topographical maps.

TABLE J-9 MUNICIPAL FLOOD CONTROL GRANT PROGRAM PROJECTS, 2002-2011

Year	Grant Number	Community	County	Funds	Description
2002-03	MFC-66181-A-02	Slinger, Village	Washington	\$69,707.19	1 vacant land acquisition
2006-07	MFC-67206-06	Brookfield, City	Waukesha	\$207,922.50	Dam removal, channel restoration
2006-07	MFC-67261-06	New Berlin, City	Waukesha	\$129,317.06	Property acquisition
2006-07	MFC-40291-06	Wauwatosa, City	Milwaukee	\$800,000.00	Work started late, grant still open
2010-11	MFC-M40702-10	MMSD	Milwaukee	\$595,000.00	8 acquisitions
2010-11	MFC-68261-10	New Berlin, City	Waukesha	\$160,020.00	1 acquisition
2010-11	MFC-68206-10	Brookfield, City	Waukesha	\$197,305.50	Flood control project

\$10,686,070.15 has been spent in or allocated in the state for flood mitigation projects by the Municipal Flood Control grant program as of June 30, 2011. The Municipal Flood Control program is run by the Wisconsin Department of Natural Resources.

The dollar amounts in red signify grant award amounts. The grants are still open, so the final expense amount is not yet known. The dollar amounts in black are final expense amounts.