# City of Madison

## Community Profile

The City of Madison is located in the center of Dane County. The city completely surrounds the smaller Town of Madison and the City of Monona, as well as the villages of Maple Bluff and Shorewood Hills. Madison shares borders with its largest suburb, Sun Prairie, and three other communities, Middleton, McFarland, and Fitchburg. Downtown Madison is located on an isthmus between Lakes Mendota and Monona. The city is sometimes described as *The City of Four Lakes*, comprising the four successive lakes of the Yahara River: Lake Mendota ("Fourth Lake"), Lake Monona ("Third Lake"), Lake Waubesa ("Second Lake") and Lake Kegonsa ("First Lake"), although Waubesa and Kegonsa are not actually in Madison, but just south of it. A fifth smaller lake, Lake Wingra, is within the city as well, but not on the Yahara River chain. The Yahara flows into the Rock River, which in turn, flows into the Mississippi River. The city's trademark of "Lake, City, Lake" reflects this geography. Notable areas within the City include the Wisconsin State Capitol and the University of Wisconsin-Madison. Land use is intensely urban in the City's core, with commercial, residential, and industrial land uses throughout the other areas of the City. According to the Dane County Land Information Office, the City of Madison a total area of 79.4 square miles.

As of the 2010 Census, there are 233,209 people, 102,516 households, and 47,824 families residing in the City of Madison. The population density is 3,037 per square mile. There are 108,843 housing units at an average density of 1417.4 per square mile. Table 1 shows the population profile by age for the City of Madison according to the 2010 Census.

**Table 1 Population Profile of City of Madison**

| Subject | Number | Percent |
|---|---|---|
| Total population | 233,209 | 100.0 |
| Under 5 years | 13,561 | 5.8 |
| 5 to 9 years | 11,341 | 4.9 |
| 10 to 14 years | 9,957 | 4.3 |
| 15 to 19 years | 16,508 | 7.1 |
| 20 to 24 years | 34,919 | 15.0 |
| 25 to 29 years | 25,967 | 11.1 |
| 30 to 34 years | 19,666 | 8.4 |
| 35 to 39 years | 14,632 | 6.3 |
| 40 to 44 years | 13,099 | 5.6 |
| 45 to 49 years | 13,318 | 5.7 |
| 50 to 54 years | 13,608 | 5.8 |
| 55 to 59 years | 13,492 | 5.8 |
| 60 to 64 years | 10,758 | 4.6 |
| 65 to 69 years | 6,704 | 2.9 |

| Subject | Number | Percent |
|---|---|---|
| 70 to 74 years | 4,634 | 2.0 |
| 75 to 79 years | 3,824 | 1.6 |
| 80 to 84 years | 3,424 | 1.5 |
| 85 years and over | 3,797 | 1.6 |

Data Source: 2010 U.S. Census

American Community Survey estimates for 2014 indicate that the median income for a household in the City of Madison is $53,933 and the median income for a family is $78,090. The per capita income for the City of Madison is $31,659. 95% of the population has at least a high school degree, while 55% of the population holds at least a bachelor's level degree.

## Hazard Identification and Risk Assessment

The first step in a hazard analysis is to identify which hazards the community is vulnerable to. Table 2 outlines the hazard identification for the City of Madison based on the Data Collection Guide. The Data Collection Guide listed all of the hazards that could impact anywhere in Dane County. The purpose of this worksheet was to identify and rank the hazards and vulnerabilities specific to the jurisdiction. The City of Madison's Emergency Management Planning Team members were asked to complete the matrix by ranking each category on a scale of 0 to 5 based on the experience and perspective of each planning team member. A ranking of 0 indicated "no concern" while a ranking of 5 indicated "highest concern." This matrix appears as Table 2. This matrix reflects the significance of the hazards relative to one another.

This matrix reflects that the City of Madison is most vulnerable to tornado and flood. The City of Madison has a lower vulnerability to dam/levee failures, extreme cold and heat, drought, fog, hail storm, landslides, lightning, subsidence, wildfire, windstorm, and winter storm. The vulnerability established here is a qualitative assumption based on the impacts, geographic extent, probability of future occurrence, and magnitude/severity. On the county level, these vulnerabilities were calculated with quantitative data as well.

## Table 2 Vulnerability Assessment Matrix for the City of Madison

| Hazard | Hazard Attributes | | | Impact Attributes | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Primary Impact (Short Term - Life and Property) | | | Secondary Impact (Long Term – Community Impacts) | | | |
| | Area of Impact | Past History, Probability of Future Occurrence | Short Term Time Factors | Impact on General Structures | Impact on Critical Facilities | Impact on At-Risk Populations | Social Impact | Economic Impact | Severity Of Other Associated Secondary Hazards | |
| | (1-5) | (1-5) | (1-5) | (0-5) | (0-5) | (0-5) | (0-5) | (0-5) | (0-5) | **Total** |
| Dam Failure | 2 | 1 | 1 | 3 | 2 | 2 | 2 | 2 | 2 | 17 |
| Extreme Cold | 4 | 4 | 3 | 2 | 2 | 5 | 3 | 3 | 3 | 29 |
| Extreme Heat | 4 | 4 | 3 | 2 | 2 | 5 | 3 | 3 | 3 | 29 |
| Drought | 2 | 2 | 1 | 1 | 1 | 2 | 2 | 3 | 2 | 16 |
| Expansive soils | 1 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 1 | 12 |
| Flood | 3 | 3 | 3 | 3 | 4 | 3 | 3 | 3 | 2 | 27 |
| Fog | 2 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 13 |
| Hail Storm | 5 | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 1 | 23 |
| Landslide | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 9 |
| Lightning | 3 | 4 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 25 |
| Tornado | 4 | 4 | 4 | 5 | 5 | 4 | 4 | 4 | 3 | 37 |
| Wildfire | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 17 |
| Windstorm | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 27 |
| Winter Storm | 4 | 5 | 4 | 3 | 3 | 4 | 4 | 4 | 3 | 34 |

## Previous Hazard Events

Through the Data Collection Guide, the City of Madison noted specific historic hazard events to include in the community profile. These events have been incorporated into the appropriate hazard chapters in the base plan. These events had a particular impact on the community beyond the impacts and events recorded in the Dane County Hazard Mitigation Plan. This is not a comprehensive summary of past incidents, as the hazard profiles collected in the main Mitigation Plan include other events that may have historically impacted the jurisdiction. The events noted by this jurisdiction in the Data Collection Guide include:

### Flooding Events – 1993, 1997, 2000, 2004, 2007, 2008, 2009, 2010 and 2013

During the summers of the above years the City of Madison and surrounding areas experienced significant rain events when considered independently and collectively. Independently these events caused limited flooding in local low points throughout the City of Madison as would be expected when a storm event exceeds the capacity of the local storm sewer.

Collectively, the events of 07, 08 & 09 combined to result in high local groundwater and significant infiltration into the sanitary sewer system and into the basements of local residences. The effects of these events have decreased over the years due to improvements made to the sanitary sewer and storm sewer systems in problem areas throughout the City. However, these problems cannot ever be fully eliminated, just reduced in magnitude, due to the nature of how Madison was developed adjacent to and in wetland areas.

The storm that led off this series of events was a highly intense and relatively isolated storm cell that traveled largely to the NE directly through the isthmus area of the City on July 27, 2007. This event caused flash flooding in areas in within the City of Madison and caused severe flooding in areas of the isthmus of the City of Madison including portions of the University of Wisconsin. Flooding occurred throughout several buildings at the University of Wisconsin, Camp Randall, and the surrounding urban areas. This event caused classes to be cancelled. Additionally, many power outages were reported throughout the City as circuit boards were flooded out and roads had to be closed due to flooding.

Following this event, rainfall during August of 2007 caused that month to be the wettest on record for the Madison area. Cumulatively, 2007 became the wettest year on record as measured at the Dane Co. Regional Airport.

A Lightning Strike occurred in August 2007 causing a power line to fall into a puddle of water located at a bus stop as people were getting on a bus. Three people died during this incident. Another incident of a lightning strike occurred during this month at a golf course in the City of Madison. One person died.

During the first 2 weeks of June, 2008 more than 10” of rain fell on Madison. Three heavy rainfall events – 2.23” on June 7th, 4.11” on June 8th, and 2.57” on June 12th –accounted for nearly 80% of this rainfall. The heavy rainfall produced flash flooding problems throughout Madison and flooding along the Yahara River chain. The City of Madison received FEMA funds to help recover from this event. June 2008 is the wettest June on record.

2009 was an above average precipitation year, by approximately 5 inches, with one notable event of over 3" in a few hours in September – this caused extreme flooding in one particular watershed flooding parking lots and destroying close to 100 parked vehicles.

2010 was again an above average precipitation year, by approximately 5 inches, with two notable storm events in late June and July localized flooding .

2013 had approximately 14 inches of precipitation above the average of 34 inches – several significant storms occurred within the year including a 25 year event and two events approaching 10 year recurrence intervals. Flooding was experienced and water levels in Lake Monona rose to well over a foot above the summer regulatory maximums causing associated groundwater problems to near shore areas.

The University of Wisconsin evaluated the impact of recent extreme rainfall events and the cumulative impacts of wetter than normal seasons on the UW campus and central Madison. The evaluation transposed the July 2008 Baraboo storm over the Mendota watershed. The research confirmed a high likelihood of significant and sustained flooding in the Madison isthmus.

### Winter Storm: February 5-6 2008

Record snow fall affected the entire City of Madison during early February of 2008. There were no reports of injuries, deaths, property, crop or infrastructure damage, and impacts on business and the economy were unavailable. The snow resulted in delays and closures along roadways, and in schools and businesses. The City of Madison received FEMA funds to help cover the expenses of salt/sand, labor and maintenance of vehicles used to remove the snow.

### Extreme Cold: Various

Extreme cold occurs during the winter that results in school closings and at times water main breaks in the City and at buildings. School closings have been reported throughout various years.

## Asset Inventory

Assets include the people, property, and critical facilities within the City of Madison that are exposed to hazards in general. Inventories of property, essential infrastructure, and natural, cultural or historic resources help provide a comprehensive picture of the community and provide a method of assessing exposure to hazards by establishing the improved and total values, capacities and populations for these assets. It also forms the basis for estimating potential losses, where possible.

## Population

### Table 3 Vulnerable Population Summary

| Disability Status from the 2014 American Community Survey | Number | Percent of Group with Disability |
|---|---|---|
| Population Under 5 years old with a Disability | 145 | 1 |

| | | |
|---|---|---|
| Population 5-17 years old with a Disability | 1,464 | 5,1 |
| Population 18-64 with a Disability | 12,315 | 7.1 |
| Population Over 65 years old with a Disability | 7179 | 30.9 |
| Total Population with Disability | 21,103 | 8.9 |

Data Source: 2014 American Community Survey

| **Other Vulnerable Populations** | Estimate | Percentage |
|---|---|---|
| Families Below Poverty Level | 4,914 | 9.8 |
| Individuals Below Poverty Level | 44,835 | 19.6 |
| Of those poverty: Individuals Under 18 | 8,806 | 21 |
| Of those poverty: Individuals Over 65 | 1,073 | 4.6 |
| Total Population Over 5 who Speak English less than "very well" | 13,269 | 5.9 |
| 2014 ACS Total Population Estimate | 239,848 | 100% |

Data Source: 2014 American Community Survey

## General Property

### Table 4 Property Exposure Summary

| Property Type | Total Parcel Count | Improved Parcel Count | Improved Values ($) | Content ($) | Total Value ($) |
|---|---|---|---|---|---|
| **Totals** | **58,404** | **54,051** | **13,588,984,141** | **6,794,492,071** | **20,383,476,212** |
| Agriculture | 126 | 39 | 9,012,500 | 4,506,250 | 13,518,750 |
| Commercial | 2,140 | 1,951 | 2,501,545,600 | 1,250,772,800 | 3,752,318,400 |
| Utilities | 209 | 18 | 12,598,700 | 6,299,350 | 18,898,050 |
| Industrial | 497 | 449 | 383,210,200 | 191,605,100 | 574,815,300 |
| Institutional/ Governmental | 466 | 117 | 82,222,000 | 41,111,000 | 123,333,000 |
| Other | 3,349 | 855 | 292,217,300 | 146,108,650 | 438,325,950 |
| Residential | 51,617 | 50,622 | 10,308,177,841 | 5,154,088,921 | 15,462,266,762 |

Data Source: Dane County Land Information Office

## Critical Facilities

The City of Madison has identified the critical facilities important to protect from disaster impacts. These are collected in Table 5.

### Table 5 Critical Facility Summary/Essential Infrastructure

| Facility | Type* | No. of Facilities | Replacement value ($) |
|---|---|---|---|
| Airport | EI | 1 | 16,200,000 |

| Facility | Type* | No. of Facilities | Replacement value ($) |
|---|---|---|---|
| Bridges | EI | 111 | 63,600,000 |
| Communications Towers | EI | 64 | 90,759,100 |
| Correctional Center | EI | 10 | 17,969,600 |
| Dams, Locks & Levees | EI | 2 | 1,100,000* |
| Electric Substation | EI | 22 | 1,855,600 |
| Emergency Shelter | EI | 8 | 119,600 |
| FCC Tower | EI | 53 | 92,241,500 |
| Fire Station/EMS | EI | 13 | 36,098,873 |
| Food Pantry | EI | 26 | 4,198,800 |
| Hospital | EI | 5 | ? |
| Jail | EI | 2 | ? |
| Landfill Remediation Facilities | EI | 5 | 2,375,037 |
| Media Outlet | EI | 22 | 26,567,200 |
| Municipal Hall | EI | 2 | 38,093,883*** |
| National Guard | EI | 1 | ? |
| Police Facilities | EI | 9 | 19,285,298 |
| Power plant | EI | 3 | 1,500,000,000 |
| Public Works Operations Facilities | EI | 8 | 135,932,512 |
| Sheriff Precinct | EI | 1 | ? |
| Stormwater Pump Stations | EI | 1 | 1,500,000 |
| Wastewater Conveyance & Treatment Facilities | EI | 46 | 526,000,000 |
| Water Supply Facilities | EI | 38 | 36,526,266 (from Eric) |
| | | | $9,350,000 (from Kelly) |
| Extremely Hazardous Substances | HM | 86 | 187,302,200 |
| Hazardous Chemicals | HM | 157 | 258,354,300 |
| Adult Day Care | VF | 4 | 2,767,000 |
| Adult Family Home | VF | 23 | 3,256,400 |
| Child Care | VF | 244 | 67,554,400 |
| Clinic | VF | 2 | ? |
| Community Based Residential | VF | 39 | 38,546,900 |
| Community Center | VF | 16 | 3,671,183 |
| Federally Assisted Rental | VF | 67 | 24,380,000 |
| Historic Site | VF | 174 | 104,026,200 |
| Manufactured Home | VF | 753 | ? |
| Nursing Home | VF | 9 | 10,987,500 |
| Private School | VF | 14 | ? |
| Public School | VF | 44 | ? |
| Residential Care Apart Complex | VF | 7 | 4,896,000 |

| Facility | Type* | No. of Facilities | Replacement value ($) |
|---|---|---|---|
| Senior Center | VF | 4 | 3,282,406 |
| Serving People w/ Disabilities | VF | 1 | ? |
| Single Room Occupancy | VF | 28 | 5,656,900 |
| Subsidized Housing | VF | 14 | 75,034,417**** |
| Supportive Permanent Housing | VF | 16 | 214,700 |
| Transitional Housing | VF | 21 | 2,070,700 |
| TOTAL | | 2,079 | 2,498,688,900 |
| *EI: Essential Infrastructure; VF: Vulnerable Facilities; HM: Hazardous Materials Facilities | | | |

Data Source: Dane County GIS, City of Madison, Madison Metropolitan Sewerage District
*EI: Essential Infrastructure; VF: Vulnerable Facilities; HM: Hazardous Materials Facilities; NA: natural assets
**Value is for Wingra Dam only; need to add Tenney Locks
*** Includes Value of MMB and City improvements only in CCB
**** CDA apartments, residence and townhouses.

## Other Assets

Other assets help define a community beyond the current composition of the City of Madison. These assets may provide economic benefit to the community, in addition to preserving the heritage and diversity of the community and may include natural, cultural and historic assets or economic assets such as major employers. It may also include more specific detail on critical facilities.

The City of Madison has many assets which are major employers and/or play a significant role in the stabilization or recovery from a major incident. The following list is intended to provide examples of the business or services important to the city. It is not intended as an all inclusive list:

- University of Wisconsin
- State of Wisconsin
- Meriter hospital
- St. Mary's Hospital
- Alliant Energy
- Madison gas and Electric
- American Family Insurance
- CUNA
- General Casualty
- Netconcepts
- TDS
- TomoTherapy
- Broadjam
- Sonic Foundry
- Woodman's
- Copp's
- Findorff Construction
- InterCon Construction
- Stevens Construction
- Home Depot
- Menard's

## Vulnerability to Specific Hazards

This section details vulnerability to specific hazards, where quantifiable, and where it differs from that of the overall County. The previous inventory tables quantify what is exposed to the various hazards within City of Madison. Table 5 cross-references the hazards with the various tables where exposure or vulnerability specifics are found. The intent of Table 5 is to quantify, where possible, future impacts of each hazard on the jurisdiction. In many cases it is difficult to estimate potential losses, so the overall exposure of populations, structures, and critical facilities is referenced.

### Table 6 Hazard Vulnerability Specifics

| Hazard | Populations | Structures | Critical Facilities | Future Damage Potential |
|---|---|---|---|---|
| **Dam Failure** | | | | |
| **Wingra Dam** | No residences, buildings, or campgrounds would be inundated by the dam failure flood. | Two bridges are within the hydraulic shadow; the McCaffery Drive bridge and the Fish Hatchery Road bridge. | No critical facilities are located within the hydraulic shadow. | Minimal |
| **Tenney Locks located in Madison but owned and operated by Dane County** | See hazard profile in County Plan | See hazard profile in County Plan | See hazard profile in County Plan | See hazard profile in County Plan |
| **Drought** | Minimal | None | Water Supply Facilities | See hazard profile in County Plan |
| **Flooding** | See section below | See section below | See section below | See section below |
| **Fog** | Minimal | None | None | See hazard profile in County Plan |
| **Hailstorm** | Minimal | All | See Critical Facility Inventory Table(s) | See hazard profile in County Plan |
| **Landslide/ Sinkholes? Erosion** | Unlikely | Unlikely | Unlikely | See hazard profile in County Plan |
| **Lightning** | General Population | All | See Critical Facility Inventory Table(s) | See hazard profile in County Plan |
| **Severe Cold** | General Population | All | See Critical Facility Inventory Table(s) | See hazard profile in County Plan |
| **Severe Heat** | General Population | Low | Minimal | See hazard profile in County Plan |
| **Severe Winter Storm** | General Population | Low | See Critical Facility Inventory Table(s) | See hazard profile in County Plan |

| Hazard | Populations | Structures | Critical Facilities | Future Damage Potential |
|---|---|---|---|---|
| **Tornado** | General Populations | Moderate | See Critical Facility Inventory Table(s) | See section below |
| **Wildfire** | Minimal | Minimal | Minimal | See hazard profile in County Plan |
| **Windstorm** | See Table 2 Population | See Table 3 Property Exposure | See Critical Facility Inventory Table(s) | See hazard profile in County Plan |

## Flood

### Structures and Properties in the Floodplain

Several areas within the City are within the mapped flood area. (see map in Figure 1). Refer to the flood profile in the mitigation plan for a description of the methodology used to identify potentially flood-prone properties. According to the flood insurance claims data, flooding is a problem in the City.

**Table 7 Primary Structures in the Floodplain**

| Total Floodway Structures | Floodway Residential Structures | Total Structures in 100 year Floodplain | Residential Structures in 100 year Floodplain | Total Structures in 500 year Floodplain | Residential Structures in 500 year Floodplain |
|---|---|---|---|---|---|
| 1 | 1 | 28 | 15 | 173 | 142 |

Source: Analysis based on Dane County Land Information Office Data

**Table 8 Properties with Primary Structures in the Floodplain**

| Total Floodway Properties | Floodway Improved Values | Floodway Residential Properties | Total Properties in 100 year Floodplain | Total Improved Value of Properties in 100 year Floodplain | Residential Properties in 100 year Floodplain | Total Properties in 500 year Floodplain | Total Improved Value of Properties in 500 year Floodplain | Residential Properties in 500 year Floodplain |
|---|---|---|---|---|---|---|---|---|
| 1 | $104,900 | 1 | 19 | $11,638,500 | 14 | 173 | $85,716,200 | 142 |

Source: Analysis based on Dane County Land Information Office Data

Based on the average household size in Dane County and the count of residential parcels in the floodplain, there are 35 and 331 individuals potentially at risk to the 100 year or the 500 year flood events respectively within the jurisdiction.

### Repetitive Loss Properties and Flood Insurance Polices

There are three repetitive loss properties within the City of Madison. According to FEMA Policy and Claim Statistics for Flood Insurance, the community has 147 flood insurance polices, with a total coverage amount of $42,926,100. There have been 42 claims and $82,986 in losses paid in flood insurance claims since 1978.

### Identified Future Loss Properties

The intensity of the July 21st, 2016 storm, allowed City Engineering to identify a series of properties that are located where basins overtop during intense storms. Due to the topography, the City is unable to mitigate or reroute these floodwaters. Therefore, the parcels shown in Figure 2 and Figure 3 identify properties at-risk in future intense storms. The City predicts that they will become repetitive loss properties.

**Indentified Risk of Extreme Flood Event**

In 2009 Dane County performed a Dam Breach Analysis for the Tenney Dam on the Yahara River. While the City agrees that a dam breach at Tenney is unlikely, the series of events from 2007-2009, cataloged in the "Previous Hazard Events" section, prompted the City to analyze the situation of an extreme storm occurring when lake levels are already high. Noting that the Monona Lake level reached the 100-year flood level in 2008 and was within 0.24' of the 100-year flood level in 2007, the City assumes during a series of wet years, Monona could be at the 100-year flood level again. If, in that scenario, a large storm passed over the Mendota watershed and the Tenney locks would need to be opened to avoid dam failure, Monona lake levels could bounce 2.83', as calculated in the Dam Breach Analysis. In this worst-case-scenario Lake Monona could reach 850.5', and flood parts of the isthmus in up to 3' of water.

Assuming Monona Lake levels would drop as they did after the major storm in 2008, the isthmus may be flooded for 9.5 weeks. This timeline would extend with any subsequent rain events. The flooding could leave 2,953 parcels in standing water, as well flood out a large portion of the sanitary sewer system on the east side of the isthmus (from the Capitol to the Yahara River). The City is currently investigating ways to mitigate this vulnerability.

## Figure 1 Flood Hazards and Future Land Use Map

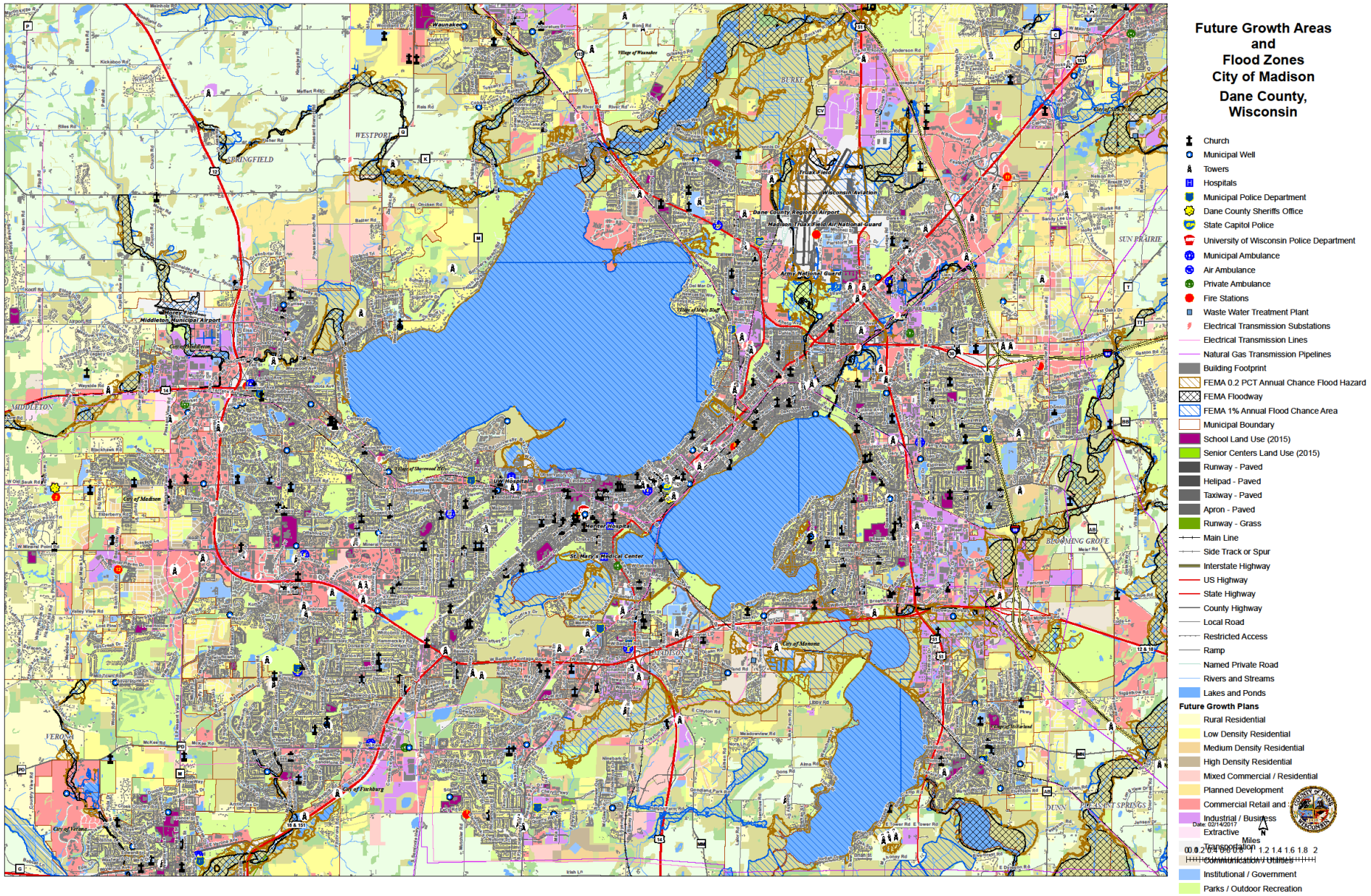
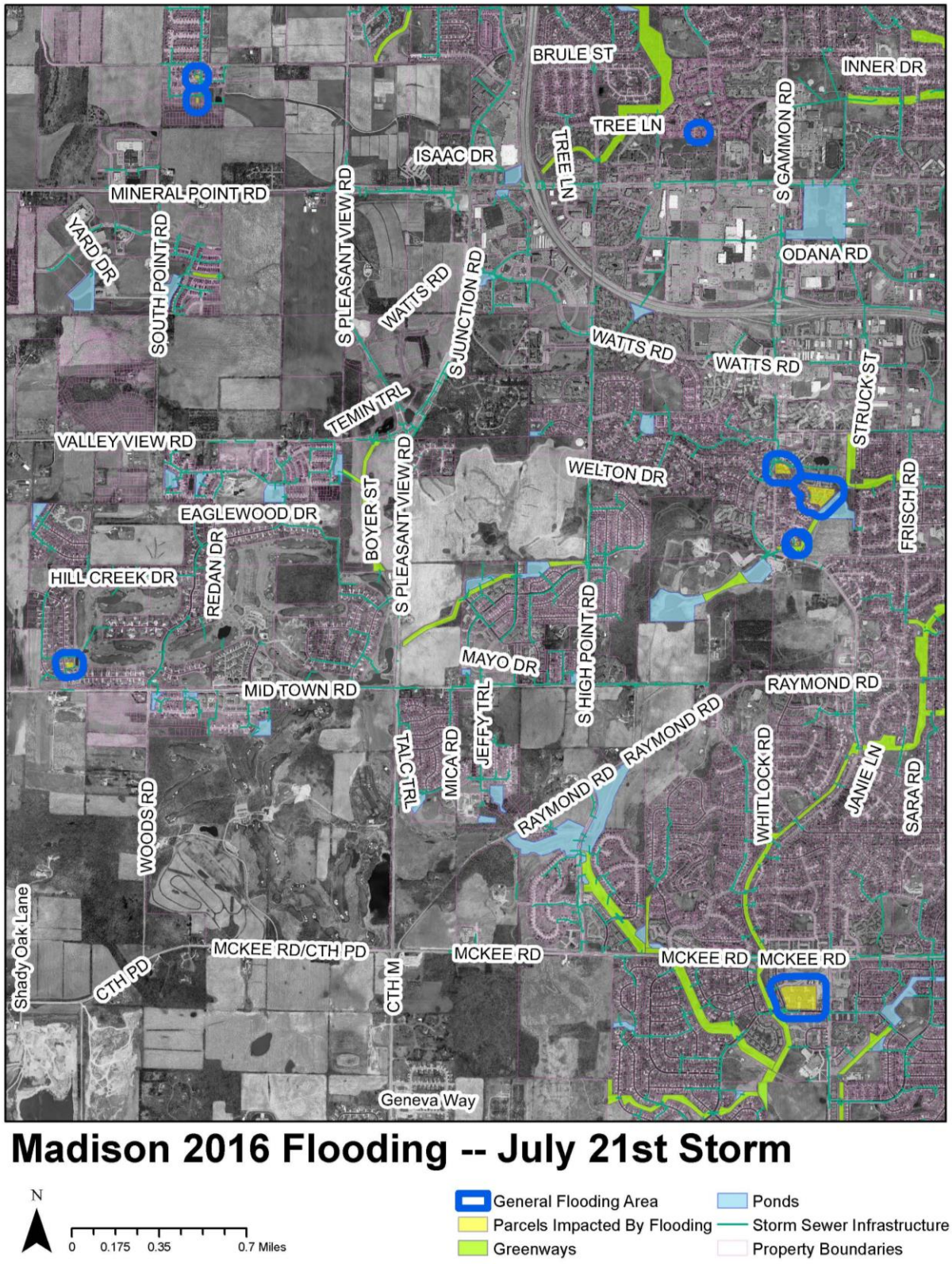


**Figure 2 Identified Future Loss Properties**




# Madison 2016 Flooding -- July 21st Storm

N

0 0.175 0.35 0.7 Miles

General Flooding Area
Parcels Impacted By Flooding
Greenways
Ponds
Storm Sewer Infrastructure
Property Boundaries

**Figure 3 Identified Future Loss Properties**


# Madison 2016 Flooding -- July 21st Storm

N

0 0.175 0.35 0.7 Miles

General Flooding Area
Parcels Impacted By Flooding
Greenways
Ponds
Storm Sewer Infrastructure
Property Boundaries

**Figure 4 Indentified Risk of Extreme Flood Event**


**Potential Impact of Extreme Flooding Event**
Madison, WI--Isthmus

Open Space
Building Footprint

0 0.2 0.4 0.8 Miles

N

### Tornado

While it is difficult to estimate specific losses to a tornado, due to the random nature of the event, a methodology was developed that was applied to each jurisdiction during the 2015 update. The table below estimates the percent area of the jurisdiction that could be impacted based on the average sized tornado (F2) in Dane County. High value exposure is based on 100% loss, medium 50% loss, and low is 25% loss to the property potentially impacted. The loss ratio, which is the ratio of the damaged building value to total exposed building value, is a measure of the impact to the jurisdiction as a whole. Communities with loss ratios 10% or more may have difficulty recovering from a disaster. Refer to the tornado hazard profile in the main mitigation plan for more details on this methodology.

**Table 9 Tornado Loss Estimate**

| % Area of Impact | Improved Parcel Count | Affected Structure Estimate | Total Exposed Value | Estimated Loss $ - High Damage Range | Estimated Loss $ - Moderate Damage Range | Estimated Loss $ - Low Damage Range | Loss Ratio for Moderate Damage Range |
|---|---|---|---|---|---|---|---|
| 1.06% | 135087 | 1436 | $453,302,493,150 | $4,817,048,412 | $2,408,524,205 | $1,204,262,102 | 0.5% |

Data Source: Analysis Based on Dane County Land Information Office's data

## Growth and Development Trends

Planned land use is shown in Figure 1, in relation to the flood hazard. Table 10 illustrates how the City of Madison has grown in terms of population and number of housing units between 2010 and 2014-15. Housing data is to 2014 due to data availability. Table 11, drawn from the Demographics Services Center at the Wisconsin Department of Administration, shows population projections through 2035.

**Table 10 City of Madison Change in Population and Housing Units, 2010-2014/15**

| 2010 Population | 2015 Population | Percent Change (%) 2010-2015 | 2010 # of Housing Units | 2014 # of Housing Units | Percent Change (%) 2010-2014 |
|---|---|---|---|---|---|
| 233209 | 242216 | 3.86% | 108,843 | 108,191 | -0.6% |

Source: Dane County

**Table 11 City of Madison Population Projections, 2015-2035**

| Population Projection | 2015 | 2020 | 2025 | 2030 | 2035 |
|---|---|---|---|---|---|
| Increase by same percentage each year (.76%) | 242,216 | 251,430 | 260,994 | 270,922 | 281,227 |

Data Source: Demographic Services Center, Wisconsin Department of Administration, 2015

## Problems or Additional Vulnerability issues

The City of Madison is a continuously growing municipality, which has caused several of the Townships surrounding it to become unsustainably small. As such, the City has entered into agreements with several surrounding municipalities regarding boundaries. These include:

- Town of Madison
    - The Town of Madison will dissolve and be split between the City of Fitchburg and the City of Madison on October 31, 2022.

- Town of Blooming Grove
    - The Town of Blooming Grove will dissolve and become part of the City of Madison on November 1, 2027.
- Town of Burke
    - The Town of Burke will dissolve and be split between Madison, Sun Prairie and Deforest on October 27, 2036.
    - The City of Madison already has a separate agreement for providing Fire and EMS services to the Town of Burke.

## Capability Assessment

Capabilities are the programs and policies currently in use to reduce hazard impacts or that could be used to implement hazard mitigation activities. This capabilities assessment summarizes regulatory mitigation capabilities, administrative and technical mitigation capabilities, and fiscal mitigation capabilities for the City of Madison.

### Mitigation Capabilities Summary

Table 12 lists planning and land management tools typically used by local jurisdictions to implement hazard mitigation activities, or by themselves contribute to reducing hazard losses. The table also indicates which of these tools are currently utilized in the City of Madison.

**Table 12 City of Madison Regulatory Mitigation Capabilities**

| Regulatory Tool (ordinances, codes, plans) | Yes/No | Comments |
|---|---|---|
| General or Comprehensive plan | Yes | http://www.cityofmadison.com/planning/comp/ |
| Zoning ordinance | Yes | Chapter 28, Online - City of Madison http://www.municode.com/resources/gateway.asp?pid=50000&sid=49 |
| Subdivision ordinance | Yes | Chapter 16, Online - City of Madison |
| Growth management ordinance | No | Neighborhood Planning Process addresses this issue |
| Floodplain ordinance | Yes | Part of Zoning Ordinance – See above |
| Other special purpose ordinance (stormwater, steep slope, wildfire) | Yes | Stormwater (Chapter 37), Steep slope, Environmental corridors |
| Building code | Yes | Chapter 29, Online - City of Madison http://www.municode.com/resources/gateway.asp?pid=50000&sid=49 Commercial Code not online |

| | | |
|---|---|---|
| Fire department ISO rating | Yes | ISO rating – 1 |
| Erosion or sediment control program | Yes | Chapter 29 and 37, Online - City of Madison http://www.municode.com/resources/gateway.asp?pid=50000&sid=49 Commercial Code not online |
| Storm water management program | Yes | Chapter 37, Online - City of Madison http://www.municode.com/resources/gateway.asp?pid=50000&sid=49 |
| Site plan review requirements | Yes | |
| Capital improvements plan | Yes | Part of the adopted annual budget |
| Economic development plan | Yes | Process of approval |
| Local emergency operations plan | Yes | Fire department website that lists the emergency and contacts. http://www.cityofmadison.com/ems/ |
| Flood insurance study or other engineering study for streams | Yes | Handled through FEMA – City of Madison adopted. Routine hydraulic studies with all new developments |
| Elevation certificates (for floodplain development) | No | Do not issue. Property owner responsible to hire contractor. City provides information and guidance as requested. |

Data Source: City of Madison Data Collection Guide, 2015

Table 13 identifies the personnel responsible for mitigation and loss prevention activities as well as related data and systems in the City of Madison.

**Table 13 Responsible Personnel and Departments for the City of Madison**

| Personnel Resources | Yes/No | Department/Position | Comments |
|---|---|---|---|
| Planner/engineer with knowledge of land development/land management practices | Yes | Planning & Development/Planning<br>Unit Director<br>Engineering/Deputy City Engineer<br>Engineering/Engineer IV | Natalie Erdman<br><br>Rob Phillips<br>Janet Dailey |
| Engineer/professional trained in construction practices related to buildings and/or infrastructure | Yes | Building Inspection/Director<br>Engineering/Deputy City Engineer | George Hank<br>Rob Phillips |
| Planner/engineer/scientist with an understanding of natural hazards | Yes | Engineering/Deputy City Engineer | Rob Phillips |

| Personnel Resources | Yes/No | Department/Position | Comments |
|---|---|---|---|
| Personnel skilled in GIS | Yes | Engineering/GIS Manager | Eric Pederson |
| Full-time Building Official | Yes | Building Inspectors | George Hank |
| Floodplain Manager | Yes | Planning & Development – Zoning Administrator | Matt Tucker |
| Emergency Manager | Yes | Fire Department/Fire Marshall | Ed Ruckriegel |
| Grant Writer | Yes | Fire Department/Various | |
| Public Information Officers to provide information of the hazard as it comes in and gets it out to the people | Yes | Fire/PIO<br>Water/PIO<br>Police/PIO | |
| Public Works Operations | Yes | Engineering/Operation Manager<br>Streets/Operations Managers<br>Traffic/Engineering Operations Manager<br>Water/Operations Managers<br>Water/Supply Manager<br>Parks/Maintenance Manager<br>Parks/City Forester | Kathy Cryan<br>Chris Kelley<br>Lynn Christoff<br>Dan Rodefeld<br>Joe Demorret<br>Charlie Romines<br>Marla Eddy |
| Evacuation support | Yes | Madison Metro Transit | Phil Gadke |
| | Yes | IT Department (1 to 2 people) | |
| | Yes | Traffic Control Management – Madison Police, Traffic Engineering, Madison Metro | |
| | Yes | Inside property dwellings<br>Outside property | George Hank |
| GIS Data Resources – (land use, building footprints, etc.) | Yes | Wetlands, water, storm, sewer, floodplain maps | Eric Pederson |

| Personnel Resources | Yes/No | Department/Position | Comments |
|---|---|---|---|
| Warning systems/services (Reverse 9-11, cable override, outdoor warning signals) | Yes | Use County System, Listservs, text messaging, etc | Dane County and City of Madison |

Data Source: City of Madison Data Collection Guide, 2015

Table 14 identifies financial tools or resources that the City of Madison could potentially use to help fund mitigation activities.

**Table 14 Financial Resources for the City of Madison**

| Financial Resources | Accessible/Eligible to Use (Yes/No) | Comments |
|---|---|---|
| Community Development Block Grants | Yes | CDBG Department – Jim O'Keefe |
| Capital improvements project funding | Yes | Capital Budget – Annual |
| Authority to levy taxes for specific purposes | Yes | Dave Schmiedicke – City Finance Director |
| Fees for water, sewer, gas, or electric services | Yes | Only for water, storm, and sewer. Gas and electric are through MG&E. |
| Impact fees for new development | Yes | |
| Incur debt through general obligation bonds | Yes | Dave Schmiedicke – City Finance Director |
| Incur debt through special tax bonds | Yes | Dave Schmiedicke – City Finance Director |
| Incur debt through private activities | No | |

## Additional Capabilities

The City of Madison has implemented a number of programs regarding educational programs including but not limited to, fire safety, environmental education, household preparedness, etc. Each City agency has funded positions for training websites.

### National Flood Insurance Program Participation

The City of Madison participates in the National Flood Insurance Program. Refer to information provided in Table 15 below.

**Table 15 City of Madison NFIP Information**

| Floodplain Regulation Program Status as of 1/2009 | Floodplain Ordinance | Dane County FIRM Panels | NFIP Participation | Init FHBM Identified | Init FIRM Identified | Curr Eff Map Date | Reg-Emer Date |
|---|---|---|---|---|---|---|---|
| MADISON | Yes | Numerous -See index | Yes | 3/8/1974 | 9/30/1980 | 09/17/2014 | 9/30/1980 |

### Public Involvement Activities

The City of Madison community participated in the County public outreach process. This was a series of public workshops held around the County in which an overview of natural hazard mitigation was given and the County plan was discussed. Residents were then given the opportunity to give their input on mitigation actions that could be taken, and filled out informational surveys that assessed the level of risk the perceived within their own community. More information on these meetings can be found in the County base plan.

Once the plan is finalized, the City will make the plan available through the city website. The plan will be available on the website throughout the adoption process.

## Mitigation Actions

Objective #1: Develop a "Situational Awareness" Process or protocol such that the City is divided into areas for teams to quickly perform field inspections to document damage and needs after an emergency weather related event or similar.

Steps:

1) Discuss roles of various agencies relative to situational awareness.
2) Identify available field resources for each city agency.
3) Identify documentation needs and methods available for communicating observations and needs.
4) Develop a protocol for city agencies.
5) Provide staff training.

Lead Implementing Agency: City of Madison – Engineering

Supporting Agencies:

- Emergency Management - City
- Agencies with field resources

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| Possible Funding and Technical Assistance: | G.O. borrowing. |
| Timeline: | Fiscal year 2016 |
| Priority: | Moderate |
| Estimated Costs: | $18,000 for contracted emergency planning services |

Objective #2: Eliminate residential basement backups attributable to overloaded sanitary sewers during rain events. The primary area identified for this problem has been worked on and final phase continues to be a strategy for the near future.

Steps:

1) Establish eligibility zones based on DFIRM data and basement backup history.

2) Survey property owners in defined eligibility zones to determine which properties have had a basement back up during a wet weather event.

3) Conduct inspections of properties which experienced basement back ups during wet weather event to determine if the property is equipped with a sewer backflow prevention device (BFD), assess BFD condition and identity cross-connections contributing to overloaded sanitary sewer during rain events.

4) Provide property owner with a written report detailing recommended actions to be taken to prevent basement back ups (i.e. install back flow prevention device) as well as code violations and cross-connections that must be remedied.

5) Provide 50% rebate of property owner's costs of implementing recommended actions.

Lead Implementing Agency: City of Madison Engineering

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| Supporting Agencies: | City of Madison Building Inspection |
| Possible Funding and Technical Assistance: | • Madison Sewer Utility<br>• FEMA Pre-Disaster Mitigation Grant Program |
| Timeline: | The City anticipates this being a Natural-year project taking approximately 10 years. |
| Priority: | High |
| Estimated Costs: | $5,000,000 |

Objective #3: Reduce inflow and infiltration into sanitary sewer collection system. This will remain an ongoing strategy for some time. Initiatives underway including swapping older "pin type" castings for sealed castings and lining of older pipes that leak. A new initiative in this area will be to come up with a strategy and policy to line the portion of private laterals within private property.

Inflow and infiltration or I & I are terms used to describe the ways that groundwater and storm water enter into sanitary sewer systems. Wet weather magnifies existing inflow and infiltration sources. As a rain or snow melt event begins the inflow and infiltration sources start filling the sanitary sewer systems with clear water, eventually overloading the sanitary sewer system. Wastewater will then flow backwards through the sanitary sewer system flooding basements or households and causing manholes to pop open releasing wastewater onto the street.

Overflow occurrences put public health at risk and violate state and federal environmental regulations. Sanitary sewer overflows release wastewater and potential pathogens onto streets, into waterways, and basements increasing potential health risks.

The City of Madison has identified specific areas where severe wet weather events can create system overloads. These include, but are not limited to, Waunona Way; the Lake Edge neighborhood and areas along Starkweather Creek, This program is designed to identify and eliminate sources of inflow and infiltration (I&I) into the City's sanitary sewer system.

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| Steps: | 1) | Identify and prioritize sanitary basins subject to significant inflow and infiltration. |
| | 2) | Perform CCTV inspection of sanitary mains and access structures to identify specific I & I issues. |
| | 3) | Identify most cost-effective and efficient remediation measures (i.e. replacement, lining, relocation, etc.) |
| | 4) | Design, let bid and construct identified remediation measures. |
| Lead Implementing Agency: | City of Madison Engineering | |
| Supporting Agencies: | | |
| Possible Funding and Technical Assistance: | • | Madison Sewer Utility |
| | • | FEMA Pre-Disaster Mitigation Grant Program Timeline: 2010-2020 |
| Priority: | High | |
| Estimated Costs: | $7,500,000 | |

Objective #4: Provide emergency back-up power generators to critical municipal facilities. During severe weather and power interruptions, it is imperative that essential City facilities have back-up power generators to ensure that essential services and communications are maintained without interruption. While many buildings have now been equipped for this, some still remain and this remains a key strategy. Grant funding would be very useful for completing this strategy.

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| Steps: | 1) | Develop a prioritized list of City facilities based on criticality of need for emergency back- up power during severe weather and power interruptions. |
| | 2) | Conduct site visits to develop a comprehensive inventory of existing emergency back-up power generators, map circuits and functional areas served by existing equipment and assess current condition. |
| | 3) | Meet with facility users to evaluate their specific requirements. |
| | 4) | Inventory and assess the power use of existing equipment, complete a power generator load study to determine the most economical, reliable and efficient solution for each facility. |
| | 5) | Develop plans and specifications for required systems. |
| | 6) | Advertise, receive bids and award contract(s). |
| | 7) | Schedule, organize, supervise and ensure system installation meets all standards and specifications. |
| | 8) | Train facilities maintenance personnel on proper operation and maintenance |
| Lead Implementing Agency: | City of Madison Engineering | |
| Supporting Agencies: | Building Inspection, Fire, Police, Streets, Water, Parks | |
| Possible Funding and Technical Assistance: | • | Madison Sewer Utility |
| | • | FEMA Pre-Disaster Mitigation Grant Program |
| Timeline: | 2016-2021 | |
| Priority: | High | |
| Estimated Costs: | Unknown at this time | |

Objective #5: Reduce flooding of the Midvale/University Ave. intersection and associated areas along the University Ave. corridor. This continues to be a strategy. Some progress has been made towards the ultimate goal, with basically 2 main phases remaining (Grand Avenue to University Bay Drive & University Bay Drive to Shorewood Boulevard). Other interim measures were completed including creation of an emergency detour plan and swapped closed castings for open. Grant funding would be very useful for completing this strategy.

Steps:

1) Complete a hydraulic and hydrologic analysis of the watershed – done
2) Complete a preliminary design to increase the pipe capacity to Willow Creek – done
3) Complete a detailed plan to implement incremental improvements to allow an eventual complete upgrade of this corridor from a flooding perspective – done
4) Begin detailed design and construction of the storm sewer upgrades as budgets and projects allow:
5) Willow Creek across Campus Drive – done
6) Midvale Blvd. to Shorewood Blvd. on University – ongoing
7) Campus Drive to Highland Ave – construction 2011
8) Willow Creek to University Bay Dr. – unscheduled
9) University Bay Dr. to Shorewood Blvd. – unscheduled

Lead Implementing Agency: City Engineering

Supporting Agencies:

- WDOT
- Dane County Transit Authority (pending)

Possible Funding and Technical Assistance:

- WDOT
- City of Madison Stormwater Utility
- Dane County Transit Authority (pending)

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| Timeline: | This project was conceptually begun circa 2000 with the preliminary work discussed in 1 & 2 above. Full design and construction work has also been completed for 4.a) in 2006. Phase 4.b) is currently being designed (summer 2009) for construction in 2010. Phase 4.c) is proposed with the reconstruction of University Avenue in 2011. Phases 4.d) and e) will require intervention by the WDOT and a possible RTA and upgrade of the railroad tracks to accommodate light rail or commuter rail. |
| Priority: | Medium |
| Estimated Costs: | Phase 4.b) is roughly estimated to cost 1,750,000.00, Phase 4.c) is estimated to cost 1,000,000.00. Both of these estimates are for storm sewer work only and do not include the associated necessary road reconstruction. |

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| Objective #6: | Reduce flooding along East Washington Avenue. While there are very limited options to deal with this flooding, a mitigation strategy would be to divert storm runoff away from the main collection artery. A relief sewer is proposed along Mifflin Street from Ingersoll to the Yahara River. |
| Steps: | 1) Develop mitigation options.<br>2) Identify most effective strategy and develop a project cost estimate.<br>3) Design system to divert storm runoff away from the E Washington corridor.<br>4) Provide for community input.<br>5) Explore funding options |
| Lead Implementing Agency: | City Engineering |
| Supporting Agencies: | |
| Possible Funding and Technical Assistance: | • WisDOT<br>• Grant money if available |

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| Timeline: | Due to limited options and complexity of the strategy, a 5-7 year timeline is proposed. |
| Priority: | Moderate |
| Estimated Costs: | To be determined |

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| Objective #7 | Purchase and install emergency chlorine gas cylinder shut-off systems (actuated valve closers) for all Water Utility sites that use and store chlorine gas (23 well sites). The previous objective of installing chlorine gas detection and alarm systems at all well sites was completed in 2012. |
| Steps: | 1) Purchase and install emergency cylinder shut-off systems at a projected rate of four systems per year.<br>2) Maintain, test and calibrate equipment on a routine basis.<br>3) Replace or upgrade equipment as required.<br>4) Incorporate emergency cylinder shut-off systems in all new facilities. |
| Lead Implementing Agency: | Madison Water Utility |
| Supporting Agencies: | • Madison Fire Department<br>• Wisconsin Emergency Management<br>• Dane County Emergency Management |
| Possible Funding and Technical Assistance: | • System installation, operation, and maintenance work performed by Water Utility personnel.<br>• The equipment and installation costs are part of the annual Capital Budget.<br>• The maintenance, repair, and replacement of components are part of the Water Utility's Operating Budget.<br>• Grant money if available. |

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| Timeline: | Two systems have been installed and four more are planned to be installed by the end of 2015. It will take approximately four to five more years to complete the installations at the projected rate of four systems per year. |
| Priority: | High |
| Estimated Costs: | $196,000 Hardware costs, $ 24,000 Labor Costs |

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| Objective #8: | Procure a Cell On Wheels – a complete trailerable base station site for emergency radio coverage. This system includes a crank up tower, generator, and housing for base stations. |
| Steps: | This objective should be discussed after new digital radio system is completed end of 2018. Estimate a very high cost, and ability to keep up with ever changing technology would add more cost.<br><br>If a catastrophe occurs, Motorola could provide temporary emergency system (rental) compatible with whatever system (digital or analog) was currently being used. Motorola provided such communications equipment for New Orleans (Katrina Hurricane). |
| Lead Implementing Agency: | DOT/Communications |
| Supporting Agencies: | • T.E. Electrical Shop<br>• Fleet services |
| Possible Funding and Technical Assistance: | |
| Timeline: | 6-10 months |
| Priority: | High |

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| Estimated Costs: | $250,000 |

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| Objective #9: | Procure a 35 kilowatt, single phase, trailer mounted generator with emergency connection outlet at each of six tower sites. |
| Steps: | We have a list of companies that rent emergency generators. The city can expand this list to vendors outside the city so we have more options.<br><br>Emergency connections – Spaanem & High Crossing Sites can be installed this year during Ph 2 Communications Project in 2016.<br><br>4 other sites – will work with TE Electricians to install connections in 2016. |
| Lead Implementing Agency: | DOT/Communications |
| Supporting Agencies: | • T.E. Electrical Shop<br>• Fleet services |
| Possible Funding and Technical Assistance: | |
| Timeline: | 3-6 months |
| Priority: | Medium |
| Estimated Costs: | $25,000 |

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| Objective #10: | Procure two 25 kilowatt, single phase standby generators and transfer switches. These will be used at the Spaanem tower and Holiday Heights tower, which currently have no emergency backup power. |
| Steps: | Spaanem to be completed in 2016<br><br>Holiday Heights site is being relocated to High Crossing. New building & generator at the High Crossing site is part of the 2016 project. |
| Lead Implementing Agency: | DOT/Communications |
| Supporting Agencies: | • T.E. Electrical Shop<br>• Fleet services |
| Possible Funding and Technical Assistance: | |
| Timeline: | 3-6 months |
| Priority: | Moderate |
| Estimated Costs: | $10,000 |

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| Objective #11: | Procure 40 portable radios to be held in reserve in a secure location for volunteers and emergency aid workers after a disaster. |
| Steps: | Radio Shop (Sayle St) has 40 portables that work with current analog system.<br><br>New digital radio system (2018) will require additional radios to be purchased as spares.<br><br>Cost is $2,500 per radio = $100,000 |

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| Lead Implementing Agency: | DOT/Communications |
| Supporting Agencies: | |
| Possible Funding and Technical Assistance: | |
| Timeline: | 2 months |
| Priority: | High |
| Estimated Costs: | $100,000 |

Objective #12: Continue to implement sound floodplain management practices through continued compliance with the National Flood Insurance Program, to include floodplain ordinance enforcement and periodic review, promoting the benefits of flood insurance, and continued staff training and development in floodplain management.

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|---|---|---|
| Steps: | 1) | Evaluate through the existing staff, County planning staff, and additional DNR staff if necessary, the regulatory deficiencies and enforcement shortcomings in flood-related ordinances and programs (see related County objective). |
| | 2) | Periodically update ordinances as necessary. |
| | 3) | Ensure that stop work orders and other means of compliance are being used as authorized by each ordinance. |
| | 4) | Suggest changes to improve enforcement of and compliance with regulations and programs. |
| | 5) | Encourage floodplain management staff to become Certified Floodplain Managers (CFM) or maintain their CFM status. |
| | 6) | Participate in Flood Insurance Rate Map updates by adopting new maps or amendments to maps. |
| | 7) | Utilize recently completed Digital Flood Insurance Rate maps in conjunction with GIS to improve floodplain management, such as improved risk assessment and tracking of floodplain permits. |
| | 8) | Promote and disperse information on the benefits of flood insurance, with assistance from partners such as the County, WDNR, or ASFPM. |

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| Lead Implementing Agency: | City Engineering and City Planning |
| Supporting Agencies: | • Dane County Planning and Development<br>• Lakes and Watershed Commission<br>• Land Conservation Department<br>• Association of State Floodplain Managers<br>• Wisconsin Department of Natural Resources |
| Possible Funding and Technical Assistance: | Staff Time |
| Timeline: | Ongoing |

Priority: High

Estimated Costs: Low; can be accomplished with existing staff and within existing department budget.

Objective #13: Construct a storm resistant shelter at the Oak Park Terrace mobile home community. The community includes 586 sites for mobile homes. The community, located on the northeast side of Madison, does not include any hardened facilities to shelter during severe weather.

Steps:

1. Involve property owners in shelter site selection.
2. Identify public and private properties suitable for a severe weather shelter.
3. Purchase property or develop agreements for the shelter site.
4. Acquire design and construction funds.
5. Design shelter.
6. Construct shelter.

Lead Agency: City of Madison Emergency Management

Supporting Agencies:

- City Engineering
- City Planning
- Dane County Emergency Management

Possible Funding and Technical Assistance: A storm shelter at this location requires collaboration between the city and the property owner. The property owner may need to set-aside property for the shelter. Thus, the property owner may have a significant financial contribution. The city can plan and budget for a shelter, but given other priorities, it is not likely a shelter will be funded. FEMA will be a source of information relative to design of the site and structure.

Timeline: Undetermined

Priority: Moderate

Cost: $1.8 -2.2 million

Objective #14: Resolve residential flooding in areas where basins overtop during extreme storm events.

Steps:

1) Identify at-risk properties. Many of the west-side properties were identified during the July 21st, 2016 storm.

2) Conduct inspections of properties which experienced flooding and assess whether the City can engineer cost-effective solutions to prevent future flooding.

3) Educate property owners about their ability to purchase flood insurance even when outside the FEMA delineated flood-zone.

4) Track and document property damage to identified properties during future intense rain events that cause flooding.

5) Request funding to purchase, flood-proof, and resell properties when possible. If flood-proofing is not possible, request funding to purchase properties for permanent City of Madison Engineering ownership.

Lead Implementing Agency: City of Madison Engineering

Supporting Agencies: City of Madison Building Inspection

Possible Funding and Technical Assistance: Grant money, if available.

Timeline: Undetermined, dependent on future rain events.

Priority: Medium

Estimated Costs: To be determined

Objective #15: Identify implementable strategies to mitigate impacts on residents, businesses and infrastructure, including the sanitary system, during an extreme flooding event as mapped in Figure 4. It is expected that this objective will develop as the flooding impacts are further investigated.

Steps:

1) Meet with necessary organizations and stakeholders to identify impacts of extreme flooding and brainstorm ways to mitigate damages. This process has already begun with City of Madison Emergency Management, and the Madison Sewer Utility.

2) Investigate how other cities prepare for extreme, long-term flooding.

3) Coordinate with City of Madison Emergency Management to create a response plan for an extreme flood event.

4) Investigate impacts of previous inflow and infiltration (I & I) improvements in isthmus area. Decide whether it is cost-effective and effective to implement more aggressive I & I programs to combat extreme flooding impacts on the isthmus sanitary sewer.

5) Complete a detailed plan to implement incremental improvements that will help mitigate impacts from extreme flooding.

Lead Implementing Agency: City Engineering

Supporting Agencies:

- Madison Sewer Utility
- Emergency Management - City

Possible Funding and Technical Assistance:

- This objective overlaps with other objectives, such as Objective #3 (to reduce I & I into sanitary sewer collection system).
- Madison Sewer Utility
- FEMA Pre-Disaster Mitigation Grant Program Timeline: 2010-2020

Timeline: Ongoing/undetermined

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|---|---|
| Priority: | Moderate |
| Estimated Costs: | To be determined |