3.1 Physical Description

3.1.1 Geography

Dane County occupies 1,230 square miles in the heart of south central Wisconsin, 75 miles west of Milwaukee and 150 miles northwest of Chicago. Most of the land is very productive farmland. In the center of the County are the City of Madison, the state capital, and the main campus of the state university. As state government, the University, and the desire to experience the County's high quality of life have grown, so has the population. As a result, the City of Madison and other cities and villages have expanded into neighboring agricultural land and natural areas. In addition to the City of Madison, Dane County includes 8 cities, 20 villages and 33 townships. Figure 3.1.1 shows the political boundaries within the County.

Dane County has a varied and unique geologic and physiographic setting. The western part of the County, known as the valley and ridge or "driftless area" is the only part of the County not affected by the most recent glacial period. The area is characterized by steep ridges and valleys drained by fast-flowing streams, generally without natural lakes or impoundments. East of the driftless area is an area of glacial moraines, located at a major drainage divide where the headwaters of many tributaries of the Wisconsin River, Rock River, and Sugar and Pecatonica Rivers originate.

East of the moraines in the center of the County is the Yahara River Valley. Here deep glacial deposits dammed large valleys forming a chain of large lakes and wetlands. The Yahara River Valley is primarily glacial ground moraine, with extensive areas of peat and marsh deposits. Streams are generally flatter and more sluggish than those in the driftless area. The eastern part of the County is known as the drumlin and marsh physiographic area and consists primarily of general glacial deposits with extensive areas of marshes. This area includes many small drumlin hills interspersed with shallow glacial deposits, which created an extensive system of interconnected wetlands with poorly defined drainage. Small streams wind slowly through the lowlands. The only lakes in this area are small stream impoundments or shallow marshy lakes.

Figure 3.1.2 is a shaded relief map of the County indicting the topography of the County.

3.1.2 Surface Waters

Figure 3.1.3 shows the principal lakes and streams in Dane County, as well as the four major river basins, which include smaller-sized watersheds that drain to individual water bodies. The *Dane County Water Quality Plan Summary Plan, Appendix B*, published by the Dane County Regional Planning Commission contains a detailed description of the surface water systems of the County.

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Figure 3.1.1
Local Units of Government

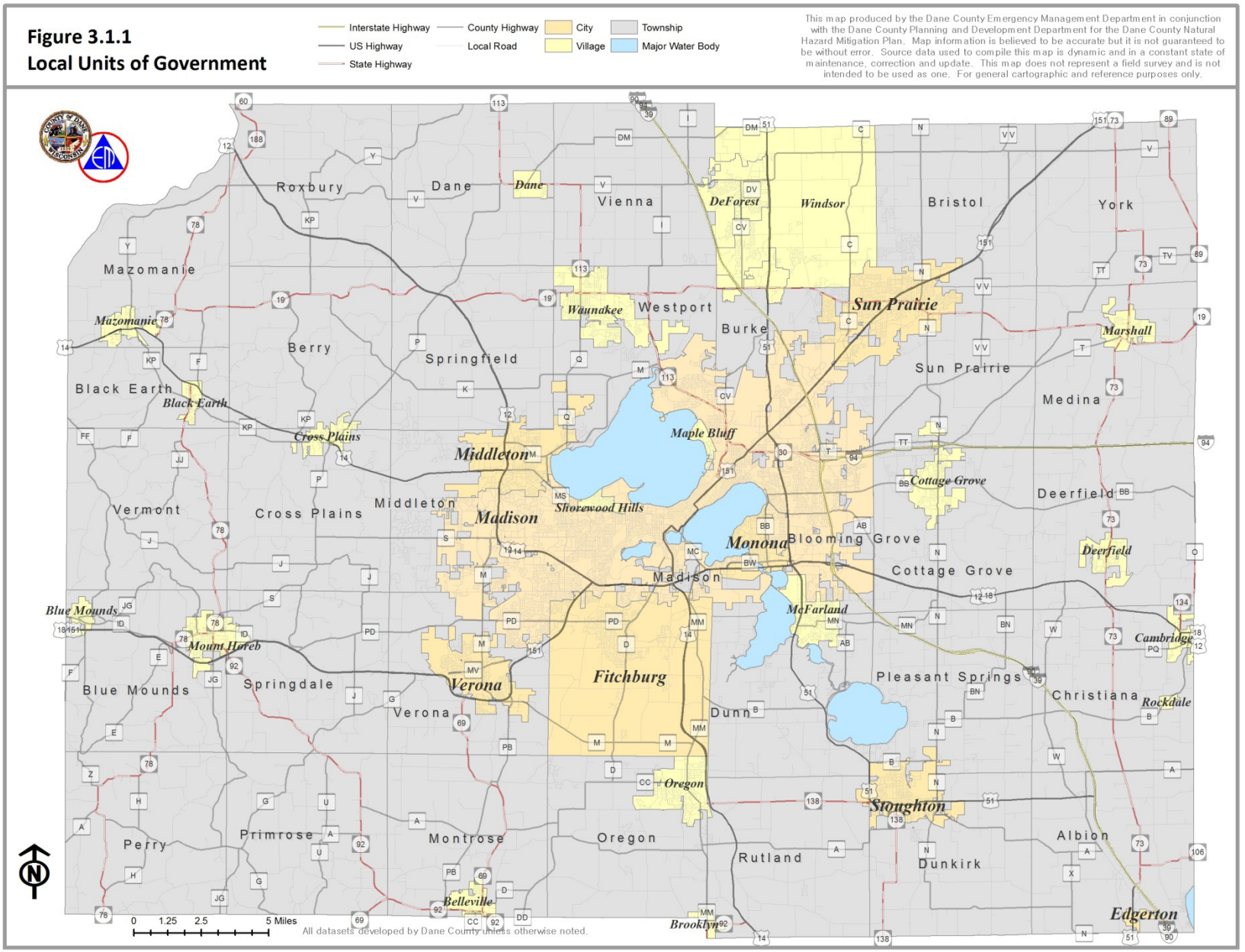


Figure 3.1.2
Dane County Terrain Map

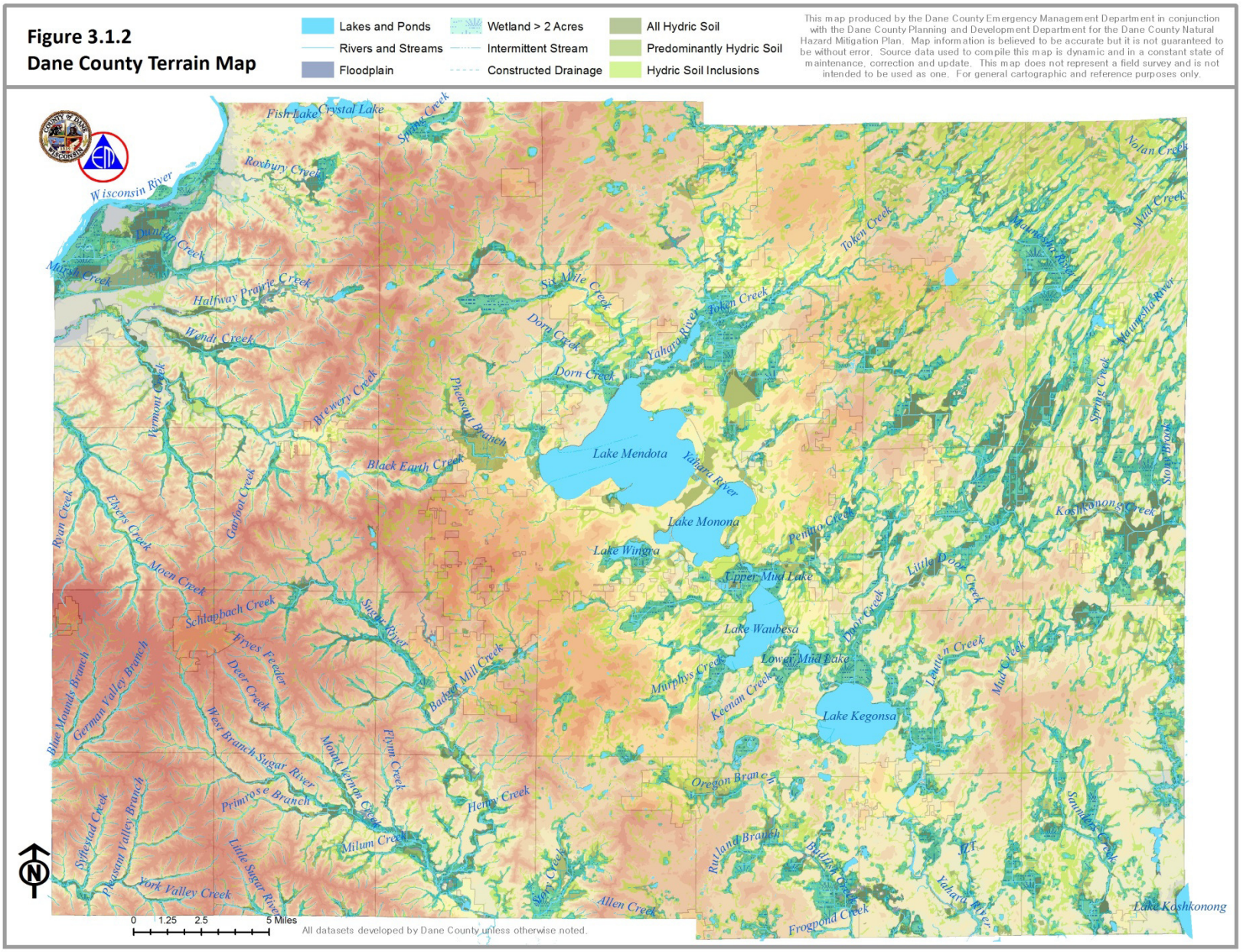
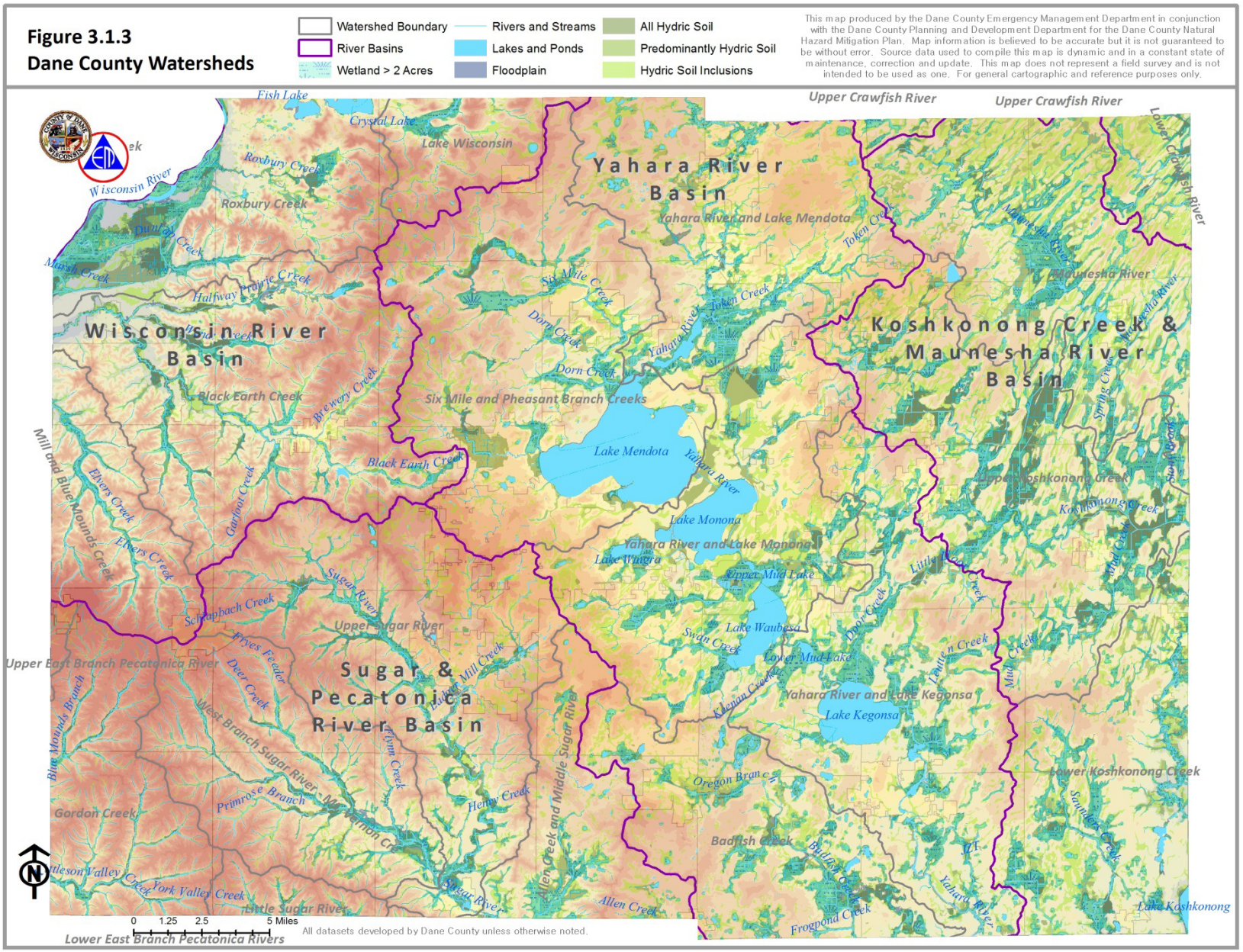


Figure 3.1.3
Dane County Watersheds



3.1.3 Major Drainage Basins

Wisconsin River Basin

The northern part of the Wisconsin River Basin includes the bottomlands and floodplain of the Wisconsin River Valley, a hillier moraine area to the east, and a drumlin-marsh glacial area east of the moraines. The Wisconsin River bottomlands include extensive wetland and marsh deposits underlain by deep alluvial deposits. A few streams and small, internally drained areas characterize the moraine areas with kettle holes occupied by marshes or small seepage lakes.

- *Fish Lake is* a high quality seepage lake occupying a valley of glacial outwash and alluvium. It covers 252 acres (313 acres including Mud Lake). It has a two-square-mile watershed, which is predominantly agricultural. On the west side of the lake, Dane County maintains a small park and boat landing. Lussier County Park is along the eastern shore. There are no surface inlets or outlets to the lake and it is primarily spring-fed.

- *Crystal Lake* is a small (approximately 571 acres), shallow, landlocked basin located about one-half mile east of Fish Lake. There is some residential and recreational development along the lakeshore, but most of the land surrounding the lake is farmland. The lake's watershed is less than five square miles. Since the predominant source of water to the lake is runoff, the water level in the lake fluctuates from year to year depending on the amount of precipitation

Sugar-Pecatonica Basin

This area is characterized by thin soils over bedrock, steep wooded slopes, and narrow stream valleys with alluvial deposits, few wetlands, and no natural lakes or impoundments. Land use is mostly rural and agricultural. Many of the wetlands along the Sugar River have been drained for agricultural use.

- *Lake Belle View* is a small impoundment on the Sugar River in the Village of Belleville. Sediment deposition from upstream areas had been a concern, prior to a large-scale River/Lake Separation Project completed in 2013 to help restore the lake. A 3200-foot berm constructed from dredged material now isolates the 40 acre lake from the high nutrient and suspended solid loads in the Sugar River for all but the largest flood events. In addition to removing four feet of accumulated sediment, dredging of the lake has resulted in restoring a maximum depth of 8-10 feet around the community park, grading to shallower areas to provide diverse fish habitat and outdoor recreational opportunities, as well as a hiking/biking trail along the length of the berm connecting the northern and southern portions of the village. In addition, approximately 30 acres on the river side of the berm has been restored to wetlands and upland habitat through native plantings and seeding.

Yahara River Basin

The surface water resources of the Yahara River Basin represent the most heavily used and highly valued in Dane County. The Yahara River Chain of Lakes – Mendota, Monona, Waubesa and Kegonsa – provide a spectacular setting for the County's central urban region, including the state capital, the main campus of the state university, and a majority of the County's population. The Yahara Lakes are by far the most heavily used recreational resource in the region, and their scenic beauty is one of the prized assets of Dane County.

Most of the Yahara River Basin is contained within Dane County. Much of the land in the basin north of Lake Mendota is devoted to agriculture, with a fairly high percentage of cropland. Rapid urban development is taking place and erosion from construction sites and runoff from urban land uses are of growing importance and concern in this part of the basin.

The central part of the basin – the area surrounding Lakes Mendota, Monona and Waubesa – is primarily urban, with limited agricultural uses on the fringe of the central urban area. The southern portion, including the area directly tributary to Lake Kegonsa, is predominantly agricultural. Only the communities of Stoughton and Oregon contribute any significant urban influence to the lower Yahara River.

- *Lake Mendota* is a large (9,800 acres) deep (maximum depth 83 feet) lake. Lake Mendota's watershed is primarily agricultural land; however, significant urban areas also drain to the lake.

- *Lake Monona* is a smaller lake (3,300 acres) with a maximum depth of 74 feet. Nearly all of the direct drainage to Lake Monona is from surrounding urban areas.

- *Lake Wingra* is a small (348-acre) shallow (maximum depth 21 feet) lake located in the middle of the urban area in the University Arboretum, which drains to Lake Monona.

- *Lake Waubesa* is a 2,100-acre lake (maximum depth of 38 feet) downstream from Lake Monona. The lake receives direct runoff from both urban and rural areas.

- *Lake Kegonsa* is a 3,200-acre lake (maximum depth of 32 feet) and is the furthest downstream of the Yahara Lakes. It is located outside of the central urban areas, and its direct watershed is primarily agricultural, with some development around the lake shoreline.

Other important water resources in the basin include the Yahara River and its tributaries: rural and urban streams draining directly to the lakes, including Token Creek, Sixmile Creek, Pheasant Branch Creek, Starkweather Creek, Nine Springs Creek, and Door Creek, as well as Lake Wingra in the University Arboretum, and large wetland areas, such as Cherokee Marsh and Door Creek Wetlands.

- *Badfish Creek* plays a major role in receiving all of the treated municipal wastewater generated in the basin and transmitting it around the lakes (approximately 42 mgd or 65 cfs in 2013). Because of the pumping and diversion of wastewater around the Yahara Lake System, the mean annual flow of the Yahara River has been reduced by approximately 30 percent. As a result, for every gallon of wastewater diverted to Badfish Creek approximately one gallon of streamflow is lost from the lower Yahara River.

Koshkonong Creek – Maunesha River Basin

Nearly all of the land in the Koshkonong Creek-Maunesha River Basin is agricultural. The City of Sun Prairie, located at the headwaters is the largest urban community in the basin. Other communities include the Village of Marshall, located on the Maunesha River, and the Villages of Deerfield, Cambridge and Rockdale, located along Koshkonong Creek.

The Koshkonong Creek—Maunesha River Basin includes many important and extensive wetland areas, such as the Deansville Marsh and the Mud Lake and Goose Lake wetlands. The Marshall Millpond is a small impoundment on the Maunesha River that supports active recreational use.

3.1.4 Environmentally Sensitive Areas

Resource protection in the region recognizes that land and natural resources perform critical environmental functions such as groundwater recharge and discharge, water quality improvement, erosion control, storage of floodwaters, wildlife habitat, and scenic beauty. Some lands are particularly vulnerable in urban and developing areas.

Resource Protection and Environmental Corridors

The approach to resource protection in Dane County is based primarily on a countywide system of continuous corridors. Most lands in need of protection are associated with stream valleys and other water features. The corridors also emphasize the importance of continuity of environmental systems and protection of the land/water edge. Local governments, the Capital Area Regional Planning Commission (CARPC), and state and federal agencies use the corridors to make decisions on the location of urban development and major facilities. The corridors are also used as the basis for open space and recreation planning and acquisition.

- *Environmental Corridors* are contiguous systems of open space in urban and urbanizing areas, that include environmentally sensitive lands and natural resources requiring protection from disturbance and development, and lands needed for open space and recreational use. They are based mainly on drainage ways and stream channels, floodplains, wetlands, steep slopes over 12.5%, and other resource features. Regional Planning Commission staff work with municipalities to delineate and map environmental corridors as part of the process for approving Urban Service Areas.

- *Resource Protection Corridors* as shown on the Planned Land Use Map of the *Dane County Comprehensive Plan*, include areas that are not suitable for structural development due to environmental sensitivity or because of the presence of fragile, irreplaceable resources. Resource Protection Corridors apply to areas outside Urban Service Areas as identified in the Dane County Water Quality Plan. Resource Protection Corridor Overlays include the following categories of lands:

    - Wetlands, as defined in state statute and including both the shoreland wetland and inland wetland districts under Chapter 11, Dane County Code.

    - Shoreland setbacks and wetland buffers required under Chapter 11, Dane County Code.

    - 1% regional floodplains, including the general floodplain district, floodway district and flood storage district, as described in Chapter 17, Dane County Code.

    - Slopes exceeding 20%, except in towns with adopted town/county comprehensive plan language that specifically permits development on slopes of 20% or greater.

- Other areas identified in town, city or village plans adopted as part of the Dane County Comprehensive Plan, as areas specifically planned to protect natural or cultural resources, and where structural development is strictly limited.

The protection of public health, safety and property is an extremely important function of open space corridors, with significant economic implications, such as avoiding or preventing development in areas subject to flooding. Open space corridors include a variety of environmentally sensitive lands and resource features including: lakes, ponds and streams; wetlands; floodplains; shoreland buffer strips along streams, drainageways, and wetlands.

Lakes, Ponds, and Streams

Lakes, ponds and streams are important water resources that provide a primary function in drainage and hydrologic balance. It is important to avoid development that adversely impacts these areas, since these water resources are necessary to convey runoff and flood flows. These areas are also heavily used for outdoor recreation, nature study and education. Swimming, boating, fishing, and nature study are among the most significant outdoor recreation activities in Dane County. These areas also represent significant wildlife habitat. Finally, lakes, ponds, and streams are important scenic features.

Existing and Historic Wetlands

Over 50 percent of the county's wetlands have been drained and are no longer a component part of the natural ecosystem.[1] Approximately 36,000 acres were reported lost between 1901 and 1936. Between 1939 and 1961 the Wisconsin Conservation Department listed 22,678 wetland acres lost. Recent estimates using GIS indicate a total loss of 66,728 acres, or 56 percent of the original wetland acreage. Most of the drainage activity took place because it was widely believed that wetlands served no useful purpose and that the land could be more productive as an agricultural or urban use. However, it has since been recognized that wetlands are an integral part of a viable and diverse natural resource system. The mapped wetlands that remain are regulated under federal, state or local controls.

Wetlands are particularly important in protecting water resources, drainage, and hydrologic functions in that they provide temporary detention and storage of floodwaters and runoff, which reduces flood damage and maintains a hydrologic balance between ground and surface waters. Wetlands usually represent groundwater discharge areas, which help to maintain stream flows during dry weather conditions. Avoiding construction and development in wetlands is important since these areas are usually subject to flooding and exhibit unstable and compressible soils.

Wetlands also provide an important function in pollution control, outdoor recreation, scenic beauty, development buffers, and education opportunities. Also, wetlands, because they exist on the edge between land and water, are usually highly productive in plant and animal biodiversity.

Hydric soils, which formed over long periods under saturated (low-oxygen) conditions, are a good indication of the location of historic wetlands that may have been ditched, drained, cropped, or altered in some fashion. These soils possess unique characteristics even though the water is no longer present.

Figure 3.1.4 is a map of wetlands and hydric soils in Dane County.

[1] Capital Area Regional Planning Commission, *Dane County Wetland Resources Management Guide*, May 2008

Floodplains

The role of floodplains in performing a drainage and hydrologic function is also very important. Loss, due to development, of the flood conveyance and storage capacity provided by floodplains can result in increased flooding and damages both upstream and downstream. Figure 3.1.5 is a map indicating Dane County floodplains.

One of the primary reasons to protect floodplains from development is to protect public health, safety and property. Locating development in the floodplain exposes property such as buildings, streets and utilities to expensive flood damage, as well as exposing the resident population to significant risks to health and safety during floods. Providing pollution control is a secondary function, primarily through the mechanism of settling out sediment from slow-moving waters in flood fringe or storage areas.

Since floodplains are associated with water features, they can satisfy some outdoor recreation and education needs. Many active and passive recreational uses are compatible with floodplains, particularly for activities that don't require structures or facilities, which might be subject to damage.

Another secondary function of floodplains is to provide wildlife habitat. Since floodplains are associated with lakes and streams, they include the land/water edge, which is important in satisfying the food, water, and habitat needs of a wide variety of land and water based wildlife. In addition, floodplains have a continuous nature, and this continuity is extremely important in enhancing the value of open space for wildlife habitat.

Finally, as a feature of the natural landscape, floodplains also perform an important function in terms of enhancing scenic beauty and shaping urban form. While floodplains in and of themselves may not be particularly scenic, they are important in providing buffers between adjacent communities or incompatible land uses and provide logical boundaries for urban growth.

Infiltration and Groundwater Recharge

Stormwater management practices emphasizing stormwater infiltration and groundwater recharge have received significant attention in recent years. Infiltration practices can provide significant groundwater recharge, pollution control, and floodwater control benefits, depending on the degree of storage and infiltration achieved.

There are constraints to the effectiveness of infiltration and not all sites are suitable for intensive infiltration practices. Considerations include soil type, depth to bedrock, and depth to groundwater.

The most suitable sites for large-scale projects are those that are in undeveloped areas located close to urban service areas boundaries. Suitable soils consist of permeable silt loams, which may be excavated to reach more permeable loam and sandy loam materials. Groundwater and bedrock depths are not less than 10 feet and generally exceed 25 feet. As development pressures and urban service boundaries expand into these areas, careful consideration should be given in stormwater planning to preserving significant amounts of this land for infiltration and groundwater recharge purposes. The opportunity to develop infiltration practices in these areas should not be overlooked, since suitable site characteristics do not exist in all urbanizing areas.

Figure 3.1.4
Wetlands and Hydric Soils

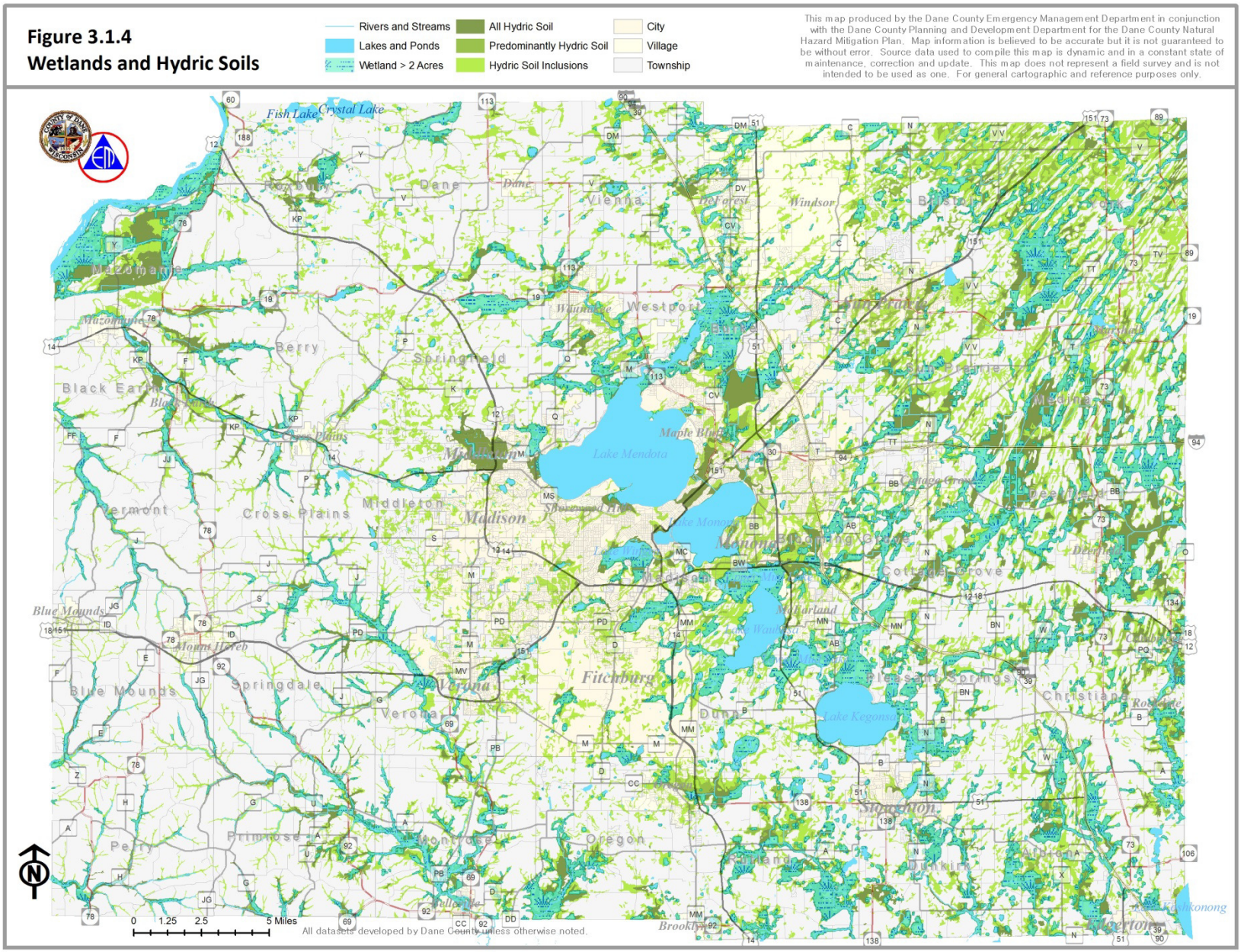
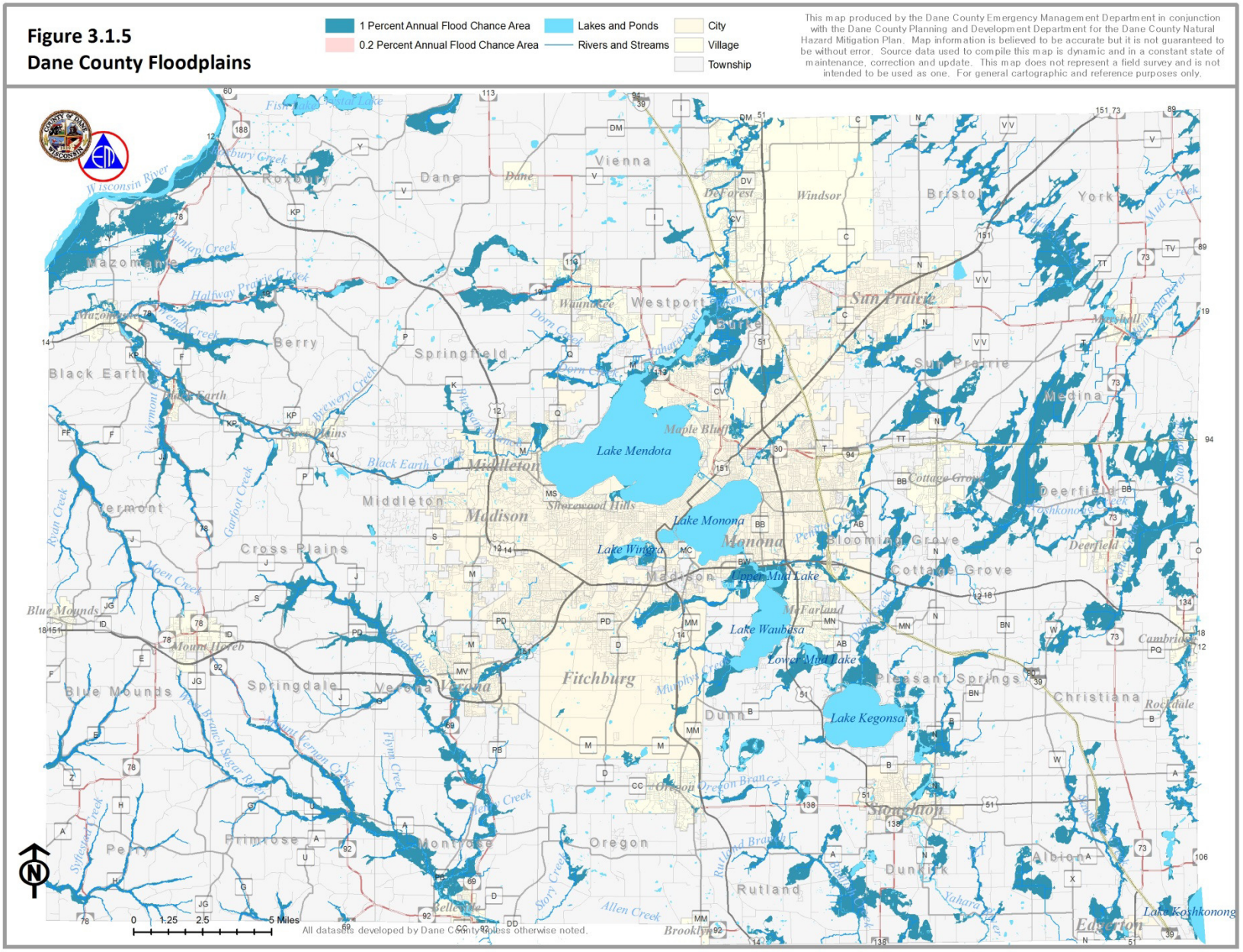


Figure 3.1.5
Dane County Floodplains



3.2 Climate

Dane County climate is typically continental—warm, humid summers and cold, snowy winters. About two-thirds of the annual precipitation falls during the growing season. It is normally adequate for vegetation, although drought is occasionally reported. The climate is most favorable for dairy farming and agriculture. The primary crops are corn, small grains, hay, and vegetables. The rapid succession of storms moving from west to east and southwest to northeast accounts for much of the climatic activity.

The most frequent air masses are of polar origin. Occasional outbreaks of arctic air affect the area during the winter months. Although northward moving tropical air masses contribute considerable cloudiness and precipitation, the true Gulf air mass does not reach this area in winter, and only occasionally at other seasons. Summers are pleasant, with only occasional periods of extreme heat or high humidity.

The average annual temperature in the County is 46°F. Temperature extremes range from an all-time high of 107°F, which was observed on July 14, 1936 to a record low of -37°F, which occurred on January 30, 1951. Winter temperatures (December-February) average near 20°F and summer temperatures (June-August) average in the upper 60s. Daily temperatures average below 32°F about 120 days of the year and above 40°F about 210 days of the year. The average seasonal snowfall is 50 inches. Average seasonal precipitation is 33 inches. There are no dry and wet seasons, but about 60 percent of the annual precipitation falls in the five months of May through September. Cold season precipitation is lighter, but lasts longer. Soil moisture is usually adequate in the first part of the growing season. During July, August and September, the crops depend on current rainfall, which is mostly from thunderstorms and tends to be erratic and variable. Average occurrence of thunderstorms is just under 7 days per month during this period.

The ground is covered with 1 inch or more of snow about 60 percent of the time from December through February in an average winter. The soil is usually frozen from the first of December through most of March with an average frost penetration of 25 to 30 inches. The growing season averages 175 days.

3.2.1 Climate Change Trends[2]

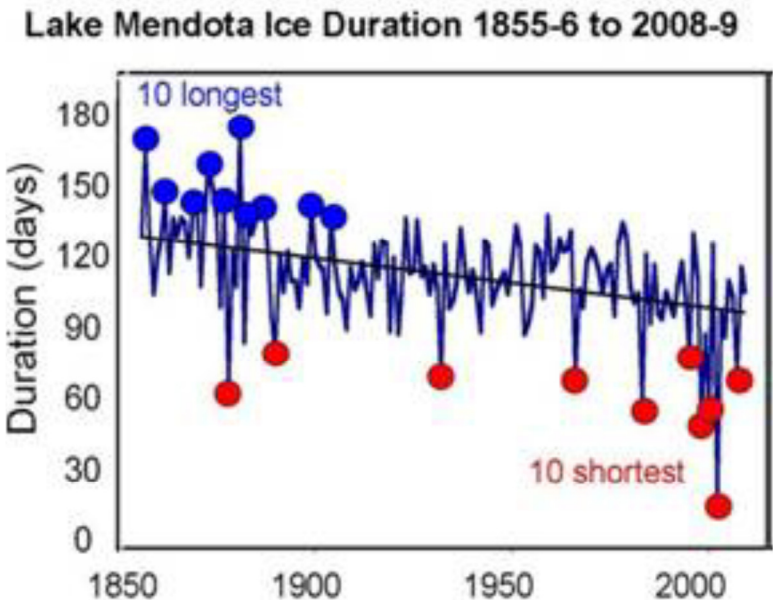
A wealth of temperature and precipitation data provide evidence that on average the State of Wisconsin has become warmer and wetter over the past 60 years. Historical temperature and precipitation patterns reflect this change across regions of the state. For instance, during the 1950-2006 period winter temperatures increased significantly in northwestern Wisconsin, and these increases extended into the central part of the state. Northwestern and central Wisconsin experienced 14 to 21 fewer nights with temperatures below zero degrees Fahrenheit. Other areas of the state saw reductions in subzero nights of seven days or less.

Future projections of temperature and precipitation patterns by University of Wisconsin-Madison climate scientists indicate that Wisconsin's warming trend will increase considerably in the decades ahead. By 2050, statewide annual average temperatures are likely to warm by 6-7°F. Today, daily high temperatures exceed 90 degrees about 12 times per year in southern Wisconsin. By 2050, the frequency of very hot days above 90 degrees is projected to triple.

[2] Dane County Climate Change Action Council, *Dane County Climate Change and Emergency Preparedness*, September 2013

We do not need to look as far away as the Arctic to view ice melting conditions. Lake Mendota is not staying ice covered as long as it once did. According to UW-Madison records, 150 years ago the ice cover lasted four months. Today the lake stays ice covered an average of three months. The winters with the 10 longest periods of ice cover all occurred before 1900, while the winters with the 10 shortest periods of ice cover occurred mostly in recent years.

Figure 3.2.1 Lake Mendota Ice Cover



Source: Dane County Climate Change Action Council, *Dane County Climate Change and Emergency Preparedness*, September 2013

While future precipitation patterns are more difficult to discern than temperature, the region is likely to continue its trend toward more precipitation overall, with the most probable increases in winter, spring and fall. Large storm events are also likely to increase in frequency during spring and fall. Statewide, the amount of precipitation that falls as rain rather than snow during the winter is also projected to increase significantly, with freezing rain more likely to occur.

The projected increase in annual rainfall and more intense rain storms heighten the potential for significant soil erosion, affecting water resources and agriculture. Without appropriate adaptation measures, future soil erosion rates could double by 2050 compared to 1990 rates, which will likely increase sediment and nutrient loading, more blue-green algal blooms in lakes and loss of biodiversity in wetlands. For agriculture, while warming temperatures in spring and fall would boost agricultural production by extending the growing season across the state, changes in rainfall patterns influence groundwater recharge, and any decrease in groundwater recharge could be compounded by increased demand for irrigation due to an extended growing season, or seasonal drought. These impacts are addressed more specifically in the hazard analysis and risk assessment section of the plan.

3.3 Population and Demographics

Hazard mitigation programs must consider the population demographics of the communities they are designed to protect. Some populations experience greater vulnerability from hazard events, not because they are more likely to experience an event, but because they may have decreased resources or physical abilities to respond. Research indicates that people living near or below the poverty level, the elderly, the physically or mentally disabled, and ethnic minorities tend to suffer more severe effects from disasters than the general population.

From a hazard mitigation standpoint, population growth and density are also relevant. Generally, growth means that more people are in the path of potential natural hazards, whether they are urban or

rural areas. There is a balance, however, as new development may be more resistant to the impacts of natural hazards because buildings meet newer, more stringent codes for building safety.

Population growth and demographics are obviously related. With Dane County's rapid growth come an increasing number of potentially vulnerable people:

- Increasing numbers of older residents and residents with disabilities and other special needs.
- Increasing racial and ethnic diversity.
- Increasing numbers of individuals living on low or fixed incomes.

These trends present challenges in all phases of the management of natural hazards.

3.3.1 Population

More than 508,000 people live in Dane County, making it the second most populous county in the State. While the total population of the County has grown by more than 20 percent since 1990, the amount of growth has varied widely for the County's municipalities. In general, the towns and the City of Madison have grown more slowly, while the smaller cities and villages grew much more quickly. Table 3.3.1 summarizes the population growth trends from 1980 to 2016.

Table 3.3.1 Dane County Population Data

	Population				**1980-2016**
Municipality	**1980**	**1990**	**2000**	**2016**	**% Change**
Towns					
Albion	1,918	1,964	1,823	1,965	2.5%
Berry	1,116	1,098	1,084	1,138	2.0%
Black Earth	406	365	449	485	19.5%
Blooming Grove	1,965	2,079	1,768	1,818	-7.5%
Blue Mounds	637	667	842	989	55.3%
Bristol	1,723	1,835	2,698	4,045	134.8%
Burke	2,967	3,000	2,990	3,339	12.5%
Christiana	1,209	1,182	1,313	1,253	3.6%
Cottage Grove	2,952	3,525	3,839	3,900	32.1%
Cross Plains	1,003	1,206	1,419	1,533	52.8%
Dane	945	921	968	1,003	6.1%
Deerfield	1,111	1,181	1,470	1,597	43.7%
Dunkirk	2,098	2,121	2,053	1,945	-7.3%
Dunn	4,966	5,274	5,270	4,956	-0.2%
Madison	6,162	6,442	7,005	6,277	1.9%
Mazomanie	1,007	982	1,185	1,102	9.4%
Medina	1,019	1,124	1,235	1,380	35.4%
Middleton	2,598	3,628	4,594	6,273	141.5%

	Population				1980-2016
Municipality	**1980**	**1990**	**2000**	**2016**	**% Change**
Montrose	1,024	1,032	1,134	1,092	6.6%
Oregon	1,798	2,428	3,148	3,231	79.7%
Perry	632	646	670	738	16.8%
Pleasant Springs	2,529	2,660	3,053	3,217	27.2%
Primrose	654	595	682	731	11.8%
Roxbury	1,491	1,536	1,700	1,841	23.5%
Rutland	1,393	1,584	1,887	1,995	43.2%
Springdale	1,279	1,258	1,530	1,948	52.3%
Springfield	2,379	2,650	2,762	2,805	17.9%
Sun Prairie	1,990	1,839	2,308	2,352	18.2%
Vermont	634	678	839	821	29.5%
Verona	2,259	2,137	2,153	1,983	-12.2%
Vienna	1,365	1,351	1,294	1,523	11.6%
Westport	2,748	2,732	3,586	4,000	45.6%
York	714	649	703	681	-4.6%
Villages					
Belleville *	1,203	1,349	1,795	1,848	53.6%
Black Earth	1,145	1,248	1,320	1,368	19.5%
Blue Mounds	387	446	708	920	137.7%
Brooklyn *	250	406	502	954	281.6%
Cambridge *	785	883	1,014	1,356	72.7%
Cottage Grove	888	1,131	4,059	6,512	633.3%
Cross Plains	2,156	2,362	3,084	3,696	71.4%
Dane	518	621	799	1,067	106.0%
Deerfield	1,466	1,617	1,971	2,423	65.3%
DeForest	3,367	4,882	7,368	9,223	173.9%
Maple Bluff	1,351	1,352	1,358	1,307	-3.3%
Marshall	2,363	2,329	3,432	3,864	63.5%
Mazomanie	1,248	1,377	1,485	1,667	33.6%
McFarland	3,783	5,232	6,416	7,946	110.0%
Mount Horeb	3,251	4,182	5,860	7,123	119.1%
Oregon	3,876	4,519	7,514	9,575	147.0%
Rockdale	200	235	214	213	6.5%
Shorewood Hills	1,837	1,680	1,732	1,928	5.0%
Waunakee	3,866	5,897	8,995	12,901	233.7%
Windsor	3,812	4,620	5,286	6,876	80.4%

	Population				1980-2016
Municipality	**1980**	**1990**	**2000**	**2016**	**% Change**
Cities					
Edgerton *			42	113	169.0%
Fitchburg	11,973	15,648	20,501	26,321	119.8%
Madison	170,616	190,766	208,054	242,216	42.0%
Middleton	11,848	13,785	15,770	18,810	58.8%
Monona	8,809	8,637	8,018	7,833	-11.1%
Stoughton	7,589	8,786	12,354	12,698	67.3%
Sun Prairie	12,931	15,352	20,369	31,810	146.0%
Verona	3,336	5,374	7,052	11,871	255.8%
County Total	323,545	367,085	426,526	508,395	57.1%

* Indicates a municipality that crosses into an adjacent county. Only the population of the portion in Dane County is counted.
Source: *2016-2017 Dane County Directory*, Dane County Clerk

3.3.2 Age Tends

The vulnerability of age groups can vary significantly based on health, age, and income level. However, as a group, the elderly are more apt to lack the physical and economic resources necessary for response. The elderly, as a group are also more likely to suffer health related consequences and be slower to recover. Like most areas of the United States, the population of Dane County is aging. Dane County is also showing significant population growth in younger age groups as well. Table 3.3.2 indicates a summary of Dane County population by age group.

Table 3.3.2 Dane County Population by Age Group, 2000 to 2015 Census Trends

Age Group (in Years)	2000 Census	2015 (Estimate)	2000-2015 Change
Under 5	25,818	31,217	20.9%
5 to 17	74,173	78,734	6.1%
18 to 24	57,151	72,014	26.0%
25 to 34	68,386	81,126	18.6%
35 to 44	70,108	68,889	-1.7%
45 to 54	60,220	68,289	13.4%
55 to 64	30,801	63,823	107.2%
65 to 74	20,211	37,838	87.2%
75 to 84	14,255	17,111	20.0%
85 or over	5,403	8,621	59.6%
Total Population	426,526	527,662	23.7%
Median Age	33.2	34.8	

Source: Census Reporter, https://censusreporter.org/profiles/05000US55025-dane-county-wi/ accessed Jan, 2017.

3.3.3 Income Trends

Impoverished people may experience a greater impact from a natural disaster than members of the general population. In the United States, individual households are expected to use first, their own private resources to prepare for, respond to, and recover from disasters. This expectation automatically places low-income individuals and families at a disadvantage when dealing with these hazards. In addition, relative to higher income groups, people with low incomes tend to occupy more poorly built and inadequately maintained housing. In some cases, these types of housing are more susceptible to damages caused by natural hazards. Tables 3.3.3 and 3.3.4 summarize income and poverty levels in Dane County from 2015 census estimates.

Table 3.3.3 Dane County Household Income Levels

Household Income Level	Number of Households	Percent
Less than $10,000	9,498	4.4%
$10,000 to $14,999	8,525	3.9%
$15,000 to $24,999	16,279	7.6%
$25,000 to $34,999	18,522	8.6%
$35,000 to $49,999	27,423	12.7%
$50,000 to $75,000	42,589	19.7%
$75,000 to $99,999	30,923	14.3%
$100,000 to $149,000	33,747	15.6%
$150,000 to $199,999	14,630	6.8%
$200,000 or more	13,913	6.4%
Total Number of Households	216,049	100%
Median Household Income (in dollars)	$65,202	

Source: Census Reporter, https://censusreporter.org/profiles/05000US55025-dane-county-wi/ accessed Jan, 2017.

Table 3.3.4 Number of Individuals in Dane County Classified as Poverty Status

Poverty Status	Population	Percent
Population for whom poverty status is determined		
Under 5 years	3,600	11.5%
5 to 17 years	7,413	9.4%
18 to 24 years	24,562	34.1%
25 to 34 years	9,385	11.6%
35 to 44 years	3,538	5.1%
45 to 54 years	4,166	6.1%
55 to 65 years	2,762	4.3%
65 to 74 years	1,332	3.5%
75 years and older	1,282	14.9%
Total	58,040	11.4%

Source: Census Reporter, https://censusreporter.org/profiles/05000US55025-dane-county-wi/ accessed Feb, 2017.

Dane County's median income figure suggests that in general, the County is doing well financially. Even so, there are still more than 58,000 people living in households with incomes below the poverty level. This equates to more than 10% of the total population of Dane County. A large number of these families include young children and a significant number of the individuals are elderly.

3.3.4 People with Disabilities

People with disabilities have a special stake in disaster planning because in broad terms, they tend to have more difficulty in responding to a hazard event than does the general population. Disabilities can vary widely in severity and permanence, making populations difficult to define and track. There is no "typical" disabled person. In addition, a disability is likely to be complicated by other factors such as age, economic disadvantage, or ethnicity. According to the U.S. Census, however, there are more than 44,000 people in Dane County who report some form of disability. This is a significant number of people and means that a relatively large number of people may need special assistance in responding to and recovering from a natural hazard event or disaster. Table 3.3.5 is a summary from 2015 census estimates.

Table 3.3.5 Number of People with Disabilities

Disability Status from the 2011 to 2015 Census Estimates	Number	Percent
Number of People with Hearing Difficulty		
Juvenile, under 18 years	551	0.5%
Adult, 18 years and over	12,589	2.7%
Number of People with Vision Difficulty		
Juvenile, under 18 years	482	0.4%
Adult, 18 years and over	5,969	1.4%
Number of People with Cognitive Difficulty		
Juvenile, under 18 years	2,879	2.6%
Adult, 18 years and over	7,753	1.9%
Number of People with Ambulatory Difficulty		
Juvenile, under 18 years	519	0.5%
Adult, 18 years and over	19,656	2.8%
Number of People with Self-Care Difficulty		
Juvenile, under 18 years	739	0.6%
Adult, 18 years and over	7,600	1.8%
Number of People with Independent Living Difficulty		
Adult, 18 years and over	15,684	3.8%

Source: American Fact Finder, US Census Bureau, Disability Characteristics Table, accessed Feb, 2017

3.3.5 Ethnicity and Language

A great deal of recent research has focused on the increased disaster vulnerability of ethnic minorities in the United States. Research shows that minorities are less likely to be involved in pre-disaster planning, experience higher mortality rates during an event, and their post-disaster recovery can be ineffective

and is often characterized by cultural insensitivity. Racially, Dane County appears to be a relatively homogenous area; 89 percent of the population listed their race as "white" and more than 93 percent were born in the United States. That being said, there is a significant diversity of ancestry and spoken language represented in the people of Dane County. Table 3.3.6 is a summary of ethnicity and language spoken by Dane County residents.

Table 3.3.6 Ethnicity and Spoken Languages in Dane County

Ethnicity and Language Spoken from the 2015 Census Estimates	Number	Percent
Total Population	510,198	
Born in the United States	468,954	91.9%
Foreign Born	41,244	8.1%
Europe	5,650	(1.1%)
Asia	18,931	(3.7%)
Africa	2,145	(0.4%)
Oceania	247	(.04%)
Latin America	12,950	(2.5%)
North America	1,278	(0.3%)
Language Spoken at Home		
Population 5 years and older	479,462	
Speak English only	426,241	88.2%
Speak Spanish	24,932	5.2%
Speak Indo-European Languages	11,986	2.5%
Speak Asian and Pacific Island Languages	17,740	3.7%
Speak Other Languages	1917	0.4%
Speak English "less than very well"	21,575	4.5%

Source: American Fact Finder, US Census Bureau, Disability Characteristics Table, accessed Feb, 2017

Table 3.3.6 indicates that while most of the population of the County was born in the United States and speaks English, there is a significant number who have cultural and language barriers. This has important implications in emergency situations where managers must communicate vital information to all members of the population.

3.3.6 Growth and Development Trends

Dane County is expected to reach a total population of nearly 606,620 by the year 2040—an increase of more than 40 percent over the 2000 population. This basic trend of slightly greater proportions of new growth occurring in outlying urban communities compared to the central urban area is expected to continue into the future. New urban development is expected to occupy even greater land areas than older development. This is partly due to lower densities of new residential, industrial and commercial construction, and partly due to declining population density resulting from a trend toward smaller household sizes. Continued population, housing, and employment growth, creates pressure for land use

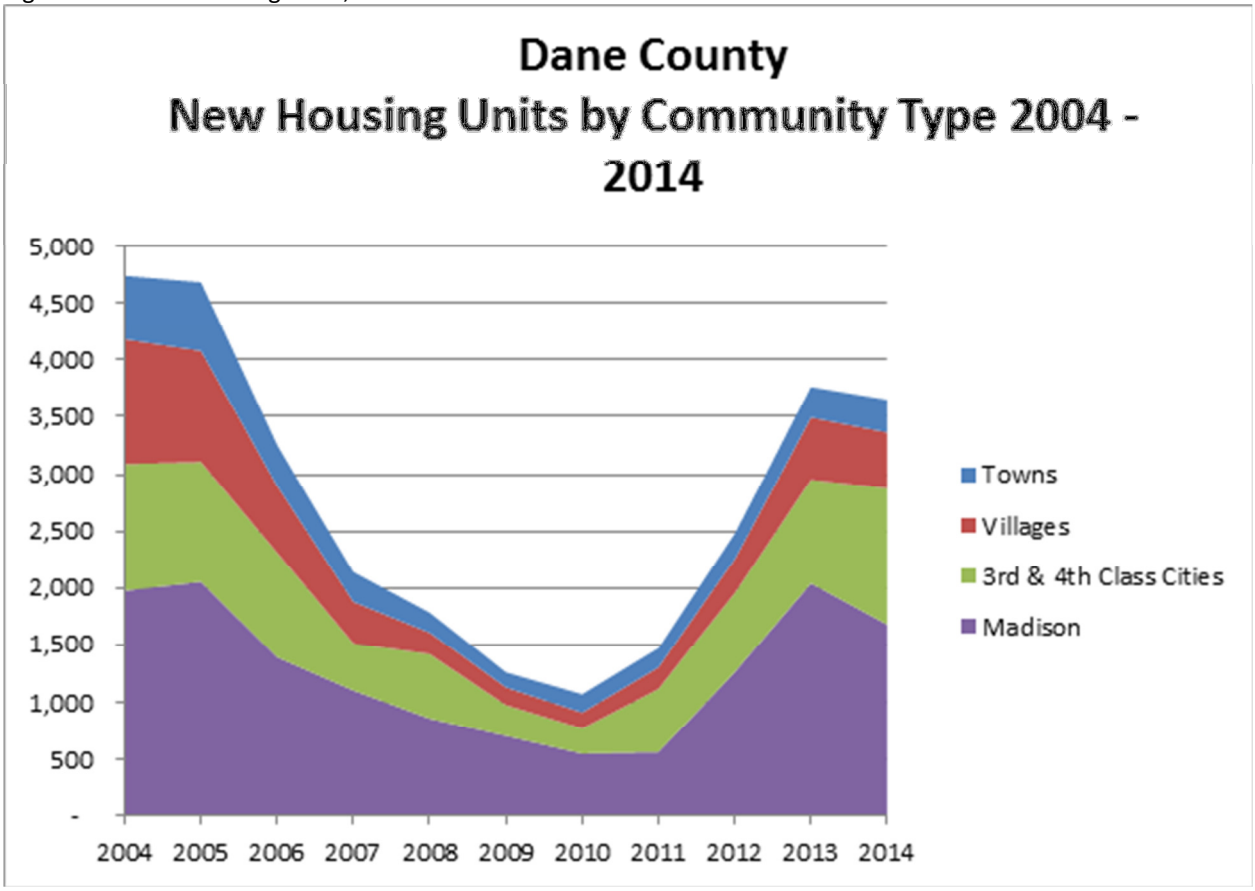
change and the supporting infrastructure improvements. Population growth and housing trends are compiled and published annually by the Capital Area Regional Planning Commission.

3.4 Housing

3.4.1 Housing Growth

According to the U.S. Bureau of the Census, there were 220,503 housing units in Dane County at the end of 2015. Between 2000 and 2015, the County's year-round housing stock increased by 40,105 units, or 22 percent. The City of Madison made up 46 percent of the County's housing stock, compared with 54 percent in 1990. The composition of the County's housing stock has been changing in recent years. Although single-family housing makes up about 55 percent of housing within the County, the popularity of multifamily housing has been increasing. Though more people live in the central urban service areas of the County, the percentage of the population residing in outlying urban service areas is increasing. New housing construction mirrors this trend.

Figure 3.4.1 New Housing Units, 2004-2015



Source: Capital Area Regional Planning Commission

3.4.2 Future Housing Production

Since the late 1970s, over one-half of the County's households have been one- or two-person households. This trend has led to a decrease in the County's average household size. As households

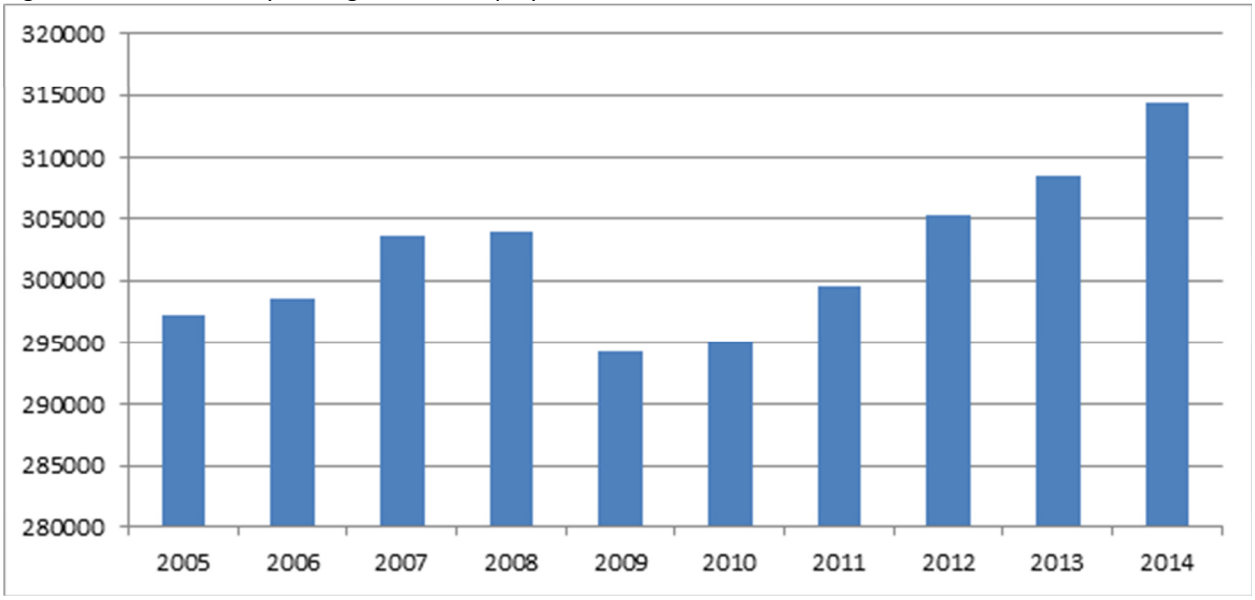
decline in size, the need for additional housing increases. The County will require over 201,000 housing units (occupied units plus vacant available units) by 2020. This means that 25,326 additional housing units would have to be constructed.

Figure 3.4.1 shows actual data for new construction between 2004 and 2014. Housing construction has followed national trends in recent years, peaking in 2004, with 4,742 new units, then dropping precipitously and bottoming-out in 2010 with a low of 1,070 new units constructed. Since 2010, new housing starts rebounded, led by a fivefold (524%) growth in new multifamily units between 2010 and 2013, before levelling off again in 2014. Total construction permits were issued for 3,651 new housing units in Dane County in 2014, a 30 percent decrease from the 3,763 permits issued in 2013. In 2014, single-family housing construction permits were down up by 2 percent from the previous year. Multi-family housing unit construction was down 24 percent from the previous year.

3.5 Economy

Much of the County's population growth can be attributed to strong growth in the regional economy. The number of jobs in all of Dane County has been growing faster than the population. In 2005 there were an estimated 297,213 jobs in the County. By 2014, that number grew 61 percent to 314,412. Figure 3.5.1 shows employment growth in Dane County since 2005.

Figure 3.5.1 Dane County Average Annual Employment Rate



Source: Wisconsin Department of Workforce Development, Quarterly Census of Employment and Wages (QCEW)

Most economic activity and jobs (almost half) in the County are concentrated in the City of Madison. The regional economy has a base of employment in government and education, as Madison is the state capital and the home of the University of Wisconsin's main campus. The University in particular contributes in many ways to the local economy, most notably through its efforts to spin off high technology and biotechnology companies. High-tech now encompasses 7 percent of County employment.

Recent growth, however, has concentrated in the private sector, much of which has been occurring outside of the City of Madison. Government employment has declined as a share of the total from a third in 1980 to about one fourth in 2000. Service employment (26 percent of County total) is a strong contributor, particularly business and health services. Manufacturing (11 percent) and finance, insurance, and real estate (9 percent) employment also contribute significantly to the local economy.

Agriculture is also a significant contributor to Dane County's economy. Farming is diversified with a main emphasis on dairy farming. Field crops are mainly corn, oats, clover, and alfalfa, but barley, wheat, rye, and tobacco are also raised. Canning factories pack peas, sweet corn, and lima beans. Fruits are mainly apples, strawberries, and raspberries.

Led by dairy and livestock, Dane County is one of the State's top producers of grains, fresh market vegetables, and other value-added enterprises. Farmland comprises about 2/3 of Dane County's land area. Soil conditions and warm, wet summer climate help Dane County farmers produce enough agricultural products to sell nearly $300 million worth every year.

3.6 Land Use

The Dane County Master plan is part of the master plan for the County provided for by Wis. Stat. 66.945 (9) and (10), includes the following components:

- Dane County Water Quality Plan (2005, Capital Area RPC)
- Dane County Comprehensive Plan, including component town, village and city plans (2012, Dane County Board of Supervisors)
- Dane County Farmland Preservation Plan (2012, Dane County Board of Supervisors)
- Dane County Parks & Open Space Plan (2012, Dane County Parks Commission)

The Capital Area Regional Planning Commission conducts a land use inventory (LUI) every five years. In 2010, the LUI was expanded to include, for the first time, detailed data about rural land uses. The most significant land use trends are highlighted below:

- The greatest amount of land in Dane County is agricultural, natural resource and undeveloped land at 635,886 acres in 2010, or over 80 percent of the total land area of the county. Developed land accounts for the remaining 20 percent, primarily residential, industrial and commercial land uses. The total developed area continues to increase each decade while the agricultural and undeveloped area continues to decrease. Cropland/pasture area has decreased partly due to urban development, but also due to increases in other undeveloped uses such as woodlands, open land, and vacant areas.
- Residential land uses account for the second largest classification of use (7.8 percent in 2010). Rates for residential use have slowed since peaks in the 1990s.
- Outdoor recreation has grown by 57.6% since 1990, reflecting increasing demand from a growing population.

- Commercial land use has also increased significantly since 1990. Almost all of the commercial land use in the County, 95 percent, is located within the incorporated communities of Dane County.

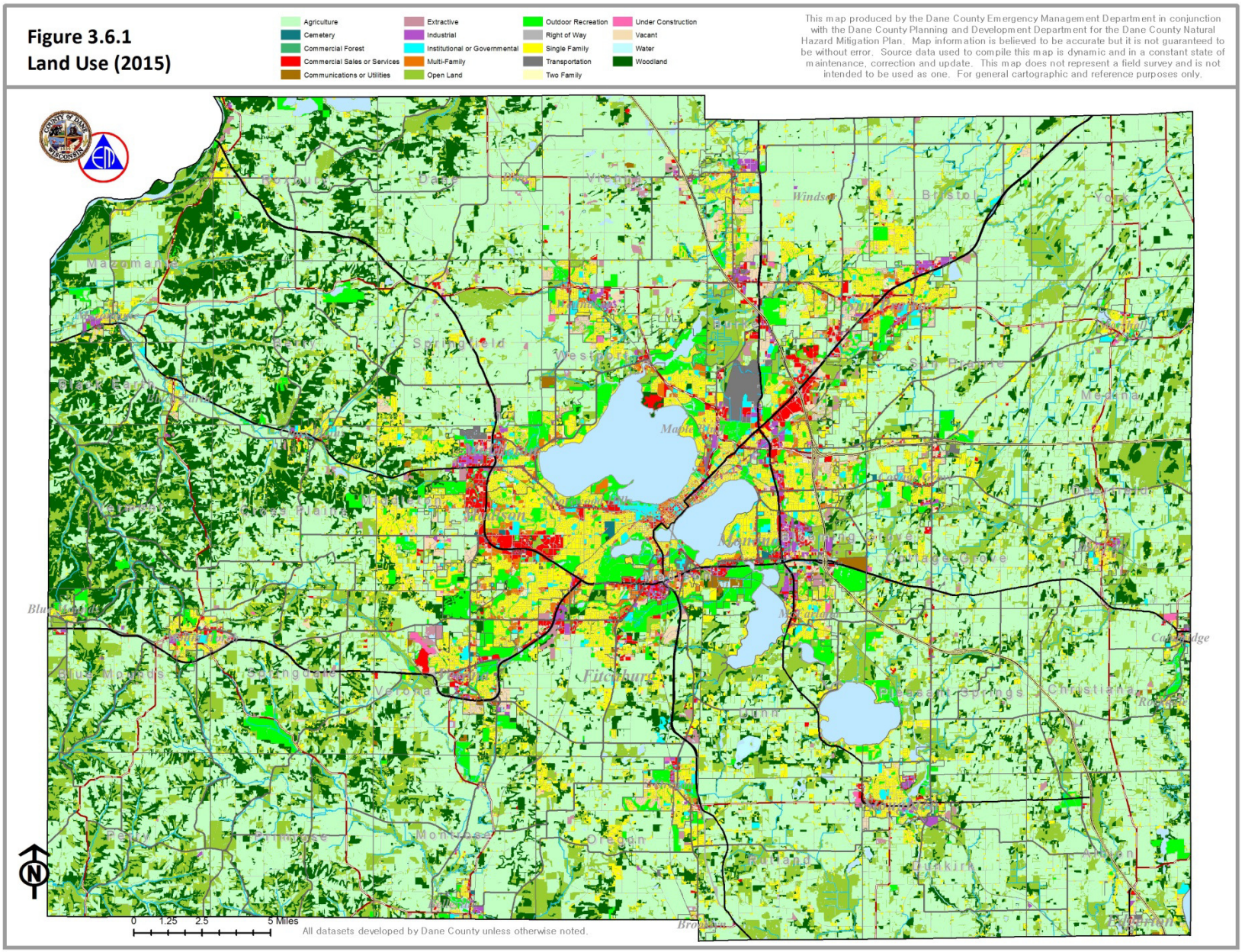
- The amount of land devoted to industrial uses has between 2005 and 2010. New industrial development has occurred primarily in cities and villages where public services are easily accessible.

- Institutional and governmental land uses have remained relatively constant over time (e.g., hospitals, schools, public buildings, churches, and cemeteries).

- The amount of land dedicated to communication and utilities, though a small percentage overall, has grown significantly since 2005, reflecting power line and communication tower development.

Figure 3.6.1 indicates 2015 land use categories.

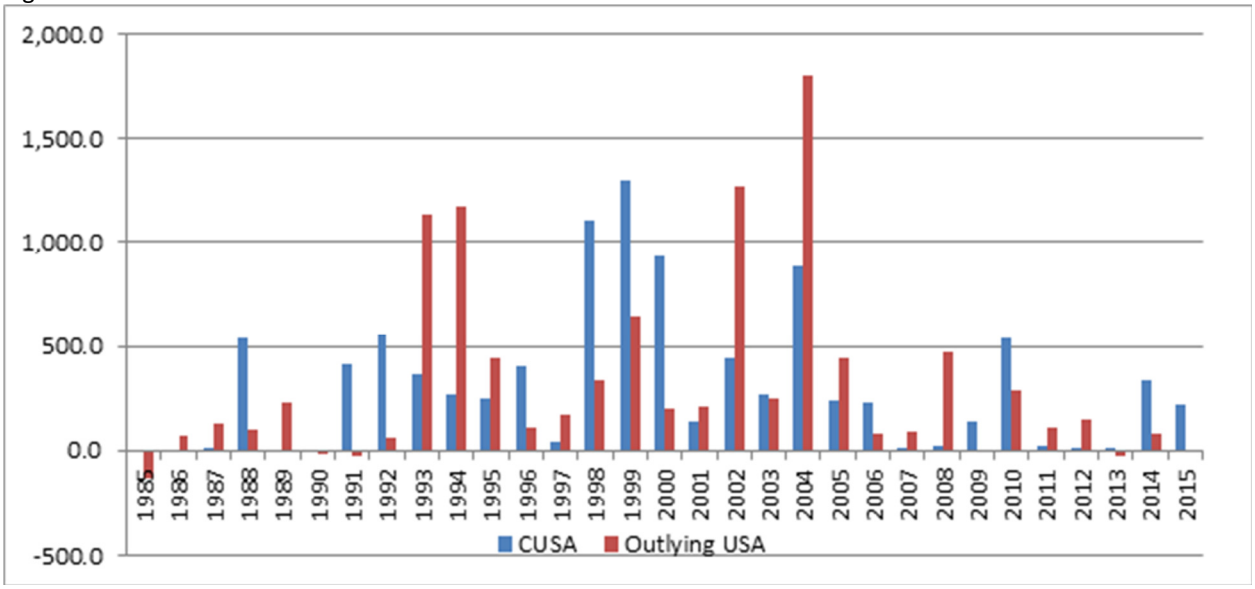
Figure 3.6.1
Land Use (2015)



3.6.1 Urban Service Areas

The Capital Area Regional Planning Commission (formerly the Dane County Regional Planning Commission) uses the concept of urban service areas as a planning tool. Urban service areas are those areas in and around existing communities that are most suitable for urban development and capable of being provided with a full range of urban services. (Urban services are those public services normally provided or needed in urban areas, including public water supply and distribution services, sanitary sewerage systems, higher levels of police and fire protection, solid waste collection, urban storm drainage, streets with curbs and gutters, street lighting, neighborhood facilities such as parks and schools, and urban transportation facilities such as sidewalks, taxi service and mass transit.) Figure 3.6.1 shows a recent history of urban service area amendments.

Figure 3.6.1 Urban Service Area Amendments: 1985 to 2015

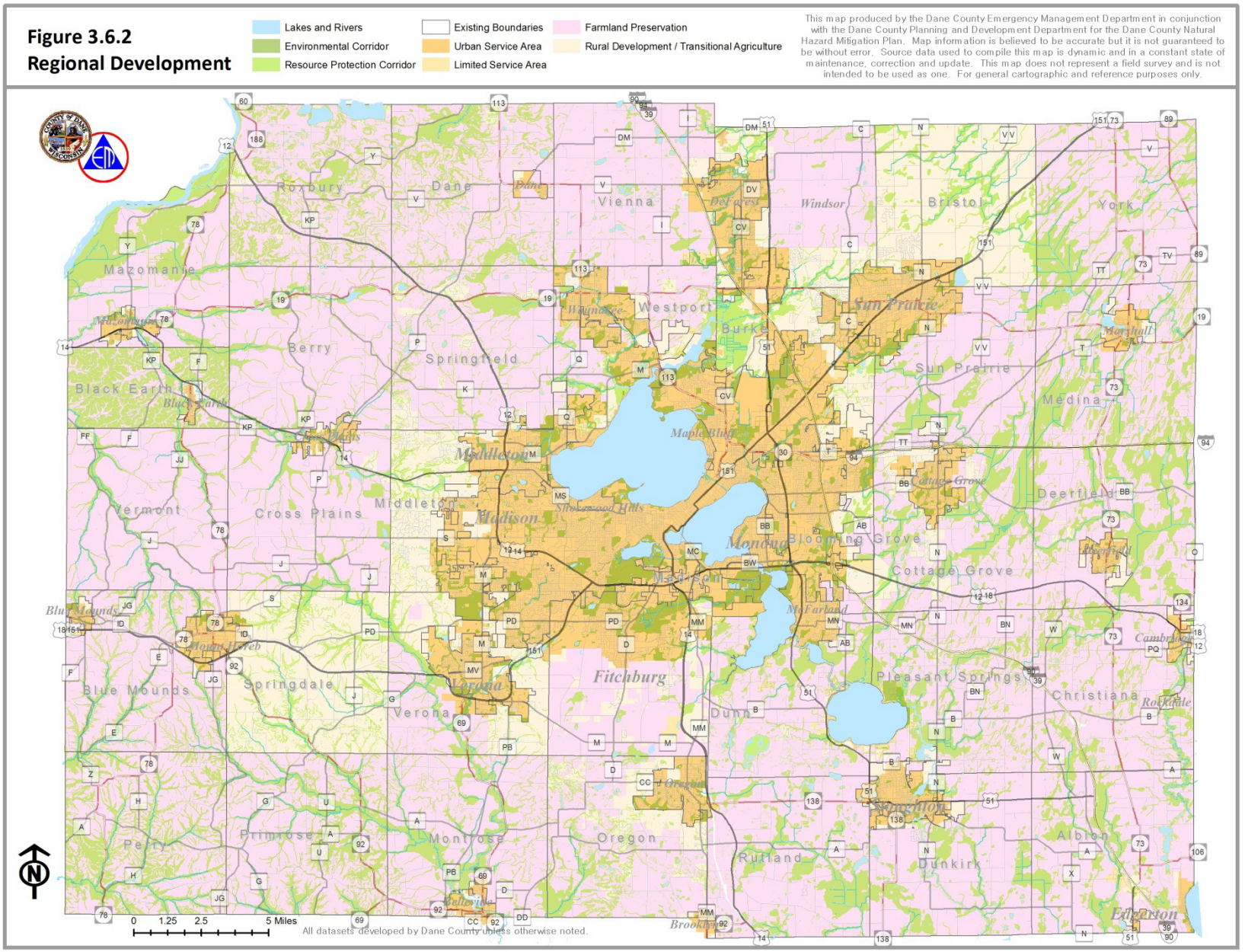


Ssource: Dane County Department of Planning and Development

The urban service area boundaries represent the outer limits of planned growth over the long-term planning period (at least 20 years) and include more than enough land to accommodate the anticipated growth. Twenty-five urban service areas have been designated and adopted in Dane County. Figure 3.10 indicates the adopted urban service areas.

The open space corridors shown on the Regional Development Plan Map include two distinct components: 1) Urban Environmental Corridors within USAs: and 2) Rural Resource Protection Areas in rural areas. Urban environmental corridors are a continuous open space system based on natural features and environmentally important lands such as streams, lakes, shore lands, floodplains, wetlands, steep slopes, woodlands, and parks and other publicly owned lands. Rural Resource protection areas are based primarily on floodplains, wetlands, and shoreland areas (land protected through zoning or other regulations), together with existing or proposed publicly owned or controlled lands.

Figure 3.6.2
Regional Development



3.7 Critical Facilities

Critical facilities are defined in this plan as physical structures that if damaged or destroyed compromise public health or safety, or are disproportionately vulnerable to natural disasters discussed in the plan, or house populations that are disproportionately vulnerable to natural disasters. These include the facilities described below.

3.7.1 Essential Infrastructure

- *Airports.* Dane County is home to four paved runway airports: Dane County Regional Airport (DCRA) north of the City of Madison, Morey Airport outside the City of Middleton, Black Hawk Airfield in the Village of Cottage Grove, and Waunakee Airport in the Village of Waunakee. DCRA is the only airport that handles commercial airline traffic.

- *Communications Towers.* There are approximately 220 communication towers in the County owned by governments, individuals, cellular phone companies, hospitals, universities, and televisions stations. They are instrumental for public safety communications, cellular phone use, television, radio, paging, messaging, and other communications.

- *Correctional Facilities.* In addition to the Dane County jail, there are five state operated correctional facilities in Dane County.

- *Electrical Generation/Distribution Facilities.* Dane County's electrical service is provided by numerous utilities and companies, which generate electricity, and own, maintain, and construct the distribution infrastructure.

    - American Transmission Company owns, operates, monitors and maintains major transmission lines in the County and cooperates with local electric utilities in providing Dane County residents with electricity.

    - Alliant Energy Corporation provides gas and electric services to communities in south-central Wisconsin, including parts of the Madison area—from Blue Mounds to Cambridge and from DeForest to Brooklyn.

    - Madison Gas and Electric Co. (MG&E) provides electric service and natural gas for Madison, Monona, Fitchburg, Middleton, Cross Plains and other Dane County communities.

    - Wisconsin Public Power, Inc. generates electricity and owns, operates, and improves electrical infrastructure for member utilities including Black Earth, Mazomanie, Mount Horeb, Stoughton, Sun Prairie, and Waunakee.

- *Media Outlets*. The Madison area broadcast stations are essential partners in the County's plans to communicate with the public before, during, and after a disaster. There are five broadcast television stations, one cable television system, and four radio groups with a total of 16 stations, as well as numerous independent radio stations that serve the Dane County area. Media outlets are extremely important component of the public safety infrastructure.

- *National Guard.* DCRA is adjacent to Truax Field which is home to the Air National Guard 115th Fighter Wing. The Army National Guard 147th Command Aviation Battalion is also located at Truax Field.

- *Natural Gas Supply.* MG&E and Alliant Energy are the largest suppliers of natural gas in the County.

- *Public Safety Communications (911) Centers.* The Dane County Public Safety Communications (911) Department provides countywide 911 emergency call-taking services. The County 911 Center provides dispatching and centralized communications services for the Dane County Sheriff's Department as well as 22 local law enforcement agencies. The 911 Center also provides communications and dispatching services to 27 local fire departments and 21 local EMS agencies.

    - In addition to the Dane County communications center, the cities of Middleton, Monona, and Sun Prairie each own and operate their own local public safety answering point (PSAP). The local units of government are responsible for maintenance and operation of these facilities.

    - Two municipalities, the cities of Fitchburg and Stoughton, own and operate local dispatch centers, but do not receive 911 calls.

    - Two state agencies in the County, the University of Wisconsin Police and Security and the Capitol Police operate call-taking and dispatch centers for facilities under their jurisdiction.

- *Public Safety Facilities*

    - There are 20 local law enforcement agencies within the County. The unincorporated areas of the County and several villages rely on the Dane County Sheriff's Office for law enforcement services.

    - Dane County has a cooperative program for Emergency Medical Services (EMS) to facilitate a uniform system of emergency medical care. The Dane County EMS regional system is composed of 22 local ambulance districts, which are formed by towns, villages, and cities.

    - There are 37 fire stations in 28 fire districts in Dane County. However, 32 fire districts serve the County, as some districts cross the County jurisdictional border.

- *Public Works and Highway Garages.* Public works buildings and highway garages contain staff and equipment critical to effective response to natural hazards. From County employees to snow removal equipment, these resources are instrumental in maintaining the functioning of government, businesses and everyday life after a natural disaster hits.

- *Town/Village/City Halls.* Every unit of government in the County has a primary government building. This building is generally the town, village or city hall. There are 61 in all. These

structures range from modified garages, to old school houses, to modern public buildings with the full range of amenities. These buildings serve as meeting and gathering spaces, locations for government staff, and as repositories for information and public records critical to the functioning of governments and communities.

- *Wastewater Treatment Facilities*

    - The Madison Metropolitan Sewerage District serves approximately 300,000 people in the Madison area. Wastewater treatment for the entire district is performed at the Nine Springs Wastewater Treatment Plant. The District and its customers operate and maintain a combined total of 17 pumping stations and 169 lift stations lift stations in 5 cities, 7 villages, and 28 town sanitary/utility districts.

    - In addition to MMSD, there are 17 municipal wastewater treatment facilities in the County. The wastewater collection and conveyance systems are operated and maintained locally.

- *Water Utilities.* Groundwater supplies almost all of the water in Dane County for household, commercial, and industrial uses. Public water supplies make up more than 75 percent of the total water usage in the County.

    - There are 26 municipal water utilities operating more than 85 groundwater wells and pumping stations across the County.

    - In rural settings, private wells serve over 75,000 residents and agricultural operations in the County.

3.7.2 Vulnerable Facilities

- *Campsites.* Dane County contains approximately 258 overnight individual camping sites at 6 locations: Babcock, Brigham, Lake Farm, Token Creek, Mendota, and Kegonsa Parks. Dane County Parks Division manages all these sites with the exception of Kegonsa State Park, which is a state park managed by the Wisconsin Department of Natural Resources.

- *Childcare Centers*. Childcare centers as vulnerable facilities are those where there are eight or more children on site at any one time. These facilities, because of the relatively high child-to-adult ratio and length of time children spend at the facilities, are particularly vulnerable to the impacts of natural hazards. There are more than 500 day care centers serving over 20,000 children in Dane County.

- *Community Based Residential Facilities (CBRF).* The term CBRF covers a wide range of facilities assisting people with a wide range of needs. They may house and assist people who are elderly, mentally ill, physically disabled, alcoholic or drug dependent, emotionally disturbed, have criminal records, or are infants. People within these facilities often have moderate to great difficulty in taking care of themselves. They may be entirely dependent upon aid workers in an emergency. CBRFs can be managed or owned by private corporations specializing in assisting special need populations, churches, non-profit organizations, or hospitals. There are 104 CBRFs in Dane County.

- *Healthcare Facilities.* Dane County has five major hospitals, Meriter Hospital, St. Mary's Hospital Medical Center, University of Wisconsin Hospital and Clinics, William S. Middleton Veterans Administration (V.A.) Hospital and Stoughton Hospital and Clinics. There are also four other smaller hospital facilities and more than 50 clinics and urgent care centers in the County.

  Historic Properties. There are 235 properties and districts listed on the National Register in Dane County, including 10 National Historic Landmarks. The County also contains historic parks, Native American effigy mound sites, and archeological districts.

  Historic properties and landscapes play a significant role in the region's communities. Buildings offer character and points of interest that cannot be replicated. They enhance the sense of place that makes a local unique and meaningful. Having symbols of the past deepen people's understanding of the place, time and culture in which they are living. This creates an identity for neighborhoods, downtowns, and rural areas that enhance the quality of life.

- *Manufactured Homes.* Once called mobile homes, the appropriate term is manufactured homes, because less than five percent of the homes are actually moved from their initial place of occupancy. There are approximately 2,300 manufactured home units in Dane County. Of these, almost 2,000 are sited in one of the eight "mobile home parks" located in Dane County. Manufactured homes are also located on individual parcels of land in rural areas of the County.

- *Long-term Care Facilities.* Commonly referred to as nursing homes, long-term care facilities house people who, because of health reasons are not able to live at home and care for themselves. Over 1,700 people are served by approximately 22 nursing homes in the County. People within these facilities often have great difficulty in taking care of themselves. They may be entirely dependent upon aid workers in an emergency.

- *Schools.* There are 176 schools in Dane County, including both public and private. There are nearly 75,000 students enrolled in the elementary, middle, and high schools of the County.

- *Special Needs Housing*. Special needs housing consists of about 75 apartment building facilities in the County serving about 2,500 people. The populations within these structures have limited capacities to function in everyday life and need assistance from care providers. This housing offers support services for the elderly, homeless, disabled, handicapped, or other residents with special needs. Support services may include case management, medical or psychological counseling and supervision, cleaning, childcare, transportation, and job training.

Figure 3.7.1
Critical Infrastructure: Utilities

Electrical Generation
Electrical Distribution
Municipal Water
Waste Water
Communications
Other

This map produced by the Dane County Emergency Management Department in conjunction with the Dane County Planning and Development Department for the Dane County Natural Hazard Mitigation Plan. Map information is believed to be accurate but it is not guaranteed to be without error. Source data used to compile this map is dynamic and in a constant state of maintenance, correction and update. This map does not represent a field survey and is not intended to be used as one. For general cartographic and reference purposes only.

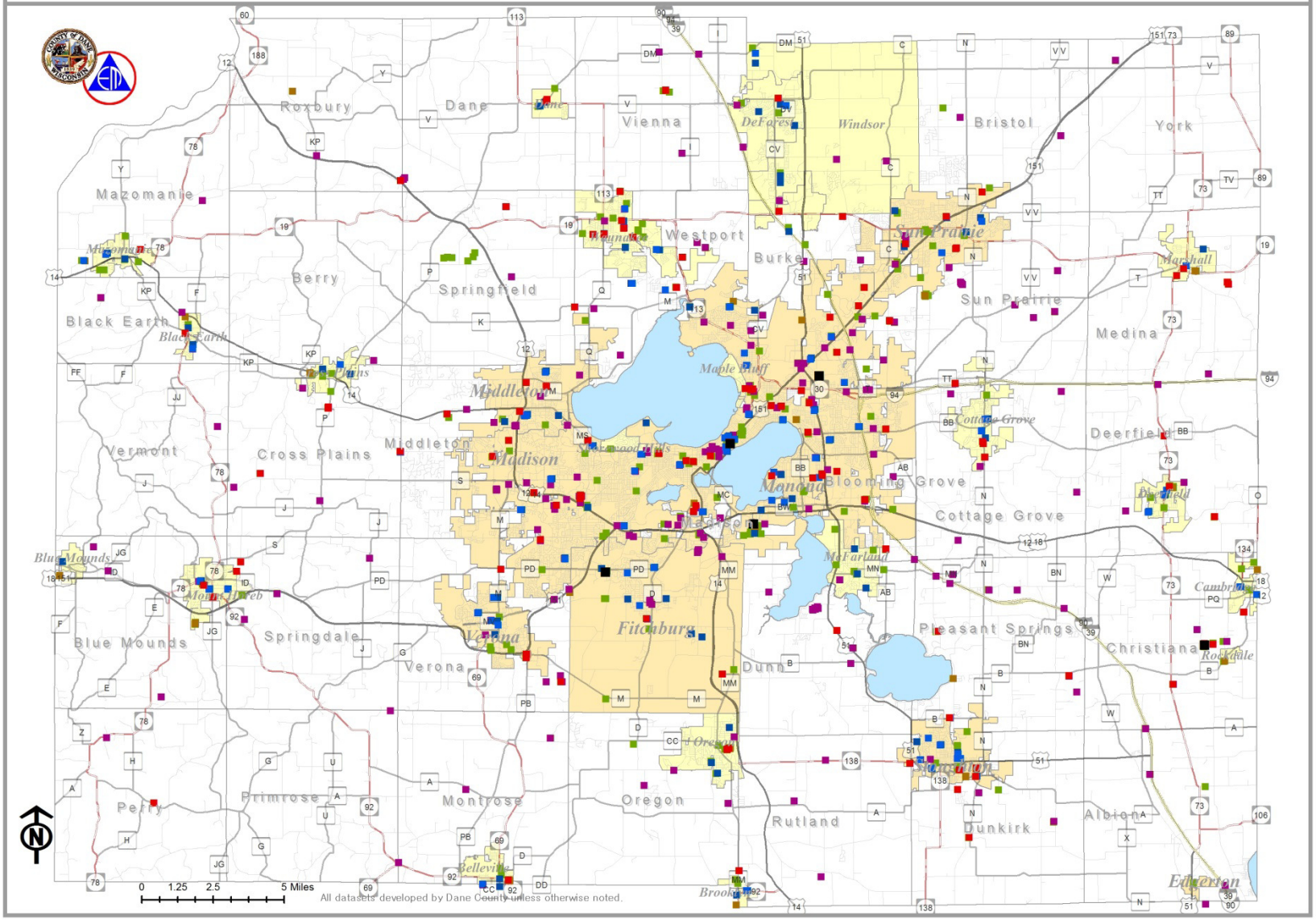


Figure 3.7.2
Critical Infrastructure: Government

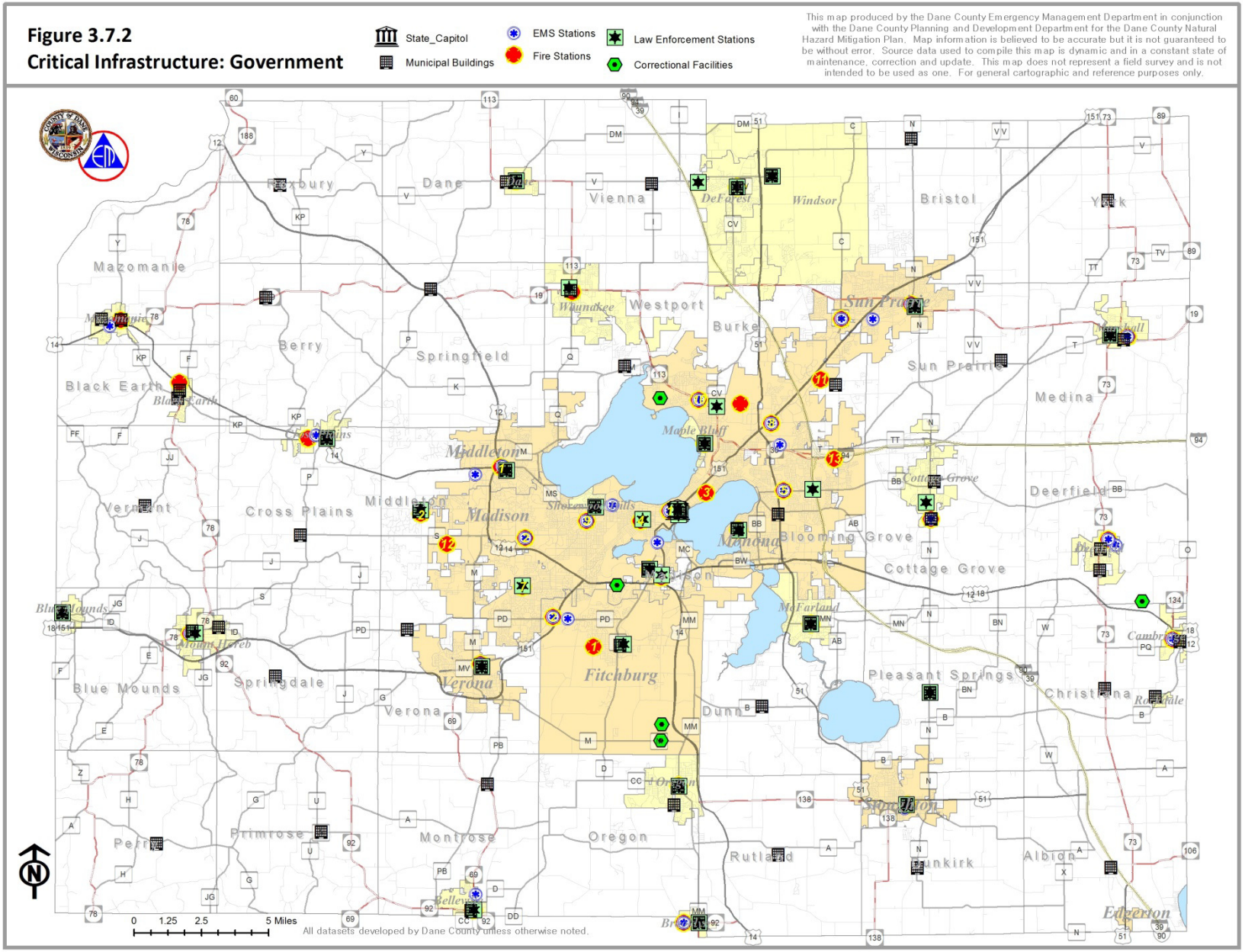


Figure 3.7.3
Vulnerable Facilities: Health Care

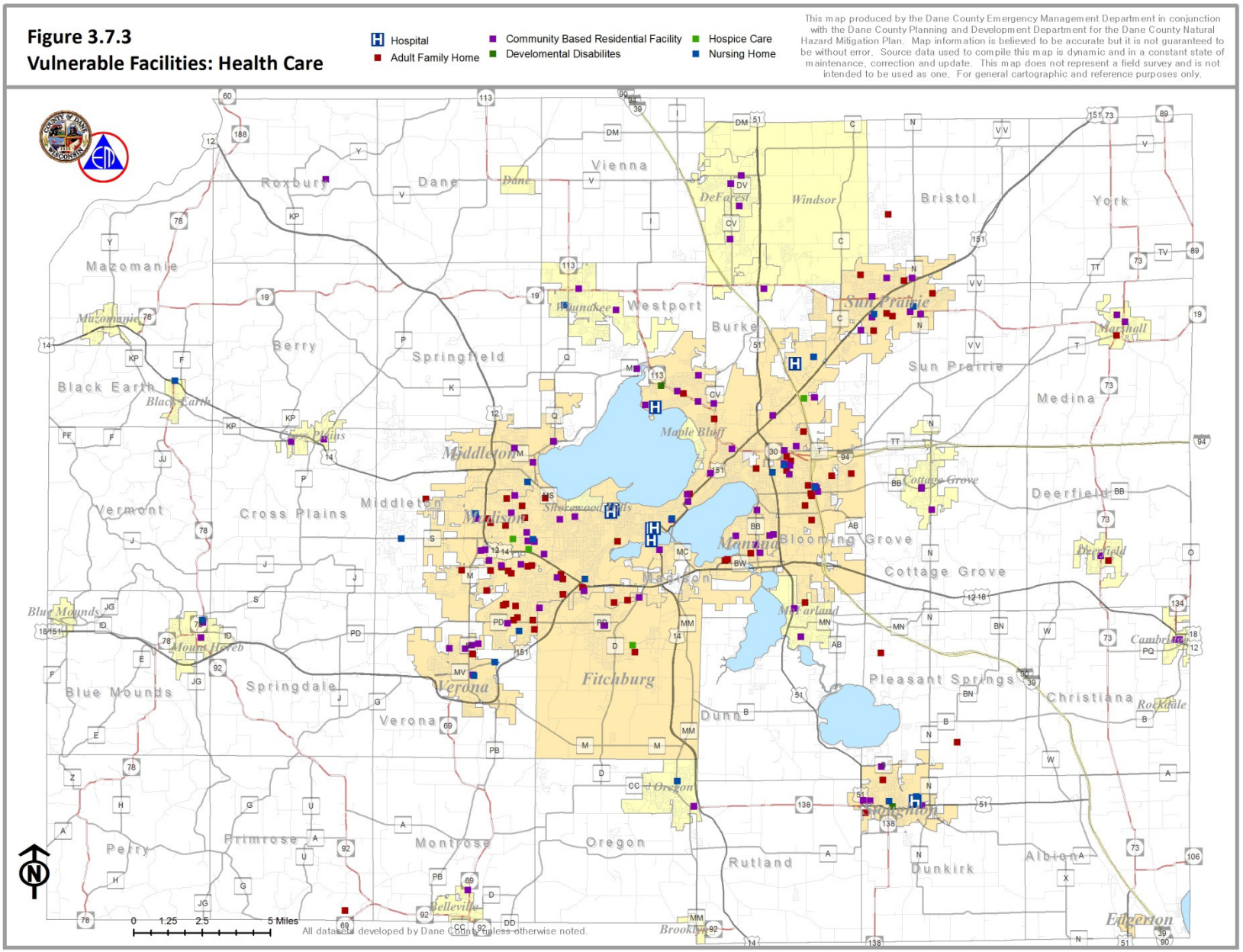


Figure 3.7.4
Vulnerable Facilities: Housing

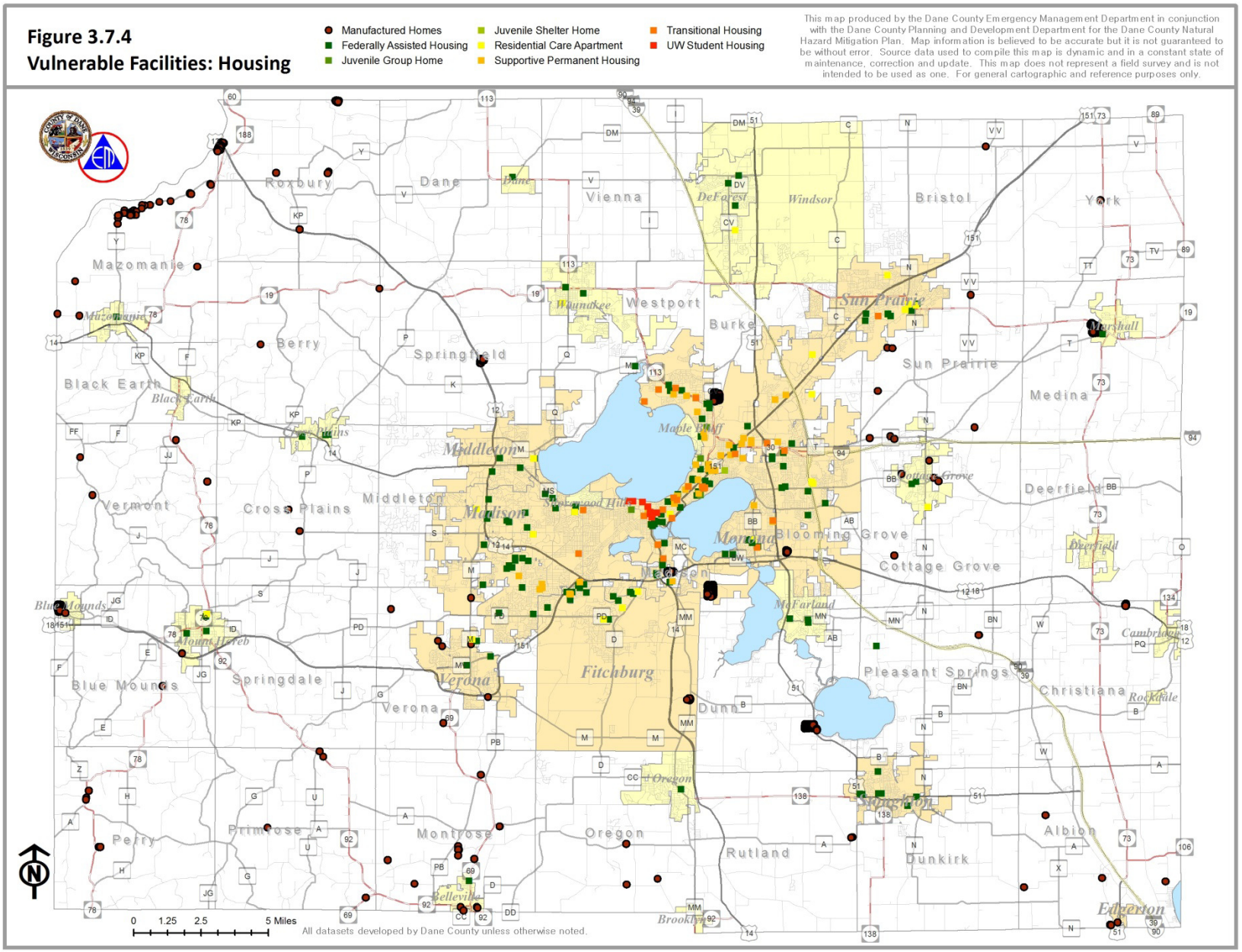


Figure 3.7.5
Vulnerable Facilities: Schools and School Districts