
Lincoln County All Hazards Mitigation Plan Update

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Prepared by:

**North Central Wisconsin
Regional Planning Commission**



LINCOLN COUNTY ALL HAZARDS MITIGATION PLAN UPDATE

prepared for:

Lincoln County Emergency Management

by:

North Central Wisconsin Regional Planning Commission

adopted by Lincoln County Board on:

Xxxxxxxx XX, 201X

This update was prepared at the request and under the supervision of the Lincoln County Emergency Management Committee and its Emergency Management Director by the North Central Wisconsin Regional Planning Commission (NCWRPC). For more information, contact:

NORTH CENTRAL WISCONSIN REGIONAL PLANNING COMMISSION
210 McCLELLAN STREET, SUITE 210
WAUSAU, WI 54403



Telephone: 715-849-5510

FAX: 715-849-5110

email: staff@ncwrpc.org

www.ncwrpc.org

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INTRODUCTION

Part I of the Lincoln County All Hazards Mitigation Plan (AHMP) Update describes and documents the process used to develop the Plan Update. This includes how it was prepared and who (committee, organizations, departments, staff, consultants, etc.) was involved in the update process. It also describes the local government involvement, the time period in which the update was prepared, and who to contact to answer questions and make recommendations for future amendments to the Plan.

DISASTER MITIGATION ACT OF 2000

The development of the Lincoln County All Hazards Mitigation Plan Update is a response to the passage of the Disaster Mitigation Act of 2000 (DMA2K). On October 30, 2000, DMA2K was signed into law by the U.S. Congress in an attempt to stem the losses from disasters, reduce future public and private expenditures, and to speed up response and recovery from disasters. This Act (Public Law 106-390) amended the Robert T. Stafford Relief and Emergency Assistance Act. The following is a summary of the parts of DMA2K that pertain to local governments and tribal organizations:

- The Act establishes a new requirement for local governments and tribal organizations to prepare an All Hazards Mitigation Plan in order to be eligible for funding from FEMA through the Pre-Disaster Mitigation Assistance Program and Hazard Mitigation Grant Program.
- The Act establishes a requirement that natural hazards such as tornados, floods, wildfires need to be addressed in the risk assessment and vulnerability analysis parts of the All Hazards Mitigation Plan. Manmade types such as hazardous waste spills are encouraged but not required to be addressed.
- The Act authorizes up to seven percent of Hazard Mitigation Grant Program funds available to a state after a federal disaster to be used for development of state, local, and tribal organization All Hazards Mitigation Plans.
- The Act establishes November 1, 2004 as the date by which local governments and tribal organizations are to prepare and adopt their respective plans in order to be eligible for the FEMA's Hazard Mitigation Grant Program and Pre-Disaster Mitigation Program.
- If a plan is not prepared by November 1, 2004, and a major disaster is declared, in order for a local government or tribal organization to be

eligible to receive funding through the Hazard Mitigation Grant Program, they must agree to prepare an All Hazards Mitigation Plan within one year.

- In addition, by not having an All Hazards Mitigation Plan, local governments and tribal organizations cannot utilize funding through the Pre-Disaster Mitigation Grant Program.
- All Hazards Mitigation Plans must be updated every five years.

THE FIVE PARTS OF AN ALL HAZARDS MITIGATION PLAN UPDATE

The Lincoln County All Hazards Mitigation Plan Update was categorized into five parts in order to address FEMA's local mitigation plan requirements. The five parts are as followed:

Part I:	Update Planning Process
Part II:	Planning Area
Part III:	Risk Assessment
Part IV:	Mitigation Strategy
Part V:	Plan Maintenance Process and Adoption

DEVELOPMENT OF THE ALL HAZARDS MITIGATION PLAN UPDATE

The Lincoln County Emergency Management Department received a Planning Grant at the beginning of 2016 to update its All Hazards Mitigation Plan through the Pre-Disaster Mitigation Grant Program (PDM).

In early 2016, the North Central Wisconsin Regional Planning Commission (NCWRPC) finalized a work agreement with Lincoln County, and began preparation of the All Hazards Mitigation Plan Update at the request of the County Emergency Management Director in June of 2016.

The update process included regular Task Force Committee meetings as well as extensive involvement from the local units of government within Lincoln County and the counties surrounding Lincoln. A variety of local and regional agencies were involved in the development of the Plan Update at various stages, and extensive opportunity for public participation was provided including public informational meetings and hearings. All sections of the Plan Update report were reviewed and analyzed by the planning team at subsequent meetings and revised as established in the design of the update process for this Plan.

The remainder of this chapter expands on and provides more detail on key aspects of the update development process.

KEY ELEMENTS OF THE UPDATE TO THE 2012 PLAN

The major enhancements to the Lincoln County All Hazards Mitigation Plan develop through this update are as follows:

- ✓ Review of Recommended Revisions - The final Crosswalk for the previous plan approval listed a number of "recommended revisions" which were addressed in this update through the experience of subsequent plan adoptions from other counties.
- ✓ Review and update of planning area chapter - The planning area description and inventory was improved with additional information and updated statistics.
- ✓ Expanded Hazard Coverage - New hazards addressed in the Update include: cyber-attack.
- ✓ Review and update of risk assessment - The risk assessment was updated with documentation on recent hazard events. The priority level of hazards facing the County was also reviewed and updated.
- ✓ Review and update of Mitigation Strategy - The mitigation strategies chapter begins with a complete progress report on the strategies from the 2012 plan, establishment of new set of strategies for next five-year cycle and an updated prioritization of projects.

ALL HAZARDS MITIGATION PLAN UPDATE TASKFORCE

The Lincoln County All Hazard Mitigation Plan Update was prepared under the authorization of the Lincoln County Emergency Management Committee:

- Robert Lee, Chair (County Board Chair)
- Mayor William Bialecki (Mayor City of Merrill)
- Mayor Steve Taskay (Mayor City of Tomahawk)
- Michael Loka
- Kortney Pike
- Robert Reichelt
- Patricia Voermans
- William Zeitz

This Committee of the County Board delegated oversight of the update process to the County's Land Services Group which consists of a broad cross section of government, agency and interest group representatives from across the County. Periodic meetings were held with the NCWRPC staff, the County Emergency Management Director (Jeff Kraft), and the Land Services Group (dba Mitigation Planning Task Force) to provide guidance and input on the types of hazards to

be considered, appropriate mitigation strategies, and to review draft reports. Task Force members and their representation are as follows:

- Mike Huth, County Zoning Program Manager
- Tony Dallman, County Surveyor
- Matt Bremer, County Land Services Administrator
- Kevin Kleinschmidt, Forestry, Land and Parks Administrator
- Sarah Koss, Register Of Deeds
- Diana Petruzates, County Treasurer
- David Smith, County Information Technology Director
- Chris Marlowe, County Clerk
- Julie Allen, County Board
- Randy Scholz, Administrative Coordinator
- Jeff Kraft, County Emergency Management Director
- Norm Bushor, County Land Information Program Manager
- Terri Pankow, County Land Services
- Jay Dick, County Land Services
- Mark Kaczorowski, County Land Services
- Paul Bernard, County Land Services

LOCAL GOVERNMENT INVOLVEMENT

There were a number of opportunities for the local units of government to become involved in the update process. All jurisdictions participated in the original plan as well as this update through one or more of these opportunities.

In August of 2016 a hazard mitigation issues survey was sent to each town (unincorporated areas) chairperson and clerk requesting which hazards are a concern, input on past and future mitigation measures, and to document other information that could be incorporated into the All Hazards Mitigation Plan Update. Responses were received from 7 of 16 towns. A significant amount of information was gleaned from these questionnaires and incorporated into the planning document.

Some of the primary issues identified in the survey results include the following:

- Presence of extensive woodlands: high wind and wildfire (dead tree removal and brushing)
- Blockage of roads and downed power lines (high wind and winter storm)
- Road washouts: flooding
- Tornado and drought concerns
- Presence of a number of LP facilities
- Mobile home parks
- Culverts (upgrading, enlarging) / ditching / building up roads
- Need for generators and emergency response plans
- Proper posting and vandalism of structure ("fire") number signs

The City of Tomahawk was formally introduced to the update process at a separate meeting on December 6, 2016. The participants at this meeting provided information on hazards that have significance to the area, discussed critical facilities and provided mitigation strategy ideas for the plan. The following City officials participated in this planning meeting:

- Steve Taskay, Mayor
- Greg Albert, City Council
- Kevin Frueger, City Council
- Alan Hanson, City Council
- John Long, City Council
- Darrell Smerz, City Council
- Jon Cole, Superintendent City Dept. of Public Works
- Loretta Wanta, Deputy City Clerk

Discussion from this meeting indicated that the City's main concern is the flooding potential due to the dams that the City is built around. Other concerns include the threats posed to its critical emergency infrastructure and water supply. Two things are of particular concern to City officials: 1) the proximity of a major LP gas storage facility to its police, fire and public works facilities and 2) the proximity of railroad tracks carrying toxic chemicals past its municipal water supply wells. Possible ways to help the City deal with these problems include construction of an emergency command center a safe distance from the LP storage and development of a second well field and water tower. The need for an early warning system and reduction in ambulance service were also discussed.

The City of Merrill was formally introduced to the update process at a separate meeting on May 22, 2017. The participants at this meeting provided information on hazards that have significance to the area, discussed critical facilities and provided mitigation strategy ideas for the plan. The following City officials participated in this planning meeting:

- Norbert Ashbeck, Deputy Health Officer
- Mary Ball, City Council
- Corey Bennett, Chief of Police
- Mike Drury, Fire Battalion Chief
- Bill Heideman, City Clerk
- Dave Johnson, City Administrator
- Kandy Peterson, City Council
- Paul Russell, City Council

Discussion revolved around tornados in the recent memory of the devastating north side tornado in 2011 and dam failure. Resultant flooding has the potential to cut off parts of the city, and certain critical facilities lie in flood zones such as

the street department shop. In addition, the City brought up the need for more fire and paramedic personnel, and citywide radio compatibility so that emergency services can coordinate with other city departments such as public works. Early warning systems were also discussed including continued improvement of the existing siren system and incorporation of new technology. The need for a shelter plan for the mobile home park was identified.

NEIGHBORING COMMUNITY INVOLVEMENT

One of the requirements of the update process was to include neighboring communities. In previous plans, the NCWRPC experienced low attendance in response to invitations to county emergency management staff from surrounding counties. As a result, NCWRPC staff e-conferenced during the update process with staff from Oneida, Langlade, Marathon, Taylor and Price counties. Ideas were exchanged about All Hazards Mitigation planning processes and strategies between the various counties.

LOCAL AND REGIONAL AGENCY INVOLVEMENT

Another requirement of the update process was to involve local and regional agencies that have a role in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia, and other private and non-profit interests. Although many of these categories are satisfied by the Plan Taskforce (see above), to further meet this objective and provide an opportunity for greater participation in the planning process, the NCWRPC invited a diverse group of stakeholders to discuss potential hazard mitigation strategies.

The meeting was held on May 25, 2017 at the Lincoln County Service Center Building in Merrill. Agencies and organizations represented include the following:

- Matt Bremer, Land Services
- Mike Huth, Zoning
- Jeff Kraft, Emergency Management
- Bob Lee, County Board Chair
- John Peeters, Tomahawk Fire Department
- David Savone, Merrill Fire Chief
- Randy Scholz, County Administrator

A number of other agencies were invited but chose not to attend.

During the meeting, the Plan Update and its components were introduced to the attendees. Mitigation strategy ideas were solicited and a number of ideas were discussed at length with the group. Part IV of the Plan was revised based on the meeting.

The meeting resulted in good discussion on a diverse range of topics spanning all four phases of emergency management. Meeting attendees talked about training and exercises on matters pertinent to the County such as tornado, mass casualty and sheltering, and how it can help to identify and address issues. For example, different departments and agencies can play a role in emergency operations where they have not been involved in the past. So, County GIS could help with logistics and provide custom mapping of key areas in an incident. The group felt that more training and exercises should be programmed to improve communication and coordination across the County. The part-time nature of the Emergency Management position was identified as an issue. Also discussed were communications issues and interoperability of radios - portables can't connect in some of the low lying areas tourism; and communities are starting to want to have the traditional warning sirens back.

PUBLIC REVIEW PROCESS AND PLAN ADOPTION

Opportunities for public comment were provided to review the Plan Update during the drafting stage and prior to Plan Update approval. See APPENDIX A for copies of public meeting notices. A copy of draft Plan Update elements were made available on the Internet during the planning process. Links that open an email submission form to the County Emergency Management Director or NCWRPC Staff were provided for questions or comments. The final Plan Update document will remain on the Internet until the next draft update is posted for review. The public can continue to submit questions or comments at any time via the email link. (See Contact Information, below, for web addresses.)

County Emergency Management Committee meetings are always open to the public (unless entering into legal closed session), and the public can bring questions or comments regarding this Plan Update to any regular meeting. Meeting schedules can be obtained by checking the County website, contacting the County Clerk's Office or the Emergency Management Director (see Contact Information, below).

A public informational meeting on the draft update was held at the Lincoln County Service Center Building on May 25, 2017. Notices were distributed to each local unit of government and posted in the local newspapers. However, no one from the public attended, and thus no public comments were received. In addition, no written comments were submitted.

A public hearing was held by the County Emergency Management Committee, see APPENDIX A for meeting details. No one from the public attended and thus no public comments were received. In addition, no written comments were submitted. Following the public hearing, the County Board approved the plan update at a subsequent meeting, see the resolution in APPENDIX B for details on this meeting. A brief overview of the update process and resulting updated plan was provided by Staff, and there was some general discussion by the Board.

The Cities of Merrill and Tomahawk were asked to adopt the Plan Update for their jurisdictions at their own properly posted and open public meeting, see APPENDIX B for the County and other local units resolutions of adoption.

INCORPORATED PLANS, STUDIES, REPORTS AND TECHNICAL DATA

Many plans, reports, and technical data sources were referenced and incorporated into the Lincoln County All Hazards Mitigation Plan Update. These sources include but are not necessarily limited to the following:

Wisconsin Department of Natural Resources, North Central Wisconsin Regional Planning Commission and Lincoln County geographic information system databases provided much of the base data for the mapping and analysis within the Update. Statistical reports and data from the US Census and Wisconsin Departments of Administration, Revenue and Workforce Development were used for the demographic background in Part 2 of this Update. Land use data in Part 2 was obtained from the Lincoln County Comprehensive Plan.

Wisconsin Department of Natural Resources Wetlands Inventory and Dams Database were used to identify and map wetlands and dams within the County for Maps and Tables in Parts 2 and 3 of this Plan. NFIP DFIRM flood zone maps for Lincoln County provided the mapping of 100-year floodplain areas in Part 2 and for the flooding risk assessment in Part 3.

NOAA National Climatic Data Center severe weather event data was used extensively for the risk assessment in Part 3. The wildfire section of the risk assessment was based on the Wisconsin Department of Natural Resources' fire occurrence database and statewide Communities At Risk (CAR) assessment.

Other plans, reports, and documents were reviewed by staff during the update process including but not limited to the State of Wisconsin Hazard Mitigation Plan; the Hazard Analysis for the State of Wisconsin, the Wisconsin Repetitive Loss Report, the Lincoln County Zoning Ordinance, the Lincoln County Land and Water Resource Management Plan, the 2010 LTPO Preparedness in Wisconsin report, and the 2014 Commodity Flow Study for Lincoln County. Although some of these may not have been directly incorporated, the review provided valuable insight and direction to the update process.

CONTACT INFORMATION

Jeff Kraft, Director
Lincoln County Emergency Management
Lincoln County Service Center
801 N. Sales Street
Merrill, WI 54452

jkraft@co.Lincoln.wi.us
715-536-6228

Go to: www.ncwrpc.org/lincoln/lincolnhzdplan/index.html
www.co.lincoln.wi.us/departments/?department=5b606eddbb7e

INTRODUCTION

Part II of the Lincoln County All-Hazard Mitigation Plan provides general geographical information on Lincoln County including demographic and economic characteristics. The general development patterns of the County are described in terms of current land use and future development trends.

In addition to developing an understanding of the planning area, this chapter represents the beginning stages of assessing vulnerability by inventorying the numbers, types and values of existing buildings, infrastructure and critical facilities within each participating jurisdiction in the planning area. This overall summary of each jurisdiction's vulnerability to hazards describes the potential impact on the community.

Land use and development trends are analyzed to project the number and type of potential future buildings, infrastructure and critical facilities within each jurisdiction so that mitigation options can be considered in future land use decisions.

The resulting information is an important element of the planning process, since sound alternative mitigation strategies cannot be formulated and evaluated without an in-depth knowledge of the relevant conditions in the study area.

GENERAL GEOGRAPHY

LOCATION

Lincoln County is located in north-central Wisconsin (See Map 1). The largest urban areas are the City of Merrill, located along the Wisconsin River in the south-central portion of the County, and the City of Tomahawk, located along the Wisconsin River in the north-central portion of the County. There are also several unincorporated hamlets. The County is bounded on the north by Oneida County, on the east by Langlade County, on the south by Marathon County, and on the west by Taylor and Price Counties.

Lincoln County lies approximately 110 miles northwest of Green Bay; 118 miles northwest of the Fox Valley; 210 miles northwest of Milwaukee; 15 miles north of Wausau; 7 miles south of Rhinelander; 167 miles north of Madison; and 185 miles northeast of La Crosse. Major metropolitan areas outside of Wisconsin with transportation linkages to Lincoln County are Chicago, 299 miles southeast; Minneapolis-St. Paul, 190 miles west; and Duluth, 213 miles north.

CIVIL DIVISIONS

There are 18 municipalities (16 towns, City of Tomahawk, and City of Merrill) in the Lincoln County planning area. These units of government provide the basic

structure of the decision-making framework. The County has a total surface area of 907 square miles, of which 3.1% is water. The area and proportion of the County within each civil division are presented in Table 1.

Table 1: Geographical Size by Municipality				
Minor Civil Division	Area in square Miles			Area as % of County
	Total Area	Water area	Land area	
Birch town	36.11	0.47	35.64	4.0%
Bradley town	63.15	8.24	54.91	7.0%
Corning town	146.43	0.25	146.19	16.1%
Harding town	72.84	1.45	71.39	8.0%
Harrison town	72.33	3.38	68.95	8.0%
King town	36.93	3.43	33.5	4.1%
Merrill city	7.8	0.57	7.24	0.9%
Merrill town	53.43	1.58	51.85	5.9%
Pine River town	64.02	0.53	63.49	7.1%
Rock Falls town	49.17	1.49	47.68	5.4%
Russell town	36.33	0.54	35.79	4.0%
Schley town	48.36	0.21	48.15	5.3%
Scott town	30.73	0.56	30.17	3.4%
Skanawan town	35.89	0.59	35.31	4.0%
Somo town	36.29	0.14	36.16	4.0%
Tomahawk city	9.34	1.58	7.76	1.0%
Tomahawk town	71.63	1.73	69.9	7.9%
Wilson town	36.22	1.29	34.92	4.0%
Lincoln County	907	28.03	878.97	100.0%

Source: Census 2010 Summary File 1, Geographic Header Record G001.

TOPOGRAPHY

Lincoln County is in the Northern Highland physiographic region of Wisconsin. This region has some of the highest elevations in the State, and elevations in the County range from about 1,910 feet above sea level just east of Ament Lake in the northeast to about 1,220 at the point where the Wisconsin River leaves the County. Merrill is about 1,300 feet above sea level, and Tomahawk is about 1,450.

The physiography, relief and drainage of the County are primarily the result of glaciation. They are modified by ridges of hard bedrock in the southern part of the County. The landscape is very diverse. Moraines, eskers, kames, ice-contact lake basins, and drift-mantled ridges and hills of bedrock are generally in the highest positions on the landscape. These landforms are interspersed with lower areas of outwash plains, drumlins, lake plains, and bogs and other depressional areas where organic soils have formed.

Insert Map 1 - Location

To reduce file size for ease of emailing and downloading, the maps are omitted from this draft. To view the maps go to

www.ncwrpc.org/lincoln/lincolnhzdplan/index.html

The most prominent physiographic feature is the broad belt of end moraine that extends across the County from the northeastern part to the south-central and then through the west-central area. This end moraine area has the highest elevations and the roughest terrain in the County.

CLIMATE

Winters in Lincoln County are very cold, and summers are short but fairly warm. The short frost-freeze period limits the production of crops. An annual average of 126.9 days had a snow depth equal to or greater than .1 inches. The prevailing wind is from the southwest, and average wind speed is highest in spring at 12 miles per hour. Precipitation is fairly well distributed throughout the year, reaching peak in summer, and snow covers the ground during much of the period from late fall through early spring.

In winter, the average temperature is 15 degrees F with the average daily minimum at 4 degrees. The lowest temperature on record (Merrill) was -48 in January of 1909. Soils usually freeze to depth ranging from a few inches up to one foot, but occasionally can freeze to several feet when cold temps occur before appreciable snow cover. In summer, the average temperature is 66 degrees and the average daily maximum temperature is 79 degrees. The highest recorded temperature was 110 degrees in July of 1936.

Average total annual precipitation is 32 inches. Of this about 70% usually falls in April through September. The heaviest 1-day rainfall on record (Merrill) was 11.25 inches over July 23 and 24 of 1912. Thunderstorms occur on about 34 days each year. Average seasonal snowfall is about 53 inches, with 104.3 inches (2014-15) being the greatest total on record. The 21.2 inches was highest single snowfall in the County, recorded in 1929.

DEMOGRAPHIC AND ECONOMIC PROFILE

POPULATION AND HOUSEHOLDS

The official state 2015 population estimate for Lincoln County shows a population of 28,835 people for the County. This represents a 0.3 percent increase over the 2010 Census reported population of 28,743 people. This is a slow growth rate, but similar compared too many of the surrounding counties and slightly below the state average (refer to Table 2). From 2000 to 2010, the County grew 3.3 percent. If the growth rate continues at the current level, there will be approximately 30,100 people in Lincoln County in 2025 and 29,355 people in 2040.

Population concentrations and trends are important when prioritizing hazard mitigation strategies. Approximately 38 percent of the population is classified by the Census as urban and 62 percent is rural. The City of Merrill is the most densely populated and developed area in the County. Other areas of population concentrations are the City of Tomahawk, waterfront development in the Towns

of Harrison, King, Bradley, Wilson, Merrill, and Harding, and the unincorporated “hamlets” of Gleason, Bloomville, and Irma. Map 2 (Land Use) shows areas of population concentrations in the County. Overall population density of the County is 32.7 persons-per-square-mile and ranges from a high of 1,335 in the City of Merrill to a low of 3.2 in the Town of Somo.

Table 2 Population of Adjacent Counties				
County	2010	2015	Change	% Change
Lincoln	28,743	28,835	92	0.32%
Langlade	19,977	19,907	-70	-0.35%
Marathon	134,063	135,341	1,278	0.95%
Oneida	35,998	36,232	234	0.65%
Price	14,159	14,133	-26	-0.18%
Taylor	20,689	20,715	26	0.13%
Wisconsin	5,686,986	5,753,324	66,338	1.17%

Source: WisDOA Estimates 2015

Between 2010 and 2016, most of the communities within Lincoln County have experienced a slight to moderate increase in their population base with the exception of the City of Merrill, the City of Tomahawk, and the towns of Corning and Schley (refer to Table 3). The highest level of growth occurred in the Town of Birch with a 16.5 percent increase between 2010 and 2015. A majority of the population change in percentage ranged between -2.0 to 2.2 percent in the municipalities. However, since 2000, the population has decreased 3 percent.

The growth in households continues to outpace the growth in population, with the Town of Some increasing 40.4%, for a net increase of 21 households. Water bodies in the northern half of the County are significant attractions and retirees converting cabins to year-round residences have fueled this growth. According to the UW-Extension Lincoln County Housing Profile, retirement-age residents (65 years and over) account for 18.3 percent of Lincoln County residents, compared to 13.7 percent for the state of Wisconsin. There were exceptions to household growth, with the percent of households decreasing in the Town of Corning, the Town of Merrill, and the Town of Russell.

According to the Wisconsin Department of Workforce Development the average age in Lincoln County is 46.4 or 7.3 years older than the state average of 39.2 years. By 2020 the expected average age of County residents will be 42.9 years and 44.6 by 2030. This puts the County's average age above the state's expected averages of 39.6 in 2020 and 41 in 2030.

Insert Map 2 Generalized Land Use

To reduce file size for ease of emailing and downloading, the maps are omitted from this draft. To view the maps go to

www.ncwrpc.org/lincoln/lincolnhzdplan/index.html

Table 3: Population and Households of Civil Divisions						
Civil Division	Census 2010 Population	Census 2010 Households	WisDOA 2015 Estimated Population	ACS 2014 Estimated Households	2010 – 2015 % Change in Population	2010 – 2014 % Change in Households
Birch town	594	189	692	226	16.5%	19.6%
Bradley town	2,408	1,089	2,441	1,089	1.4%	0.0%
Corning town	883	330	881	314	-0.2%	-4.8%
Harding town	372	140	379	160	1.9%	14.3%
Harrison town	833	356	842	366	1.1%	2.8%
King town	855	373	874	440	2.2%	18.0%
Merrill town	2,980	1,204	2,999	1,199	0.6%	-0.4%
Pine River town	1,869	754	1,883	793	0.7%	5.2%
Rock Falls town	618	266	628	271	1.6%	1.9%
Russell town	677	276	682	273	0.7%	-1.1%
Schley town	934	378	929	433	-0.5%	14.6%
Scott town	1,432	537	1,442	605	0.7%	12.7%
Skanawan town	391	165	400	188	2.3%	13.9%
Somo town	114	52	115	73	0.9%	40.4%
Tomahawk town	416	193	426	215	2.4%	11.4%
Wilson town	309	137	314	139	1.6%	1.5%
Merrill city	9,661	4,175	9,573	4,173	-0.9%	0.0%
Tomahawk city	3,397	1,480	3,335	1,526	-1.8%	3.1%
Lincoln County	28,743	12,094	28,835	12,483	0.3%	3.2%

Source: 2010 Census, 2014 ACS 5 Year Estimates, WisDOA Population Estimates

SEASONAL POPULATION

In addition to the regular full-time resident population, the impact of seasonal population cannot be overlooked when planning for hazards. Although not as significant as in neighboring Oneida County, 20.3 percent of Lincoln's housing stock has been identified as seasonal/recreational. Roughly 30 percent of the County's seasonal housing units are in Bradley. There are also significant units in the towns of Harrison (12.5%) and King (14.8%). Table 4 shows estimated seasonal residents by municipality. Determining when and for how long these seasonal residents will be in the County is problematic, but the numbers give some indication of what weekend or other peak period population levels might be.

Another component of the seasonal population includes short-term accommodations such as campgrounds or hotel-style lodging. The scope of this

plan did not provide for a detailed inventory of accommodations; however the Wisconsin DNR completed a general inventory as part of its statewide comprehensive outdoor recreation plan. That inventory identified 713 hotel/motel beds, 28 bed and breakfast beds and 76 other types of beds available around the County. The DNR also identified 574 campsites in various campgrounds across the County as well as educational/recreational camps with capacity for 406 individuals. Short term, special event attendance can result in a major influx of population in a given localized area and present unique problems in a disaster situation. For example, the annual Tomahawk Fall Ride brings many thousands of people into the area for just a few days.

Table 4: Estimated Seasonal Resident Population		
Civil Division	Est. 2014 Seasonal Housing Units	Est. 2014 Seasonal Population
Birch town	49	107
Bradley town	1,037	2,064
Corning town	136	316
Harding town	125	329
Harrison town	429	935
King town	506	1,032
Merrill town	42	103
Pine River town	29	68
Rock Falls town	253	567
Russell town	107	268
Schley town	40	95
Scott town	11	28
Skanawan town	55	135
Somo town	71	137
Tomahawk town	250	485
Wilson town	195	427
Merrill City	33	73
Tomahawk City	57	119
Lincoln County	3,425	7,287

Source: 2014 ACS 5 Year Estimates, NCWRPC

EMPLOYMENT

According to the Wisconsin Workforce Development, the Manufacturing sector, the Trade, Transportation, and Utilities sector, Healthcare and Education Services sector are the top employers in Lincoln County. The Manufacturing industry produces everything from wood products to motorcycle accessories and parts to paper and metal products and is the largest employer, with 2,608 workers. The Trade, Transportation, and Utilities sectors employed 2,156 workers in 2014. The school districts and healthcare facilities are also some of the largest employers in the area, employing 1,659 persons. Together these four sectors employ over 59 percent of the County's workers. Identifying locations of

large employment is important when prioritizing hazard mitigation strategies. Table 5 displays the top employers in the area.

Table 5 Selected Major Employers in Lincoln County			
Company	Product or Service	Size	Location
Merrill Public School	Public Education	500-999	Various locations
Church Mutual Insurance Co.	Insurance Carrier	500-999	City of Merrill
County of Lincoln	County Public Employment	250-499	Various locations
Packaging Corp. of America	Paper Mill	250-499	City of Tomahawk
WI Dept. of Corrections	Correctional Facilities - Public	250-499	Various Locations
Harley-Davidson Motor Co.	Motorcycles and Parts	250-499	City of Tomahawk
Lincoln Wood Products, Inc.	Wood Windows and Doors	100-249	City of Merrill
Semling Menke Co, Inc.	Wood Windows and Doors	100-249	City of Merrill
Weinbrenner Shoe	Leather Finishing	100-249	City of Merrill
School District of Tomahawk	Public Education	100-249	City of Tomahawk

Source: Wisconsin DWD County Workforce Profile, 2013 and NCWRPC.

LAND USE/LAND COVER AND DEVELOPMENT PATTERNS

Table 6: Lincoln County Land Use 2015		
Description	Acres	%
Agriculture	52,916.41	9.1%
Commercial	1,123.48	0.2%
Cranberry Bog	254.00	0.0%
Governmental/Institutional	790.35	0.1%
Industrial	1,623.04	0.3%
Open Lands	15,071.41	2.6%
Outdoor Recreation	890.85	0.2%
Residential	12,808.46	2.2%
Transportation	7,907.59	1.4%
Water	17,370.41	3.0%
Woodlands	469,417.15	80.9%
Total	580,173.15	100.0%

Source: NCWRPC, 2015

Land use is an important determinant in the potential impact a particular hazard may have, and in actions which may be taken to mitigate the hazard impacts. An understanding of the amount, type, and spatial distribution of urban and rural land uses within the County is an important consideration in the development of a sound hazard mitigation plan.

The North Central Wisconsin Regional Planning Commission (NCWRPC) has categorized land use in Lincoln County into eleven classifications based on land use data compiled in 2015 and analyzed in 2016. This generalized land use provides a "big-picture"

understanding of land use and development patterns within Lincoln County. Map 2 shows the land use and surface water in Lincoln County. Table 6 shows the acreage and percent of each classification.

FORESTRY AND AGRICULTURE

The dominant land-use in Lincoln is forestry. Land area is approximately 81 percent forested, comprised of approximately 469,417 acres of woodland. Agricultural land covers another 9.1 percent of the County's land area, which is mostly located on previously forested tracts that were cleared by early settlers. Dairy, beef, cash crops, ginseng, strawberries, cranberries, apples and maple syrup make up the core of what Lincoln County farmers produce off the land. A short growing season, irregular topography, and relatively poor soil productivity, limits most of the agricultural production to the southern portions of the county.

COMMERCIAL AND INDUSTRIAL DEVELOPMENT

Commercial and industrial development makes up only about 0.2 percent of the total County area. Such land use is mostly located in and around the two cities of Merrill and Tomahawk. There are three designated industrial parks in the County; one in each of the cities and Town of Merrill. Other industrial sites are located in the Town of Bradley. Commercial activity is also located in the Cities of Merrill & Tomahawk and the Towns of Bradley & Merrill where these areas serve as sub-regional service hubs supported by the surrounding forestry and agri-business industry. Commercial activity in the unincorporated areas is primarily dominated by private commercial recreation. However, some rural centers act as mini service hubs with notable commercial/industrial development. For example, within Gleason there is a bank, gas station, bowling alley, post office, race track, limited commercial, and a variety of restaurants.

RESIDENTIAL DEVELOPMENT

Land in residential development makes up approximately 2.2 percent of the total county area. Residential concentrations are scattered throughout the County (see "Population and Households" above). Much of the scattered rural development is related to direct recreational demand as various types of housing have clustered along streams and lakes.

There are a number of mobile home parks in the County. According to the 2014 American Census 5 Year Estimates, there were 1,285 mobile homes in 2014. This is about 8 percent of housing units for the County compared to about 4 percent for the entire State. This is significant due to their vulnerability in natural hazards especially tornadoes. Map 8 (Tornado Vulnerability) displays the mobile home concentrations within the County.

SURFACE WATER

Lincoln County is located in the Upper Wisconsin River drainage basin. There are thirteen watersheds within the County, with seven major tributaries: Somo, Spirit, New Wood, Copper, Pine, Prairie and Tomahawk Rivers all flowing into the Wisconsin River, which generally bisects the County from north to south.

Insert Map 3 Surface Water and Watersheds

To reduce file size for ease of emailing and downloading, the maps are omitted from this draft. To view the maps go to

www.ncwrpc.org/lincoln/lincolnhzdplan/index.html

The total surface water area of lakes and streams in Lincoln County contains approximately 17,370 acres. More than half of the County's 500 plus lakes are artificial impoundments on the Wisconsin River. Lake Mohawksin is the largest of these lakes at 1,909 acres. Over eighty-six percent of the lakes are less than 10 acres, while only 3% are over 100 acres.

Within the watersheds, there are 246 interior rivers and streams covering about 668 miles (see Map 3). All the streams, like the lakes, are important in the hydrological and ecological regime and should be protected by shoreland zoning and physical protective measures. The 285-foot drop of the Wisconsin River is moderated by six water control structures, which help to control flooding.

Floodplains and wetlands are important subsidiary components to the surface water system as described below.

Floodplains

The primary value of floodplains is their role in natural flood control. Flood plains represent areas where excess water can be accommodated whether through drainage by streams or through storage by wetlands and other natural detention/retention areas. Specific areas that will be inundated will depend upon the amount of water, the distance and speed that water travels, and the topography of the area. If uninterrupted by development, the areas shown on a map as floodplains should be able to handle the severest (regional) flood, i.e. those that have a probability of occurring once every one hundred years.

There is a value in preserving and protecting these natural flood control areas from encroachment. First, by preventing development in the floodplain, the cost of building dikes, levies, or other man-made flood control devices will be saved. Second, for each structure that is built in a flood-prone area, that area expands, potentially subjecting other structures originally built outside the delineated flood hazard area to the risk of flooding. Each new structure (or modification to existing) placed in the flood plain puts more life and property in danger.

Counties, cities, and villages are required to adopt reasonable and effective floodplain zoning ordinances. The requirement is found in section 87.30 of the Wisconsin Statutes and Chapter NR 116 of the Wisconsin Administrative Code. Floodplain zoning is designed to protect individuals, private property, and public investments from flood damage.

Floodplain zoning maps identify areas where major floods occur. Regulations prohibit development in the floodway, the most dangerous flood area. In other flood areas, the flood fringe, development that is built above flood levels and otherwise flood-protected is allowed if it is in accordance with local ordinances. For regulatory purposes, a floodplain is generally defined as land where there is a one percent chance of flooding in any year (also known as the 100-year floodplain).

Insert Map 4 Floodplain and Dams

To reduce file size for ease of emailing and downloading, the maps are omitted from this draft. To view the maps go to

www.ncwrpc.org/lincoln/lincolnhzdplan/index.html

In order to participate in the Federal Emergency Management Agency's (FEMA) National Flood Insurance Program (NFIP), the County, City of Merrill, and City of Tomahawk have completed a Flood Insurance Study and a Flood Insurance Rate Map (FIRM) that encompasses Lincoln County, see Table 7 for summary of NFIP status.. This FIRM delineates the "A" Zones including the floodway and flood fringe which are those areas inundated by the 100-year flood within the County.

Table 7 FEMA Community Status Book Report Communities Participating in the National Flood Insurance Program Wisconsin - Lincoln County				
Community	Initial FHBM	Initial FIRM	Current Map	Program Entry
Lincoln County	09/22/78	02/19/86	08/16/11	02/19/86
City of Merrill	na	07/20/73	08/16/11	07/20/73
City of Tomahawk	na	09/04/85	08/16/11	09/04/85
<i>Source: FEMA, 2016.</i>				

Lincoln County participated with FEMA in updating its FIRM to new digital standards. The digital FIRMs are referred to as DFIRM. The NCWRPC downloaded the DFIRM from the County for use in this plan. Although unofficial, the digital files indicate there are 18,100 acres of floodplain in Lincoln County, or 3.1 percent of the land area. Map 4 shows the approximate floodplains in Lincoln County. Floodplains in Lincoln are generally small and floods occur only during periods of exceptionally heavy rainfall. Currently, there are no repetitive loss structures, those with multiple flood insurance claims, in Lincoln County.

The Biggert-Waters Flood Insurance Reform Act was signed into law in July, 2012. This act implemented significant reforms to the structure of flood insurance under the National Flood Insurance Program (National Flood Insurance Program (NFIP). Then, on March 21, 2014, President Obama signed the Homeowner Flood Insurance Affordability Act of 2014 (HFIAA) into law amending the NFIP further. These new laws impact the various elements of the NFIP, including Insurance, Flood Mapping, Mitigation, and Floodplain management.

HFIAA repeals and modifies certain provisions of the Biggert-Waters Flood Insurance Reform Act, and makes additional program changes to other aspects of the program not covered by that Act. Many provisions of the Biggert-Waters Flood Insurance Reform Act remain and are still being implemented. The new law lowers the recent rate increases on some policies, prevents some future rate increases, and implements a surcharge on all policyholders. The Act also repeals certain rate increases that have already gone into effect and provides for refunds to those policyholders. Both of these laws are important to local floodplain managers and planners because rate structure increases may increase interest of policy holders that own floodprone properties in alternatives to mitigate both flood risk and flood insurance costs for those properties.

Wetlands

Wetlands perform many indispensable roles in the proper function of the hydrologic cycle and local ecological systems. In terms of hazard mitigation, they act as water storage devices in times of high water. Like sponges, wetlands are able to absorb excess water and release it back into the watershed slowly, preventing flooding and minimizing flood damage. As more impermeable surfaces are developed, this excess capacity for water runoff storage becomes increasingly important.

According to the GIS mapping of Lincoln County in 2015, there are 121,356.56 acres of wetlands, or 21 percent of its total area. Map 3 shows these wetland areas to be scattered throughout Lincoln County. There are no main concentrations of wetlands, except that cattails and bulrushes in shallow water, and alder, sedges and grasses in the saturated areas dominate wetland communities.

Eradication of wetlands can occur through the use of fill material. This can destroy the hydrological function of the site and open the area to improper development. The Wisconsin Department of Natural Resources (DNR) has promulgated minimum standards for managing wetlands and generally, local zoning does permit development of these areas.

OTHER LAND COVER/USES

Recreational lands including parks and outdoor sports facilities total about 890.85 acres or .15 percent of the County area. Other lands may have recreational aspects, particularly woodlands. Governmental, public and institutional lands total about 0.14% of the County area. Open lands cover about 15,071 acres or 2.6% of County area. These include grasslands, scrub and other barren lands.

FUTURE GROWTH AND DEVELOPMENT IN LINCOLN COUNTY

Natural features, including the Wisconsin River, and the region's major transportation corridors, particularly U.S. 51, have largely dictated the County's land use pattern. The County's adopted Comprehensive Plan predicts this will continue to be the case.

Lincoln County's population has increased slightly over the last five years. By 2035, Lincoln County will have grown to a population of about 30,750, a gain of 2,007 residents from the 2010 Census, according to the Wisconsin DOA 2013 county projections. In addition, household sizes continue to decrease, resulting in a need for more housing units to accommodate these households. The following discusses how these new housing units might be dispersed across the County and what other development will be brought along with it.

The northern two-thirds of the County is dominated by publicly and privately owned forest lands. Public forest uses are most prevalent in the Towns of

Harding, Harrison, Somo, Tomahawk and Wilson. So growth will be slower in those areas. Private managed forest covers large portions of the Towns of Corning, Harding and King, so these areas should see slow but steady growth over time.

Agricultural areas cover much of the southern portion of the County, throughout the Towns of Russell, Schley, Pine River, Scott and eastern Corning, particularly along the Prairie River basin. Several Christmas tree farms are interspersed with general agricultural uses in the Town of Pine River. Tree farms are also common in King, Skanawan and Wilson. As with the forestry based communities mentioned above, the agro-forestry nature of these towns indicate a slow growth dispersed widely across the landscape over time. Commercial developments will be very minimal, and typically of a home-based business variety. New infrastructure or public facilities will be very minimal, if any.

The central part of the County contains large areas of recreational land. Public recreation uses like Council Grounds State Park, Newwood Wildlife Area, Menard Island Resource Area and Underdown Recreation Area, can be found in the Towns of Birch and Merrill. Private recreational uses like golf courses, racetracks and campgrounds are located in the Towns of Bradley, Rock Falls, Merrill and Scott. These recreational amenities along with easy access to the freeway make these areas more attractive for residential developments; however, it is still expected to be primarily dispersed, low-density. Commercial developments will again be very minimal, as well as, new infrastructure or public facilities. A new industrial park was established in the Town of Merrill but has attracted only one tenant (LP fuel facility) thus far.

There are two basic exceptions to the development pattern described thus far: the Cities of Merrill and Tomahawk and the County's waterfront areas. Within the central recreation area lie the two cities of Merrill (south central) and Tomahawk (north central). It is in and around these cities where the most significant concentrated new residential development will occur. Sizeable new subdivisions have already been platted. These areas in and around the cities contain the most intensive land uses in the County including a mixture of residential, commercial and industrial. More substantial infrastructure is also anticipated in association with this other development. New roads, sewer and water lines are the most common infrastructure to expand with new development adjacent to the cities. In Merrill, two new multifamily housing complexes have added 36 and 60 new units, and there has been a boom of commercial developments on the City's east side. Tomahawk has had some new residential and commercial (new shopping plaza and convenience store) development and some industrial expansion and reuse.

Waterfront residential development is most prominent in the Towns of Bradley, Harding, Harrison, King, Merrill and Wilson. Waterfront areas in these municipalities will continue to see development pressure.

New public and community facilities include a new town hall built in Birch and one being planned by Town of Skanawan. Within the last five years in the City Merrill a number of new projects have been completed or under construction. These include: a new fire station, new airport terminal, new Human Society building, new grandstand and other upgrades at the festival grounds, high school football field, Enrichment Center and Expo Hall, Aquatic Center, a new water treatment plant. In Tomahawk there is a new nursing home, new homeless shelter and two new assisted living facilities, and plans are being made for a new public safety building. The County is currently constructing a major expansion of its Pine Crest Nursing Home.

PUBLIC FACILITIES AND SERVICES

TRANSPORTATION

The transportation system of Lincoln County provides the basis for movement of goods and people into, out of, through, and within the County. An efficient transportation system is essential to the sound social and economic development of the County and the Region. The analysis of transportation routes should be considered in the possible event of a disaster (See Map 5).

Two major U.S. Highways, U.S.H. 8 and U.S.H. 51 serve Lincoln County. U.S. 8 runs an east-west arc through the extreme northern portion of the County, while U.S. 51 runs a north-south course through the center of the county. U.S. 51 is a four-lane facility and links the County to Interstate 39 at Wausau.

Four state highways access the County. Highways 64 and 86 run east-west paths. Highway 86 is in the northern half of the County through Tomahawk, while Highway 64 serves the southern half, running through the City of Merrill. Highway 107 moves north-south connecting Tomahawk and Merrill. Highway 17 cuts a northeasterly track through the southeast corner of the County. These highways link the County with neighboring communities and are vital to the County's tourism and recreation-based economy.

Networks of County trunk highways collect traffic from rural land uses. These County highways serve an important role in linking the area's agricultural and timber resources to the county's two cities and major highways. Local roads provide access to local development, farming and forestry areas, as well as the County's lake areas.

The U.S./State and County highways in Lincoln County include a large network of bridges owned by the federal, state, county and local governments. The majority of the State bridges are under/over passes along U.S. 51. The County system contains the majority of bridges in the area.

Insert Map 5 Transportation

To reduce file size for ease of emailing and downloading, the maps are omitted from this draft. To view the maps go to
www.ncwrpc.org/lincoln/lincolnhzdplan/index.html

Lincoln County Commission on Aging coordinates transit services for the elderly and disabled in the county. Private operators and non-profits provide mobility services for both median and non-emergency transportation, including bus reservations, volunteer drivers, and discounted taxi cabs. Abby-Vans Inc. provides transportation to Lincoln County's neighboring areas, including weekend travel. In Merrill, the city's transit service provides this function on week days at a discounted rate for seniors and those with disabilities within the City limits, but riders must call ahead in advance.

The Tomahawk Railway and the Canadian National (CN) Railroad serve Lincoln County. The Tomahawk Railway is a 6-mile rail line serving the mills and distribution center in the City of Tomahawk. The CN line runs through the center of the County and connects Merrill and Tomahawk to the freight rail network.

The Merrill Municipal Airport located north of the City of Merrill and the Tomahawk Municipal Airport located west of the City of Tomahawk serve the area. Both airports provide general aviation service for private airplanes and daily airfreight. There are private landing strips located in the Towns of Schley, Russell, Rock Falls, and Corning. The nearest commercial passenger service is located in Rhinelander or Mosinee.

UTILITIES

Utility systems are important in hazard mitigation planning because of the dependency on water, wastewater treatment, gas service, electricity, and communications. Because of this reliance and vulnerability to hazards, utility systems must be identified for this Plan, see Map 6

The protection of the public water supply from potential contamination from hazards such as flooding is a consideration for hazard mitigation planning. The City of Merrill and Tomahawk provide municipal water supplies for domestic and commercial use, while the Lincoln Hills School provides water for their students.

The protection of the wastewater facilities is an important consideration for hazard mitigation planning because of its potential to contaminate nearby waterbodies in the event of high water, such as the Wisconsin River. Also of concern during periods of flooding is the threat of damage to infrastructure of associated facilities. Three municipal wastewater treatment facilities serve Lincoln County. The Cities of Merrill and Tomahawk, along with the Gleason area in the Town of Russell are provided with service.

The infrastructure of electric and telephone lines should be considered in the events of high wind, ice storms, tornadoes, flooding, and fire. Wisconsin Public Service provides Lincoln County with electric service throughout the County. As of 2001, an independent company, American Transmission Company LLC (ATC), owns, maintains, and operates the major transmission facilities located in

the State of Wisconsin, including Lincoln County. The general locations of the major electrical transmission facilities, owned by ATC are shown on Map 6.

Frontier is the primary provider of traditional telephone service in the County. With cellular phones playing an increasingly important role in communications, see Map 6 for tower locations within the County.

The ANR pipeline is the main source of natural gas in the County. A segment of the pipeline traverses the County north-south between Merrill and Tomahawk. A spur line to serve the City of Antigo in Langlade County branches off the main north-south line near the Marathon County line and lies just inside Lincoln County.

EMERGENCY SERVICES AND FACILITIES

The type and location of public emergency services are an important consideration in hazard mitigation planning, because of the potential direct involvement of such facilities in certain hazard situations.

There are six fire service providers that serve the local units of governments in Lincoln County. The Cities of Merrill and Tomahawk, and Towns of Russell, Corning, and Pine River offer fire services to the areas and one department, Crescent, lies outside the County. The Merrill Fire Department is the only one that provides full-time service, while the remainder of the departments relies on volunteers for this service.

Additionally, there are three EMS and three First Responder providers in the County: Merrill EMS, Tomahawk EMS, Oneida County EMS, Tripoli First Responders, Russell First Responders and Pine River First Responders.

The Lincoln County Sheriff's Office provides service to all the towns and the cities for law enforcement. The Cities of Merrill and Tomahawk also have their own police departments. The main correctional facilities within the County include the Lincoln County Jail in Merrill and Lincoln Hills School, a state facility for troubled youth, near Irma.

CRITICAL COMMUNITY FACILITIES

In addition to emergency service facilities, other community facilities are also important in hazard mitigation planning. Government administration buildings serve as the headquarters that link to resources in helping solve potential problems. Hospitals are very important for knowing where injured residents have to be transported and as to how many people each hospital can handle if a hazard would breakout. The County has hospitals in Merrill and Tomahawk. Nursing homes are vulnerable, because of the high level of assistance with the residents that live there. The schools are another facility that is important, since hundreds of the county's children are there for most of the year. Map 7 shows the location of selected critical community facilities within Lincoln County.

Insert Map 6 Utilities

To reduce file size for ease of emailing and downloading, the maps are omitted from this draft. To view the maps go to
www.ncwrpc.org/lincoln/lincolnhzdplan/index.html

Insert Map 7 - Critical Facilities

To reduce file size for ease of emailing and downloading, the maps are omitted from this draft. To view the maps go to

www.ncwrpc.org/lincoln/lincolnhzdplan/index.html

INVENTORY & VALUE OF STRUCTURES/PROPERTY IN LINCOLN COUNTY

The value of the real estate and personal property in a community reflects the upper end of the potential for property damages in each community. The annual equalized value of each municipality represents the Department of Revenue estimate of market value (Agricultural land is included at Use Value) of all taxable property. Property tax levies of jurisdictions are apportioned to each municipality on the basis of equalized value. Table 8 lists each municipality's total equalized values for real estate, personal property, and all property and the percent each municipality represents of the county total.

Table 8: Equalized Value by Municipality				
Municipality	Real Estate	Personal Property	Total	% of Total
Birch town	\$38,002,300	\$261,900	\$38,264,200	1.65%
Bradley town	\$419,709,800	\$12,589,100	\$432,298,900	18.68%
Corning town	\$67,899,700	\$1,488,000	\$69,387,700	3.00%
Harding town	\$46,530,200	\$4,500	\$46,534,700	2.01%
Harrison town	\$161,492,600	\$633,400	\$162,126,000	7.01%
King town	\$156,171,200	\$667,100	\$156,838,300	6.78%
Merrill town	\$190,248,000	\$1,141,100	\$191,389,100	8.27%
Pine River town	\$133,166,300	\$884,900	\$134,051,200	5.79%
Rock Falls town	\$82,422,900	\$861,000	\$83,283,900	3.60%
Russell town	\$40,279,900	\$644,900	\$40,924,800	1.77%
Schley town	\$63,150,300	\$480,500	\$63,630,800	2.75%
Scott town	\$94,199,600	\$829,300	\$95,028,900	4.11%
Skanawan town	\$50,040,400	\$566,900	\$50,607,300	2.19%
Somo town	\$21,112,400	\$17,800	\$21,130,200	0.91%
Tomahawk town	\$67,484,700	\$644,300	\$68,129,000	2.94%
Wilson town	\$62,323,400	\$1,988,600	\$64,312,000	2.78%
Tomahawk city	\$213,300,900	\$11,647,800	\$224,948,700	9.72%
Merrill city	\$352,442,000	\$19,068,700	\$371,510,700	16.05%
Lincoln County	\$2,259,976,600	\$54,419,800	\$2,314,396,400	100.00%

Source: WI Department of Revenue

As stated above, the valuation of property in a community reflects the potential for property damages across the community. However, only taxable properties are included in this valuation. Tax exempt government properties are not included. With Lincoln County owning many critical facilities that are needed in times of disaster, the potential for damages to these structures could be devastating for the County. In Table 9, the County owned critical facilities are listed with the general location they are in and the value of the facilities. Estimates for local government facilities are given in Tables 9b - d.

Table 9a Value of County Owned Properties		
Name	Value*	Location
Courthouse	\$10,168,667	Merrill City
Service Center	\$7,456,602	Merrill City
Sheriff/Safety Building	\$21,641,694	Merrill City
Health & Human Services	\$5,150,474	Merrill City
Lincoln Industries	\$1,342,941	Tomahawk City
Pine Crest Nursing Home	\$17,283,265	Merrill City
Developmental Disabilities Center	\$1,486,341	Merrill City
Central Highway Department	\$5,176,160	Merrill City
Salt Shed	\$200,748	Merrill City
Highway Sign Shop	\$962,698	Merrill City
Highway Facilities - Tomahawk	\$1,567,597	Tomahawk City
Salt Shed	\$188,681	Tomahawk City
Forestry Shop	\$1,760,925	Irma
Forestry Building - Harrison Hills	\$66,635	Gleason
Outdoor Recreation Facilities	\$298,742	Various Locations
Solid Waste	\$1,639,611	Merrill City
Total	\$76,391,781	

*Includes insured buildings, contents and property in the open.

Source: Statement of Values State of Wisconsin Local Government Property Insurance Fund, 2017.

Table 9b Value of City Owned Properties Tomahawk	
Property	Value*
Airport	\$604,156
City Hall	\$1,650,202
Fire Station	\$1,109,595
Harley North	\$1,181,626
City Garage	\$1,509,869
Library	\$3,834,309
Wastewater Plant & Lift Stations (4)	\$4,871,261
Senior Center	\$313,491
Historical Society & Museum	\$401,404
Waterworks	\$2,457,515
Kwahamot Ski Area	\$368,382
Other Parks and Rec.	\$3,595,704
Misc Other	\$3,129,472
Total	\$25,026,986

*includes insured building contents and property in the open.

Source: Local Gov't Property Insurance Statement of Values, 2011 & NCWRPC Est.

Table 9c Value of City Owned Properties Merrill	
Property	Value*
Landfill Site (former)	\$54,849
Airport	\$2,705,807
City Hall/Police	\$9,854,571
Fire Station 1	\$3,637,878
City Garage	\$3,662,041
Library	\$8,422,045
Wastewater Plant	\$17,688,427
Weinbrenner Factory	\$16,584,582
Warehouse	\$2,107,403
Pump Houses (3)	\$507,800
Lift Stations (2)	\$318,932
Merrill Area Rec. Center (MARC)	\$4,920,498
MARC Multipurpose Building	\$5,277,322
Merrill Festival Grounds	\$2,219,246
Other Parks and Rec.	\$2,122,776
Misc Other	\$3,173,204
Total	\$83,257,381

**includes insured building, contents and property in the open.*

Source: Local Gov't Property Insurance Statement of Values, 2017

Table 9d: Value of Town Owned Properties		
Municipality	Property	Value*
Birch town	Town Hall	\$105,000
Bradley town	Town Hall/Community Center	\$435,000
	Other Buildings	\$296,000
	Other Property	\$159,000
Corning town	Town Hall	\$105,000
	Fire Station	\$210,000
Harding town	Town Hall	\$115,000
	Storage Garage	\$14,000
	Outhouse	\$8,000
Harrison town	Town Hall	\$105,000
King town	Town Hall	\$105,000
Merrill town	Variety of properties	\$297,000
Pine River town	Town Hall/Fire Station/Misc.	\$1,659,253
Rock Falls town	Town Hall	\$105,000
Russell town	Town Hall/Fire Station	\$301,000
Schley town	Town Hall / Garage	\$288,783
Scott town	Town Hall	\$105,000
Skanawan town	Town Hall	\$105,000
Somo town	Town Hall	\$105,000
Tomahawk town	Town Hall	\$105,000
Wilson town	Town Hall	\$95,000
	Storage Building	\$10,000
	Storage Building	\$11,000
	Storage Building	\$5,000
<i>*Includes insured buildings, contents and property in the open. Source: Local Government Property Insurance Declarations, 2015 and NCWRPC Estimates, 2017.</i>		

INTRODUCTION

Analyzing the hazards facing a community is an important and vital step in the mitigation planning process. Before mitigation strategies can be determined, a risk assessment must be made. Part III of this Lincoln County All-Hazards Mitigation Plan will focus on the following:

- Identification of all types of natural hazards that can affect Lincoln County
- An analysis of the hazards identified as pertinent to Lincoln County

The hazard analysis will consist of:

- Background information
- History of previous occurrences of hazard events
- An analysis of the County's vulnerability to future events
- An estimate of future probability and potential losses from the hazard

HAZARD IDENTIFICATION

The process of identifying those hazards that should be specifically addressed in the Lincoln County All Hazards Mitigation Plan was based on consideration of a number of factors. The process included a review of past hazard events to determine the probability of future occurrences and threat to human safety and property damage.

Worksheets from the Wisconsin Guide to All-Hazards Mitigation Planning were used by the Planning Taskforce to evaluate and rank the listing of possible hazards to help identify which hazards should be included in the Plan according to threat to human safety and possible damage to property. The Committee reviewed the composite results of this individual scoring exercise and concurred with the results with one exception, earthquake, which was dropped from the list as an anomaly in the scoring. Low magnitude earthquakes do occur in Wisconsin every few years, but none have exceeded a magnitude of 3.9, which would have vibrations similar to the passing of a semi-truck, therefore, earthquakes are not covered in this Plan.

The top hazards were selected and grouped by the Mitigation Planning Committee as follows, in priority order:

1. Tornado
2. Winter Storms/Extreme Cold
3. Thunderstorm/High Wind/Lightning/Hail
4. Drought/Extreme Heat
5. Cyber Attack
6. Flooding/Dam Failure
7. Forest/Wild Fires

This plan focuses on natural hazards that have or could cause disasters that can be mitigated on a local level. Technological or manmade hazards include things like transportation incidents, hazardous material incidents, structure fire, civil disturbances, mass casualty events, war, and terrorism. Lincoln County already has action plans for

these types of events as mandated by Homeland Security requirements, so they are not included in this planning process. Although fog can be an issue, it is not covered directly in this Plan due to a lack of ways to effectively mitigate against it. Lincoln County does not have avalanche, coastal hazard, hurricane, tsunami or volcano issues and conditions for landslide, subsidence or expansive soil problems are not significant in the County.

There was some discussion of the "agricultural" hazard due to the significance of agriculture in the Lincoln County economy. Many "agricultural" hazards are addressed through other hazard categories. Extreme cold, high winds or tornados, flooding, hail and drought can all decimate crops and threaten livestock. In addition, livestock disease outbreak (i.e.: "mad cow" and other diseases) are extensively planned and prepared for by the state's departments of Agriculture, Trade and Consumer Protection (DATCP) and Natural Resources (DNR), so they are not dealt with directly in this Plan to maintain manageability of the mitigation planning activity and also to reduce duplication.

Although a significant concern, human communicable diseases (including epidemic and pandemic situations) are not addressed in the Plan. The Lincoln County Health Department and area hospitals work with the Wisconsin Department of Health Services (WDHS) and the CDC to monitor and plan for these situations.

HAZARD ANALYSIS

The hazard analysis for each hazard included in this plan is broken down into four components, as follows:

1. Background on Hazard - The next step after identifying a hazard is to define the hazard and give some general background behind it. This can include occurrence of hazard within the County or State. This section may also give some indication of the risk to public health and safety and to personal and public property.

2. History of Hazards - Past experiences of disasters is an indication of the potential for future disasters for which Lincoln County would be vulnerable. A review of past occurrences for each identified hazard in Lincoln County was completed.

Some disasters have had damages that exceeded the capabilities of local communities and state agencies. Federal assistance is then requested. Federal assistance may be offered through a variety of programs. Assistance may be directed to agricultural producers, individuals and families, businesses, or local governments. There have been eight natural disasters in Lincoln County, where a Presidential Declaration was requested from 1971-2015. They include the following:

- 1971 Flooding
- 1973 Flooding – Presidential Disaster Declaration

- 1975 Army Worm Infestation
- 1976 Drought – Presidential Disaster Declaration
- 1977 High Winds/Hail – Presidential Disaster Declaration
- 1993 Flooding – Presidential Disaster Declaration
- 2002 Severe Storms/Flooding/Tornado – Presidential Disaster Declaration
- 2011 Tornado

It should be noted that this significantly underestimates the number of hazards that have occurred in Lincoln County. Almost every year there are significant weather events or disasters that cause millions of dollars in damage across the state for which no Federal disaster assistance is requested. Major indicators of hazard severity are the deaths, injuries, and economic losses resulting from natural hazards and disasters.

The National Oceanic and Atmospheric Administration (NOAA) and National Climatic Data Center (NCDC) publish the National Weather Service (NWS) data describing recorded weather events and resulting deaths, injuries, and damages. From January 1, 1950 to December 31, 2015, NCDC reported 349 weather events for Lincoln County.

Note that since the NCDC data is somewhat incomplete, this report focuses on the 10-year period from 2006 through 2015 (137 events). Other sources of data are used to supplement the NCDC data. These sources included other plans, reports, documents from Lincoln County Emergency Management, past local newspaper articles, the Wisconsin Department of Natural Resources, Wisconsin Emergency Management (WEM), and the National Weather Service.

3. Vulnerability Assessment For Hazards - For each hazard identified, a summary of the impact that may be caused to the community is given. When possible, existing buildings, infrastructures, and critical facilities located in the hazard areas are identified. Critical facilities are community buildings that are especially important to the health and welfare of the population following hazard events. Examples of such facilities include hospitals, police & fire stations, town halls, and shelters.

Because this is a multi-jurisdictional plan, FEMA requires that the plan assess each jurisdiction's risks where they vary from the risks facing the entire planning area. This section of the plan will identify variations in vulnerability for specific municipalities where they occur.

4. Future Probability and Potential Dollar Losses for Hazard - The historic data and vulnerability assessment for each hazard is used to project the potential future probability of that hazard occurring in the county and the potential damages in dollars that might be reasonably expected. This section sets the benchmark to mitigate for each hazard.

HAZARD ANALYSIS: TORNADOS**Background on Tornado Hazard:**

A tornado is a relatively short-lived storm composed of an intense rotating column of air, extending from a thunderstorm cloud system. It is nearly always visible as a funnel, although its lower end does not necessarily touch the ground. Average winds in a tornado, although never accurately measured, are between 100 and 200 miles per hour, but some tornados may have winds in excess of 300 miles per hour.

Table 10		
Tornado Wind and Damage Scale		
Tornado Scale	Wind Speeds	Damage
EF0	65 to 85 MPH	Some damage to chimneys, TV antennas, roof shingles, trees, and windows.
EF1	86 to 110 MPH	Automobiles overturned, carports destroyed, trees uprooted
EF2	111 to 135 MPH	Roofs blown off homes, sheds and outbuildings demolished, mobile homes overturned.
EF3	136 to 165 MPH	Exterior walls and roofs blown off homes. Metal buildings collapsed or are severely damaged. Forests and farmland flattened.
EF4	166 to 200 MPH	Few walls, if any, standing in well-built homes. Large steel and concrete missiles thrown far distances.
EF5	OVER 200 MPH	Homes leveled with all debris removed. Schools, motels, and other larger structures have considerable damage with exterior walls and roofs gone. Top stories demolished

Source: National Weather Service

A tornado path averages four miles, but may reach up to 300 miles in length. Widths average 300 to 400 yards, but severe tornados have cut swaths a mile or more in width, or have formed groups of two or three funnels traveling together. On average, tornados move between 25 and 45 miles per hour, but speeds over land of up to 70 miles per

hour have been recorded. Tornadoes rarely last more than a few minutes in one location or 15 to 20 minutes in a ten-mile area.

Tornadoes are classified into six intensity categories, EF0-EF5, see Table 10. This scale is an updated or "enhanced" version of the Fujita Tornado Scale (or "F Scale"). The scale estimates wind speeds within tornadoes based upon the damage done to buildings and structures. It is used by the National Weather Service in investigating tornadoes and by engineers in correlating building design standards against anticipated damage caused by different wind speeds.

Wisconsin lies along the northern edge of the nation's maximum frequency belt for tornadoes, known as "Tornado Alley". Tornado Alley extends northeast from Oklahoma into Iowa and then across to Michigan and Ohio. Winter, spring and fall tornadoes are more likely to occur in southern Wisconsin than in northern counties. Tornadoes have occurred in Wisconsin every month except February.

History of Tornadoes in Lincoln County:

The most recent (within the 2006 to 2015 study period) tornado event occurred on July 9, 2013. Thunderstorms formed along a weak boundary and produced several funnel clouds and four weak tornadoes. Damage by the tornadoes was minimal, affecting mainly wooded areas and open fields. One of the tornadoes touched down about six miles south of Irma and moved east for about 4 miles. A few trees and power lines were knocked down. Average path width was 75 yards.

Many in the Merrill area are still feeling the effects of the April 10, 2011 tornado. Wind speeds reached 140 mph, placing the tornado in the EF3 category. A number of people were injured and total damages were cited around \$11 million, however, it did not qualify for Federal disaster assistance. Several businesses in the Merrill Industrial Park were heavily damaged and numerous residences in the Town of Merrill were destroyed. Costs for debris removal, law enforcement and road repairs was approximately \$450,000 and was partly covered by the Wisconsin Disaster Fund.

Including these 2 events, Lincoln County has had 23 verified tornadoes from 1950 to 2015, with 2 since 2006 (Table 11). In addition, there have been five reported funnel clouds since 2005 which are not included in these statistics. The most recent of these funnel cloud reports came on September 19, 2012 when a funnel cloud was spotted over Tomahawk. Thunderstorms developed ahead of a cold front and a strong upper level system. Some of the storms produced large hail, damaging winds, and funnel clouds, including the one over Tomahawk. Another interesting report came on April 11, 2010 when a "dust devil" was reported to have caused about \$600 damage at a residence in Gilbert just south of Tomahawk.

On July 11, 2004. Clusters of thunderstorms moved across north-central Wisconsin during the late afternoon and early evening. A strong upper atmospheric disturbance enhanced rotation in the storms and several funnel clouds developed in Lincoln and surrounding areas. Some of the funnels touched down as tornadoes, including a pair of

tornadoes simultaneously west of the Tomahawk Airport. Two other tornadoes were spotted in Lincoln County; one near Irma and another west of Tomahawk.

A more severe event occurred on September 30, 2002, when a F2 tornado touched down for 3 miles uprooting and snapping off thousands of trees in its path. A house in the path also sustained major structural damage, all of the outbuildings on the property were demolished, and a camping trailer was crushed after being thrown 300 feet. A car was also thrown into a tree, resting 15 feet above the ground and two barns were also destroyed. The total estimated damage accounted for was roughly \$75,000. The storms also knocked out power to around 3,000 customers in the Tomahawk area and about 600 customers in the Rhinelander and Crandon areas. This tornado, combined with other tornados, storm damage and flooding across 19 counties, including Lincoln, resulted in a disaster declaration.

Table 11 Reported Tornadoes in Lincoln County							
DATE	TIME	LOCATION	LENGTH (miles)	WIDTH (yards)	DEATHS	INJURIES	F-SCALE
7/9/2013	1359 CST	Irma	4.1	100	0	0	EF0
4/10/2011	1710 CST	T. Merrill	20	1,050	0	3	EF3
7/11/2004	1640 CST	T. Wilson	0.1	10	0	0	F0
7/11/2004	1613 CST	T. Wilson	0.1	10	0	0	F0
7/11/2004	1613 CST	T. Wilson	0.1	10	0	0	F0
7/11/2004	1545 CST	Irma	0.1	10	0	0	F0
9/30/2002	1830 CST	T. Tomahawk	3	250	0	0	F2
7/30/2002	1825 CST	T. Merrill	0.1	25	0	0	F0
7/30/2002	1808 CST	T. Merrill	9	200	0	0	F0
7/30/2002	1747 CST	T. Merrill	1	150	0	0	F0
4/18/2002	1549 CST	T. Bradley	0.1	25	0	0	F0
5/5/1999	1630 CST	T. Tomahawk	0.1	25	0	0	F0
3/29/1998	1928 CST	T. Tomahawk	5	75	0	0	F0
7/16/1997	1438 CST	T. Merrill	1	100	0	0	F2
7/18/1996	1620 CST	T. Tomahawk	3	100	0	0	F1
6/14/1991	1155 CDT	T. Harding	1	50	0	0	F1
6/16/1979	1540 CST	T. Skanawan	N/A	N/A	0	0	F1
6/16/1979	1530 CST	T. Skanawan	N/A	N/A	0	0	F1
6/13/1976	2045 CST	T. Pine River	6	50	0	0	F1
7/24/1962	1700 CST	T. Corning	1	50	0	0	F2
9/3/1961	1700 CST	T. Corning	1	33	0	0	F1
6/30/1958	1730 CST	T. Russell	2	50	0	0	F2
5/3/1955	1800 CST	T. Rock Falls	7	33	0	2	F1

Source: National Climatic Data Center

Insert Map 8 Tornado Vulnerability

To reduce file size for ease of emailing and downloading, the maps are omitted from this draft. To view the maps go to www.ncwrpc.org/lincoln/lincolnhzdplan/index.html

On July 30, 2002, two months before the F2 tornado, three of four confirmed F0 tornados touched down in Lincoln County and the other touched down in Marathon County. The damage from these three tornados totaled \$105,000 destroying a barn and an outbuilding, tearing roofs off numerous buildings, and moving others off of their foundations. The tornados also demolished a mobile home and snapped many trees and tree limbs.

Out of the tornados reported in Lincoln County, none claimed a life and the May 3, 1955 tornado was the only one in addition to 2011 to have noted injuries, however several others have caused significant damages. The July 16, 1997, F2 tornado touched down in the Town of Pine River and damaged several homes, vehicles, and silos, and it destroyed several barns, sheds, and crops with total damage estimated at \$525,000.

Tornado Vulnerability Assessment:

Though Lincoln County is mostly a rural county, there are concentrations of population scattered throughout the County. Subdivisions, rural unincorporated communities, and the cities of Merrill and Tomahawk can be regarded as more vulnerable because tornados pose more of a threat to human safety and property damage in more concentrated areas, see Map 8.

Mobile homes are of significant concern in assessing the hazard risks from tornados, since they comprise about 7 percent of Lincoln County's housing units. In general, it is much easier for a tornado to damage and destroy a mobile home than a standard site-built home. Research by the NWS shows that 40 percent of all deaths in the nation from tornados were in mobile homes; compared to 29 percent in permanent homes, and 11 percent in vehicles.

While mobile homes are scattered throughout the County, many are concentrated in mobile home parks. Lincoln County has approximately 11 mobile home parks, see Map 8 for locations. Within these park sites, there are approximately 398 individual sites. The largest is located in the City of Merrill with about 140 sites (although it appears that 84 of the sites are empty at the time of this writing). The second largest is just north of the City in the Town of Merrill with about 77 sites. The total number of mobile homes reported in the 2012 American Community Survey (Census) reported for Lincoln County was 1,229.

Besides mobile homes, campground patrons are vulnerable to tornados because there usually is little shelter provided. Treehaven is the University of Wisconsin – Stevens Point field station where summer environmental classes are taught, and about 130 students and staff reside from May – August. Lincoln Hills School is a Type 1 Secured Juvenile Correctional Facility, where an average daily budgeted population of 345 are housed. Tornado shelters are provided onsite at both Treehaven and Lincoln Hills School.

The following is a list of things that may be affected by a tornado. Much of this list can be referenced in Part II.

- Community facilities – hospitals, schools, jails
- Public Service – police and fire departments
- Utilities – power lines, telephone lines, radio communication
- Transportation – debris clean-up, sign damage
- Residential – nursing homes, mobile homes/parks, garages, trees and limbs, roofing, siding, windows
- Businesses – signs, windows, siding, billboards
- Agricultural – buildings, crops, livestock

Based on review of the historic events of tornados, there are no specific areas in the county that have unusual risk of occurrence. The events are a countywide concern. General vulnerability by geographic area (local unit of government) is identified in Map 8. However, in their mitigation survey results, Town of Merrill identified tornado as a top vulnerability concern based on their past experience and having two LP suppliers and two mobile home parks in the Town. The City of Merrill, also heavily impacted by the 2011 tornado, echoed its neighboring towns concern regarding tornado vulnerability.

Future Probability and Potential Dollar Losses – Tornados:

Based on the historic data presented here (frequency of past events - 2006 to 2015), Lincoln County can expect a tornado about once every 5 years on average. This equates to a probability of 0.20 or about a 20 percent chance in a given year. Table 12 indicates the probability of tornados of a specific magnitude. However, these probabilities are slightly skewed by multiple tornado events, 3 on July 30, 2002 and 4 on July 11, 2004. The County did not experience a tornado between 2004 and 2011.

Table 12						
Probability of Intensity for any given Tornado in Lincoln County						
Tornado Scale	F0	F1	F2	F3	F4	F5
Number of Reported Tornados*	11	7	4	1	0	0
Probability of Occurrence	48%	30%	17%	4%	<1.0%	<1.0%

Source: National Weather Service & NCWRPC – *Based on historical data from 1955 through 2015.

Historic data is again used to estimate potential future dollar losses due to a tornado. Estimated damages resulting from various tornados in Lincoln County range from \$0 to \$11 million, including the 2011 event. On average, Lincoln County might expect damages of \$572,818 per tornado, however, only one of the 23 historic tornados, in addition to the 2011 event, resulted in damages exceeding \$500,000, four others had \$250,000, and the rest were \$100,000 or less. Over the next ten-year period, tornado losses in Lincoln County could approach \$1,145,636.

HAZARD ANALYSIS: WINTER STORMS / EXTREME COLD**Background on Winter Storms/Extreme Cold Hazard:**

A variety of weather phenomena and conditions can occur during winter storms. For clarification, the following are National Weather Service approved descriptions of winter storm elements:

Heavy snowfall – the accumulation of six or more inches of snow in a 12-hour period or eight or more inches in a 24-hour period.

Blizzard – the occurrence of sustained wind speeds in excess of 35 miles per hour accompanied by heavy snowfall or large amounts of blowing or drifting snow.

Ice Storm – an occurrence where rain falls from warmer upper layers of the atmosphere to the colder ground, freezing upon contact with the ground and exposed objects near the ground.

Freezing drizzle/freezing rain – the effect of drizzle or rain freezing upon impact on objects that have a temperature of 32 degrees Fahrenheit or below.

Sleet – solid grains or pellets of ice formed by the freezing of raindrops or the refreezing of largely melted snowflakes. This ice does not cling to surfaces.

Wind chill – an apparent temperature that describes the combined effect of wind and low air temperatures on exposed skin.

Winter storms can vary in size and strength and include heavy snowfall, blizzards, ice storms, freezing drizzle/freezing rain, sleet, wind chill, and blowing and drifting snow conditions. Extremely cold temperatures accompanied by strong winds can result in wind chills that cause bodily injury such as frostbite and death.

True blizzards are rare in Wisconsin. They are more likely to occur in the northwestern part of the state than in south-central Wisconsin, even though heavy snowfalls are more frequent in the southeast. However, blizzard-like conditions often exist during heavy snowstorms when gusty winds cause the severe blowing and drifting of snow. Heavy snow and ice have been part of nearly every winter in Lincoln County.

Dangerously cold conditions can be the result of the combination of cold temperatures and high winds. The combination of cold temperatures and high wind creates a perceived temperature known as "wind chill". Wind chill is the apparent temperature that describes the combined effect of wind and air temperatures on exposed skin. When wind blows across the skin, it removes the insulating layer of warm air adjacent to the skin. When all factors are the same, the faster the wind blows the greater the heat loss, which results in a colder feeling. As winds increase, heat is carried away from the body at a faster rate, driving down both the skin temperature and eventually the internal body temperature.

The National Weather Service issues wind chill advisories when wind chill readings of -20 to -34 degrees are expected. Wind chill warnings are issued when wind chill values are expected at or below -35 degrees. Extreme cold events are most likely during the months of January and February.

History of Winter Storms/Extreme Cold in Lincoln County:

The NCDC has reported 21 significant winter storm events for Lincoln County between 2006 and 2015. All of these storms contained some form of snow, sleet, freezing rain, or ice conditions.

The most recent (within the 2006 to 2015 study period) winter storm event occurred on November 10, 2014 when a complex storm system affected the region, bringing a swath of heavy snow to parts of northern Wisconsin. The main storm hit in two phases. The first phase was in the form of a long west to east band of snow which set up across Minnesota and northern Wisconsin early on November 10th. Low pressure then moved across far southern Wisconsin and produced another round of snow late on November 10th and into the 11th across central and northern Wisconsin. In addition to the long-duration storm, additional lake effect snow from Lake Superior pushed totals over 20 inches in some locations in the snowbelt. The highest reported snowfall total was 23.7 inches at Lac du Flambeau in Vilas County. Storm total snowfall of 10.9 inches was measured 8 miles west of Merrill, and at Rice Reservoir, near Bradley.

Noteable snowfall is attributed to the winter storm event on March 22, 2011. A low pressure system that moved across northern Illinois from Iowa received plenty of moisture from the Gulf of Mexico. This abundant moisture allowed the late-season storm to produce significant heavy, wet snow and some thundersnow across parts of central and northeast Wisconsin on March 22nd-23rd. During the two-day period, many locations received more than a foot of snow. Lightning from the storm destroyed a house in Marathon County. The high water content of the snow caused more problems than would normally be expected with storms having similar snowfall totals. Some of the highest snowfall totals from across the area included 18.8 inches in Shawano County and 18.0 inches at Irma. The 17.8 inches of snow that fell in Green Bay was the most from a single storm in more than 120 years. It was also the third highest storm total since Green Bay weather records began in 1886.

The National Weather Service has classified the December 11, 2010 snowstorm as a blizzard. In Merrill, 14.7 inches of snow fell with winds gusting up to 40 mph between December 11 and 12, causing numerous cancellations and rescheduling. The snow developed as low pressure moved from Wyoming to Lake Michigan. The pressure difference between an arctic high over southern Canada and the low pressure storm system generated strong winds resulting in severe blowing snow and blizzard conditions across the State. The Governor declared a state of emergency in all 72 counties and the state's Emergency Operations Center was activated. The State Patrol advised against traveling as it was difficult to keep the blowing and drifting snow off the highways. There were numerous slide-offs and accidents across the state including 9

slide-offs and 3 other crashes reported by the Lincoln County Sheriff's Office, although no injuries were noted. Frigid temperatures followed the storm with actual air temps dropping to -23 degrees.

On December 8, 2009 heavy snow developed as low pressure rapidly deepened as it moved into Lake Michigan. Strong winds generated by the deepening low created blowing snow and near blizzard conditions on the morning of the 9th across northeast Wisconsin. During the height of the snow, lightning and thunder were reported in central Wisconsin. Snow fall totals ranged from 8 to 16 inches across northern, central and east-central Wisconsin.

On December 23, 2007, a low pressure system over Missouri rapidly intensified as it moved into eastern Wisconsin during the early morning hours. Precipitation associated with the system began in the form of rain and then rapidly changed to snow as winds circulating around the low brought much colder air into the area. Heavy snow fell, and combined with west winds gusting over 40 mph to produce near blizzard conditions across much of the region. Six-foot high snow drifts made some roads impassible in central Wisconsin where over a foot of new snow fell. The highest reported snowfall total was 18.2 inches in Wood County while 14.3 inches was reported at Merrill.

On December 22, 2006, rain quickly turned to snow as an upper low pressure system moved across Wisconsin. The snow caused roads to become slippery and hundreds of vehicle accidents were reported. Heavy, wet snow stuck to power lines and tree branches causing them to snap under its weight. The downed tree limbs and power lines knocked out electricity to more than 30,000 customers, between Stevens Point and Rhinelander, including Merrill and parts of Lincoln County. About 11,000 customers were still without electricity on the morning of the 24th.

On November 10, 2006, 8 to 16 inches of snow fell from west-central into north-central Wisconsin as a low pressure system moved across the region. There were reports of more than 220 accidents on slick roads in Marathon and Lincoln counties. One of the accidents involved a logging truck that dumped part of its load onto U.S. Highway 51 in Lincoln County, snarling traffic for several hours. Two minor injuries were reported in Lincoln County accidents. Merrill recorded 12.0 inches of snowfall. The snow fell at a rate of 1 to 2 inches per hour at the height of the storm.

From the NCDC, 7 extreme cold temperature events have affected Lincoln County from 2006 to 2015. The most recent was on January 5, 2015. Temperatures in the 12 below to 22 below zero range combined with west winds of 10 to 20 mph to produce dangerous wind chills during the night of January 4th and the morning of the 5th. These dangerous wind chills were mainly across parts of central and north central Wisconsin. The wind chill dropped as low as 35 below zero at Merrill.

On January 27, 2014, high pressure over the Plains and upper level flow from the Canadian Plains brought extremely cold temperatures and wind chills to the area. Temperatures fell to lows in the 15 below to 28 below zero range. West winds of 10 to

20 mph combined with the frigid air to produce wind chills in the 35 below to 45 below zero range. The coldest temperature recorded in Lincoln County was 23 degrees below zero at Merrill with wind chills as low as 40 below zero.

On January 6, 2014, a bitterly cold arctic air mass, the coldest to impact the region in years, spread across the area following the passage of a cold front. Temperatures fell to lows in the 16 below to 32 below zero range. The cold temperatures, combined with west winds of 10 to 20 mph, produced wind chills in the 40 below to 55 below zero range. The coldest recorded temperature in Lincoln County was 30 degrees below zero at Tomahawk with wind chills as low as 51 below zero.

An extended cold streak occurred in February of 1996 when a frigid arctic air mass became entrenched across central and northeast Wisconsin. Actual temperatures remained below zero for more than 130 hours straight and dropped to 45 below at Harrison. The extreme cold temps combined with west winds of 10 to 15 mph produced wind chills from 50 to 70 below zero on February 2. The cold weather was responsible for many school closures, stalled vehicles, frozen pipes, and broken water lines, as well as, electrical and phone outages resulted from snapped lines. All outdoor events at the Badger State Games had to be canceled and ski hills were closed.

Winter Storms/Extreme Cold Vulnerability Assessment:

Winter storms and extreme cold present a serious threat to the health and safety of affected citizens and can result in significant damage to property. Heavy snow or accumulated ice can cause the structural collapse of buildings, down power lines, motor vehicle accidents, or isolate people from assistance or services. Extreme cold includes the risk of frostbite and hypothermia.

The following is a list of things that may be adversely affected by a winter storm or extreme cold. Much of these community assets can be referenced in Part II:

- Infrastructure – operation of emergency services, operation of public facilities and schools
- Utilities – down power and telephone lines
- LP Gas at residences freezing in temps below -40 degrees
- Septic systems - freezing
- Transportation – automobile accidents, roadway plowing, salting/sanding
- Residential – roofs
- Businesses –commerce
- Agricultural – livestock, frost or snow damage to crops

Based in review of the historic events of winter storms and extreme cold, there are no specific areas in the county that have an unusually high risk. The risk for winter storms and extreme cold is relatively uniform and a county-wide concern. However, in their mitigation survey results, the Towns of Birch and Corning identified winter storms as a top vulnerability concern, citing downed powerlines and blocked roads as problems in their heavily wooded areas.

Future Probability and Potential Dollar Losses – Winter Storms/Extreme Cold:

Based on historical frequency, Lincoln County can expect 2.1 major winter storm events per year on average. In other words the probability is 1.00 or a 100% chance in a given year.

For extreme cold temperatures, based on historical frequency, Lincoln County can expect an occurrence about every 1.4 years on average for a probability of 0.7 or a 70% chance in a given year. However, since extreme cold temperatures often accompany winter storms, a probability of 100% chance in a given year cannot be ruled out.

Estimating potential future losses for winter storms is difficult. Damages and losses are typically widespread. Auto accidents and additional snow removal time are typical impacts of winter storms, and such claims are not aggregated or tracked for monetary damage. Winter storms do have the potential to be extremely destructive, particularly in the case of ice storms. Potential future losses per incident might range from \$5,000 to \$2 million based on experiences from other counties.

HAZARD ANALYSIS: SEVERE THUNDERSTORM / HIGH WIND / HAIL / LIGHTNING**Background on Severe Thunderstorm Hazard:**

The National Weather Service definition of a *severe thunderstorm* is a thunderstorm event that produces any of the following: downbursts with winds of 58 miles per hour or greater (often with gusts of 74 miles per hour or greater), hail 1 inch in diameter or greater, or a tornado. Strong winds, hail, and lightning will be addressed in this section; however, tornadoes are referenced as a separate hazard due to their unique severity.

Lightning results from discharge of energy between positive and negative areas separated by rising and falling air within a thunderstorm. This discharge heats the surrounding air to 50,000 degrees. Hail results as the warm rising air cools, forming ice crystals which are held by the updrafts until accumulating enough weight to fall. The hail size depends on strength of the updrafts keeping it up.

Thunderstorm frequency is measured in terms of incidence of thunderstorm days or days on which thunderstorms are observed. Wisconsin averages between 30 and 50 thunderstorm days per year depending on location. A given county may experience ten or more thunderstorm days per year. The southwestern area of the state normally has more thunderstorms than the rest of the state.

History of Severe Thunderstorms in Lincoln County:

The NCDC has reported 35 severe thunderstorm events for Lincoln County between 2006 and 2015. These storms typically contain some form of heavy rain and strong winds. About 15 significant hail events, typically related to a severe thunderstorm were listed during this time period, however, there were no notable lightning incidents identified. In 1977, one of the five Presidential Disaster Declarations (since 1971) for

Lincoln County was associated with severe storms with high winds and hail being the primary cause of damages.

The most recent (within the 2006 to 2015 study period) thunderstorm event occurred on September 4, 2014. Thunderstorms formed north of a warm front and propagated east across northern Wisconsin. The storms produced wind gusts in excess of 60 mph, large hail, and heavy rainfall. The high winds caused scattered tree damage in Merrill. Quarter size hail fell in Harrison.

On June 26, 2013, an upper level disturbance triggered thunderstorms that moved across central and north central Wisconsin. The storms produced isolated severe weather across the area, including large hail, wind damage and heavy rainfall. The heavy rain in and around Merrill caused some street flooding with 1.77 inches of rain recorded with a 1-hour period at the Merrill Airport. High winds knocked trees onto power lines and a house. Reported hail ranged from nickel to quarter size at Merrill and Tomahawk.

On July 27, 2010, following an earlier strong thunderstorm on July 14. A cold front combined with a warm and humid air mass triggering thunderstorms that moved northeast Wisconsin. The storms produced hail to golf ball size, wind gusts to 95 mph, funnel clouds and heavy rainfall that led to flash flooding in some areas. Numerous trees and power lines were downed with power outages around Merrill. Winds were estimated at 60 mph at the intersection of County J and I-39.

One person was injured on April 23, 2001 when a mobile home was flipped on its side by thunderstorm winds 5 miles northeast of Tomahawk. This storm also downed more than 100 trees near Alice Lake. Two cottages were destroyed and six others were damaged when trees landed on them.

The most recent hail event noted by NCDC occurred on August 2, 2015. A thunderstorm that rapidly intensified over central Wisconsin dropped large hail, up to two inches in diameter, in and around Merrill as it moved across southern Lincoln County. Hail completely covered the ground in some locations. Penny size hail was reported southeast of Merrill, half dollar size hail was reported at the intersection of Highways 64 and 51, and golf ball size hail was reported west of Merrill.

Softball size hail fell near Highway 86 and County D near Tomahawk during a widespread hail event on April 25, 2008.

Lightning struck and burned a vacant house near Tomahawk on September 25, 1998. A lightning strike punched a hole in the roof and significantly damaged the electrical system of a home 3 miles northwest of Merrill on September 10, 1996. In May 1996, lightning started a fire that destroyed a home 3 miles southeast of Merrill. Damage was estimated at \$150,000.

Severe Thunderstorm Vulnerability Assessment:

The National Weather Service can forecast and track a line of thunderstorms that may be likely to produce severe high winds, hail, and lightening, but where these related hazards form or touch down and how powerful they might be remains unpredictable. The distribution of thunderstorms and related hazard events have been widely scattered throughout the County.

Many thunderstorm events (without tornadoes) have caused substantial property and infrastructure damage, and have the potential to cause future damage. In order to assess the vulnerability of the Lincoln County area to thunderstorms and related storm hazards, a review of the past events indicate significant impacts to:

- Infrastructure – hospitals, schools, street signs, police and fire departments
- Utilities – electric lines/poles/transformers, telephone lines, radio communication
- Transportation – debris clean-up
- Residential – mobile homes, garages, trees and limbs, siding, & windows
- Businesses – signs, windows, siding, & billboards
- Agricultural – buildings, crops, & livestock
- Vehicles – campers, boats, windshields, body, & paint

Based on review of the historic patterns of thunderstorms associated with high wind, hail, or lightening, there are no specific municipalities that have unusual risks. The events are relatively uniform and a countywide concern. However, in their mitigation survey results, the Towns of Birch and Skanawan identified high winds as a top vulnerability concern, citing downed powerlines and blocked roads as problems in their heavily wooded areas.

Future Probability and Potential Dollar Losses – Severe Thunderstorms:

Based on historical frequency, Lincoln County can expect 3.5 thunderstorm events per year on average. In other words, the probability is 1.0 or a 100% chance of multiple storms in a given year. The probability of a thunderstorm with damaging hail in Lincoln County is also at 1.0 or 100% chance with about 1.5 incidents in a given year. There was insufficient data to determine the probability of a significant lightning event in a given year.

According to the NCDRC, historic thunderstorm events with associated high wind averaged \$10,000 in damage per incident. There was insufficient data to calculate average hail or lightning damages. Losses in Lincoln County associated with severe thunderstorms could approach \$350,000 over the next ten-year period.

HAZARD ANALYSIS: DROUGHT / EXTREME HEAT**Background on Drought / Extreme Heat Hazard:**

A drought is an extended period of unusually dry weather, which may be accompanied by extreme heat (temperatures which are 10 or more degrees above the normal high

temperature for the period). There are basically two types of drought in Wisconsin: agricultural and hydrologic. Agricultural drought is a dry period of sufficient length and intensity that markedly reduces crop yields. Hydrologic drought is a dry period of sufficient length and intensity to affect lake and stream levels and the height of the groundwater table. These two types of drought may, but do not necessarily, occur at the same time.

Droughts, both agricultural and hydrologic, are relatively common in the state. Small droughts of shortened duration have occurred at an interval of about every ten years since the 1930's.

Extended periods of warm, humid weather can create significant risks for people, particularly the elderly who may lack air conditioning or proper insulation or ventilation in their homes. Animals are also at risk during extended periods of heat and humidity. The National Weather Service issues a Heat Advisory when the Heat Index ranges from 105 to 114 degrees daytime and remains at or above 80 degrees at night, during a 24-hour period. The heat index combines the effects of heat and humidity to better reflect the risk of warm weather to people and animals. When heat and humidity combine to reduce the amount of evaporation of sweat from the body, outdoor activity becomes dangerous even for those in good shape. The index measures the apparent temperature in the shade. People exposed to the sun would experience an even higher apparent temperature. A heat index of 105 is considered dangerous and prolonged exposure can result in heat stroke, exhaustion and cramps. People should be reminded to use extreme caution when the heat index is between 95 and 105. A heat index of 95 occurs when the temperature is 90 degrees and the relative humidity is 50 percent.

History of Drought / Extreme Heat in Lincoln County:

NCDC reports indicate that much of Wisconsin including Lincoln County was under drought conditions between 2004 and 2013. At one point, the Governor had declared a state of emergency to get assistance to the state's agricultural sectors. The extended dry conditions posed serious challenges for farmers from drought stressed crops to issues providing feed for livestock.

Beginning in 2013, improved rainfall across the Midwest gradually relieved the drought in Wisconsin. Nationally, however, what is being tagged as the 2012-2015 North American Drought has affected over 80% of the U.S. as well as parts of Canada and Mexico, and drought continues to affect parts of the country. This drought is on track to exceed the 1988-89 drought, which also affected Wisconsin (to a lesser extent in Lincoln), as the costliest natural disaster in U.S. history.

Lincoln County was one of 64 counties that were included in a Presidential Emergency Declaration for the drought of 1976-1977. Statewide agricultural losses during this drought were set at \$624 million. A number of wells in the County went dry and financial assistance was needed to drill new ones. Federal assistance totaled only 19% of losses attributed to the drought.

Despite all this drought, there are no incidences of extreme heat listed by the NCDC for Lincoln County between 2006 and 2015. The last excessive heat event reported by the NCDC was in 1999 when consecutive days of high temperature between July 23 and July 31 combined with high humidity levels resulted in numerous heat related illnesses. The heat caused some roads to buckle.

Drought / Extreme Heat Vulnerability Assessment:

Droughts can have a dramatic effect on the farms and other agricultural activities as well as forestry enterprises located throughout Lincoln County. With forestry and agriculture being important sectors of the County's economy, droughts can have disastrous effects. Even small droughts of limited duration can significantly reduce crop growth and yields, adversely affecting farm income. More substantial events can decimate croplands and result in total loss, hurting the local economy.

Irrigation can negatively impact the environment by drawing water that naturally goes to aquifers and surface water. Drought can exacerbate the problem when high withdrawal rates versus little precipitation deplete waterbodies and aquifer supplies, therefore decreasing drinking water supplies, drying streams, and hindering aquatic and terrestrial wildlife. During severe droughts, some wells - mainly private wells - will go dry.

Another significant area of impact from drought includes the tourism sector of the economy. As water levels go down, there is less tourism seen in the County. The past drought conditions reduced water levels on many lakes and streams across the County.

Droughts can trigger other natural and man-made hazards as well. They greatly increase the risk of forest fires and wildfires because of extreme dryness. In addition, the loss of vegetation in the absence of sufficient water can result in flooding, even from average rainfall, following drought conditions.

The following is a list of things that may be adversely affected by a drought. Much of these community assets can be referenced in Part II.

- Infrastructure – municipal water supplies
- Surface water – groundwater reserves, recreation, and wildlife
- Forests - forest products
- Agricultural - crops, livestock

The areas most susceptible to drought conditions would be agricultural towns. Agricultural land is scattered throughout the County but is more concentrated in the southern and eastern parts of the County, see Map 2. In their mitigation survey results the Towns of Tomahawk and Skanawan identified drought as a top vulnerability concern primarily due to the increased risk of wildfire in their heavily wooded areas.

According to the Wisconsin Emergency Management, excessive heat has become the most deadly hazard in Wisconsin in recent times. Extreme heat can happen anywhere within Lincoln County affecting everyone, however the elderly and young are the ones

with the highest risk of getting heat related injuries, which can lead to death. Ways to prevent injuries include wearing light-colored clothing, drink plenty of water, slow down, and do not stay in the sun for too long.

Future Probability and Potential Dollar Losses – Drought/Extreme Heat:

Based on the historic data presented here (frequency of past events), Lincoln County can expect a drought every ten years on average, which is a probability of 0.10 or a 10 percent chance in a given year. Significant severe drought is somewhat less common, affecting Wisconsin once about every 15 years.

Drought is another hazard lacking good loss figures at the county level. However, a look at aggregate data from two previous major droughts for which figures are available can give some indication of potential impact. Those droughts resulted in losses of \$9.6 million (1976-77) to \$18 million (1987-88) per affected county in Wisconsin on average.

Normally, central Wisconsin is known for its cold winters, however, extreme heat waves will affect Lincoln County in the future. There was insufficient data available to determine the probability of a significant extreme heat event in a given year.

HAZARD ANALYSIS: CYBER ATTACK**Background on Cyber Attack Hazard:**

A vast array of networks form the foundation of our means to communicate and travel, power our homes, run our economy, and provide government services. Yet, cyber-attacks have increased dramatically in the United States over the last decade, exposing sensitive personal and business information, disrupting critical operations, and imposing high costs on the economy.

A cyber-attack is the actual or potential disruption of government information systems. Information technology systems are connected in networks or through the Internet, and thus are at risk of cyber-attack. An attack may be a deliberate effort to gain access to the system or processes; or it may be the result of a randomly initiated threat, such as a worm or virus. Unlike physical threats that prompt immediate action, cyber threats are often difficult to identify and comprehend. Among these dangers are viruses erasing entire systems, intruders breaking into systems and altering files, or intruders stealing confidential information.

Cyber-attack may result in the loss of confidence in the government's ability to protect citizens. However, the support services performed in the aftermath of an event can rebuild the reputation of the government's ability to provide services to the people in time of need.

With the extensiveness of information technology (IT) and cyber networks in nearly all parts of society, effectively securing critical infrastructure requires investments in network resiliency as well as cyber infrastructure protection. As all levels of government

now rely on cyber networks and assets to provide public safety and economic prosperity, their operations depend on information systems that are maintained, protected, and secured from exploitation and attack.

History of Cyber Attack in Lincoln County:

Cyber-attacks have increased throughout the world and are a major issue due to the increasing reliance on computers and networked technology. The probability of Lincoln County experiencing cyber-attacks is based on the increase of cyber-attacks throughout the country.

In Lincoln County's experience with firewalls and network security appliances, they are under continuous hacking attacks. So far, however, they have had viruses but not any hacking breaches. Lincoln County conforms as best it can to industry standards, utilizing products and vendors who specialize in these areas.

Other counties in the area have experienced viruses that resulted in loss of data from Department file servers including documents, pictures, pdf files, etc. Databases have had to be rebuilt. Denial of service issues have occasionally been a problem in the past. Denial of Service attacks are designed to overload a network with useless traffic preventing legitimate users access and crashing the system.

Cyber Attack Vulnerability Assessment:

The impact of a cyber-attack on property, facilities, and infrastructure is dependent on the type of event and the location in which it occurs. Cyber-attacks, in all probability, will have limited effect on buildings, properties, or infrastructure, but may severely affect the transportation of goods and services to and from critical facilities. Infrastructure damage or interruption of power to communication services could have a substantial impact; but effects are minimized through thorough planning on the part of the utility and its determination to resume critical services. Economic and financial systems could potentially be significantly impacted, depending on the scope, breadth, and success of the cyber-attack.

All government and personal computers and networks within Lincoln County are susceptible to cyber-attack. The County has 840 computers and 70 servers comprising its network. Attention must be given to security education and awareness, so we do not place too much faith in technology's ability to protect data. Inadequate security awareness can facilitate access to critical computer systems, making them vulnerable to attacks. Secure off-site back up is critical for reestablishing operations if a serious cyber-attack does occur. The County does maintain off-site back up of its computer data, and is looking at updating the back-up system. The City of Merrill also maintains off-site back-up of critical data and has set up the ability to continue government operations from the Fire Department in the event something happens to City Hall.

Cyber-attacks may last from minutes to days depending upon the type of intrusion, disruption, or infection. Generally, no direct effects are felt by the built environment, but secondary effects may occur depending upon the system being attacked. Denial of

service attacks can cripple all or part of a county computer system and are hard to protect against. The County is planning fail safes against denial of service type attacks.

The spectrum of cyber risks is limitless, and serious threats can have wide-ranging effects. Transportation, power, and other services may be disrupted by large scale cyber-attacks. The extent of the disruption is highly uncertain, as it will be determined by many unknown factors such as the target and size of the incident. Vulnerability to data breach and loss increases if a network is compromised. Information about citizens and employees can be at risk.

Future Probability and Potential Dollar Losses – Cyber Attack:

Although there is currently insufficient data to determine an accurate probability, the data suggests that the percentage chance of a serious cyber-attack on Lincoln County in any given year is estimated to be 20 percent.

The threat of cyber-attack has been identified as a significant and growing threat to Lincoln County. The level of success or damage will vary greatly. Intrusion detection systems log attack attempts almost every day. There are constant probes by individuals and groups with intent to cause anything from total system shutdown to simply “seeing if they can do it.”

No accurate method of estimating potential losses related to cyber-attack is available at this time for Lincoln County; however this will be monitored and reviewed for the next plan update.

HAZARD ANALYSIS: FLOODING/DAM FAILURE

Background on Flood/Dam Failure Hazard:

There are a variety of classifications for flooding including coastal, dam failure, flash, lake, riverine, stormwater and urban/small stream. Lincoln County has the potential for all these types except coastal. The following descriptions of the types of flooding are compiled from various FEMA and other notable hazard planning sources:

Coastal – Different from other types of flooding which relate to movement of water through a watershed, coastal flooding is due to the effect of severe storm systems on tides resulting in a storm surge. Primarily known as an ocean-based event, the Great Lakes coastal areas can also be affected.

Dam Failure – More of a technology related hazard than a natural hazard, various factors can result in the failure of the structural technology that is a dam, thus causing flooding of areas downstream of the dam often similar in effect to flash flooding.

Flash – Involves a rapid rise in water level moving at high velocity with large amounts of debris which can lead to damage including tearing out of trees, undermining buildings and bridges, and scouring new channels. Dam failure, ice jams and obstruction of the

waterway can also lead to flash flooding. Urban /built-up areas are increasingly subject to flash flooding due to removal of vegetation, covering of ground with impermeable surfaces and construction of drainage systems.

Lake – Prolonged wet weather patterns can induce water-level rises that threaten lakeshore areas.

Riverine – Also known as overbank flooding, this is the most common type of flooding event. The amount of flooding is a function of the size and topography of the watershed, the regional climate, soil and land use characteristics. In steep valleys, flooding is usually rapid and deep, but of short duration, while flooding in flat areas is typically slow, relatively shallow, and may last for long periods.

The cause of flooding in rivers is typically prolonged periods of rainfall from weather systems covering large areas. These systems may saturate the ground and overload the streams and reservoirs in the smaller sub-basins that drain into larger rivers. Annual spring floods are typically due to the melting of snowpack.

Stormwater – Water from a storm event that exceeds the capacity of local drainage systems, either man-made or natural, can result in flooding. Inadequate storm sewers and drainage systems are often the primary factor resulting in this type of flooding.

Urban and Small Stream – Locally heavy rainfall can lead to flooding in smaller rivers and streams. Streams through urban or built-up areas are more susceptible due to increased surface runoff and constricted stream channels.

Flooding in Lincoln County tends to occur in the spring when melting snow over frozen soil adds to normal runoff and in summer or early fall after intense rainfalls. This runoff builds up until the river or stream overflows its banks, for as long as a week or two and then slowly recedes inch by inch. The timing and location of this type of flooding is fairly predictable and allows ample time for evacuation of people and protection of property.

Flooding is a notable hazard in Lincoln County, particularly because the Wisconsin River runs right through the middle of the county and the two major cities. As described in Part II, there are approximately 668 miles of rivers and streams in Lincoln County within 13 watersheds. All but a small portion of the County is within the Upper Wisconsin River (Headwaters) Basin.

Floodplains exist along the Wisconsin River and the tributaries that feed into it. These floodplains are narrow along tributaries and lakes but extensive throughout the County. Floodplains are described in Part II and shown on Map 4. The Federal Emergency Management Agency (FEMA) identifies these floodplains on Digital Flood Insurance Rate Maps (DFIRMs), which the NCWRPC obtained from Lincoln County. While not officially certified, this digital floodplain data is a useful planning tool.

DAM NAME	MILES FROM NEXT CITY	HAZARD RATING	NAME OF NEXT CITY	OWNER	UPDATED EAP YEAR
ALEXANDER	1	HIGH	MERRILL	WI PUBLIC SERVICE CORP.	2015
CARL	0	LOW		CHUCK BYE	2015
DOERING	0	LOW		DOERING ENTERPRISES	
GRANDMOTHER FALLS	16	HIGH	MERRILL	PACKAGING CORP. OF AMER.	2015
HARRISON	0	LOW		LINCOLN COUNTY FOREST	2017
JERSEY	0	HIGH	TOMAHAWK	WI PUBLIC SERVICE CORP.	2014
JUNE LAKE	0	LOW		HANSON BROS LLC	2010
KINGS	1	HIGH	TOMAHAWK	TOMAHAWK POWER & PULP	1996
MERRILL	0	LOW	MERRILL	WI PUBLIC SERVICE CORP.	2014
NEW WOOD	0	LOW		WI DNR -WILDLIFE BIOLOGIST	2016
OLIVOTTI LAKE		LOW		GIRL SCOUTS	2013
PINTEN	0	LOW		PINTEN TRUST	
RICE	2	HIGH	TOMAHAWK	WI VALLEY IMPROVEMENT CO.	2015
SPIRIT RIVER RESERVOIR	1	SIGNIFICANT	RIVER OAKS SUB.	WI VALLEY IMPROVEMENT CO.	2015
TOMAHAWK (Pride's)	2	HIGH	RIVER OAKS...	WI PUBLIC SERVICE CORP.	2015
UPPER GRANDFATHER FALLS	10	HIGH	MERRILL	WI PUBLIC SERVICE CORP.	2015

Source: WDNR Statewide Dams Database, 6/20/2016.
<http://dnr.wi.gov/topic/Dams/data.html>

There are 48 dams in Lincoln County according to the DNR, but most do not pose a significant hazard if they would fail. These dams serve many useful purposes including agricultural uses, providing recreational areas, electrical power generation, erosion control, water level control, and flood control. According to the DNR, Lincoln County has 16 large dams (see Map 4), 24 small dams and the others were not classified. The Wisconsin DNR regulates all dams on waterways to some degree; however the small dams are not stringently regulated for safety purposes. The Federal Energy Regulatory Commission has jurisdiction over large dams that produce hydroelectricity. Jersey, King, Spirit River Reservoir, Tomahawk (Pride's) and Upper Grandfather Falls all have current FERC licenses. Licenses for Alexander and Grandmother Falls appear to have expired, and Merrill's FERC status is unknown.

A dam can fail for a number of reasons such as excessive rainfall or melting snow. It can also be the result of poor construction or maintenance, flood damage, weakening caused by burrowing animals or vegetation, surface erosion, vandalism or a combination of these factors. Dam failures can happen with little warning resulting in the loss of life and significant property damage in an extensive area downstream of the dam.

The WDNR assigns hazard ratings to large dams within the state, see Table 13 for Lincoln County. When assigning hazard ratings, two factors are considered: existing land use and land use controls (zoning) downstream of the dam. Dams are classified

into three categories that identify the potential hazard to life and property downstream should the dam fail. A high hazard indicates that a failure would most probably result in the loss of life. A significant hazard indicates a failure could result in significant property damage. A low hazard exists where failure would result in only minimal property damage and loss of life is unlikely. For Lincoln County, there are seven dams that have a high hazard rating: Alexander, Grandmother Falls, Jersey, Kings, Rice, Tomahawk, and Upper Grandfather Falls. Spirit River Reservoir is the only one having a significant rating, while the rest are rated low.

All dams perceived as posing a threat to downstream development have a dam failure analysis performed in order to identify the hydraulic shadow (that area of land downstream from a dam that would be inundated by water upon failure of the dam during a regional flood). This information is used to develop an Emergency Action Plan (EAP) for the dam, which includes provisions for notifying emergency personnel and warning affected downstream residents of a failure.

History of Flooding/Dam Failure in Lincoln County:

Flooding is significant hazard of concern in Lincoln County, being the principal cause of damage in three of five Presidential Disaster Declarations in Lincoln County (1973, 1993, 2002) since 1971. Disaster declaration was requested for flooding in 1971 but not awarded. NCDC has reported only 1 flooding event in Lincoln County for the study period between 2006 and 2015.

The flood event noted by NCDC occurred in September of 2010. Heavy rain fell across the County between September 22 and 23, causing streams to overflow their banks and resulting in the closure of 21 roads, mainly in the southern part of the County. A number of other roads were passable but had water near or over the roadway. Many basements had water in them and Merrill area schools were closed due to flooding and high water. Rainfall totals across exceeded 2.5 inches. The highest recorded total was 4.38 inches at Spirit Falls where the NCDC reported flash flooding. Flooding continued across the southern part of the County for several days after the rainfall ended. Minor flooding continued along the Wisconsin River into the morning of the 26th.

Warm temperatures during the second week in April 2002 led to significant runoff from snow melt across much of northern Wisconsin. Additional rainfall then resulted in minor flooding in the Wisconsin River basin. A boat landing and some low areas on a County highway become covered by water. The flooding primarily affected agricultural lands and parks. The flooding combined with other storm damage across the area including tornadoes led to a disaster declaration.

In September of 2000, the Tomahawk area experienced urban and small stream flooding resulting from severe storms with heavy rain. The storms caused widespread problems including minor street flooding in Tomahawk.

Heavy runoff from spring snow melt compounded by rain in April 1996 resulted in widespread minor flooding across northern Wisconsin. With numerous roads and

culverts washed out in several counties including Lincoln. The Wisconsin River in Merrill rose to 2 feet above flood stage on April 21. Street flooding was reported in the Merrill area. A faulty gate on the Prairie River Dam was blamed for a water back up that resulted in the flooding of the 1200 block of 14th Street and a park. Area basements were filled with 3 feet of water and eight homes suffered damage.

One of the worst flood events experienced by Lincoln County, the state, and entire Midwest was the Flood of 1993. The flooding in Lincoln County was a result of several compounding factors including heavy rains and flooding in the fall of 1992, above average amounts of precipitation in the spring of 1993, and unusually heavy amounts of rain onto already saturated ground from early June throughout July.

Lincoln County was one of the 47 counties that were included under the disaster declaration; however their eligibility was only for individual assistance. Public facilities suffered minor impact compared to other counties. One highway built through a swamp had some damage, along with minor flooding problems reported at the City of Merrill Library and High School. Individual assistance disaster aid paid out \$41,540 to private citizens. The majority of these funds were used for basement damage (furnace or water heater and personal property), damage to septic systems, or contaminated wells.

The local businesses and economy were also impacted from the flood. Some stores suffered basement flooding, which resulted in merchandise damage. Tourism levels measured slightly lower than normal, and the logging industry reported inventories to be very low, resulting in increased prices. The farmers in Lincoln County received the greatest impact. While some fields were flooded by riverside overflows, the excessive moisture and saturated soils were the greater problem. Emergency financial assistance was provided to over 52 farmers encompassing 78 farms. Agricultural disaster assistance funds paid out over \$120,000, but the estimated crop losses countywide were over \$4 million.

Another flood event of note where Lincoln County received public assistance was in 1973. The 1973 flood affected a total of thirty-five counties, which were along the Mississippi and Wisconsin Rivers and bordering the Great Lakes. Total private and public damage losses were set at \$24 million.

Lincoln County has not experienced a dam break with any loss of life or substantial property damage. However, during the last mitigation plan process there was some concern about the aging of the dam structures within the County.

Flood/Dam Failure Vulnerability Assessment:

Flood events in the County have caused substantial property and infrastructure damage in the past and have the potential to cause future damage, since a significant number of structures still exist in the floodplain. Looking at past events, the following have been significantly impacted by flooding:

- Infrastructure – flooded public facilities, and schools

- Utilities - down electric lines/poles/transformers, telephone lines, and radio communication
- Roadways – washouts, inundated roadways, debris clean-up
- Residential structures – flooded basements, damaged septic systems
- Businesses – loss of commerce
- Agriculture - inundated cropland

To assess the vulnerability of Lincoln County to flooding hazards, basic inventory data in Part II must be analyzed. For this purpose, consideration should be given to structures (specifically critical facilities), infrastructure, and cropland.

One of the first reports to reference in assessing vulnerability to structures during flooding is the State of Wisconsin Repetitive Loss Report. This Report provides the status of repetitive loss structures by community. FEMA, through the Federal Insurance Administration, classifies a repetitive loss structure “when more than one flood insurance claim of at least \$1,000 is made within a ten-year period.” The information is used as a floodplain management tool and to supplement information provided by communities for flood mitigation grants administered WEM. According to the report, there are no repetitive loss structures in Lincoln County. Since no structures are listed in the Repetitive Loss Report, structures within floodplains were analyzed. The floodplain boundaries (as well as the watershed boundaries) within Lincoln County are shown on Map 4. These areas are generally located along the Wisconsin River and its major tributaries.

Table 14 shows the number of structures in each municipality identified as “vulnerable to flooding” according to proximity to floodplains. There were a total of 268 structures identified as within the designated floodplain boundaries (see Map 9). by the NCWRPC following the methodology below.

Methodology – Structures within Floodplains:

1. NCWRPC imported the County's DFIRM digital floodplain maps from into a GIS coverage for the County.

Table 14 Approximate Values of Structures in Floodplains in Lincoln County			
Municipality	Number	Total Value	Average Value
Birch town	0	\$-	\$126,100
Bradley town	16	\$2,768,000	\$173,000
Corning town	2	\$270,000	\$135,000
Harding town	3	\$480,000	\$160,000
Harrison town	1	\$183,600	\$183,600
King town	7	\$1,388,800	\$198,400
Merrill town	63	\$9,481,500	\$150,500
Pine River town	3	\$457,500	\$152,500
Rock Falls town	45	\$7,456,500	\$165,700
Russell town	15	\$1,650,000	\$110,000
Schley town	2	\$261,200	\$130,600
Scott town	1	\$152,400	\$152,400
Skanawan town	0	\$ -	\$195,000
Somo town	1	\$100,000	\$100,000
Tomahawk town	4	\$477,200	\$119,300
Wilson town	7	\$1,026,900	\$146,700
Merrill city	97	\$8,603,900	\$88,700
Tomahawk city	1	\$140,800	\$140,800
Lincoln County	268	\$34,898,300	\$130,217

Source: U.S. Census and NCWRPC

2. A building point cover was digitized from county lidar data along the floodplain areas.
3. The floodplain coverage was then combined with the building point coverage to identify those structures within the floodplain boundary.
4. Total structures within the floodplain were then tabulated by municipality.
5. Average values from U.S. Census data were used to determine the total value for the identified vulnerable structures.

Lincoln County has seven dams within its boundaries that have a high hazard rating, and one that has a significant hazard rating. The Willow Reservoir dam, upstream from Lincoln County, is large with a high hazard rating that would affect Lincoln County if it failed. All nine of these major dam complexes, located on the Wisconsin River and its tributaries, have Emergency Action Plans.

Included in the plans are the warning procedures, identified areas that could be expected to flood during a dam break, and water flow coordination procedures among all the dams on the Wisconsin River.

To understand the potential risk from dam failure, a similar methodology was followed, starting with NCWRPC digitization of the inundation maps from the EAPs (Map 10). Average values for structures within the inundation areas are tabulated.

Table 15 Approximate Value of Structures in Dam Failure Inundation Area			
Dam	# Structures (Lincoln Co.)	Total Improvement Value	Average Value Per Structure
Willow River Reservoir	225	\$29,320,875	\$130,315
Rice	26	\$2,666,768	\$102,568
Jersey	10	\$1,069,650	\$106,965
Kings	140	\$13,574,120	\$96,958
Tomahawk	24	\$2,771,256	\$115,469
Spirit River Reservoir	2	\$260,630	\$130,315
Grandmother Falls	10	\$1,125,000	\$112,500
Upper Grandfather Falls	0		
Alexander	213	\$17,894,982	\$84,014

Source: US CENSUS and NCWRPC

In addition to structural damage from flooding, there would be significant damage to public roadways, particularly to roadway surfaces, culverts, and bridges. Flooding would inundate or close roadways due to washouts from a period of a few days up to as much as several months. Such interruptions in the County transportation network would cause travel delays through detours.

Insert Map 9 Flood Vulnerability

To reduce file size for ease of emailing and downloading, the maps are omitted from this draft. To view the maps go to www.ncwrpc.org/lincoln/lincolnhzdplan/index.html

The agriculture industry is a sector that faces substantial losses, during floods, cool, rainy/wet, sunshine deficient climatic conditions of the spring and summer create a general condition of high water and saturated soils throughout the County.

Flood conditions can leave farmers with the following economic setbacks:

- Delayed planting (reduced growing season)
- Seed and agricultural chemicals washing out of fields
- Rotting of plants due to excess moisture
- Areas where planted crops are left in the fields due to excessive moisture
- Crops not reaching full maturity or stunted growth
- Requirements by farmers to expend higher amounts of money on additional soil amendments
- Lower quality (nutritional value) of harvestable crops as a feed source.

Reductions in quantity can result in loss of revenues from cash crops and increased expenses for purchasing the needed livestock feed from outside sources. Additionally, reductions in crop quality result in lower prices received for cash crops and increased amounts spent for nutritional supplements to animal feed, which need to be added even in much of the purchased feed.

The saturated soil conditions responsible for these woes can occur anywhere throughout the County. Agricultural land in Lincoln County is primarily located in the south and eastern portions of the County. These farming areas were previously forested tracts that were cleared by early settlers, which are composed of hard pan soils with poor drainage qualities.

Economic losses to farmers can generate a ripple affect to the local community as well. Reduction in farm income will curtail the farmers' ability to purchase new equipment and make other improvements. Farmers will have less money to spend at farm dealers, farm supplies, building/hardware suppliers, fertilizer, feed and seed dealers, and other agribusiness and retail establishments. The State itself will have reduced tax revenues. Farmers will have less money to save and invest, and suffer still more increases in debt load.

The forest products industry is affected similarly to agriculture. Forestlands become too wet for logging operations and many water logged tree plantations suffer high mortality rates. Mill inventories become very low, resulting in increased prices for consumers.

The areas considered to have a higher risk for impact from flooding include those communities with structures in floodplains as shown in Map 9 or those with structures in dam break inundation areas as shown in Map 10. Both cities, Merrill and Tomahawk, indicated in their planning meetings that flooding, particularly related to dam failure, is one of their top hazard concerns.

Insert Map 10 Dam Inundation Areas

To reduce file size for ease of emailing and downloading, the maps are omitted from this draft. To view the maps go to www.ncwrpc.org/lincoln/lincolnhzdplan/index.html

Future Probability and Potential Dollar Losses – Flood/Dam Failure:

Based on the historic data presented here (frequency of past events - 2006 to 2015), Lincoln County can expect a flood event about every 10 years on average. This equates to a probability of 0.1 or about a 10 percent chance in a given year. However, localized heavy rainfall will continue to cause spot flooding from time to time. With 3 disaster declarations related to flooding, should anticipate and prepare for another major flood event in the future.

To estimate potential future dollar losses due to flood, historic data from past flood events for which we have loss figures is used. Lincoln County can anticipate property and crop losses of approximately \$508,128, on average, between the public and private sector for each significant flood occurrence. Over the next ten-year period, flood losses in Lincoln County could approach \$508,000.

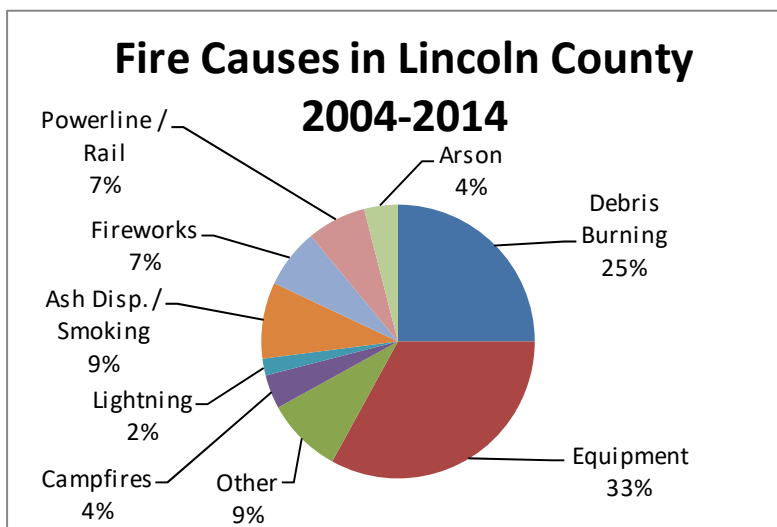
Potential flood losses for structures by jurisdiction are reflected in Table 13. While structures outside mapped floodplains may also be lost or damaged in a flood, structures within flood plains represent the greatest risk for flood damages.

As indicated earlier, no dam breaks have been identified within Lincoln County. Therefore, there is no historic frequency upon which to base a future probability, other than to say that the probability of a dam failure is very low. However, the number of significant dams and the risk illustrated in their EAPs make dam failure an important hazard to plan for. Table 14 shows potential structural losses from failure of each significant dam that would affect Lincoln County.

HAZARD ANALYSIS: FOREST FIRES/WILDFIRES**Background on Forest Fires/ Wildfires Hazard:**

A forest fire is an uncontrolled fire occurring in a forest or in woodlands outside the limits of incorporated villages or cities. A wildfire is any instance of uncontrolled burning in brush, marshes, grasslands or field lands. For the purpose of this analysis, both of these kinds of fires are being considered together.

Forest fires and wildfires can occur at any time whenever the ground is not completely snow covered. The season length and peak months may vary appreciably from year to year. Land use, vegetation,



amount of combustible materials present and weather conditions such as wind, low humidity and lack of precipitation are the chief factors for fire season length.

History of Forest Fires/Wildfires in Lincoln County:

The Wisconsin DNR maintains a database of wildfire data. This data represents the most comprehensive source of information for analyzing fire trends in an area such as Lincoln County. However, the data is only current through 2014, so the ten year period from 2005 through 2014 is used for analysis. Between 2005 and 2014, there was an average of 27 fires that have burned 33 acres, annually. The typical fire in Lincoln County burns about 1.2 acres.

May is the leading month for wildfire in Lincoln with 32% of the total number of fires between 2005 and 2014. Wildfires have occurred each month of the year except January, February and December in Lincoln.

The Town of Merrill experienced the most wildfires between 2005 and 2014 with 47, and also leads the County in total acres burned with 147. The Town of Tomahawk had the fewest fires with 2 over that period. Town of Harding had the least area burned, among non-urban areas, with just 0.66 acres affected.

The chart above breaks down the causes of wildfire within Lincoln County between 2005 and 2014 as classified by the WDNR. The principle cause of wildfire with 33% in Lincoln County over this period is equipment which includes vehicle, motor and other machinery related causes except railroad. Debris burning, typically number one in Wisconsin, is the next leading category at 25% of wildfires within the County. Arson resulted in about 4% of wildfires, and lightning, the only natural cause of fire, was responsible for around 2%.

There has been some correlation between drought or heat waves and increased risk of wildfire in Lincoln County. The drought conditions from 2004 to 2010 shows a significant spike in the number and size of fires (with the exception of 2008 where the numbers are way down). Fire numbers also spike in the heatwave years of 1994 and 1995, however the numbers are comparably down a bit in the 1999 dry spell year.

Forest Fires/Wildfires Vulnerability Assessment:

Lincoln County has approximately 469,417 acres of forestland, or 81 percent of the area, scattered throughout the County. The potential for property damage from fire increases each year as more dwellings are developed on wooded land.

Rural buildings may be more vulnerable because of lack of access. Access to buildings off main roads is sometimes long, narrow driveways with minimal vertical clearance and no turn around areas large enough for emergency vehicles making it hard for emergency vehicles to combat fires. These buildings also may not have much of a defensible space because of little area between the structures themselves and highly flammable vegetation.

Campgrounds are also a concern because campfires cause about 4 percent of fires in Lincoln County as indicated by the Wisconsin Department of Natural Wildfire Database described above, see pie chart. Lincoln County has a number of campgrounds such as those shown on Map 8.

The trend toward introducing more human development into fire prone areas has brought about the term wildland urban interface or WUI. The WUI identifies areas where structures and human development meet or intermingle with undeveloped wildlands. It is within these areas where wildfire poses the greatest risk to human lives and property.

The WDNR has completed a statewide evaluation of fire risk, referred to as the CAR or Communities At Risk assessment. This assessment uses extensive DNR geo-databases to analyze and map hazardous woodland fuel types and the degree of the intermixing of development with wildlands. The maps identify the level of risk for each community on a scale of very high, high, moderate, or low, and also have a community of concern designation. The Towns of Bradley, King, Merrill and the City of Tomahawk are rated high. Birch, Harding, Harrison, Russell, Skanawan, Tomahawk and Wilson are designated as communities of concern. The Towns of Corning, Pine River, Rock Falls, Schley, Scott, Somo, and the City of Merrill are rated low risk for wildfire. See Map 11

Future Probability and Potential Dollar Losses – Forest Fires/Wildfires:

Forest and wild fires are relatively common occurrences in Lincoln County. Over the 10 year analysis, there has been an average of 27 fires per year in the County. In other words, the probability is 1.0 or 100% chance of wildfire each year.

Because of the relatively small impact of typical individual fires in the County, loss data is not tracked. This makes it difficult to develop an estimate of potential future dollar losses. However, with 27 fires per year, the County should expect some fires to "get out of hand" with the potential to easily exceed the \$1.4 million in damages of the 2005 Cottonville Fire that occurred in Adams County, for example.

Insert Map 11 Wildfire Risk

To reduce file size for ease of emailing and downloading, the maps are omitted from this draft. To view the maps go to www.ncwrpc.org/lincoln/lincolnhzdplan/index.html

INTRODUCTION

Hazard mitigation is any action taken to reduce or eliminate the long-term risk to human life and property damage from natural hazards. This chapter describes the mitigation goals and actions to be taken by Lincoln County and its local units of government for each of the hazards identified in Part III – Risk Assessment. The intention is to reduce or avoid long-term vulnerability to the identified hazards.

Part IV of the Lincoln County All Hazards Mitigation Plan will discuss the following factors in establishing the multi-jurisdictional mitigation strategies:

- Benchmark Progress of Previous Plan 2012-2017
- Review of Mitigation Goals
- Prioritize Identified Mitigation Strategies
- Establish Mitigation Action Plan

PROGRESS REPORT 2012 - 2017

Table 16 identifies the completed, deleted or deferred mitigation actions from the previous 2012 Plan. For each action recommendation, a brief status report is provided which describes the progress made on that measure. If an item remains unchanged, a description is provided as to why no action has been taken and whether that item is deferred to the new plan.

The table also provides the new status of each recommendation with regard to the updated plan alongside the original timeframe target for comparison. Many of the recommendations are on-going efforts and are carried over as such in the updated action plan. Some have had significant progress or have been deferred, but are recommended for further action with new target date or on-going status. If the recommendation has been completed with no further specific action anticipated within the next five year planning period, it is shown as "Removed from list" and will not appear in the updated action plan. In some cases, an incomplete action is not selected for various reasons (noted) and is also shown as "Removed from list".

This progress report serves as a benchmark for progress in achieving the multi-jurisdictional mitigation goals of Lincoln County and the local jurisdictions that participated in the Plan.

TABLE 16 BENCHMARK FOR PROGRESS 2012 - 2017 PLAN			
2012-2017 Plan Measure	Progress Report	Original Status	New Status
Continue to promote the increased use of National Oceanic and Atmospheric Administration (NOAA) weather radios.	Recent grant applications not funded. County EM continues to promote use of the radios and seek funding to disseminate radios.	On-going (1)	On-going (1)
Continue to add/update Emergency Management Department link off their existing County web site.	Website actively maintained with hazard information. Created a "Ready Lincoln" page to help educate and prepare public.	On-going (2)	On-going (2)
Verify that back-up utilities are available at all critical facilities.	Installation at some county facilities. More evaluation needed.	On-going (3)	On-going (3)
Create second street to the hospital in the City of Tomahawk.	Not yet completed. Remains concern. Wetlands issues blocking progress.	2015 (4)	2021 (4)
Develop county-wide early warning systems possibly including all telephone message cast and cable TV broadcast, among others.	County has been exploring some emergency alert systems such as CodeRed, NIXLE, and others.	On-going (5)	On-going (5)
Develop county-wide disaster shelter plan possibly including i.d. available shelters, trailer park shelter needs, notification procedures, etc.	Did review Red Cross sheltering but more is needed. Trailer parks in the County are one area of concern. Shelter needs in Towns of Harding and Merrill.	On-going (6)	On-going (6)
Establish a second well field and water tower for the City of Tomahawk.	Budget constraint has been the limiting factor for this recommendation.	2016 (7)	2020 (7)
Develop Emergency Response Zone Atlas.	Little progress to date. May be increasing priority with WDNR.	2013 (8)	2019 (8)
Establish an "off-site" emergency command post for City of Tomahawk.	Budget constraint has been the limiting factor for this recommendation.	2014 (9)	2022 (9)
Update radio / emergency communications systems for City of Merrill.	Police department did acquire new radios but more updating is needed. Other key depts need new radios.	2013 (10)	2020 (10)
Continue development of County EOC and mobile command post.	Limited development due to lack of available funding.	2016 (11)	2022 (11)
Address gaps in emergency interoperability communications coverage...	Tower/repeater installed in Pine River in 2013. Additional work needed.	2015 (12)	2021 (12)
Improve addressing signage to improve emergency response in Corning.	Status unknown. Not reported as current priority by Town.	2013 (13)	Removed from list (-)
Analyze water towers for tornado strength.	No progress to date.	2013 (14)	2019 (17)
Encourage mobile homes to have tie-downs with ground anchors.	Limited progress to date.	On-going (15)	On-going (18)
Promote winter hazards awareness at home and while traveling.	County EM working with Health Department on extreme cold safety awareness.	Annual (16)	Annual (19)

TABLE 16 <i>Continued</i>			
2012-2017 Plan Measure	Progress Report	Original Status	New Status
County/City continued participation in NFIP.	On-going efforts of the County and both cities.	On-going (17)	On-going (20)
If needed, mitigate impacts of flooding through acquisition / removal of flood damaged buildings in floodplain.	Has not been needed to date.	As needed (18)	As needed (21)
Culvert sizing evaluation and maintenance program.	County Hwys program in place and on-going. Town of Corning has installed larger culverts. Maintenance is still an issue.	On-going (19)	On-going (22)
Continue to review and test Emergency Action Plan (EAP) for each significant and high hazard dam.	Plans and exercises completed with WVIC, WPL, PCA & Kings dams. On-going maintenance efforts recommended.	On-going (20)	On-going (23)
Improve ditching along town roads...to better control flooding.	On-going maintenance concern with towns to prevent washouts and maintain access.	2013 (21)	On-going (24)
Determine if critical facilities are adequately grounded to eliminate lightning damage. Install surge protection as necessary.	No progress to date.	2014 (22)	2018 (25)
Promote lightning safety awareness to reduce risk.	County does lightning safety awareness as needed.	Annual (23)	Annual (26)
Assist population with reducing heat disorders through awareness program.	County EM working with Health Department on extreme heat safety awareness.	As needed (24)	As needed (27)
Develop countywide drought mitigation plans for multi-agency approaches to water conservation, drought prediction, stream and groundwater monitoring.	No progress to date.	On-going (25)	As needed (28)
Promote Firewise and related educational materials increase awareness of wildfire risk.	Combined public informational efforts of WDNR, area fire department and County EM.	Annual (26)	Annual (29)
Provide wildland/structural crossover firefighter training...	Local fire departments routinely conduct training and exercises	2013 (27)	Removed from list (-)
Develop driveway ordinances and private road standards to ensure emergency vehicle access.	Many towns have ordinances, etc. along these lines, but more could be done in some areas of the County.	2015 (28)	2022 (30)
Develop "area-wide" wildfire protection plan for Tomahawk fire district covering northern Lincoln and southwestern Oneida Counties.	No progress to date.	2013 (29)	2020 (31)

LOCAL HAZARD MITIGATION GOALS

The mitigation strategy is based on a set of goals to reduce or avoid long-term vulnerabilities to the hazards identified in the Risk Assessment. The goals were established by the previous Mitigation Plan Taskforce during the development of the original plan. The update Plan Taskforce reviewed the goals and concurred that these goals, with some minor revisions, continue to represent the desired conditions to strive for through the mitigation efforts of the County and municipalities.

The mitigation goals for reducing or avoiding the long-term vulnerability of Lincoln County are as follows:

- Prepare and protect residents and visitors from all natural hazards.
- Protect health, safety, and general welfare of county residents and visitors, along with mitigating future loss of property from tornados.
- Create safety awareness in citizens and travelers of Lincoln County to protect them during and after winter storm and extreme cold events.
- Continue compliance with the National Flood Insurance Program and work to reduce flood risk throughout Lincoln County and the Cities of Merrill and Tomahawk.
- Eliminate the loss of life and reduce the risk of property damage in downstream areas that result from a dam failure.
- Minimize the threat to human life and property damaged caused by severe storms and associated hail, lightning and high wind.
- Create safety awareness in citizens and visitors of Lincoln County to help protect themselves during extreme heat events.
- Minimize crop loss while maintaining water supplies during times of drought.
- Protect the safety and property of residents and visitors from forest and wildfires.
- Protect Lincoln County computer systems and data from cyber-attack to help ensure continuing, effective operations of county government and emergency services.

PRIORITIZATION OF STRATEGIES

The Mitigation Planning Committee considered a number of factors in identifying and ranking proposed mitigation strategies. The matrix, below, describes the factors incorporated into the prioritization process. The resulting priority of each strategy is shown in the summary Table 17.

Prioritization Factors for Lincoln County Mitigation Strategies

<i>Strategy Prioritization Factor</i>	<i>Description of Factor Considerations</i>
Priority of Hazard Type	The ranking of hazard types, tornado, flooding, etc., accounts for threat to human safety and possible property damage and was carried over to groups of strategies by hazard type. Strategies believed to benefit multiple hazards (listed under "All Hazards") were valued higher.
Ease of Implementation	Strategies where existing staff and resources are adequate were valued higher than those where additional resources are necessary. Consideration was also given to strategies that meet other countywide goals or incorporated as part of another county project. Project timing was also a consideration as to when funding such as grant applications might be available and when various activities could be scheduled.
Perceived Cost versus Potential Benefit	Although a detailed cost-benefit analysis was deemed beyond the scope of this study, the Committee weighed the perceived costs of each strategy against the potential benefit anticipated. Proposals that seemed economically unfeasible were rejected.
Multi-jurisdictional Application	Strategies benefiting multiple jurisdictions were valued more than those pertaining to fewer jurisdictions.

Members of the Taskforce scored each strategy based on these prioritization factors and assigned a high, medium or low rating to reflect their relative level of priority for that strategy. A 3-point weighted scale was used to average the scores into the overall high, medium or low priority for the County or local units as shown in Table 17.

MITIGATION ACTION PLAN

The mitigation strategies are organized by hazard beginning with some overall strategies that apply to a number of different hazards and are listed under the category, “all hazards”. For each hazard, a goal was established as to what the County intends to achieve by implementing the specific action strategies and is based on the risk assessment findings. Each action strategy is then briefly described and followed by a discussion of the jurisdictions/agencies that will pursue the action including the proposed lead jurisdiction/agency.

Each section of this part is broken down as follows:

Goal:

Broad, long-term mitigation goals to reduce or avoid vulnerabilities to the identified hazard are stated.

Action:

Each action strategy proposed to aid in achieving the overall goal for the identified hazard is described. A given action strategy may be comprised of a number of related sub-actions.

Participating Jurisdictions:

The proposed lead agency or lead jurisdiction (responsible unit) is identified along with a listing of the other agencies or jurisdictions that the recommended action applies to. This does not preclude other agencies or jurisdictions from participating in the action.

The chapter concludes with a summary of the recommended mitigation strategies shown in Table 16. Table 16 also contains project cost estimates where available, existing resources (authority, policies, programs. etc.) and potential time frames.

Hazard: All Hazards**Goal:**

Prepare and protect residents and visitors from all natural hazards.

Action 1:

The county should continue to promote the increased coverage and use of National Oceanic and Atmospheric Administration (NOAA) weather radios. Previously, the County distributed radios to key locations such as County buildings, schools, major employers, etc. Recent grant applications to refresh and expand this effort have not been successful. NOAA weather radios receive signals from a nationwide network of radio stations broadcasting continuous weather information from the nearest National Weather Service office. All National Weather Service forecasts, watches, warnings, and other hazard information like dam failures are broadcast 24 hours / 7 days a week. The

NOAA weather radio is a single source for comprehensive weather and emergency information; because the Emergency Alert System (formerly the Emergency Broadcast System) broadcasts use the same network of radio stations as one of many electronic methods to broadcast other hazard information.

Participating Jurisdictions for Action 1:

Lead agency will be Lincoln County Emergency Management. Jurisdictions participating in this action will include Lincoln County, City of Merrill, City of Tomahawk, and all Towns including: Birch, Bradley, Corning, Harding, Harrison, King, Merrill, Pine River, Rock Falls, Russell, Schley, Scott, Skanawan, Somo, Tomahawk, and Wilson.

Action 2:

The County should continue to add and update information on an Emergency Management web page link off the existing County website. The web page should contain information describing the types of hazards and how to respond to a hazard threat. The site should also contain information on ordinances pertaining to hazards (i.e. County floodplain zoning), locations of shelters, and links to other sites that provide valuable information on weather conditions, burning permits, etc.

The County recently created a "Ready Lincoln" webpage which contains information and resources for residents to learn more about potential hazards in Lincoln County and help better prepare themselves and their families in the event of a disaster.

Participating Jurisdictions for Action 2:

Lead agency will be Lincoln County Emergency Management. The only directly participating jurisdiction will be Lincoln County.

Action 3:

Critical facilities need operational utilities such as power, communications, water and sewer to function effectively. The need for back-up generators should electricity be cut off, obtaining alternative sources of potable water, and dealing with wastewater are issues that need to be examined. Back-up power (heat) is especially important at facilities that may be used to shelter people in case of a power outage during extreme cold weather. Lincoln County has evaluated its existing facilities and installed back up power generation where needed. The City of Merrill has previously identified this as a need and has installed emergency power generators for City Hall. The City of Tomahawk and all Town governments should address this issue. Existing back-up systems need to be maintained to ensure operation in time of need.

Participating Jurisdictions for Action 3:

Lead agencies will be Lincoln County, all Cities and all Towns. Jurisdictions participating in this action will include Lincoln County, City of Merrill, City of Tomahawk, and all Towns.

Action 4:

The City of Tomahawk needs to create a second street to the hospital located in the City. The Sacred Heart Hospital in Tomahawk currently has access via only one public street. There are no side or rear streets adjacent to the hospital property. A number of hazards could cut off the access road causing a significant problem in getting disaster victims into the facility for the appropriate level of care as well as impeding the flow of medical equipment and supplies.

The design and cost of the roadway will depend on the selected location. Currently, there are wetland issues surrounding the property, and the City must work with the Wisconsin DNR and US Army Corps of Engineers. This plan urges the Department of Natural Resources and Corps of Engineers to facilitate wetland permitting associated with establishing an alternate access to the hospital.

Participating Jurisdictions for Action 4:

Lead agency will be the City of Tomahawk. The only directly participating jurisdiction will be the City of Tomahawk.

Action 5:

Early warning related concerns were identified during the development of this All-Hazards Plan. The rural nature of much of the county, maintenance, liability technology issues, and funding are concerns raised during the discussions.

Several years ago, the City of Merrill did install new warning sirens with radio triggers. Now additional improvements are needed to deal with remaining older units that have been disconnected to address gaps in coverage and incorporate new technology that allows the sirens to be linked. Tomahawk had abandoned its warning sirens due to high cost for repairs and maintenance. There were also concerns about coverage area of those sirens. Currently, some officials and residents feel there is a need to reestablish warning sirens in the community.

Some counties in Wisconsin have been experimenting with new technology based alternatives to the traditional warning mechanisms. One example is CodeRED, which is a phone-based early warning system that can deliver targeted emergency notifications to phone numbers in an affected area. There are a variety of other services available and the County has been evaluating some of the options such as NIXLE and RAVE. RAVE is a new system being used by the State, and some cost savings may be available via the state purchasing contract. Maintenance of such systems is currently from \$4,000 to \$6,000 per year.

Development of early warning and communication systems to include Emergency Alert System (EAS) capabilities and expanded use of emerging technologies is recommended. Currently, NOAA weather radio is the primary trigger for activating the EAS on commercial radio, television and cable systems. Another concern identified is the lack of access to cable television in certain parts of the county due to its rural nature and sparse population. Many residents rely on satellite television which has no

connection to the emergency alert system and no access for local officials. Local access to these types of warning systems could facilitate more timely notification of a hazard situation as well as the ability to tailor important information or instructions for the specific area.

Participating Jurisdictions for Action 5:

Lead agency will be Lincoln County Emergency Management, all Cities and all Towns. Jurisdictions participating in this action will include Lincoln County, City of Merrill, City of Tomahawk, and all Towns.

Action 6:

Shelter related concerns were identified during the development of this All-Hazards Plan. Issues identified included mobile home parks, campgrounds seasonal housing, power outage and disruption of fuel supplies, among others. The County has worked on this issue in the past, particularly with regard to special needs populations. More recently, Emergency Management has worked with the Red Cross and ran a tabletop exercise to evaluate and update its shelter program in Lincoln County and identified a need to add more shelter sites. In addition, Emergency Management has been working with the County Health Department on warming and cooling shelters for extreme temperature situations.

To address these concerns, the County should work to develop a countywide disaster shelter plan. The Towns of Harding, Merrill, and Skanawan and identified an interest or need for shelter facilities and should work cooperatively with the County to create detailed plans specific to their situations. Shelters may be eligible for funding under the Community Development Block Grant (CDBG) program and have become more fundable under WEM/FEMA programs. One issue with shelters may stem from lack of knowledge regarding existence of shelters and procedures for use. Plan distribution and public informational efforts are recommended.

The plan should identify available shelters by function and determine where coverage is deficient. The function of a shelter is to protect people during a disaster event, to accommodate displaced people in the aftermath, or both. Existing facilities (schools, churches, public buildings, etc.) should be evaluated for suitability or locations determined for new structures. Mobile home parks, campgrounds and County parks within the County lack shelters and are a particular concern.

Establish zones to help people to identify which shelter they should go to and procedures for notification. It is also important to evaluate shelters for suitability for various types of hazards. For example, a shelter located within a floodplain may not be the best place to send people during a storm that could result in flooding. Adequate heat (and back-up source of energy to run it) is an important consideration when seeking to shelter people during a winter weather power outage. Local sponsors should be identified to help maintain shelters and ensure they are open in time of need. Transportation options should also be considered especially for the elderly and those

with disabilities. The transportation and subsequent shelter of persons with special medical or other needs are critical factors to address.

Participating Jurisdictions for Action 6:

Lead agencies will be Lincoln County Emergency Management and Health Departments, all Cities and all Towns. Jurisdictions participating in this action will include Lincoln County, City of Merrill, City of Tomahawk, and all Towns, particularly including:, Harding, Merrill, and Skanawan.

Action 7:

The City of Tomahawk should establish a second municipal well field and a second water tower. Currently, the City gets its entire water supply from a single well field and water tower. An incident affecting the water supply would likely impact all of the City's wells and/or water tower simultaneously. Many of the hazards covered in this plan have that potential. Another concern is the rail line that runs near the wells which carries potentially hazardous cargo that could threaten the water supply. The potential loss of water supply for the entire City presents public health concerns from lack of drinking water and economic concerns due to lack of water for industrial processes and tourism impacts. Further, a second tower would provide extra water storage capacity to help mitigate municipal well problems. Adequate fire flow is an issue in newly developing parts of the City that could be addressed through enhanced pressurization from the new second water tower.

Participating Jurisdictions for Action 7:

Lead agency will be the City of Tomahawk. The only directly participating jurisdiction will be the City of Tomahawk.

Action 8:

A county-wide emergency response zone atlas should be developed. Often referred to as a fire zone atlas, these atlas books were originally conceived to help direct firefighting and evacuation operations in rural areas at high risk for wildfire. A number of counties across the state have developed, or are developing these atlases, typically sponsored by and/or in conjunction with the WisDNR. Recognizing their potential value in responding to a wide variety of hazard events, many counties are utilizing them as a tool in responding to and managing other situations beyond fire.

Zones are drawn around groups of structures based on factors related to access and evacuation. The zones are named, colored-coded and indexed for ease of reference. Atlas books are distributed to police, fire and EMS units responsible for responding to emergency situations in rural areas of the county covered by the atlas.

Participating Jurisdictions for Action 8:

Lead agency will be Wisconsin Department of Natural Resources in conjunction with Lincoln County Emergency Management. Jurisdictions participating in this action will include Lincoln County, the Cities of Merrill and Tomahawk, and all Towns including corresponding police, fire and EMS departments.

Action 9:

The City of Tomahawk's critical emergency response facilities: police, fire and public works departments are all located within close proximity of each other downtown. So, a hazard event causing significant damage to one facility would also likely inflict similar damage on the others. In addition, a large LP gas facility is located adjacent to this area as well. A hazard causing an incident at the LP facility could threaten significant damage or complete destruction of these critical city operations. As a result of these conditions, the City should establish an emergency operations center away from this central location to serve as a command post for city operations in the event a hazard threatens or destroys its downtown facilities.

Participating Jurisdictions for Action 9:

Lead agency will be the City of Tomahawk. The only directly participating jurisdiction will be the City of Tomahawk

Action 10:

Due to on-going changes in regulations and technology (narrow banding, etc.), the City of Merrill has made some upgrades and modernized its emergency communications equipment including radios for police and fire. However, interoperability, or the ability for different radios to work with each other, is a significant problem for emergency services and local governments across the state, and Merrill is no different. Radio compatibility across various key City departments such as public works, needs to be addressed. New, compatible radios need to be acquired for these departments, and cross department interoperability needs to be maintained as system updates and technology changes continue such as "Next-Gen 911".

Participating Jurisdictions for Action 10:

Lead agency will be the City of Merrill. The only directly participating jurisdiction will be the City of Merrill.

Action 11:

The County's emergency operations center (EOC) needs additional outfitting including emergency radio communications equipment and HAM radio set and other supplies and equipment. EOC procedures and operations need to be review and developed, including identification of departments that might be involved in staffing the EOC in a given situation and determining the needs of each. For example, County GIS (Geographic Information Systems) staff can help with situational logics by providing access to aerial photography and mapping of areas and creating specialized maps for a given situation. However, such functions require more robust workstations with a more powerful PC and map plotting capabilities. The County should also look at potential needed updates to its mobile command post.

Participating Jurisdictions for Action 11:

Lead agencies will be Lincoln County Emergency Management and Sheriff's Office. Lincoln County will be the only directly participating jurisdiction in this action.

Action 12:

Existing County radio communication towers have good coverage from their high elevation location on Irma Hill. However, there are small areas or "gaps" that have been identified where communications could be improved. For example, the southwestern corner of the County (Pine River) was a coverage problem area until tower improvements were made in 2013. Western Corning is a candidate for an additional tower. In the far northwestern part of the County (i.e. Somo and Tomahawk) coverage can be "iffy" depending on weather conditions.

Participating Jurisdictions for Action 12:

Lead agency will be Lincoln County Emergency Management. Lincoln County and the Towns Corning, Harrison, Somo and Tomahawk will be the participating jurisdictions in this action.

Action 13:

The Town of Tomahawk has expressed a need to improve the posting of its addressing / fire number signs to improve emergency response.

Participating Jurisdictions for Action 13:

Lead agency will be the Town of Tomahawk. The only directly participating jurisdiction in this action will be the Town of Tomahawk.

Action 14:

The Town of Harding has identified a need to develop a local emergency response plan (ERP). Other towns may not have an emergency response plan in place as well. An ERP helps the community determine the roles to be played by each emergency service, how communication channels will be utilized, lines of authority, and strategies or "game plans" for responding to different kinds of hazard situations. Wisconsin Emergency Management has plan templates that towns can use to fill in the blanks and begin formulating their own local ERP.

One area of concern identified as needing to be addressed in Lincoln County is the provision of aid and evacuation for elderly and other homebound as well as animals in the event of a disaster emergency. Towns should consider and plan for this issue when developing ERPs. Community groups and service organizations are a possible resource to tap in providing a mechanism to provide this aid.

ERP's should conform to the State and National Response Plans, which are organized by emergency support functions and incorporate the provisions of the National Incident Management System (NIMS). The NIMS is a comprehensive system that incorporates operations through the use of the Incident Command System (ICS) and application of standardized procedures and preparedness measures. It promotes development of cross-jurisdictional, statewide and interstate regional mechanisms for coordinating response and obtaining assistance during a large-scale or complex emergency incident.

Participating Jurisdictions for Action 14:

Lead agency will be the Town of Harding. Jurisdictions participating in this action will include The Town of Harding and other towns without a current ERP. Lincoln County and Wisconsin Emergency Management can provide assistance in developing a town ERP.

Action 15:

The Town of Merrill has identified a need to install an emergency generator in order to ensure the continued operation of critical facilities (i.e. town hall) during a power outage. One option might be the utilization of portable generators, however, the facility needing power would require special accommodations (transfer switch) be pre-installed to connect the generator and allow it to power the building/facility.

Participating Jurisdictions for Action 15:

Lead agency will be the Town of Merrill. The Town of Merrill will be the only directly participating jurisdiction.

Action 16:

Lincoln County should develop a Continuity of Government (COG), also known as a Continuity of Operations Plan (COOP) to sustain government operations in case of a catastrophic event such as a natural disaster or major cyber-attack that severely disrupts Lincoln County government facilities. In today's technology driven society, access to computers and databases is a critical component.

The goal of COOP planning is to ensure that essential functions of an organization such as a government can continue to operate during and after an emergency incident which may prevent access to normally operating systems such as physical plant, data or communications networks, or transportation. This includes system and personnel redundancy, educating staff, backing up and securing critical data, and setting up remote access site(s) to continue county operations in the event a particular government building(s) becomes inaccessible.

Participating Jurisdictions for Action 16:

Lead agency will be Lincoln County Emergency Management. Lincoln County would be the only directly participating jurisdiction. This recommendation is also suggested for other units of government within the County including the Cities of Merrill and Tomahawk and all towns.

Hazard: Tornado**Goal:**

Protect health, safety, and general welfare of county residents and visitors, along with mitigating future loss of property from tornadoes.

Action 17:

The Cities of Merrill and Tomahawk should analyze water towers for strength and stability against tornadoes.

Participating Jurisdictions for Action 17:

Lead agency will be the Cities of Merrill and Tomahawk. The only directly participating jurisdictions will be the City of Merrill and the City of Tomahawk.

Action 18:

The County, cities and towns should encourage builders and owners of manufactured and mobile homes to use tie-downs with ground anchors to help secure the main structure and any exterior attachments such as carports and porches. Using these devices can reduce the risk of damage to mobile and manufactured homes. Local units with zoning (or other related) ordinances should strengthen applicable provisions and improve enforcement.

Participating Jurisdictions for Action 18:

Lead agencies will be Lincoln County Planning and Zoning Department, all Cities and all towns. Jurisdictions participating in this action will include Lincoln County, City of Merrill, City of Tomahawk, and all Towns.

Hazard: Winter Storm/Extreme Cold**Goal:**

Create safety awareness in citizens and travelers of Lincoln County to protect them during and after winter storm and extreme cold events.

Action 19:

The County should promote winter hazards awareness, including home and travel safety measures, such as avoiding travel during winter storms and periods of extreme cold. If travel cannot be avoided, having a shovel, sand, warm clothing, food, water, and back-up heating system should be encouraged to have in vehicles.

Participating Jurisdictions for Action 19:

Lead agencies will be Lincoln County Emergency Management, all Cities and all Towns. Jurisdictions participating in this action will include Lincoln County, City of Merrill, City of Tomahawk, and all Towns.

Hazard: Flood / Dam Failure**Goal:**

Continue compliance with the National Flood Insurance Program and work to reduce flood risk throughout Lincoln County and the Cities of Merrill and Tomahawk.

Goal:

Eliminate the loss of life and reduce the risk of property damage in downstream areas that result from a dam failure.

Please note: actions denoted with an asterisk () relate to compliance with the National Flood Insurance Program (NFIP).*

Action 20*:

Communities within Lincoln County currently participating in the National Flood Insurance Program (NFIP) should work to ensure continued compliance. Compliance primarily entails adopting and enforcing floodplain management regulations that meet minimum criteria. Lincoln County and the cities of Merrill and Tomahawk are in the program. All towns are included under the umbrella of the County through the state mandated county shoreland zoning. These regulations will continue to apply to and be enforced for new and existing buildings and infrastructure.

Participating Jurisdictions for Action 20:

Lead agencies include Lincoln County Planning and Zoning, the City of Merrill and the City of Tomahawk. The only directly participating jurisdictions are Lincoln County, the City of Merrill and the City of Tomahawk.

Action 21*:

To mitigate the long-term impacts of flooding, if evidence of recurring flooding is an issue with specific properties after a significant flood event, the County or other appropriate jurisdiction should investigate, as a possible solution, the voluntary acquisition and removal of buildings in the floodplain with flood damage. Property owners should be informed of their floodplain status and related insurance issues. A survey to gauge interest in buy-out and relocation of properties within the floodplain is recommended to help evaluate the County's options in capturing part of a major stream of federal mitigation dollars.

Participating Jurisdictions for Action 21:

Lead agencies include Lincoln County Planning and Zoning and Emergency Management, the City of Merrill and the City of Tomahawk. Participating jurisdictions will include: Lincoln County, the City of Merrill and the City of Tomahawk.

Action 22:

The County and local units of government should inventory the drainage culverts in roads of their respective jurisdictions. Each culvert should be evaluated for sizing and maintenance status. A program should be implemented that regularly maintains free flow through the culvert and phases in replacement of undersized units. This is critical to minimizing flood damage to roadways and preventing washouts.

Participating Jurisdictions for Action 22:

Lead agencies will be Lincoln County Highway Department, all Cities and all Towns. Jurisdictions participating in this action will include Lincoln County, City of Merrill, City of Tomahawk, and all Towns.

Action 23:

Lincoln County continues to work with owners and operators to review, update and test dam failure Emergency Action Plans (EAP) for each significant and high hazard dam within Lincoln County. FEMA guidelines for dam safety indicate that training and exercises are necessary to maintain operational readiness, timeliness and responsiveness. The status of training and levels of readiness should be evaluated in periodic simulated emergency exercises for response personnel and the dam owner/operator.

Emergency situations and/or dam failures are not common events, but the dams within the County are aging and as a result becoming more of a concern. The EAP can become outdated, lose its effectiveness and no longer be workable if the plan is not practiced. Those involved may become unfamiliar with their roles and responsibilities, especially with the turn over of local officials. If the plan is not updated, the information contained in it may become outdated and useless.

There are five types of exercises, including: orientation seminar, drill, tabletop exercise, functional exercise and full-scale exercise. They range in complexity from simple to more complex, but it is not required that every exercise program include all five types. Lincoln County periodically coordinates such exercises, a tabletop and a functional exercise were completed during this planning process.

Participating Jurisdictions for Action 23:

Lead agency will be Lincoln County Emergency Management. Participating jurisdictions will include the Cities of Merrill and Tomahawk, and those Towns that could be affected, including Bradley, Wilson, Rock Falls, Harding, Merrill, Scott and Pine River. Federal and state officials should also be invited including DNR and State Patrol, as well as dam owners/operators.

Action 24:

In their hazard mitigation issues surveys, both the towns of Birch and Tomahawk indicated the need for improved ditching along town roads, while Town of Corning identified the need for installation of larger culverts to better manage water and control flooding. The Town of Birch is interested in doing improved ditching techniques with rock retainers and sumps for water management to reduce flash flooding.

Participating Jurisdictions for Action 24:

Lead agencies will be the towns of Birch, Corning and Tomahawk. Participating jurisdictions include the towns of Birch, Corning and Tomahawk.

Hazard: Severe Thunderstorm/Hail/Lightning/Wind**Goal:**

Minimize the threat to human life and property damaged caused by severe storms and associated hail, lightning and high wind.

Action 25:

Determine if critical facilities such as hospitals, police buildings, fire halls, administration buildings, schools, and telecommunication antennas are adequately grounded to eliminate lightning damage. Lincoln County Emergency Management could coordinate efforts with cooperation from local units and private operators such as the hospitals.

Where necessary, install lightning grade surge protection devices for critical electronic components used by government, public service and public safety facilities, such as warning systems, control systems, communications and computers.

Participating Jurisdictions for Action 25:

Lead agencies will be Lincoln County Emergency Management, all Cities and all Towns. Jurisdictions participating in this action will include Lincoln County, City of Merrill, City of Tomahawk, and all Towns.

Action 26:

Due to the wide variety of recreation activities throughout the County, public awareness of proven lightening safety guidelines to reduce risk should be promoted. Areas of concern include golf courses, country clubs, parks, ball fields (and other athletic fields), public beaches and boat launches. Efforts should be made to get managers and staff of such facilities "up to speed" with procedures and training for lightning safety. Another common measure is erecting of signs that inform people when to get out of the water or off a golf course (etc.) when lightening threatens.

Participating Jurisdictions for Action 26:

Lead agencies will be Lincoln County Emergency Management, all Cities and all Towns. Jurisdictions participating in this action will include Lincoln County, City of Merrill, City of Tomahawk, and all Towns.

Hazard: Drought/Extreme Heat**Goal:**

Create safety awareness in citizens of Lincoln County to help protect themselves during extreme heat events.

Goal:

Minimize crop loss while maintaining water supplies during times of drought.

Action 27:

To assist the population in reducing heat disorders, the County should promote extreme heat hazards awareness, including safety tips, medical information, and contact information for health officials. Information regarding checking on neighbors or other known residents that live alone or that may be at a disadvantage in fending for themselves should be included.

Participating Jurisdictions for Action 27:

Lead agencies will be Lincoln County Emergency Management and Health Departments, all Cities and all Towns. Jurisdictions participating in this action will include Lincoln County, City of Merrill, City of Tomahawk, and all Towns.

Action 28:

Develop countywide drought mitigation plan to encourage multi-agency approaches to water conservation, drought prediction and stream and groundwater monitoring. Droughts probably have the greatest impact on agricultural and tourism areas, and given the significance of the tourism sector of the County's economy, drought becomes an important hazard to prepare for.

Participating Jurisdictions for Action 28:

Lead agency will be Lincoln County Emergency Management, Land and Water Conservation and UWEX departments. Jurisdictions participating in this action will include Lincoln County, City of Merrill, City of Tomahawk, and all Towns.

Hazard: Forest/Wild Fires**Goal:**

Protect the safety and property of residents from forest and wildfires.

Action 29:

Promote Firewise program and related educational materials to increase community awareness of wildfire risk within the County. The Towns and County should develop education and information for homeowners on protecting their homes and other structures from fires and promote Firewise. Since Lincoln County is mostly rural with vast woodlands, emphasis should be placed on construction and establishing defensible areas around structures. Roofs and exterior siding should be made of ignition-resistant materials. At least 30 feet should be left between homes and surrounding combustible vegetation. Outreach efforts can exist in the form of web sites, local newspaper articles, and pamphlets to homeowners.

Participating Jurisdictions for Action 29:

Lead agency will be local units of government. Participating jurisdiction would include Lincoln County, Wisconsin Department of Natural Resources, City of Tomahawk, all towns and area Fire Departments.

Action 30:

Local units of government should develop driveway ordinances and minimum standards for private roads to support emergency vehicle access where lacking. The ability of emergency response units to reach a site is often the critical factor in the effectiveness of the response. Inadequate private access roads or driveways are common problems in rural areas. In some cases emergency units cannot physically reach a target site due to narrowness, tight corners, steep slopes, etc. Other problems include lack of space to maneuver or turn around.

Participating Jurisdictions for Action 30:

Lead agencies will be all Towns. Jurisdictions participating in this action will include all Towns.

Action 31:

Due to the nature of the pine "fuel" resulting in high risk for wildfire in the northern half of the County, Lincoln County should work with the northern towns, the City of Tomahawk and the Wisconsin Department of Natural Resources to develop an area-wide Community Wildfire Protection Plan (CWPP). Similar conditions also exist in southwestern Oneida County, presenting an opportunity to coordinate on a multicounty collaborative effort. The boundaries of the WisDNR Tomahawk Fire Response Unit make a logical planning area based on the similar conditions and risks throughout.

A CWPP identifies and prioritizes areas for hazardous fuels reduction treatments and recommends types and methods of treatment that will protect at-risk areas and critical infrastructure. WisDNR has grant funding available for community wildfire protection planning.

Participating Jurisdictions for Action 31:

Lead agency will be Lincoln County Emergency Management in conjunction with the Wisconsin Department of Natural Resources. Jurisdictions participating in this action will include: Lincoln County, the City of Tomahawk, the northern Towns, and the WisDNR, as well as Oneida County and towns in southwestern Oneida County.

HAZARD: CYBER ATTACK**Goal:**

Protect Lincoln County computer systems and data from cyber-attack to help ensure continuing, effective operations of county government and emergency services.

Action 32:

Counties must plan to respond to catastrophic cyber events the way plan to manage tornadoes, blizzards or other emergencies: determine which assets are at risk, figure out what they are worth to the county, and put in place the security controls to protect them so that if attacked, the worst does not happen.

The County should implement a multi-layered process of assessment, patching and training to prevent cyber-attacks. These preventive measures are described as follows:

- *Assessment*: ongoing analysis of networks and processes to check for weaknesses
- *Patching*: regularly updating software to fix vulnerabilities
- *Training*: educating staff, elected officials, and all others who access the network about the risks of cyber-attacks and what they can do to keep the network safe

Maintaining an up to date and complete back-up of files is critical for continuity of operations in the event of a major cyber-attack. County IT is working on implementing a new back-up system.

Participating Jurisdictions for Action 32:

Lead agency will be the Lincoln County IT Department. Other jurisdictions with significant computer infrastructure should also follow this recommendation. Jurisdictions participating in this action will include Lincoln County, City of Merrill, and City of Tomahawk.

TABLE 17 SUMMARY OF MITIGATION STRATEGIES LINCOLN COUNTY ALL HAZARDS MITIGATION PLAN					
MITIGATION MEASURES (See Expanded Description in Plan Text)	RESPONSIBLE UNITS	COST ESTIMATE	EXISTING AND POTENTIAL RESOURCES TO IMPLEMENT	PROJECT ** TIMEFRAME	PRIORITY LEVEL
ALL HAZARDS					
1. Continue to promote the increased use of National Oceanic and Atmospheric Administration (NOAA) weather radios.	County EM Dept.	Staff Time	WEM Grant - Possible Radio sales to cover cost.	On-going	MEDIUM
2. Continue to add/update Emergency Management Department link off existing County website.	County EM Dept.	Staff Time	Dept. Budget	On-going	HIGH
3. Verify that back-up utilities are available at all critical facilities, including necessary maintenance.	County / All Cities / All Towns	Staff Time	Dept. Budget	On-going	LOW
4. Create second street to the hospital in the City of Tomahawk. Work with DNR and Corps of Engineers on wetland issues.	City of Tomahawk	Costs to be determined	General Fund / Local Road Aids	2021	HIGH
5. Work toward development of county-wide early warning systems possibly including all telephone message cast (e.g. "Code Red") and cable TV broadcast, among others.	County EM Dept. / All Cities / All Towns	Costs to be determined	General Funds / Dept. Budgets	On-going	HIGH
6. Consider developing county-wide disaster shelter plan possibly including i.d. available shelters, trailer park shelter needs, notification procedures, etc.	County EM Dept. / County Health Dept/ All Cities / All Towns	Costs to be determined	General Funds / Dept. Budgets	On-going	MEDIUM
7. Establish a second well field and water tower for the City of Tomahawk	City of Tomahawk	Costs to be determined	General Fund / US RDA Water Facilities Grant/Loan	2020	LOW
8. Develop Emergency Response Zone Atlas - print and distribute.	Wisconsin DNR / County EM Dept.	20,000	Wisconsin DNR tech. assist. and funding / WEM funding	2019	LOW
9. Establish an "off-site" emergency command post to mitigate proximity of Tomahawk's police, fire and public works facilities to each other and to high hazard threats (LP gas).	City of Tomahawk	150,000	General Fund / Federal Assistance to Firefighters Grant (AFG)	2022	MEDIUM
10. Update radio / emergency communications system interoperability within the City of Merrill.	City of Merrill	Costs to be determined	General Fund / OJA Funding Programs	2020	HIGH
11. Continue to develop and enhance new County EOC location as well as County mobile command post.	County EM Dept. / Sheriff's Office	Costs to be determined	General Fund / OJA Funding Programs	2022	MEDIUM

MITIGATION MEASURES (See Expanded Description in Plan Text)	RESPONSIBLE UNITS	COST ESTIMATE	EXISTING AND POTENTIAL RESOURCES TO IMPLEMENT	PROJECT ** TIMEFRAME	PRIORITY LEVEL
12. Address gaps in emergency interoperable communications coverage by installing communications towers/repeaters in problems areas like western Corning and the far northwest corner of County.	County EM Dept. / Sheriff's Office	Costs to be determined	General Fund / OJA Funding Programs	2021	HIGH
13. Improve addressing / fire number signing to improve emergency response in Town of Tomahawk.	Town of Tomahawk	Staff Time	Fee for address plaques.	2018	HIGH
14. Town of Harding should develop a local emergency response plan.	Town of Harding	Staff Time	General Fund	2018	MEDIUM
15. Town of Merrill should install emergency generator at Town Hall.	Town of Merrill	\$20,000	General Fund	2019	MEDIUM
16. Lincoln County should develop a Continuity of Operations / Government (COOP / COG) Plan.	County EM Dept. / Co. Administration	Staff Time	Dept. Budgets	2020	HIGH
TORNADO					
17. Analyze water towers for tornado strength.	City of Merrill / City of Tomahawk	Costs to be determined	General Funds	2019	MEDIUM
18. Encourage mobile homes and exterior attachments such as carports and porches to have tie-downs with ground anchors.	County P&Z Dept. / All Cities / All Towns	Staff Time	Dept. Budgets	On-going	LOW
WINTER STORM / EXTREME COLD					
19. Promote winter hazards awareness including home and travel safety measures.	County EM Dept. / All Cities / All Towns	Staff Time	Dept. Budget	Annual	LOW
FLOOD / DAM FAILURE					
20. County/City continued compliance in the National Flood Insurance Program (NFIP)*.	County P&Z Dept. / City of Merrill / City of Tomahawk	Staff Time	Dept. Budgets	On-going	MEDIUM
21. If evidence of recurring flooding is an issue with specific properties after a significant flood event, investigate, as a possible solution, the voluntary acquisition/removal of buildings in a floodplain with flood damage.* (FEMA NFIP requirement)	County P&Z Dept. / City of Merrill / City of Tomahawk	Costs to be determined	Mitigation Grants	As needed	MEDIUM
22. Culvert sizing evaluation and maintenance program.	County Hwy Dept. / All Cities / All Towns	Costs to be determined	Dept. Budgets	On-going	MEDIUM
23. Continue to work with dam owners to maintain EAPs for each significant and high hazard dam.	County EM Dept.	Staff Time	Dept. Budget	On-going	HIGH

MITIGATION MEASURES (See Expanded Description in Plan Text)	RESPONSIBLE UNITS	COST ESTIMATE	EXISTING AND POTENTIAL RESOURCES TO IMPLEMENT	PROJECT ** TIMEFRAME	PRIORITY LEVEL
24. Improve ditching and culverts along town roads in Birch, Corning and Tomahawk to better manage water and control flooding.	Towns of Birch, Corning, and Tomahawk	Costs to be determined	General Funds	On-going	MEDIUM
SEVERE THUNDERSTORM / HAIL / HIGH WIND / LIGHTNING					
25. Determine if critical facilities are adequately grounded to eliminate lightning damage. Install surge protection as necessary.	County EM Dept. / All Cities / All Towns	Staff Time	Dept. Budget	2018	LOW
26. Promote lightning safety awareness to reduce risk.	County EM Dept. / All Cities / All Towns	Staff Time	Dept. Budget	Annual	HIGH
DROUGHT / EXTREME HEAT					
27. Assist population with reducing heat disorders through awareness program as needed.	County EM Dept. / County Health Dept / All Cities / All Towns	Staff Time	Dept. Budgets	As needed	LOW
28. Develop countywide drought mitigation plans for multi-agency approaches to water conservation, drought prediction, stream and groundwater monitoring.	County EM Dept. / County Land Conservation / County UWEX	Staff Time	Dept. Budgets	As needed	LOW
FOREST / WILD FIRE					
29. Promote Firewise program and related educational materials to increase community awareness of wildfire risk within the County.	Wisconsin DNR / Local fire depts / all towns	Staff Time	Dept. Budget	Annual	MEDIUM
30. Develop driveway ordinances and private road standards as well as possible zoning recommendations to ensure emergency vehicle access where lacking.	Various Towns	Costs to be determined	General Funds	2022	LOW
31. Develop "area-wide" Community Wildfire Protection Plan For Tomahawk fire district covering northern Lincoln County and southwestern Oneida.	County EM Dept. / northern Towns / City of Tomahawk / WisDNR	24,999	WisDNR National Fire Plan Funding	2020	MEDIUM
CYBER ATTACK					
32. Implement multi-layered process of assessment, patching, and training to prevent cyber-attacks.	County IT Dept. / City of Merrill / City of Tomahawk	Costs to be determined	Dept. Budgets / General Funds	On-going	HIGH
*Denotes actions related to compliance with NFIP. ** Actual project implementation dependent on funding and staff availability.					

INTRODUCTION

Part V of the Lincoln County All Hazards Mitigation Plan Update describes the plan adoption, implementation, monitoring, evaluation and maintenance.

PLAN UPDATE ADOPTION

The adoption of the Lincoln County All Hazards Mitigation Plan Update lends itself to serve as a guiding document for all local government officials. It also certifies to program and grant administrators from the FEMA and WEM that the plan's recommendations have been properly considered and approved by the governing authority and the jurisdiction's citizens. Finally, it helps to ensure the continuity of mitigation programs and policies over time because elected officials, staff, and other community decision-makers can refer to the official document when making decisions about the community's future.

Before adoption of the Plan Update by the incorporated areas, the update must be sent to the state and federal level to verify that all DMA2K requirements are met. Once a draft of the updated Plan has been completed, it is submitted to the State Hazard Mitigation Officer (SHMO) at the state level at WEM. Previous drafts of the update have already been reviewed prior to this submittal. The SHMO will determine if the updated Plan meets DMA2K and/or other state program requirements. Upon approval of the draft by WEM, the SHMO is responsible for showing the update to the FEMA Region V Office for review.

Prior to final approval by WEM and FEMA, the update must be formally adopted by Lincoln County and its incorporated areas by resolution. Incorporated communities that do not adopt the Plan Update cannot apply for mitigation grant funds unless they opt to prepare, adopt, and submit their own plan. Adoption of the Plan Update gives the jurisdiction a legal basis to enact ordinances, policies, or programs to reduce hazard losses and to implement other mitigation actions.

All general purpose units of government (i.e. cities, towns) within Lincoln County were offered one or more avenues to participate in the development of this Plan Update. Adoption of the Plan by a local unit of government certifies their participation. The Lincoln County Board has adopted this Update. Resolutions of adoption are contained in APPENDIX B.

PLAN UPDATE IMPLEMENTATION**Administrative Responsibilities**

Once the Plan Update has been approved, stakeholders must be informed. The County Emergency Management Director will distribute copies to stakeholders. The County will make the Plan Update available to the public by linking the report on the Internet.

Along with monitoring the progress of the action projects, Lincoln County's Emergency Management Director and Emergency Management Committee should also work to secure funding to implement the Plan Update. State and federal agencies, nonprofit organizations, and foundations continually make grants available. Emergency Management should research these grant opportunities to determine eligibility for the County and its local units of government.

When implementing this Plan Update, innovative ways should be considered to involve active participation from nonprofit organizations, businesses, and citizens to implement the Update. The relationship between these groups will result in greater exposure of the Plan Update and provide greater probability of implementation of the action projects listed.

The role of department administrators, elected officials, and local administrators are to ensure that adopted actions from Part IV are considered in their budgets. It is understood that projects may not be carried out as they are scheduled in Part IV due to budget constraints. However, since many of these action projects are considered an investment in safeguarding the public's health, safety, and property, they should be carefully considered as a priority.

Promote Success Of Identified Projects

Upon implementing a project covered by this Plan Update, it is important to promote the accomplishment to the stakeholders and to the communities. This will help inform people that the update is being implemented and is effective.

Incorporation Into Other Local Planning Mechanisms

FEMA requires a process by which the mitigation plan is incorporated into other planning mechanisms where appropriate. When undergoing any planning process, County departments, local units of government and/or any professional staff assisting them, typically review and incorporate any related pre-existing plans as a matter of course. However, to help ensure this outcome, Lincoln County has established a two-part process to incorporate the All Hazards Mitigation Plan into other County and local planning efforts as follows:

- Notification of County Departments and Local Units of Government - Upon adoption of the All Hazards Mitigation Plan, the County EM Director will distribute a letter that explains how the Plan applies to other planning efforts they might undertake and how to obtain copies of the Mitigation Plan.
- Promotion by EM Director - The EM Department will promote incorporation of the All Hazards Mitigation Plan as the EM Director is made aware of or becomes a participant in any new planning process.

The upcoming County Comprehensive Plan Update has been identified for incorporation of the All Hazards Mitigation Plan, as follows:

Lincoln County Comprehensive Plan

The following concepts will be considered when developing the next Lincoln County Comprehensive Plan Update, based on the nine elements of the Wisconsin comprehensive planning law:

- *Issues and Opportunities Element* – a summary of major hazards local government is vulnerable to, and what is proposed to done to mitigate future losses from the hazards.
- *Housing Element* – an inventory of the properties that are in the floodplain boundaries, the location of mobile homes, recommendation on building codes, shelter opportunities, and a survey of homeowners that may be interested in a voluntary buyout and relocation program.
- *Utilities and Community Facilities Element* – identify critical facilities such as shelter, schools, medical, water infrastructure, etc. and make recommendations on how to mitigate specific risks factors
- *Transportation Element* – identify any transportation routes or facilities that are more at risk during flooding, winter storms, or hazardous material spills.
- *Agricultural, Natural Resources, and Cultural Resources Element* – identify the floodplains and agricultural areas that area at risk to hazardous events. Incorporate recommendations on how to mitigate future losses to agricultural areas.
- *Economic Development Element* – describe the impact past hazards have had on County and municipal business.
- *Intergovernmental Cooperation Element* - identify intergovernmental police, fire, and rescue service sharing agreements that are in effect, or which may merit further investigation, consider cost-sharing and resource pooling on government services and facilities.
- *Land Use Element* - describe how flooding have impacted land uses and what is being done to mitigate negative land use impacts from flooding; map and identify hazard areas such as floodplains, hazardous materials areas, and soils with limitations.
- *Implementation Element* – have action plans from this Plan implemented into comprehensive plans.

PLAN UPDATE MONITORING, EVALUATION AND MAINTENANCE

Planning is an ongoing process. Because of this, this document should grow and adapt in order to keep pace with growth and change of the County and its local jurisdictions. DMA2K requires that local plans be evaluated and updated at least every five years to remain eligible for assistance.

The Plan will be monitored and evaluated on an annual basis as needed by Emergency Management. The Lincoln County Emergency Management Director will evaluate incoming information against the contents of the Plan to determine possible need for revisions; and bring that information to the County Public Safety Committee to discuss the evaluation and potential revisions to the Plan as needed. The Emergency Management Director is encouraged to consult/coordinate with the NCWRPC in the event of any revision.

Plan monitoring also includes evaluating and revising following disaster events to determine if the recommended actions are appropriate given the impact of the event. The risk assessment (Part III) should also be reviewed to see if any changes are necessary based on the pattern of disaster damages.

Full updates are required every five years. As a result, every fifth year, the review will be expanded to an overall plan update to meet FEMA requirements. All stakeholders and the public will again be involved in the update process. The County will conduct a survey and open comment meeting. This also provides an opportunity to inform on the progress of any projects.

The Lincoln County Emergency Management Committee and County Board must approve all changes and updates to the Plan.

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