Contents: Pemiscot-Dunklin Electric

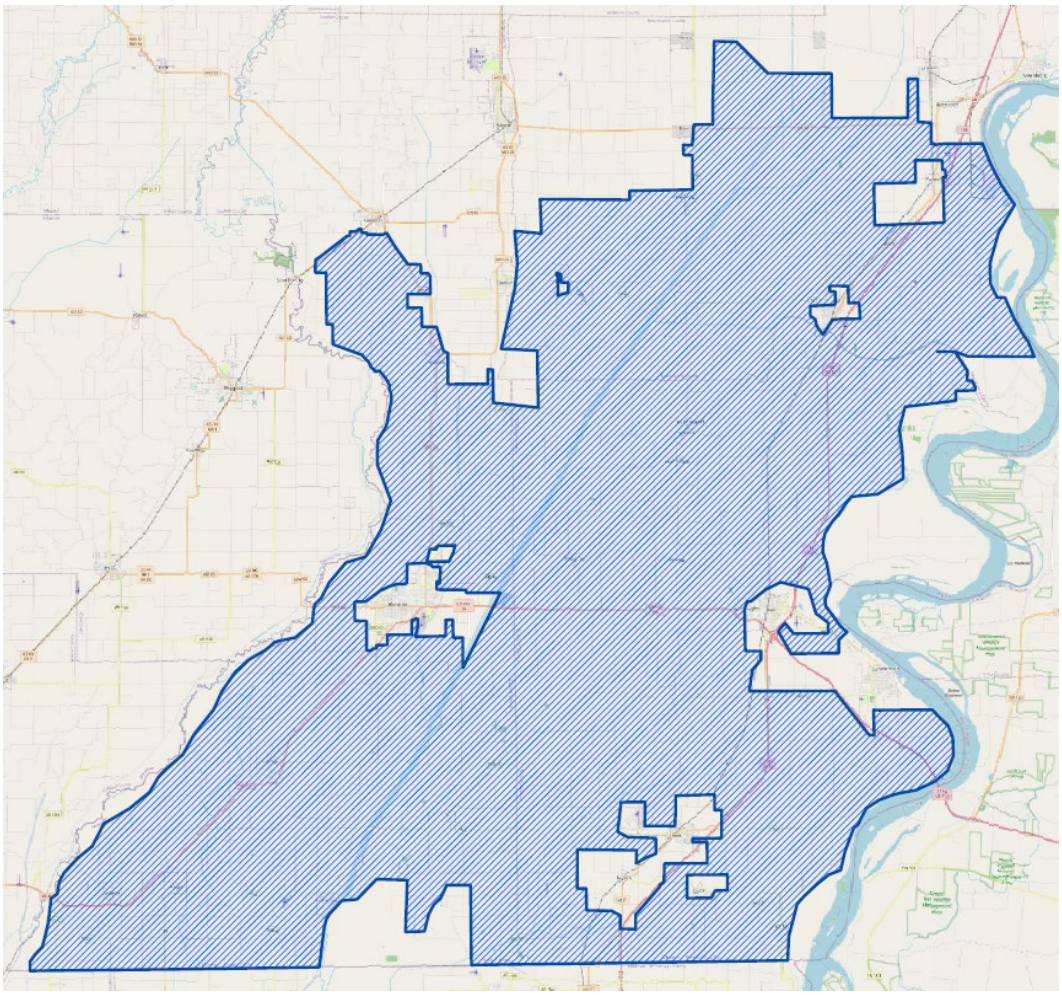
Section 1: Introduction

Pemiscot-Dunklin Electric Cooperative (PDEC) was established in 1937 to provide electric service to the rural areas of southeast Missouri. PDEC is headquartered near Hayti, Missouri, and provides service to customers in Pemiscot, Dunklin, and New Madrid counties in Missouri. The cooperative is run by a board of nine directors which approve the company's mission and internally developed business policy:

"Pemiscot-Dunklin Electric Cooperative is dedicated to providing our members with a reliable, competitively-priced, high-quality supply of electric energy, while adhering to cooperative principles and striving to improve the quality of life for all members through a highly trained, efficient staff."

PDEC's service boundaries within the state of Missouri include Pemiscot and Dunklin counties in their entirety as well as the southern portion of New Madrid County. The cooperative owns 1,252 miles of service line within these counties. Figure 1 depicts the geographic boundaries of the cooperative in relation to USGS local quadrangles within the state of Missouri. *(Map sources: www.usgs.gov, Association of Missouri Electric Cooperatives, Pemiscot-Dunklin Electric Cooperative.)*

Figure 1 *PDEC Boundaries Map*



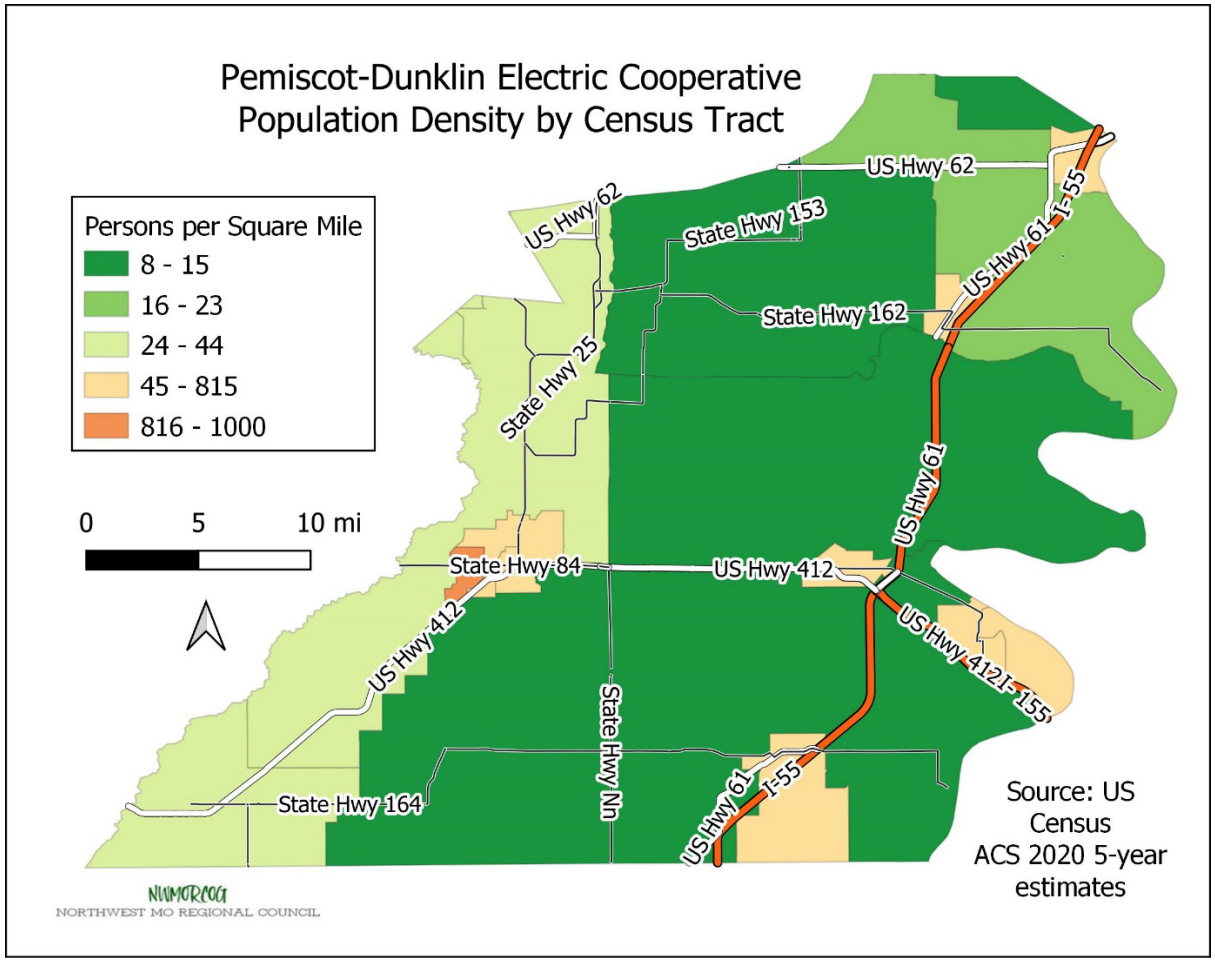
The customer base of PDEC currently exceeds 8,625 members in the three-county service area. Residential customers account for 62% of membership while nonresidential customers make up 38%. All of those members are located in the state of Missouri. Table 1 provides the summary of metered customers by Missouri County.

Table 1 *Meters by Missouri County*

County	Number of Meters
Pemiscot	2,235
Dunklin	5,206
New Madrid	1,184
Total	8,625

The average daily customer usage for PDEC is 48 kilowatt-hours (kWh). Annual total usage of PDEC customers in 2021 was 152,343,375 kWh of service. Population density for the cooperative service area is depicted in Figure 2 (*Map source: U.S. Census 2020*).

Figure 2 *Population Density Map*



Critical Facilities

It is important in mitigation planning for the Electric Cooperatives to identify the critical facilities in each area and to be able to prioritize reconnection and back-up power needs. PDEC does not provide service to any critical facilities (hospitals, emergency services, etc.) or higher education institutions, but does provide service to large industrial centers.

Future Development

The major areas of growth for electric service have been to industry and agricultural businesses while seeing decline in the number of residential customers. PDEC is in the process of completing construction for a fiber network throughout our electric service area and extending into towns within the area but not serviced with electricity. PDEC leases this infrastructure to its wholly owned subsidiary who provides internet, voice, and video services to its customers.

PDEC operates on a $22 million operating budget annually and has planned to make almost $6 million in capital improvements in 2022 as we finalize the fiber network and make improvements to the electric grid to ensure reliable service to our membership.

Table 2 below illustrates the population trend for the counties served by PDEC.

Table 2 *County Population Trend, 1990-2030*

County	1990	2000	2010	2020	2030 Projected
Dunklin	33,112	33,155	31,953	28,878	28,765
New Madrid	20,928	19,760	18,956	16,693	12,554
Pemiscot	21,921	20,047	18,296	15,600	16.,447
Source: U.S. Census Data					

Planning Process

Since the planning process is the same for each of the electric cooperative plans, the details of the planning process are presented in the Statewide Summary section of the plan.

Appendices

Three appendices are included at the end of each plan:

Appendix A contains the Adoption Resolution; a document signed by the Cooperative's governing official showing that the Board of Directors has adopted the mitigation plan.

Appendix B contains the Documentation of Participation; copies of press releases, website postings and other public outreach that was made to request public comment.

Appendix C contains the Surveys; the Data Survey that is the source of data for the 2023plan update; the Goals and Actions Survey is the updated review of the mitigation strategies.

Section 2: Asset Inventory

Pemiscot-Dunklin Electric Cooperative has a wide variety of assets by type. Real estate owned by the company includes office buildings, warehouses, garages, and other outbuildings throughout the service area. PDEC does not own any electric generation or transmission infrastructure. 1,504 miles of distribution lines are owned and maintained by PDEC. Table 3 provides information concerning total asset valuation.

Table 3 *Pemiscot-Dunklin Asset Inventory Valuation Summary*

Asset	Total Replacement Cost	Cost Breakdown
Total PDEC Assets	$262,622,984	Buildings and vehicles - $11,683,559 Overhead assets - $225,518,145 Underground assets - $25,421,280
Distribution Lines	Overhead (OH) $76,428,000 Underground (UG) $21,491,280	OH Single-phase lines - $29,784,000 UG Single-phase lines - $4,067,280 OH Three-phase lines - $46,644,000 UG Three-phase lines - $17,424,000
Supporting Infrastructure	$88,799,485 OH $4,623,500 UG	Meters - $11,605,350 Poles - $45,099,360 OH Transformers - $32,745,000 UG Transformers - $3,930,000 Guys/Anchors - $19,730,970 Cross-arms - $4,228,065 Regulators - $8,154,000 SP Oil-Circuit Reclosures - $1,192,500 3 phase Oil-Circuit Reclosures - $20,790,000 Capacitors - $5,544,000
Office Buildings	$3,331,352	
Warehouses	$5,370,981	
Vehicles	$2,981,226	
Source: Internal Pemiscot-Dunklin Accounting and Insurance records		

Ensuring quality distribution to its customers, Pemiscot-Dunklin maintains not only distribution lines, but also the supporting infrastructure as well.

PEMISCOT-DUNKLIN ELECTRIC COOPERATIVE

Table 4 includes a list of asset types, emergency replacement cost per unit or mile, the asset inventory by Service County, and total infrastructure numbers.

Table 4 *Pemiscot-Dunklin Asset Inventory by Service County*

Asset	Emergency Replacement Cost per unit or mile	Number of units or miles: PEMISCOT	Number of units or miles: DUNKLIN	Number of units or miles: NEW MADRID	Number of units or miles: TOTAL
Meter	SP $900 TP $2,550	SP 1,776 TP 717	SP 5,036 TP 834	SP 1,184 TP 178	7,996 SP 1,729 TP
Pole	$1,440/ unit	10,616	15,081	5,622	31,319
SP*** Distribution Line	OH $51,000/mile UG $96,840/mile	OH 192 UG 11	OH 255 UG 22	OH 137 UG 9	584 OH 42 UG
TP**** Distribution Line	OH $78,000 UG $396,000	OH 249 UG 13	OH 256 UG 28	OH 93 UG 3	584 OH 42 UG
Transformers	OH $3,300 UG $7,500	OH 3,387 UG 139	OH 5,151 UG 289	OH 1,285 UG 96	9,923 OH 524 UG
Guys/anchors	$2,100/unit	3,185	4,524	1,687	9,396
Cross-arms	$270	5,308	7,541	2,811	15,660
Regulators	$54,000	63	60	28	151
Oil Circuit Reclosures	SP $7,500 TP $54,000	SP 48 TP 160	SP 77 TP 170	SP 34 TP 55	159 SP 385 TP
Capacitors	$24,000/unit	75	120	36	231
Total Replacement Value by County		$81,428,130 OH $7,255,740 UG	$105,761,505 OH $15,385,980 UG	$ 21,781,065 OH $719,840 UG	$225,518,145 OH $25,421,280 UG

*OH = overhead **UG = underground ***SP = Single phase ****TP – Three phase
Source: Internal Pemiscot-Dunklin Accounting and Maintenance records

Section 3: Risk Assessment

Risk Assessment Methodology

The risk assessment methodology used in the following section was utilized for both the statewide aggregation as well as for each individual cooperative chapter. Section 4 of the Statewide Summary details this methodology. Some variation in the availability of data exists between the electric cooperatives as each utilizes a different system of recording the impact of natural disasters.

For the purpose of this risk assessment, the identified hazards for the PDEC service area have been divided into two categories: **historical and non-historical hazards**. Based on the data collected for the update, the hazards have been reclassified to reflect the actual data available and those hazards with no data available have been reclassified as non-historical. This does not mean that a non-historical hazard will never cause damage; it just means there have been no impacts prior to this report. The potential still exists, but the probability of the occurrence is numerically near zero. For the analysis in this plan non-historical hazard probability is stated as less than one.

> **Historical Hazards** are those hazards with a measurable previous impact upon the service area. Damage costs per event and a chronology of occurrences are available. The associated vulnerability assessments utilize the number of events and cost of each event to establish an average cost per incident. For PDEC, hazards with historical data include tornadoes, severe thunderstorms/high wind/hail, flood/levee failure and severe winter weather.
>
> **Non-historical Hazards** are hazards with no previous record of impact upon the local service area. As such, the associated vulnerability assessments for each of these hazards will have an occurrence probability of less than 1% in any given year, but the extent of damage will vary considerably. For PDEC, hazards without historical data include wildfire, earthquakes, and dam failure.

Each hazard has a unique impact upon the service area, requiring each hazard to utilize a different valuation amount depending upon the level of impact. Non-historical hazards assume damage to all general assets. For Historical Hazards, assets were divided into two groups based upon historical impact which were utilized in the hazard damage analysis:

- Overhead infrastructure assets and buildings
    - Used for:
        - Tornado damage assessments
            - Valued at $237,201,704
- Overhead infrastructure assets only
    - Used for:
        - Severe Thunderstorm / High Wind / Hail
        - Flood
        - Severe Winter Weather
            - Valued at $225,518,145

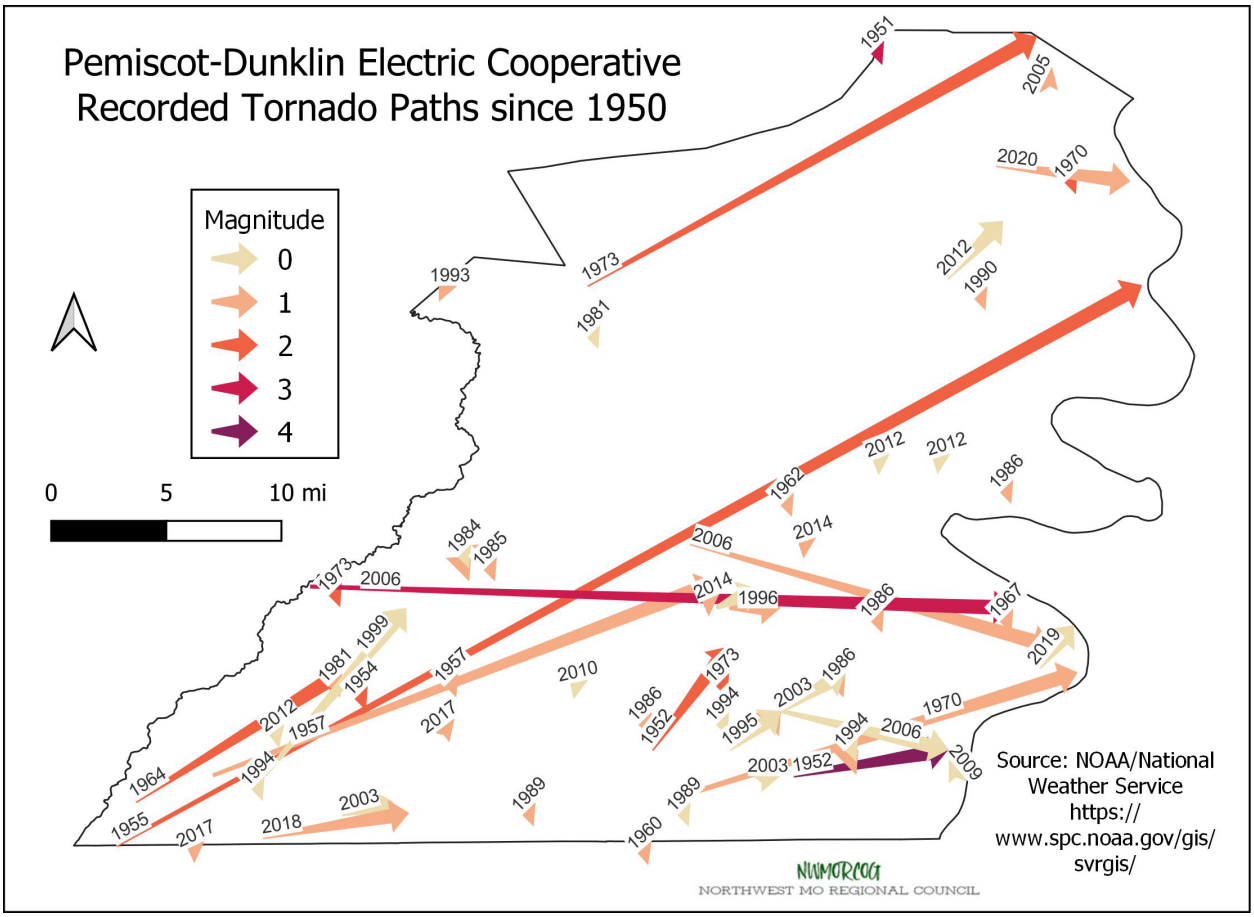
A. Historical Hazards

Tornadoes

Previous Occurrences

From 1950-2020, 61 tornadoes have been reported within the Pemiscot-Dunklin Cooperative boundaries. Figure 3 provides a pictorial representation of all recorded tornado touchdown sites and recorded path. *(Data for map collected from National Oceanic and Atmospheric Administration, NOAA.)*

Figure 3 *Tornado Map*



For the purpose of this assessment, the years for which records exist for PDEC have been used. From 2006-2016, Pemiscot-Dunklin's service area within the state of Missouri has experienced a total of 13 tornadic events.

Probability of Future Occurrence and Vulnerability

Using the 71-year period, 1950-2020, there is an 86% probability of a tornado, with an average annual number of tornado events is .86. Estimated cooperative material damages associated with each of these events were compiled by PDEC staff. Two occurrences caused damage to cooperative assets during the

years existing in cooperative records. The probability that a tornado that produces damage to PDEC's assets will occur in any given year is 12.5%.

Table 5 provides a summary of event dates, EF-scale ratings, and damage cost estimates. Information on reported outages was not available.

Table 5 *PDEC Tornadic Event Summary*

Date of event	EF Scale rating	Damage estimates
4/2/2006	EF2	$8,000,000
12/10/2021	EF4	$1,200,000
	Totals	$9,200,000
Data provided based on internal PDEC records which reflect cost from the referenced event year.		

Based upon the last 16 years of historical event records tornado events will cause an average annual damage of $575,000. This averaged amount accounts for less than 0.5% of PDEC's total overhead assets and building valuation of $237,201,704.

Average annual outages were not recorded during tornadoes since 2006. It can be projected that less than 1% of all meters may experience outages during any given year due to a tornadic event.

Problem Statement

Although PDEC has only one recorded event which has resulted in damages, tornadoes are potentially such violent events that it is cost prohibitive to build an infrastructure that can withstand such powerful winds. Strategies could be developed or improved, if already in place, to ensure that employees are warned of approaching storms when in the field. Procedures to restore power after outages should be reviewed regularly to ensure that power is restored to critical facilities as quickly as possible.

Severe Thunderstorms, High Wind, Hail

Previous Occurrences

For the period starting in January 1997 and ending at the end of June 2017, the three counties containing Pemiscot-Dunklin's service area have experienced a total 104 days of hail events. Hail events have resulted in over $153,000 in estimated property damage for the residents of the three counties according to NOAA's Storm Event Database. For this same time period, 132 days of thunderstorm/high wind events were reported. Property damage was reported for the three-county area on 103 of those storm days.

For this update, it was possible to look at the bounds of the Pemiscot Electric Cooperative using GPS, finding 211 hail events and 282 high wind/thunderstorm events from 1955-2020.

Probability of Future Occurrence and Vulnerability

The average annual number of days with a hail storm for the area is 3.2; while the average annual number of days with a thunderstorm/high wind event is 4.3. PDEC provided information on two damaging storms for the 25 year time period. The event in May 2017 resulted in over 60 broken poles due to measured wind gusts of 76 mph. Two damaging storms occurred during the years existing in cooperative records.

This is a probability of 8% that a damaging thunderstorm will occur in any given year. Table 6 shows a summary of Severe Thunderstorm events.

Table 6 *PDEC Severe Thunderstorm, High Wind or Hail Event Summary*

Event Date	Damage Estimates
March 2017	$70,000
May 2017	$273,800
Total	$343,800
Data provided based on internal PDEC records which reflect cost from the referenced event year.	

Based upon historical records, thunderstorm hail/high wind events will cause an average annual damage of $13,752. This averaged amount accounts for less than 0.1% of PDEC's overhead asset valuation of $225,518,145.

No outages were recorded during hail, thunderstorm, and high wind events since 1997. When compared with the total number of meters served by PDEC, it can be projected that less than 1% of all meters may experience outages during any given year due to a hail, thunderstorm, or high wind event.

Problem Statement

Thunderstorms producing hail and high winds are events that occur several times each year in the service area. Since the trend has been towards more intense storms over the last decade, replacing wooden poles with manufactured ones whenever possible is recommended.

Flood and Levee/Dam Failure

Flood and levee/dam failure carry, perhaps, the greatest ongoing potential threat to the existing infrastructure of the Pemiscot-Dunklin Electric Cooperative. In Pemiscot, Dunklin and New Madrid Counties, approximately 65% of the cooperative service area in is located directly within the 100 year floodplain.

Previous Occurrences

From 1997 through June, 2017, the counties containing PDEC's service area has experienced 78 days of flooding events. This includes both flash and riverine floods. Currently, inundation data for levee/dam failure is lacking due to issues surrounding mapping, appropriate models, and its close association with flooding events. The events in March 2011 were especially noteworthy as told in this event narrative from NOAA's Storm Event Database:

"The U.S. Army Corps of Engineers activated the New Madrid Floodway by detonating a levee at Birds Point in Mississippi County. The intentional levee breach relieved pressure on levees along the lower Ohio River and portions of the Mississippi River. The blast that opened the levee shattered windows in Mississippi County and rattled windows as far away as Paducah, Kentucky. The flash flood caused by the levee breach was anticipated for days, and evacuations had been completed beforehand. Over 130,000 acres of prime farmland were submerged. Dozens of homes were flooded. A primary national insurer

estimated property losses were around 100 million dollars within the floodway. The westward extent of the flash flood was limited by a second set of levees designed to channel the water back toward the Mississippi River. The floodway remained submerged for the remainder of the month."

To update this data, NCEI reported 4 flood events occurring during the past five years in the area. PDEC did not report any additional damages or outages since the last update.

Figure 4 below depicts the 100 year floodplain in relation to the cooperative's boundaries. *(Map sources: FEMA HAZUS-MH; DFIRMS; Missouri Office of Administration, and AMEC)*

Figure 4 *100 Year Floodplain*

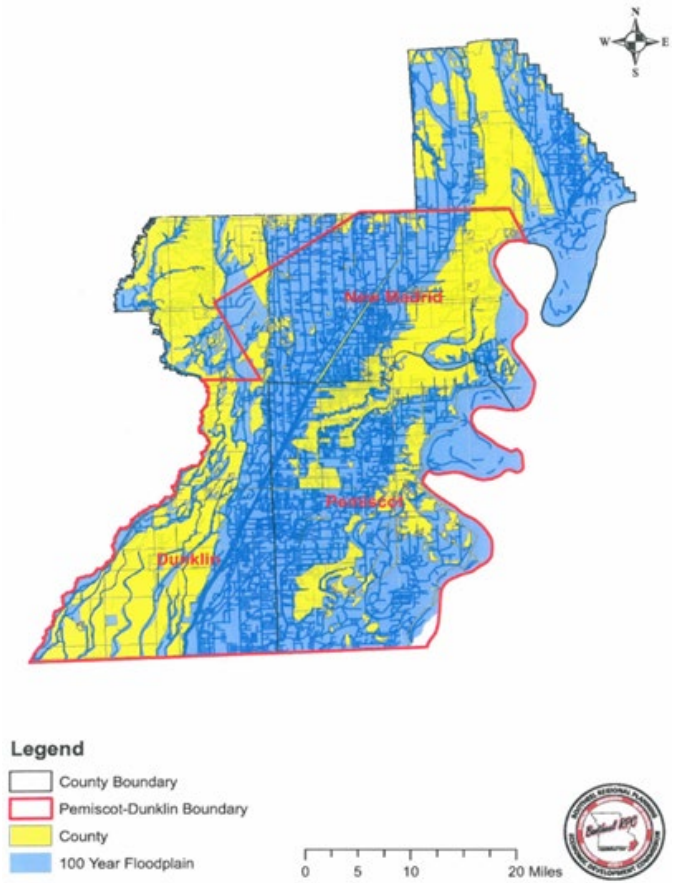


Figure 5 on the next page provides the location of known state and federal levees within the cooperative's boundaries. (*Map sources: Bootheel RPC)*

Figure 5 *Levee Map*

Probability of Future Occurrence and Vulnerability

Estimated material damages associated with flood events were compiled by the PDEC staff. Table 7 summarizes flood event dates by month and damage cost estimates. Outage information was not available. One occurrence caused damage to cooperative assets during the years existing in cooperative records. For 25-year time period the probability of a damaging flood in any given year is 4%

Table 7 *PDEC Flood Event Summary*

Event Date	Damage Estimates
3/4/2011	$15,000,000
Data provided based on internal PDEC records	

Flood events vary widely based upon numerous factors including, but not limited to, annual precipitation. Based upon historical records, flood events will cause an average annual damage of $600,000. This averaged amount accounts for 0.5% of Pemiscot-Dunklin's overhead asset valuation of $225,518,145.

Outages were not recorded during flooding events since 1997. When compared with the total number of meters (8,625) served by PDEC, it can be projected that less than one percent of all meters may report outages during any given year due to a flooding event.

Problem Statement

The Pemiscot-Dunklin Electric Co-operative service area is protected from Mississippi River flooding by a mainline levee along the Mississippi River. The levee borders the entire length of Scott, Mississippi and New Madrid counties. In order to protect locations in Missouri and counties bordering the river from flooding, when the river gauge on the Ohio River in Cairo, Illinois reaches 50 feet, federal law requires the US Army Corps of Engineers to artificially breach the mainline levee. The levee will be breached in Mississippi County which is located just north of New Madrid County. By breaching the levee in Mississippi County and utilizing the Birds Point-New Madrid Floodway pressure will be relieved on levees and dam below the breach. As long as the mainline levee contains the Mississippi River, other counties in the service area will be spared major flooding.

Flash flooding tends to be a greater threat to PDEC service as is evidenced by loss claims and historical data. A large portion of the service area is located in the 100-year flood zone and subject to flooding of some nature. The flooding tends to rise fast and recede in the same manner as long as river levels allow it to do so. Prolonged periods of elevated river levels can and does slow the movement of water out of the county. A breach of the mainline levee is of major concern to PDEC service area as evidenced by the 2011 event. Additional measures should be considered to minimize the effects of this hazard.

Severe Winter Weather

Previous Occurrences

From 1997-2016, Pemiscot-Dunklin's service area has experienced 39 days of severe winter weather events, including heavy snowfall and ice storms. The winter and ice storms of January 2009 resulted in an estimated $72 million in property damage for the residents of the three-county area. To update this data, NCEI reported 8 winter weather events occurring during the past five years in the area. PDEC did not report any additional damages or outages since the last update.

Probability of Future Occurrence and Vulnerability

The probability of a severe winter weather event in the PDEC service area in any given year is 100% with an average annual of 1.6 events. One occurrence in the years existing in cooperative records, an ice storm on January 12, 2007, caused damage to cooperative assets, resulting in a 5% probability that severe winter-weather will result in damage to PDEC in any given year. Table 8 on the next page provides a summary of event dates, types, and associated damage estimates.

Table 8 *PDEC Severe Winter Weather Event Summary*

Event Date	Event Type	Damage Estimates
1/26/2009	Ice storm	$60,000,000
Data provided based on internal PDEC records which reflect cost from the referenced event year		

Based upon these historical records, severe winter weather events will cause an average annual damage of $2,400,000. This averaged amount accounts for 1% of PDEC's total overhead asset valuation of $225,518,145.

PDEC was not able to provide outage data. With the large amount of damage due to ice storms that has occurred, it is projected that up to 10% or 862 meters may experience an outage due to severe winter weather in any given year.

Problem Statement

Underground placement of assets remains the best protection against damage from ice storms.

B. Non-historical Hazards

Wildfire

Previous Occurrences

Wildfire events have occurred in each of the three counties. Table 9 summarizes the incidences of wildfire within the three counties. Wildfire data is only available by county and PDEC's service area includes all of Pemiscot and most of Dunklin Counties. Only the southern half of New Madrid County is serviced by PDEC, so the actual numbers for its service area will be lower than is shown in Table 9.

Table 9 *Wildfire Summary by County*

County	# of Wildfires, 2004-2016	Average Annual # of Wildfires	Acres Burned	Average Annual Acres Burned
Dunklin	14	1	24	2
Pemiscot	74	6	302	23
New Madrid	98	8	167	13
Totals	186	15	493	38
Source: Missouri State Hazard Mitigation Plan, 2018				

Probability of Future Occurrence and Vulnerability

The probability of a wildfire event in the PDEC service area in any given year is 100% with an average annual of 15 wildfires throughout the three-county area. Although PDEC does not have records of any significant damage from wildfires, for the purposes of this assessment, wildfire and its associated impacts cannot be eliminated from the realm of possibility.

With an average annual of 493 acres burned in the area, and a total three-county area of 1,124,480 acres, it is unlikely that infrastructure damage would exceed one percent based upon asset location and the unlikeliness of an uncontrollable wildfire.

No customers have reported outages during recorded wildfires. When compared with the total number of customers served by PDEC, it can be projected that less than 1 percent of all customers may report outages during any given wildfire event.

Problem Statement

Further study will be required to create a model for damage assessments related to wildfire.

Earthquakes

Previous Occurrences

The PDEC service area lies on the New Madrid Fault, which runs from Northern Arkansas through Southeast Missouri and Western Tennessee and Kentucky to the Illinois side of the Ohio River Valley.

The New Madrid Fault is still an active fault. During the first twenty days of August 2017, twenty-four earthquakes occurred, ranging from 0.9 to 3.2 in magnitude.

Probability of Future Occurrence and Vulnerability

Scientists from the U.S. Geological Survey and the Center for Earthquake Research and Information at the University of Memphis have updated their expectations for earthquakes in the New Madrid Seismic Zone. The new forecasts estimate a 7 to 10 percent chance, in the next 50 years, of a repeat of a major earthquake like those that occurred in 1811-1812. There is a 25 to 40 percent chance, in a 50 year time span, of a magnitude 6.0 or greater earthquake.

Based upon those projections and risk factors, the counties served by PDEC could experience the following damage shown in Table 10.

Table 10 *Modified Mercalli Earthquake Damage Levels*

County	Potential Damage
Pemiscot County	Modified Mercalli Levels X (8.0+)
Dunklin County	Modified Mercalli Levels IX (6.7-7.6)
New Madrid County	Modified Mercalli Levels X (8.0+)

In the event of an earthquake with a magnitude of 7.0 or greater, the PDEC service area is most likely to experience significant damage due to liquefaction. Distribution lines, overhead and underground, transformers, substations, and office/maintenance facilities could receive moderate to major damage. Power outages throughout the area could occur and require extensive time and expense to repair.

The 2013 Missouri Hazard Mitigation Plan used Hazus to model a worst case scenario of a 7.7 magnitude event. In this analysis the PDEC service area would suffer losses of 30.1 to 76.2%.

Based upon information from CERI, FEMA, and SEMA, it may be estimated that in excess of 4,340 customers could report outages related to an earthquake event. When compared with the total number of customers served by PDEC, it can be projected that more than 50% of all customers may report outages during any given seismic event.

Problem Statement

Due to its location on the New Madrid Fault, best practices for protecting assets in earthquake prone areas should be implemented.

Dam Failure

According to Missouri DNR's Dam Safety Division, five dams currently exist within the cooperative boundaries: two in Dunklin County, three in Pemiscot County, and none in New Madrid County. Of these dams, none are regulated due to the fact that they are non-agricultural, non-federal dams which exceed 35 feet in height. Figure 6 on the next page shows the locations of all known dams located within Pemiscot-Dunklin's service area. *(Map sources: www.msdis.missouri.edu; www.dnr.mo.gov/env/wrc.)*

Figure 6 *Dam Map*

Previous Occurrences

Twenty-six dam failures have occurred within the state of Missouri over the past 100 years. However, no such event has occurred within or near the cooperative's boundaries.

Probability of Future Occurrence and Vulnerability

For the purposes of this assessment, dam failure and its associated impacts cannot be eliminated from the realm of possibility. In order to allow for a risk assessment, the probability of this event has been included as less than 1%.

Determining the potential extent of dam failure is currently impossible due to a lack of data concerning inundation zones. Based on location of infrastructure relative to dams, this assessment assumes a limited impact upon downstream electric distribution infrastructure of less than 10% for both infrastructure damage and service interruption.

Problem Statement

Further study concerning existing dams and the impact of their failure is required to make a more comprehensive assessment of potential damages and mitigation strategies to address this potential hazard.

C. Risk Assessment Summary

Most of the historical hazards have had an impact on the electric cooperatives. Table 11 below shows the annual damages associated with each hazard for PDEC. The table is ranked by the highest Average Annual Damages which is an indication of the vulnerability to each hazard.

Table 11 *PDEC Hazard Risk Summary*

Hazard	Average Annual Damages
Severe Winter Weather	$2,400,000
Flood and Levee Failure	$600,000
Tornadoes	$575,000
Severe Thunderstorms, Hail and High Winds	$13,752
Earthquakes	$0
Dam Failure	$0
Wildfire	$0

Each of the non-historical hazards Wildfire, Earthquakes and Dam Failure has the potential for causing catastrophic damages in any given year. To date there have been zero damages to the assets of the Pemiscot-Dunklin Electric Cooperative from the non-historical events. Nonetheless, this set of hazards should be considered in mitigation strategies because of the damage potential.

Section 4: Mitigation Strategies

Previous Mitigation Efforts

For organizations like PDEC, mitigation is part of prudent business operations. To ensure the delivery of a quality product and minimize service interruptions, a number of mitigation strategies are continually utilized. Routine maintenance and upgrades to existing equipment are completed as part of daily tasks. Vegetation management is utilized to limit the cascading effects of natural hazards. Safety and reporting information are disseminated to the public through various types of media. Mutual aid agreements and partnerships create relationships which provide for future support in the event of a natural disaster.

Additionally, mitigation is considered prior to any expansion of service into special hazard areas. Before any service is build, it is first "staked out" in coordination with local builders and property owners. This process, completed by the Line Superintendent and contracted engineers, identifies and addresses foreseeable hazards and safety issues before any new service lines area constructed. USDA-RUS specifications regarding operation and safety are utilized in every step of the process. Steps are taken to practically minimize the exposure of equipment to loss due to foreseeable hazards, particularly flooding. Customers who reside in the floodplain are not charged for repairs or losses associated with flooding unless they purposefully destroy or restrict the cooperative from protecting their distribution system assets.

Existing and Potential Resources

As stated above, mitigation is a key component of good business practices. Pemiscot-Dunklin Electric Cooperative includes mitigation strategies as part of regular work activities to ensure service with minimal interruptions. Funding for these activities is provided through the cooperative's normal budgetary process for maintenance.

To expand mitigation efforts beyond normal maintenance, it is likely that PDEC will need to seek outside funding sources. These may include private, state, or federal programs which provide grant and loan funding. Upon passage of this plan, PDEC will be eligible for funding through FEMA in the following categories:

- Hazard Mitigation Grant Program
- Flood Mitigation Assistance Program
- Pre-Disaster Mitigation Program
- 406 Stafford Act
- USDA Economic Development Grants

Review of Goals and Actions

To focus on the mitigation actions for the 2023 update to this plan, it was decided to reach consensus on four goals that would address the needs of every cooperative member of AMEC and eliminate the objectives from previous updates. The PDEC mitigation staff reviewed these goals and the actions from the previous update which addressed hazard mitigation issues. They evaluated each action to decide if it was completed, will be continued, or should be deleted. There also was the opportunity to add new actions.

The staff considered which type of actions will maximize benefits and minimizes costs, how mitigation strategies will be implemented, and how the plan will be maintained and updated. Table 12 lists the goals as presented in the 2018 plan, and in the last column, as reviewed in the 2023 plan update.

Table 12 *PDEC Goals*

Identified Goals-2018	Reassessment of the Goal- 2023
Goal 1: Protect the health and safety of the community.	Accept, as is
Goal 2: Reduce future losses due to natural hazard events.	Accept, as is
Goal 3: Improve emergency management capabilities and enhance local partnerships.	Accept, as is
Goal 4: Continue to promote public awareness and education.	Accept, as is

Traditionally, the STAPLEE (Social, Technical, Administrative, Political, Legal, Environmental, and Economic) method is used to prioritize mitigation actions. These categories, however, do not necessarily align with the private sector in the same way they are applicable to governmental agencies. Several action items could be included with multiple goals, for example. As a result, the cooperatives chose to use a different method to prioritize their mitigation strategy.

The chosen method of reviewing the proposed and existing mitigation strategies was to perform a cost-benefit analysis of all mitigation actions. The analysis was based on past experiences of performing certain actions and the potential number of beneficiaries. The following matrix, Table 13, was used to rate each mitigation action. Cooperative staff was asked in the Goals and Actions Survey to review the cost-benefit rating and change if necessary.

Table 13 *Cost Benefit Matrix*

COST	BENEFIT		
	High	Medium	Low
High	7	4	1
Medium	8	5	2
Low	9	6	3

The following tables represent the completed review of current and potential mitigation strategies. Each strategy has assigned a cost benefit score assigned by the cooperative staff based on prior experience and professional opinions.

Table 14 shows review the actions and the results of the cost-benefit analysis. The table has been updated through the Goals and Actions Survey that was sent to PDEC to facilitate the staff update review. The Survey can be found in Appendix C. Staff members reviewed each item on the original tables and determined the status of the item.

PEMISCOT-DUNKLIN ELECTRIC COOPERATIVE

Table 14 *Prioritized Mitigation Actions for Pemiscot-Dunklin Electric Cooperative*

Goal-Action#	Action Item	Status Update	Progress on Continued Actions	Hazards Addressed by This Action	Completion Date	Cost/ Benefit Score
1-1	Use vegetation management to limit public safety danger of downed lines and to prevent interference with delivery of power.	Continue (In-progress)	Vegetation management is an ongoing process.	Thunderstorms Tornado Winter Weather	annually	7
1-2	Utilize GIS technology to reduce site identification and response time.	Continue (In-progress)	Ongoing process	Thunderstorms Tornado Winter Weather	2028	8
2-1	Addition of lightning arresters, electronic reclosures, conductors, guidewires. Raising padmount transformers in flood prone areas.	Continue (In-progress)	Adding lightning arrestees and replacing conductors and guide wires where needed. Will work with any consumers who desire to pay the cost to raise padmount transformers	Thunderstorms Tornado Winter Weather	2027	5
2-2	Add alternate source wiring to eliminate or reduce time of outages.	Continue (In-progress)	Ongoing process	Thunderstorms Tornado Winter Weather	2025	7
2-3	Convert overhead lines to underground lines or vice versa in troubled areas based on vulnerability.	Continue (In-progress)	Converting as needed when repairs are made.	Thunderstorms Tornado Winter Weather	annually	7
2-4	Improve data collection related to natural hazard events	Continue (In-progress)	Ongoing process	Thunderstorms Tornado Winter Weather	2024	8
2-5	Collect GPS data for all existing infrastructure.	Continue (In-progress)	Ongoing process	Thunderstorms Tornado Winter Weather	2026	8
3-1	Partner with county emergency management agencies to ensure power for local shelters, fuel stations, and public safety.	Continue (In-progress)	Ongoing process	Thunderstorms Tornado Winter Weather	annually	6

Goal-Action#	Action Item	Status Update	Progress on Continued Actions	Hazards Addressed by This Action	Completion Date	Cost/ Benefit Score
4-1	Provide safety and reporting information to the general public through varying methods: • Company website • Social media sites • Local newspapers • Presentations • Publications	Continue (In-progress)	Ongoing through website, social media, and magazine mailed to consumers.	All Hazards	annually	9

After review, there were no Actions completed from the Action Items list for the 2018 plan update. There were three Actions deleted shown in Table 15. All other actions are continued in the plan update. There are no additional actions added to the plan.

Table 15 *Prioritized Mitigation Deleted Actions for Pemiscot-Dunklin Electric Cooperative*

Actions Item	Status Update	Explanation for Deleted Action	Hazards Addressed by This Action	Cost/ Benefit Score
Increase number of generators owned for use in critical asset outages	Delete this action	Cost prohibited	Thunderstorms Tornado Winter Weather	1
Upgrade to concrete or steel poles where possible.	Delete this action	The cost/benefit is too high to complete this action.	Thunderstorms Tornado Winter Weather	1
Cooperate with local law enforcement and government officials to reduce the impact of power outages.	Delete this action	The cost/benefit is too high to complete this action.	Thunderstorms Tornado Winter Weather	1

Section 5: Plan Implementation and Maintenance

Plan Incorporation

The goals and actions of the previous section identify both ongoing efforts at mitigation and potential methods for expanding efforts. The plan has been reviewed and adopted by the Board of Directors as part of the company's operations policy. This mitigation plan necessitates involvement from every PDEC employment level as the organization strives to ensure quality service to their customers.

Local Planning Capabilities

Some internal planning capabilities do exist at PDEC. The Hazard Mitigation Plan can be considered and/or incorporated into regular budgetary planning, the four-year work plan for capital improvements, and the maintenance planning policy. Planning capabilities per se for the electric cooperatives are limited. What is important is that the Action Items developed through the mitigation planning process are incorporated into the daily activities of the cooperative.

The four-year work plans embrace the mitigation efforts that are in the mitigation plan. The electric cooperatives across Missouri are always working to strengthen their systems. This would include installing stronger/larger poles when smaller ones need to be changed out, installing stronger/larger conductors that can carry more weight and decreasing span lengths between poles, installing larger anchors, relocating structures out of flood plains, and installing structures to stop cascading during ice storms.

Other capabilities are unique to the electric cooperative's business of providing reliable electricity to their members. Many of the Action Items listed in the plan include tree trimming plans, use of GPS to locate outages, service upgrades to lines and poles, warning systems and use of weather radios, collection of GIS data and utility specific software for locating and rerouting outages to restore power, all contribute to local capabilities. Integration of PDEC's planning with local law enforcement, mutual aid agreements, and partnerships with local emergency management resources ensures power to critical facilities during a hazard event. This coordination and cooperation broaden the capabilities of the local cooperative.

Beyond the Pemiscot Dunklin Hazard Mitigation Plan, regional planning capabilities exist at the local level. The Missouri counties of Pemiscot, Dunklin and New Madrid each have a FEMA-approved Natural Hazard Mitigation Plan in place. County emergency management directors have Local Emergency Operations Plans which seek to mitigate the same hazards for residents. These same counties are also included in the Regional Transportation Plan (RTP) as well as a Comprehensive Economic Development Strategy (CEDS). PDEC's plan can be easily incorporated into these local plans and allow for coordination across agencies in the event of an emergency.

PDEC is located within the rural portions of third-class counties which are prohibited from enforcing building codes and zoning by the state of Missouri. They do not provide service to any municipality within these counties. Comprehensive plans and Capital Improvement plans do not exist inside of the PDEC service areas.

Plan Maintenance

Pemiscot-Dunklin will follow the requirements coordinated by the Association of Missouri Electric Cooperatives (AMEC) for monitoring, evaluating, and updating the plan.

Continued Public Involvement Opportunities

Public notice was given in the form a notice in the *Rural Missouri*, a publication of the Association of Missouri Electric Cooperatives, distributed to all cooperative members. The updated plans were posted on the website of the Northwest Missouri Regional Council of Governments for public review and comment. Comments were considered and addressed. Once all co-op plans were completed, they were assembled into one plan and submitted to the State Emergency Management Agency and the Federal Emergency Management Agency for review and approval. The documentation for public involvement and comments can be found in Appendix B of each cooperative's section of the plan.

Pemiscot-Dunklin will follow the requirements coordinated by the Association of Missouri Electric Cooperatives (AMEC) for continued public involvement. Opportunities for public comment will continue to be offered through various media outlets and the physical office of PDEC.

Appendix: A - Adoption Resolution

OLD RESOLUTION

HAZARD MITIGATION PLAN

WHEREAS (Cooperative name) wishes to be more prepared for the occurrence of natural hazards and to offset their impacts where possible; and

WHEREAS the (Cooperative name) has participated in the preparation of a multi-hazard mitigation plan, hereby known as the Multi-jurisdictional Hazard Mitigation Plan for Missouri's Electric Cooperatives, hereafter referred to as the Plan, in accordance with the Disaster Mitigation Act of 2000; and

WHEREAS, this living document was updated in 2017 and is intended to serve as a planning mechanism for participating Missouri Rural Electric Cooperatives; and

WHEREAS, (Cooperative name) worked to identify hazards, vulnerabilities and potential actions that may lessen the impact of natural hazards upon (Cooperative name) assets in the future; and

THEREFORE, BE IT RESOLVED: That (Cooperative name) adopts the Multi-Jurisdictional Hazard Mitigation Plan 2017 Update for Missouri Electric Cooperatives as it pertains and applies to (Cooperative name).

CERTIFICATE OF SECRETARY

I, _____, do hereby certify that I am Secretary of (Cooperative name); that the above and foregoing is a true copy of the Resolution adopted by the Board of Directors of said Cooperative relating to the Hazard Mitigation Plan.

IN WITNESS WHEREOF, I have hereunto set my hand as Secretary of Cooperative name)

And affixed the seal thereof this ___ Day of ___, 2017

_____

_____, Secretary

(CORPORATE SEAL)

Appendix: B - Documentation of Participation

This ad was published in the *Rural Missouri,* a monthly publication of the Missouri Association of Missouri Electric Cooperatives, giving public notice to all subscribing members of AMEC.

OLD

Appendix: C - Surveys

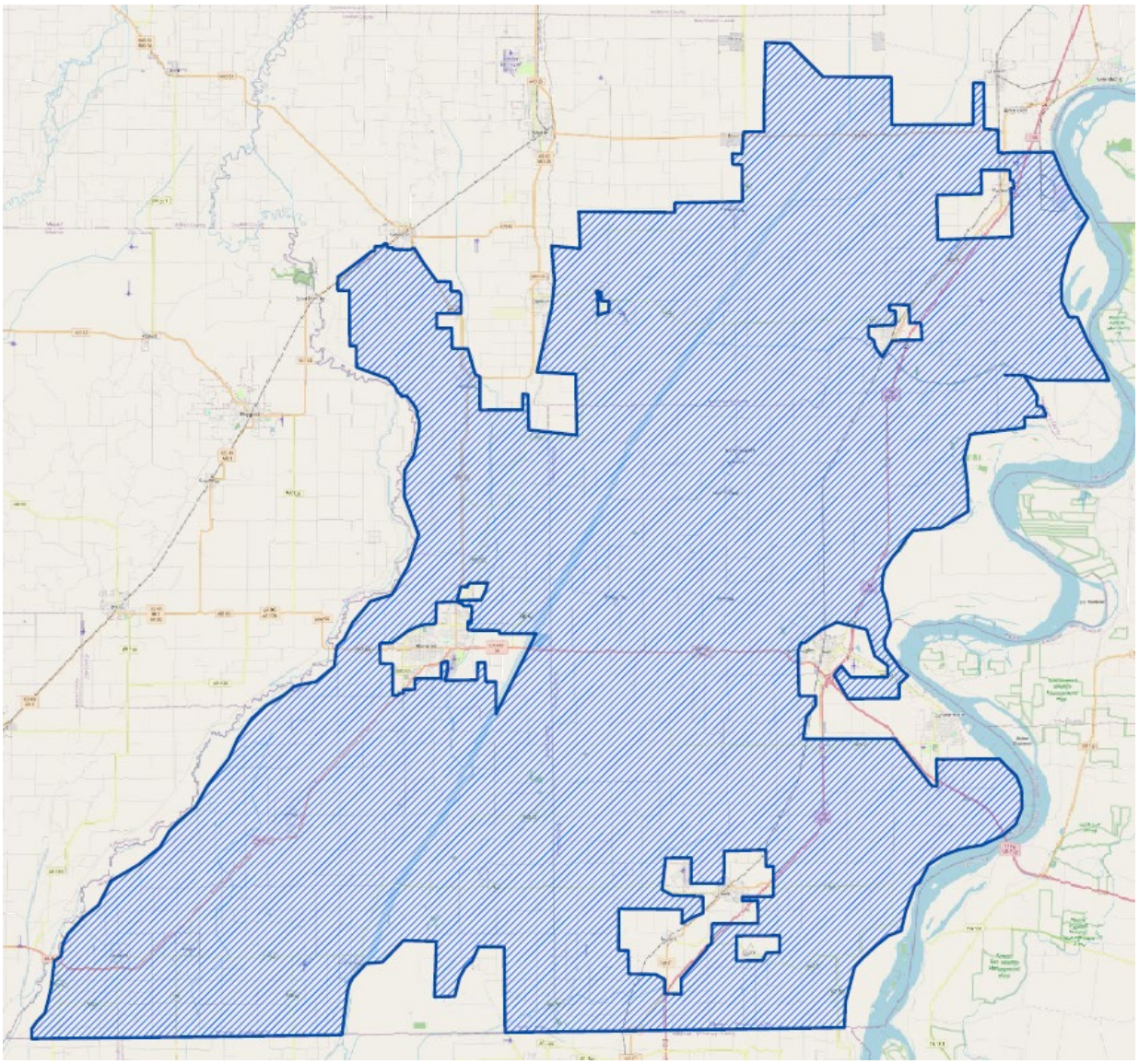
Data Survey

The following is the returned survey from PDEC which was used by NWMORCOG staff to update the Plan:

Pemiscot-Dunklin Electric Cooperative (PDEC) was established in 1937 to provide electric service to the rural areas of southeast Missouri. PDEC is headquartered near Hayti, Missouri, and provides service to customers in Pemiscot, Dunklin, and New Madrid counties in Missouri. The cooperative is run by a board of nine directors which approve the company's mission and internally developed business policy:

"Pemiscot-Dunklin Electric Cooperative is dedicated to providing our members with a reliable, competitively-priced, high-quality supply of electric energy, while adhering to cooperative principles and striving to improve the quality of life for all members through a highly trained, efficient staff."

PDEC's service boundaries within the state of Missouri include Pemiscot and Dunklin counties in their entirety as well as the southern portion of New Madrid County. The cooperative owns 1,252 miles of service line within these counties.



Population Density Map will be updated by staff at NWMORCOG

The customer base of PDEC currently exceeds 8,625 members in the three-county service area. Residential customers account for 62% of membership while nonresidential customers make up 38%. All of those members are located in the state of Missouri. Table A below provides the summary of metered customers by the three counties.

Table A: Meters by County

County	Number of Meters
Pemiscot	2,235
Dunklin	5,206
New Madrid	1,184
Total	8,625

The average daily customer usage for PDEC is 48 kilowatt-hours (kWh). Annual total usage of PDEC customers in 2021 was 152,343,375 kWh of service.

Critical Facilities

PDEC does not provide service to any critical facilities (hospitals, emergency services, etc.) or higher education institutions, but does provide service to large industrial centers.

Future Development

The info wanted here is if any of your members you serve have future development plans that would potentially affect your operation.

The FEMA reviewers that approved the previous update suggested including current operating budget information, any capital improvements, or strategic initiatives in this update. Please add or attach if possible.

The major areas of growth for electric service have been to industry and agricultural businesses while seeing decline in the number of residential customers. PDEC is in the process of completing construction for a fiber network throughout our electric service area and extending into towns within the area but not serviced with electricity. PDEC leases this infrastructure to its wholly owned subsidiary who provides internet, voice, and video services to its customers.

PDEC operates on a $22 million operating budget annually and has planned to make almost $6 million in capital improvements in 2022 as we finalize the fiber network and make improvements to the electric grid to ensure reliable service to our membership.

Asset Inventory Please update the figures below to the most current information

Pemiscot-Dunklin Electric Cooperative has a wide variety of assets by type. Real estate owned by the company includes office buildings, warehouses, garages, and other outbuildings throughout the service area. PDEC does not own any electric generation or transmission infrastructure. 1,252 miles of distribution lines are owned and maintained by PDEC. Table B provides information concerning total asset valuation.

Table B: Pemiscot-Dunklin Asset Inventory Valuation Summary

Asset	Total Replacement Cost		Cost Breakdown	
Total PDEC Assets		$262,622,984	Buildings, equipment and vehicles	$11,683,559
			Overhead assets	$225,518,145
			Underground assets	$25,421,280
Distribution Lines	Overhead (OH)	$76,428,000	OH Single-phase lines	$29,784,000
	Underground (UG)	$21,491,280	UG Single-phase lines	$4,067,280
			OH Three-phase lines	$46,644,000
			UG Three-phase lines	$17,424,000
Supporting Infrastructure	Overhead (OH)	$149,090,145	Meters	$11,605,350
	Underground (UG)	$3,930,000	Poles	$45,099,360
			OH Transformers	$32,745,900
			UG Transformers	$3,930,000
			Guys/Anchors	$19,730,970
			Cross-arms	$4,228,065
			Regulators	$8,154,000
			SP Oil-Circuit Reclosures	$1,192,500
			3 phase Oil-Circuit Reclosures	$20,790,000
			Capacitors	$5,544,000
Office Buildings		$3,331,352		
Equipment		$5,370,981		
Vehicles		$2,981,226		
Source: Internal Pemiscot-Dunklin Accounting and Insurance records				

Ensuring quality distribution to its customers, Pemiscot-Dunklin maintains not only distribution lines, but also the supporting infrastructure as well.

Table C includes a list of asset types, emergency replacement cost per unit or mile, the asset inventory by Service County, and total infrastructure numbers.

Table C: Pemiscot-Dunklin Asset Inventory by Service County

Asset			Emergency Replacement Cost per unit or mile	Number of units or miles: PEMISCOT	Number of units or miles: DUNKLIN	Number of units or miles: NEW MADRID	Number of units or miles: TOTAL
Meter	SP		$900	1776	5036	1184	7996
	TP		$2,550	717	834	178	1729
Pole			$1,440	10,616	15,081	5,622	31,319
Distribution Lines	SP	OH	$51,000	192	255	137	584
		UG	$96,840	11	22	9	42
	TP	OH	$78,000	249	256	93	598
		UG	$396,000	13	28	3	44
Transformers		OH	$3,300	3387	5151	1385	9923
		UG	$7,500	139	289	96	524
Guys/anchors			$2,100	3,185	4,524	1,687	9,396
Cross-arms			$270	5,308	7,541	2,811	15,660
Regulators			$54,000	63	60	28	$151
Oil Circuit Reclosures	SP		$7,500	48	77	34	159
	TP		$54,000	160	170	55	385
Capacitors			$24,000	75	120	36	231
Total Replacement Value by County		OH		81,428,130	105,761,505	38,328,510	225,518,145
		UG		7,255,740	15,385,980	2,779,560	25,421,280

*OH = overhead **UG = underground ***SP = Single phase ****TP – Three phase

Source: Internal Pemiscot-Dunklin Accounting and Maintenance records

Risk Assessment

Please add any known information related to each of the natural hazards that follow: Flooding (Major and Flash), Levee Failure, Dam Failure, Earthquake, Land Subsidence/Sinkholes, Drought, Extreme Temperature, Severe Thunderstorms, Severe Winter Weather, Tornadoes, Wildfire

NWMORCOG will add information to the narrative from the National Weather Service that has occurred since 2016

Tornadic Event Summary

Date of event	EF Scale rating	Damage estimates	Outages
12/10/2021		$1,200,000	
Data provided based on internal PDEC records which reflect cost from the referenced event year.			

Thunderstorm/High Wind, Hail Event Summary

Event Date	Damage Estimates	Outages
May 2020	$908,476	
Total		
Data provided based on internal PDEC records which reflect cost from the referenced event year.		

The hazards of flood and levee failure have been separated in the Missouri State Hazard Mitigation Plan. If possible, separate any damage/outages data into the appropriate hazard's table.

Flood Event Summary

Event date	Damage estimates	Outages reported

Levee failure

Event Date	Damage Estimates	Outages

Severe Winter Weather Event Summary

Event Date	Event Type	Damage Estimates	Outages

Please add any dates, known damage, and outages since the last plan due to

dam failure

Event date	Damage estimates	Outages reported

drought

Event date	Damage estimates	Outages reported

earthquake

Event date	Damage estimates	Outages reported

extreme temperatures (hot & cold)

Event Date	Event Type	Damage Estimates	Outages reported

land subsidence

Event date	Damage estimates	Outages reported

or wildfire.

Event date	Damage estimates	Outages reported

Goals and Actions Survey

The original survey is an interactive Excel file that could not be inserted without stabilizing the formatting. All of the data submitted is included in the images below.

Complete each row left to right. Click on each box to receive instructions for that box.	Goals	Reassess the goal	Instructions	Justifications for modifying or removing a goal	Rewritten goal, if modified	Instructions
→	**Goal 1**: Protect the health and safety of the community	accept, as is ☑ yes	If you chose to remove or modify the goal, please give your reasons in the box to the right.			Go to the next row & start at the left
→	**Goal 2**: Reduce future losses due to natural hazard events.	accept, as is ☑ yes	If you chose to remove or modify the goal, please give your reasons in the box to the right.			Go to the next row & start at the left
→	**Goal 3**: Improve emergency management capabilities and enhance partnerships.	accept, as is ☑ yes	If you chose to remove or modify the goal, please give your reasons in the box to the right.			Go to the next row & start at the left
→	**Goal 4**: Continue to promote public awareness and education.	accept, as is ☑ yes	If you chose to remove or modify the goal, please give your reasons in the box to the right.			Go to the next row & start at the left
↘	**After completing this sheet, please click the "actions" tab at the bottom**					

risk summary table information to consider when updating

Table 1 *PDEC Hazard Risk Summary*

Hazard	Average Annual Damages
Severe Winter Weather	$2,400,000
Flood and Levee Failure	$600,000
Tornadoes	$575,000
Severe Thunderstorms, Hail and High Winds	$13,752
Earthquakes	$0
Dam Failure	$0
Wildfire	$0

	Goal-Action#	Action Items Specify locations when able	Status Update	Explanation for completed/deleted action	Report progress on continued actions	Select Hazard(s) addressed by this action	Completion Date	COST/BENEFIT SCORE
Read each row left to right. Click on each box to receive instructions for that box.	2-1	Addition of lightning arresters, electronic reclosures, conductors, guidewires. Raising padmount transformers in flood prone areas.	Continue (In-progress)		Adding lightning arrestees and replacing conductors and guide wires where needed. Will work with any consumers who desire to pay the cost to raise padmount transformers	Dam Failure Earthquakes Flooding Land Subsidence Levee failure Thunderstorms Tornado Wildfire Winter Weather		5
	2-2	Upgrade to concrete or steel poles where possible.	Delete this action	The cost/benefit is too high to complete this action.		Dam Failure Earthquakes Flooding Land Subsidence Levee failure Thunderstorms Tornado Wildfire Winter Weather		
	1-1	Use vegetation management to limit public safety danger of downed lines and to prevent interference with delivery of power.	Continue (In-progress)		Vegetation management is an ongoing process.	Dam Failure Earthquakes Flooding Land Subsidence Levee failure Thunderstorms Tornado Wildfire Winter Weather		7
	2-3	Add alternate source wiring to eliminate or reduce time of outages.	Continue (In-progress)		Ongoing process	Dam Failure Earthquakes Flooding Land Subsidence Levee failure Thunderstorms Tornado Wildfire Winter Weather		7
	2-4	Convert overhead lines to underground lines or vice versa in troubled areas based on vulnerability.	Continue (In-progress)		Converting as needed when repairs are made.	Dam Failure Earthquakes Flooding Land Subsidence Levee failure Thunderstorms Tornado Wildfire Winter Weather		7
	4-1	Provide safety and reporting information to the general public through varying methods: • Company website • Social media sites • Local newspapers • Presentations • Publications	Continue (In-progress)		Ongoing through website, social media, and magazine mailed to consumers.	Dam Failure Earthquakes Flooding Land Subsidence Levee failure Thunderstorms Tornado Wildfire Winter Weather		9
	1-2	Increase number of generators owned for use in critical asset outages. Investigate grant funding.	Delete this action	The cost/benefit is too high to complete this action.		Dam Failure Earthquakes Flooding Land Subsidence Levee failure Thunderstorms Tornado Wildfire Winter Weather		
	3-1	Partner with county emergency management agencies to ensure power for local shelters, fuel stations, and public safety.	Continue (In-progress)		Ongoing process	Dam Failure Earthquakes Flooding Land Subsidence Levee failure Thunderstorms Tornado Wildfire Winter Weather		6
	3-2	Cooperate with local law enforcement and government officials to reduce the impact of power outages.	Delete this action	The cost/benefit is too high to complete this action.		Dam Failure Earthquakes Flooding Land Subsidence Levee failure Thunderstorms Tornado Wildfire Winter Weather		
	2-5	Improve data collection related to natural hazard events	Continue (In-progress)		Ongoing process	Dam Failure Earthquakes Flooding Land Subsidence Levee failure Thunderstorms Tornado Wildfire Winter Weather		8

	2-6	Collect GPS data for all existing infrastructure.	Continue (In-progress)		Ongoing process	Dam Failure Earthquakes Flooding Land Subsidence Levee failure Thunderstorms Tornado Wildfire Winter Weather		8	ongoing process
	1-3	Utilize GIS technology to reduce site identification and response time.	Continue (In-progress)		Ongoing process	Dam Failure Earthquakes Flooding Land Subsidence Levee failure Thunderstorms Tornado Wildfire Winter Weather		8	ongoing process
NEW Action (optional)			NEW Not Started	NEW	NEW	Dam Failure Earthquakes Flooding Land Subsidence Levee failure Thunderstorms Tornado Wildfire Winter Weather			If you don't have new actions & the goals sheet was already completed, you are done. Please save your work. Thank you!