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July 30, 2021

Lisa Felice
Executive Secretary
Michigan Public Service Commission
7109 West Saginaw Highway
3rd Floor
Lansing, MI 48917

Re: Case No. U-20147

Dear Ms. Felice:

Attached for electronic filing in Case No. U-20147, please find Indiana Michigan Power Company's Five Year Distribution Plan (2021-2025).

Thank you.

Sincerely,

DYKEMA GOSSETT, PLLC

Richard Aaron

Digitally signed by: Richard Aaron
DN: CN = Richard Aaron email = raaron@dykema.com C = US O = Dykema
Date: 2021.07.30 15:35:58 -04'00'

Richard J. Aaron

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MICHIGAN

FIVE-YEAR DISTRIBUTION PLAN

2021-2025

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I. EXECUTIVE SUMMARY

Indiana Michigan Power Company (I&M or the Company) is one of seven (7) operating companies within the American Electric Power (AEP) system. I&M is an electric utility that serves approximately 130,000 retail customers in southwest Michigan and approximately 470,000 retail customers in Indiana. Approximately 20% of I&M's retail customers are in Michigan.

This document is I&M's five-year (2021-25) distribution plan (Plan) for its Michigan service territory. I&M intends for this document to provide the Michigan Public Service Commission (Commission or MPSC), the Commission's Staff (Staff) and other stakeholders clear insight into I&M's distribution planning process and a thorough understanding of I&M's specific plans for its Michigan distribution system for the next five (5) years. To meet this goal, I&M relied on its decades of experience in distribution planning and creating multi-year plans. I&M also thoroughly reviewed, considered and implemented guidance provided by Staff and the Commission in its August 20, 2020, order in Case No. U-20147. Following this guidance and building on I&M's last five-year distribution plan filed in 2019, I&M created this comprehensive and detailed document and Plan.

I&M created this Plan based on the understanding that the elements of distribution planning are related to the core objective of meeting customer needs. Another fundamental aspect of the Plan is that it takes steps to align with both generation and transmission planning. The Plan also recognizes the growth potential for third party distributed energy resources (DERs) and the increased need for active utility monitoring and controls to manage a more dynamic grid. Additionally, the Plan includes I&M's pursuit of options for non-wires alternatives (NWAs), as well as I&M's progress in developing a process for screening and developing NWA solutions. The Plan is consistent with Commission and Staff direction.

I&M organized this document into five parts. Following this Executive Summary (Part I), I&M describes the Core Functionality of the Grid by providing its vision for the future, and outlining key objectives (Part II) that underlie I&M's Plan. Foremost among these objectives is maintaining and improving safety for the public and I&M's employees and contractors. Other critical objectives include focusing on customer experience and addressing the reliability and resiliency of I&M's distribution system. These objectives led I&M to design its Plan to address the leading causes of outages on its system – including, most importantly, vegetation management (e.g. "tree trimming") and aging infrastructure. I&M also incorporated planning that will help move toward creating an enabling platform that will allow I&M's customers to install DERs and access data to be more energy efficient.

After outlining the key objectives of the Plan, I&M describes the System Conditions (Part III) of its Michigan service territory and explains how these characteristics impact reliability metrics. I&M faces several challenges in its Michigan distribution system. For instance, I&M's service area in Michigan is predominantly forested rural areas. This results in vegetation having a significant impact on reliability. Additionally, like many utilities, I&M faces increasing reliability risks related to distribution equipment that is reaching the end of its design life. I&M explains how these challenges have contributed to reliability metrics and how I&M intends to address these challenges to improve reliability and resiliency while operating with safety (public and employee) as a paramount focus.

I&M then goes on to describe its Plan Development (Part IV). This includes how I&M created and prioritized the programs in its Plan. I&M provides details of the many inputs used in distribution planning, such as circuit performance, load profiles, inspection results, and industry data. I&M also explains how it integrates its annual load forecasts for distribution planning, and how it prioritizes each of the programs in the Plan and the tasks within each program. As part of this discussion, I&M explains how it uses two primary tools in distribution planning. The first tool, the Circuit Health Index (CHI), is a comprehensive system for gathering data on the performance of I&M's distribution circuits and identifying the most pressing needs on I&M's system. The second tool, the Project Value Ranking (PVR), is I&M's primary way of assessing the value of each potential distribution project and ranking those projects in order of priority. The PVR draws on a range of data concerning project costs and benefits and allows I&M to create a list of the most impactful and cost effective projects.

Additionally, I&M's Plan Development includes consideration of NWAs, which represent an emerging aspect, over the more "traditional" infrastructure investments, of distribution planning. I&M describes its analysis of NWAs as a way to defer traditional energy delivery system investment, which can benefit customers and I&M. To achieve this overarching objective, I&M considers solutions including demand response, energy waste reduction (EWR), conservation voltage reduction (CVR), microgrids, renewables, energy storage, and distributed supply options. I&M anticipates that NWAs will play an increasingly important role in its distribution planning process in the future.

After establishing the above-described foundation, I&M then describes the contents of its Five-Year Distribution Plan (Part V). The Plan involves four (4) primary categories of investments, which are implemented in five (5) activities as shown in the following table:

Distribution Management Plan Categories & Activities

Category	Activity	Description
Reliability Enhancement	Vegetation Management	The cornerstone of I&M's Plan is to continue on its cycle-based vegetation management program to meet customer expectations for fewer and shorter outages caused by vegetation.
	Asset Renewal	I&M has developed a suite of programs to replace aging infrastructure and harden the system to improve reliability and resiliency.
Distribution Asset Management	Combined Projects (Capacity Additions, Station & Line Components)	I&M has identified specific asset renewal and reliability projects that are needed to address contingency capacity constraints, improve outage recovery, replace or upgrade aging or obsolete station equipment and perform voltage conversions of select stations and distribution circuits.
Risk Mitigation	Infrastructure Inspection Programs and Underground Locates	I&M performs inspections designed to identify potential issues on the distribution system, promoting public safety.
Grid Modernization	Resiliency Improvement via System Response and Monitoring Projects	I&M has identified technologies that will help it monitor, protect, and improve the operation and resiliency of its distribution system. AMI, Enhanced CVR, Sensors, DACR and Smart Reclosers are project groups included in this activity.

As described in this document, I&M has carefully designed the projects and programs in its Five-Year Plan to bring the most value to customers – and to align with the MPSC's and I&M's key objectives – in a cost-effective manner. I&M looks forward to sharing its Five-Year Plan with the MPSC, Staff, and other stakeholders and receiving input.

II. CORE FUNCTIONALITY OF THE GRID

A. VISION

The utility industry is experiencing massive transformation. I&M, along with other AEP operating companies, has a net zero carbon goal by 2050 and an 80% emissions reduction target by 2030. The decarbonization of the utility industry, the transportation sector and the greater economy will continue to drive the transformation of the utility business, and specifically the distribution system. I&M's transformation strategy and vision can be summarized by five pillars, 1) Generation Transformation; 2) Modernizing the Grid; 3) Expanding Customer Choices; 4) Embracing New Technology; and 5) Developing a Work-force of the Future. These pillars represent the focus areas that are expected to be foundational to the grid of the future. They also

recognize that the power grid is and will continue to become increasingly complex, distributed and inter-dependent. I&M and other utilities have the unique responsibility of managing this future in a way that optimizes the system and the interconnected resources, both utility- and customer-owned, in a way that ensures the safety and reliability of the electrical grid. I&M's distribution system is core to this future.

I&M's approach to enabling the grid of the future maintains a key focus on safety, reliability and resiliency as we incorporate new technologies to benefit customers. I&M anticipates a future state where substantially more DERs, as well as electric vehicles, are connected to the distribution system and power flows are dynamic and no longer driven by utility operations. In this grid of the future, I&M takes on the role of an enabler; setting up a safe, reliable and resilient grid that is supportive of customer choices while being vendor and technology agnostic. I&M sees the potential to incorporate technologies such as energy storage and microgrids to increase the flexibility and resiliency of the system and provide tailored solutions to fit unique customer needs. I&M will continue to utilize AEP's cyber security practices and procedures to harden our data system and prevent ransomware attacks. Such attacks, at a minimum, desire to compromise portions of our energy delivery system. While today the economies of scale favor utility scale solutions when it comes to storage and similar technologies, it is expected that in the coming years, more distributed solutions will become effective options.

Continued evolution of the industry is driving changes in how utilities plan and operate their systems. Pilots are expected to provide increasingly valuable opportunities to learn specific operational considerations in order for I&M to be effective in the role as an enabler. I&M will be looking to leverage learnings from peer utilities within and outside of AEP to help expedite that learning process as well as continue to evaluate and strategically incorporate pilot opportunities of its own.

At its core, I&M's distribution strategy is based on the following three (3) guiding principles:

- Improve the reliability of the system today and in the future.
- Utilize technology to increase resiliency through operational efficiency.
- Position I&M to meet changing regulatory requirements and customer expectations.

To improve the reliability of the system, I&M is continuing its strategic approach to asset renewal. This is necessary to maintain a safe and reliable system. I&M is also continuing the vegetation management program that protects facilities and promotes reliable service, while being considerate of the interests of property owners. These efforts led to improvements in reliability metrics that result in customer benefits.

Additionally, the incorporation of technology allows I&M to increase operational efficiency, which benefits customers' experiences with electrical service. For example, grid modernization technologies, including advanced metering infrastructure (AMI), allow I&M to have a more predictive and data-driven approach to managing the system. Through technology, I&M can safeguard against potential outages, take advantage of self-healing opportunities, and reduce outage restoration times. If one were to consider combining AMI with the use of Enhanced CVR, you can reduce system losses and provide more insight into customer end use points.

Furthermore, this distribution system strategy prepares I&M to provide a system on which customers can optimize their use of our service in a changing energy world. The energy industry is starting to move away from a linear paradigm where electrons flow in one direction from large central power stations to end users. The industry is moving toward a more complex matrix of customer options, such as DERs, that provide a two-way power flow. Customer and regulatory expectations are evolving in parallel with the changing industry. There is a growing interest and expectation to integrate generation and energy delivery planning. The increasing penetration of DERs will present challenges and opportunities, and necessitate the ongoing evaluation of how utilities compensate and charge customers for the service(s) provided. This shift is a direct impact of FERC's recent Order 2222 (Order 2222). I&M must be prepared to address the implications of Order 2222. I&M's strategy is intended to facilitate meeting the changes in customer expectations and regulatory requirements.

B. KEY OBJECTIVES

The Plan's primary focus is on ensuring safe, reliable, and resilient energy at reasonable rates. I&M's Plan seeks to meet the following six key objectives that guide I&M's efforts in building and maintaining a distribution system to serve customers.

- *Maintain and improve safety* – The safety of the public, I&M's employees, and its contractors is the first priority. Safety is a foundational element of all of I&M's planned distribution system improvements. I&M designed specific programs, such as inspections and replacing aging assets, to reduce the probability of safety incidents.

- *Improve reliability*– A key principle of I&M's distribution planning efforts is focusing on customer experience. This means establishing programs and projects aimed at reducing the number of outages and selecting investments that allow the Company to respond and restore service quicker when an outage occurs. Assets continue to age and trees continue to grow – both present a potential challenges. I&M addresses these challenges by prioritizing work to optimize its investments it is making so that improving reliability remains a key focus.

- *Enhance system resilience* - The Plan focuses on enhancing the resilience of the system through system upgrades as well as leveraging grid modernization technologies. These technologies will automate and expedite the restoration of power post unplanned events. With the emergence of energy storage technologies, microgrids, and other innovations, there will be even greater opportunity in the future to bolster the resilience of I&M's distribution system.
- *Create an enabling platform* – I&M is working to modernize its distribution system to integrate and optimize the use of new technologies and services. An enabling platform will allow the distribution system to incorporate DERs, respond to generation or load changes, maintain power quality and reliability, and ensure real-time, dynamic communication with these technologies. Changing dynamics in today's energy markets anticipate this capability.
- *Maintain system flexibility* – Over time, I&M will need to be able to respond to changing conditions and modify its Plan. Responses and modifications may include introducing additional programs, altering programs, or shifting resources between programs to address emerging priorities. Flexibility is key in allowing I&M to effectively and efficiently respond to the needs of its customers, the changing demands on the distribution system, and changes in equipment and technology.
- *Enhance data collection and utilization* – I&M is installing AMI into its distribution system to allow for two-way communication and near real-time billing and operational data. Customers will be able to access this data to help them use electricity more efficiently. I&M can use the data to more accurately detect power outage locations, to identify precursors to failing equipment or vegetation contacts prior to an outage, and to improve service restoration.

C. GENERATION, TRANSMISSION AND DISTRIBUTION PLANNING INTEGRATION

Technology continues to change rapidly providing a greater number and more dynamic set of supply-side and demand-side resource options. It appears that this trend will continue. Resource options are becoming more distributed in nature and customers have increasingly more economic options available to provide some of their own energy needs. These trends impact consumption patterns and load assumptions. The result is that system planning across generation, transmission, and distribution (GT&D) is becoming more dynamic and integrated. This creates increasing challenges to predicting the future.

AEP and I&M are actively taking steps to align the GT&D planning functions. Effective January 1, 2021, AEP reorganized its central planning functions with the formation of the Grid Solutions business unit. AEP combined integrated generation, transmission and distribution planning to create this single unit. These changes will help foster the collaboration and integration of information exchanges and input assumptions across the various planning functions. To assist with the successful transition to a comprehensive, holistic approach that integrates GT&D planning, AEP has engaged an external consultant to leverage their expertise in this area and assist in evaluating AEP's current planning processes and the development of a roadmap that leads to a fully integrated planning process. AEP also established a sponsorship team at the executive level. The team's near term focus is on evolving tools, processes, and standards to thrive in a world with dynamic system planning requirements. The longer-term goal is to provide clean, affordable and reliable energy with customer centric options.

It is important to recognize that the integration of GT&D planning will be a journey. It should be flexible, rather than prescriptive. The uncertainty associated with utility planning is greater today than in the past. Regulatory, environmental and legislative energy policy directives that affect energy plans are commonplace and subject to rapid change. In some cases, utilities are required to comply with new energy directives in a fairly short amount of time. System planning and decision-making are dynamic and fluid. As such, it is necessary to recognize the need for utility planning to remain flexible in nature.

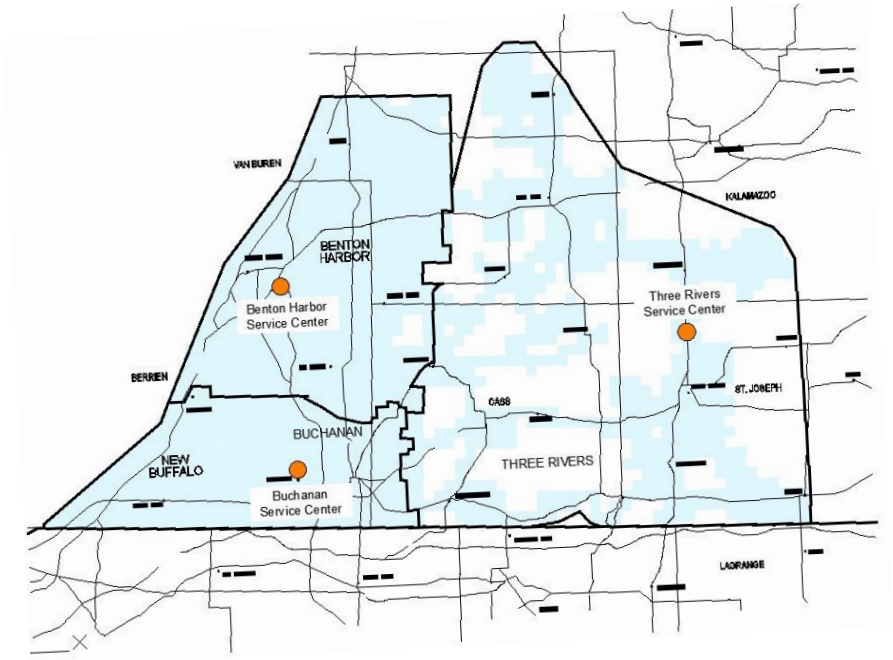
III. SYSTEM CONDITIONS

A. SERVICE TERRITORY

I&M's Michigan service territory covers the southwestern portion of Michigan and is shown in Figures III.A.1 and III.A.2 below.

FIGURE III.A.1: LOCATION OF I&M'S SERVICE TERRITORY IN MICHIGAN

FIGURE III.A.2: COUNTIES IN I&M'S MICHIGAN SERVICE TERRITORY



SERVICE TERRITORY FACTS

- Approximately 130,000 customers.
- Approximately 2,200 square miles.
- 46 cities and communities.
- Six (6) counties: Berrien; Cass; Kalamazoo; St. Joseph; Van Buren; and a small area within Allegan County. See Figure III.A.2 above.

DISTRIBUTION SYSTEM FACTS

- Approximately 59 distribution substations.
- Approximately 5,390 miles of distribution lines consisting of:
    1. Approximately 4,510 miles of overhead line primarily supported on wood or metal poles.
    2. Approximately 880 miles of underground cable.

SERVICE TERRITORY CONSIDERATIONS

- *Segmented Territory* – I&M's Michigan service territory is segmented and interwoven with rural electric co-ops, municipalities and neighboring utilities. The resulting non-contiguous nature of the territory, along with lower customer density, presents unique challenges in managing and maintaining the distribution system. For example, substations are more dispersed; increasing the time it takes to restore power following an outage because the ability to tie circuits together or transfer load is more limited.
- *Seasonal Customers* – I&M's service territory includes seasonal customers, which presents unique challenges. Historically I&M has relied on customers to provide notification when an outage occurs. An absent customer is likely unaware of such an event and therefore will not notify us. The deployment of AMI (discussed later in this document) will alleviate these challenges because AMI technology will automatically notify I&M as soon as an outage occurs.
- *Rural Territory with Difficult-to-Access Distribution Equipment* – Geographically, I&M's Michigan service territory features large areas that are heavily forested and experience lake effect weather (e.g., strong wind gusts and snow) caused by Lake Michigan. These terrain characteristics present unique accessibility and operational challenges that must be taken into consideration when planning distribution system maintenance. Additionally, I&M estimates that over 40% of its primary overhead distribution lines are rural or off-road, meaning that the lines are at least 50 feet from a road or access point. In these locations, I&M is limited on the use of service trucks and other equipment to perform restoration work. In some locations, personnel must manually transport material and equipment to perform the necessary work, which affects restoration and construction time. I&M's service territory in Michigan also presents challenges because distribution equipment is located in backyards, making access difficult and restoring service more time consuming. An ongoing line relocation effort (outlined later in this document) is partially addressing this issue.

- *High Tree Density* – As shown in Figures III.A.3 and III A.4, I&M's service territory has a high tree density and growth rate. U.S. climate data show that temperatures in I&M's territory are temperate and facilitate an environment that allows for high tree density and growth rates. Similarly, the Climate Atlas of Michigan shows that I&M's service territory has a long tree growth season due to weather surrounding the Great Lakes, the variation in latitude, and the variation in elevation. These factors emphasize the challenges that vegetation can cause and why managing vegetation under these conditions is critical.

FIGURE III.A.3: TREE DENSITY BY COUNTY (NET VOLUME OF ALL LIVE TREES, CUBIC FEET)

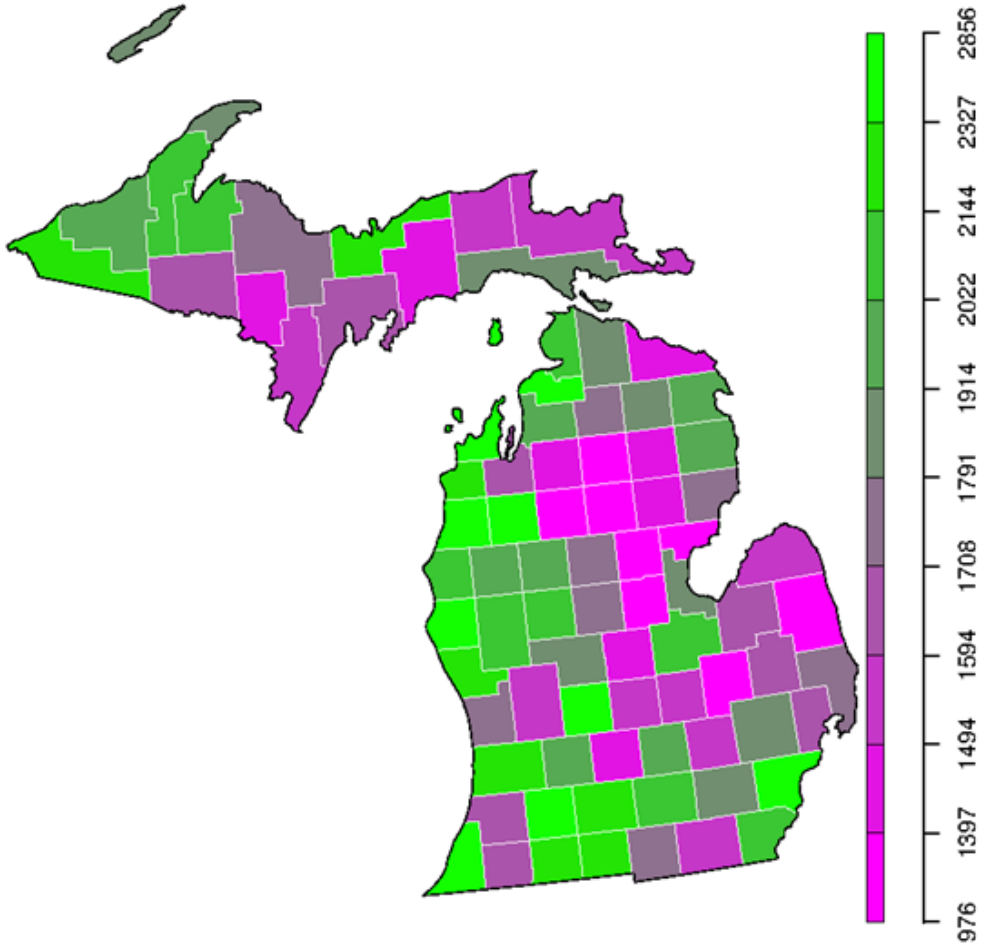
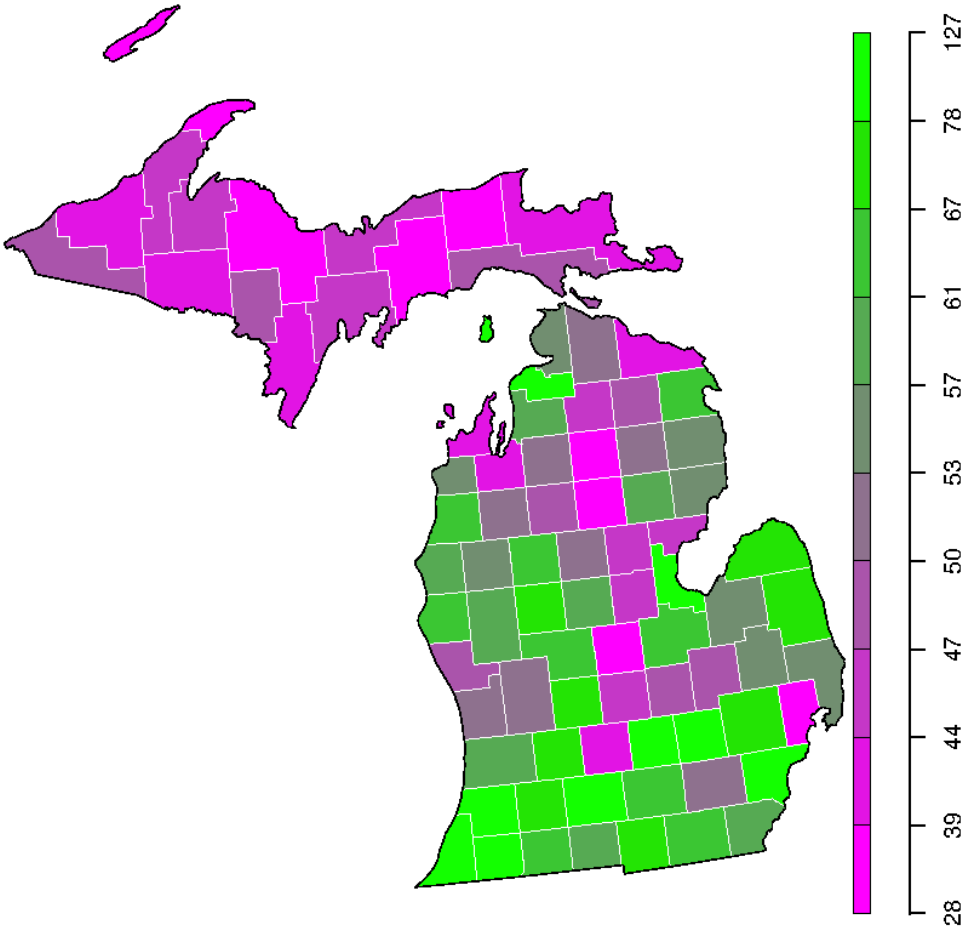


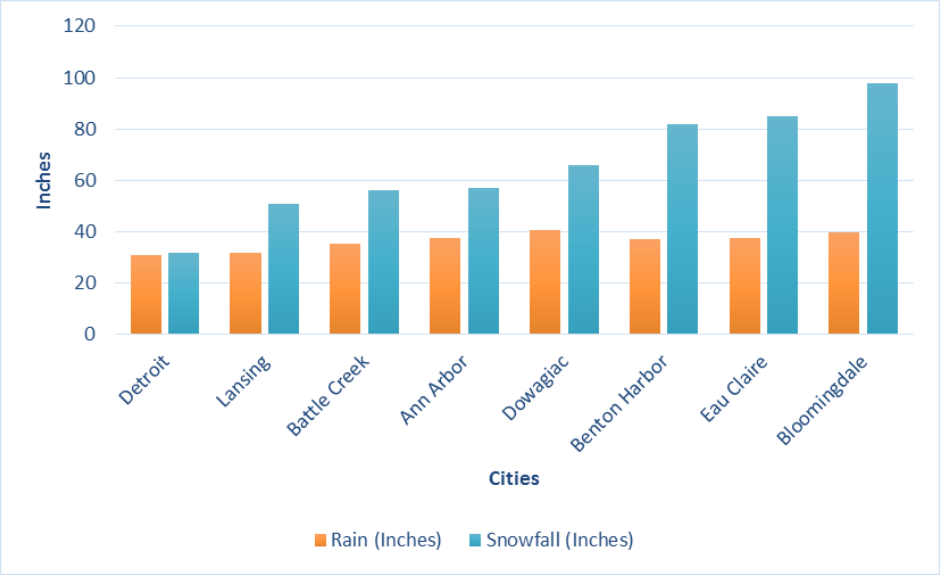
FIGURE III.A.4: TREE GROWTH BY COUNTY (GROSS CUBIC FEET PER YEAR)[1]



- *Sandy Soil* – Sandy soil in I&M's service territory is another factor contributing to vegetation-related outages. It affects rooting stability in wet and/or windy conditions.
- *High Level of Rain and Snow* – U.S. climate data, as shown in Figure III A.5, shows that I&M's Michigan service area has high levels of rainfall and snowfall. Maintaining the territory under these conditions is difficult for two reasons: 1) the high average rainfall contributes to the high rate of tree growth and density; and 2) the high average snowfall makes it more difficult to maintain distribution lines, particularly in winter months when access is limited due to lake effect snow.

[1] The source of the data for Figures III.A.3 and III.A.4 is the U.S. Forestry Service website.

FIGURE III.A.5: COMPARISON OF RAINFALL LEVELS IN MICHIGAN[2]



- *Combination of Historically Separate Systems* – Originally, I&M served the western area of the current service territory, including Benton Harbor and Saint Joseph. AEP, purchased the Michigan Gas and Electric Company and eventually sold the gas portion of this company. The two companies were then merged in the early 1990s, forming what is now I&M's Michigan service territory. Merging these companies presented challenges that remain to this day. This merger combined systems composed of different types of equipment and designs. Over time, some of these disparities have been eliminated through replacement programs, but the issue of aging assets persists for some of the remaining equipment.

B. RELIABILITY METRICS

Reliability is a foundational element of I&M's distribution planning process as well as I&M's current Plan. I&M is familiar with the Commission and Governor Whitmer's focus on reliability as it relates to the MI Power Grid initiative, as well as Staff's attention to reliability as displayed in its May 27, 2021 Integration of Resource, Distribution, and Transmission Planning Report. As such, I&M has a heightened awareness and focus on improving the reliability of the system.

[2] The source of the data for Figure III.A.5 is www.currentresults.com and www.usclimatedata.com.

The indices that I&M primarily uses to gauge service reliability are the System Average Interruption Duration Index (SAIDI) and the System Average Interruption Frequency Index (SAIFI). These indices are also in general use across the electric utility industry in the United States. Other metrics added to I&M's Plan are Customers Experiencing Multiple Interruptions (CEMI) and Customers Experiencing Longest Interruption Duration (CELID). SAIDI, SAIFI, CEMI, CELID, and Customer Average Interruption Duration Index (CAIDI) are described in the Institute of Electrical and Electronics Engineers (IEEE) Standard 1366-2012.

These indices provide insight into how well I&M is minimizing the number and duration of service interruptions. Lower values for these indices mean better reliability performance. Additionally, these indices can be further broken down and analyzed to show outage causes, historic trending, and how particular events contribute to I&M's SAIDI and SAIFI performance. In other words, data supporting these indices enable I&M to determine what outages are the largest contributors to customer minutes of interruption.

C. ASSET CHALLENGES AND OPPORTUNITIES

EQUIPMENT FAILURE DATA

I&M tracks all equipment failures. From this data, I&M is able to determine how specific equipment failures are contributing to I&M's reliability. The contributions to SAIDI and SAIFI from different types of equipment failures are provided in Figures III.C.1 and III.C.2 below:

Figure III.C.1: Type of Equipment Failure as a Percentage of SAIDI (Michigan, Excludes MEDs)

Distribution Line Equipment Failure Cause	2016	2017	2018	2019	2020
ARRESTER	3.1%	1.9%	1.5%	0.4%	2.3%
CONDUCTOR OVERHEAD	7.8%	6.7%	6.7%	20.4%	14.1%
CONDUCTOR UG	3.3%	5.2%	3.2%	2.9%	12.2%
CONN/CLAMP	10.3%	3.2%	8.0%	2.6%	2.8%
CROSSARM	23.3%	18.6%	9.9%	10.6%	6.4%
CUTOUT	24.6%	30.9%	38.8%	32.8%	24.9%
INSULATOR	4.0%	16.7%	19.4%	4.6%	16.4%
JUMPER/RISER	6.0%	3.1%	0.7%	13.2%	3.0%
POLE	1.7%	0.5%	3.6%	2.9%	4.4%
RECLOSER, LINE/OCR/BR	3.1%	3.0%	1.5%	1.6%	1.8%
REMAINING EQUIPMENT	6.4%	8.0%	2.7%	4.2%	8.6%
TRANSFORMER, OH	6.6%	2.2%	4.0%	3.7%	3.3%

FIGURE III.C.2: TYPE OF EQUIPMENT FAILURE AS A PERCENTAGE OF SAIFI (MICHIGAN, EXCLUDES MEDS)

Distribution Line Equipment Failure Cause	2016	2017	2018	2019	2020
ARRESTER	2.0%	0.9%	1.9%	0.7%	2.2%
CONDUCTOR OVERHEAD	8.3%	7.9%	7.8%	13.4%	16.3%
CONDUCTOR UG	1.5%	3.3%	1.5%	1.8%	7.2%
CONN/CLAMP	9.2%	3.6%	5.2%	3.2%	3.7%
CROSSARM	21.5%	17.6%	15.8%	10.1%	17.6%
CUTOUT	22.7%	34.7%	39.0%	36.6%	19.5%
INSULATOR	3.1%	13.1%	15.6%	5.7%	15.1%
JUMPER/RISER	6.2%	5.8%	1.1%	17.0%	5.5%
POLE	0.3%	0.4%	3.4%	4.1%	2.9%
RECLOSER, LINE/OCR/BR	9.4%	2.9%	2.8%	1.3%	1.8%
REMAINING EQUIPMENT	10.2%	8.3%	3.1%	3.5%	6.8%
TRANSFORMER, OH	5.4%	1.4%	2.8%	2.5%	1.4%

SUMMARY OF EQUIPMENT FAILURE DATA

I&M's Michigan service territory experiences outages and operating challenges related to aging assets. Much of I&M's Michigan system was built in the 1960s and 1970s when I&M's territory experienced a growth phase. As such, and an increasing number of assets are reaching the end of their expected design life. Although age alone is not the determining factor for the failure of an asset, approaching or exceeding an asset's expected design life correlates with increasing asset failure rates. This concern is compounded when multiple assets begin to reach the end of their design life in the same general time span, creating an exponential effect in outages and corresponding recovery. Aging asset replacement continues to be a growing priority for I&M to support future reliability.

Additionally, older assets tend to be harder to recover or replace after a failure. Often, that is because it is difficult to obtain parts for aging equipment. Older assets also pose inherent safety risks. Equipment that is operating after the end of its design life has a higher incidence of failure during operation. The type and design of the asset are also relevant factors. With some aging assets, the material used in their manufacture has been replaced with different material, which may offer benefits over the original material. Overhead conductors are an example of this and are discussed below.

I&M's equipment failure data show that I&M's primary equipment challenges are as follows:

- *Cutouts* – A fuse cutout is a combination of a fuse and a switch. It is used in primary overhead feeder lines to protect selected distribution equipment and primary conductor from current surges and overloads. An overcurrent caused by a fault in the equipment or on the line will cause the fuse to melt, disconnecting the equipment from the line or a primary line segment from the upstream source. Utility linemen can also open it manually. The most common mode of failure for porcelain cutouts is material related; lateral cracking (from top to bottom of the cutout). Cracking causes the cutout to lose its insulating properties resulting in electric faults. Cracking can also cause carbon tracking, which can lead to burnt crossarms and poles and result in pole-top fires.
- *Lightning Arresters* – These protect electrical equipment from over-voltage transients caused by external (lightning) or internal (switching) events. Wear and aging due to lightning and other elements have led to the deterioration of lightning arrestors on I&M's system.
- *Crossarms* – These wood pieces extend off poles to hold conductor and other equipment. As with other distribution assets, crossarms have experienced wear due to age and the elements and become more prone to failure as they age.
- *Insulators* – These devices attach conductors to structures, keeping the conductors electrically isolated from the structure and from other conductors. Older insulators are commonly porcelain and can fail due to cracking from stress or deterioration over time.
- *Overhead conductor* – Conductor consists of bare metal wire of a single strand or multiple strands energized at primary distribution voltage. They are supported by insulators on wood or metal poles. As conductor types continue to weather and incrementally deteriorate over time (due to factors such as temperature, conductor loading, weather conditions, tree damage, and corrosion), resiliency is diminished and failure increases. For instance, American wire gauge (AWG) size 6 Copper Conductor (6-CU) and AWG size 4 Copper Conductor (4-CU) are smaller diameter copper conductors. As these conductors age, they tend to stretch when stressed by wind storms, ice, and contacts by falling tree limbs. Similarly, in the case of a small aluminum conductor with steel reinforcement (AS), the tensile strength is provided by the central steel strand. In the older AS conductors, the steel core deteriorates over time and the conductor strength becomes compromised. For both types, the failure rate is increasing due to the conductors approaching the end of their useful life.

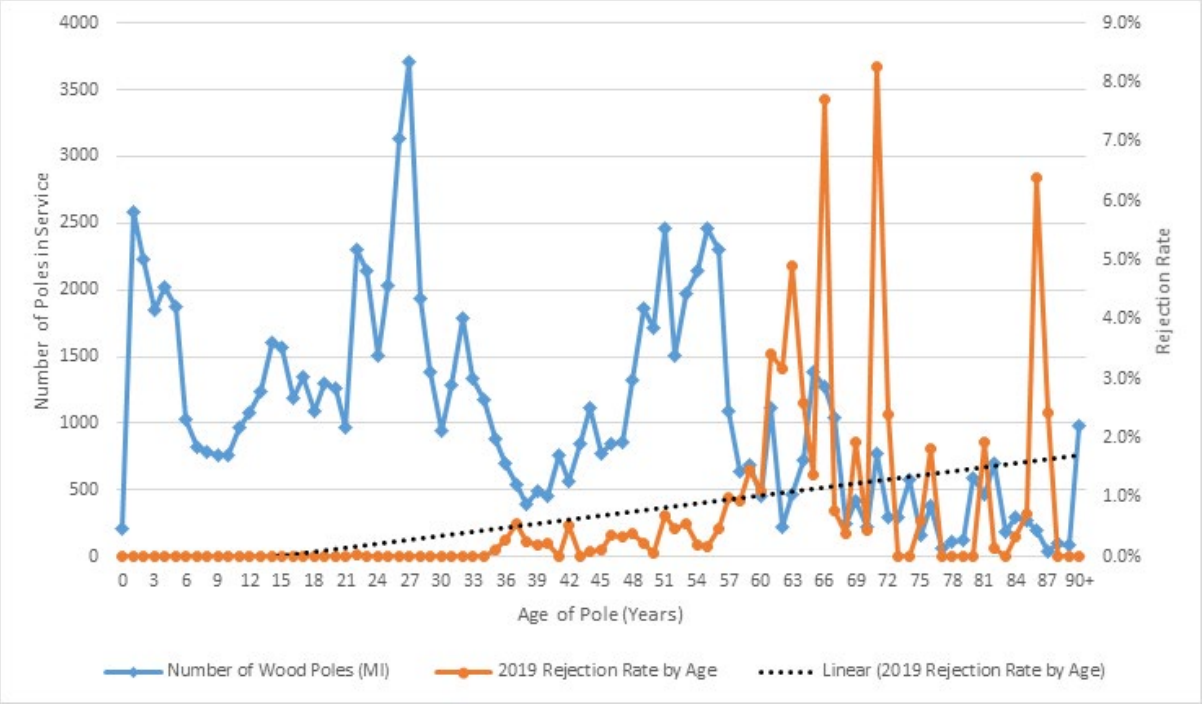
- *Reclosers* – This equipment is used on overhead distribution systems to detect and interrupt faults. Since many short-circuits on overhead lines clear themselves, a recloser improves service continuity by automatically restoring power to the line after a fault. If the fault persists, the recloser will open to isolate the fault condition. Reclosers are more prone to failure as they age due to moisture getting in and around aged seals. Additionally, after hundreds of operations, components of the device such as the contacts wear out, which will also cause failures.

OTHER ASSET CONSIDERATIONS

As explained in the previous section, I&M is monitoring trends in specific types of equipment failures that are negatively affecting reliability. In reviewing its Michigan distribution system, I&M determined that there are other aging assets that pose potential issues and need to be addressed proactively.

- *Underground residential distribution (URD) cable* – I&M has historically installed two (2) types of URD: 1) unjacketed and 2) jacketed. Before the mid-1980s, URD cable used for most distribution applications in the United States was unjacketed, meaning the neutral conductor was exposed to earth. This factor, coupled with natural deterioration of the URD cable insulation, increases the likelihood of the URD cable failing and causing customer interruptions. Beginning in the mid-1980s, I&M started installing jacketed cable, where the neutral is protected and therefore does not come into direct contact with earth. However, approximately 15% of I&M's URD cables are unjacketed and are in need of replacement.
- *Distribution Poles* – Many distribution poles in I&M's Michigan service territory are in need of replacement. Of the approximately 139,000 wood distribution poles in I&M's Michigan service territory, the average age is 35 years, and about 15% of the poles have been in service for over 60 years. The estimated population of deteriorated poles in I&M's Michigan service territory is increasing over time. Based on a three-year average, I&M has found approximately 6% of its pole population is deteriorated to the point of requiring replacement. This amount is on an upward trajectory due to the number of poles reaching the end of their expected design life. Deteriorated poles are more likely to fail under significant ice or wind loading when placed under heavy vertical and longitudinal loads. Figure III.C.3 shows the age of I&M's poles in its Michigan service territory. As expected, the average reject rate, shown in the dotted black line, increases with the age of the pole.

FIGURE III.C.3: I&M DISTRIBUTION POLE AGE AND REJECT RATE (MICHIGAN)



D. OUTAGE RESTORATION

I&M understands that outage response can significantly affect customers' experience. Therefore, improving outage restoration is an important goal for I&M's distribution investments. Understanding how I&M prioritizes outage restorations provides context into I&M's investments that target improving outage restoration time, also referred to as resiliency.

EVENT PREDICTION & PREPARATION

I&M receives alerts from AEP's Meteorology department and continually monitors all available local, regional, and national weather forecasting information to anticipate potential impacts to the electrical system and resources needed to restore service to customers in a timely manner. I&M proactively activates storm procedures and requests resources in advance of predicted significant weather impacts before the first outage occurs. This action positions I&M to obtain off-system resources from other utilities if it appears that a large area of the region will have a strong likelihood of being impacted by severe weather. It also allows I&M to have an initial wave of resources geographically positioned, prepped, and assigned within the field management structure as the weather affects the system.

I&M established restoration plans for the most common types of major storm situations based on the level of damage to the electric system. I&M's plans are scalable and based on the federal Incident Command System (ICS) commonly used by emergency management organizations across the country. The objective of I&M's major storm restoration plans is to restore power safely and effectively, with an emphasis on outage prioritization, management of resources, cost control and tracking, and providing timely and accurate communication to customers and stakeholders. I&M has a specific plan for responding to heavy system damage events (e.g., severe ice storms, derechos, or tornados) and a specific plan for responding to moderate system damage events (e.g., ice storms or heavy thunderstorms). I&M's major storm restoration plans include predetermined actions related to external resource requests and the timing of resource requests, estimated resource needs that can be utilized effectively, support functions and management structures, timing of internal planning and information calls, deadlines for establishing restoration estimates, and timing of communication to regulatory officials, customers and the media. Once the impact of the storm is fully assessed, I&M adjusts the number, type, and location of external resources requested to match the situation to ensure customers are restored as safely, timely, and cost-effectively as possible.

RESTORATION PRIORITY AND ASSESSMENT

I&M typically prioritizes its restoration efforts with assessment and mitigation of hazardous conditions at the highest priority. Next in priority are essential services and critical customers, such as hospitals, fire departments, law enforcement, and water and sewage treatment facilities. Following that, the priority in the restoration effort focuses on restoring the largest number of customers served from one isolating device.

During the initial high level assessment phase, I&M begins to gain an early understanding of the extent of damage to the electrical system including whether damage is primarily to the distribution system, the transmission system, or both. For example, a damage assessor may find distribution protective devices open with little or no physical damage to lines and equipment. On the other end of the spectrum, an assessor may note broken poles and multiple spans of conductor down. This early perspective on the extent of the damage through assessment information is then used to estimate an Event Estimated Time of Restoration (ETR). This Event ETR is assigned to all reported outage cases that are related to that specific outage event. An Event ETR is the date and time I&M expects to complete all restoration work associated with the storm.

The next phase of assessment is to look at each individual outage case predicted in the outage management system to determine the cause of that outage and to identify material, personnel, and equipment needed to facilitate repairs. Once field personnel assess these requirements, Event ETRs are then refined to a Projected ETR for the individual outage case. This Projected ETR is a best estimate performed by the personnel scheduling the repair work of when a crew will ultimately complete repairs. This projection is based upon such factors as when a crew will be assigned to the outage case as dictated by the resources available coupled with the repair requirements at the job site as identified in the assessment phase.

ESTIMATED TIME OF RESTORATION (ETR)

Normally, when an outage occurs, a Global ETR is assigned. This Global ETR is based on the historical average outage time for that particular geographical area, the time of day and day of the week (weekends tend to have extended ETRs due to fewer response personnel readily available).

During larger events when widespread damage adds additional complexities to accurately predict when a customer's power will be restored, prompt initial assessment is critical. Factors such as road conditions and accessibility of electrical facilities greatly affect restoration times and make forecasting these restoration times very challenging. Despite these challenges, I&M works to establish Event ETRs within as short a time as possible, recognizing that many factors can impact final results. To inform those needing to know, Event ETRs are entered into the system with the expectation of having at least 90% of affected customers restored to service by that date/time. As the extent of damage, accessibility, the number of responders and other data becomes clearer, Event ETRs are often replaced by ETRs that are specific to each outage case. These are called Projected ETRs and Field ETRS.

Projected ETRs are used in two different scenarios. I&M uses a Projected ETR when it can be estimated with a very high level of confidence that the customer will be restored well in advance to the Event ETR that was entered earlier in the storm. The second and less frequent reason is that an assigned ETR will soon expire and a Projected ETR is entered to notify the customer that I&M is still aware of the outage, coupled with better accuracy (based on influencing factors) of final restoration.

The final refinement of the ETR comes when the crew is actually on-site to make repairs. At this time, the crew provides a final estimated restoration time referred to as the Field ETR. As the Company works to restore service after an outage event, the ETR becomes more accurate as actual field assessments are integrated into the estimate. Customers who inquire regarding their specific ETRs are provided the most accurate estimate available at that time, even though it may only be an Event ETR early in the restoration progress.

CUSTOMER COMMUNICATION CHANNELS

I&M provides updates on restoration efforts via the following channels:

- *Mobile App* – I&M's mobile app allows customers to report outages and to receive outage updates on their smartphones.
- *Social Media* – I&M posts outage restoration information on social media sites such as Facebook and Twitter. During events, I&M personnel monitor these sites and respond to individual questions.
- *One Voice* – During events, I&M updates the local news media on the overall progress of restoration efforts affecting the area and issues informational releases to the news media regarding restoration progress at least three times a day during major power outages.
- *Website* – Through I&M's website, customers are able to report an outage, check outage status, sign up for outage alerts, and use an interactive outage map, which shows information such as the location and number of current outages.
- *Customer Service* – Customers can contact I&M customer service representatives to obtain information about outages. During major events, customer issues can be escalated to a hotline. Customer service contact information is listed in a variety of locations, including on customer bills and I&M's website.
- *Incident Command System (ICS)* – ICS is a management tool to respond to small and large emergencies or even non-emergency situations. It is a proven system and structure that has been successfully used for many years by the military, emergency response organizations, local and state agencies, and private organizations like other utilities. As part of ICS, the utility has a designated role to communicate with external shareholders such as government officials, community leaders, and emergency management agencies about the outage event and restoration efforts.

PLANS FOR IMPROVING RESTORATION

I&M is in the early stages of utilizing Unmanned Aircraft Systems (UAS), commonly referred to drones, in assessment efforts. UAS presents the possibility of facilitating a quicker and safer assessment, particularly in areas that are difficult to access. As I&M gains experience, additional UAS use cases will be considered.

In addition to the possibility of UAS utilization, I&M is actively modernizing its grid with a core purpose of improving resiliency through improved recovery timing (better information, automation of devices, etc.). Specific resiliency influence by these grid modernization efforts include the following:

- AMI – Provides near real-time notification of outages per customer without relying upon customer to report an outage to call centers.
- DACR Schemes – In event of an outage, DACR reconfigures circuit to minimize number of customers affected by extended outage.
- Sensors – Provides more detailed line loading, allowing greater confidence in transferring loads on the distribution system where feasible.
- Smart Reclosers – Can be operated remotely from dispatch center eliminating need for crew to visit site and manually operate recloser.

IV. PLAN DEVELOPMENT

I&M's distribution system plan development utilizes an approach that is designed to identify and prioritize the required work first, followed by the most cost-effective system upgrades and renewal investments I&M can make on its distribution system. The goal of I&M's project prioritization process is to determine which projects will provide the most benefit to customers at a reasonable cost.

A. DISTRIBUTION PLANNING INPUTS

Depending on the issues and projects involved, the source and type of inputs that I&M uses for distribution planning can vary. The following is a list of the data sources for distribution planning that I&M regularly considers:

- *Analysis of Circuit Performance* – Evaluating circuit performance aids in understanding issues that are causing outages, as well as what efforts are needed to improve performance. Circuit performance data is circulated to field personnel who use their knowledge to assist with prioritizing projects.

- *Engineering* Expertise – I&M's insight into equipment performance, coupled with the equipment's failure characteristics, is guided by the knowledge and experience of I&M's engineers. By design, engineering works closely with field personnel, who know where failures occur, what causes outages, and which areas or types of equipment have the greatest frequency of incidents. Although I&M's engineering analyses may show that an asset is operating beyond its expected design life, field personnel responsible for inspecting and maintaining these assets contribute to decisions on whether assets should be replaced.
- *Forecasted Load Profiles* – I&M reviews a 10-year load forecast as part of its distribution system planning. This load forecast is updated annually, using five (5) years of historical load data as a basis for the growth rate. Other reviewed factors include specific load for I&M's distribution stations and circuits, as well as load information for large commercial and industrial customers. The system load forecasts are compared against the capacity of I&M's distribution system and monitored. Areas where load is expected to exceed capacity are then further reviewed to determine if a project is needed to address any potential issue. Since this process is conducted on an annual basis, I&M is able to meet the capacity of its system on a proactive basis.
- *Inspection Results* – I&M systematically conducts inspections of its distribution equipment. Results from these inspections are used to prioritize asset renewal and reliability programs. This proactive approach helps identify issues that may otherwise go undetected and result in interruptions or public safety issues if left unmitigated. More information about I&M's inspection program can be found in Part V.
- *Industry Data* – I&M uses available industry data and analyses to provide information on equipment failure rates and projected obsolescence of equipment. For instance, I&M, through AEP engineering, partners with consultants and electric utilities across the U.S., using industry benchmarking data for comparisons of failure rates and causes. This information is coupled with I&M's own analysis on failure rates to inform the project selection process.
- *New Technologies* – Improvements in distribution hardware and infrastructure, such as smart grid technologies, are incorporated into the Plan. In addition to operational improvements, these new technologies will allow I&M to address changes in how customers meet their energy needs, which fundamentally requires an interactive, two-way operational grid. Several of these grid modernization technologies are becoming essential in ensuring that the Company can maintain safety and reliability through effective planning

as the distribution grid becomes more versatile due to factors such as greater penetration of distributed energy resources and the needs to power electric vehicles across the system.

- *Historical Volumes* – For activities that are required to be performed, but are not within I&M's control, a historical three-year average is utilized for reference. Activities such as new customer service installations and outage restoration work (storm and non-storm) are included in this type of work. Given that these particular activities are "reactionary" in nature, meaning they are not scheduled or anticipated at a project level, a predictive model using historical volumes of work by month is used for estimating these types of annual investments.

B. PROJECT SELECTION AND PRIORITIZATION

I&M uses specific methods and tools to identify, refine and prioritize the projects included within its Plan. This is accomplished through processes specific to the type of investment being made. Given the nature of I&M's aging assets and the volume of this work, I&M utilizes specific tools to prioritize the projects that are planned for a particular year, which informs and influences the selection of Asset Renewal and Grid Modernization projects. Two separate stages are used to make a final determination of these prioritized projects including the following:

- *CHI* – CHI is a tool used for assessing distribution system health at the individual circuit level utilizing multiple data sources. The CHI methodology generates scores for all distribution circuits and associated substation equipment, with a forward-looking capability used to anticipate issues. The results of the CHI methodology are a ranked list of circuits according to circuit health. I&M uses this output to refine the list of potential circuits where distribution projects can be most impactful. The CHI methodology generates scores for each distribution circuit based on two (2) components:
    1. *Asset Health* – The age and condition of wires, poles, transformers, capacitors, reclosers, regulators, and other assets, as well as the state of vegetation management.
    2. *Historical Circuit Performance* – Environmental factors, vegetation, repeated outages and equipment failures are used to calculate a total historical circuit performance score.

- *PVR* – Once the specific circuits are identified via CHI, the PVR tool is utilized to analyze multiple factors and prioritize a portfolio of each year's distribution reliability and combined projects. The PVR process determines the optimal allocation of capital and Operations and Maintenance (O&M) costs to produce the best value combination for I&M and its customers. The PVR (see Appendix 5 for the complete PVR output for Michigan projects) is based on the following:
    1. *Reliability* – This factor is focused on determining the potential impact of a project on customer reliability and takes into consideration: annual reduction of CMI to affected customers; number of affected customers; number of customer interruptions; amount of affected customer load, power quality issues (e.g., voltage variances high, low, or flickering); and the impact to system resiliency.
    2. *Financial* – This factor takes into consideration the financial impact the project has on annual O&M. For example, does the project have the potential to lower annual O&M, or is an increase needed that will affect the annual budget?
    3. *Strategic* – This factor takes into consideration the alignment of the project with I&M's strategic objectives, which include enhancing operability (e.g., adds the ability to operate equipment remotely), the ability to recognize asset conditions and capture data, automating equipment, and adding protection and infrastructure to help enable distributed energy resources.
    4. *Safety* – This factor takes into consideration how the project affects the safety of the public as well as I&M personnel. For example, if existing assets will be upgraded or replaced, are there any known issues with the assets that could potentially impact safety? The importance of this factor is paramount and is a consideration for every single project I&M undertakes.
    5. *Compliance* – This factor takes into consideration whether the project aligns with code compliance, the current percentage-loading amount on any station equipment associated with the project, and, absent intervention, how long station equipment associated with the project is 5% loaded beyond its existing capacity.
    6. *Reputation* – This factor takes into consideration whether the project aligns with specific Commission objectives (e.g., energy efficiency initiatives or support of distributed energy resources), specific municipal and/or state priorities (e.g., renewables, serving pre-certified economic development sites) and the potential negative impact on customers.

Planning for other areas of investment, such as Combined Projects involves a team of individuals that annually review, update and prepare a ten-year investment plan. This team, consisting of both transmission and distribution planners, weighs a number of factors, including loading data, related work (often driven by PJM), and overall system resiliency and performance. The majority of this work comprises the larger scale projects, some of which are multiyear projects. The team performs needs identification assessments based on criteria consisting of three main categories: Asset Condition; Historical Performance; and Risk. These criteria are utilized to identify opportunities to address aging infrastructure in poor physical condition, poor performing facilities and assets that possess the highest reliability risk for our customers. These criteria are complemented with field and engineering assessments to further analyze our asset fleet. This enables I&M to develop the most efficient, holistic, and cost effective solutions to address its needs and to achieve the highest grade of reliability for our customers.

C. ADDITIONAL PLANNING CONSIDERATIONS

I&M's Plan has been developed based on the most current and best information and data available. But because I&M's distribution system is dynamic, there are a variety of reasons why I&M requires flexibility in implementing its Plan. Therefore, when developing its Plan, I&M considered additional factors that play a role in the successful implementation of projects. These factors include customer service, workforce availability, schedule constraints, and financial parameters and are more closely examined as follows:

- *Customer Service and Public Project Relocation (PPR) Projects* – There are several day-to-day customer service activities that I&M must perform. These activities include, but are not limited to, installing new service, restoring outages, relocating distribution facilities to accommodate road construction, and water and sewer line installation. Additionally, customer service and PPR projects (typically initiated by local, county and state governing authorities) often arise throughout the year, requiring crews to be assigned in order to meet in-service deadlines. I&M factored this into its Plan and estimated both the volume of this work and the timing based on historical experience and future projections. Because these activities are not perfectly predictable, in terms of volume, scope, location, and timing, a degree of flexibility is required to allow these customer service activities to be appropriately prioritized.
- *Workforce Availability* – I&M uses a mix of internal and external labor in order to execute its distribution projects in a cost-effective manner. In recent years, the craft labor market has realized high demand within I&M's service territory, making it necessary to plan further

in advance and remain actively engaged with market changes. Similarly, weather events often cause periodic delays in work completion while crews work to repair damage on I&M's system or other utility systems (via Mutual Assistance). I&M factors a certain amount of these interruptions into the Plan schedule, adjusting as necessary when more time is taken for these activities than projected. This work, as with Customer Service, takes a priority and is reactive by its nature.

- *Material Availability* – Material availability and lead times for ordering materials fluctuate for various reasons. More recently, issues stemming from COVID-19 created shortages in certain construction materials, requiring schedule adjustments. Likewise, having a broad portfolio of work enables the Company to adjust if/when necessary to address such issues.
- *Scheduling Considerations* – Some projects, such as those requiring station outages, must be scheduled in coordination with PJM. Dynamic system loading – influenced by weather, other projects, and unanticipated outages – also influences the timing of project work. These considerations are factored into I&M's planning and are reviewed weekly so that assignments can be adjusted as schedule changes occur.
- *Financial Parameters* – The costs of distribution projects are also a key factor in I&M's distribution planning.

As time goes by, I&M will need to be able to respond to these conditions and change its Plan accordingly. This may include the introduction of additional projects. This may also include shifting dollars and resources between current programs to address emerging priorities. Flexibility in implementing the Plan will allow I&M to balance the benefits of planned investment with costs – with the primary objective of maintaining appropriate focus on those improvements that will have the greatest influence on customer experience.

V. FIVE-YEAR DISTRIBUTION PLAN

Using the inputs outlined above, I&M created its Plan, covering 2021 to 2025, for investment in its distribution system. The objective of this Plan is to provide safe, reliable and economic electric service to I&M's customers. The Plan addresses new developments in energy delivery in order to increase the value of the distribution system to each customer. While this Plan is I&M's best assessment of the work that will occur over the next five (5) years, distribution system planning is an ongoing process. This process provides flexibility to quickly respond to many factors including changing system conditions, emerging needs, and technology

development. Therefore, I&M recognizes that this Plan will necessarily change over time.

The purpose of the Plan is to define and itemize a portfolio of programs and projects that ensure the system operates safely, provides for continuous improvement in reliability, and enhances customer experience. In this collective portfolio of work, the programs represent specific work activities that are perpetual in nature such as vegetation management (once a four-year cycle is completed, it begins again). Projects represent activities with a defined start and end date, such as the AMR to AMI conversion.

I&M's Plan is divided into four categories: 1) Reliability Enhancement; 2) Distribution Asset Management; 3) Risk Mitigation; and 4) Grid Modernization. These categories are outlined in Figure V.1. Subsequent Figures V.2 and V.3 outline the respective O&M and capital costs identified with the associated programs and projects defined in this section.

FIGURE V.1: FIVE-YEAR DISTRIBUTION PLAN CATEGORIES & PROGRAMS

Category	Activity	Description
Reliability Enhancement	Vegetation Management	The cornerstone of I&M's Plan is to continue on its cycle-based vegetation management program to meet customer expectations for fewer and shorter outages caused by vegetation.
	Asset Renewal	I&M developed a suite of programs to replace aging infrastructure and harden the system to improve reliability and resiliency.
Distribution Asset Management	Combined Projects (Capacity Additions, Station & Line Components)	I&M identified specific asset renewal and reliability projects that are needed to address contingency capacity constraints, improve outage recovery, replace or upgrade aging or obsolete station equipment and perform voltage conversions of select stations and distribution circuits.
Risk Mitigation	Infrastructure Inspection Programs and Underground Locates	I&M performs inspections designed to identify potential issues on the distribution system, promoting public safety.
Grid Modernization	Resiliency Improvement via System Response and Monitoring Projects	I&M identified technologies that will help I&M monitor, protect, and improve the operation and resiliency of its distribution system. AMI, Enhanced CVR, Sensors, DACR and Smart Reclosers are project groups included in this activity.

FIGURE V.2: PROJECTED O&M BY CATEGORY (MICHIGAN)

Category	Program	2021	2022	2023	2024	2025
Reliability Enhancement	Vegetation Management	$13,200,000	$13,200,000	$13,200,000	$13,200,000	$13,200,000
	Asset Renewal and Reliability	N/A	N/A	N/A	N/A	N/A
Distribution Asset Management	Station Combined Projects	N/A	N/A	N/A	N/A	N/A
Risk Mitigation	Inspection Programs	$988,000	$1,016,000	$1,046,000	$1,074,000	$1,105,000
Grid Modernization	Sensors, DACR, AMI, Smart Reclosers, Smart Circuit Ties, CVR	$94,000	$122,000	$163,000	$210,000	$264,000
Total		$14,282,000	$14,338,000	$14,409,000	$14,484,000	$14,569,000

FIGURE V.3: PROJECTED CAPITAL BY CATEGORY (MICHIGAN)

Category	Program	2021	2022	2023	2024	2025
Reliability Enhancement	Vegetation Management	N/A	N/A	N/A	N/A	N/A
	Asset Renewal and Reliability	$12,625,000	$11,314,000	$19,149,000	$18,717,000	$18,011,000
Distribution Asset Management	Station Combined Projects	$12,833,000	$8,518,000	$15,704,000	$8,879,000	$17,216,000
Risk Mitigation	Inspection Programs	N/A	N/A	N/A	N/A	N/A
Grid Modernization	Sensors, DACR, AMI, Smart Reclosers, Smart Circuit Tie, CVR	$12,745,000	$25,881,000	$11,469,000	$12,916,000	$11,045,000
Total		$38,203,000	$45,713,000	$46,322,000	$40,512,000	$46,272,000

A. RELIABILITY ENHANCEMENT – VEGETATION MANAGEMENT PROGRAM

WORK PLAN

A critical first step in managing vegetation (trees, brush, and vines) is to refrain from reverting to a reactive approach and continue following a systematic, cycle-based vegetation management program.

As outlined below in Figure V.A.1, I&M is in the final two years of completing its initial five-year cycle throughout its Michigan service area. Upon completion of this initial cycle by the end of 2022, I&M will begin its second five-year cycle, beginning in 2023. Supporting this effort, Figure V.A.2 shows projected vegetation management O&M costs associated with this work.

FIGURE V.A.1: VEGETATION MANAGEMENT WORK PLAN (MICHIGAN)

	Units	2021	2022	2023	2024	2025
Remedial Maintenance	Line Miles	696	696	696	696	696

FIGURE V.A.2: VEGETATION MANAGEMENT PROJECTED O&M COSTS (MICHIGAN)

2021	2022	2023	2024	2025
$13,200,000	$13,200,000	$13,200,000	$13,200,000	$13,200,000

DRIVERS & BENEFITS

- *Sustainable Increased Reliability for Customers* – Tree-caused outages account for approximately ½ of total SAIDI minutes within I&M's Michigan service area. A primary benefit of the cycle-based vegetation management program is that it significantly reduced vegetation-related outages. Systematic, vegetation management programs are widely acknowledged by the industry as the most effective way to reduce vegetation-related outages. I&M's experience, however, also shows that outages start to increase again after five (5) years without performing vegetation management on a cleared circuit. For this reason, I&M's planned cycle-based vegetation management program is specifically designed to be on a five-year cycle.
- *Reduced Cost through Intentional Maintenance* – Although improved reliability for customers is the main driver of a five-year vegetation management cycle, it will also lead to O&M savings related to a reduction in outages caused by vegetation. A reduction in vegetation-caused outages will also prolong the life of equipment by reducing wear and tear and, in turn, reducing equipment maintenance, restoration, and replacement costs.

PRIORITIZATION

I&M will prioritize vegetation management work based on an analysis of circuit performance and field personnel input. Evaluating circuit performance helps I&M understand what issues are occurring, the impact on customers and what efforts are needed to improve performance. Once the circuit performance list has been developed, it is then circulated to the field personnel that are responsible for, and most familiar with, the circuits in question. The field personnel utilize their knowledge of the circuits, as well as input from customers, to prioritize vegetation management work on the circuits.

Circuit listings and corresponding maps of areas where I&M is planning to conduct vegetation management from 2021 through 2025 can be found in Appendix 2.

ENVIRONMENTAL CONSIDERATIONS IN VEGETATION MANAGEMENT

Since I&M pre-plans all vegetation control work specific to each location, I&M's planning process incorporates seasonal and environmental constraints into its process. A number of these are identified below:

- *Seasonal Bat Protection* – The Indiana Brown Bat has been listed as endangered under the Endangered Species Act and is also protected by the Federal Cave Resources Protection Act of 1988. Between April and October, the Indian Brown Bat is more likely to be nesting in trees or resting during migration in I&M's Michigan service territory. During this time, I&M employs care and caution around work on tree species that serve as nesting or resting habitat for the bat. Specifically, I&M avoids trees with loose bark such as the shagbark hickory.
- *Oak Wilt Prevention* – Oak wilt is a prevalent disease that I&M has had to contend with for many years. Avoiding the spread of this pathogen is advantageous to I&M and its customers as it prolongs the life of susceptible oak trees and minimizes the untimely decline of a tree that otherwise would be characteristically dependable (i.e., wind firm) during inclement weather. All of I&M's business partners that perform vegetation control utilize the accepted industry practice of sterilizing their equipment with chloride bleach between working on trees susceptible to this disease.
- *Dune Critical Areas* –I&M has facilities in its Michigan service territory that were built in areas now protected by State environmental restrictions related to Dune Critical Areas. I&M fully abides by the permitting and review process in place through the Michigan Department of Environmental Quality (MDEQ) and has maintained a positive relationship with MDEQ throughout the period that these rules have been in effect.

- *Seasonal Frost Laws* – I&M manages a large number of vehicles that operate with a Gross Vehicle Weight (GVW) above 26,000 lbs. A number of the counties I&M serves (e.g., Berrien, Van Buren, and Cass) have enacted frost laws that restrict where vehicles can operate during certain periods of the year. I&M incorporates these dynamic restrictions into its planning processes for all work, including vegetation control and line construction and repair.

B. RELIABILITY ENHANCEMENT – ASSET RENEWAL AND RELIABILITY PROJECTS

I&M's Reliability and Asset Renewal Projects is a suite of projects developed to replace aging infrastructure and harden the distribution system to make it more resilient. As explained above, a growing portion of I&M's distribution assets are reaching the end of their expected design life. Assets that are approaching or exceeding the end of design life – are much more likely to fail and can present public and employee safety risks.

Each of I&M's Asset Renewal Reliability Projects are described below. In addition, maps showing the location of asset renewal projects are provided in Appendix 3.

1. OVERHEAD LINE REBUILD

WORK PLAN

I&M's asset renewal projects focus on replacing aged infrastructure with the purpose of ensuring the distribution system remains reliable and safe:

- *Overhead Line Rebuild Projects* – I&M constructs/reconstructs overhead lines and associated equipment to current design standards. Replacement of aged overhead facilities reduces the likelihood of unplanned outages due to equipment failure, and subsequently enhances resiliency through use of current standards. In addition, overhead rebuilds enhance safety for customers and I&M personnel by decreasing the likelihood of downed lines or failure of equipment.
- *Establish or Bolster Circuit Ties* – I&M will tie circuits together or bolster existing ties. A circuit tie allows interconnections between adjacent feeders for contingency load transfers. Load transfers between feeders can help minimize the length of an outage when large outages occur. For circuit tie projects, a larger overhead conductor is used, as the larger size is needed to be able to transfer load between two circuits.

- *Relocate Select Overhead Distribution Circuits* – I&M will relocate hard-to-access overhead lines to areas that are more easily accessible. Hard-to-access lines may be the result of geographic or terrain features such as fire lanes, dense vegetation, rivers or lakes. The focus of this program is to make these selected sections of distribution circuits more accessible, which helps facilitate safer and more expedient restoration.
- *Sectionalizing* - Sectionalizing will be performed on select distribution circuits by dividing the distribution feeder into smaller sections using devices that can isolate a faulted piece of the system from the rest of the remaining system. In this way, sectionalizing limits the impact of a faulted section of the system. When an outage occurs, fewer customers are interrupted.
- *Recloser Replacement* – Reclosers are a type of switchgear that detects and interrupts faults. Unlike fuses, which remain open after sensing a fault, reclosers have the ability to quickly open and close after fault detection to determine if the fault has been resolved. For several years, I&M has been replacing aging hydraulic reclosers with vacuum units. I&M will replace most remaining hydraulic reclosers located during inspections and begin a cyclic replacement of all reclosers based on type (12-year cycle for vacuum interrupter reclosers and 24-year cycle for solid dielectric reclosers).
- *Capacitor Replacement* – A capacitor is an electrical device that can accept a charge, store it, and release it. By accepting, storing, and releasing electrical charges, capacitors increase the amount of usable power that is available to customers. I&M has a 25-year replacement cycle for capacitors. In addition, I&M continues to install new controls on switched banks.
- *Porcelain Cutout Replacement* - A fused cutout is a combination of a fuse and a switch. It is used in primary overhead feeder lines to protect selected distribution equipment and primary conductor from current surges and overloads. I&M has found that porcelain cutouts have been failing due to the material they are made of, and therefore they are in need of replacement.
- *Lightning Arrester Replacement* – Lightning arresters protect electrical equipment from over-voltage transients caused by external (lightning) or internal (switching) events. Wear and aging due to lightning and other elements have led to the deterioration of lightning arresters on I&M's system. I&M continues to replace these deteriorated devices.

- *Crossarm Replacement* – Crossarms are wood pieces that extend off poles to hold conductor and other equipment. As with lightning arresters, many cross arms are worn or deteriorated due to age and the elements and consequently are at risk of failure. I&M will replace deteriorated crossarms and, where applicable, install crossarms that conform to current standards offering hardening and resiliency benefits.

Figures V.B.1.1 and V.B.1.2 summarize the work plan, timing, and projected capital costs of I&M's Overhead Line Rebuild Work Plan over the five-year period of 2021-2025.

FIGURE V.B.1.1: OVERHEAD LINE REBUILD WORK PLAN (MICHIGAN)

	Units	2021	2022	2023	2024	2025
Replace/Rebuild 1-Phase Overhead Line	Line Miles	11.06	12.66	19.02	15.72	9.43
Replace/Rebuild 3-Phase Overhead Line	Line Miles	9.04	7.48	11.58	11.09	6.76
Establish/Bolster Circuit Ties	Line Miles	2.32	2.73	4.53	4.36	3.3
Roadside Relocation	Line Miles	19.6	8.66	30.02	27.81	24.87
Sectionalizing	Circuits	6	3	5	4	4
Recloser Replacement	Units	4	13	7	9	8
Capacitor Replacement	Units	7	6	11	8	8
Porcelain Cutout/ Lightning Arrester Replacement*	Units	1,086	1,730	2,172	2,092	1,825
Crossarm Replacement*	Units	311	311	311	311	311

FIGURE V.B.1.2: OVERHEAD LINE REBUILD PROJECTED CAPITAL COSTS (MICHIGAN)

	2021	2022	2023	2024	2025
Replace/Rebuild 1-Phase Overhead Line	$887,000	$1,022,000	$1,630,000	$1,468,000	$993,000
Replace/Rebuild 3-Phase Overhead Line	$2,466,000	$2,073,000	$3,398,000	$3,570,000	$2,454,000
Establish/Bolster Circuit Ties	$457,000	$605,000	$904,000	$1,011,000	$755,000
Roadside Relocation	$3,828,000	$1,725,000	$6,331,000	$6,391,000	$6,440,000
Sectionalizing	$154,000	$75,000	$123,000	$124,000	$127,000
Recloser Replacement	$21,000	$70,000	$64,000	$56,000	$58,000
Capacitor Replacement	$84,000	$74,000	$139,000	$111,000	$127,000
Porcelain Cutout/Lightning Arrester Replacement*	$357,000	$585,000	$719,000	$760,000	$684,000
Crossarm Replacement*	$763,000	$786,000	$809,000	$834,000	$859,000
Total	$9,016,000	7,015,000	$14,118,000	$14,325,000	$12,498,000

DRIVERS & BENEFITS

- *Reduce Number of Outages* – Rebuilding lines reduces the number of outages and avoids customer minutes of interruption (CMI). This is accomplished by replacing aged or obsolete overhead conductors along with the associated hardware, as well as using current design standards.
- *Faster Outage Restoration* – Circuit ties provide operational flexibility and allow I&M to restore power to some customers through alternative power flows during outages. A circuit tie allows interconnection between adjacent feeders for contingency load transfers. That is, if an issue occurs on a circuit, the adjacent interconnected or "tied" circuit can provide an alternate electrical path to serve the load. This transfer can help minimize an outage duration when large interruptions occur. In terms of roadside relocation, I&M has portions of distribution circuits that are difficult to access due to various terrain features, such as fields or forests. In these cases, I&M may not be able to utilize equipment, such as service trucks, in order to perform work or vegetation management on these circuits. Instead, personnel must physically transport material and equipment to manually perform the necessary work. Relocating these distribution circuit portions along roadsides mitigates these issues by improving accessibility of the distribution facilities.
- *Reduce the Number of Customers Impacted by Outages* - Sectionalizing enables smaller circuit segments and fewer customers to experience interruptions due to faults that occur on distribution circuits. This activity also has the net result of affecting less customers per outage during storm events.
- *Improve Reliability by Replacing Aging Assets* –
    - The failure of porcelain cutouts is a leading cause of outages in terms of volume and duration.
    - Wear, aging and other elements have led to the deterioration of many lightning arresters and crossarms on I&M's system.
    - Reclosers must be replaced on a cyclical basis (hydraulic reclosers every 5-6 years, and vacuum reclosers every 12 years) because these types of assets are more prone to failure due to the number of operations and/or years in service between refurbishment.
- *Improve Resiliency Through Design Specifications* – Overhead rebuilds further enhance reliability and resiliency because they use more robust design specifications, such as current standards for crossarms and poles. For example, I&M's current standards call for

the use of poles with stronger structural strength, designed for the heavy loading district. This allows them to withstand ice build-up (up to one inch) and strong winds (40 mph).

- *Reduced Vegetation Management Costs* – Relocating distribution lines can also lead to reduced vegetation management cost. When a distribution line is located within a wooded area, I&M must trim both sides of the conductor. However, when the line is moved to a roadside, I&M only needs to trim one side of the conductor – the side that is opposite the road. The side of the conductor nearest the road will remain clear of vegetation because of the road.

PRIORITIZATION

- I&M selects circuits for overhead line rebuilds based on its planning methodology discussed in the Plan Development, including the CHI and PVR tools.
- I&M constructs and/or bolsters circuit ties to provide maximum flexibility and opportunities to restore power to customers during outages based on its planning methodology discussed in the Plan Development, including the CHI and PVR tools.
- Outputs from I&M's Risk Mitigation Program (detailed below) will identify problematic devices on the grid (such as porcelain cutouts and lightning arresters), broken or damaged facilities (such as crossarms), as well as overall facility condition.
- I&M uses industry information and analyses to assist in identifying generalized failure rates and obsolescence of equipment such as various overhead conductor types.
- I&M selects portions of circuits for roadside relocation based on input from field personnel, who are familiar with the local terrain. I&M also utilizes the CHI tool, which is discussed in above in the Plan Development.

2. UNDERGROUND REPLACEMENT PROJECT

WORK PLAN

- *URD Cable and Live-Front Replacement Projects* – I&M identifies deteriorated and unjacketed cable in need of replacement and simultaneously replaces live-front padmount transformers.
- *Underground Station Exit Cable Replacement Projects* – For these projects, I&M identifies and replaces aging underground station exit cables. A failure on this critical portion of the circuit interrupts service to all customers served on the affected circuit.

Figures V.B.2.1 and V.B.2.2 summarize the work plan, timing, and projected capital costs of I&M's Underground Replacement Project over a five-year period.

Figure V.B.2.1: Underground Replacement Work Plan (Michigan)

	2021	2022	2023	2024	2025
Replace Unjacketed Underground Cable (miles)	3.26	2.68	4.32	4.07	4.66
Replace Underground Station Exits (feet)	552	189	1067	N/A	514

FIGURE V.B.2.2: UNDERGROUND REPLACEMENT PROJECTED CAPITAL COSTS (MICHIGAN)

	2021	2022	2023	2024	2025
Unjacketed Underground Cable	$400,000	$334,000	$576,000	$601,000	$761,000
Underground Station Exits	$70,000	$24,000	$253,000	N/A	$136,000
Total	$471,000	$359,000	$828,000	$601,000	$896,000

DRIVERS & BENEFITS

- *Reduce Outages on Underground Cable* – Current standards require that underground cable be jacketed to reduce deterioration from the elements. But unjacketed underground cable was commonly installed beginning in the 1960s and these underground cables are still in use in I&M's Michigan service territory. These unjacketed cables are nearing the end of their useful life and are at high risk of failure. Replacing these cables will help prevent outages due to cable failure.
- *Reduce Large-Scale Outages Related to Station Exits* – Underground station exits are a primary portion of the circuit. A failure of an underground station exit interrupts service to all customers served by that breaker. Proactively replacing this cable before it fails will prevent outages that affect many customers.

PRIORITIZATION

- I&M has developed and is implementing a systematic underground replacement plan targeting unjacketed URD cable based on its outage performance and the number of customers served. I&M selected circuits for underground line rebuilds based on the planning methodology discussed in Plan Development, including the utilization of CHI and PVR tools.

3. POLE REPLACEMENT PROJECT

WORK PLAN

- *Pole Replacement* – I&M replaces poles as necessary based on the results from its proactive inspection program. Externally, poles may appear to be in good condition but may have deteriorated internally or below the ground line to the point where they no longer are strong enough to withstand horizontal loads produced by wind or vertical loads caused by ice. I&M notes that this specific work plan is for pole replacements and not inspections. The inspections that identify poles for replacement are addressed in the "Inspection Program" in Risk Mitigation Programs below.

Figures V.B.3.1 and V.B.3.2 summarize the work plan, timing, and projected capital and O&M costs of I&M's Pole Replacement Project over a five-year period.

FIGURE V.B.3.1: POLE REPLACEMENT WORK PLAN (MICHIGAN)

	2021	2022	2023	2024	2025
Pole Replacements	834	834	834	834	834

FIGURE V.B.3.2: POLE REPLACEMENT CAPITAL COSTS (MICHIGAN)

	2021	2022	2023	2024	2025
Pole Replacements	$3,138,000	$3,232,000	$3,329,000	$3,429,000	$3,532,000

DRIVERS & BENEFITS

- *Improve Safety, Reliability, and Resiliency* – Proactively replacing poles reduces the proportion of deteriorated poles, the risk of a pole failing near customers or I&M personnel, and the number of failed poles during a major event. This leads to a reduction in restoration time and cost. Additionally, current design standards are more robust than historical standards meaning that replacement poles will likely be larger in size. This, in turn, improves resiliency and lessens the likelihood of a weather event causing broken poles.

PRIORITIZATION

- Findings from the Pole Inspection Risk Mitigation Program help identify which poles are in need of replacement. Poles are categorized as priority or deficient, based on

I&M's pole standards. I&M schedules priority poles to be replaced within one (1) year, and deficient poles to be replaced within three (3) years.

4. DISTRIBUTION FEEDER BREAKER REPLACEMENT

WORK PLAN

- *Replace Distribution Feeder Breakers* – I&M will replace specific types and vintages of obsolete distribution feeder breakers. Timing is closely coordinated with I&M's Transmission team to optimize work schedules with related work that may be taking place.

Figures V.B.4.1 and V.B.4.2 summarize the work plan, timing, and projected capital costs of I&M's Distribution Feeder Breaker Replacement Project over a five-year period.

FIGURE V.B.4.1: DISTRIBUTION FEEDER BREAKER REPLACEMENT WORK PLAN (MICHIGAN)

	Units	2021	2022	2023	2024	2025
Distribution Feeder Breaker	Each	0	3	4	1	3

FIGURE V.B.4.2: DISTRIBUTION FEEDER BREAKER REPLACEMENT CAPITAL COSTS (MICHIGAN)

	2021	2022	2023	2024	2025
Distribution Feeder Breaker	N/A	$708,000	$874,000	$362,000	$1,085,000

DRIVERS & BENEFITS

- Replacement of distribution feeder breakers has multiple reliability and safety benefits. Specifically, the impact of CMI is tremendous, as older troublesome breakers and the associated legacy substation protection infrastructure tend to have more problems operating. Newer distribution feeder protection coordination, relay settings and breaker interrupting ratings reduce circuit and/or station level outages, which affect larger groups of customers. Replacing the oldest breakers further reduces potential hazards and improves the safety of employees and contractors working on the system. In some instances, failures in older breakers can be catastrophic, violently breaking porcelain bushing housings.

PRIORITIZATION

- I&M identifies and prioritizes distribution feeder breakers for replacement using a combination of age/ manufacturer type, information from AEP's circuit breaker subject matter experts, asset health assessments, and historical operations (number and cause of fault operations).

C. COMBINED PROJECTS

WORK PLAN

I&M identifies various distribution projects, termed "Combined Projects" that are not included in the Reliability Enhancement, Risk Mitigation or Grid Modernization Categories. These projects are necessary to:

- Address capacity and contingency capacity constraints (i.e., the ability to serve customers from another location, thereby reducing the length of an outage);
- Improve outage recovery, to replace or upgrade aging or obsolete station equipment;
- Implement supervisory control and data acquisition (SCADA); and
- Perform voltage conversions of select stations and distribution circuits.

Figure V.C.1 summarizes the work plan, timing, and projected capital costs of I&M's Combined Projects over a five-year period. Figure V.C.2 shows the major equipment being installed or replaced in each project. Figures V.C.3A and V.C.3B show a representation of the physical location of each project. Further information about the scope of each station Combined Project can be found in Appendix 4.

FIGURE V.C.1: SUBSTATION COMBINED PROJECTS WORK PLAN (MICHIGAN)

Project	In Service Year	Description/Scope Statement	Estimated Capital Cost
Blossom Trail Station	2021	New 138/12kV station with 3-12kV feeders; replaces Indian Lake and Eau Claire stations, 10/4: possible deferral if absolutely needed	$1,227,000
Boxer (Berrien Springs)	2021	Install 69/12kV xfmr with three 12kV circuits	$3,586,000
Hagar Station	2021	Add 1-12kV Feeder; replace 2-12kV CB's and reconfigure circuits	$2,184,000
Ripple Station	2021	Install 69/12kV xfmr with three 12kV circuits	$3,545,000

Simplicity Property Purchase	2021	Property purchase at old Simplicity Pattern site for Lake St/Simplicity new station	$650,000
Main Street Station	2021	Reconfigure and extend 4-12kV feeders	$650,000
Three Oaks Station	2021	Add 1-12kV Feeder; and reconfigure circuit	$991,000
Covert Station	2022	Add 1-12kV Feeder; and reconfigure circuit	$1,940,000
Crystal Station	2022	Add 1-12kV Feeder; and reconfigure circuit	$1,887,000
Murch SCADA	2022	Add 69kV circuit switcher, SCADA, and replace 3-12kV CB's	$1,625,000
Sodus Station (SCADA)	2022	Add 138kV circuit switcher, SCADA, 1-12kV feeder, and replace 2-12kV CB's	$2,286,000
Stevensville (Bus Regulators)	2022	Upgrade Tx2 Bus Regs and associated equipment	$780,000
Almena Station (feeder addition)	2023	Add 1 Feeder and 12/34.5 kV Voltage Conversion	$1,900,000
Buchanan-Hydro - Bucktown new station	2023	replace 69/12kV 9.375 MVA with 20 MVA , add 3rd feeder	$3,510,000
Simplicity Station (Lake St)	2023	Install 69/12kV xfmr with three 12kV circuits	$9,490,000
Stubey Road Station	2023	Add Feeder	$804,000
Hickory Creek-Main Street #2 Underbuild Dline	2024	Transmission Line underbuild circuit upgrade	$169,000
Riverside Underbuild Dline	2024	Transmission Line underbuild circuit upgrade	$650,000
Scottdale Station	2024	Station Upgrade	$4,485,000
Valley Station	2024	Install 138/34.5kV transformer and one additional 19.9kV feeder	$3,575,000
Corey Station	2025	Construct 138/12 kV, 12/20 MVA MVA with 3-12 kV Feeders	$10,066,000
Pearl St Station	2025	34.5/69kV conversion; Install 2 transformers and reconfigure 4-12kV feeders	$7,150,000

FIGURE V.C.2: STATION COMBINED PROJECTS EQUIPMENT (MICHIGAN)

Station	Year	Nbr of UG Exits	Nbr of Breakers (CB, Tie, LS)	Trans-former	SCADA	Control House	Circuit Switcher	Distri-bution Line (miles)	Regu-lators
Blossom Trail Station	2021	0	4	1	Yes	1	1	2.1	3
Boxer Station	2021	0	4	1	Yes	1	1	1	3
Hagar Station	2021	0	1	0	No	0	0	0.49	0
Ripple Station	2021	0	3	1	Yes	0	1	1.1	3
Simplicity Property Purchase	2021	0	0	0	No	0	0	0	0
Main Street Station	2021	4	0	0	Yes	0	0	0.56	0
Three Oaks Station	2021	0	1	0	Yes	0	0	3.01	0
Covert Station	2022	0	1	0	Yes	0	1	4.3	0
Crystal Station	2022	0	1	0	Yes	1	0	2.05	0
Murch Station	2022	0	3	0	Yes	0	1	0	0
Sodus Station (SCADA)	2022	0	3	0	Yes	0	0	0.75	0
Stevensville (Bus Regulators)	2022	0	0	0	No	0	0	0	3
Almena Station	2023	0	0	0	Existing	0	0	5.45	0
Bucktown Station	2023	0	4	1	Yes	1	1	1	3
Simplicity Station	2023	0	4	1	Yes	1	1	2.2	3
Stubey Rd Station	2023	0	1	0	Yes	0	0	0.89	0
Hickory Creek-Main Street Underbuild Dline	2024	0	0	0	No	0	0	0.97	0
Riverside Underbuild Dline	2024	0	0	0	No	0	0	0.59	0
Scottdale Station	2024	0	3	1	Existing	0	1	0	3
Valley Station	2024	0	1	1	Existing	0	1	1.5	3
Corey Station	2025	0	4	1	Yes	1	1	2	3
Pearl Street	2025	1	5	2	Existing	1	2	0.5	3
Elcona Station		0	3	1	Existing	0	1	4	3
Greenleaf Station		0	4	1	Yes	1	1	0.25	3

FIGURE V.C.3A: MAP OF STATION COMBINED PROJECTS 2021-22 (MICHIGAN)

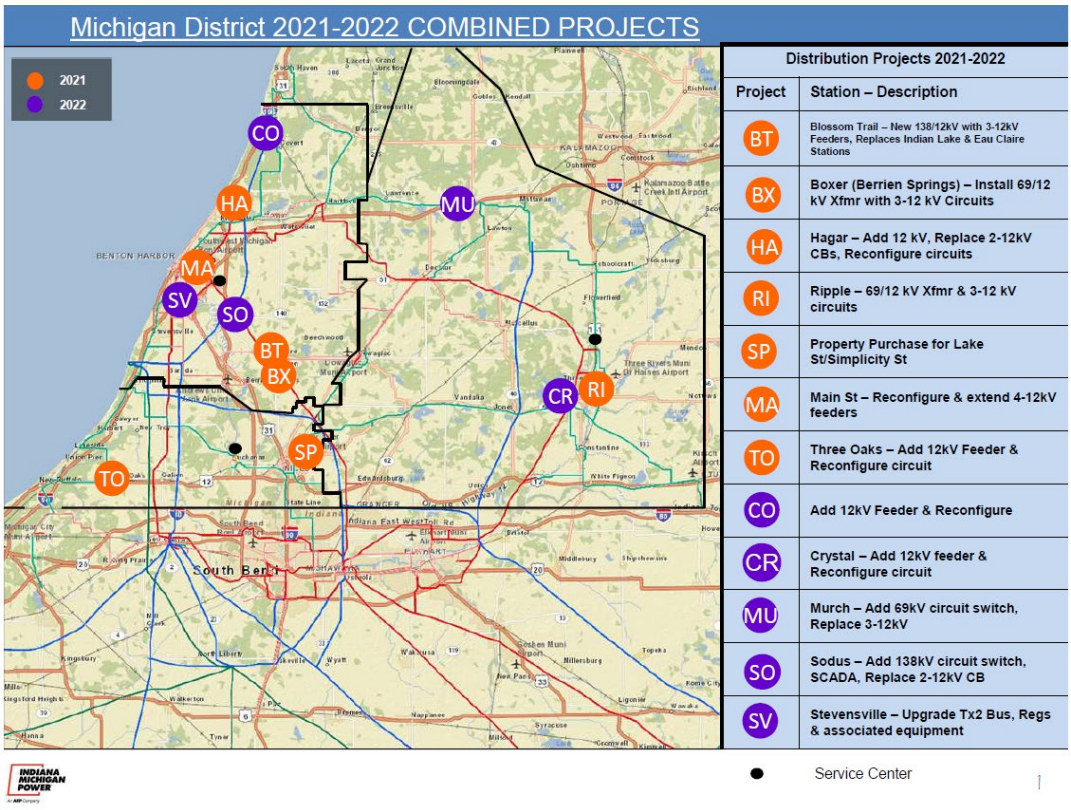
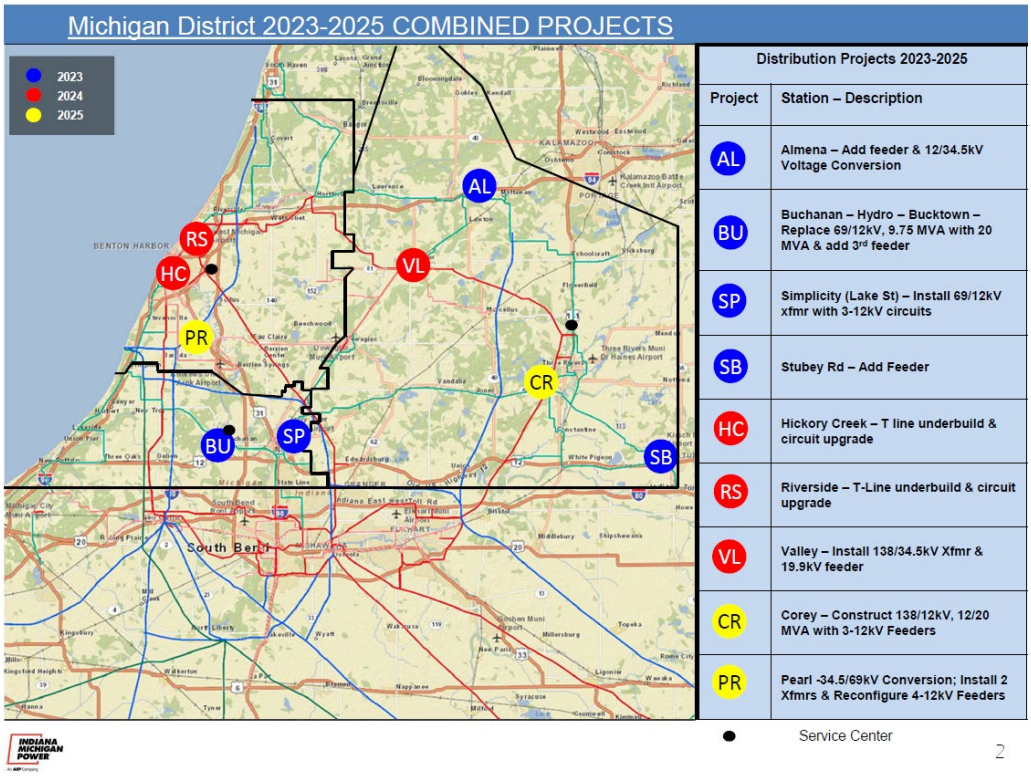


FIGURE V.C.3B: MAP OF STATION COMBINED PROJECTS 2023-25 (MICHIGAN)



DRIVERS & BENEFITS

The drivers and benefits for each combined project that I&M plans to complete over the next five years are detailed in Appendix 4. Appendix 4 contains a description, justification, benefits and a listing of the components of each project shown in Figures V.C.2 and V.C.3 above. They are briefly addressed as follows:

- *Improve Reliability*– Replacing aging or obsolete equipment reduces the probability of failures and improves the ability for contingency transfers and outage recovery.
- *Improve the Ability to Serve Increased Load* – Expanding the capacity of the distribution system allows for increased customer load.
- *Improve Safety and Help Modernize the Distribution System* – Replacing aging or obsolete station equipment with current equipment helps improve safety and add capabilities, such as monitoring and remote operability.

COMBINED STATION PROJECT COST ESTIMATION PROCESS

Distribution uses a project management life cycle process to track and manage the lifecycle of combined station projects.

The approach includes five (5) tiers: Project Development; Detail Development; Project Review; Project Approval; and System Approval. In Project Development, the Distribution Planner develops the conceptual project scope and Class 5 estimate before routing the project for pre-engineering approval. Detail Development further develops the scope of the project, Class 3-4 estimates, and schedule. At the Project Review tier, there is a review of the detailed project scope, Class 3-4 estimates, and schedule developed in Detail Development. Project Approval is the routing and approval of the project. In the System Approval tier the project has been approved and is ready for project execution. Use of these cost class estimate levels are standard industry practice.[3]

The Combined Projects that are part of I&M's Five-Year Plan are Class 4 and 5 estimates with some Class 3 estimates. Class 5 estimates are generally prepared based on limited information and subsequently have wide accuracy ranges. Typical accuracy ranges for Class 5 estimates are - 20% to -50% on the low side and +30% to +100% on the high side.

Class 4 estimates are also generally prepared based on limited information and subsequently have fairly wide accuracy ranges. They are typically used for project screening, determination of feasibility, concept evaluation, and preliminary budget approval. Generally, engineering is from 1% to 15% complete, and would comprise at a minimum such items as utility equipment lists. Typical accuracy ranges for Class 4 estimates are -15% to -30% on the low side, and +20% to +50% on the high side, depending on such factors as the technological complexity of the project.

[3] See, for example, AACE International Recommended Practice No. 18R-97 – Cost Estimate Classification System – As Applied in Engineering, Procurement, and Construction for the Process Industries, http://www.costengineering.eu/Downloads/articles/AACE_CLASSIFICATION_SYSTEM.pdf.

Class 3 estimates are generally prepared to form the basis for budget authorization, appropriation, or funding. As such, they typically form the initial control estimate against which all actual costs and resources will be monitored. Generally, engineering is from 10% to 40% complete, and would comprise at a minimum, such items as preliminary diagrams, developed layout drawings, and essentially complete utility equipment lists. Typical accuracy ranges for Class 3 estimates are -10% to -20% on the low side, and +10% to +30% on the high side, depending on the technological complexity of the project, appropriate reference information, and the inclusion of an appropriate contingency determination.

PRIORITIZATION

At a high level, several I&M groups, ranging from planning and engineering to the Distribution Dispatch Center, work together to review I&M's distribution system in order to identify potential needs. I&M uses computer models, which take into consideration such items as load flows and overloads to identify system constraints. Next, I&M reviews asset health information, which is mainly collected through field inspections, to help identify equipment conditions. Based on the system constraints and equipment conditions identified, I&M determines which projects will help reduce the greatest number of customer minutes of interruption, which in turn helps create a project priority list.

I&M's full planning methodology, which includes planning of combined projects, is included in the Plan Development. At a more granular level, combined project planning and prioritization is encompassed by the following process steps:

- Develop a representative model of the existing distribution system.
- Work closely with local operational personnel and utilize monitoring systems to observe, document, and evaluate the performance of the distribution system during normal system configuration.
- Develop a forecast of future loads on the distribution system.
- Analyze the existing distribution system's ability to adequately serve the short and long term future loads.
- Identify the appropriate solutions to address any deficiencies in the existing distribution system for both the short and long term. Solutions considered include both traditional energy delivery solutions and NWAs.
- Determine when the improvements to the distribution system are needed.

- Communicate the project requirements, as well as the justification for implementing the proposed improvement plans to management, and any risk and alternatives to be considered.

The load forecast, also discussed above, has additional considerations for Combined Projects. Specifically, each distribution station and circuit has its own thermal load capacity limits. When the load on a substation element is projected to exceed its normal calculated capability, a project should be planned such that it will relieve loading or increase capacity at the substation prior to the projected overload. Projects need to be submitted for prioritization and budgeting early enough to allow design and construction to be completed by the needed service date.

D. RISK MITIGATION PROGRAMS

WORK PLAN

- *Pole Inspections* —To ensure the integrity of its overhead pole plant, I&M systematically inspects its distribution poles on a ten-year cycle. These poles that are determined to meet ANSI strength requirements, based on the height, diameter, and class of the pole, are treated with preservatives to prevent any further degradation from potential decay or insects until the next inspection. In contrast, poles deemed insufficient to continue supporting the overhead infrastructure are designated for replacement. Poles that are identified for replacement are replaced through the "Pole Replacement" project addressed in Subsection V.B.3 above.
- *URD equipment inspections* – I&M inspects the above ground equipment of the URD system (e.g., pedestals, padmount transformers, and primary risers) to identify potential safety risks and equipment indicating a need of repair or replacement. These systematic inspections are scheduled to physically inspect all of these facilities over a five-year period.
- *Overhead Line Inspections* – I&M inspects overhead facilities and equipment to identify potentially hazardous conditions due to deteriorated or damaged equipment. These situations are immediately resolved if necessary, or are scheduled for repair/replacement. These systematic inspections are scheduled so that all of these facilities are physically inspected over a five-year period. Overhead components (e.g. porcelain cutouts, lightning arresters, and crossarms) that are identified for replacement are replaced through the "Overhead Rebuilds" project addressed in Subsection V.B.1 above.

- *Underground locates* – Per statutory rules, I&M is required to locate its underground facilities, when requested, within two (2) working days in order to protect the public from inadvertently digging into buried energized facilities owned by the Company. I&M strictly adheres to the statutory requirements around timely and accurate location identification of its underground facilities and utilizes trained, responsive business partners to perform this work.

Figures V.D.1 and V.D.2 summarize the work plan, timing, and projected O&M costs of I&M's Risk Mitigation Program over an initial five-year period.

FIGURE V.D.1: RISK MITIGATION PROGRAM WORK PLAN (MICHIGAN)

	Units	2021	2022	2023	2024	2025
Pole Inspections	Poles	10,700	10,700	10,700	10,700	10,700
URD Equipment Inspections	Units	3,159	3,159	3,159	3,159	3,159
Overhead Line Inspections	Miles	880	880	880	880	880
Locate Underground Facilities	Units	29,491	30,376	31,287	32,226	33,192

FIGURE V.D.2: RISK MITIGATION PROGRAM PROJECTED O&M COSTS (MICHIGAN)

	2021	2022	2023	2024	2025
Pole Inspections	$344,000	$354,000	$365,000	$374,500	$385,200
URD Equipment Inspections	$19,333	$19,523	$19,712	$19,933	$20,123
Overhead Line Inspections	$94,081	$96,158	$98,085	$100,038	$102,045
Locate Underground Facilities	$530,838	$546,763	$563,166	$580,061	$597,463
Total	$988,252	$1,016,443	$1,045,963	$1,074,533	$1,104,831

DRIVERS & BENEFITS

- *Identify Safety Risks from Aging Infrastructure* – As previously described, I&M's distribution system is aging, and this increases the potential for asset failures. As more digital equipment technologies are deployed (e.g. meters), fewer personnel are in the field to observe surrounding equipment conditions. Meter readers are no longer visiting every customer every month. By identifying aging infrastructure, I&M's inspections will provide the greatest margin for public and employee safety.

- *Systematic Approach to Identifying Issues* – I&M's inspection program provides a systematic approach to identifying potential system issues and reducing the probability and consequences of asset failures. The results of the inspections directly drive the asset renewal and reliability programs.
- *Mitigate Potential Public Exposure to Energized Assets* - the risk mitigation programs, and in particular Underground Facility Locates, are intended to identify where underground I&M facilities are located that may pose a potential safety risk to the public or employees if contacted during excavation.

PRIORITIZATION

I&M's risk mitigation programs are a systematic approach to identify potential system equipment issues. The overhead and underground inspection programs are designed to review 20% of these assets each year; resulting in the entire system going through an inspection within five (5) years. The pole inspection program is designed to inspect the entire system on a 10-year cycle. The inspection results identify specific asset conditions, which are then used to prioritize the correlating Asset Renewal and Reliability Programs described above. This proactive approach helps identify issues that may otherwise go undetected and potentially cause customer interruptions and/or public safety issues.

In addition to these targeted risk mitigation programs, I&M participates in Michigan MISS DIG system. I&M utilizes the Michigan Utility Notification System, MISS DIG system to process underground locate requests. Then a third party or in house personnel locate and marks the underground facilities. This helps provide a higher level of safety whenever an excavation is performed.

I&M is also a contributor to the Michigan Infrastructure Council's Project Portal. I&M's contributions allow for better project coordination. Participation in the Project Portal will help minimize disruptions to Michigan's infrastructure during construction projects.

E. GRID MODERNIZATION PROGRAM

WORK PLAN

- *Advanced Metering Infrastructure* (AMI) – I&M is in the process of deploying AMI to provide more accurate and timely circuit data. AMI refers to systems that measure, collect and analyze energy usage from meters through a communications network. This infrastructure includes hardware, such as meters that enable two-way communications (AMI meter), the communications network, customer information systems, and meter data management systems. This allows for improved system monitoring, enhanced distribution system performance and improved management of, and response to, outages. It improves the customer experience through improved data, information and analytics.
- *Distribution Automation Circuit Reconfiguration (DACR)* – DACR consists of creating smart circuit ties coupled with technology that isolate an outage condition and automatically reconfigure the power supply to minimize the length of time customers are affected. I&M will subsequently dispatch its personnel to the affected area to resolve the issues that caused the initial event.
- *Supervisory Control and Data Acquisition (SCADA)* – SCADA systems include hardware and software components installed at distribution substations. This system provides remote visibility into a station and is set to provide real-time information on various hardware components, power flows, loading conditions, and circuit level outage events.
- *Distribution Line Sensors* – These devices are attached to overhead distribution lines and continuously monitor parameters of the lines in real time (e.g., current, voltage, fault currents). By analyzing the data from the sensors placed at strategic locations, I&M's engineers are able to monitor the state of the grid in real time, identify faults and outages faster, conduct real-time loading of the circuit portions downstream from the sensor, and monitor and analyze interferences affecting power quality. The data collected from distribution line sensors will also help improve the engineering and design efforts over time by providing more information on system characteristics.
- *Smart Reclosers* - Smart reclosers are standard recloser units equipped with communication and control technology that allows for remote monitoring and operation of these devices.

- *Smart Circuit Ties* – I&M's smart circuit tie program upgrades circuits by incorporating smart reclosers and line sensors in areas that could be used to reconfigure circuits following an outage event. This will allow the Distribution Dispatch Center (DDC) to remotely evaluate the loading configuration of circuits prior to restoring service without having to wait on a field resource to take measurements or reconfigure connections between circuits.
- *Conservation Voltage Reduction (CVR)* - I&M's CVR projects are designed to utilize technology to adjust the voltage and reactive power profile on a distribution circuit. This reduces load and improves asset performance. With the addition of AMI meters, CVR at I&M will operate more effectively with data and information taken directly from the end of line meter voltage readings located at the point of service delivery to the customer.

Figures V.E.1, V.E.2, and V.E.3 summarize the work plan, timing, and projected costs of I&M's Grid Modernization Program over a five-year period.

FIGURE V.E.1: GRID MODERNIZATION WORK PLAN (MICHIGAN)

	Units	2021	2022	2023	2024	2025
AMI	Units	7,443	106,101	N/A	N/A	N/A
DACR	Scheme	2	1	1	1	1
Station SCADA	Units	1	7	4	3	2
Distribution Line Sensors	Units	99	102	150	111	93
Smart Reclosers	Units	32	18	29	46	40
Smart Circuit Tie	Line Miles	3.9	3.5	4.3	4	3.2
CVR	Circuits	6	8	11	14	13

FIGURE V.E.2: GRID MODERNIZATION PROJECTED CAPITAL COSTS (MICHIGAN)

	2021	2022	2023	2024	2025
AMI*	$5,564,000	$14,673,000	$674,000	$157,000	$174,000
DACR	$690,000	$330,000	$323,000	$342,000	$358,000
Station SCADA	$1,193,000	$4,952,000	$2,666,000	$2,258,000	$1,612,000
Distribution Line Sensors	$219,000	$231,000	$332,000	$260,000	$229,000
Smart Reclosers	$1,994,000	$1,108,000	$1,740,000	$2,841,000	$2,560,000
Smart Circuit Ties	$1,212,000	$1,109,000	$1,326,000	$1,309,000	$1,084,000
CVR	$1,873,000	$3,478,000	$4,409,000	$5,750,000	$5,028,000
Total	$12,745,000	$25,881,000	$11,469,000	$12,916,000	$11,045,000

*AMI costs beyond 2022 represent AMI infrastructure

FIGURE V.E.3: GRID MODERNIZATION PROJECTED O&M COSTS (MICHIGAN)

	2021	2022	2023	2024	2025
CVR	$17,000	$36,000	$61,000	96,000	$141,000
Line Sensor – Ample	$78,000	$87,000	$102,000	$114,000	$123,000
Total	$94,000	$122,000	$163,000	$210,000	$264,000

DRIVERS & BENEFITS

- *Improve Visibility of the System* – Distribution line sensors help locate faults within a more defined location, allowing crews to hone in on outage areas. In addition, DACR communicates problem areas to I&M personnel. Deploying distribution SCADA improves visibility by alerting I&M when issues at the station exist, again, allowing crews to be dispatched to resolve issues at the problem area.
- *Improve Reliability*
    1. The improved visibility distribution line sensors and SCADA provide also positively impacts reliability, as crews are now able to respond in a more timely manner to outages.
    2. With DACR, the circuit is automatically reconfigured to isolate the loss of voltage or fault condition so that power can be restored to customers. In addition, the company will have the ability to verify that service has been restored following an interruption.

3. AMI can be integrated with service restoration systems to more accurately detect power outage locations. This allows for dispatching crews more efficiently to reduce customer outage duration.

- *Mitigate Customers Experiencing Multiple Interruptions (CEMI)* – Through data analytics, AMI will provide dynamic service integrity evaluations and can be triggered to alert district personnel to begin an investigation whenever a single or multiple customer "pocket" has numerous interruptions in a certain period. I&M understands that CEMI is a key driver of customer satisfaction and will leverage AMI data to mitigate CEMI.
- *Improve Safety*
    1. Enhances public safety by providing mechanisms to proactively de-energize the grid remotely from a control center (DDC). Having more visibility into the system provides additional information that helps minimize risk and safety hazards by enabling early detection of issues on the system.
    2. Having remote operating capability, as well as automation, allows I&M personnel to correct issues without being in the vicinity of electrified equipment.
    3. The current AMR technology requires driving within short range of the meter device to obtain a reading. With AMI there is no longer a need to send meter readers to the customer's meter and therefore the associated driving, necessary to read the meters, is virtually eliminated.
    4. AMI meters will also be able to alert for a hot socket condition with potential to cause a fire. Specifically, temperature data from AMI meters will be collected and analyzed to determine whether the temperature of any meter is an outlier compared to nearby meters. If an anomaly is found, a service technician will be dispatched to investigate an issue. This functionality has the potential to significantly reduce safety hazards; before AMI meters, these safety hazards likely would have gone undetected.
- *Address Tampering and Theft*
    1. AMI meter data will allow I&M to detect meters that have been tampered. Sometimes customers tamper with meters to reconnect them when service has been disconnected or for other reasons. AMI meter data can be analyzed to detect such tampering.
    2. AMI meters will allow I&M to detect meters that have been stolen and installed in a new location. AMI meter data can be used to detect such meters and to triangulate their location.

- *Improve Meter Accuracy* – In the past, meter errors were difficult to detect, or took time to correct. For instance, if a meter had an error at the beginning of a billing cycle, I&M may not learn about the error until the end of the cycle when the meter was read. In fact, some minor reading errors may not have been detected for months or years. With AMI meters, I&M will immediately be aware of many types of reading errors; and those errors can be fixed. This will reduce lost revenue or the need to estimate bills due to meter errors.
- *Improve the Customer Experience* – In addition to improved safety and reliability, AMI will provide a unique and fundamental tool to improve the customer experience in other ways by providing the following benefits:
    1. Customers will have the ability to view daily or hourly usage data via a web page or app, They will also have the ability to receive alerts based upon energy usage;
    2. AMI will support expansion of pricing options;
    3. If a customer experiences trouble, the Company will be able to remotely check the meter to aid in determining if the meter is operating properly;
    4. Customers will experience shorter wait times for electric service connect and disconnect because the Company will be able to do both, remotely.
    5. The Company can be notified when a customer's power goes out without the customer needing to contact the Company. If the customer is not at home, I&M can be notified of an outage and make repairs before the customer even returns home.
    6. Customers will be able to participate in new advanced programs as they are developed which may provide further, more innovative opportunities for customer convenience, reduced energy consumption, and reduced bills.
    7. The AMI meters will be able to identify low or high voltages above/below a threshold amount.

PRIORITIZATION

While I&M uses a prioritization method specific to each component included in Grid Modernization as outline below, the components are further prioritized by how they fit into the Plan holistically. Individual Grid Modernization projects are often coupled with other projects and programs, such as Combined Projects, to provide added value and cost savings.

- *AMI* – The AMI Project is a continuation of the replacement of AMR meters across Michigan that started in Q2 of 2021 and continue through Q4 of 2022. During the deployment, I&M will replace 113,544 remaining AMR meters. The 2021 Michigan deployment involves 7,200 meters and locations that have been intentionally selected to help strengthen the current network which was deployed in 2020, alleviating gaps in coverage that are currently there.

  The AMI project is primarily directed to positively influence customer experience, with customer engagement portions to facilitate I&M customers gaining the full benefit of an AMI system. The smart meter customer engagement plan, communications with customers and customer participation in new programs will increase customer interaction with, and awareness of, the Company's activities across the board. AMI will also allow I&M to have enhanced outage tracking and outage verification processes to streamline outage restoration efforts with automated notifications. Executing the AMI program will allow I&M to join its peers in modernizing the grid and provide a greater experience for its customers.
- *DACR* – In determining both the number of circuits and the circuit selection for DACR, I&M performs an analysis that begins by reviewing the last three (3) years of customer reliability information and then analyzing circuit configurations and available technologies to match potential problem areas with the right technology to minimize the amount of CMI, thus improving SAIDI. DACR is chosen for circuits that have strong circuit ties to adjacent circuits which have the capacity to handle the additional load from the potentially affected circuit during an outage. I&M maintains a tool that includes circuit tie information, reliability data, and circuit and station capacity information that it utilizes to make these decisions.
- *SCADA* – For the benefits outlined above, SCADA offers the first line of insight and control to I&M's remote substation facilities. I&M has made this a priority over the next two (2) years and will have 100% SCADA penetration in all of its non-dedicated substations by 2022.
- *Line Sensors* – Distribution line sensors are chosen for locations and circuits within I&M's service territory that will dynamically measure load, aid in identifying interruptions and identification of potential problematic devices and/or external influences (such as trees or other encroachments) that impact energy delivery.
- *Smart Reclosers* - I&M selects reclosers to upgrade based on their life cycle. Smart Reclosers are equipped with communications equipment, allowing both immediate operation indications and remote reset capabilities.

- *Smart Circuit Ties* - I&M selects circuits for overhead line rebuilds based on its planning methodology discussed in Part IV, including the CHI and PVR.

F. NON – WIRES ALTERNATIVES / SOLUTIONS

Guidehouse Insights, formerly known as Navigant Research, defines NWAs as, "an electricity grid investment or project that uses non-traditional transmission and distribution (T&D) solutions, such as distributed generation, energy storage, energy efficiency, demand response, and grid software and controls, to defer or replace the need for specific equipment upgrades, such as T&D lines or transformers, by reducing load at a substation or circuit level." I&M supports this definition and has incorporated consideration for NWAs into its planning processes. This requires a new approach to distribution planning where various NWAs are considered, evaluated against "traditional" options and potentially incorporated (based on need, cost and performance) as alternatives to resolve distribution asset replacement or new installation.

I&M acknowledges the questions posed by Mr. Paul De Martini during an October 16, 2019 stakeholder meeting and the single question that MPSC staff raised in its April 1, 2020 Electric Distribution Planning Stakeholder Process Report regarding NWAs. It should be understood that I&M is in the early stages of NWA implementation and experience is limited. With time and exposure I&M will be better equipped to respond to these questions. At the current moment, I&M is offering the following responses to the questions:

1. Why are NWAs being pursued?

I&M is pursuing NWAs are being pursued as another resource to effectively help address system needs while meeting customer expectations. I&M is in the early phases of building out how to best incorporate NWA considerations into the planning process and is therefore still learning how to accurately value the benefits that NWAs bring to I&M and its customers compared to the benefits of traditional solutions. As this process matures, particularly as it relates to NWA development and build-out, and as the value streams for both options evolve and become more comparable, I&M expects to be deploying more NWA solutions in the coming years. Future deficiency solutions will consider both traditional options and NWAs where traditional energy delivery solutions are compared against NWA options and the most appropriate solution is developed through benefits analysis and comparison.

2. What are the desired outcomes?

While the range of possible outcomes are still being developed, I&M recognizes the potential for NWAs providing several benefits. Benefits can come in the form of improved reliability and resiliency. Additionally, NWAs can support future supply needs and facilitate a self-healing system. They can also improve system operation by reducing line losses and defer the need to construct or upgrade components of the distribution and/or transmission system.

Although NWAs represent a new frontier for opportunities, they also pose challenges to distribution system planning and operation. Conventional planning practices require adjustments in order to incorporate NWAs as resource options. Historically, I&M's distribution system has been designed to operate for one-way power flow from centralized generation to end use loads. With the advent of NWAs, distribution planning must now consider and design for bi-directional power flow and highly variable demand profiles. These challenges require new planning practices and new planning tools and equipment, such as more complex protection and control schemes.

3. What are the range of potential solutions?

The range of potential solutions being considered as we develop our process are listed below. This list could expand as I&M's processes mature. I&M considers NWAs, as well as traditional energy delivery solutions, to determine the best option as a need arises. A benefit analysis is performed on applicable value streams to help determine the best option. The goal is to determine the solution that brings the most benefit to customers and I&M according to the specific need. The following are potential NWA solutions:

a. Load Management – measures or programs that target equipment or behavior to result in decreased peak electricity demand such as reducing peak period usage through conservation, shifting demand from a peak to an off-peak period, or aligning end-use loads with local supply availability.

b. Solar – convert sunlight into electrical energy either through photovoltaic (PV) panels or through mirrors that concentrate solar radiation. This energy can be used to generate electricity or be stored in batteries or thermal storage.

c. Energy Storage – This can include the current most common solution of Lithium Ion as well as other battery technologies such as flow batteries. It can also include other thermal or mechanical systems. Software is paired with these systems to control the charge and discharge of energy.

d. Combined heat and power (CHP) – This is the concurrent production of electricity and useful thermal energy from a single source of energy.

e. Microgrid – This is a decentralized group of electricity generating sources and loads that can operate either connected to the wider grid or can disconnect from the grid and operate autonomously.

f. Energy Waste Reduction (EWR) – This is a decrease in customer consumption of electricity achieved through measures or programs that target customer behavior, equipment, devices, or materials without reducing the quality of energy services.

g. Distributed Generation/Distributed Energy Resource (DG/DER) – This is any small-scale unit of local generation connected to the grid at the distribution level.

h. Electric Vehicles (EV) – EV batteries may be utilized as an energy resource. Particularly when used in an aggregated fashion these can be used to provide grid services.

I&M is evaluating many of the solutions identified above, through engagement within the industry.

4. What is the role of customers, DER developers, utilities, aggregators, and others?

I&M, as well the DER developers and aggregators, must leverage our knowledge of safe, reliable, and resilient generation of electricity. As the stakeholders, and most importantly the customers, provide data through our AMI infrastructure outlined above, the aggregated system should become flexible in terms of supplying necessary energy to where it is needed when it is needed.

5. Are the benefits and costs of NWAs accruing to all customers on an equitable basis?

The costs of such a system should be in the base rate and shared equally across the system, as the energy and environmental impacts may be beneficial to all in the service territory.

G. OVERVIEW OF RELIABILITY METRICS

In a Commission Order in Case No. U-20147 dated August 20, 2020, the Commission stated that it agreed with Staff recommendations regarding the reporting of metrics that make up what has been referred to as "standardized components". Provided below in Figures V.G.1 through V.G.3 is I&M's reliability metrics data for its Michigan service territory from 2016 to 2020 which addresses the requirement.

FIGURE V.G.1: I&M RELIABILITY INDICES 2016-2020 (MICHIGAN)

	Excludes Major Event Days						All Conditions					
	SAIDI		SAIFI		CAIDI		SAIDI		SAIFI		CAIDI	
Year	Annual	5-Yr. Avg	Annual	5-Yr. Avg	Annual	5-Yr. Avg	Annual	5-Yr. Avg	Annual	5-Yr. Avg	Annual	5-Yr. Avg
2016	373	275	1.72	1.35	217	200	561	747	1.91	1.688	294	436.8
2017	303	308	1.75	1.51	174	206	442	759	2.01	1.832	220	422.2
2018	314	317	1.51	1.55	208	206	609	643	1.78	1.83	342	359
2019	332	326	1.71	1.63	195	201	505	528	2.13	1.91	237	279
2020	240	312	1.08	1.55	221	203	644	552	1.43	1.85	451	309

RELIABILITY METRIC DEFINITIONS

- *SAIDI* – The total time the average customer is without service due to sustained interruptions during the specified period. It is the sum of customer minutes of interruption from each outage divided by the number of customers served.
- *SAIFI* – How often the average customer experiences a sustained interruption over a predefined period of time. It is the total number of customers interrupted divided by the total number of customers served.
- *CAIDI* – The average time required to restore service. It is the sum of customer minutes of interruption from each outage divided by the total number of customers interrupted.
- *Major Event Days (MEDs)* – Major events represent conditions that exceed reasonable design or operational limits of the electric power distribution system. I&M identifies major events using the major event day methodology detailed in *IEEE Std. 1366-2012, IEEE Guide for Electric Power Distribution Reliability Indices*.

- *Customers Experiencing Multiple Interruptions* (CEMI) – The percentage of customers experiencing a specific number of sustained interruptions during a defined period. It is the number of customers with the specified number of customers with the defined number of interruptions divided by the number of customers served.
- *Customers Experiencing Long Interruption Duration* (CELID) – The percentage of customers experiencing a sustained interruption with a duration less than or equal to a specific duration during a defined period. It is the number of customers with the specified duration divided by the number of customers served.

OUTAGE CAUSE DATA

I&M tracks major and minor outage causes in order to understand what is driving its reliability metrics. This data is captured and stored within I&M's Outage Management System (OMS). OMS also tracks customer minutes of interruption (CMI), customers affected and major event information. I&M analyzed this information to determine outage impacts on customers, which in turn was used to help develop I&M's Five-Year Plan. Outages are categorized as follows:

- *Vegetation (Inside the Rights-of-Way, Outside the Rights-of-Way, and Vines)* – sustained outages in Michigan caused by vegetation both inside and outside the rights-of-way, as well as outages caused by vines;
- *Equipment Failure* – sustained outages in Michigan caused by distribution line equipment failures;
- *Transmission Line* – sustained outages in Michigan due to a failure on transmission facilities related to any cause;
- *Station* – sustained outages in Michigan due to a failure within a substation related to any cause;
- *Vehicle Accident* – sustained outages in Michigan caused by a vehicle colliding with I&M distribution line facilities;
- *Unknown* – sustained outages in Michigan caused by an unknown cause. In some cases, the cause of the outage is not evident, and therefore it is placed into this outage category
- *Lightning* – sustained outages in Michigan from distribution line equipment failures caused by lightning;
- *Remaining* – sustained outages in Michigan caused by issues such as contamination or flashover, customer equipment, fire, foreign objects, overloads, customer actions, and vandalism. These causes are categorized together because they account for very few

outages;

- *Scheduled* – sustained outages in Michigan caused by a scheduled outage to allow I&M personnel to safely complete work on the distribution system; and
- *Animal* – sustained outages in Michigan caused by animals coming into contact with energized distribution equipment.

The causes of outages in I&M's Michigan service territory from 2016 to 2020 are provided on Figures V.G.2 and V.G.3 below:

FIGURE V.G.2: I&M'S PRINCIPAL CAUSES OF OUTAGES AS A PERCENTAGE OF SAIDI (MICHIGAN)

Interruption Cause	2016	2017	2018	2019	2020	5-Year Avg.
Trees (In, Out & Vines)	48.8%	37.6%	49.5%	35.1%	47.2%	43.6%
Equipment Failure	12.8%	16.3%	15.5%	16.0%	14.0%	14.9%
Transmission Line	7.2%	13.6%	6.0%	16.4%	9.1%	10.5%
Station	5.5%	10.9%	7.2%	8.8%	3.6%	7.2%
Vehicle Accident	9.7%	5.8%	5.0%	6.9%	6.8%	6.8%
Unknown	7.4%	4.3%	4.6%	4.3%	5.3%	5.2%
Remaining	1.0%	3.8%	3.8%	5.7%	6.6%	4.2%
Scheduled	2.9%	3.6%	5.3%	3.9%	4.6%	4.1%
Lightning	3.7%	2.8%	2.1%	2.2%	0.9%	2.3%
Animal	1.0%	1.4%	1.0%	0.8%	1.9%	1.2%

FIGURE V.G.3: I&M'S PRINCIPAL CAUSES OF OUTAGES AS A PERCENTAGE OF SAIFI (MICHIGAN)

Interruption Cause	2016	2017	2018	2019	2020	5-Year Avg.
Trees (In, Out & Vines)	39.0%	29.0%	37.7%	28.8%	36.0%	34.1%
Equipment Failure	18.6%	19.0%	16.9%	18.5%	19.2%	18.4%
Station	8.0%	15.1%	11.2%	12.0%	4.6%	10.2%
Scheduled	5.3%	6.0%	9.7%	6.8%	9.0%	7.4%
Transmission Line	5.6%	10.7%	6.2%	8.1%	6.0%	7.3%
Vehicle Accident	9.6%	5.6%	6.0%	7.7%	7.4%	7.3%
Unknown	7.1%	5.3%	5.1%	6.5%	5.4%	5.9%
Remaining	1.1%	4.3%	3.2%	7.6%	7.5%	4.7%
Animal	2.5%	2.4%	2.2%	1.6%	4.0%	2.6%

Lightning	3.2%	2.6%	1.9%	2.4%	0.9%	2.2%

FIGURE V.G.4: PRINCIPAL CAUSES OF I&M'S TRANSMISSION LINE SAIDI (MICHIGAN)

Transmission Line Interruption Cause	2016	2017	2018	2019	2020	5-Yr. Avg.
Equipment Failure	1.5	7.8	3.6	39.0	3.7	11.1
Error – Field				3.6		0.7
Facilitation Of Work					1.3	0.3
Other			1.7			0.3
Other Utility		10.8	0.0	7.9		3.7
Overload			0.5			0.1
Relay Mis-Operation		9.2				1.8
Scheduled Company	6.6	7.6	5.3	2.8	3.3	5.1
Tree Inside Row	1.9	0.6	7.2			1.9
Tree Out Of Row	17.1					3.4
Third Party Tree Removal		5.3			13.7	3.8
Third Party Vehicle Accident			0.6	0.9		0.3
Total Transmission Line SAIDI	27.0	41.3	18.8	54.3	21.9	32.7

Figure V.G.5: Principal Causes of I&M's Transmission Line SAIFI (Michigan)

Transmission Line Interruption Cause	2016	2017	2018	2019	2020	5-Yr. Avg.
Equipment Failure	0.011	0.032	0.012	0.075	0.017	0.029
Error – Field				0.019		0.004
Facilitation Of Work					0.002	0.000
Other			0.008			0.002
Other Utility		0.020		0.028		0.010
Overload			0.019			0.004
Relay Mis-Operation		0.069				0.014
Scheduled Company	0.038	0.043	0.019	0.008	0.019	0.025
Tree Inside Row	0.012	0.003	0.034			0.010
Tree Out Of Row	0.035					0.007
Third Party Tree Removal		0.019			0.027	0.009
Third Party Vehicle Accident			0.003	0.008		0.002
Total Transmission Line SAIFI	0.096	0.187	0.093	0.138	0.065	0.116

FIGURE V.G.6: PRINCIPAL CAUSES OF I&M'S STATION SAIDI (MICHIGAN)

Station Interruption Cause	2016	2017	2018	2019	2020	5-Yr. Avg.
Abnormal Feed	0.0	0.0	0.0	0.3	0.0	0.1
Animal - Other	0.0	0.0	0.0	1.9	0.0	0.4
Animal Bus	2.7	0.0	1.0	4.3	0.0	1.6
Animal Bushing XFMR	4.4	0.0	0.0	0.0	0.0	0.9
Equipment Failure	4.1	20.0	6.2	19.4	3.2	10.6
Error - Field	0.0	5.1	0.0	0.0	0.0	1.0
Error - Operations	0.0	0.2	0.0	0.0	0.0	0.0
Other	0.0	1.3	0.0	0.0	0.0	0.3
Overvoltage	8.4	0.0	0.0	0.0	0.0	1.7
Relay Mis-operation	0.0	0.5	0.0	0.4	0.0	0.2
Scheduled Company	0.4	6.0	12.2	3.0	5.5	5.4
Unknown (Non-Weather)	0.0	0.0	0.0	0.0	0.0	0.0
Weather - Lightning	0.0	0.0	3.3	0.0	0.0	0.7
Weather - Unknown	0.3	0.0	0.0	0.0	0.0	0.1
Total Station SAIDI	20.3	33.1	22.7	29.3	8.7	22.8

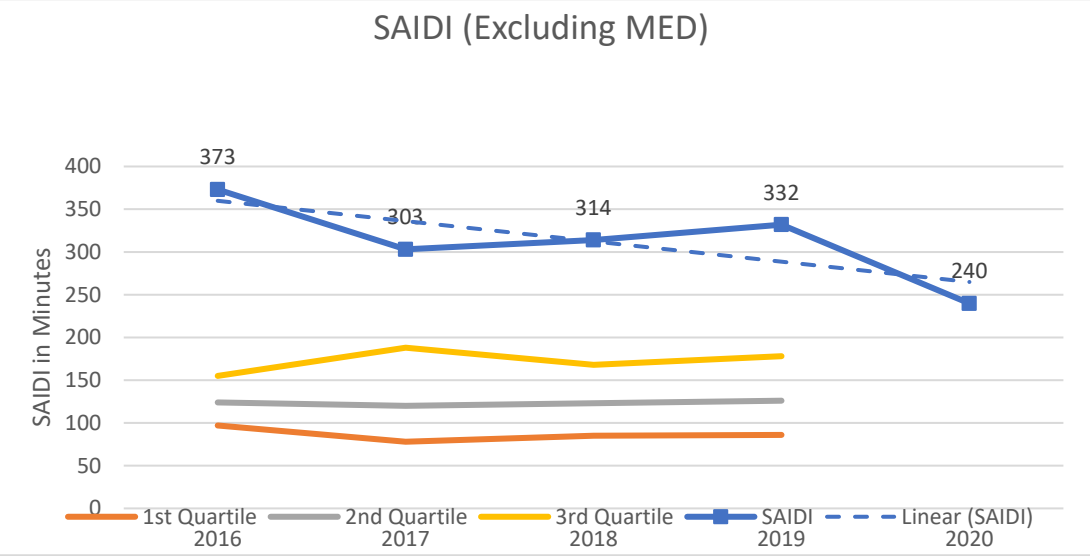
FIGURE V.G.7: PRINCIPAL CAUSES OF I&M'S STATION SAIFI (MICHIGAN)

Station Interruption Cause	2016	2017	2018	2019	2020	5-Yr. Avg.
Abnormal Feed	0.000	0.000	0.000	0.003	0.000	0.001
Animal - Other	0.000	0.000	0.000	0.012	0.000	0.002
Animal Bus	0.013	0.000	0.014	0.031	0.000	0.012
Animal Bushing XFMR	0.011	0.000	0.000	0.000	0.000	0.002
Equipment Failure	0.037	0.141	0.067	0.118	0.017	0.076
Error - Field	0.000	0.025	0.000	0.000	0.000	0.005
Error - Operations	0.000	0.019	0.000	0.000	0.000	0.004
Other	0.000	0.012	0.000	0.000	0.000	0.002
Overvoltage	0.054	0.000	0.000	0.000	0.000	0.011
Relay Mis-operation	0.000	0.032	0.000	0.028	0.000	0.012
Scheduled Company	0.017	0.033	0.074	0.014	0.033	0.034
Unknown (Non-Weather)	0.000	0.000	0.000	0.000	0.000	0.000
Weather - Lightning	0.000	0.000	0.013	0.000	0.000	0.003
Weather - Unknown	0.005	0.000	0.000	0.000	0.000	0.001
Total Station SAIFI	0.137	0.263	0.170	0.205	0.050	0.165

The charts and tables below represent reliability performance over the past five (5) years. The quartiles shown in the charts are based on IEEE benchmarking surveys.

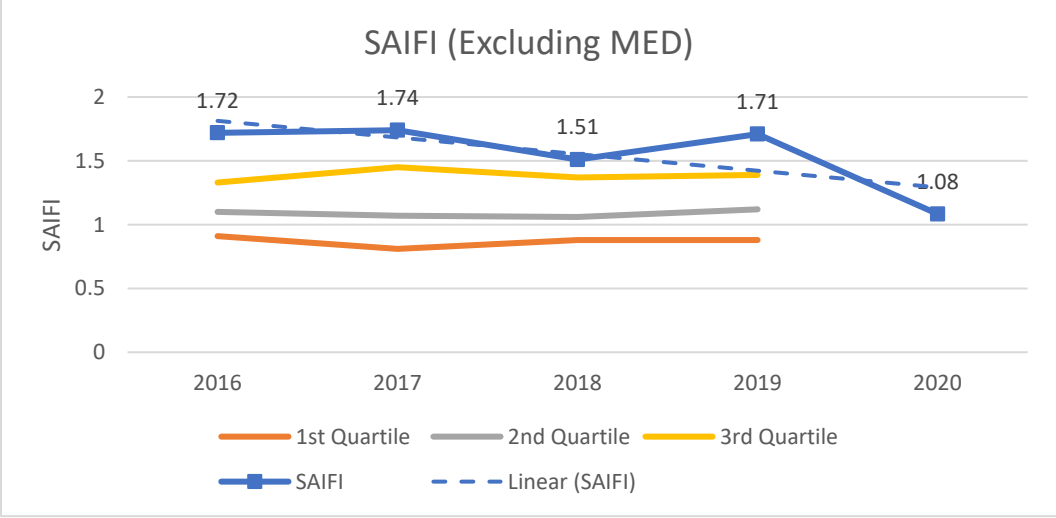
1. SAIDI

FIGURE V.G.8: I&M SAIDI (MICHIGAN)



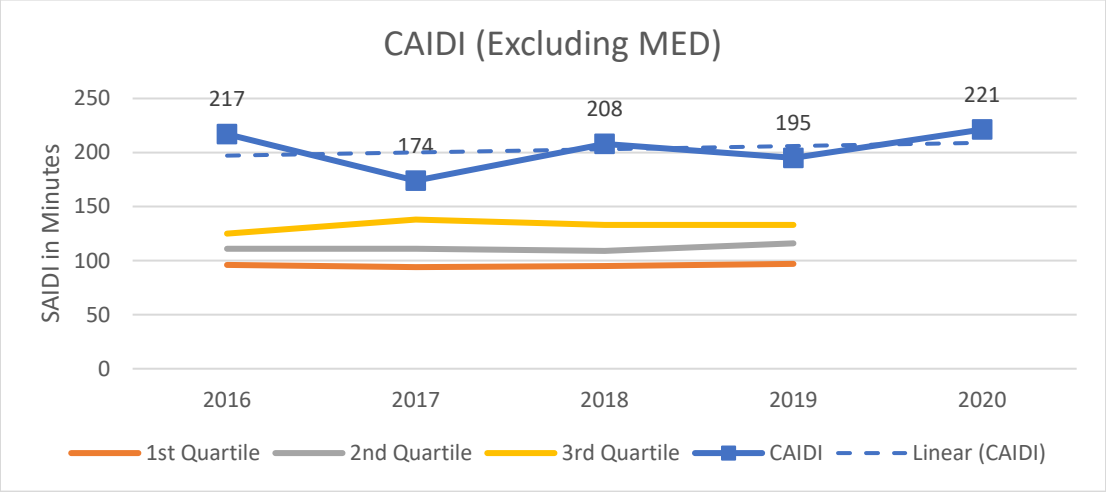
2. SAIFI

FIGURE V.G.9: I&M SAIFI (MICHIGAN)



3. CAIDI

FIGURE V.G.10: I&M CAIDI (MICHIGAN)



4. CEMI

CEMI data is shown below in Figure V.G.11. This includes sustained outages and for all weather conditions.

FIGURE V.G.11: CUSTOMERS EXPERIENCING MULTIPLE INTERRUPTIONS (MICHIGAN)

CEMI by Year					
% of Customers Experiencing X Interruptions					
Number of Interruptions	2016	2017	2018	2019	2020
0	21%	25%	24%	16%	29%
1	27%	25%	27%	26%	32%
2	20%	17%	19%	19%	18%
3	12%	12%	12%	16%	9%
4	10%	8%	7%	11%	5%
5	5%	5%	4%	5%	3%
6	2%	3%	3%	3%	2%
7	1%	3%	1%	1%	1%
8	1%	1%	1%	1%	0%
9	1%	1%	0%	0%	0%
10+	1%	0%	1%	0%	0%

5. CELID

CELID data is shown below in Figure V.G.12. This includes sustained outages and for all weather conditions.

FIGURE V.G.12: CUSTOMERS EXPERIENCING LONG INTERRUPTION DURATION (MICHIGAN)

% of Customers Experiencing Interruptions **Less Than** or Equal to XX Hours

Year	8 Hours	24 Hours	36 Hours	48 Hours	60 Hours	72 Hours	96 Hours	120 Hours
2016	86%	97%	99%	99%	100%	100%	100%	100%
2017	90%	99%	100%	100%	100%	100%	100%	100%
2018	84%	95%	98%	99%	99%	100%	100%	100%
2019	89%	99%	100%	100%	100%	100%	100%	100%
2020	76%	93%	95%	98%	99%	100%	100%	100%

H. ENERGY WASTE REDUCTION (EWR)

1. Overview of EWR Programs

I&M offers a wide range of EWR programs that provide residential, Income Qualified (IQ), commercial and industrial customers the opportunity to receive rebates. These rebates help decrease the upfront cost of energy efficient end-use appliances (also known as energy waste reduction measures) that serve to reduce energy consumption. Many of I&M's EWR programs offer customer education, customer awareness, and energy use tips and advice for ways to achieve energy conservation. A main focal point of the programs is to encourage earlier adoption of more efficient measures. Through EWR pilot programs and program offerings, I&M remains current on new approaches for providing EWR to its customers and new technologies that have the potential to improve energy conservation for customers.

I&M's active EWR programs and pilots include the following:

- Residential EWR Programs and Pilots:
    - Home Appliance Recycling
    - Home Energy Products - Appliances
    - Home Energy Products - Lighting
    - Home Energy Reports
    - Residential Online Energy Check-up
    - Home Weatherproofing
    - Residential Income Qualified Weatherproofing
    - Schools Energy Education

- Heat Pump Clothes Dryer Pilot

- Commercial and Industrial Programs and Pilots:
  - Work Prescriptive
  - Work Custom
  - Work Direct Install
  - Public Efficient Streetlighting
  - Business Energy Manager Pilot
  - Small Business Energy Manager Pilot

2. Energy Measure Characteristics

I&M's EWR programs contain energy efficient measures that reflect each measure's unique energy use profile according to how each segment of I&M's customers use them. In other words, measures are aligned to their respective utility load shape, according to the following end-use load shape categories:

- Heating
- Cooling
- Ventilation
- Lighting
- Water Heating
- Refrigeration
- Cooking
- Clothes Washing
- Clothes Drying
- Office
- Miscellaneous
  - Electronics
  - Media

I&M's EWR programs contain rebates for energy intensive applications, or use profiles, informed by the relative size of the end-use load shape, to I&M's aggregate load shape. Prioritization according to energy intensity facilitates better affordability for customers and helps I&M measure and program cost effectiveness. Ultimately, when considering EWR measures as NWA options, energy intensity by end use at the local level, informs how EWR can be used to optimally achieve NWA solutions. Consider if a specific distribution circuit serves predominantly residential air conditioning loads. To the extent residential air conditioning usage drives utility asset improvement or supply need on that specific distribution circuit, EWR programs can focus on improving residential air conditioning efficiency for those customers. This helps reduce the urgency for the asset improvement or supply need. In other words, it defers the asset improvement or supply need to a future point in time. In this example, EWR programs might offer enhanced rebates to customers served by the distribution circuit to upgrade their air conditioners to more efficient models, sooner than they would have.

3. EWR and Distribution Planning Integration

EWR, as an NWA solution, requires changes in planning for EWR program administrators and distribution planning engineers. Detailed customer usage data and information regarding the composition of and timing of end-use loads on each distribution circuit in order to accurately and reliably deploy EWR in advance of the distribution circuit need is required. While field audits may best provide that level of detail, resource constraints practically constrain this option. Instead, when planning in advance of that need, detailed usage data and information, along with load disaggregation analytics, can make the "EWR as NWA" solution identification and deployment process much more efficient and timely. As I&M's distribution system modernization plan components and AMI system are deployed, this level and type of data and information becomes more readily available for use in analysis and end-use load disaggregation. With this type of data and information, EWR as NWA opportunities can be better analyzed for load reduction impacts, the timing thereof, and associated benefit and cost results. Once the most appropriate and feasible EWR solution is identified, distribution planning can integrate the solution into the planning process for assessment of NWA's against other traditional options.

I. ENERGY STORAGE

AEP, which owns approximately 30 GW of generation, has a goal to be net zero carbon dioxide emissions by 2050. That goal includes adding 16 GW of regulated wind and solar generation by 2030. Over 85% of energy utilized in I&M is produced emission free. As part of this portfolio, I&M owns or contracts over 500 MW of renewable generation resources.

1. Anticipated Benefits and Challenges of Energy Storage

Wind and solar generation have inherent challenges of power fluctuations due to their intermittent nature. Storage solutions address this key challenge by smoothing generation production. But storage technology also presents its own challenges. One of the biggest challenges is that the technology, particular utility-scale storage, is relatively new. To date, most has been adapted from the small-scale retail market such as phones and cars. These applications use lithium ion batteries. These batteries have had issues with fires and they are also limited in that they only provide service economically for up to eight (8) hours. Whereas these solutions are limited by size and weight, utility-scale deployments cannot practically have these constraints.

Another challenge concerns decommissioning. This challenge specifically centers on the labor-intensive process involved coupled with the disposal of environmentally unfriendly materials.

2. Use Cases

AEP and I&M have actively explored the potential of replacing or supplementing traditional distribution investments with utility-scale storage solutions. In distribution, the opportunities for energy storage include T&D spend deferral or reduction, renewable smoothing, voltage regulation, and utility demand response. Other utility-use cases include wholesale demand response, energy arbitrage, frequency and voltage regulation, resource adequacy, congestion relief, and spinning/non spinning reserves. Customer-use cases include bill management, transportation, self-generation, and backup power. A utility can stack the benefits to optimize the value they bring to the grid. For example, I&M can combine investment deferral with demand response to stack benefits for one storage installation.

3. Pilot Considerations

Though no specific pilot plans are being proposed at this time, I&M desires to pilot battery energy storage in Michigan in anticipation of a significant increase of these installations on its system. I&M will utilize this pilot to gain insight on how this potential solution impacts I&M's system

and customers.

Through this pilot, I&M anticipates being able to achieve the following:

- *Reduce Peak Capacity*: I&M currently tempers demand through use of customer-facing load management programs. One reason to do this is to decrease peak demand and therefore the capacity required to meet customer needs. Through battery storage pilots, I&M will seek a new path to decrease peak capacity. I&M will accomplish this by charging battery storage during off-peak hours and discharging during peak hours. In doing so, I&M will be able to compare the effectiveness of reducing peak demand using battery storage against traditional customer programs.
- *Battery Cycling*: With the evolution of Order 2222, I&M seeks to learn how to manage more storage assets in aggregate on the system. This will involve multiple factors including battery cycling dynamics, impact to the system including the oversight by I&M's DDC and the maintenance of these assets as they are operated to serve customers' needs.

J. DG AND INTERCONNECTIONS

1. Review of Current Interconnection Process

As described in previous sections, I&M views its role in the future of the industry as an enabler. I&M is dedicated to the creating a reliable and resilient grid that resembles what is often referred to as a "plug-and-play" model. This grid is vendor agnostic to customer choices. It is also worth recognizing that the distribution grid will likely become more interactive and dynamic in the future. This will require a comprehensive review of the current interconnection process, state-approved interconnection agreements, and an analysis of the process to support more DERs and EVs connected to the distribution grid.

The interconnection processes will need to evolve to support requirements from the RTOs due to Order 2222. Order 2222 enables a broad category of technologies, which are interconnected on the distribution system, to aggregate produced energy for participation into the ISO/RTO wholesale markets, as instructed by a distribution utility's relevant electric retail regulatory authority. ISO/RTOs must create a new Market Participant category for Distributed Energy Resource Aggregators (DERA) and develop associated market rules to enable aggregation. With DER aggregating retail customer output, it is essential to ensure that the DERs are interconnected to the distribution system with the wholesale market equipment necessary to reliably participate. I&M must ensure that these interconnection reviews meet I&M and Michigan

requirements, as well as NERC and FERC standards as the DERAs register across multiple ISO/RTOs. As such, existing DER interconnection agreements may need to be reconsidered, updated and adjusted to reflect customer choices to opt into new wholesale programs. GT&D planning may need to review distribution system limitations of aggregated energy in real time, metering requirements, telemetry items, operational control and transfer capability, and system upgrade cost responsibility for operating in an aggregated manner. New DER requests for interconnection will also require updating to keep pace with the technology.

Today, I&M's single program DG interconnect process flows as follows:

- A customer DG request is entered through third party vendor software called Power Clerk.
- An I&M customer representative reviews the application for completeness and accuracy.
- Distribution planning conducts a technical review, involving simple screening to full impact studies. The intent is to make sure the customer DG system will not cause any adverse impact.
- Once a technical review has been completed and cost impacts are communicated, an I&M representative works with the customer to obtain the correct program and tariff. Typically, the retail net metering tariff is applied.
- The construction must be verified or commissioned so that all equipment is installed as planned by both the customer and I&M.
- Updates must be made to I&M systems and maps to indicate the new DG addition to the circuit.

2. Monitor, Assess, and Prepare for FERC 2222

Order No. 2222 will potentially accelerate the need for upgrades to I&M's distribution system and impact operation functions. With the responsibility of ensuring grid stability, it is important that I&M be in a position to follow MPSC direction and communicate final determination of an individual DER's eligibility to participate in wholesale DER aggregation to ensure safe and reliable operations of the distribution system.

AEP's service territory experienced a 176% increase in the number of customer-owned DER applications between 2019 and 2020. AEP expects an acceleration in DER implementations due to Order 2222. An Advanced Distribution Management System (ADMS) with Distributed Energy Resource Management System (DERMS) functionality will allow the company to implement a new network architecture across AEP. This new network architecture will expand

distribution planning criteria listed above, as the load will no longer be net with the DER energy produced. DERAs and the energy they aggregate from multiple DERs are anticipated to follow similar market protocols as other Generation Independent Power Producer resources. AEP must have robust situational awareness of both retail and wholesale system connected DER/DG assets and the DERA interconnected at the distribution level to properly operate the distribution wires in the best interest of AEP customers.

3. Hosting Capacity Analysis / Maps

AEP and I&M continue to evaluate options for cost effectively developing a hosting capacity map. AEP's corporate teams are currently evaluating pilot opportunities with several vendors and I&M plans to leverage these learnings to inform the development of a hosting capacity map / tool. The corporate teams' current plans include pilot efforts to be underway in 2021-2022 with a potential roll out / implementation in the 2023-2024 time frame. Given the low penetration of DERs on I&M's system today (237 DERs, 11.2MW, as of 7/19/21), I&M intends to pragmatically implement a hosting capacity map in a timely fashion. I&M currently has a robust interconnection review process which can support customer needs as it works toward implementation of an automated tool for the same.

L. INTEGRATED RESOURCE PLANNING

Integrated Resource Planning (IRP) is a key input into resource decisions and overall management of the utility business. The IRP process provides a detailed and robust view into the long-term dynamic resource needs and solutions that are available to the Company and its customers. The IRP considers trends affecting customers and the greater region from both a load perspective and solutions to serve the load through long-term scenario planning and stochastic analyses.

While the IRP is a detailed and robust management tool, it has its inherent limitations. Most importantly, the IRP is a snapshot in time that requires nearly two (2) years to complete. The IRP process should not constrain or place a burden on responding to near-term changing system needs or resource options. In addition, it should not be prescriptive in nature or override or delay management's judgement.

The continued integration of resource, distribution and transmission planning will provide the Company and its stakeholders the opportunity to develop solutions that ensure system reliability and resiliency, while putting the Company on a path to net-zero carbon by 2050.

1. Load Forecasting

I&M's load forecasting methodology used for the development of its IRP currently captures the impacts of several dynamic inputs. Those inputs include changing saturations of energy efficient technologies, saturation of customer owned DERs, adoption of EVs and impact of economic development activities. This load forecasting is conducted at a macro level and is agnostic to location specific considerations. The distribution planners on the other hand, perform load forecasting at a circuit level and consider annual growth rates as well as specific known load additions in their annual review process. As part of the integration of the GT&D planning processes there will be interplay among these processes to further enhance the forecasting. I&M is in the early stages of integrating these processes.

As described in previous sections, I&M reviews a 10-year load forecast as part of its distribution system planning. This load forecast is updated annually, using five (5) years of historical load data as a basis for the growth rate. Other reviewed factors include specific load for I&M's distribution stations and circuits, as well as load information for large commercial and industrial customers. The system load forecasts are compared against the capacity of I&M's distribution system and monitored. Areas where load is expected to exceed capacity are then further reviewed to determine if a project is needed to address any potential issue. Since this process is conducted on an annual basis, I&M is able to meet the capacity of its system on a proactive basis.

Absent AMI, I&M has developed a proven load forecasting methodology that is accurate and reliable for the purposes of system planning and setting rates. As I&M fully deploys AMI we will have the capability of developing a fully modular approach to forecasting.

2. DER Forecasting

DERs are emerging as an important source of system supply. With Order 2222, DER assets can participate in wholesale markets as a capacity or energy resource. This creates the necessity to take this into consideration in distribution planning and analysis. The growth of DERs will require further alignment of the planning functions to inform new resource characterization approaches and novel DER sourcing mechanisms.

I&M is working to modernize its distribution system to integrate and optimize the use of new technologies and services. An enabling platform will allow the distribution system: to incorporate distributed energy resources; automatically react to sudden generation or load changes; maintain power quality and reliability; and ensure real-time, dynamic communication with these technologies.

While I&M does not utilize an in-house forecasting model for assessing DER penetration on the distribution circuits, it does use two (2) sets of inputs in the planning processes. The Market Potential Study performed as part of the Energy Efficiency/Demand-Side Management program provides a DER adoption/growth forecast and helps the planners. Further, the interconnection data collected internally helps I&M assess the growth trends of DERs on the system.

3. Electric Vehicles

AEP has developed an in-house EV forecasting model for all of its utility operating companies. This model is based on custom EV adoption market factors in the residential and commercial fleet sector for light duty (LD), medium duty (MD) and heavy duty (HD) vehicles. This model also incorporates EV registration data at a ZIP Code + 4 level of granularity to show current EV adoption trends. I&M will integrate this data into the DER adoption / growth forecast as the growth of EVs continues to mature to help planners plan ahead.

In Michigan, I&M is implementing an approved pilot program called IM Plugged In. I&M's IM Plugged In focuses on incentivizing off-peak plug-in electric vehicle (PEV) charging to lower overall system costs with a combination of incentives and tariff options for residential, small commercial, multi-unit dwelling (MUD) and commercial and industrial (fleet and workplace) customers with qualifying PEVs.

The IM Plugged In pilot program is available to residential and small commercial customers under the provisions of the Company's Tariff RS/PEV and GS/PEV respectfully. This program offers a $500 incentive to participating residential and small commercial customers in I&M's service territory to install a submeter to measure PEV charging and receive off-peak charging rate discounts with proof of a qualifying PEV purchase, subject to the IM Plugged In spending cap.

For multi-unit dwelling (MUD) and commercial and industrial (fleet and workplace) customers with qualifying PEVs, The IM Plugged In pilot program is capped at $2,500 rebate per port installed subject to the aggregate spending cap. These options requires a separate meter, either individually or for a bank of chargers; and includes a suspension of Contribution in Aid of Construction (CIAC) subject to the aggregate spending cap.

The pilot program also includes support and incentives for Michigan's "Charge Up!" Direct Current (DC) fast charging interstate corridor project for a single network node (Node 18) in I&M's service area. The Charge Up Michigan Program is an EV Charger Placement project that aims to build the infrastructure for DC fast charging (DCFC) stations in Michigan to ensure feasibility of all long distance trips for EV users within the state, and also to neighboring states and Canada.

To achieve this, the Department of Environment, Great Lakes, and Energy (EGLE) and I&M will provide funding for qualified DCFC EV charging equipment, site preparation, equipment installation, networking fees and signage.

In collaboration with EGLE, applications are first submitted to I&M to review for:

- Alignment with EGLE identified site/node locations,
- Alignment with I&M service territory, and
- Impact on current and future load requirements on I&M energy infrastructure.

Once reviewed and approved, developers are notified to apply to the Charge Up program for further review and ultimate approval. To date, the implementation of I&M's residential, small commercial, MUD, workplace, and fleet commercial & industrial customer PEV programs in Michigan have encountered several challenges. These challenges, which have led to a low uptake rate for our incentives to date, are summarized as follows:

- Michigan Covid-19 restrictions and I&M safety policy impacted I&M's ability to conduct direct outreach to drive program enrollments.
- I&M's approved rate case for residential PEV incentive restricts payments to I&M customers with 2nd homes in Southwestern Michigan that have PEVs registered out of state.
- I&M's approved rate case for residential PEV incentive also restricts payments to I&M customers with PEVs registered in Michigan prior to the Program Effective Date of January 23, 2020.
- Southwestern Michigan customers lack access to PEV inventory at local dealerships. With Tesla PEV owners, they have had to travel to Chicago area Tesla dealers to purchase vehicles. Non-Tesla PEV owners and interested potential buyers face low levels of PEV inventory in existing local dealerships.

Based on Electric Power Research Institute (EPRI) vehicle registration data, a total of just under 700 PEVs have been registered in I&M's service area as of the end of 2020. Of this total, only just over 300 of these PEVs are fully battery electric vehicles charging. Given this low overall penetration, the emergence of EVs and associated charging has not yet emerged as a critical factor in I&M's medium to long-term distribution grid planning strategies.

I&M sees several opportunities for increased incentive deployments that could increase the adoption of PEVs that could be incentivized to charge off-peak to drive down overall system costs. These opportunities are summarized below:

- The easing of Michigan Covid-19 restrictions and I&M safety policy will lead to new opportunities to conduct direct outreach to drive program enrollments.
- Allowing I&M to make PEV incentive payments to I&M residential customers to charge off peak regardless of where the PEV is registered.
- Allowing I&M to make PEV incentive payments to I&M residential customer with a PEV registered in Michigan regardless of the current program effective date.
- State policy that incentives the adoption of PEVs such as Zero Emissions Vehicle mandates can drastically improve the dealership incentive to stock and sell PEVs in I&M's service area.

4. Load Management

Load management activities can have a direct impact on the peak loading of the distribution system, when managed during the specific peak demand periods those assets individually experience. However, not all distribution system assets experience individual peak loading at the same time with the actual I&M system coincident peak demand period. This is typically the preferred load reduction period in which load management demand reductions are targeted. While some may directly correlate to the I&M system coincident peak demand period, others do not, and individual distribution circuit peak demands depend on the type of end-use loads served and the level of coincidence in the timing of those end-use loads.

Different from EWR as NWA options, load management activities tend to provide higher reliability for peak load reductions because I&M has varying degrees of control for when the load reductions occur. However, similar to EWR as NWA options, data and information on the nature and characteristics of end use loads served on any given distribution circuit and early planning are necessary in order to appropriately inform distribution planning for the type and level of peak demand reductions that can be available. Distribution modernization activities, the deployment of AMI infrastructure, and data analytics will augment I&M's ability to evolve into load management focused on specific distribution equipment loading.

I&M is investigating and developing an array of load management alternatives. Currently, I&M is either piloting or offering the following load management activities:

- Residential smart thermostat direct load control;

- Small business thermostat direct load control;
- Residential air conditioner switch direct load control aimed at specific hard to reach customer segments;
- Residential electric water heat direct load control aimed at specific hard to reach customer segments;
- Residential customer behavioral demand response;
- Residential Critical Peak Pricing (CPP) tariff option;
- Residential Time of Use pricing option for EV charging;
- Business Critical Peak Pricing tariff option; and
- Large business customer (e.g. industrial) Demand Response tariff option.

With the offer of several different forms of peak demand reduction, integration of load management into distribution planning will require adjustments to the planning process for both load management planning and distribution planning. The degree of integration will depend upon the type, level of data and information, and level of reliability regarding each form of load management. I&M envisions use and reliance on a DERMS type system to aid in the management of all load management resources in the future and is currently working to identify and begin development for these type of systems.

Single Phase Line Rebuild 2021				
Map Reference Number	Station	Circuit	Description	Miles
1	Pokgagon	12 KV	CA487-13 TO CA486-225, 2-4AS TO 2-2AA	0.60
2	Covert	12 KV	VB271-57 to VB272-14; 2-4AS to 2-2AA	0.72
3	Three Oaks	12 KV	BE581-95 to BE579-102, 2-4AS to 2-2AA	2.10
4	Cameron	Lawton	VB593-181 to VB570-24; 2-4AS & 2-6A CC to 2-2AA	1.04
5	Hagar	Riverside	BE151-44 to BE151-67; 2-6CU to 2-2AA	0.49
6	Buchanan	South	BE680-13 to BE711-8; 2-4AS to 2-2AA	0.88
7	Colby	West	VB723-23 to VB699-13; 2-6A CC to 2-2AA	0.79
8	Sister Lakes	Sister Lakes	VB718-99 to CA102-59; 2-6Cu to 2-2AA	0.70
9	Kalamazoo	Schoolcraft	KA587-115 to KA587-1166; 2-6Cu to 2-2AA	0.43
10	Kalamazoo	Schoolcraft	KA587-354 to KA587-391; 2-6Cu to 2-2AA	0.33
11	West Street	Paw Paw Lake	BE104-36 to BE112-45; 2-4AS to 2-2AA	2.04
12	Kalamazoo	Schoolcraft	KA587-38 TO KA587-45, 2-6A CC TO 2-2AA	0.11
13	Crystal	Coloma Tie	BE206-17 to BE205-86; 2-4AS to 2-2AA	0.83
			Total	11.06
		Estimated Capital	$886,693	

Single Phase Line Rebuild 2022				
Map Reference Number	Station	Circuit	Description	Miles
1	Almena	Gobles 34.5 KV	VB495-55 to VB472-311; 2-4AS to 2-2AA	0.56
2	Baroda	Livingston	BE365-140 to BE365-76; 2-4AS to 2-2AA	0.20
3	Riverside	Klock Park	BE200-170 to BE200-448 & BE200-481; 2-4AS to 2-2AA:Make UG	0.20
4	Hickory Creek	Niles	BE247-342 to BE247-350 & BE264-53 to BE264-182; 1-4AS & 1-2AS to 2-2AA	0.38
5	Stone Lake	Diamond	CA377-12 to CA377-38; 2-6A CC to 2-2AA	0.33
6	Buchanan South	Clark	BE598-35 to BE599-233; 2-4AS to 2-2AA	1.04
7	Stubey Road	West	SJ573-29 to SJ548-39; 2-6A CC to 2-2AA	0.85
8	Stubey Road	West	SJ572-28 to SJ572-21; 2-6A CC to 2-2AA	0.20
9	Three Rivers	State Street	SJ324-284 TO SJ325-32, 2-6A CC TO 2-2AA	0.76
10	Lakeside	New Troy	BE508-85 TO BE532-28 TO BE509-5, 2-477 CB TO 2-2AA	0.71
11	Sodus	Bainbridge	BE289-7 to BE274-12 & lateral; 2-4AS to 2-2AA	1.60
12	Sodus	Bainbridge	BE272-4 to BE272-28; 2-4AS to 2-2AA	0.57
13	Bridgman	Sawyer	BE422-115 to BE422-117; 2-4AS to 2-2AA	0.11
14	Bridgman	Sawyer	BE463-321 to BE463-411 & laterals; 2-4AS to 2-2AA	0.89
15	Berrien Springs Hydro	South	BE417-11 to BE437-21; 2-4AS to 2-2AA	1.58
16	Almena	Gobles 34.5 KV	VB471-65 to VB447-49; 2-4AS to 2-2AA	0.15
17	Berrien Springs Hydro	South	BE418-112 to BE419-109; 2-4AS to 2-2AA	1.51
18	Hartford	West	VB551-114 to VB550-3; 2-6A CC to 2-2AA	1.02
			Total	12.66
		Estimated Capital	$1,022,214	

Single Phase Line Rebuild 2023				
Map Reference Number	Station	Circuit	Description	Miles
1	Niles	Bertrand 34.5 KV	BE573-33 to BE573-9 & lateral; 2-4AS to 2-2AA	0.87
2	Niles	Bertrand 34.5 KV	BE599-146 to BE626-13 & lateral; 2-4AS to 2-2AA	0.87
3	Niles	Bertrand 34.5 KV	BE627-129 to BE627-14; 2-4AS to 2-2AA	0.51
4	Niles	Bertrand 34.5 KV	BE656-81 to BE656-154; 2-4AS to 2-2AA	0.50
5	Sodus	Bainbridge	BE255-83 to BE253-33; 2-4AS to 2-2AA	1.47

Note: The Five-Year Distribution Plan is subject to change

6	Buchanan Hydro	River Rd	BE518-131 to BE495-16; 2-4AS to 2-2AA	0.72
7	Almena	Gobles 34.5 KV	VB292-1 to VB292-50; 2-6A CC to 2-2AA	0.87
8	Almena	Bloomingdale 34.5 KV	VB230-44 to VB229-13; 2-6A CC to 2-2AA	1.02
9	Almena	Bloomingdale 34.5 KV	VB469-3 to VB468-7; 2-4AS to 2-2AA	0.61
10	Buchanan Hydro	River Rd	BE543-20 to BE543-10; 2-4AS to 2-2AA	0.51
11	Berrien Springs Hydro	South	BE435-15 to BE434-89; 2-4AS to 2-2AA	0.70
12	West St	Coloma	B102-33 to B103-27; 2-4AS to 2-2AA	1.42
13	Niles	North	BE504-37 to CA437-7; 2-4AS to 2-2AA	0.60
14	Crystal	Coloma Tie	BE190-112 to BE191-260; Various small wire to 2-2AA	0.67
15	Bridgman	Baroda	BE511-14 to BE512-32; 2-4CU to 2-2AA	1.43
16	Buchanan Hydro	Town	BE569-242 to BE595-315; 2-4AS to 2-2AA	0.23
17	Buchanan Hydro	Town	BE569-103 to BE569-9; 2-6CU to 2-2AA	0.36
18	Niles	East	CA557-7 to CA557-79; 2-4CU to 2-2AA	0.59
19	Almena	Mattawan 34.5 KV	VB524-29 to VB547-4; 2-6CU to 2-2AA	0.72
20	Almena	Mattawan 34.5 KV	VB545-120 to VB546-50; 2-6A CC to 2-2AA	0.40
21	Buchanan Hydro	River Rd	BE518-131 to BE495-16; 2-4AS to 2-2AA	0.72
22	Buchanan Hydro	River Rd	BE518-4 to BE518-87; 2-4AS to 2-2AA	0.65
23	Buchanan Hydro	River Rd	BE570-201 to BE546-14; 2-4AS to 2-2AA	0.87
24	Hagar	Riverside	BE151-71 to BE140-63; 2-6CU to 2-2AA	0.59
25	Hagar	Riverside	BE165-37 to BE166-35; 2-4AS to 2-2AA	1.12
			Total	19.02
		Estimated Capital	$1,630,241	

Single Phase Line Rebuild 2024

Map Reference Number	Station	Circuit	Description	Miles
1	Pearl St	Fairplain North	BE216-314 to BE216-700; 1-6CU & 1-4CU to 2-2AA	0.34
2	Pearl St	Fairplain North	BE216-948 to BE216-676; 2-4CU to 2-2AA	0.57
3	West St	Coloma	B102-33 to B103-27; 2-4AS to 2-2AA	1.42
4	West St	Coloma	B143-22 to B143-40; 2-4AS to 2-2AA	0.36
5	West St	Coloma	B144-211 to B156-10; 2-4AS to 2-2AA	0.38
6	Niles	South	B687-152 to B658-125; 2-4AS to 2-2AA	1.09
7	Three Rivers	Corey Lake	SJ342-38 to SJ317-17; 2-6CU to 2-2AA	0.81
8	Three Rivers	Corey Lake	SJ346-161 to SJ346-56; 2-6CU to 2-2AA	0.58
9	Sodus	Sodus	BE269-4 to BE252-79; 2-4AS to 2-2AA	1.16
10	Sodus	Sodus	BE301-89 to BE303-10; 2-4AS to 2-2AA	1.23
11	Buchanan South	Terre Coupe	BE568-78 to BE568-14; 2-4AS to 2-2AA	0.43
12	Buchanan South	Terre Coupe	BE568-64 to BE593-47; 2-4AS to 2-2AA	1.46
13	Buchanan South	Terre Coupe	BE620-15 to BE648-48; 2-4AS to 2-2AA	0.71
14	Buchanan South	Terre Coupe	BE621-31 to BE620-10; 2-4AS to 2-2AA	0.81
15	Vicksburg	Richardson	KA547-141 to KA548-28; 2-4AS to 2-2AA	1.03
16	Crystal	Coloma Tie	BE177-29 to BE191-352; 2-4AS to 2-2AA	1.41
17	Stevensville	Red Arrow	BE312-1 to BE311-45; 2-4CU to 2-2AA	0.54
18	Hartford	West	VB551-114 to VB550-3; 2-6A CC to 2-2AA	1.02
19	Crystal	Coloma Tie	BE204-87 to BE204-57; 1-4AS & 1-2AS to 2-2AA	0.26
20	Three Oaks	12KV	BE610-10 to BE609-32; Replace 1-6CU and 1-2AA with 2-2AA	0.11
			Total	15.72
		Estimated Capital	$1,468,138	

Single Phase Line Rebuild 2025

Map Reference Number	Station	Circuit	Description	Miles
1	Hawthorne	Industrial	BE215-273 to BE215-97 & BE215-802 to BE215-898 & BE215-405 to BE215-412; Replace 2-4CU w/2-2AA	0.47
2	Bridgman	Manley	BE402-2 to BE383-79; Replace 2-4AS w/2-2AA	0.51
3	Bridgman	Manley	BE383-79 to BE383-86; Replace 2-4AS w/2-2AA	0.16

Note: The Five-Year Distribution Plan is subject to change

4	Stevensville	Red Arrow	BE294-62 to BE276-15; Replace 2-4CU w/2-2AA	0.48
5	Oronoko	Red Bud	BE411-140 to BE411-19; Replace 2-6CU w/2-2AA	0.36
6	Oronoko	Red Bud	BE412-23 to BE412-109; Replace 2-4CU w/2-2AA	0.71
7	West St	Millburg	BE195-1 to BE195-14; Replace 2-4CU w/2-2AA	0.51
8	Mottville	Mottville	SJ511-15 to SJ511-107, SJ511-117 to SJ511-118, SJ511-106 to SJ511-113, SJ512-23 to SJ488-52, SJ488-45 to SJ488-46, SJ512-19 to SJ512-22; Replace mixed 2-6CU, 2-2AS with 2-2AA	0.81
9	Sauk Trail	Eagle Lake	CA566-1 to CA565-37; Replace 2-6A CC w/2-2AA	0.29
10	Hawthorne	Industrial	BE215-252 to BE214-37 & BE215-254 to BE214-50 & BE215-256 to BE214-62; Replace 2-4CU w/2-2AA	0.28
11	West St	Millburg	BE194-203 to BE194-122; Replace 2-4CU w/2-2AA	0.41
12	Mottville	Mottville	SJ534-15 to SJ534-105; Replace 2-6A CC with 2-2AA	0.13
13	Hagar	Michigan Beach	BE119-61 to BE119-258 & BE119-180; Replace 2-4CU w/2-2AA	0.89
14	Mottville	Mottville	SJ534-195 to SJ534-205; Replace 2-4CU with 2-2AA	0.06
15	Three Oaks	12KV	BE610-1 to BE611-116, BE584-20 to BE584-76; Replace 2-4AS and 2-631CB w/ 2-2AA	1.78
16	Three Oaks	12KV	BE607-16 to BE607-58; Replace 2-4AS with 2-2AA	0.62
17	Lakeside	Union Pier	BE572-372 to BE552-58; Replace 2-4CU w/ 2-2AA	0.64
18	Hawthorne	Industrial	BE229-108 to BE229-141 & BE229-114; Replace 2-4CU w/2-2AA	0.32
			Total	9.43
		Estimated Capital	$993,095	

Three Phase Line Rebuild 2021

Map Reference Number	Station	Circuit	Description	Miles
1	Niles	North	BE504-1 to CA389-56; 2-4CU & 1-2AS to 3-2AA	0.68
2	Hickory Creek	Niles	B247-308 to B247-370; 3-4AS & 1-2AS to 4-2AA	0.18
3	Pokagon	12KV	CA439-13 to CA439-141; 4-4AS to 4-2AA	0.82
4	Murch	Lake Cora	VB513-75 to VB512-8; 3-6A CC & 1-2 AA	0.29
5	Lakeside	Union Pier	B578-10 to B578-93; 3-6CU&1-4CU to 4-2AA	0.29
6	Niles	Bertrand 34.5 KV	B549-29 to B547-51; mixed 2ph to 4-2AA	1.06
7	Lakeside	Mustang	B553-114 to B552-12; 4-6CU to 4-2AA	0.71
8	Buchanan Hydro	Town	B569-269 to B569-103; 2-6CU& 2-4CU to 4-2AA	0.10
9	Cameron	Lawton 34.5 KV	VB592-276 to VB591-15; 3-4AS&1-2AA to 4-2AA	0.25
10	Valley	Valley 34.5 KV	VB704-2 to VB704-14; 3-4CU to 3-2AA	0.43
11	Valley	Valley 34.5 KV	VB682-281 to VB681-421; 3-6A CC to 4-2AA	0.33
12	Hawthorne	Shoreham	BE245-4 to BE245-301; 4-4AS to 4-2AA	0.05
13	Pearl St	Plaza	BE232-154 to BE232-372; 4-4AS to 4-2AA	0.20
14	Niles	North	BE527-34 to CA437-35; 4-4AS to 4-2AA	0.22
15	Kalamazoo	Schoolcraft	KA587-146 to KA587-343; 4-6CU to 3-556AL & 4/0AA	0.22
16	Kalamazoo	Schoolcraft	KA611-128 to KA587-326; 4-6CU to 4-2AA	0.26
17	Sister Lakes	Sister Lakes	VB718-145 to VB694-1; 3-6CU & 1-4CU to 4-2AA	0.68
18	Pearl St	Plaza	BE218-383 to BE218-206; 4-4CU to 4-2AA	0.65
19	West St	Paw Paw Lake	BE144-106 to BE144-98; 4-4CU to 3-556AL & 1-4/0AA	0.17
20	Hawthorne	Shoreham	BE245-20 to BE245-133; 4-4CU to 4-2AA	0.30
21	Lakeside	Mustang	BE528-39 to BE528-50; 4-4CU to 4-2AA	0.27
22	Niles	East	BE629-130 to BE629-166; 4-4AS to 4-2AA	0.22
23	Oronoko	Red Bud	BE414-82 to BE395-162; 4-4AS to 4-2AA	0.22
24	Three Rivers	Corey Lake	SJ318-34 to SJ318-38; 3-6A CC to 3-2AA	0.14
25	Riverside	Paw Paw	BE174-310 to BE174-318; IN 3-556 DBL CKT	0.30
			Total	9.04
		Estimated Capital	$2,466,296	

Note: The Five-Year Distribution Plan is subject to change

Three Phase Line Rebuild 2022				
Map Reference Number	Station	Circuit	Description	Miles
1	West Street	Coloma	BE132-27 to BE132-98 & BE133-324 to BE133-553 & BE133-52 to BE133-342; 4-4AS to 4-2AA	0.25
2	Stone Lake	Diamond	CA375-296 to CA375-307; 3-4A CC & 1-2AS to 3-556AL & 1-4/0AA	0.18
3	New Buffalo	State Line	BE690-146 to BE690-263; 3-4AS & 1-2CU to 4-2AA	0.16
4	Riverside	North Shore	BE149-22 to BE149-31; 4-4AS to 4-2AA	0.08
5	Pearl St	Fairplain South	BE232-100 to BE232-446; 4-4AS to 4-2AA	0.09
6	West St	Ryno Rd	BE136-520 to BE135-81; 3-6CU & 1-4CU to 4-2AA	0.03
7	West St	Ryno Rd	BE135-404 to BE135-407; 4-4AS to 4-2AA	0.07
8	Valley	Valley 34.5 KV	VB682-361 to VB682-382; 3-6A CC to 4-2AA	0.28
9	Main Street	Riverview	BE201-585 to BE201-880; 4-4AS to 4-2AA	0.11
10	Stevensville	East	BE313-38 to BE314-186; 4-4AS to 4-2AA	0.09
11	Pearl St	Plaza	BE232-448 to BE232-449; 4-4AS to 4-2AA	0.04
12	Buchanan South	Clark	BE596-40 to BE596-349; 4-4AS to 4-2AA	0.10
13	Hagar	Michigan Beach	BE128-170 to BE129-174; 4-4AS to 4-2AA	0.18
14	Stone Lake	Diamond	CA352-162 to CA352-171; 3-6CU to 3-2AA	0.10
15	Three Rivers	Westland	SJ299-36 to SJ299-3; 3-6CU (CN) to 4-2AA	0.14
16	Hartford	East	VB504-17 to VB504-305 & VB504-312 to VB504-345; 4-4AS to 4-2AA	0.44
17	Vicksburg	East	KA616-46 to KA616-49; 3-4AS & 1-2AA to 4-2AA	0.07
18	Crystal	Coloma Tie	BE204-53 to BE203-351; 4-4AS to 4-2AA	0.10
19	Pearl St	Fairplain North	BE217-26 to BE216-275; 4-4CU to 4-2AA	0.69
20	New Buffalo	Bison	BE632-44 to BE632-21; 4-4CU to 3-556AL & 1-4/0AA	0.63
21	Stubey Road	West	SJ571-39 to SJ572-7; 4-4A CC to 4-2AA or 3-556AL	0.54
22	Sodus	Bainbridge	BE224-15 to BE223-17; 4-4AS to 4-2AA	0.09
23	Sodus	Bainbridge	BE239-85 to BE240-87; 2-4AS & 1-2AA to 3-2AA or 3-556AL	1.13
24	Niles	South	BE687-145 to BE687-104; 3-4CU (CN) to 4-2AA	0.27
25	Nickerson	Napier	BE233-192 to BE233-202; 3-1/0AS to 4-2AA	0.30
26	Buchanan Hydro	River Rd	BE570-249 to BE571-97; 2-4AS & 2-2AA to 4-2AA	1.13
27	Niles	North	BE551-122 to BE551-15; 4-4CU to 4-2AA	0.19
			Total	7.48
		Estimated Capital	$2,072,978	

Three Phase Line Rebuild 2023				
Map Reference Number	Station	Circuit	Description	Miles
1	Sister Lakes	Sister Lakes	VB718-39 to VB718-47; 3-4AS to 3-2AA	0.16
2	Niles	Bertrand 34.5 KV	BE686-18 to BE684-32; 4-4AS to 4-2AA	1.88
3	Bridgman	Sawyer	BE422-103 to BE443-134; 2-4AS & 1-2AA to 3-2AA	1.09
4	Bridgman	Sawyer	BE443-120 to BE463-206; 2-4AS & 1-2AA to 3-2AA	0.40
5	Kalamazoo	Schoolcraft	KA586-33 to KA561-24; 2-2AA & 2-6A CC to 4-2AA	1.30
6	Almena	Bloomingdale 34.5 KV	VB259-1 to VB258-7; 3-6A CC & 1-2AA to 4-2AA	1.18
7	Sister Lakes	Sister Lakes	VB694-20 to VB694-76; 2-6CU & 1-2AS to 3-2AA	1.18
8	Riverside	North Shore	BE162-10 to BE149-9; 4-4CU to 3-556AL	0.49
9	Riverside	North Shore	BE149-9 to BE150-132; 4-4CU to 3-556AL	0.90
10	Nickerson	Napier	BE233-192 to BE233-202; 3-1/0AS to 4-2AA	0.30
11	Buchanan Hydro	Town	BE570-28 to BE595-118; 2-4CU to 4-2AA	0.64
12	Buchanan Hydro	Town	BE570-172 to BE570-47; 3-4/0 CU to 4-2AA	0.43
13	Buchanan Hydro	Town	BE597-262 to BE597-79; 3-4/0 CU to 4-2AA	0.17
14	Niles	East	CA533-100 to CA534-21; 3-1/0AS to 4-2AA	1.46
			Total	11.58
		Estimated Capital	$3,398,025	

Note: The Five-Year Distribution Plan is subject to change

Three Phase Line Rebuild 2024				
Map Reference Number	Station	Circuit	Description	Miles
1	Almena	Mattawan 34.5 KV	VB524-35 to VB524-52; 3-6A CC & 1-2AS to 4-2AA	0.29
2	Buchanan Hydro	River Rd	BE544-59 to BE544-63; 4-4CU to 4-4AA	0.16
3	Berrien Springs Hydro	South	BE416-9 to BE436-28; 1-336AL & 2-4CU to 3-556AL & 4/0AA	0.80
4	Berrien Springs Hydro	South	BE418-104 to BE418-138 & BE399-257 to BE419-2; 2-4AS & 1-2AA to 3-2AA	0.97
5	Covert	12KV	VB271-12 to VB271-52; 3-2AA & 1-4AS to 4-2AA	0.52
6	Covert	12KV	VB332-63 to VB364-14; 2-4AS & 2-2AA to 4-2AA	0.98
7	Hagar	Riverside	BE140-19 to BE140-26; 4-4CU to 4-2AA	0.15
8	Hagar	Riverside	BE141-94 to BE131-65; 4-4CU to 4-2AA	0.68
9	Niles	North	BE551-83 to CA437-35; 2-4CU & 2-2AA to 4-2AA	0.94
10	Pearl St	Fairplain North	BE216-64 to BE216-280; 3-4CU to 3-2AA	0.42
11	Pearl St	Fairplain North	BE217-26 to BE216-175; 4-4CU to 4-2AA	0.69
12	Niles	East	BE576-77 to BE602-153; 3-4/0AS to 3-556AL & 4/0AA	0.50
13	West St	Coloma	BE133-86 to BE133-73; 4-4CU to 4-2AA	0.19
14	West St	Coloma	BE133-106 to BE133-386; 4-4CU to 4-2AA	0.10
15	Moore Park	Portage	SJ253-10 to SJ254-11; 4-6A CC to 4-2AA	1.47
16	West St	Paw Paw Lake	BE133-51 to BE133-564; 1PH and no line to 3-556AL & 4/0AA	0.32
17	Pokagon	12KV	CA486-325 to CA486-183; 2-4CU & 1-2AA to 3-2AA	0.15
18	Valley	Valley 34.5 KV	VB681-257 to VB704-2 & VB681-260 to VB681-256 & VB681-325 to VB681-334; 3-4CU & 1-2AS to 4-2AA	0.92
19	Almena	Bloomingdale 34.5 KV	VB173-31 to VB173-39; 3-6A CC & 1-2AA to 4-2AA	0.35
20	Three Rivers	Corey Lake	SJ294-181 to SJ294-136; 3-6CU to 3-2AA	0.29
21	Three Rivers	Corey Lake	SJ295-12 to SJ295-1; 3-6A CC to 4-2AA	0.20
			Total	11.09
		Estimated Capital	$3,569,545	

Three Phase Line Rebuild 2025				
Map Reference Number	Station	Circuit	Description	Miles
1	Niles	South	BE687-152 to BE657-193; 4-4CU to 4-2AA	0.40
2	Sodus	Sodus	BE268-167 to B268-11; 4-4CU to 4-2AA	0.25
3	Sodus	Sodus	BE284-74 to BE283-80; 4-4AS to 4-2AA	0.18
4	Sodus	Sodus	BE357-17 to BE357-41; 3-4AS to 3-2AA	0.62
5	Buchanan South	Terre Coupe	BE594-35 to BE568-98; 4-4AS to 4-2AA	0.53
6	Vicksburg	Richardson	KA545-34 to KA546-64; 2-6A CC & 1-2AS to 3-2AA	1.50
7	Three Rivers	Corey Lake	SJ270-27 to SJ270-84; 3-6CU to 3-2AA	0.26
8	Sauk Trail	Eagle Lake	CA540-48 to CA542-1; 3-336AS to 3-556 AL	1.30
9	Sauk Trail	Eagle Lake	CA540-1 to BE540-1; 3-336AS to 3-556 AL	0.30
10	Lakeside	Union Pier	BE578-15 to BE578-59; 4-4 CU to 4-2AA	0.25
11	Bridgman	Manley	BE403-139 to BE402-8; 4-4CU to 4-2AA	0.81
12	Niles	East	BE629-123 to BE629-30; Replace 3-2 AA w/ 4-2AA	0.36
			Total	6.76
		Estimated Capital	$2,453,933	

Circuit Ties 2021			
Station	Circuit	Description	Miles
Florence Road	Race Bank	SJ367-39 to SJ343-13; new tie to Three Rivers/Corey Lake with new Corey Station coming	0.64

Note: The Five-Year Distribution Plan is subject to change

Buchanan South	Clark	BE571-67 to BE598-85; New tie to Buchanan Hydro/Town	1.00
Scottdale	Oaks	B232-71 to B232-47; 556 tie on Nickerson Ave to create tie with Pearl St/Fairplain North	0.68
		Total	2.32
	Estimated Capital	$456,737	

Circuit Ties 2022			
Station	Circuit	Description	Miles
Baroda	Livingston	BE350-47 to BE370-61; Adds capability once Oronoko XFMR is installed.	1.78
Wheeler St	Fisher Lake	SJ275-29 to SJ298-130; Upgrade 3/0 to 556; tie to Three Rivers/Corey Lake & Three Rivers/Westland; deteriorated wire with bad voltage drop	0.95
		Total	2.73
	Estimated Capital	$605,007	

Circuit Ties 2023			
Station	Circuit	Description	Miles
Valley	Valley 34.5 KV	VB685-25 to VB616-18; Replace 2CU with 556AL for tie with Stubey Road/West	4.53
		Total	4.53
	Estimated Capital	$904,430	

Circuit Ties 2024			
Station	Circuit	Description	Miles
Riverside	Klock Park	BE200-1756 to BE201-1742; 556 tie across M-63 to create-tie with Paw Paw Ckt	0.08
West St	Coloma	BE132-16 to BE143-56; Create new Circuit Tie between West St/Coloma and Hagar/Riverside	0.45
West St	Coloma	BE143-56 to BE142-56; Create new Circuit Tie between West St/Coloma and Hagar/Riverside	0.23
Scottdale	Scott	BE314-12 to BE318-11; Setting up ties for new Derby Dist XFMR	3.60
		Total	4.36
	Estimated Capital	$1,010,698	

Circuit Ties 2025			
Station	Circuit	Description	Miles
Mottville	Mottville	SJ534-391 to SJ511-2; new tie between Mottville/Mottville and Florence/Race Bank	3.3
		Total	3.30
	Estimated Capital	$755,311	

Roadside Relocation 2021			
Station	**Circuit**	Description	Miles
Buchanan South	South	BE681-66 to BE679-1; 2-4AS to 2-2AA	0.70
Buchanan South	South	BE681-66 to BE679-1; 2-4AS to 2-2AA Part 2 Reconductor	0.60
Buchanan South	South	Reconductor for Voltage - BE712-1 to BE681-9	0.43
Pokagon	12KV	Relocate 1PH CA0343000068 to CA0342000068; Remove 2-4AS.	0.43

Note: The Five-Year Distribution Plan is subject to change

Pigeon River	Elkhart Street	Relocate 3PH SJ0541000016 to SJ0542000016; Remove 3-2 CU, Install 3-556AL	0.57
Sodus	Bainbridge	Relocate 3PH BE0224000040 to BE0224000091 Remove 3-4/0 AA	0.28
Pigeon River	Elkhart Street	Relocate 3PH SJ0541000016 to SJ0542000016; Remove 3-2 CU, Install 3-556AL	0.86
Sodus	Bainbridge	Relocate 3PH BE0224000013 to BE0224000039; Remove 3-4/0 AA	0.38
Almena	Bloomingdale 34.5 KV	Relocate 1PH; VB0349000001 to VB0348000015	0.23
Hartford	West	Relocate 3PH river crossing to 67 1/2 St; VB478-13 to VB478-111 & VB454-29 to VB478-106; Reconductor 2-2AA,4CU,4AS to 4-2AA; VB478-111 to VB454-29; New 4-2AA; VB478-89 to VB478-106; Remove 4-2AA - Part 2	1.00
East Watervliet	County Line	Relocate 1PH to County Line Rd; BE148-5 to BE172-31; New 2-2AA; BE148-5 to BE172-31; Remove 2-4AS. Relocate 1ph to Dan Smith Rd; BE160-16 to BE160-50; New 2-2AA; BE160-16 to BE160-50; Remove 2-4AS. Relocate 1ph to 68th Ave; VB573-18 to VB549-31; New 2-2AA; VB573-18 to VB549-31; Remove 2-4AS.	1.28
Niles	Bertrand 34.5 KV	Relocate 1PH BE0684000018 to BE0654000026; Remove 2-2AS.	0.57
Niles	Bertrand 34.5 KV	Relocate 1PH BE0684000018 to BE0654000026; Remove 2-2AS. Part 2	0.64
Kalamazoo	Eagle	Relocate 3PH KA0588000021 to KA0589000118 & KA0588000033 to KA0612000028; Remove 3-1/0AS, 1-2AS and 4-2AA.	0.95
Kalamazoo	Eagle	Relocate 3PH KA0588000021 to KA0589000118 & KA0588000033 to KA0612000028; Remove 3-1/0AS, 1-2AS and 4-2AA. Part 2	0.70
Kalamazoo	Eagle	Relocate 3PH KA0590000048 to KA0591000097; Remove 3-1/0AS, 1-2AA.	0.77
Almena	Bloomingdale 34.5 KV	Relocate 3PH VB0470000063 to VB0446000023; Remove 3-556AL.	0.84
Covert	12KV	Relocate 3PH VB0332000076 to VB0332000089; Remove 2-4CU, 1-2AA.	0.38
Niles	North	Relocate 3PH BE0601000058 to BE0575000050; Remove 3 - 556AL.	0.49
Niles	North	UG Portion of the relocation near Airport	0.19
Almena	Gobles 34.5 KV	Relocate 3PH VB0234000105 to VB0234000121; Remove 3-556AL, 1-4/0AA.	1.95
Almena	Gobles 34.5 KV	Relocate 1PH VB0235000016 to VB0235000198; Remove 2-4CU.	0.52
Almena	Gobles 34.5 KV	Relocate 1PH VB0263000069 to VB0263000079; Remove 2-2AA.	0.52
Scottdale	East	B283-58 to B283-58, 1-4AS & 1-2AS to 2-2AA	0.08
Almena	Gobles 34.5 KV	Relocate 3PH VB0206000002 to VB0206000072; Remove 4-2AA.	0.64
Lakeside	Mustang	Relcoate 1PH; BE555-24 to BE555-11	0.49
Lakeside	New Troy	Relocate 1PH; BE532-84 to BE532-98	0.30
Sodus	Sodus	Relocate 1PH; BE303-70 to BE303-73	0.15
Buchanan South	South	Relocate 3PH; BE622-5 to BE651-7	1.19
Three Rivers	Westland	Relocate 3PH; SJ298-34 to SJ323-161	0.28
Almena	Mattawan 34.5 KV	Relocate 3PH with 3-556AL; VB519-6 to VB521-28	1.19
		Total	19.60
	Estimated Capital	$3,827,747	

Roadside Relocation 2022			
Station	**Circuit**	Description	Miles

Note: The Five-Year Distribution Plan is subject to change

Almena	Bloomingdale 34.5 KV	Relocate 3PH VB0470000290 to VB0493000118; Remove 4-2AS.	0.81
Buchanan South	Terre Coupe	BE594-35 to B568-98; 4-4AS to 4-2AA	0.53
Almena	Gobles 34.5 KV	Relocate 3PH VB0206000002 to VB0206000072; Remove 4-2AA.	0.64
Vicksburg	Richardson	KA545-88 to KA569-179, New 2-2AA line & RM line from woods across street	0.10
Crystal	Coloma Tie	Relocate 3PH; BE191-36 to BE193-28	2.14
Berrien Springs Hydro	North	Relocate 1PH; BE377-3 to BE377-11; Try to relocate new line to Eau Claire/12KV	0.34
West Street	Coloma	Relocate 1PH; BE123-10 to BE123-5	0.32
Bridgman	Baroda	Relocate 1PH; BE488-15 to BE511-51	0.28
New Buffalo	Grand Beach	Relocate 3PH; BE660-1100 to BE660-240	0.19
Almena	Mattawan 34.5 KV	Relocate 3PH with 3-556AL; VB521-43 to VB523-1	1.44
Almena	Mattawan 34.5 KV	Relocate 3PH with 3-556AL; VB499-1011 to VB475-18	1.87
		Total	8.66
	Estimated Capital	$1,724,852	

Roadside Relocation 2023			
Station	**Circuit**	Description	Miles
Almena	Red Arrow	Relocate 3PH with 3-556AL and Convert from 12KV to 34.5KV; VB495-27 to VB497-84	2.16
Almena	Red Arrow	Relocate 3PH with 3-556AL and Convert from 12KV to 34.5KV; VB473-105 to VB475-18	1.32
Almena	Red Arrow	Relocate 3PH with 3-556AL; VB498-32 to VB522-19	1.23
Covert	12KV	[FIRE LANES] Relocate 1PH OH to UG; VB329-5 to VB329-6; VB329-6 to VB329-71	0.42
Covert	12KV	[FIRE LANES] Relocate 1PH OH to UG; VB329-6 to VB329-9; VB329-9 to VB329-64	0.49
Covert	12KV	[FIRE LANES] Relocate 1PH OH to UG; VB329-9 to VB329-15; VB329-14 to VB329-45; VB329-15 to VB329-40	0.86
Covert	12KV	[FIRE LANES] Relocate 1PH OH to UG; VB329-15 to VB360-2; VB329-16 to VB329-23; VB329-19 to VB329-21; VB329-17 to VB329-26; VB329-18 to VB329-68; VB360-2 to VB360-11	0.85
Covert	12KV	[FIRE LANES] Relocate 1PH OH to UG; VB360-2 to VB360-4; VB360-3 to VB360-13; VB360-4 to VB360-18	0.32
Covert	12KV	[FIRE LANES] Relocate 1PH OH to UG; VB360-4 to VB360-8; VB360-5 to VB360-38; VB360-6 to VB360-34	0.88
Covert	12KV	[FIRE LANES] Relocate 1PH OH to UG; VB360-8 to VB359-19; VB359-10 to VB359-18	0.46
Hagar	Michigan Beach	[FIRE LANES] Relocate 1PH OH to UG; VB390-20 to VB390-5; VB390-8 to VB390-20; VB390-7 to VB390-23; VB390-5 to VB390-29; VB390-47 to VB390-16; VB390-13 to VB391-19	1.10
Hagar	Michigan Beach	[FIRE LANES] Relocate 1PH OH to UG; VB422-194 to VB390-8; VB390-12 to VB390-43	0.46
Hagar	Michigan Beach	[FIRE LANES] Relocate 1PH OH to UG; VB422-53 to VB422-193. Install new 1PH UG from near VB422-102 to VB422-53.	0.04
Hartford	East	Relocate 1PH; VB531-159 to VB531-185	0.36
Buchanan South	Terre Coupe	Relocate 3PH; BE594-104 to BE594-240	0.44
Lakeside	New Troy	Relocate 1PH; BE557-43 to BE558-8	0.81
Kalamazoo	South	Relocate 1PH; KA635-60 to KA635-69	0.43
Three Rivers	Corey Lake	Relocate 1PH; SJ317-69 to SJ317-75	0.40
Three Rivers	Corey Lake	Relocate 3PH; SJ320-16 to SJ320-1	0.80

Sauk Trail	Eagle Lake	Relocate 3PH; CA542-6 toCA566-67	0.84
Sauk Trail	Eagle Lake	Relocate 3PH; CA540-98 to CA540-14	0.25
Sauk Trail	Eagle Lake	Relocate 3PH; CA540-48 to CA541-33	0.62
Sauk Trail	Eagle Lake	Relcoate 1PH; CA592-29 to CA591-2	0.43
Bangor	Viking	Relocate 1PH; VB305-33 to VB304-10	1.50
Bangor	Viking	Relocate 3PH; VB248-17 to VB277-70	0.50
Bangor	Viking	Relocate 1PH; VB278-10 to VB278-52	0.32
West St	Coloma Tie	Relocate 1PH; BE123-10 to BE123-5	0.32
Buchanan South	South	Relocate 3PH; BE622-5 to BE651-7	1.20
Buchanan Hydro	River Rd	Relocate 1PH; BE474-34 to BE475-35	1.12
Buchanan Hydro	River Rd	Relocate 1PH; BE471-35 to BE471-33	0.30
Buchanan Hydro	River Rd	Relocate 1PH; BE493-47 to BE492-33	0.40
Three Oaks	12KV	Relocate 1PH; BE581-95 to BE581-37	1.00
Three Oaks	12KV	Relocate 1PH; BE699-11 to BE699-3	0.70
Three Oaks	12KV	Relocate 1PH; BE698-11 to BE698-84	0.60
Three Oaks	12KV	Relocate 1PH; BE582-59 to BE581-43	0.86
New Buffalo	Casino	Relocate 1PH; BE665-27 to BE665-88	0.53
Mottville	12KV	Relocate 1PH; SJ535-179 to SJ536-55	0.60
Berrien Springs Hydro	South	Relocate 1PH; BE417-32 to BE417-29	0.20
Rickerman	Galien	Relocate 1PH; BE560-19 to BE559-51	1.30
Oronoko	Red Bud	Relocate 1PH; BE452-9 to BE453-9	0.40
Three Oaks	12KV	Relocate 1PH; BE581-59 to BE581-69	0.30
Rickerman	Galien	Relocate 1PH; BE674-4 to BE676-27	1.90
		Total	30.02
	Estimated Capital	$6,330,976	

Roadside Relocation 2024			
Station	**Circuit**	Description	Miles
New Buffalo	State Line	Relocate 1PH; BE666-27 to BE696-8	0.76
Buchanan South	Terre Coupe	Relocate 1PH; BE568-64 to BE593-44	1.23
Buchanan South	Terre Coupe	Relocate 1PH; BE649-1 to BE649-24	0.90
Moore Park	Railroad	Relocate 3PH; SJ227-22 to SJ251-175	1.98
Colby	West	Relcoate 3PH; CA227-14 to CA251-31	0.55
Stubey Road	West	Relocate 3PH; SJ570-63 to SJ569-13	1.97
Stubey Road	West	Relocate 1PH; SJ519-34 to SJ520-18	0.51
Stubey Road	West	Relocate 1PH; SJ520-18 to SJ496-43	1.41
Stubey Road	West	Relocate 3PH; SJ626-18 to SJ600-91	0.47
Stubey Road	West	Relocate 1PH; SJ548-43 to SJ549-39	0.32
Stubey Road	West	Relocate 1PH; SJ573-29 to SJ548-42	0.93
Rickerman	Sawmill	Relocate 1PH; BE671-6 to BE671-29	1.00
Rickerman	Sawmill	Relocate 1PH; BE704-41 to BE671-1	1.04
Rickerman	Sawmill	Relocate 1PH; BE642-8 to BE672-69	1.08
Rickerman	Sawmill	Relocate 1PH; BE642-478 to BE643-66	1.19
Baroda	Baroda	Relocate 1PH; BE389-7 to BE389-45	0.85
Baroda	Livingston	Relocate 1PH; BE371-3 to BE372-47	1.42
Almena	Paw Paw	Relocate 1PH; VB542-17 to VB542-26	0.42
Almena	Paw Paw	Relocate 1PH; VB542-34 to VB566-47	1.23
Florence Road	Racebank	Relocate 1PH; SJ438-9 to SJ463-18	0.66
Florence Road	Racebank	Relocate 3PH; SJ390-18 to CA412-4	2.26
Florence Road	Racebank	Relocate 3PH; CA388-31 to CA387-179	1.36
Florence Road	Racebank	Relocate 3PH; SJ421-46 to SJ397-6	0.68
Stone Lake	Diamond	Relocate 3PH; CA354-21 to CA357-307	2.70
Berrien Springs Hydro	South	Relocate 1PH; BE480-51 to BE502-103	0.89
		Total	27.81
	Estimated Capital	$6,390,912	

Roadside Relocation 2025			
Station	**Circuit**	Description	Miles
New Buffalo	Casino	Relocate 1PH; BE634-38 to BE665-2	0.38

Note: The Five-Year Distribution Plan is subject to change

Berrien Springs Hydro	South	Relocate 1PH; BE480-51 to BE502-104	0.85
Bridgman	Baroda	Relocate 1PH; BE488-15 to BE511-51	1.31
Bridgman	Baroda	Relocate 1PH; BE535-29 to BE536-1	0.47
Bridgman	Baroda	Relocate 1PH; BE512-32 to BE489-43	1.36
Bridgman	Manley	Relocate 1PH; BE346-19 to BE328-48	0.38
Hagar	Riverside	Relocate 3PH; BE154-195 to BE154-27	0.30
Hagar	Riverside	Relocate 1PH; BE166-15 to BE166-62	0.53
Hagar	Riverside	Relocate 1PH; BE179-79to BE179-80	0.36
Niles	East	Relocate 1PH; CA559-88 to CA560-15	0.89
Niles	East	Relocate 1PH; CA535-64 to CA535-20	0.51
Niles	North	Relocate 3PH; BE551-205 to BE551-15	0.49
Niles	North	Relocate 1PH; CA509-23 to CA485-72	0.47
Niles	North	Relocate 1PH; BE526-33 to BE526-68	0.76
Vicksburg	Richardson	Relocate 1PH; KA544-72 to KA544-91	0.66
Three Oaks	12KV	Relocate 1PH; LP111-9 to LP111-19	0.51
Vicksburg	West	Relocate 3PH; KA591-60 to KA591-178	0.79
Vicksburg	East	Relocate 1PH; KA641-13 to KA664-1	0.80
Vicksburg	East	Relocate 1PH; KA596-11 to KA597-5	0.80
Vicksburg	East	Relocate 3PH; KA595-34 to KA596-11	0.74
Vicksburg	East	Relocate 1PH; KA640-48 to KA640-60	0.51
West St	Coloma	Relocate 1PH; BE131-82 to BE130-77	0.38
West St	Coloma	Relocate 1PH; BE123-11 to BE113-99	1.53
West St	Coloma	Relocate 1PH; BE111-19 to BE111-133	0.74
West St	Coloma	Relocate 1PH; BE102-16 to BE102-84	0.93
West St	Coloma	Relocate 1PH; BE102-143 to BE102-33	0.55
West St	Coloma	Relocate 1PH; BE103-17 to BE103-27	0.55
West St	Millburg	Relocate 1PH; BE195-16 to BE195-87	0.79
West St	Millburg	Relocate 1PH; BE180-13 to BE167-46	1.00
West St	Ryno Road	Relocate 1PH; BE159-49 to BE158-6	0.93
Scottdale	Scott	Relocate 1PH; BE299-101 to BE299-156	0.30
Scottdale	Scott	Relocate 1PH; BE298-21 to BE298-48	0.36
East Watervliet	Panther	Relocate 1PH; VB477-13 to VB453-17	0.90
East Watervliet	Panther	Relocate 1PH; VB453-11 to BE108-2	1.54
Hartford	East	Relocate 1PH; VB555-1 to VB556-27	0.50
		Total	24.87
	Estimated Capital	$6,440,307	

Sectionalizing 2021			
Station	Circuit	Description	Units
Cameron	Lawton 34.5 KV	Review and modify sectionalizing on circuit	1
Cameron	Juice 34.5 KV	Review and modify sectionalizing on circuit	1
Lakeside	Union Pier	Review and modify sectionalizing on circuit	1
Langley	Park St	Review and modify sectionalizing on circuit	1
Oronoko	Red Bud	Review and modify sectionalizing on circuit	1
Kalamazoo	Schoolcraft	Review and modify sectionalizing on circuit	1
		Total	6
	Estimated Capital	$153,508	

Sectionalizing 2022			
Station	Circuit	Description	Units
Three Rivers	Corey Lake	Review and modify sectionalizing on circuit	1
Kalamazoo	South	Review and modify sectionalizing on circuit	1
Kalamazoo	Eagle	Review and modify sectionalizing on circuit	1
		Total	3
	Estimated Capital	$74,715	

Sectionalizing 2023			
Station	Circuit	Description	Units

Hawthorne	Hilltop	Review and modify sectionalizing on circuit	1
Bridgman	Manley	Review and modify sectionalizing on circuit	1
Pearl St	Mercy Hospital	Review and modify sectionalizing on circuit	1
Scottdale	Scott	Review and modify sectionalizing on circuit	1
Stevensville	North	Review and modify sectionalizing on circuit	1
		Total	5
	Estimated Capital	$123,810	

Sectionalizing 2024			
Station	Circuit	Description	Units
Bangor	Town	Review and modify sectionalizing on circuit	1
Buchanan South	Terre Coupe	Review and modify sectionalizing on circuit	1
Hickory Creek	Glenlord	Review and modify sectionalizing on circuit	1
Main St	Britain	Review and modify sectionalizing on circuit	1
		Total	4
	Estimated Capital	$124,490	

Sectionalizing 2025			
Station	Circuit	Description	Units
Covert	12KV	Review and modify sectionalizing on circuit	1
Stubey Rd	West	Review and modify sectionalizing on circuit	1
Colby	West	Review and modify sectionalizing on circuit	1
Hartford	East	Review and modify sectionalizing on circuit	1
		Total	4
	Estimated Capital	$127,372	

Recloser Replacement 2021			
Station	Circuit	Description	Units
Almena	Gobles 34.5 KV	VB0292000043 Replace 1-50 V4H	1
New Buffalo	State Line	BE0694000002 Replace 1-100 V4L	1
Three Rivers	Corey Lake	SJ0294000084 Replace 2-100 V4H	2
		Total	4
	Estimated Capital	$20,654	

Recloser Replacement 2022			
Station	Circuit	Description	Units
Almena	Gobles 34.5 KV	VB0234001010 Replace 3-100 V4H	3
Berrien Springs Hydro	South	BE0481000048; Replace 1-70 V4H	1
Bridgman	Baroda	BE0488000041; Replace 2-50 V4H	2
Buchanan South	South	BE0623000092; Replace 1-100 V4L	1
Crystal	Coloma Tie	BE0176000012; Replace 1-100 V4H	1
Lakeside	New Troy	BE0486000039; Replace 1-100 V4L	1
Niles	Bertrand 34.5 KV	BE0688000493; Replace 1-50 V4H	1
Niles	Bertrand 34.5 KV	BE0599000090; Replace 1-100 V4H	1
Rickerman Road	Sawmill	BE0642000057; Replace 1-100 V4L	1
Stevensville	East	BE0313000310; Replace 1-140 V4L	1
		Total	13
	Estimated Capital	$70,480	

Recloser Replacement 2023			
Station	Circuit	Description	Units
West St	Millburg	BE0182000050; Replace 1-100 4H	1
West St	Millburg	BE0168000022; Replace 2-140 V4L	2
Almena	Red Arrow	VB0497000082; Replace 1-100 V4H	1
Bridgman	Manley	BE0384000442; Replace 1-140 V4L	1
Niles	Bertrand 34.5 KV	BE0627000135; Replace 1-70 V4H	1

Note: The Five-Year Distribution Plan is subject to change

Niles	Bertrand 34.5 KV	BE0599000021; Replace 1-70 V4H	1
		Total	7
	Estimated Capital	$63,970	

Recloser Replacement 2024			
Station	Circuit	Description	Units
Niles	East	BE0658000015; Replace 1-100 V4L	1
Niles	North	BE0527000014; Replace 1-100 V4L	1
Kalamazoo	Eagle	KA0615000010; Replace 1-70 V4H	1
West St	Millburg	BE0156000005; Replace 1-100 V4L	1
Niles	Bertrand 34.5 KV	BE0599000099; Replace 2-140 DV	2
Hickory Creek	Niles	BE0247000682; Replace 1-140 V4L	1
Buchanan Hydro	River Road	BE0496000053; Replace 2-100 V4H	2
		Total	9
	Estimated Capital	$56,201	

Recloser Replacement 2025			
Station	Circuit	Description	Units
Hickory Creek	Niles	BE0247000530; Replace 2-140 V4L	2
Vicksburg	Richardson	KA0545000023; Replace 1-140 V4L	1
Almena	Bloomington 34.5 KV	VB0173000007; Replace 1-140 V4L	1
Sauk Trail	Eagle Lake	CA0543000071; Replace 1-100 V4H	1
Hartford	West	VB0578000048; Replace 2-50 V4L	2
Sauk Trail	Eagle Lake	CA0519000067; Replace 1-100 V4L	1
		Total	8
	Estimated Capital	$57,564	

Capacitor Replacement 2021			
Station	Circuit	Description	Units
Stubey Road	West	SJ0568000007; Replace 450 KVAR SW	1
Oronoko	Red Bud	BE0414000293; Replace 900 KVAR SW	1
Nickerson	Nickerson	BE0251000118; Replace 450 KVAR SW	1
Lakeside	New Troy	BE0531000091; Replace 450 KVAR SW	1
Hagar	Riverside	BE0165000132; Replace 450 KVAR SW	1
Vicksburg	Richardson	KA0569000011 Replace 900 KVAR SW	1
Vicksburg	West	KA0596000004; Replace 450 KVAR SW	1
		Total	7
	Estimated Capital	$83,789	

Capacitor Replacement 2022			
Station	Circuit	Description	Units
Nickerson	Napier	BE0218000144; Replace 450 KVAR SW	1
Bangor	Industrial	VB0311000047; Replace 450 KVAR SW	1
West St	Coloma	BE0133000031; Replace 900 KVAR SW	1
Hartford	East	VB0505000194; Replace 900 KVAR SW	1
Almena	Mattawan 34.5 KV	VB0499000037; Replace 900 KVAR SW	1
Riverside	North Shore	BE0176000340; Replace 900 KVAR SW	1
		Total	6
	Estimated Capital	$74,067	

Capacitor Replacement 2023			
Station	Circuit	Description	Units
Rickerman	Galien	BE0629000019; Replace 450 KVAR SW	1
Hawthorne	Hilltop	BE0230000666; Replace 450 KVAR SW	1
Bridgman	Lake	BE0404000007; Replace 900 KVAR SW	1
Scottdale	West	BE0263000217; Replace 900 KVAR SW	1

Scottdale	West	BE0280000032; Replace 450 KVAR SW	1
Stevensville	East	BE0295000015; Replace 900 KVAR SW	1
Stevensville	East	BE0295000046; Replace 450 KVAR SW	1
Three Rivers	State Street	SJ0324000023; Replace 900 KVAR SW	1
Vicksburg	Richardson	KA0571000046; Replace 900 KVAR SW	1
East Watervliet	Panther	BE0126000190; Replace 900 KVAR SW	1
Hagar	Riverside	BE0139000169; Replace 900 KVAR SW	1
		Total	11
	Estimated Capital	$139,235	

Capacitor Replacement 2024			
Station	Circuit	Description	Units
Main St	Riverview	BE0201001083; Replace 450 KVAR SW	1
Pearl St	Fairplain North	BE0216000169; Replace 900 KVAR SW	1
Pearl St	Fairplain South	BE0217000884; Replace 900 KVAR SW	1
Crystal	Mercy Hospital	BE0218000511; Replace 900 KVAR SW	1
Baroda	Livingston	BE0370000053; Replace 450 KVAR SW	1
Hartford	West	VB0503000034; Replace 900 KVAR SW	1
Hickory Creek	Memorial	BE0230000107; Replace 900 KVAR SW	1
Bridgman	Lake	BE0403000519; Replace 900 KVAR SW	1
		Total	8
	Estimated Capital	$110,692	

Capacitor Replacement 2025			
Station	Circuit	Description	Units
Oronoko	Red Bud	BE0413000025; Replace 900 KVAR SW	1
Bridgman	Baroda	BE0423000016; Replace 450 KVAR SW	1
Colby	West	CA0227000123; Replace 900 KVAR SW	1
Colby	West	CA0250000034; Replace 450 KVAR SW	1
Stone Lake	Town	CA0375000203; Replace 450 KVAR SW	1
West St	Coloma	BE0132000124; Replace 450 KVAR SW	1
Stevensville	North	BE0278000606; Replace 900 KVAR SW	1
Buchanan Hydro	River Road	BE0519000063; Replace 900 KVAR SW	1
		Total	8
	Estimated Capital	$127,372	

Porcelain Cutout & Arrester Replacement 2021			
Station	Circuit	Description	Units
Various	Various	Replace porcelain cutouts and arresters	1,086
		Total	1,086
	Estimated Capital	$356,558	

Porcelain Cutout & Arrester Replacement 2022			
Station	Circuit	Description	Units
Various	Various	Replace porcelain cutouts and arresters	1,730
		Total	1,730
	Estimated Capital	$584,662	

Porcelain Cutout & Arrester Replacement 2023			
Station	Circuit	Description	Units
Various	Various	Replace porcelain cutouts and arresters	2,172
		Total	2,172
	Estimated Capital	$718,500	

Porcelain Cutout & Arrester Replacement 2024

Note: The Five-Year Distribution Plan is subject to change

Station	Circuit	Description	Units
Various	Various	Replace porcelain cutouts and arresters	2,092
		Total	2,092
	Estimated Capital	$760,175	

Porcelain Cutout & Arrester Replacement 2025			
Station	Circuit	Description	Units
Various	Various	Replace porcelain cutouts and arresters	1,825
		Total	1,825
	Estimated Capital	$684,303	

Crossarm Replacement 2021			
Station	Circuit	Description	Units
Various	Various	Replace deteriorated crossarms and insulators identified from the overhead inspection program	311
		Total	311
	Estimated Capital	$763,000	

Crossarm Replacement 2022			
Station	Circuit	Description	Units
Various	Various	Replace deteriorated crossarms and insulators identified from the overhead inspection program	311
		Total	311
	Estimated Capital	$786,000	

Crossarm Replacement 2023			
Station	Circuit	Description	Units
Various	Various	Replace deteriorated crossarms and insulators identified from the overhead inspection program	311
		Total	311
	Estimated Capital	$809,000	

Crossarm Replacement 2024			
Station	Circuit	Description	Units
Various	Various	Replace deteriorated crossarms and insulators identified from the overhead inspection program	311
		Total	311
	Estimated Capital	$834,000	

Crossarm Replacement 2025			
Station	Circuit	Description	Units
Various	Various	Replace deteriorated crossarms and insulators identified from the overhead inspection program	311
		Total	311
	Estimated Capital	$859,000	

URD Cable Replacement 2021				
Map Reference Number	Station	Circuit	Description	Miles
1	Sauk Trail	Mohawk 12KV	CA564-161 to CA564-181	0.30
2	Sauk Trail	Eagle Lake 12KV	CA545-10 to CA545-8	0.30
3	Moore Park	Portage	SJ301-126 to SJ302-26 □ SJ301-126 to SJ302-23	0.68

Note: The Five-Year Distribution Plan is subject to change

4	Crystal	Coloma Tie	B204-349 to B204-89; Country View Apartments	0.52
5	Stevensville	South	B312-598 to B312-592; Village Square	0.10
6	West Street	Paw Paw Lake	BE144-423 to BE144-440	0.47
7	West Street	Paw Paw Lake	BE145-190 to BE145-191	0.33
8	Langley	Park St	B216-1121 to B216-1124	0.07
9	Eau Claire	12 KV	BE359-151 to BE359-160	0.44
10	Berrien Springs	North	B434-30 to B434-159	0.05
			Total	3.26
		Estimated Capital	$400,349	

URD Cable Replacement 2022

Map Reference Number	Station	Circuit	Description	Miles
1	West St	Paw Paw Lake	BE134-34 to BE134-476	0.16
2	Stubey Road	West	SJ574-34 to SJ574-52	0.51
3	Stubey Road	West	SJ574-9 to SJ574-71	0.25
4	Stubey Road	West	SJ543-39 to SJ543-76	0.20
5	Stubey Road	West	SJ569-35 to SJ569-39	0.21
6	Moore Park	Railroad	SJ230-2 to SJ230-204	1.04
7	Stubey Road	West	SJ626-14 to SJ626-15	0.31
			Total	2.68
		Estimated Capital	$334,451	

URD Cable Replacement 2023

Map Reference Number	Station	Circuit	Description	Miles
1	Niles	Bertrand 34.5 KV	BE656-8 to BE656-141	0.08
2	Niles	Bertrand 34.5 KV	BE599-118 to BE599-119	0.17
3	Niles	Bertrand 34.5 KV	BE573-167 to BE573-241	0.15
4	Niles	Bertrand 34.5 KV	BE573-234 to BE573-235	0.13
5	Niles	Bertrand 34.5 KV	BE573-226 to BE573-228	0.08
6	Niles	Bertrand 34.5 KV	BE573-259 to BE573-260	0.17
7	Niles	Bertrand 34.5 KV	BE573-252 to BE573-253	0.12
8	Baroda	Livingston	B365-119 to B365-141; Rp 1 Live-Front	0.05
9	Niles	Bertrand 34.5 KV	BE548-121 to BE548-65	0.14
10	Scottdale	East	BE283-136 to BE283-133	0.6
11	Scottdale	East	BE266-35 to BE266-129	0.1
12	Scottdale	East	BE265-164 to BE265-165	0.57
13	Bangor	Industrial	VB311-242 to VB311-249	0.49
14	Colby	West	CA251-50 to CA251-48	0.81
15	Hickory Creek	Niles	BE263-255 to BE263-309	0.5
16	Almena	Mattawan 34.5 KV	VB522-103 to VB522-104	0.16
			Total	4.32
		Estimated Capital	$575,924	

URD Cable Replacement 2024

Map Reference Number	Station	Circuit	Description	Miles
1	Almena	Mattawan 34.5 KV	VB545-79 to VB545-92	0.55
2	Almena	Mattawan 34.5 KV	VB522-136 to VB522-135	0.84
3	Almena	Mattawan 34.5 KV	VB548-5 to VB548-6	0.15
4	Almena	Mattawan 34.5 KV	VB476-81 to VB476-64	0.73
5	Almena	Mattawan 34.5 KV	VB476-49 to VB476-50	0.06
6	West St	Coloma	BE122-96 to BE122-27	0.93

Note: The Five-Year Distribution Plan is subject to change

7	Pearl St	Fairplain North	BE216-863 to BE216-1136	0.53
8	Hickory Creek	Niles	BE263-256 to BE263-263	0.23
9	Hickory Creek	Niles	BE247-638 to BE247-639	0.05
			Total	4.07
		Estimated Capital	$601,162	

URD Cable Replacement 2025				
Map Reference Number	Station	Circuit	Description	Miles
1	Hawthorne	Industrial	BE229-385 to BE229-378	0.11
2	Three Oaks	12KV	BE638-211 to BE638-213	0.13
3	Hartford	West	VB504-589 to VB504-590	0.10
4	Hartford	West	VB527-108 to VB527-115	0.13
5	Three Rivers	Westland	SJ323-219 to SJ323-433	0.20
6	Three Rivers	Westland	SJ323-231 to SJ323-219	0.20
7	Hartford	West	VB503-739 to VB527-16	0.17
8	Hawthorne	Industrial	BE215-1488 to BE215-1522	0.08
9	Hickory Creek	Niles	BE0247-341 to BE247-580	0.05
10	Hickory Creek	Niles	BE264-397 to BE264-221	0.08
11	Hickory Creek	Niles	BE0247-338 to BE247-583	0.09
12	Hickory Creek	Niles	BE0247-204 to BE247-553	0.06
13	Hickory Creek	Niles	BE0263-97 to BE263-251	0.08
14	Three Oaks	12KV	BE610-16 to BE610-368	0.11
15	Three Oaks	12KV	BE668-58 to BE668-59	0.08
16	Hickory Creek	Niles	BE0247-479 to BE247-1010	0.15
17	Mottville	Mottville	SJ535-184 to SJ535-196	0.21
18	Hickory Creek	Niles	BE0247-550 to BE247-570	0.08
19	Oronoko	Red Bud	BE0432-86 to BE432-121	0.93
20	Mottville	Mottville	SJ511-81 to SJ511-85	0.13
21	Three Oaks	12KV	BE698-54 to BE698-61	0.06
22	Lakeside	Union Pier	BE552-186 to BE552-368	0.04
23	Mottville	Mottville	SJ536-74 to SJ536-75	0.26
24	Lakeside	Union Pier	BE578-527 to BE578-537	0.18
25	Three Oaks	12KV	BE636-39 to BE636-40	0.11
26	Lakeside	Union Pier	BE578-306 to BE578-405	0.04
27	Cameron	Lawton 34.5 KV	VB593-126 to VB593-193	0.55
28	Moore Park	Portage	SJ302-27 to SJ302-24	0.25
			Total	4.66
		Estimated Capital	$760,777	

Underground Station Exit Cable Replacement 2021				
Map Reference Number	Station	Circuit	Description	Feet
1	Riverside	Klock Park	Replace w/ 1000 MCM AL with 6" CDT	552
			Total	552
		Estimated Capital	$70,325	

Underground Station Exit Cable Replacement 2022				
Map Reference Number	Station	Circuit	Description	Feet
1	Lakeside	Union Pier	Replace w/ 1000 MCM AL with 6" CDT	189
			Total	189
		Estimated Capital	$24,406	

Note: The Five-Year Distribution Plan is subject to change

Underground Station Exit Cable Replacement 2023				
Map Reference Number	Station	Circuit	Description	Feet
1	Murch	North	Replace w/ 1000 MCM AL with 6" CDT	453
2	Sodus	Sodus	Replace w/ 1000 MCM AL with 6" CDT	614
			Total	1,067
		Estimated Capital	$252,515	

Underground Station Exit Cable Replacement 2024				
Map Reference Number	Station	Circuit	Description	Feet
			Total	0
		Estimated Capital	$0	

Underground Station Exit Cable Replacement 2025				
Map Reference Number	Station	Circuit	Description	Feet
1	Niles	North	Replace w/ 1000 MCM AL with 6" CDT	295
2	Hartford	East	Replace w/ 1000 MCM AL with 6" CDT	219
			Total	514
		Estimated Capital	$135,641	

Pole Replacement 2021			
Station	Circuit	Description	Units
Various	Various	Replace deteriorated poles identified from the pole inspection program	834
		Total	834
	Estimated Capital	$3,138,000	

Pole Replacement 2022			
Station	Circuit	Description	Units
Various	Various	Replace deteriorated poles identified from the pole inspection program	834
		Total	834
	Estimated Capital	$3,232,000	

Pole Replacement 2023			
Station	Circuit	Description	Units
Various	Various	Replace deteriorated poles identified from the pole inspection program	834
		Total	834
	Estimated Capital	$3,329,000	

Pole Replacement 2024			
Station	Circuit	Description	Units
Various	Various	Replace deteriorated poles identified from the pole inspection program	834
		Total	834
	Estimated Capital	$3,429,000	

Note: The Five-Year Distribution Plan is subject to change

Pole Replacement 2025			
Station	Circuit	Description	Units
Various	Various	Replace deteriorated poles identified from the pole inspection program	834
		Total	834
	Estimated Capital	$3,532,000	

Distribution Feeder Breaker Replacement 2021			
Station	Circuit	Description	Units
		Total	
	Estimated Capital	$0	

Distribution Feeder Breaker Replacement 2022			
Station	Circuit	Description	Units
West St	Coloma	Replace obsolete ESV feeder breaker	1
West St	Paw Paw Lake	Replace obsolete ESV feeder breaker	1
West St	Millburg	Replace obsolete ESV feeder breaker	1
		Total	3
	Estimated Capital	$708,012	

Distribution Feeder Breaker Replacement 2023			
Station	Circuit	Description	Units
Stone Lake	TR.1 BANK CB A	Replace obsolete FVR feeder breaker	1
Stone Lake	Diamond	Replace obsolete FVR feeder breaker	1
Stone Lake	Town	Replace obsolete FVR feeder breaker	1
Constantine Hydro		Replace obsolete feeder breaker	1
		Total	4
	Estimated Capital	$874,011	

Distribution Feeder Breaker Replacement 2024			
Station	Circuit	Description	Units
Sister Lakes		Replace obsolete feeder breaker	1
		Total	1
	Estimated Capital	$361,811	

Distribution Feeder Breaker Replacement 2025			
Station	Circuit	Description	Units
Baroda		Replace obsolete feeder breaker	3
		Total	3
	Estimated Capital	$1,085,432	

Risk Mitigation 2021			
Program	Units	Description	Est O&M Cost
Wood Pole Inspection	10,700 Units	Comprehensive pole inspection and treatment	$344,000
URD Equipment Inspection	3,159 Units	Inspect above ground structures (padmounts, enclosures, pedestals, etc.)	$19,333
Overhead Line Inspection	880 Miles	Inspect overhead distribution lines	$94,081
UG Locate	29,491	Locate UG Facilities	$530,838
		Total	$988,252

Risk Mitigation 2022			
Program	Units	Description	Est O&M Cost

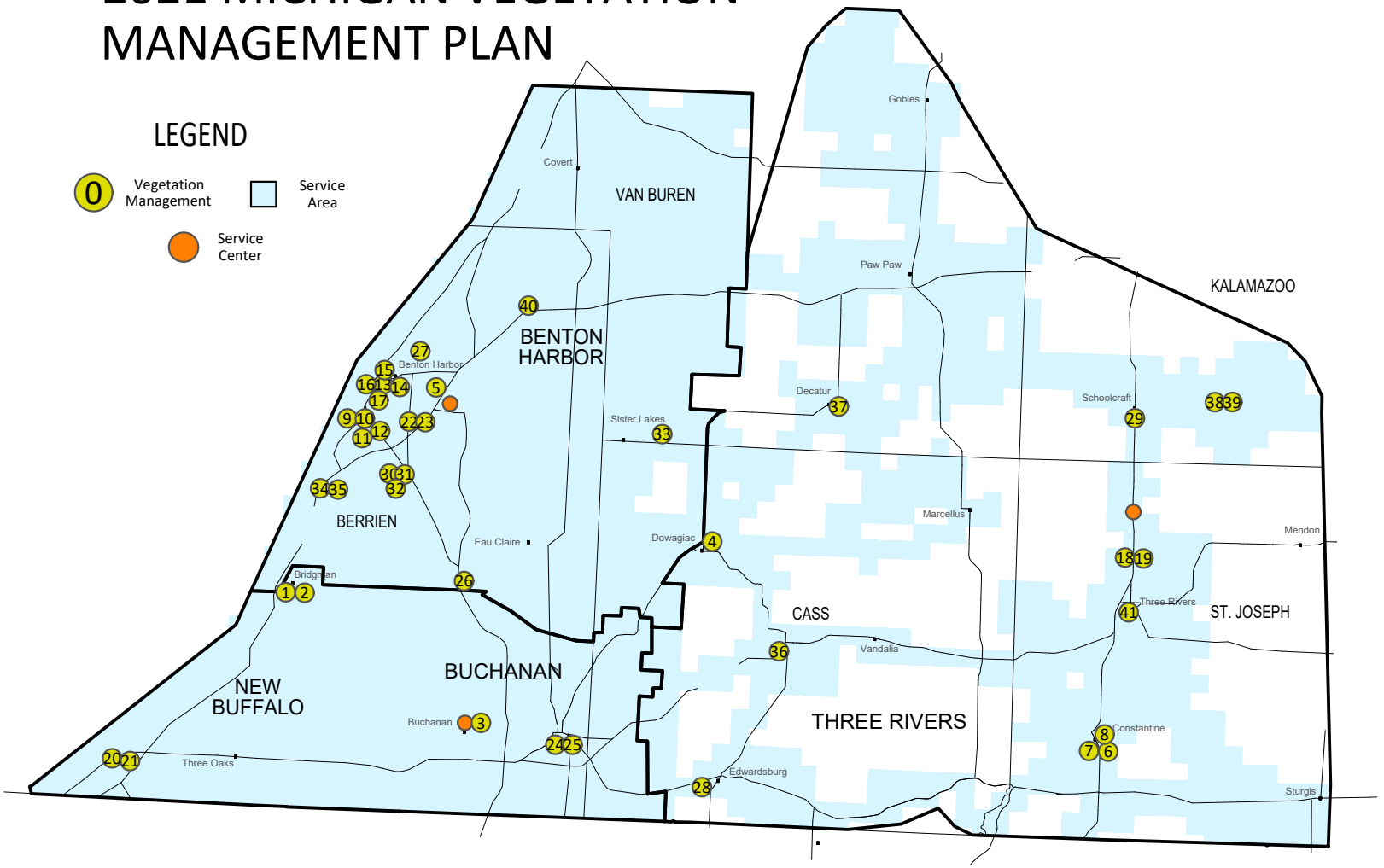
Wood Pole Inspection	10,700 Units	Comprehensive pole inspection and treatment	$354,000
URD Equipment Inspection	3,159 Units	Inspect above ground structures (padmounts, enclosures, pedestals, etc.)	$19,523
Overhead Line Inspection	880 Miles	Inspect overhead distribution lines	$96,158
UG Locate	30,376	Locate UG Facilities	$546,763
		Total	$1,016,444

Risk Mitigation 2023			
Program	Units	Description	Est O&M Cost
Wood Pole Inspection	10,700 Units	Comprehensive pole inspection and treatment	$365,000
URD Equipment Inspection	3,159 Units	Inspect above ground structures (padmounts, enclosures, pedestals, etc.)	$19,712
Overhead Line Inspection	880 Miles	Inspect overhead distribution lines	$98,085
UG Locate	31,287	Locate UG Facilities	$563,166
		Total	$1,045,963

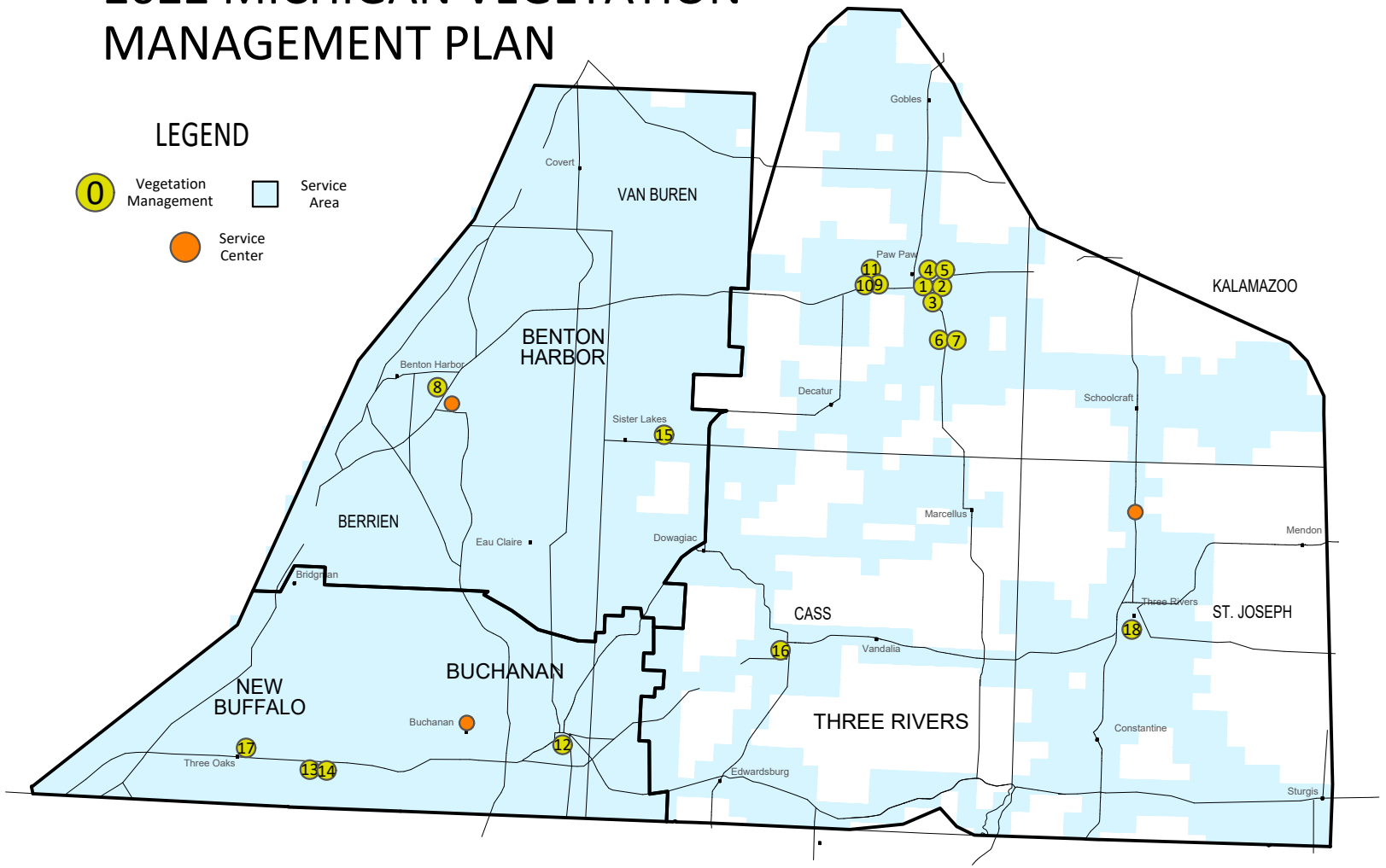
Risk Mitigation 2024			
Program	Units	Description	Est O&M Cost
Wood Pole Inspection	10,700 Units	Comprehensive pole inspection and treatment	$374,500
URD Equipment Inspection	3,159 Units	Inspect above ground structures (padmounts, enclosures, pedestals, etc.)	$19,933
Overhead Line Inspection	880 Miles	Inspect overhead distribution lines	$100,038
UG Locate	32,226	Locate UG Facilities	$580,061
		Total	$1,074,532

Risk Mitigation 2025			
Program	Units	Description	Est O&M Cost
Wood Pole Inspection	10,700 Units	Comprehensive pole inspection and treatment	$385,200
URD Equipment Inspection	3,159 Units	Inspect above ground structures (padmounts, enclosures, pedestals, etc.)	$20,123
Overhead Line Inspection	880 Miles	Inspect overhead distribution lines	$102,045
UG Locate	33,192	Locate UG Facilities	$597,463
		Total	$1,104,831

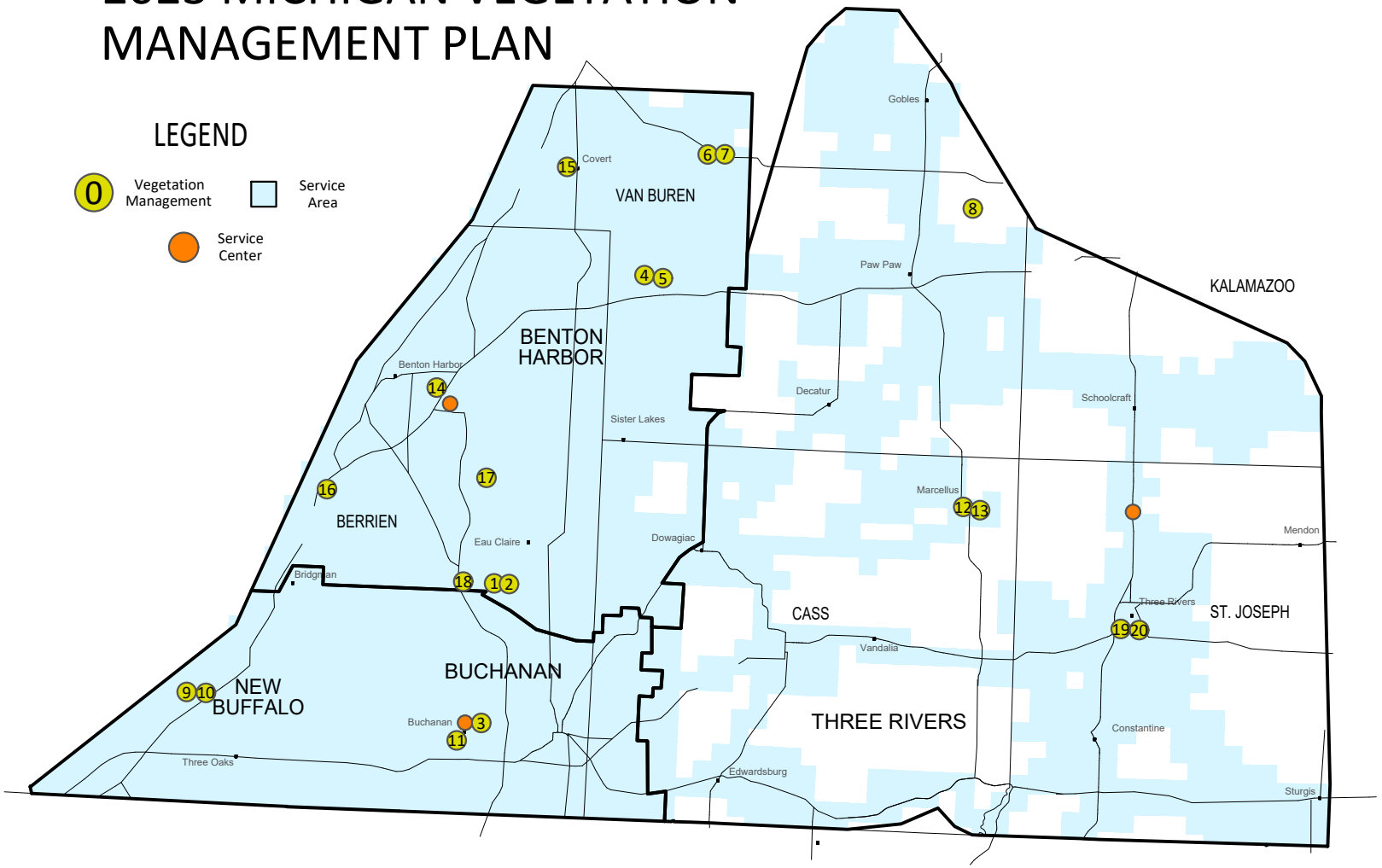
INDIANA MICHIGAN POWER
2021 MICHIGAN VEGETATION MANAGEMENT PLAN



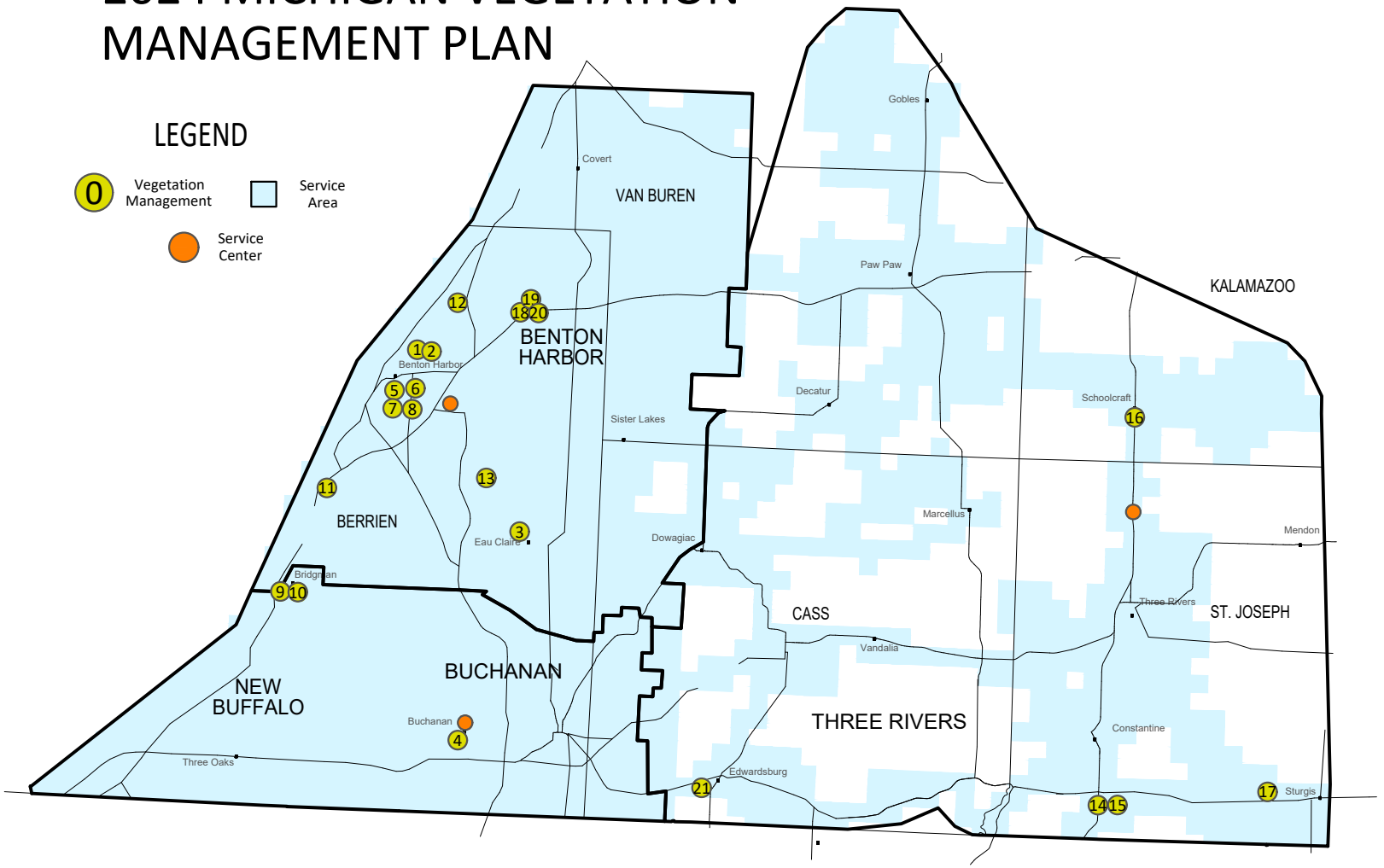
INDIANA MICHIGAN POWER
2022 MICHIGAN VEGETATION MANAGEMENT PLAN



INDIANA MICHIGAN POWER
2023 MICHIGAN VEGETATION MANAGEMENT PLAN



INDIANA MICHIGAN POWER
2024 MICHIGAN VEGETATION MANAGEMENT PLAN



INDIANA MICHIGAN POWER
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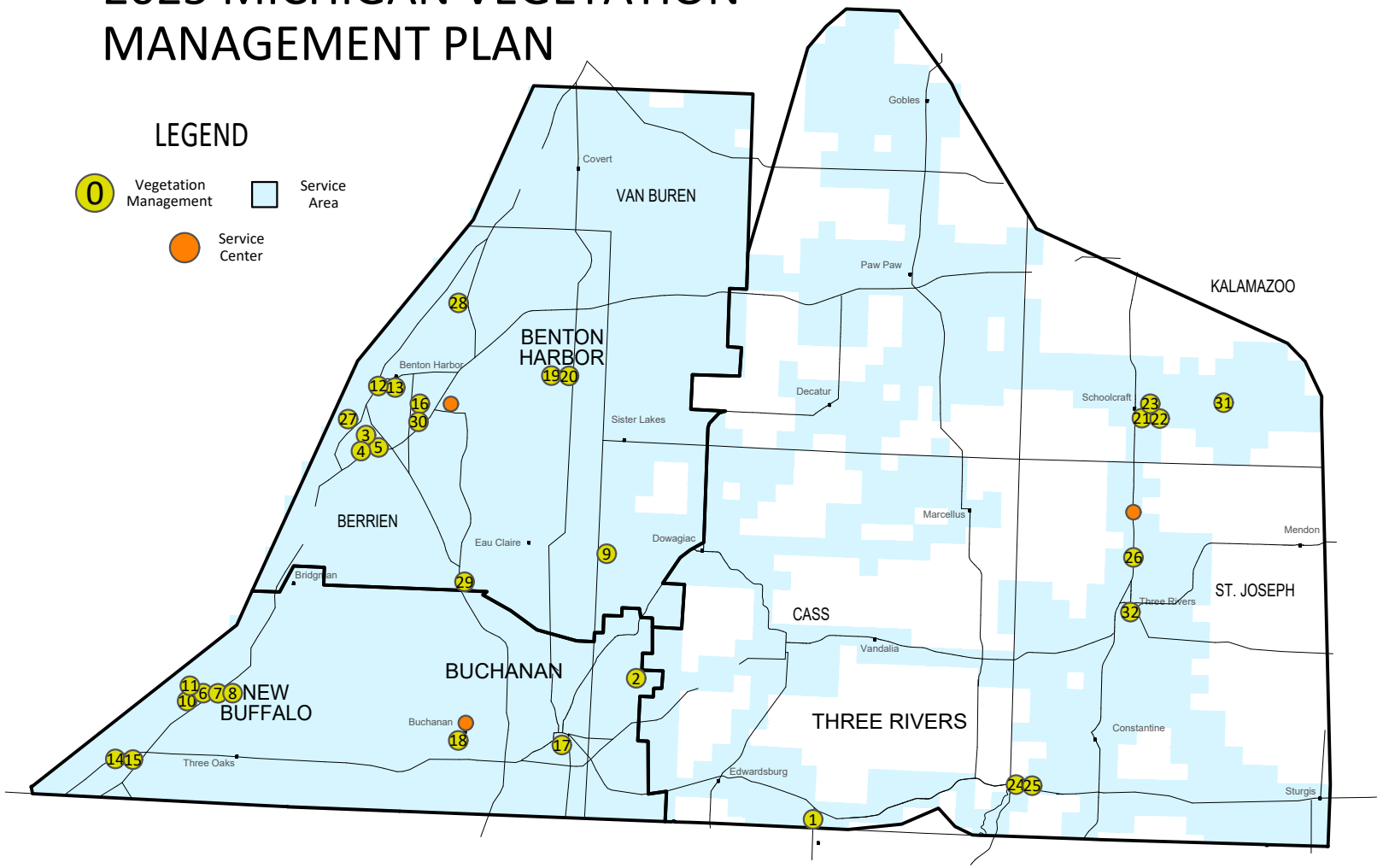
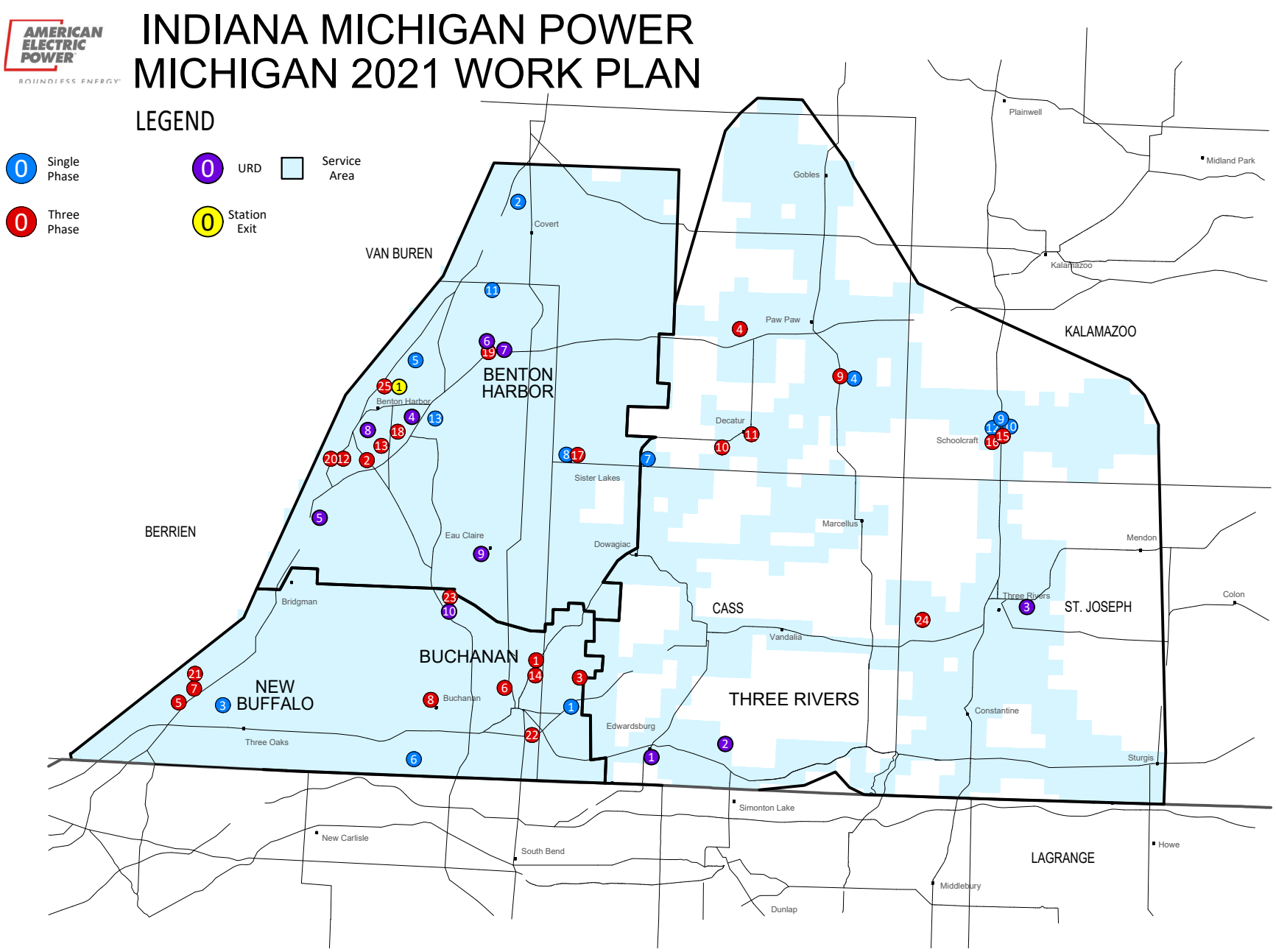
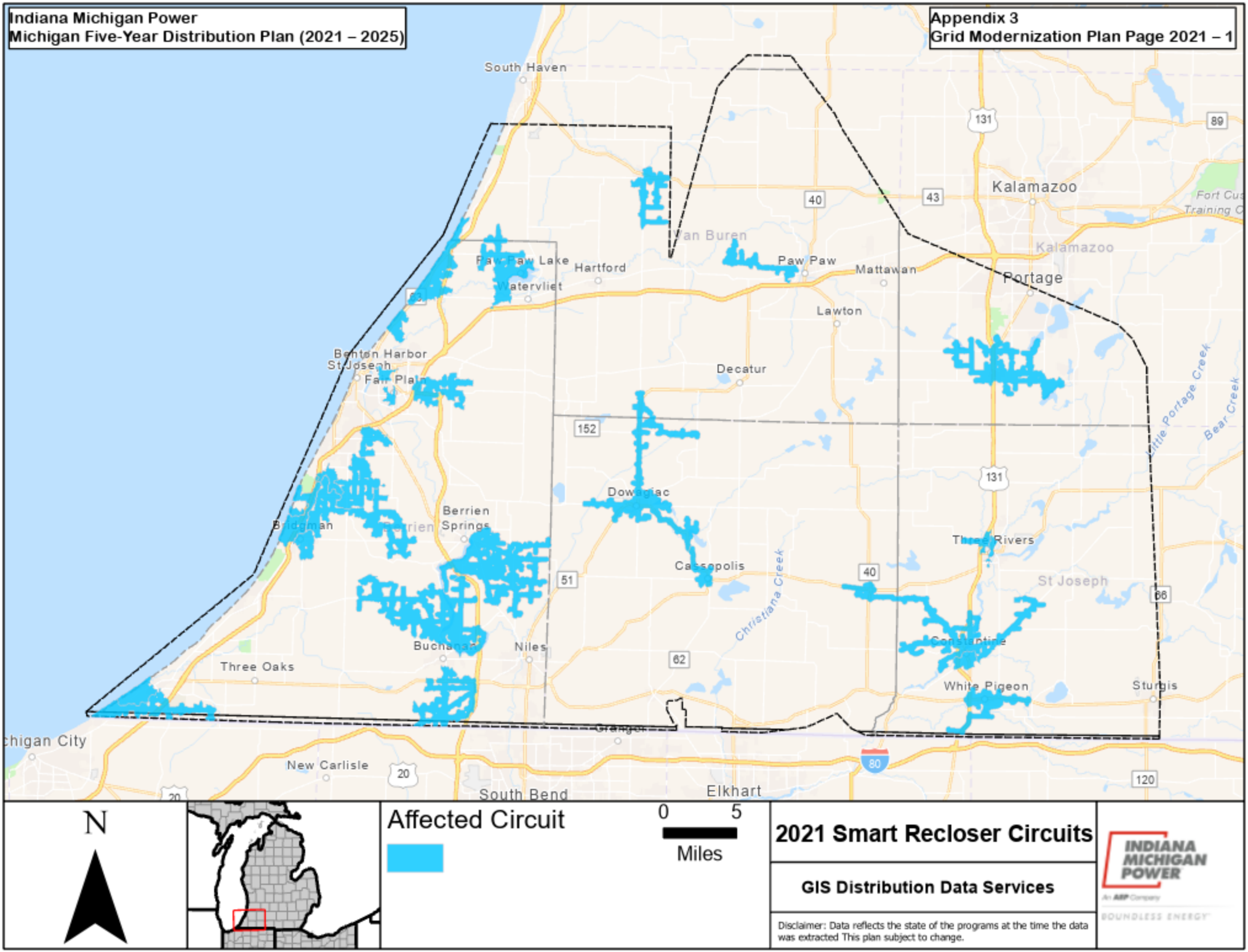


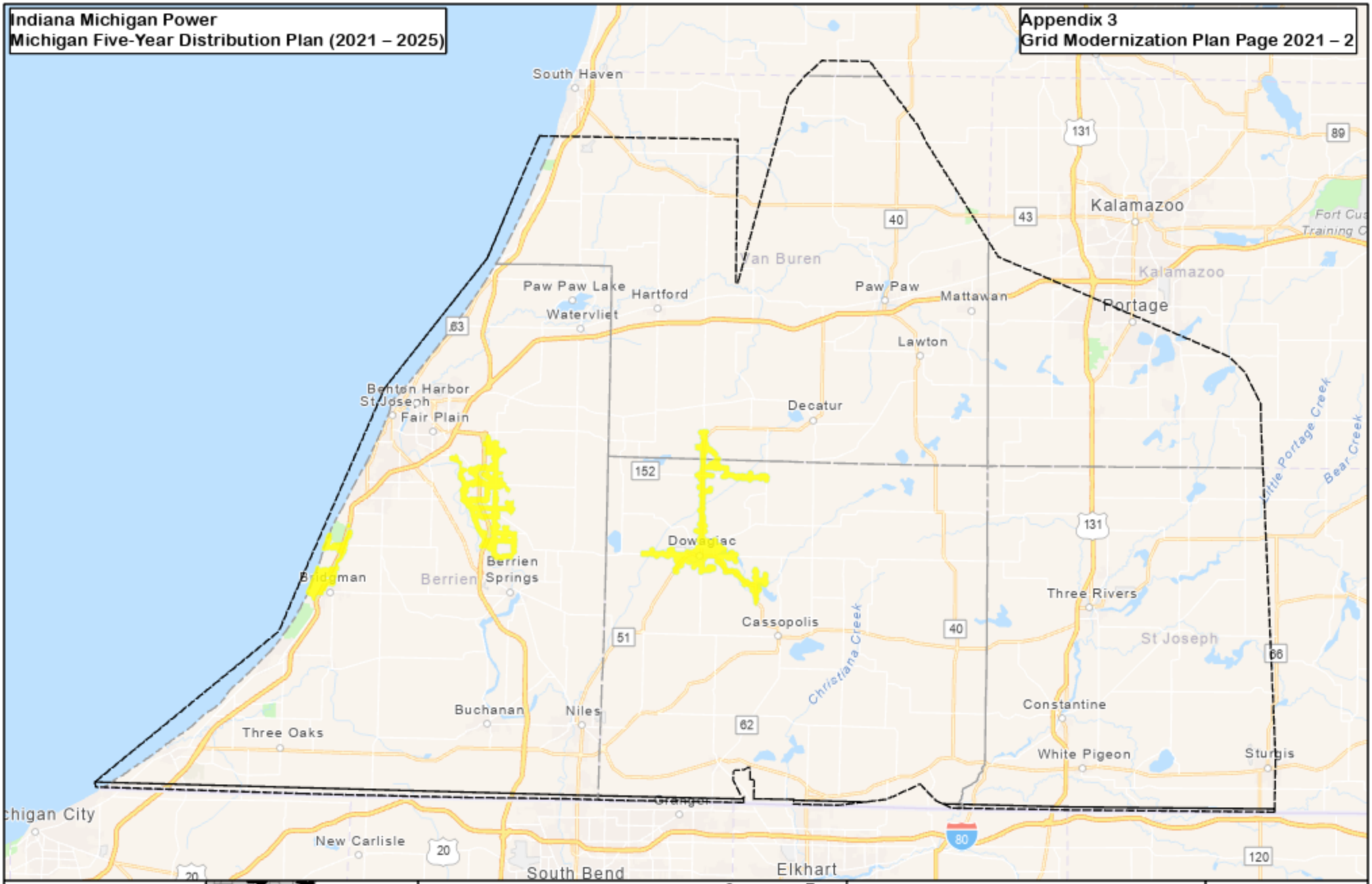
FIVE YEAR DISTRIBUTION PLAN (2021-2025) Last Update 07/2021




Indiana Michigan Power
Michigan Five-Year Distribution Plan (2021 – 2025)
Appendix 3
Grid Modernization Plan Page 2021 – 1
South Haven
Kalamazoo
Van Buren
Paw Paw Lake
Hartford
Watervliet
Paw Paw
Mattawan
Portage
Lawton
Benton Harbor
St Joseph
Fair Plain
Decatur
Dowagiac
Berrien Springs
Bridgman
Cassopolis
Three Rivers
St Joseph
Buchanan
Niles
Three Oaks
Constantine
White Pigeon
Sturgis
Michigan City
New Carlisle
South Bend
Elkhart
131
89
40
43
152
51
62
80
120
20
66
Little Portage Creek
Bear Creek
Christiana Creek
N
Affected Circuit
0 5
Miles
2021 Smart Recloser Circuits
GIS Distribution Data Services
Disclaimer: Data reflects the state of the programs at the time the data was extracted This plan subject to change.
INDIANA MICHIGAN POWER
An AEP Company
BOUNDLESS ENERGY

Indiana Michigan Power
Michigan Five-Year Distribution Plan (2021 – 2025)

Appendix 3
Grid Modernization Plan Page 2021 – 2



N

Affected Circuit

0 5
Miles

2021 Smart Circuit Tie Circuits

GIS Distribution Data Services

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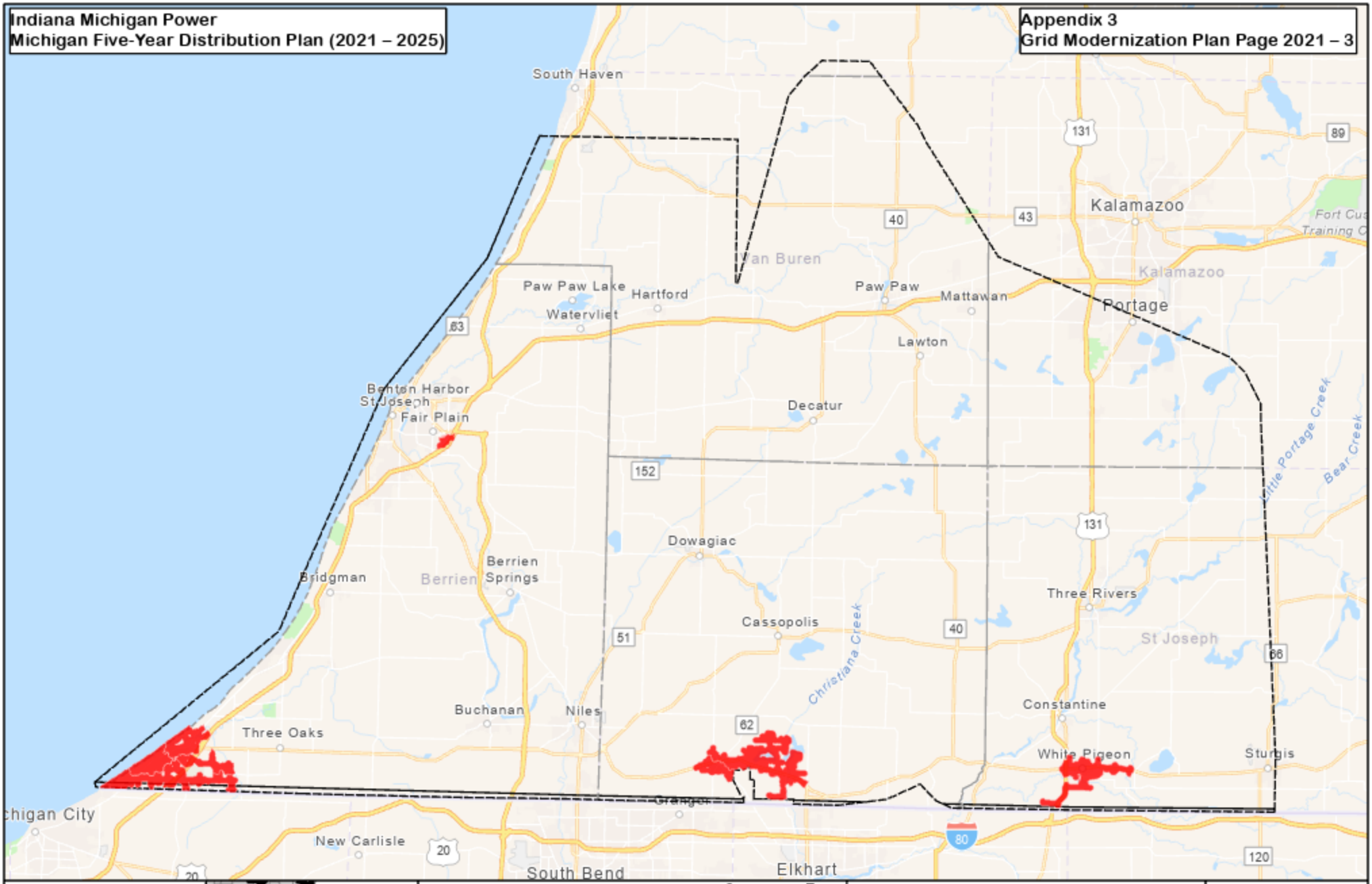
INDIANA MICHIGAN POWER
An AEP Company
BOUNDLESS ENERGY

Indiana Michigan Power
Michigan Five-Year Distribution Plan (2021 – 2025)

Appendix 3
Grid Modernization Plan Page 2021 – 3



N

Affected Circuit

0 5
Miles

2021 Line Sensor Circuits

GIS Distribution Data Services

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INDIANA MICHIGAN POWER
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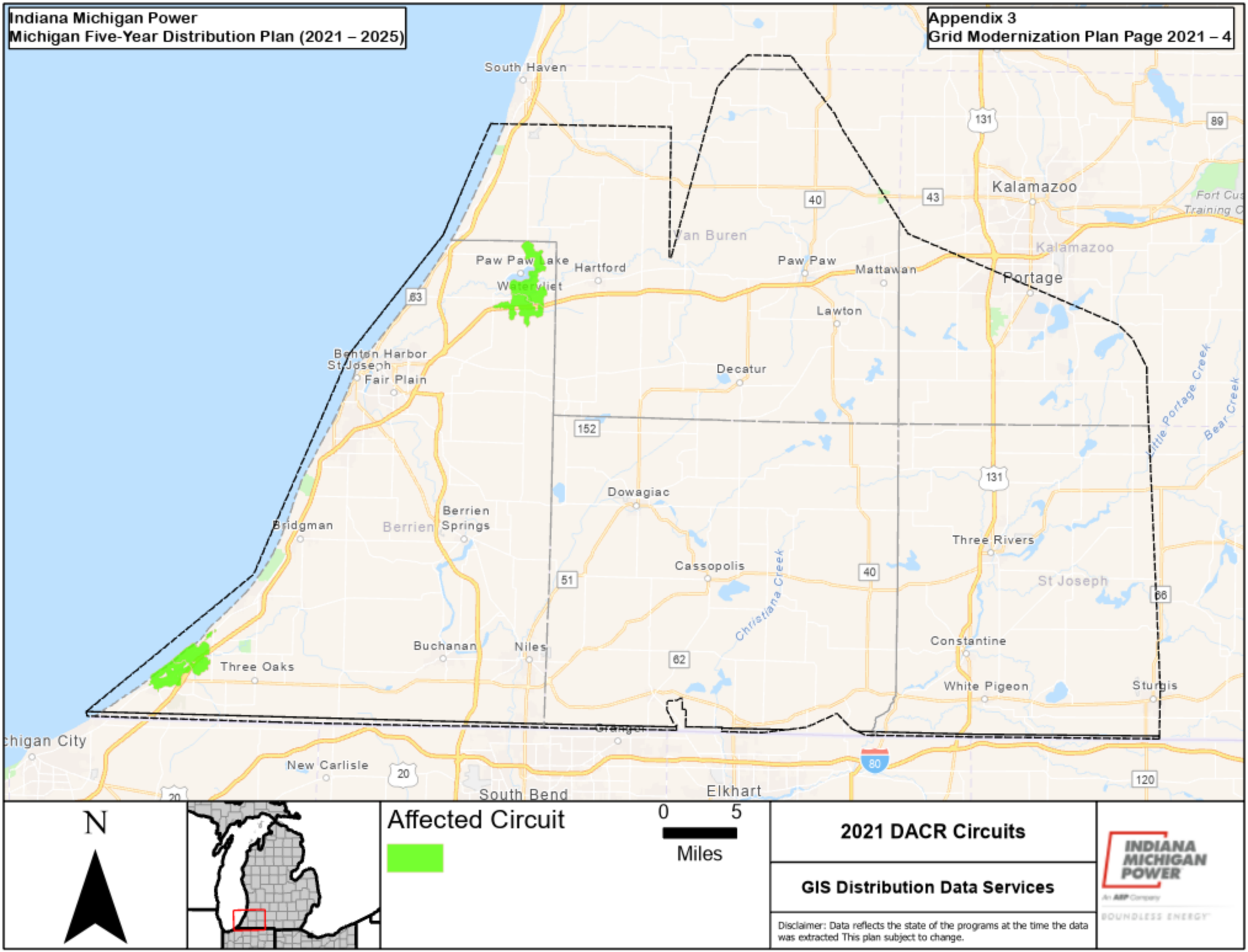
Indiana Michigan Power
Michigan Five-Year Distribution Plan (2021 – 2025)
Appendix 3
Grid Modernization Plan Page 2021 – 4
South Haven
Kalamazoo
Van Buren
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Hartford
Paw Paw
Mattawan
Portage
Lawton
Decatur
Benton Harbor
St Joseph
Fair Plain
Dowagiac
Berrien
Springs
Bridgman
Three Rivers
Cassopolis
St Joseph
Buchanan
Niles
Three Oaks
Constantine
White Pigeon
Sturgis
New Carlisle
South Bend
Elkhart
N
Affected Circuit
0 5
Miles
2021 DACR Circuits
GIS Distribution Data Services
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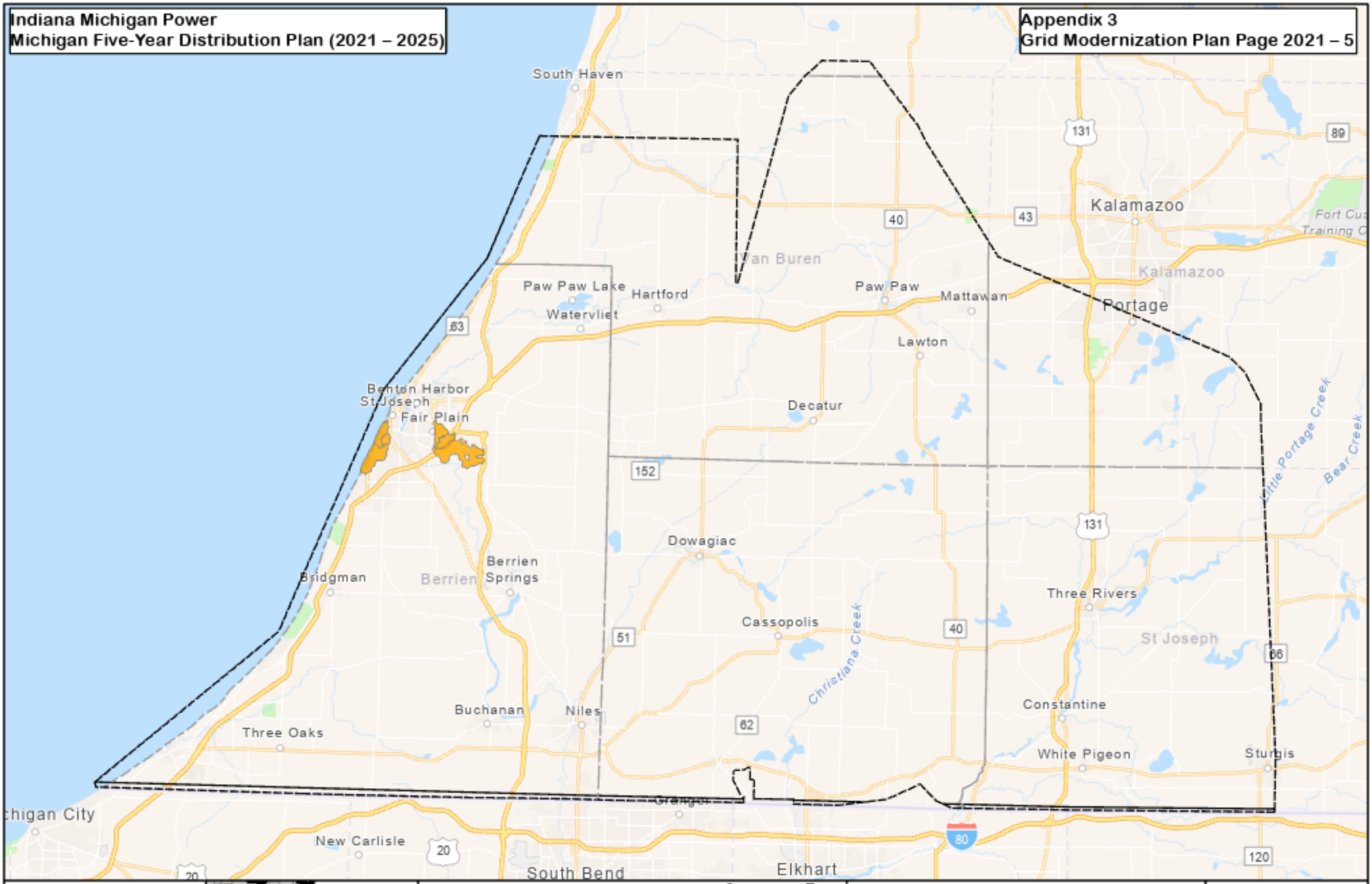
INDIANA MICHIGAN POWER

Indiana Michigan Power
Michigan Five-Year Distribution Plan (2021 – 2025)

Appendix 3
Grid Modernization Plan Page 2021 – 5



N

Affected Circuit

0 5
Miles

2021 CVR Circuits

GIS Distribution Data Services

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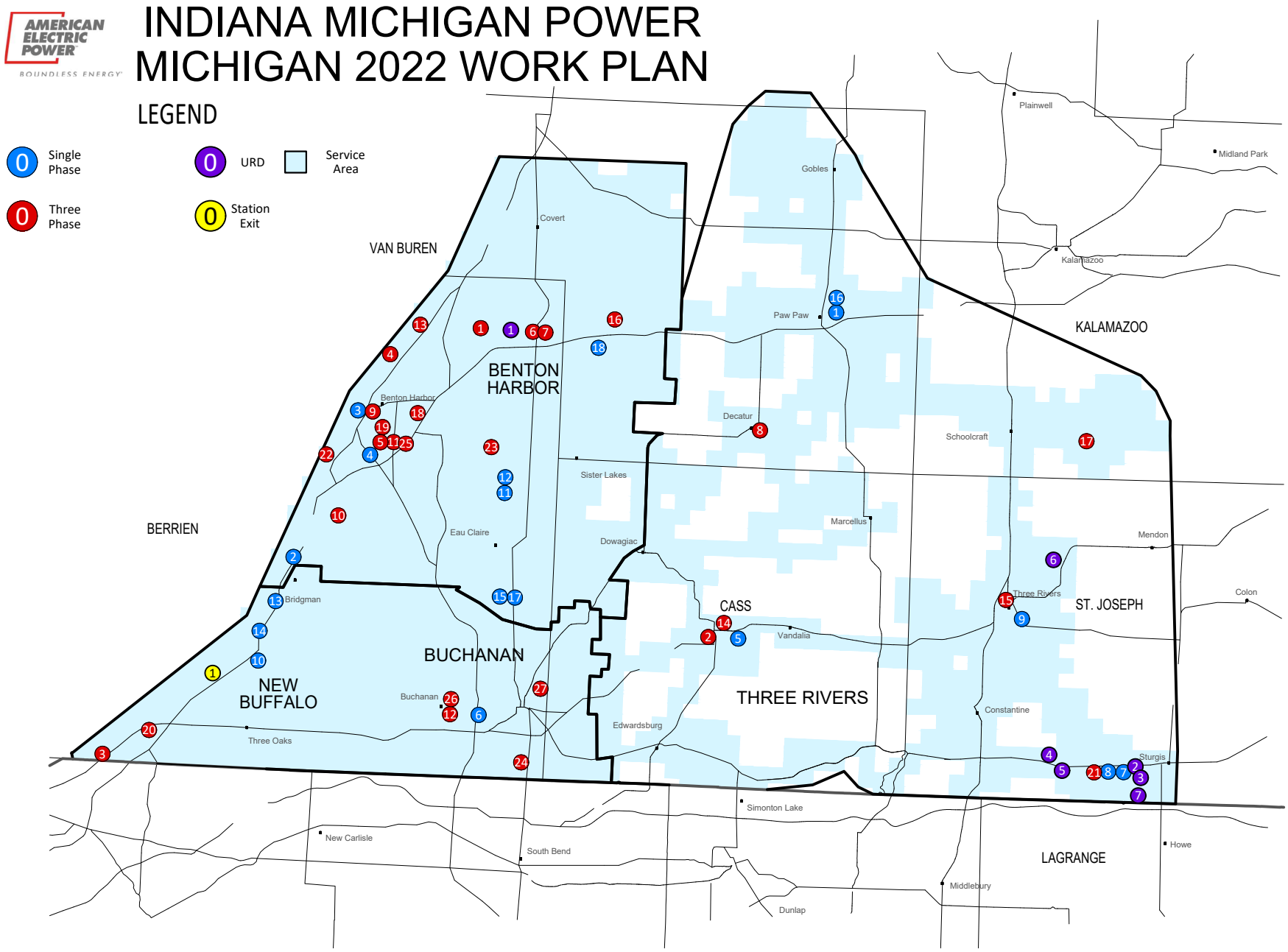
INDIANA MICHIGAN POWER
An AEP Company
BOUNDLESS ENERGY


AMERICAN ELECTRIC POWER
BOUNDLESS ENERGY
INDIANA MICHIGAN POWER
MICHIGAN 2022 WORK PLAN
LEGEND
Single Phase
Three Phase
URD
Station Exit
Service Area
VAN BUREN
BERRIEN
BENTON HARBOR
BUCHANAN
NEW BUFFALO
CASS
THREE RIVERS
KALAMAZOO
ST. JOSEPH
LAGRANGE
Covert
Gobles
Plainwell
Midland Park
Kalamazoo
Paw Paw
Benton Harbor
Decatur
Schoolcraft
Sister Lakes
Eau Claire
Dowagiac
Marcellus
Mendon
Colon
Three Rivers
Bridgman
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Constantine
Sturgis
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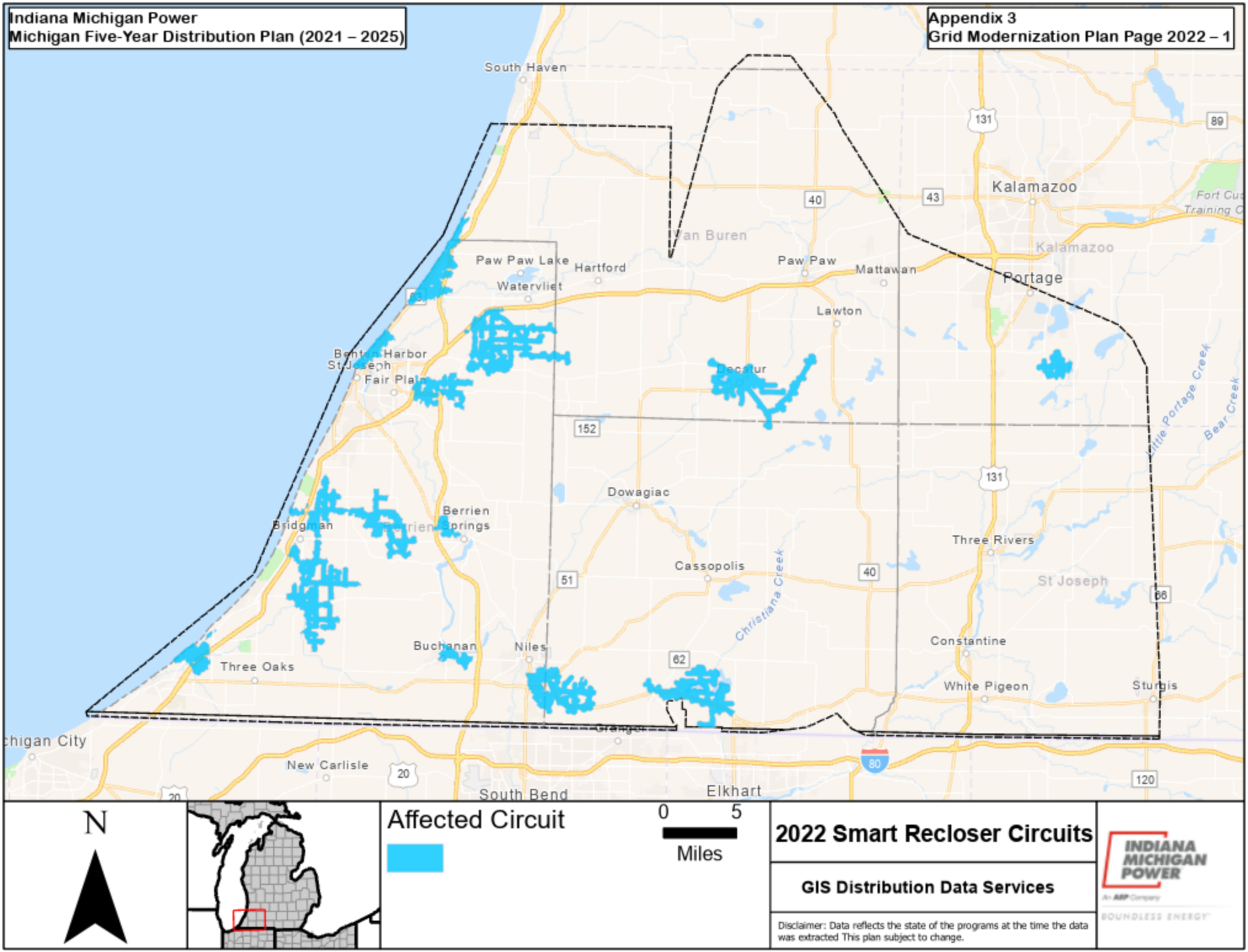
South Bend
Howe
Middlebury
Dunlap


Indiana Michigan Power
Michigan Five-Year Distribution Plan (2021 – 2025)
Appendix 3
Grid Modernization Plan Page 2022 – 1
South Haven
Paw Paw Lake
Hartford
Watervliet
Paw Paw
Mattawan
Kalamazoo
Portage
Lawton
Decatur
Bridgman
Berrien Springs
Dowagiac
Cassopolis
Three Rivers
St Joseph
Constantine
White Pigeon
Sturgis
Three Oaks
Buchanan
Niles
New Carlisle
South Bend
Elkhart
Little Portage Creek
Bear Creek
Christiana Creek
N
Affected Circuit
0 5
Miles
2022 Smart Recloser Circuits
GIS Distribution Data Services
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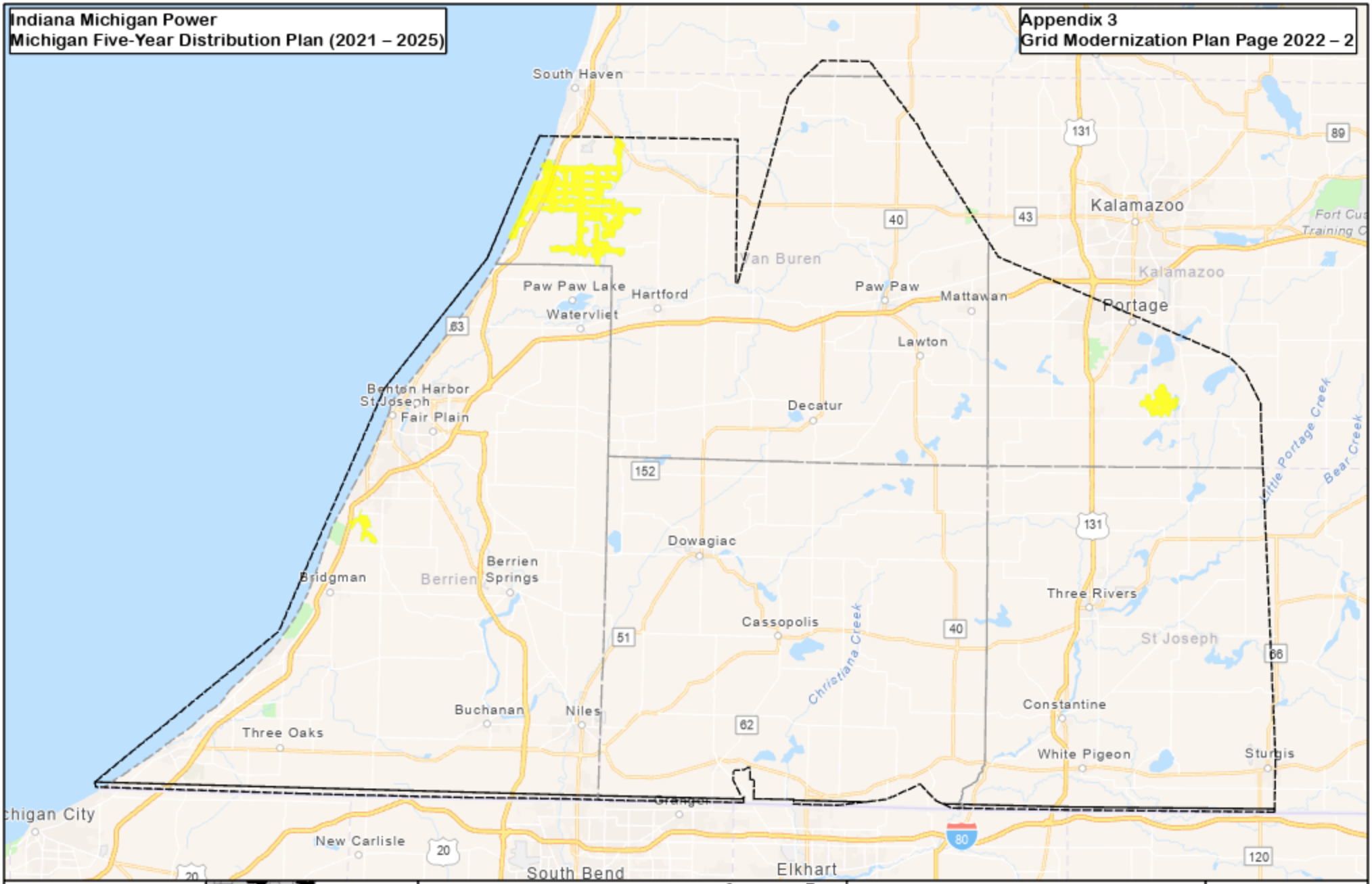
INDIANA MICHIGAN POWER

Indiana Michigan Power
Michigan Five-Year Distribution Plan (2021 – 2025)

Appendix 3
Grid Modernization Plan Page 2022 – 2



N

Affected Circuit

0 5
Miles

2022 Smart Circuit Tie Circuits

GIS Distribution Data Services

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INDIANA MICHIGAN POWER
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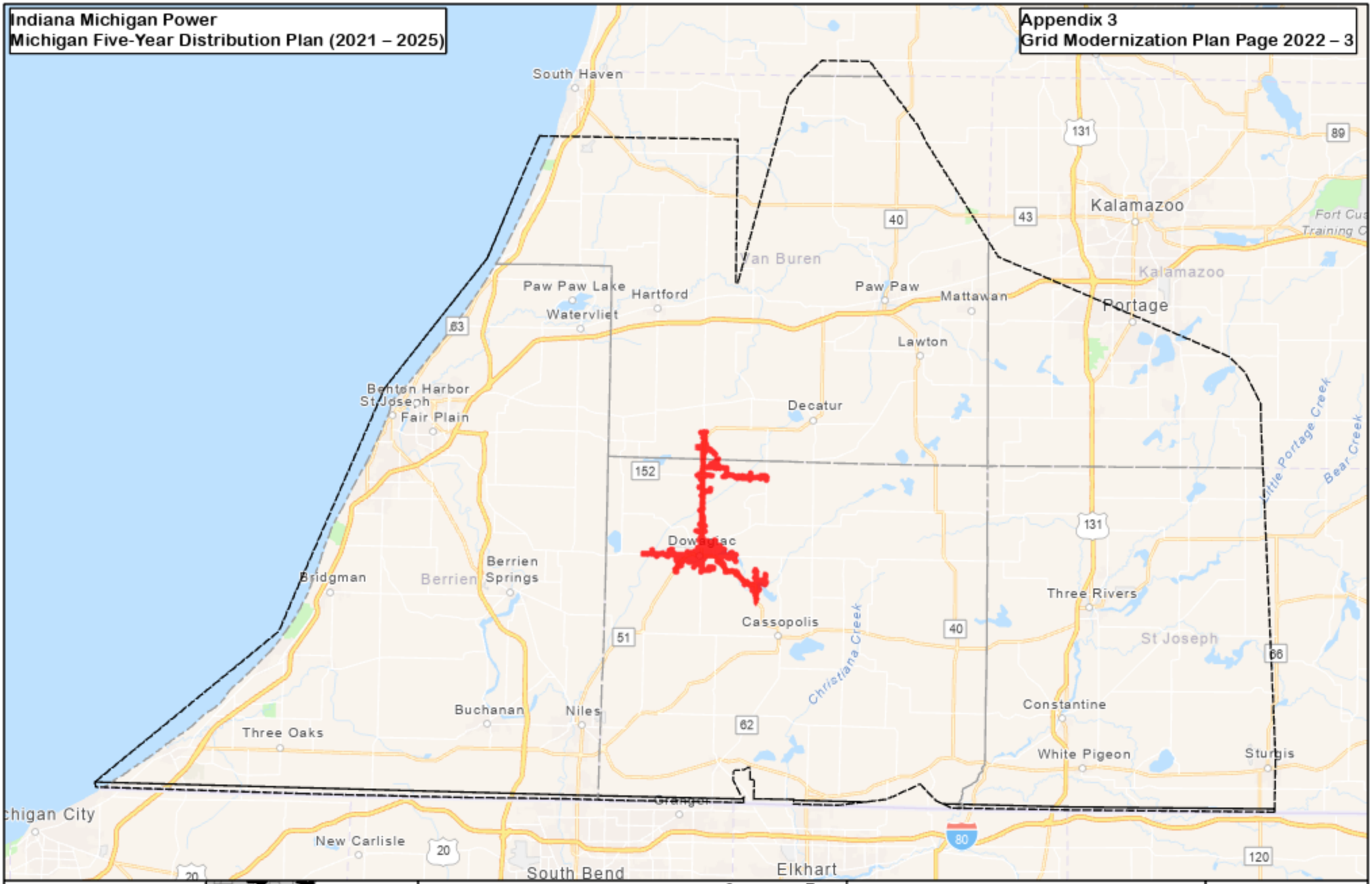
Indiana Michigan Power
Michigan Five-Year Distribution Plan (2021 – 2025)

Appendix 3
Grid Modernization Plan Page 2022 – 3



N

Affected Circuit

0 5
Miles

2022 Line Sensor Circuits

GIS Distribution Data Services

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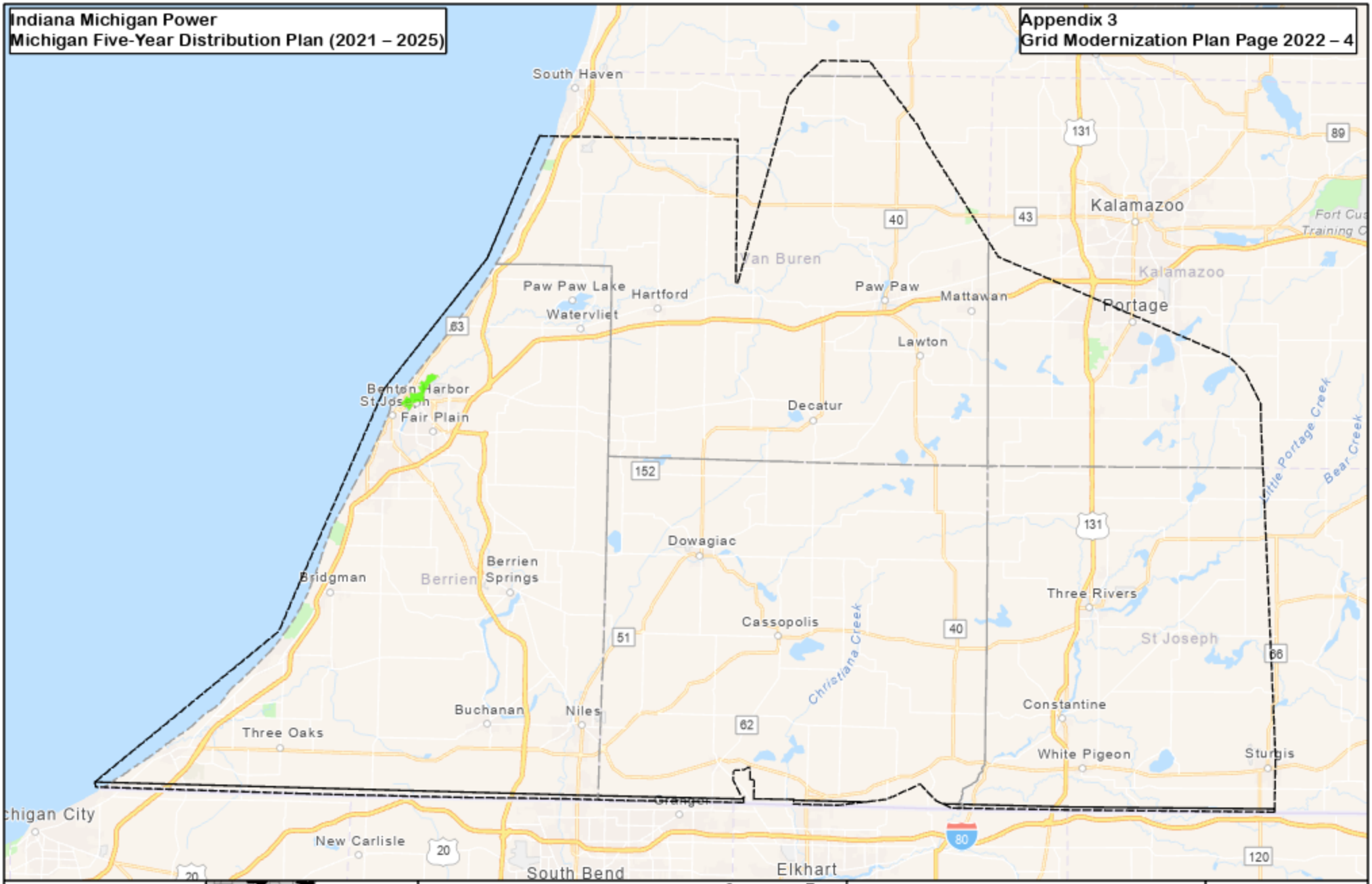
INDIANA MICHIGAN POWER
An AEP Company
BOUNDLESS ENERGY

Indiana Michigan Power
Michigan Five-Year Distribution Plan (2021 – 2025)

Appendix 3
Grid Modernization Plan Page 2022 – 4



N

Affected Circuit

0 5
Miles

2022 DACR Circuits

GIS Distribution Data Services

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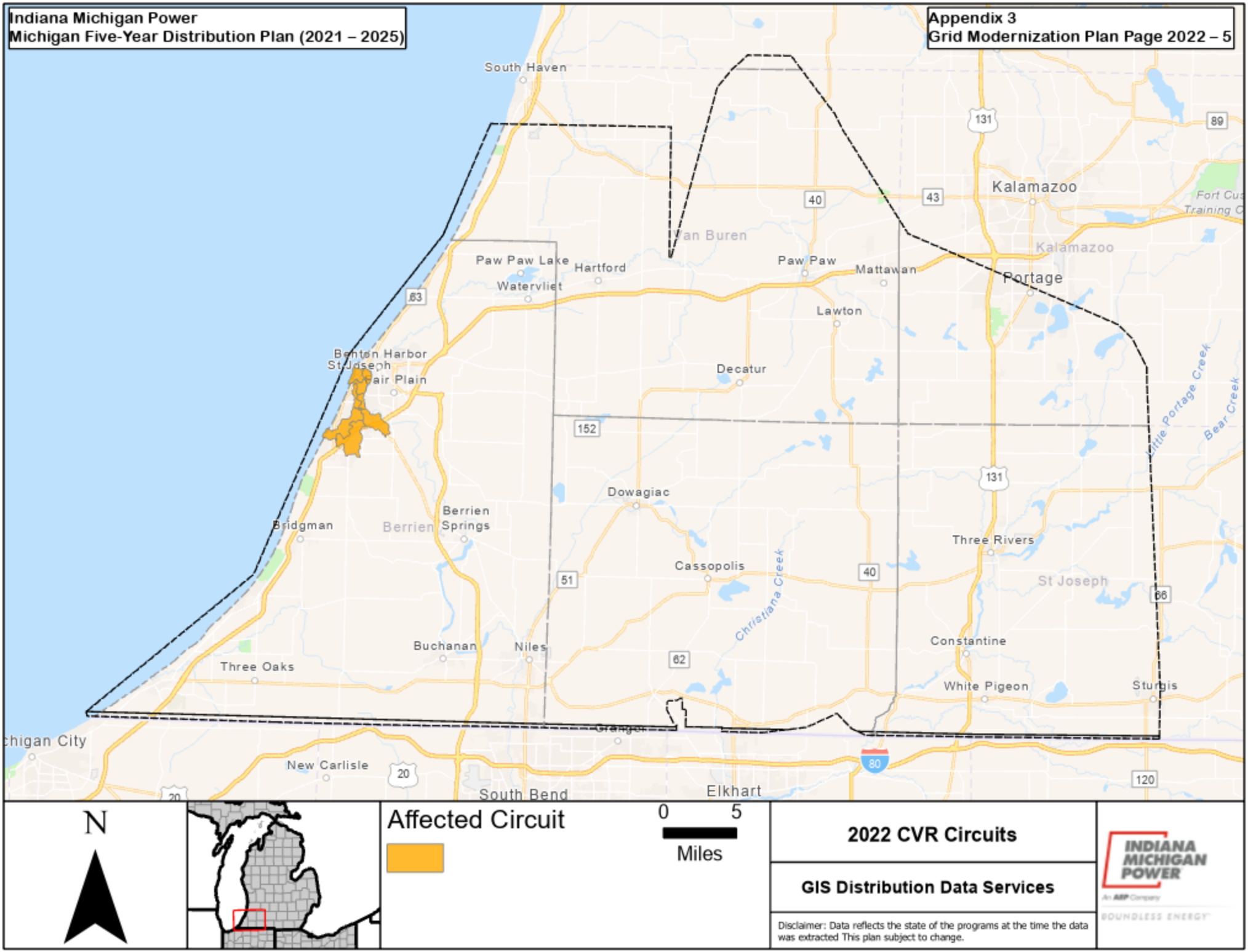
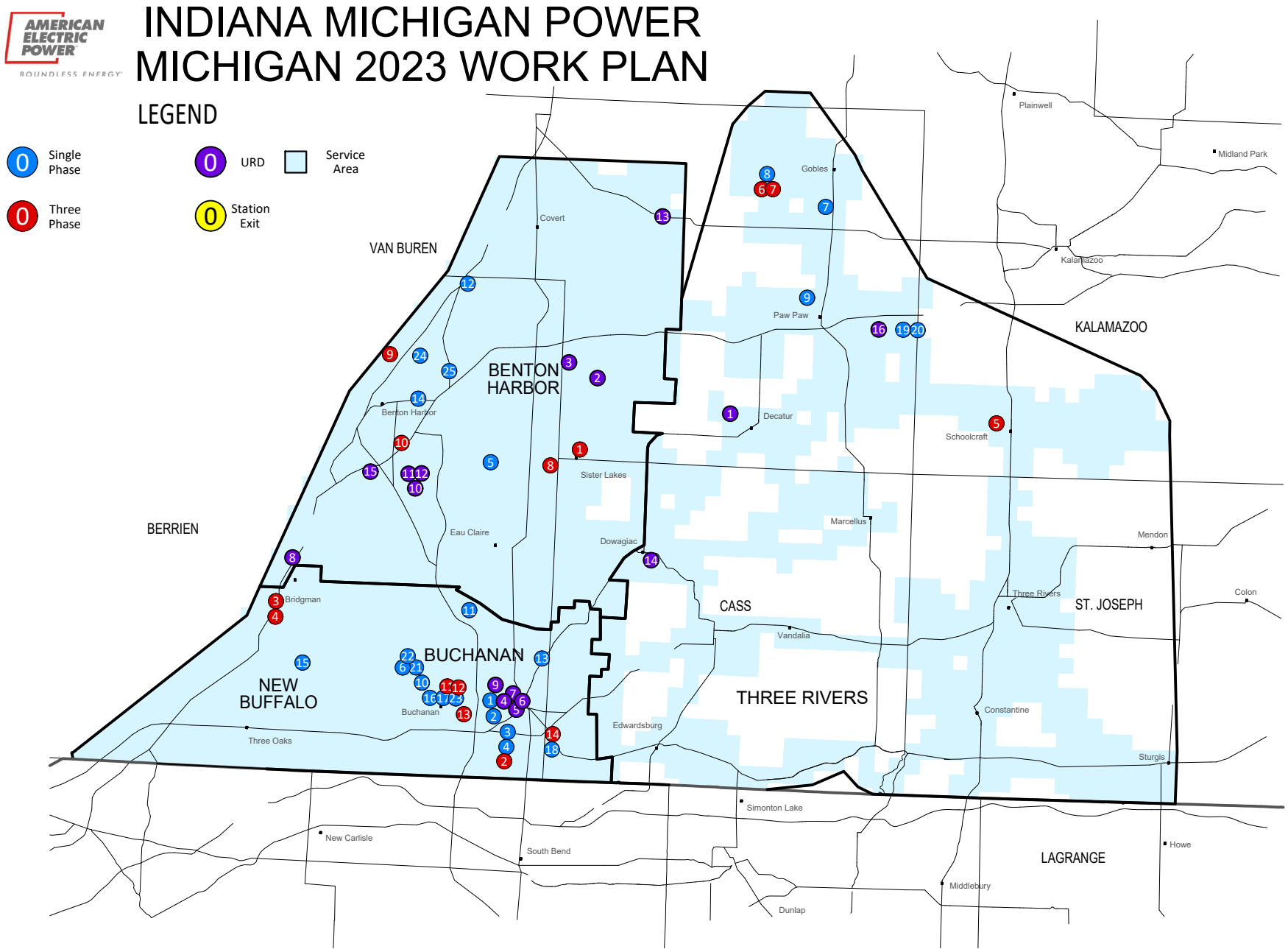
INDIANA MICHIGAN POWER
An AEP Company
BOUNDLESS ENERGY

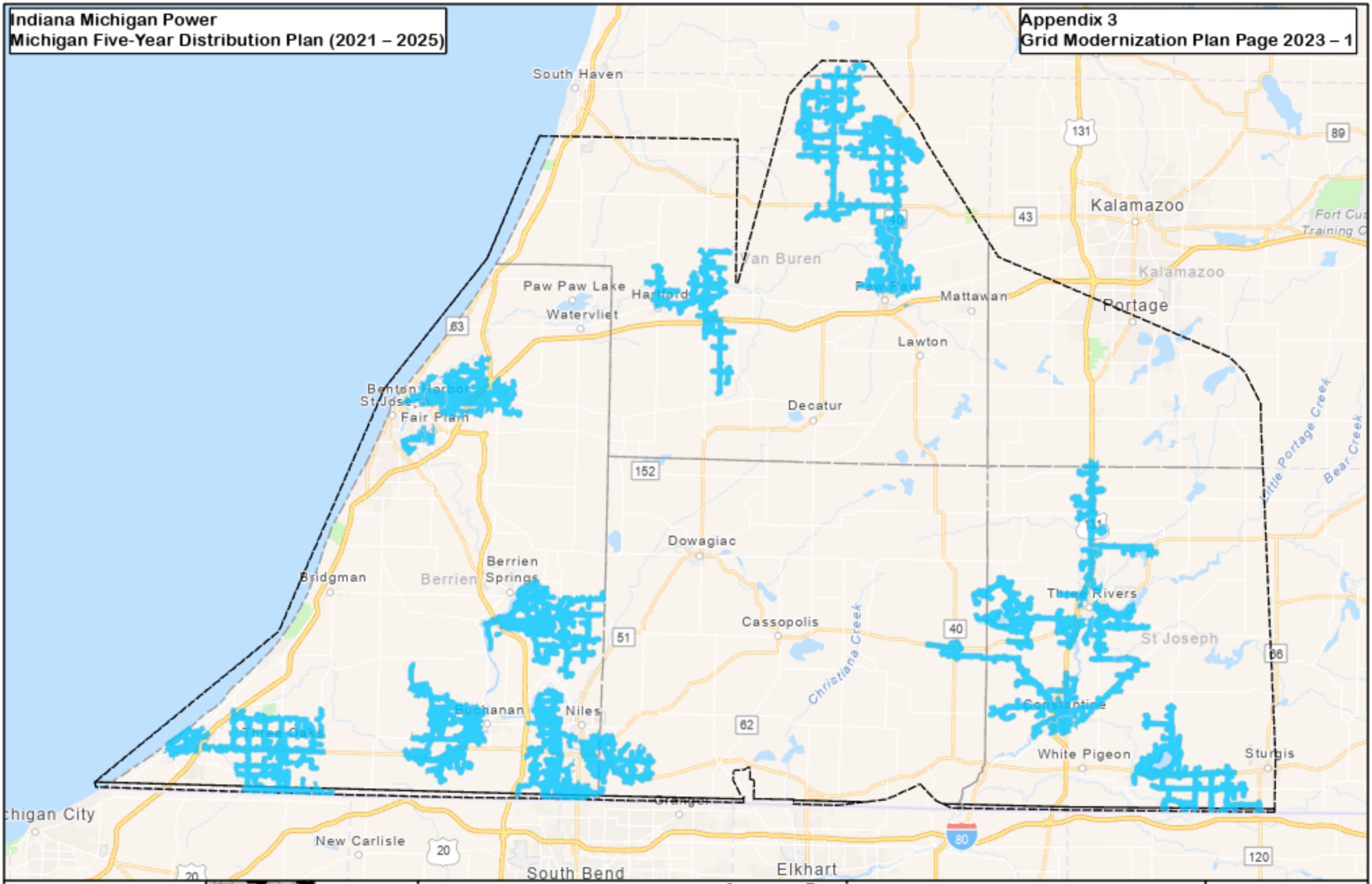

Indiana Michigan Power
Michigan Five-Year Distribution Plan (2021 – 2025)
Appendix 3
Grid Modernization Plan Page 2022 – 5
South Haven
Kalamazoo
Paw Paw Lake
Hartford
Watervliet
Paw Paw
Mattawan
Portage
Lawton
Benton Harbor
St Joseph
Fair Plain
Decatur
Dowagiac
Berrien
Springs
Bridgman
Three Rivers
Cassopolis
St Joseph
Buchanan
Niles
Three Oaks
Constantine
White Pigeon
Sturgis
New Carlisle
South Bend
Elkhart
N
Affected Circuit
0 5
Miles
2022 CVR Circuits
GIS Distribution Data Services
Disclaimer: Data reflects the state of the programs at the time the data was extracted This plan subject to change.
INDIANA MICHIGAN POWER

FIVE YEAR DISTRIBUTION PLAN (2021-2025) Last Update 07/2021



Indiana Michigan Power
Michigan Five-Year Distribution Plan (2021 – 2025)

Appendix 3
Grid Modernization Plan Page 2023 – 1



N

Affected Circuit

0 5
Miles

2023 Smart Recloser Circuits

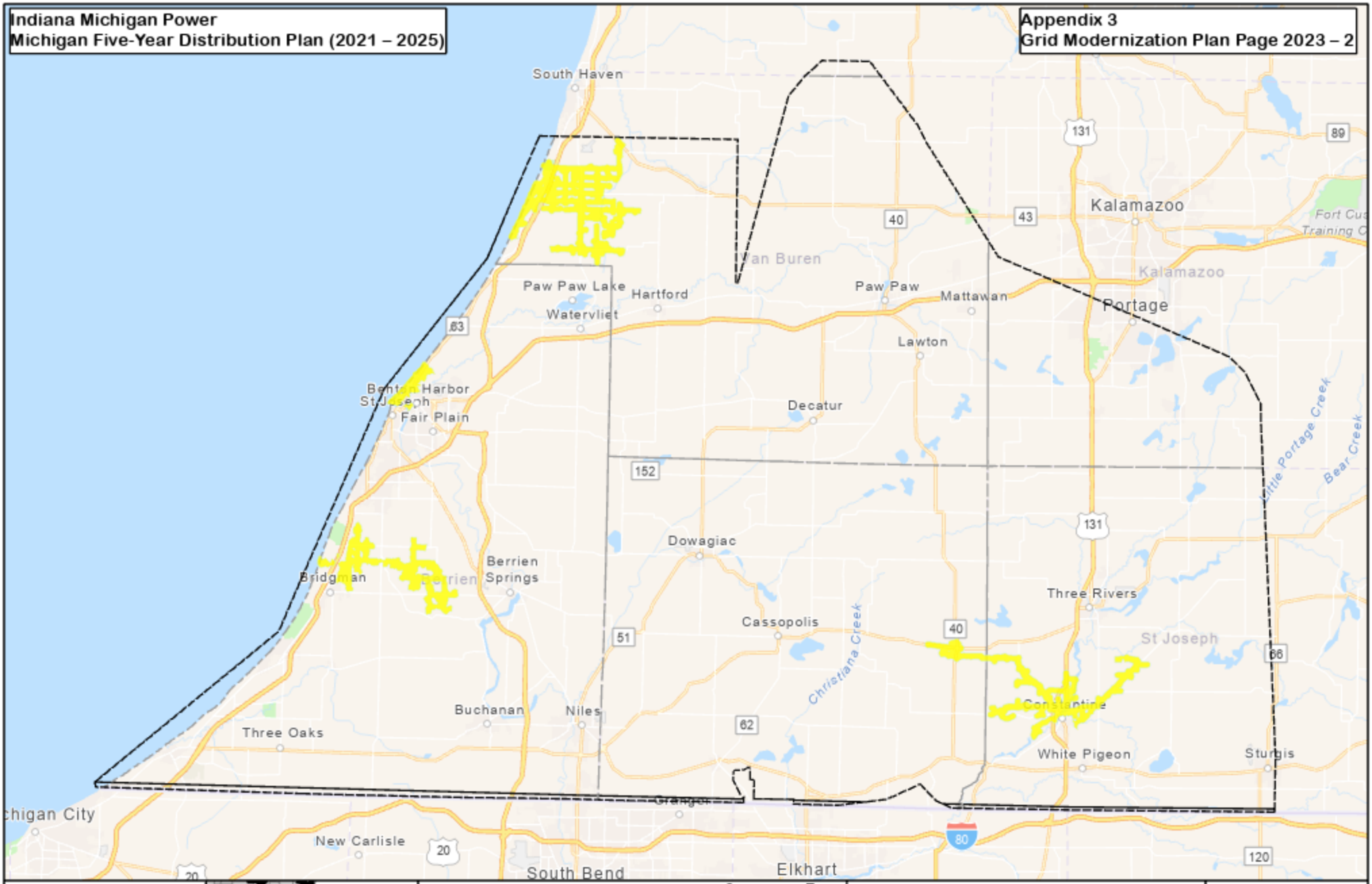
GIS Distribution Data Services

Disclaimer: Data reflects the state of the programs at the time the data was extracted This plan subject to change.

INDIANA MICHIGAN POWER
An AEP Company
BOUNDLESS ENERGY

Indiana Michigan Power
Michigan Five-Year Distribution Plan (2021 – 2025)

Appendix 3
Grid Modernization Plan Page 2023 – 2



N

Affected Circuit

0 5
Miles

2023 Smart Circuit Tie Circuits

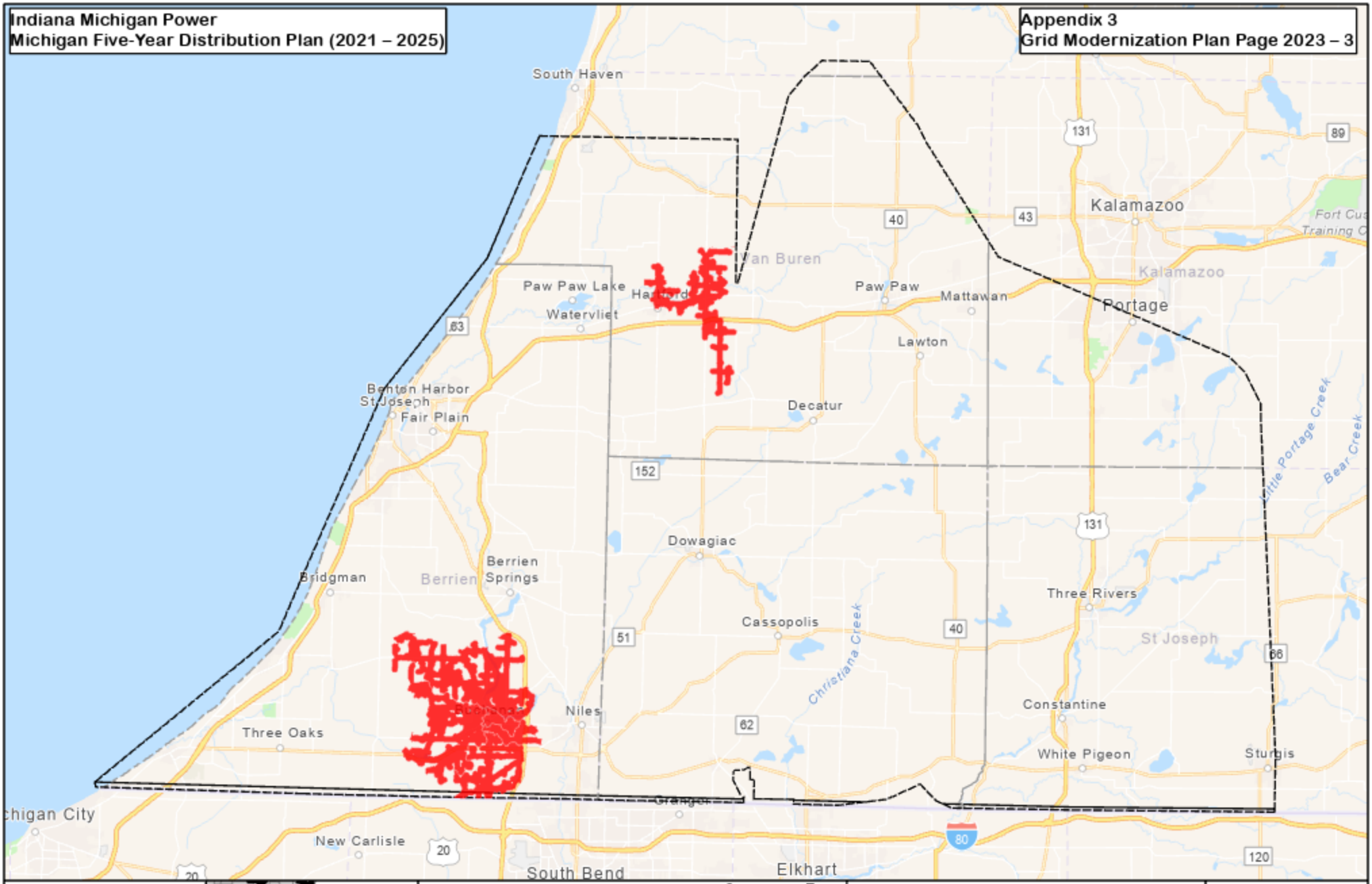
GIS Distribution Data Services

Disclaimer: Data reflects the state of the programs at the time the data was extracted This plan subject to change.

INDIANA MICHIGAN POWER
An AEP Company
BOUNDLESS ENERGY

Indiana Michigan Power
Michigan Five-Year Distribution Plan (2021 – 2025)

Appendix 3
Grid Modernization Plan Page 2023 – 3



N

Affected Circuit

0 5
Miles

2023 Line Sensor Circuits

GIS Distribution Data Services

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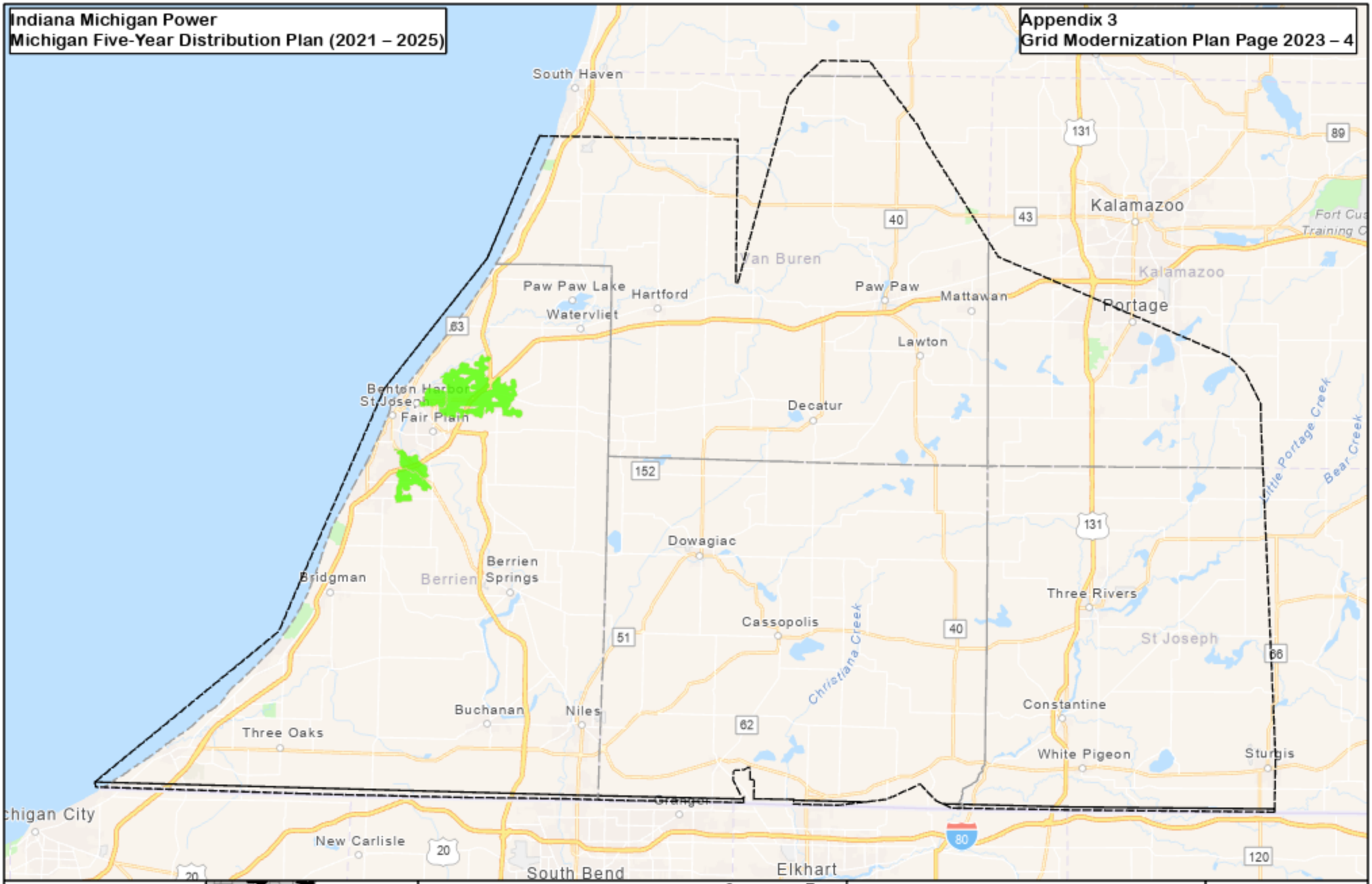
Indiana Michigan Power
Michigan Five-Year Distribution Plan (2021 – 2025)

Appendix 3
Grid Modernization Plan Page 2023 – 4



N

Affected Circuit

0 5
Miles

2023 DACR Circuits

GIS Distribution Data Services

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INDIANA MICHIGAN POWER
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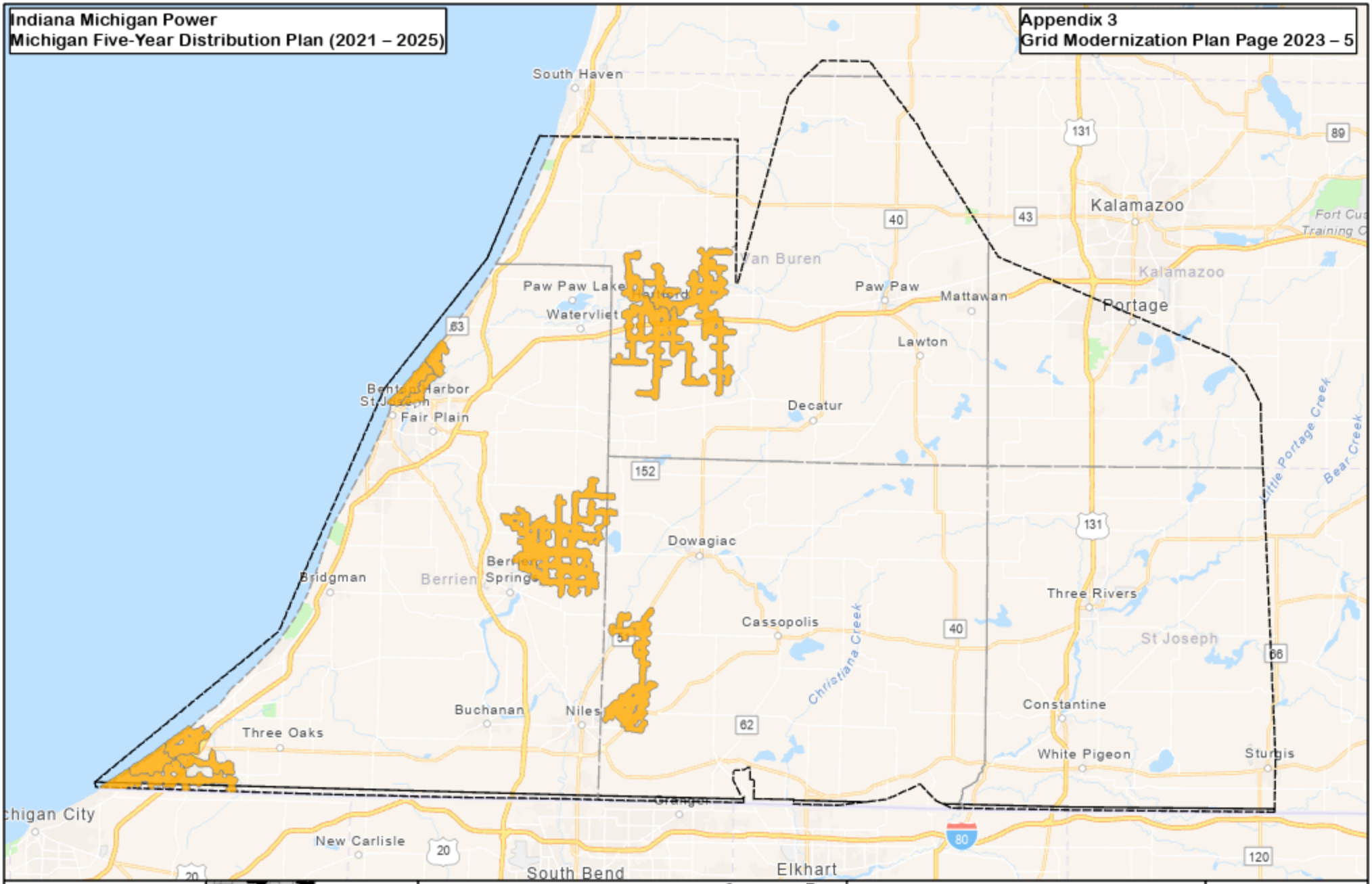
BOUNDLESS ENERGY

Indiana Michigan Power
Michigan Five-Year Distribution Plan (2021 – 2025)

Appendix 3
Grid Modernization Plan Page 2023 – 5



N

Affected Circuit

0 5
Miles

2023 CVR Circuits

GIS Distribution Data Services

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INDIANA MICHIGAN POWER
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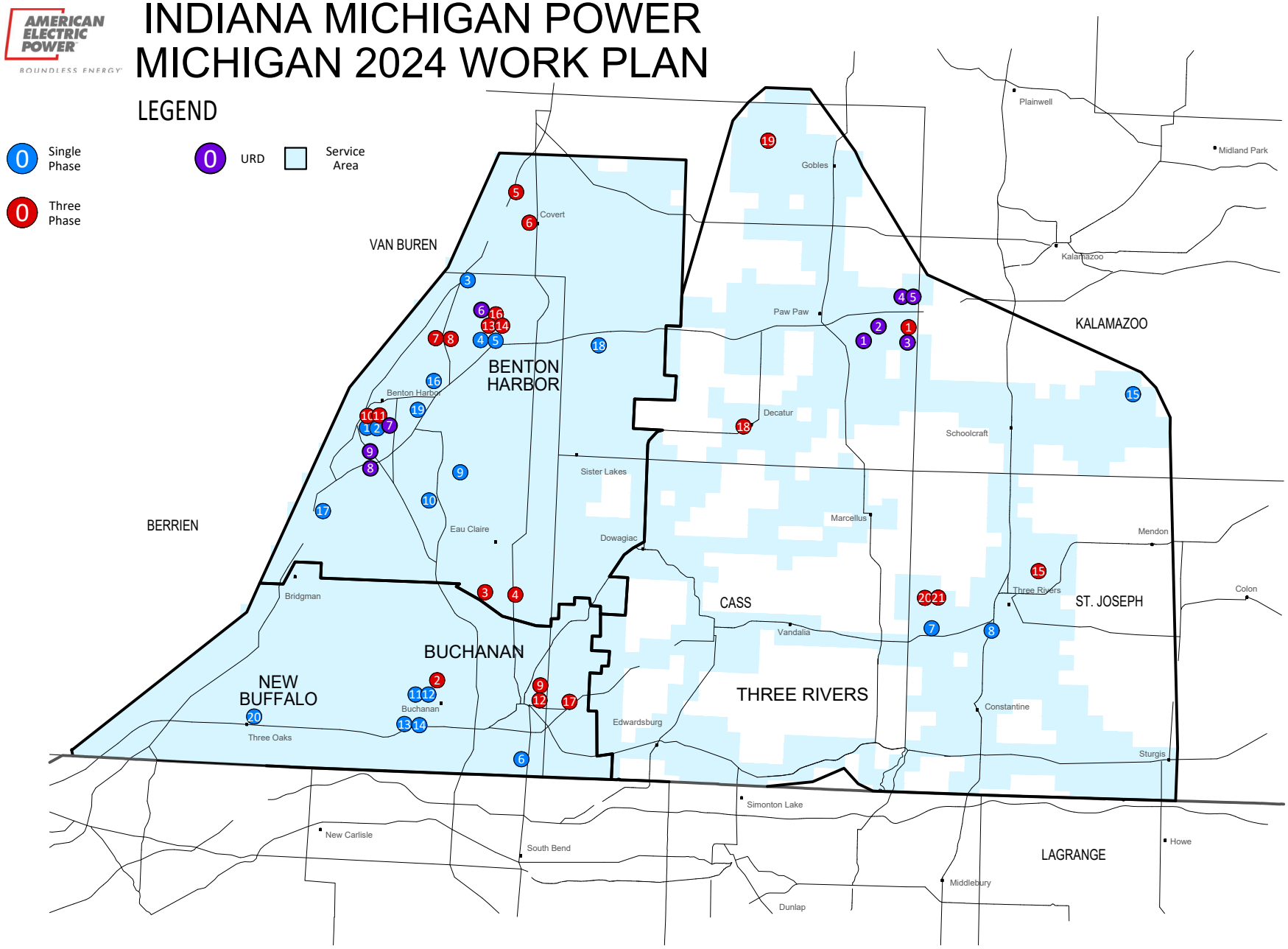
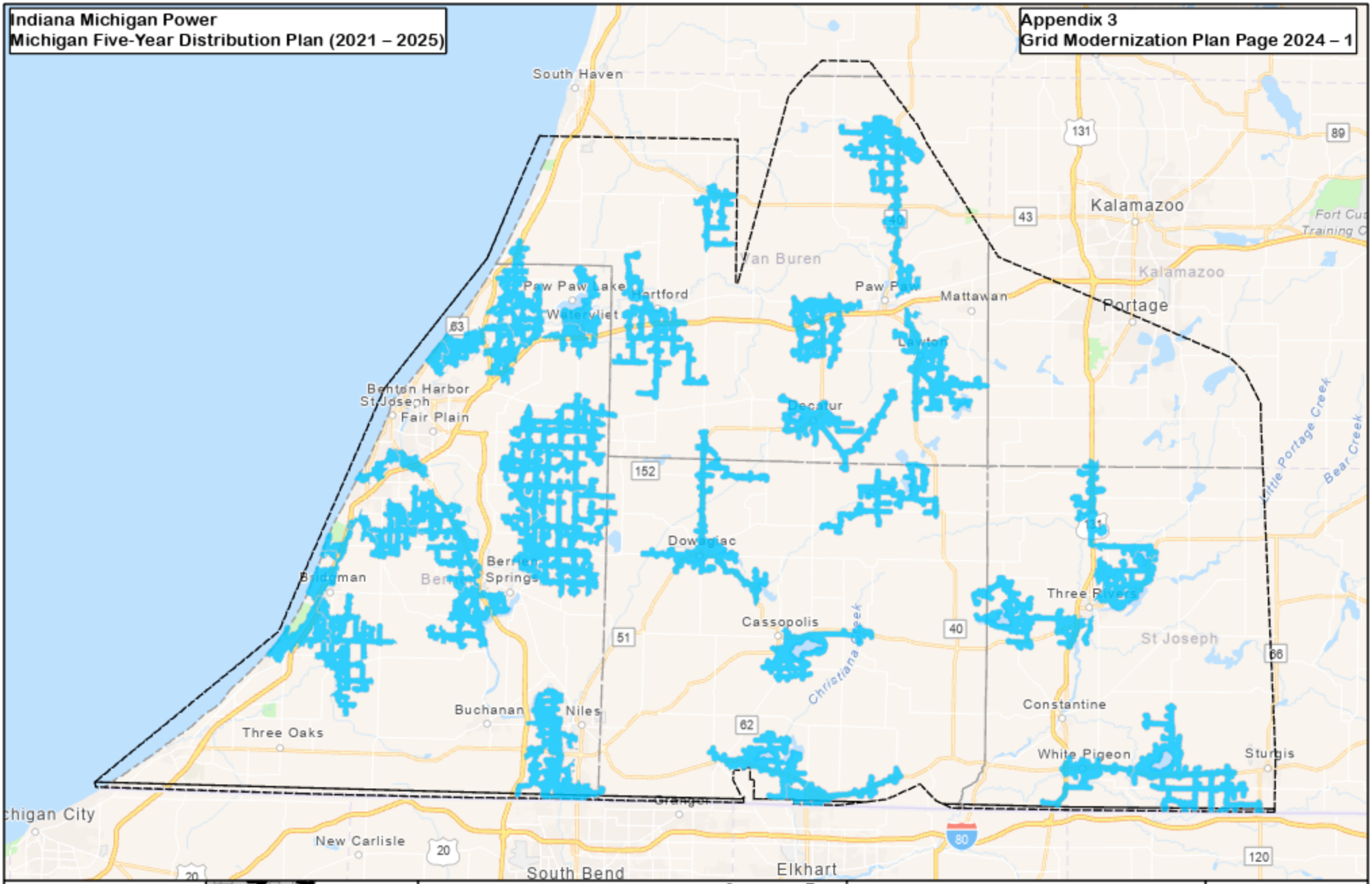
INDIANA MICHIGAN POWER
MICHIGAN 2024 WORK PLAN



Indiana Michigan Power
Michigan Five-Year Distribution Plan (2021 – 2025)

Appendix 3
Grid Modernization Plan Page 2024 – 1



N

Affected Circuit

0 5
Miles

2024 Smart Recloser Circuits

GIS Distribution Data Services

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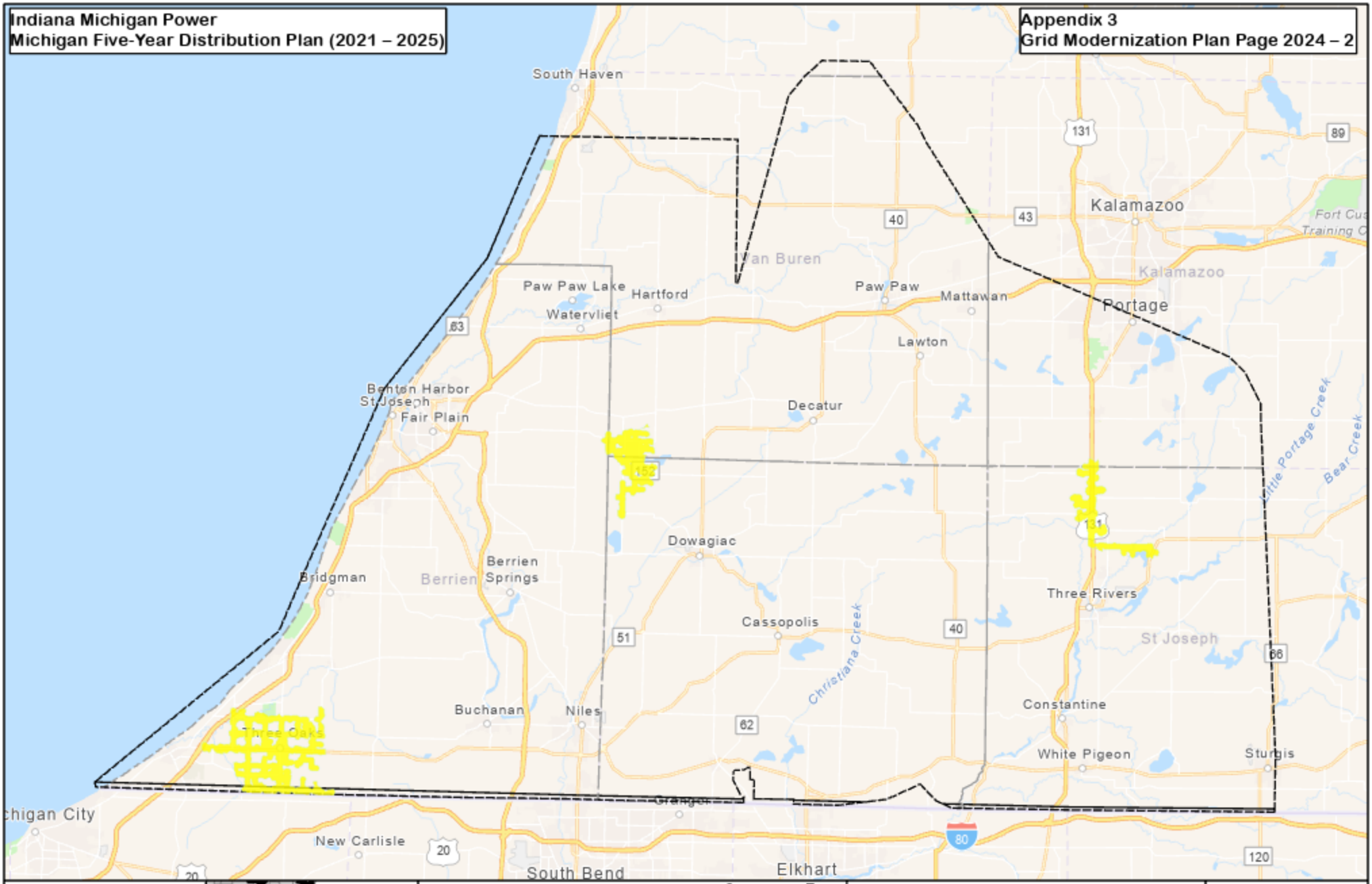
INDIANA MICHIGAN POWER
An AEP Company
BOUNDLESS ENERGY

Indiana Michigan Power
Michigan Five-Year Distribution Plan (2021 – 2025)

Appendix 3
Grid Modernization Plan Page 2024 – 2



N

Affected Circuit

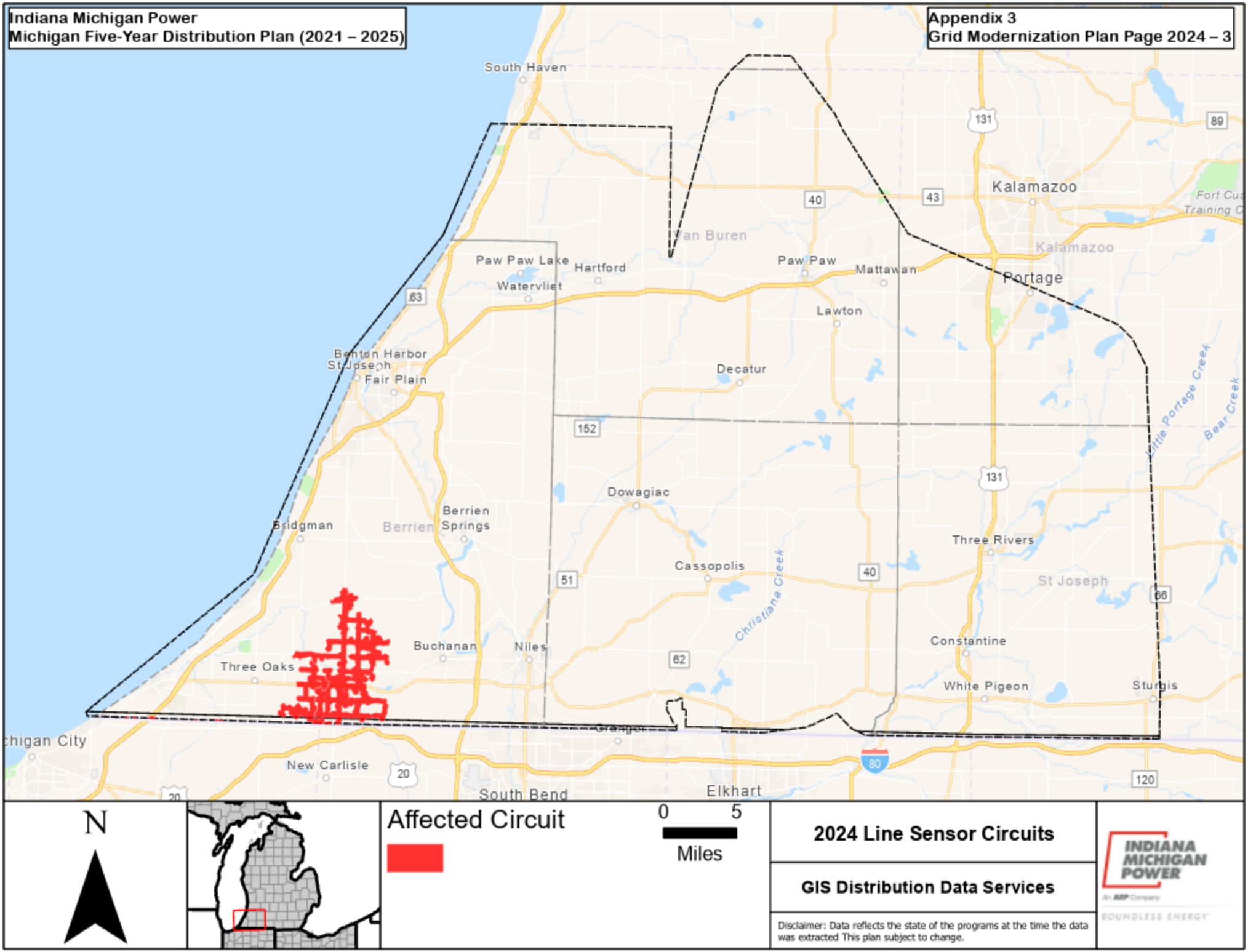
0 5
Miles

2024 Smart Circuit Tie Circuits

GIS Distribution Data Services

Disclaimer: Data reflects the state of the programs at the time the data was extracted This plan subject to change.

INDIANA MICHIGAN POWER
An AEP Company
BOUNDLESS ENERGY


Indiana Michigan Power
Michigan Five-Year Distribution Plan (2021 – 2025)
Appendix 3
Grid Modernization Plan Page 2024 – 3
South Haven
Kalamazoo
Van Buren
Paw Paw Lake
Hartford
Watervliet
Paw Paw
Mattawan
Portage
Lawton
Benton Harbor
St Joseph
Fair Plain
Decatur
Dowagiac
Berrien
Berrien Springs
Bridgman
Cassopolis
Three Rivers
St Joseph
Buchanan
Niles
Three Oaks
Constantine
White Pigeon
Sturgis
Elkhart
South Bend
New Carlisle
Michigan City
Little Portage Creek
Bear Creek
Christiana Creek
N
Affected Circuit
0 5
Miles
2024 Line Sensor Circuits
GIS Distribution Data Services
Disclaimer: Data reflects the state of the programs at the time the data was extracted This plan subject to change.
INDIANA MICHIGAN POWER
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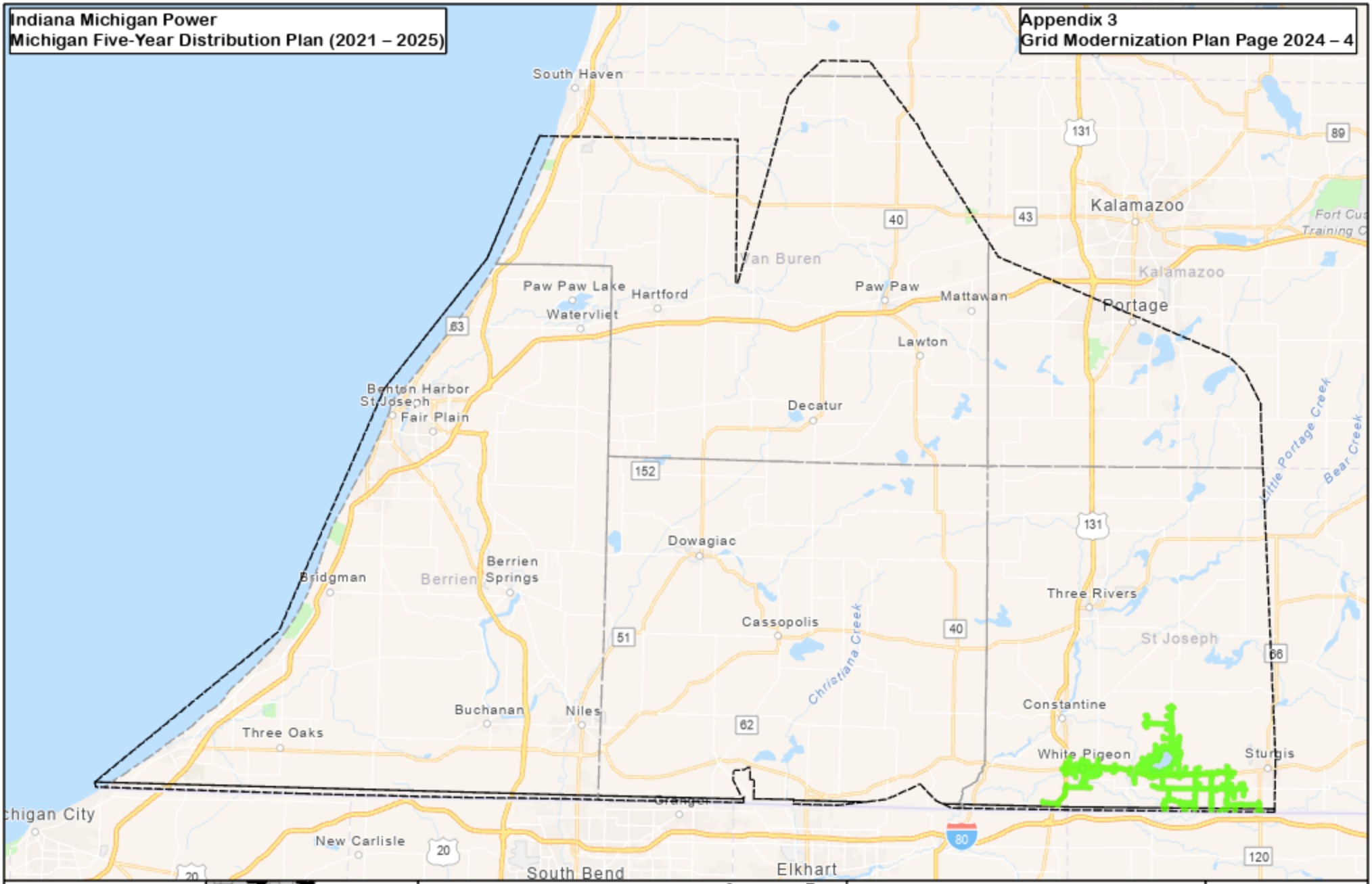
Indiana Michigan Power
Michigan Five-Year Distribution Plan (2021 – 2025)

Appendix 3
Grid Modernization Plan Page 2024 – 4



N

Affected Circuit

0 5
Miles

2024 DACR Circuits

GIS Distribution Data Services

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INDIANA MICHIGAN POWER
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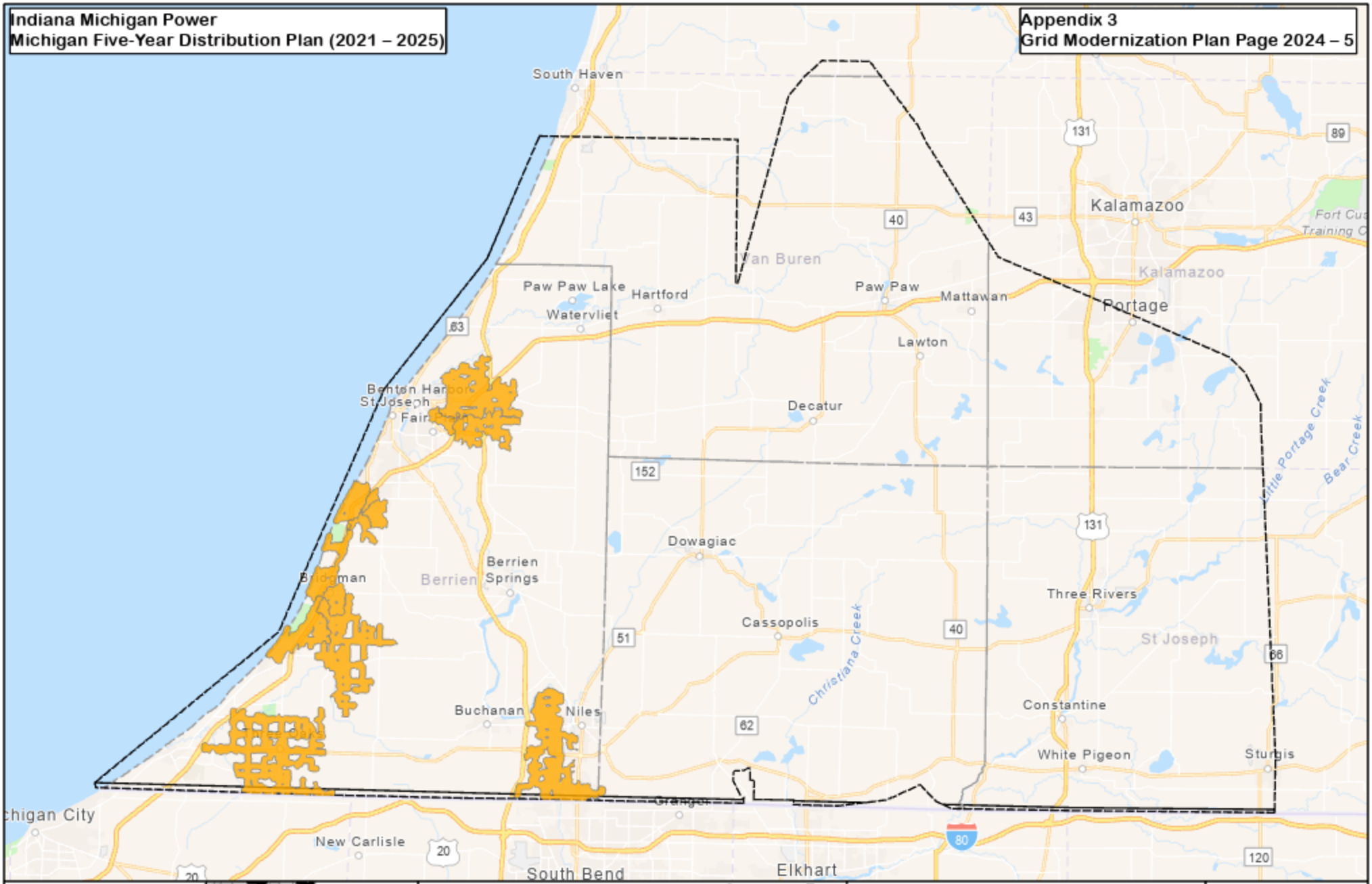
BOUNDLESS ENERGY

Indiana Michigan Power
Michigan Five-Year Distribution Plan (2021 – 2025)

Appendix 3
Grid Modernization Plan Page 2024 – 5



N

Affected Circuit

0 5
Miles

2024 CVR Circuits

GIS Distribution Data Services

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INDIANA MICHIGAN POWER
An AEP Company
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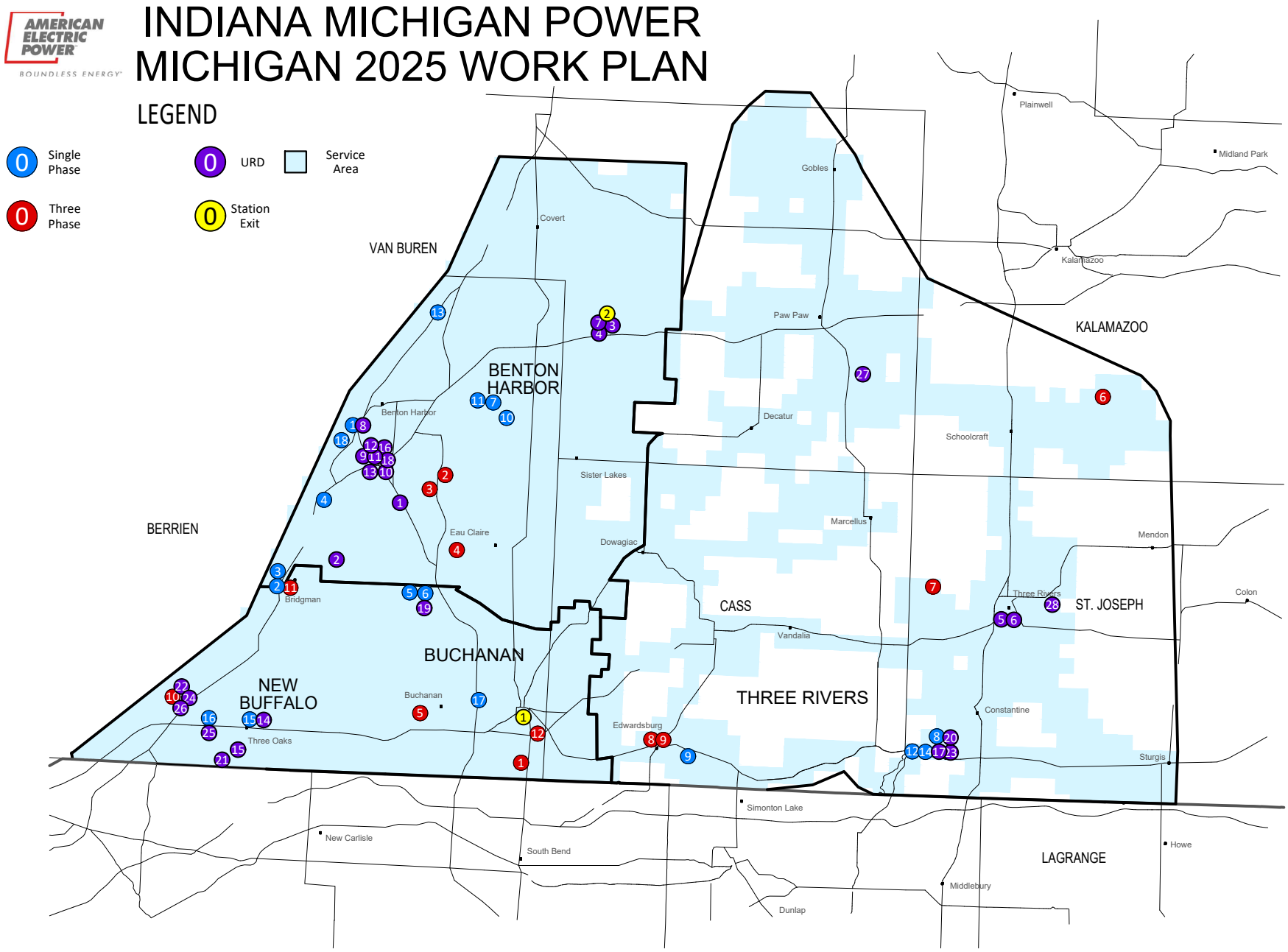
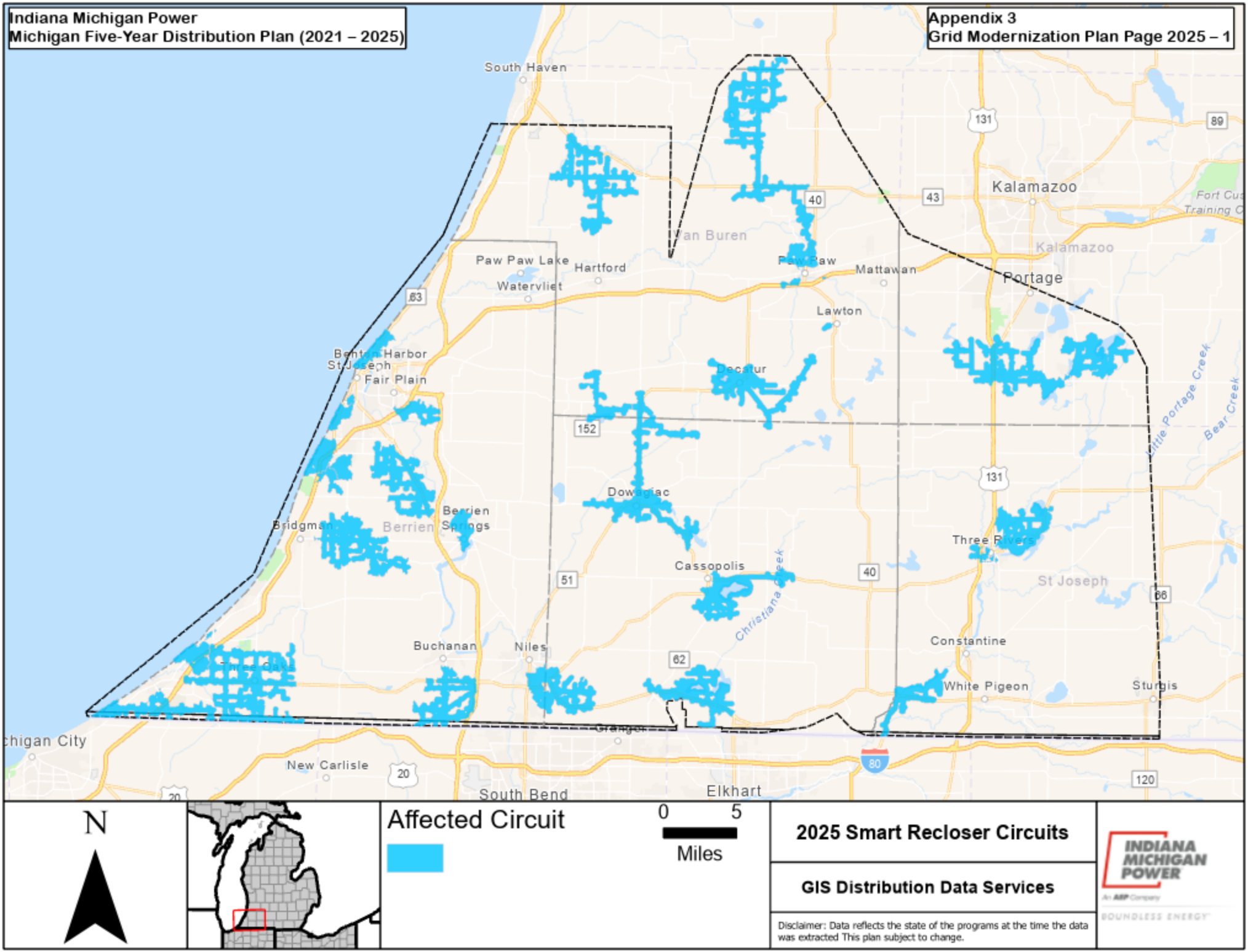
FIVE YEAR DISTRIBUTION PLAN (2021-2025) Last Update 07/2021




Indiana Michigan Power
Michigan Five-Year Distribution Plan (2021 – 2025)
Appendix 3
Grid Modernization Plan Page 2025 – 1
South Haven
Kalamazoo
Van Buren
Paw Paw Lake
Hartford
Watervliet
Paw Paw
Mattawan
Portage
Lawton
Decatur
Benton Harbor
St Joseph
Fair Plain
Dowagiac
Berrien
Berrien Springs
Bridgman
Cassopolis
Three Rivers
St Joseph
Buchanan
Niles
Constantine
White Pigeon
Sturgis
Granger
New Carlisle
South Bend
Elkhart
Little Portage Creek
Bear Creek
Christiana Creek
131
89
40
43
63
152
51
62
20
80
120
N
Affected Circuit
0 5
Miles
2025 Smart Recloser Circuits
GIS Distribution Data Services
Disclaimer: Data reflects the state of the programs at the time the data was extracted This plan subject to change.
INDIANA MICHIGAN POWER
An AEP Company
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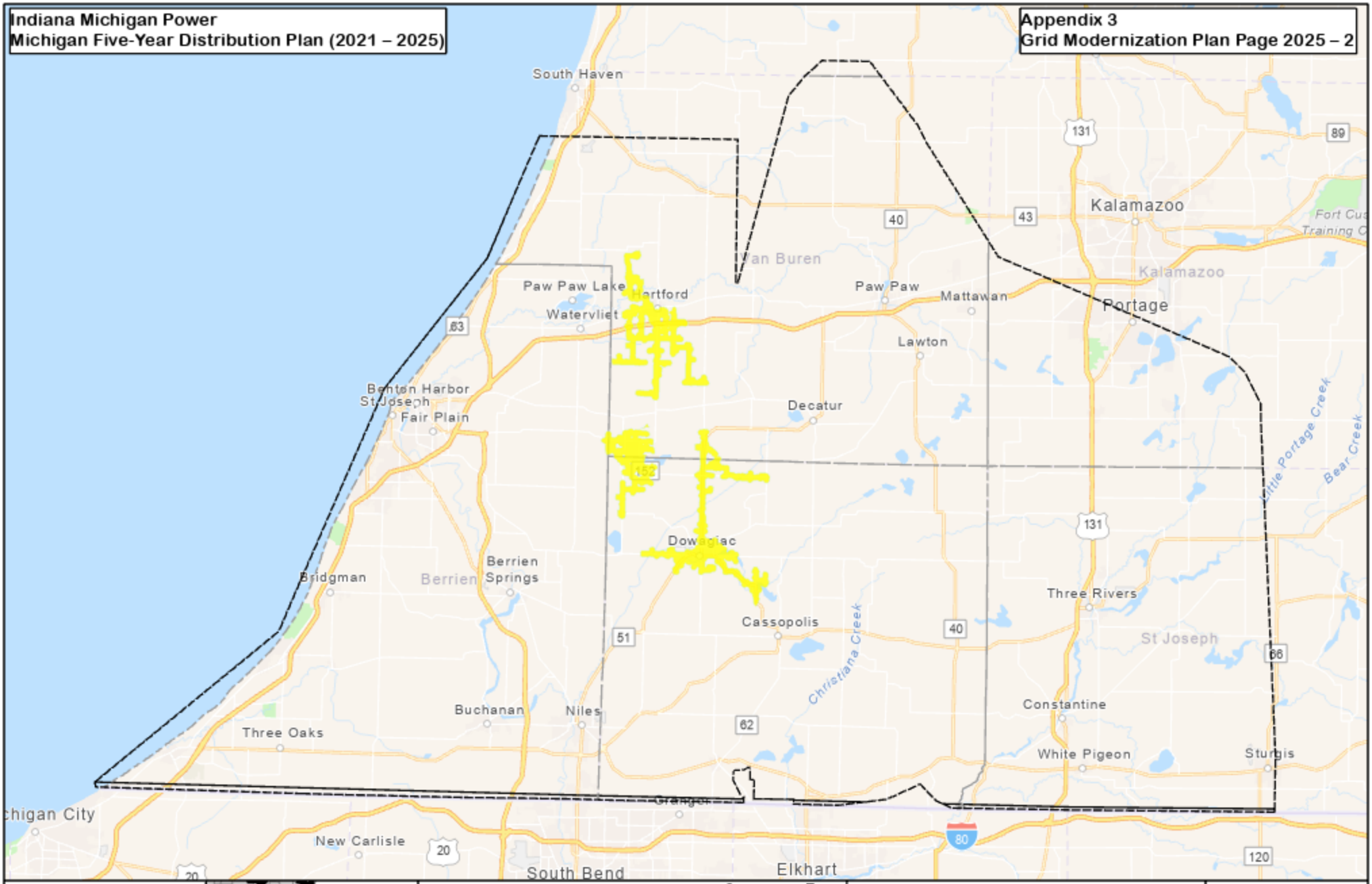
Indiana Michigan Power
Michigan Five-Year Distribution Plan (2021 – 2025)

Appendix 3
Grid Modernization Plan Page 2025 – 2



N

Affected Circuit

0 5
Miles

2025 Smart Circuit Tie Circuits

GIS Distribution Data Services

Disclaimer: Data reflects the state of the programs at the time the data was extracted This plan subject to change.

INDIANA MICHIGAN POWER
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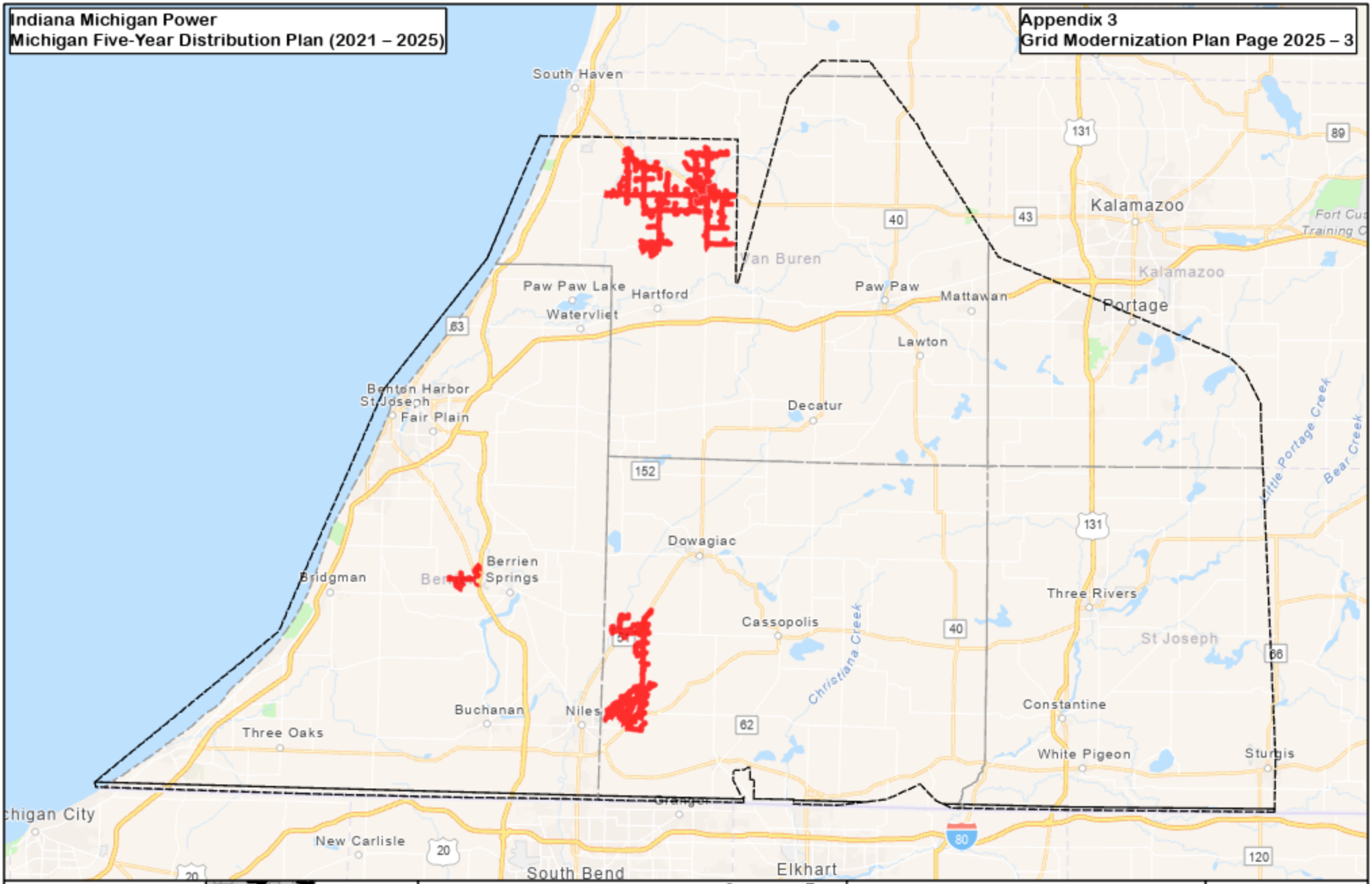
Indiana Michigan Power
Michigan Five-Year Distribution Plan (2021 – 2025)

Appendix 3
Grid Modernization Plan Page 2025 – 3



N

Affected Circuit

0 5
Miles

2025 Line Sensor Circuits

GIS Distribution Data Services

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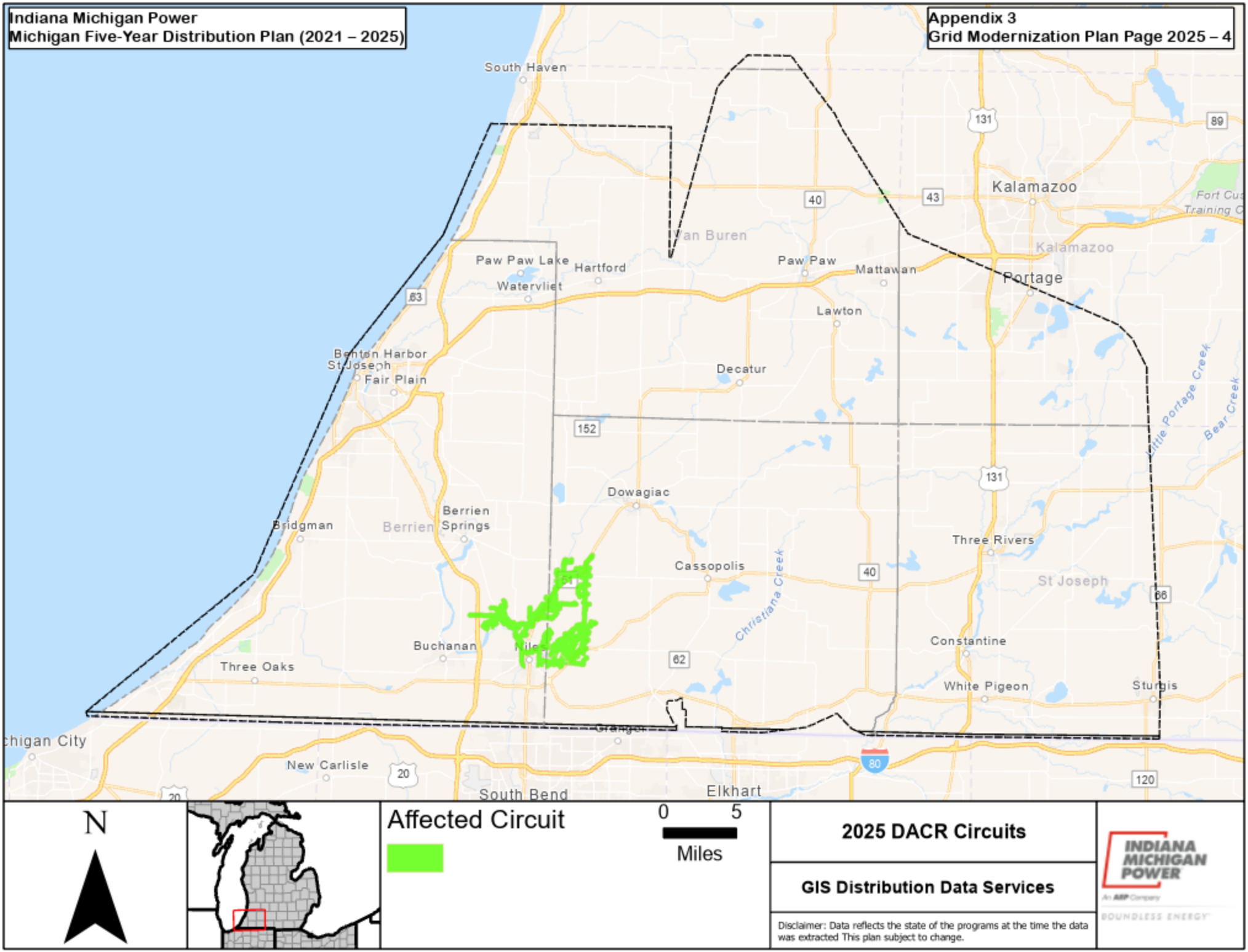
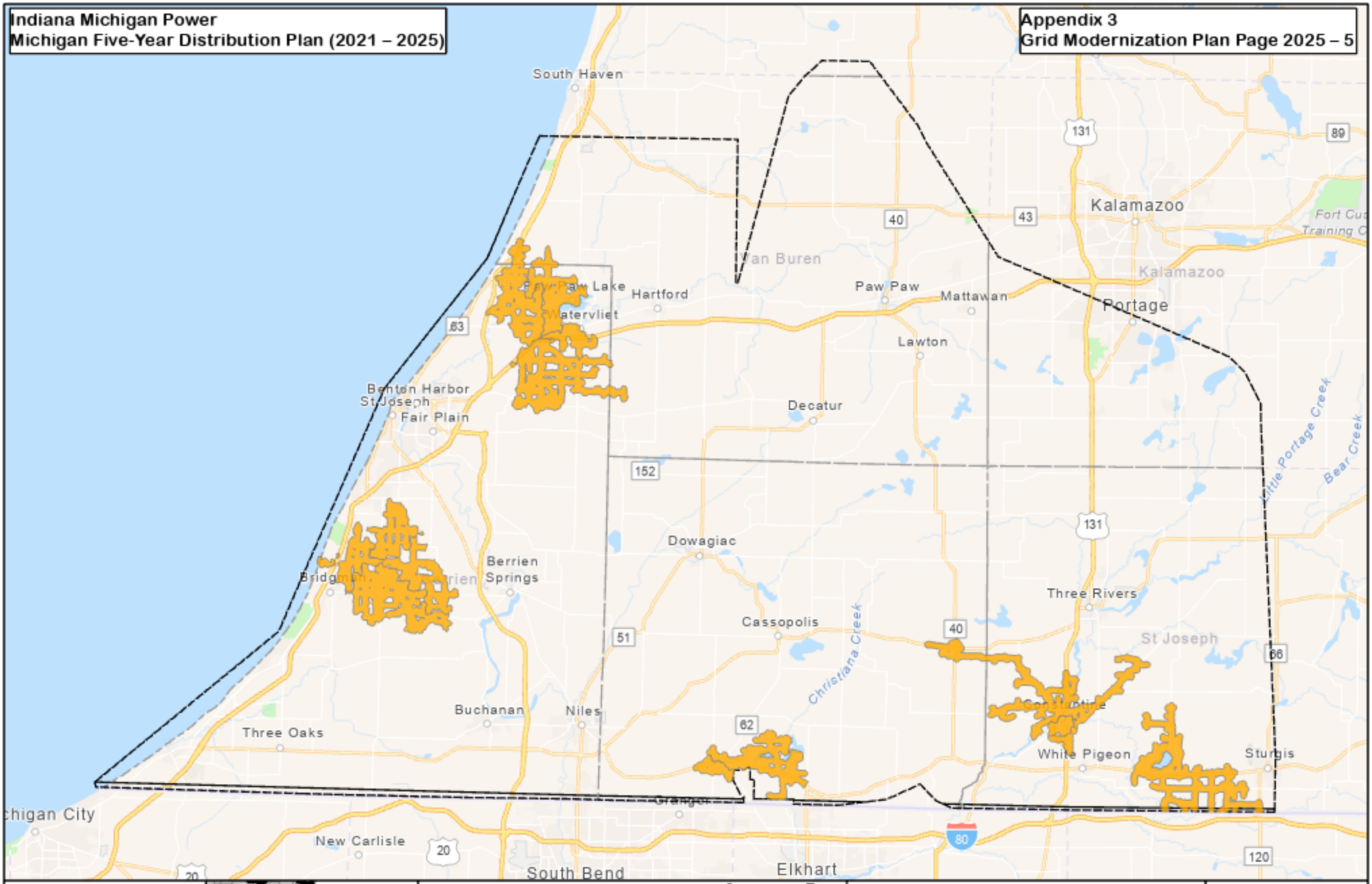
INDIANA MICHIGAN POWER
An AEP Company
BOUNDLESS ENERGY


Indiana Michigan Power
Michigan Five-Year Distribution Plan (2021 – 2025)
Appendix 3
Grid Modernization Plan Page 2025 – 4
South Haven
Kalamazoo
Paw Paw Lake
Hartford
Watervliet
Paw Paw
Mattawan
Portage
Lawton
Benton Harbor
St Joseph
Fair Plain
Decatur
Dowagiac
Berrien
Springs
Bridgman
Three Rivers
Cassopolis
St Joseph
Buchanan
Constantine
Three Oaks
White Pigeon
Sturgis
New Carlisle
South Bend
Elkhart
N
Affected Circuit
0 5
Miles
2025 DACR Circuits
GIS Distribution Data Services
Disclaimer: Data reflects the state of the programs at the time the data was extracted This plan subject to change.
INDIANA MICHIGAN POWER

Indiana Michigan Power
Michigan Five-Year Distribution Plan (2021 – 2025)

Appendix 3
Grid Modernization Plan Page 2025 – 5



N

Affected Circuit

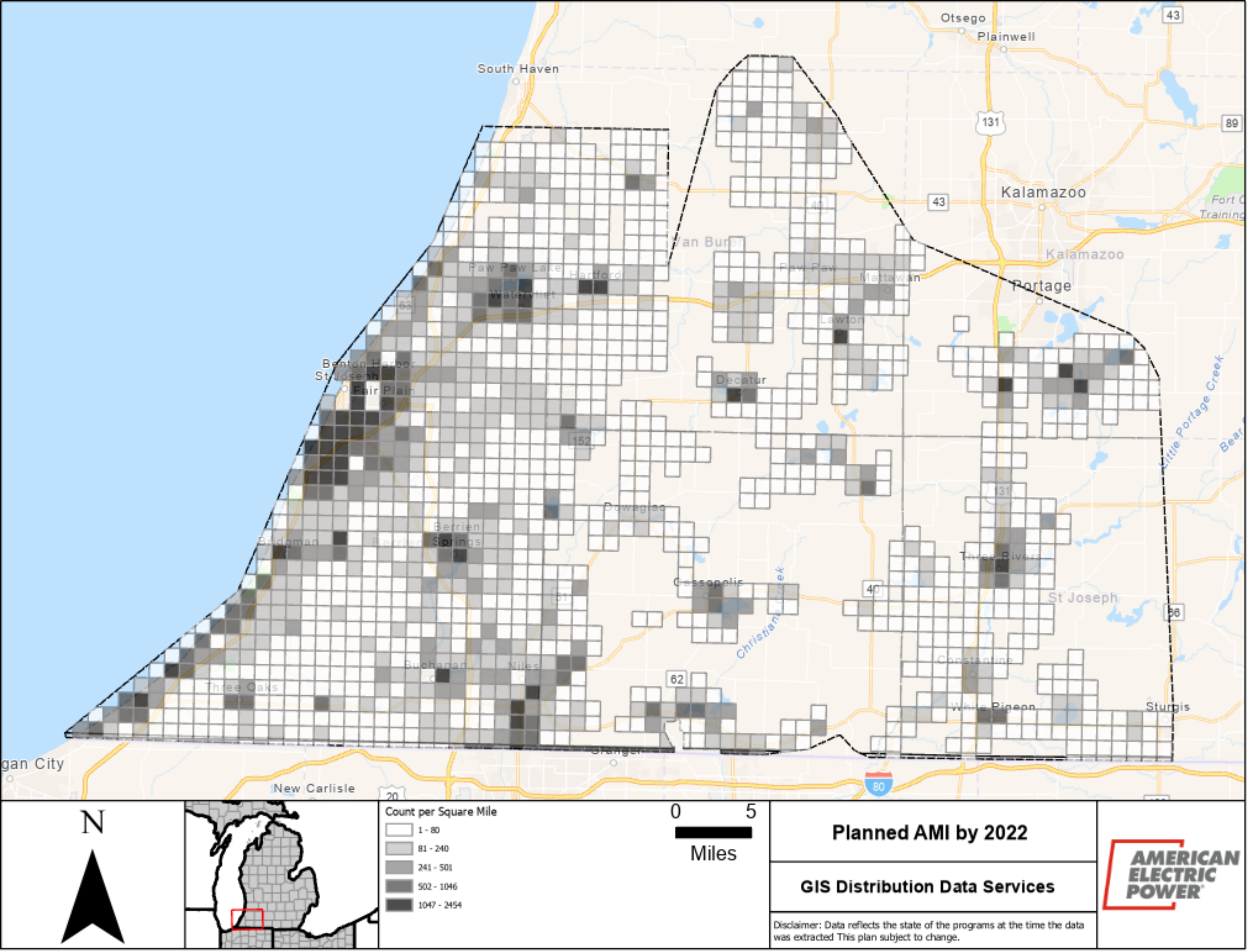
0 5
Miles

2025 CVR Circuits

GIS Distribution Data Services

Disclaimer: Data reflects the state of the programs at the time the data was extracted This plan subject to change.

INDIANA MICHIGAN POWER
An AEP Company
BOUNDLESS ENERGY


Planned AMI by 2022
GIS Distribution Data Services
Disclaimer: Data reflects the state of the programs at the time the data was extracted This plan subject to change.
Count per Square Mile
1 - 80
81 - 240
241 - 501
502 - 1046
1047 - 2454
0
5
Miles
N
AMERICAN ELECTRIC POWER
Otsego
Plainwell
South Haven
Kalamazoo
Portage
Paw Paw Lake
Hartford
Watervliet
Van Buren
Paw Paw
Mattawan
Lawton
Benton Harbor
St Joseph
Fair Plain
Decatur
Dowagiac
Bridgman
Berrien Springs
Three Rivers
Cassopolis
St Joseph
Buchanan
Niles
Three Oaks
Constantine
White Pigeon
Sturgis
Granger
New Carlisle
Christiana Creek
Little Portage Creek
131
43
89
152
62
40
80
20

Benton Harbor Area – New Blossom Trail Station

Project Description:

- Rebuild the existing Eau Claire and Indian Lake 34.5/12kV stations, which provides 12kV service to I&M customers into a single modern 138/12kV station.
- Upgrade total station transformation from 6MVA to a 10MVA.
- Upgrade from two to three 12kV feeders.
- Install station Supervisory Control and Data Acquisition (SCADA).
- ISD =2021; 3 year project timeline.

Justification / Need for the Project:

The Eau Claire and Indian Lake station rebuild is due to concerns of reliability and expectation for load growth.

- The existing stations were built in the 1950's and the 34.5kV equipment is obsolete. Both contain non-standard and aged equipment that is difficult to replace in the event of failure.
- This project replaces two transformers aged 60+ years that have maintenance issues due to parts not being available.
- Increase reliability with remote supervisory control and load monitioring.
- This is a capacity constrained area which limits the opportunities for load transfers durning emergency situations.

Distribution Component:

Relocate and extend two existing feeders to new station location and install one new 12kV feeder.

- Relocate the existing Eau Claire and Indian Lake feeders to the new station.
- Install one new 12kV feeder exit and extend to new circuit configuration.
- An estimated 2.1 miles of 3 phase 3-556AL & 1-4/0AA distribution line from the station to the existing circuit ties wil need to be rebuilt to configure the new exits and allow for switching between circuits.

Benefits of the Project:

- The voltage conversion and capacity addition at the new station relieves reliability concerns of aged equipment and improves the ability for contingency transfers.
- Construction of a standard modern station will allow for connection of a mobile backup transformer for increased reliability for outage and planned maintenance events.
- SCADA capabilities allow enhanced monitoring and additional switching and sectionalizing abilities done remotely, reducing overall outage identification and restoration time.
- New equipment is more reliable for customers and more easily maintained.

Benton Harbor Area – Boxer Station

Project Description:

- Replace the existing Berrien Springs Hydro 34.5/12kV station which provides 12kV service to I&M customers with a new modern 69/12kV station to be named Boxer.
- Replace the paralleled Tx5 and Tx6, 34.5/12kV, 6.25MVA transformers with a 69/12kV, 20MVA Non-LTC, station transformer with bus regulators and a low side transformer breaker.
- Replace the 34.5kV circuit switcher with a 69kV unit.
- Relocate 2-12kV feeder exits to new site.
- Install distribution Supervisory Control and Data Acquisition (SCADA).
- ISD =2021; 3 year project timeline.

Justification / Need for the Project:

The rebuild of Berrien Springs station is due to concerns of reliability, expectation for load growth, and modernizaton.

- Berrien Springs station was built in the 1950's and most of the 34.5kV equipment has poor condition evaluations and high risk of failure.
- The site is space constrained by the St Joseph River, the Hydo Dam, and the Bluff.
- Engineering review indicates insufficient area for 69kV equipment requiring a new site.
- The existing circuit configuration limits the opportunities for load transfers for both emergency situations and routine maintenance.
- The age and condition of the existing 34.5kV subtransmission system is planned to be upgraded to 69kV in the future.
- This project replaces 2–60+ year old 34.5/12kV, 6.25MVA transformers with maintenance issues with a 69/12kV, 20MVA unit .
- Increase reliability with remote supervisory control and load monitioring.

Distribution Component:

Relocate two existing 12kV feeders to the new the new station site.

- The two 12kV feeder exits and line extensions are planned to be overhead with 3 phase 3-556AL + 1-4/0AA conductors.
- An estimated 1.0mile of 3ph Distribution line in front of station will need to be re-built to configure for new exits and allow for switching between circuits outside of the station.

Benefits of the Project:

- The replacement of the Berrien Springs station with a modern 69/12kV station relieves reliability concerns of aged 34.5kV equipment and improves the ability for contingency transfers.
- Construction of a standard modern station will allow for connection of a mobile backup transformer for increased reliability for outage and planned maintenance events.
- SCADA capabilities allow enhanced monitoring and additional switching and sectionalizing abilities done remotely, reducing overall outage identification and restoration time.
- New equipment is more reliable for customers and more easily maintained.

Buchanan Area – Simplicity Station Property purchase

Project Description:

- Purchase property for the 2023 project to build a new modern 69/12kV distribution station as an expansion of the customer owned Simplicity station site.
- ISD = 2021 for property purchase of new station site

Justification / Need for the Project:

The new Simplicity station is needed due to concerns of reliability and recoverability of the Niles Station.

- Provides recovery of Niles 12kV Circuits. There is none at this time.
- Provides necessary transformation to complete Niles/Bertrand 34kV to 12kV Conversion.
- Present mobile limits allows recovery of only 11MVA (18MVA needed).
- Niles station is space constrained and an alternate site is required.

Distribution Component:

- n/a

Benefits of the Project:

Property for new Simplicity Station:

- Provides company owned land for new station construction in an area space constrained for station expansion.
- Provides space for capacity addition for distribution automation and future load growth.

Three Rivers Area – Three Rivers (Ripple) Station

Project Description:

- Rebuild the existing Three Rivers 69/12kV station which provides service to I&M customers into a new modern 69/12kV station to be named Ripple.
- Replace the station transformer on the new site with a 25MVA unit.
- Replace the 69kV ground switch with a circuit switcher.
- Retire metal clad switch gear with modern 12kV bay and relocate three 12kV feeders to the new site.
- Reconstruct distribution feeder on new 69kV transmission line.
- Install station Supervisory Control and Data Acquisition (SCADA).
- ISD =2021; 3 year project timeline.

Justification / Need for the Project:

Three Rivers station rebuild is due to concerns of reliability and expectation for load growth.

- The Three Rivers – Moorepark 69kV line rebuild is due to its rank as #13 worst performing Transmission circuit in I&M. These outages have all been due to failed T line equipment.
- The space constraint at Three Rivers station requires a new site to rebuild for the new 69kV CB's, Drop In Control Module, and 12kV bay.
- Increase reliability with remote supervisory control and load monitioring.
- This is a capacity constrained area which limits the opportunities for load transfers durning emergency situations.

Distribution Component:

Relocate three existing feeders to new station location and rebuild the existing 69kV underbuilt line between Three Rivers and Moorepark stations.

- Relocate the existing Corey Lake, State St, and Westland feeders to the new Ripple station.
- An estimated 0.5mile of 3 phase 3-556AL & 1-4/0AA distribution line from the station to the existing circuit ties wil need to be rebuilt to configure the new exits and allow for switching between circuits.
- Upgrade an estimate 0.51mile of 3-3/0AS + 1-1/0AS 3 phase 69kV underbuild to 3-556AL + 1-4/0AA on the Ripple-Westland and Wheeler-Fisher Lake circuit.

Benefits of the Project:

- The replacement of the Three Rivers station with the new Ripple station relieves reliability concerns of aged equipment and improves the ability for contingency transfers.
- The replacement of the metal clad 12kV switch gear eliminates a safety issue for station personel working in the area.
- Construction of a standard modern station will allow for connection of a mobile backup transformer for increased reliability for outage and planned maintenance events.
- SCADA capabilities allow enhanced monitoring and additional switching and sectionalizing abilities done remotely, reducing overall outage identification and restoration time.
- New equipment is more reliable for customers and more easily maintained.

Benton Harbor Area – Main St Station

Project Description:

- Rebuild the existing Main St 138/12kV station which provides 12kV service to I&M customers into a modern 138/12kV station.
- Replace Tx4 a 22.4MVA LTC with a 25MVA Non-LTC, station transformer with 1093 amp bus regulators and alow side transformer breaker.
- Replace the 138kV ground switch with a circuit switcher.
- Replace 4-12kV metal clad switch gear circuit breakers with new 1200amp units in the new 138/12kV bay location.
- Install distribution Supervisory Control and Data Acquisition (SCADA).
- ISD =2021; 3 year project timeline.

Justification / Need for the Project:

The rebuild of Main St station is due to concerns of reliability, expectation for load growth, and modernization.

- Transmission is rebuilding the 138kV line through Main St station and will require additional space for the new transmission equipment.
- The space constraints of the station will require building in the clear on the south side of the property.
- Main St station equipment currently operating is 1940s-1960s vintage, with the exception of Tx4 and 2-12kV breakers that are 1970 vintage.
- The station has very poor condition evaluations and is at risk of failure.
- Transmission Field Service has poor structural evaluations of the 138kV box bay and it will have to be replaced.
- This vintage General Electric 12kV cubicle switchgear is experiencing an increasing number of failures and spare parts are no longer available. Parts must be custom built at a significant expense.
- The project will eliminate all remaining 4kV equipment, including the 1940 vintage Tx1.
- Increase reliability with remote supervisory control and load monitioring.

Distribution Component:

Relocate four existing 12kV exits to the new 138/12kV bay

- All four 12kV exits are underground and will need to be relocated with 3-1000AL & 1-4/0 Cu cable.
- An estimated 0.4mi of 3ph Distribution line in front of station will need to be re-built to configure for new exits and allow for switching between circuits outside of the station.

Benefits of the Project:

- The Main St project relieves reliability concerns of aged equipment and improves the ability for contingency transfers.

- Construction of a standard modern station will allow for connection of a mobile backup transformer for increased reliability for outage and planned maintenance events.
- Provides improved safety to station personel by replacing aged metal clad switchgear.
- SCADA capabilities allow enhanced monitoring and additional switching and sectionalizing abilities done remotely, reducing overall outage identification and restoration time.
- New equipment is more reliable for customers and more easily maintained.

Michigan District – Feeder Additions

Project Description:

Add 1-12kV feeder addition to the following stations, except where noted as 19.9kV:

- Hagar ISD =2021, two year project. Timing coordinates with T station project
- Three Oaks ISD =2021, two year project. Timing coordinates with T station project
- Covert ISD = 2022, two year project.
- Crystal ISD = 2022, two year project.
- Sodus ISD = 2022, two year project.
- Almena ISD= 2023, single year project. 19.9kV Ckt
- Stubey Rd. ISD = 2023, single year project.

Justification / Need for the Project:

The feeder addition projects are needed due to reliability and expectations for growth.

- This is a reliability constrained area with limited opportunities for load transfers durning emergency situations.
- The feeder additions will help improve area reliability and operational flexibility.
- The existing stations have transformer capacity and the feeder addition will facilitate the operability of this capacity.

Distribution Component:

- Each feeder addition will have a new exit span and line extension to meet existing facilities.

Benefits of the Project:

- The project will increase reliability with additional circuit ties for contingency switching.
- The additional circuit provides capacity for anticipated load growth and economic development opportunities.
- The feeder addition will utilize excess transformer capacity.

Michigan District – SCADA Additions

Project Description:

Install station Supervisory Control and Data Acquisition (SCADA) to the following stations:

- Murch ISD =2022, two year project. Timing coordinates with T station project
- Sodus ISD = 2022, two year project. Timing coordinates with T station project.

Justification / Need for the Project:

SCADA addition at existing distribution stations is due to concerns of reliability and enhanced monitoring. The following are drivers for these projects:

-
- This is a reliability constrained area with limited opportunities for load transfers durning emergency situations.

Distribution Line Component:

- N/A

Benefits of the Project:

- SCADA capabilities allow enhanced monitoring and additional switching and sectionalizing abilities done remotely, reducing overall outage identification and restoration time.
- New equipment is more reliable for customers and more easily maintained.

Benton Harbor Area – Sodus Station

Project Description:

- Install a 138 kV circuit switcher on the transformer.
- Replace two 12 kV circuit breakers
- Install station Supervisory Control and Data Acquisition (SCADA).
- ISD =2022; 2 year project timeline.

Justification / Need for the Project:

Replacement of distribution facilities at Sodus Station is due to concerns of reliability and enhanced monitoring.

- Two existing 12 kV feeder breakers are at the end of life and has been identified for proactive replacement
- The existing transformer protection scheme is obsolete.
- Limited SCADA functionality of station devices.

Distribution Line Component:

- N/A

Benefits of the Project:

- Updated transformer protection scheme allows for greater reliability
- Replacement of the existing obsolete feeder breakers reduces the risk of asset failure.
- SCADA capabilities allow enhanced monitoring and additional switching and sectionalizing abilities done remotely, reducing overall outage identification and restoration time.
- Integrating circuit breaker controls into SCADA, where possible, contributes to the strategic goal of modernizing the distribution grid.
- New equipment is more reliable for customers and more easily maintained.

Benton Harbor Area – Stevensville Bus Regulators

Project Description:

- Replace existing 438amp 12kV Bus #2 Regulators with 875amp units to match transformer capability

Justification / Need for the Project:

This Regulator project is needed due to reliability and expectations for growth.

- This is a reliability constrained area with limited opportunities for load transfers durning emergency situations.
- The regulator upgrade will help improve area reliability and operational flexibility.
- The existing station has transformer capacity and the regulator upgrade will facilitate the operability of this capacity.

Distribution Component:

- N/A

Benefits of the Project:

- The project will increase reliability with additional capacity for contingency switching.
- The regulator upgrade provides capacity for anticipated load growth and economic development opportunities.
- The regulator upgrade will utilize excess transformer capacity.

Buchanan Area – Buchanan Hyro (Bucktown) Station

Project Description:

- Relocate and rebuild the existing Buchanan Hydro 69/12kV distribution station which provides service to I&M customers into a new modern 69/12kV station to be named Bucktown.
- Upgrade the existing 69/12kV, 9.375MVA LTC to a 20MVA transformer with Bus Regulators, and add 3rd 12kV feeder.
- Install a 69kV circuit switcher.
- Install station Supervisory Control and Data Acquisition (SCADA).
- ISD =2023; 2 year project timeline

Justification / Need for the Project:

A relocation to the Buchanan Hydro Station Transformer is needed due to concerns of reliability and modernization.

- The Buchanan Hydro station was constructed in 1964 and has poor site and equipment condition evaluations.
- The station transformer ranks in the worst 1/3rd of I&M's tranformers.
- This is a capacity constrained area which limits the opportunities for load transfers durning emergency and planned contingency situations.

Distribution Component:

- Add one new and relocate two 12kV feeder exits. The distance and easements required make this line extension are to be determined due to new site selection.

Benefits of the Project:

- The Buchanan Hydro project relieves reliability concerns of an aged station transformer and associated equipment.
- The capacity addition provides load transfers to the Buchanan South station that allows the rebuild of the Buchanan South 69kV Radial Tap line. This is a 1960's vintage wooden pole line.
- SCADA capabilities allow enhanced monitoring and additional switching and sectionalizing abilities done remotely, reducing overall outage identification and restoration time.
- Eliminates the need for a mobile during outages on the Buchanan South Circuits (Planned or Emergency).
- New equipment is more reliable for customers and more easily maintained.

Buchanan Area – Simplicity Station

Project Description:

- Build a new modern 69/12kV distribution station as an expansion of the customer owned Simplicity station site.
- Install 69kV circuit switcher.
- Install a 69/12kV, 20MVA transformer with bus regulators and 3-12kV feeders.
- Install station Supervisory Control and Data Acquisition (SCADA).
- ISD =2023; 3 year project timeline

Justification / Need for the Project:

The new Simplicity station is needed due to concerns of reliability and recoverability of the Niles Station.

- Provides recovery of Niles 12kV Circuits. There is none at this time.
- Provides necessary transformation to complete Niles/Bertrand 34kV to 12kV Conversion.
- Present mobile limits allows recovery of only 11MVA (18MVA needed).
- Niles station is space constrained and an alternate site is required.

Distribution Component:

- 3 new station exits.
- An estimated 2.5mi of 3ph Distribution lines need to be re-built to configure for new exits and allow for switching points to the existing Niles circuits.

Benefits of the Project:

A new Simplicity Station:

- The capacity addition provides contingency recovery of the Niles 12kV Circuits.
- Provides necessary transformation to complete Niles/Bertrand 34kV to 12kV Conversion.
- Eliminates the need for a mobile during outages (Planned or Emergancy).
- Provides for capacity for distribution automation.
- Provides capacity for future load growth.

Michigan District – Transmission Line Underbuild upgrades

Project Description:

Reconductor a mix of small wire to 3-556AL +1-4/0AA on Transmission line rebuild projects.

- Hickory Creek-Main St ISD = 2024, single year project. Timing coordinates with T line rebuild.
- Main St-Riverside ISD = 2024, single year project. Timing coordinates with T line rebuild.

Justification / Need for the Project:

The distribuition line reconductoring projects are needed due to reliability and expectations for growth.

- This is a reliability constrained area with limited opportunities for load transfers durning emergency situations.
- The line upgrades will help improve area reliability and operational flexibility.
- The existing stations have transformer capacity and the line upgrade will facilitate the operability of this capacity.

Distribution Component:

- Each Transmission line rebuild project has distribution underbuild that will be upgraded at the same time to maximize project construction resources.

Benefits of the Project:

- The project will increase reliability with additional circuit ties for contingency switching.
- The additional circuit line capacity will provide for anticipated load growth and economic development opportunities.
- The line upgrade will utilize excess transformer capacity.

Benton Harbor Area – Scottdale Station

Project Description:

- Rebuild the existing Scottdale 34.5/12kV station which provides 12kV service to I&M customers into a modern 69/34.5/12kV station.
- The 69kV upgraded station will add 1-69/34.5/12kV, 10/12.5MVA transformer.
- Install station Supervisory Control and Data Acquisition (SCADA).
- ISD =2024; 2 year project timeline.

Justification / Need for the Project:

The rebuild of Scottdale station is due to concerns of reliability and expectation for load growth.

- Scottdale station is over 50 years old and most of the 34.5kV equipment is obsolete.
- Scottdale station is located in a capacity constrained area which limits the opportunities for load transfers during emergency situations.
- Prepares for the 34.5 to 69kV subtransmission voltage conversion on the Berrien Springs-Hickory Creek 34.5kV line.
- Replaces a 54 year old 34.5/12kV, 7.5MVA transformer with maintenance issues with a 69/34.5/12kV, 10MVA unit .
- Increase reliability with remote supervisory control and load monitioring.

Distribution Component:

There is no Distribution component at this time.

Benefits of the Project:

- The upgrades at Scottdale station relieves reliability concerns of aged and obsolete equipment and improves the ability to serve increasing load.
- The load served by Scottdale station becomes fully recoverable.
- SCADA capabilities allow enhanced monitoring and additional switching and sectionalizing abilities done remotely, reducing overall outage identification and restoration time.
- New equipment is more reliable for customers and more easily maintained.

Three Rivers Area – Valley Station

Project Description:

- Add a new modern 69/34.5kV distribution source at the Valley station.
- Install 69kV circuit switcher.
- Install a 69/34.5kV, 10/12.5MVA transformer with bus regulators and 1- new 34.5kV feeder.
- Install station Supervisory Control and Data Acquisition (SCADA).
- ISD =2024; 2 year project timeline

Justification / Need for the Project:

The new Valley distribution source is needed due to concerns of reliability and modernization. The following are drivers for the project:

- This is a reliability constrained area with limited opportunities for load transfers durning emergency situations.
- The feeder addition will help improve area reliability and operational flexibility.
- The new station transformer has capacity and the feeder addition will facilitate the operability of this capacity.
- SCADA control and visibility.

Distribution Component:

- 1 new 34.5kV distribution station exit.
- Rebuild approximately 0.5miles of distribution line to establish a new feeder tie point to the existing Valley-Valley 34.5kV circuit.

Benefits of the Project:

Valley station:

- Increase reliability by reducing the circuit exposure and increased transfer options with the additional 34.5kV feeder.
- The additional circuit provides capacity for anticipated load growth and economic development opportunities.
- SCADA capabilities allow enhanced monitoring and additional switching and sectionalizing abilities done remotely, reducing overall outage identification and restoration time.

Benton Harbor Area – Corey Station

Project Description:

- Build a new modern 138/12kV distribution station at the Corey station site.
- Install 138kV circuit switcher.
- Install a 138/12kV, 20MVA transformer with bus regulators and 3-12kV feeders.
- Install station Supervisory Control and Data Acquisition (SCADA).
- ISD =2025; 3 year project timeline

Justification / Need for the Project:

The new Corey station is needed due to concerns of reliability and recoverability of the Three Rivers (Ripple) and Florence Rd stations.

- Ripple and Florence Rd both have 12kV circuits are currently limited by location, capacity, and line tie capability for planned and emergency contingency transfers.
- Provides necessary transformation future load growth and economic development.
- Station space constraints and locations make an alternate site required.

Distribution Component:

- 3 new Overhead 12kV station exits.
- Rebuild of approximately 5.5 miles of Distribution Line to establish tie points to the Ripple and Florence Rd circuits.

Benefits of the Project:

A new Corey Station will provide:

- The necessary transformation and line tie upgrades for additional planned and emergency contingency recovery of Ripple and Florence Rd 12kV circuits.
- Reduces the need for a mobile during outages (Planned or Emergency).
- Provides capacity for future distribution automation.

Benton Harbor Area – Pearl St Station

Project Description:

- Rebuild the existing Pearl St 34.5/12kV station which provides 12kV service to I&M customers into a modern 69x34.5/12kV station.
- Upgrade single 34.5kV phase over phase entrance to a modern 69kV in and out design
- Install 2-69kV circuit switchers to replace existing single ground switch.
- The 69kV upgraded station will add two 69x34.5/12kV, 12.5/14MVA transformers.
- Install station Supervisory Control and Data Acquisition (SCADA).
- ISD =2025; 2 year project timeline.

Justification / Need for the Project:

The rebuild of Pearl St station is due to concerns of reliability and expectation for load growth.

- Pearl St station was built in 1956 and contains 34.5kV equipment that is obsolete.
- Pearl St station is located in a capacity constrained area which limits the opportunities for load transfers during emergency situations.
- The age and condition of the existing 34.5kV subtransmission system is being replaced with 69kV in the near future.
- This project replaces both a 53 and 69 year old 34.5/12kV, 7.5MVA transformers with maintenance issues with 2-69x34.5/12kV, 12.5/14MVA units .
- Increase reliability with remote supervisory control and load monitioring.

Distribution Component:

Transfer four existing feeder exits to new 12kV bay location.

- Transfer 2-Overhead and 2-underground exits to new location.

Benefits of the Project:

- The upgrades at Pearl St station relieves reliability concerns of aged and obsolete equipment and improves the ability to serve increasing load.
- The load served by Pearl St station becomes fully recoverable.
- SCADA capabilities allow enhanced monitoring and additional switching and sectionalizing abilities done remotely, reducing overall outage identification and restoration time.
- New equipment is more reliable for customers and more easily maintained.

Michigan District Projects - 2021-2025 Project Years	
Projects	PVR Score
DP19F0004 Almena Feeder addition	0.2027
DP22F02B0 - Stevensville Bus Regulators	113.8018
DR15F00004 Ripple station	0.7477
DR17F0009 - Crystal feeder addition	1.9153
DR19F0013-Three Oaks	1.0292
DR19F0014 Hagar	1.321
DR19F0016 Scottdale station	0.063
DR19F0017 Corey new station	0.7842
DR19F0019 Derby	0.0657
DR19F0020 Stubey Rd	0.4832
DR20F0003 Lake St station	0.1976
DR20F0005 Buchanan Hydro station upgrade	0.5072
DR20F0007 Pearl St 69kV conversion	1.2613
DR20F0008 Covert feeder addition	0.1808
DR20F01B2 - West St CB	2.2937
DR20F01B4 - Stone Lake CB	1.4079
DR21F0004 Boundary_NIles	3.1817
DR22F0007 Valley	0.3256
DR22F0012 - Covert Fire Lanes	0.7017
GMDACRIN.Swanson/Swanson.No.2 34.5kv/ No.3 34.5kv.DACR	7.0987
GMDACRMI.Crystal/Main St.Coloma tie/ Eastside.DACR	10.8303
GMDACRMI.East watervliet/ West St.Panther/Ryno Rd.DACR	3.1332
GMDACRMI.Hickory Creek/ Scottdale.Niles/West.DACR	5.3915
GMDACRMI.Lakeside/ New Buffalo.Union Pier/Bison.DACR	6.0594
GMDACRMI.Main st/Riverside.Sears/Paw Paw Ave.DACR	0.6492
GMDACRMI.Pigeon River/Stubey Road.Elkhart Street/West.DACR	9.5859
GMDACRMI.Pokagon/Niles.12Kv/North.DACR.	18.609
GMMGRDMI.Vicksburg.Richardson.KA0547000131	0.6042
GMMGRDMI.West Street.Paw Paw Lake.BE0114000008	0.2326
GMSCADMI.Buchanan Hydro.ALL.SCADA	0.1692
GMSCADMI.Crystal.ALL.SCADA	3.1898
GMSCADMI.East Watervliet.ALL.SCADA	1.7954
GMSCADMI.Florence Road.ALL.SCADA	2.0382
GMSCADMI.Hickory Creek.ALL.SCADA	3.6774
GMSCADMI.Lakeside.ALL.SCADA	3.2554
GMSCADMI.Main St.ALL.SCADA	2.5266
GMSCADMI.Murch.ALL.SCADA	1.9786
GMSCADMI.New Buffalo.ALL.SCADA	3.0009
GMSCADMI.Niles.ALL.SCADA	6.731
GMSCADMI.Pigeon River.ALL.SCADA	1.6778
GMSCADMI.Pokagon.ALL.SCADA	2.6634
GMSCADMI.Riverside.ALL.SCADA	1.999
GMSCADMI.Scottdale.ALL.SCADA	3.3101

GMSCADMI.Sodus.ALL.SCADA	3.6023
GMSCADMI.Stevensville.ALL.SCADA	0.1301
GMSCADMI.Stubey Road.ALL.SCADA	2.3162
GMSCADMI.Three Oaks.ALL.SCADA	0.0336
GMSCADMI.Valley.ALL.SCADA	1.7551
GMSCADMI.West St.ALL.SCADA	3.6862
IMGMSCTMI.Baroda/Stevensville.Livingston/South.Smart Circuit Tie	9.3558
IMGMSCTMI.Bridgman/Manley.Baroda/Livingston.Smart Circuit Tie	23.5527
IMGMSCTMI.Buchanan South/Clark.Buchanan Hydro/Town.Smart Circuit Tie	5.9127
IMGMSCTMI.Colby West/.Indian Lake 12KV.Smart Circuit Tie	45.5028
IMGMSCTMI.Colby West/.Indian Lake 12KV.Smart Circuit Tie PART 2	18.8329
IMGMSCTMI.Colby West/.Indian Lake 12KV.Smart Circuit Tie PART 3	29.8821
IMGMSCTMI.Covert/Bangor.12kV/Viking.Smart Circuit Tie	9.6809
IMGMSCTMI.Florence Road/Three Rivers.Race Bank/Corey Lake.Smart Circuit Tie	7.6233
IMGMSCTMI.Florence/Mottville.Race Bank/12Kv.Smart Circuit Tie	3.7694
IMGMSCTMI.Hartford/Sister Lakes.West/Keeler.Circuit Tie	3.0554
IMGMSCTMI.Kalamazoo/Moore Park.South/Railroad.Circuit Tie	1.5768
IMGMSCTMI.Main St/Sears.Main St/Riverview.Riverside/Paw Paw Lake.Smart Circuit Tie	4.7088
IMGMSCTMI.Moore Park/Kalamazoo.Railroad/South.Circuit Tie	1.6933
IMGMSCTMI.Riverside/Riverside.Klock Park/Paw Paw Ave.Smart Circuit Tie	1.6433
IMGMSCTMI.Scottdale/Baroda.Scott/Cleveland.Smart Circuit Tie	0.8976
IMGMSCTMI.Sister Lakes/Hartford.Keeler/West.Circuit Tie	17.5999
IMGMSCTMI.Sodus/Eau Claire.Sodus/12KV.Smart Circuit Tie	9.1563
IMGMSCTMI.Stevensville/South.Baroda/Livingston.Stevensville/Red Arrow.Smart Circuit T	15.0983
IMGMSCTMI.Valley/Cameron.Valley 34.5KV/Juice 34.5KV.Smart Circuit Tie	4.1373
IMGMSCTMI.Vicksburg/Kalamazoo.West/Eagle.Smart Circuit Tie	13.7552
IMGMSCTMI.Wheeler Street/Moore Park.Fisher Lake/Rocky.Smart Circuit Tie	1.8854
IMMIR1PHL.Almena.Bloomingdale.VB0230000044	0.5109
IMMIR1PHL.Almena.Bloomingdale.VB0469000003	0.1975
IMMIR1PHL.Almena.Gobles.VB0292000001	1.1831
IMMIR1PHL.Almena.Gobles.VB0471000065	1.6626
IMMIR1PHL.Almena.Gobles.VB0495000055	1.0714
IMMIR1PHL.Almena.Mattawan.VB0524000029	1.7125
IMMIR1PHL.Almena.Mattawan.VB0545000120	4.0344
IMMIR1PHL.Baroda.Baroda.BE0428000066	2.1648
IMMIR1PHL.Baroda.Livingston.BE0365000140	2.6478
IMMIR1PHL.Berrien Springs.South.BE0417000011	6.1337
IMMIR1PHL.Berrien Springs.South.BE0435000015	1.6479
IMMIR1PHL.Bridgman.Baroda.BE0511000014	2.7556
IMMIR1PHL.Bridgman.Manley.BE0347000007	1.2925
IMMIR1PHL.Bridgman.Manley.BE0383000079	4.9847
IMMIR1PHL.Bridgman.Manley.BE0402000002	5.0731
IMMIR1PHL.Bridgman.Sawyer.BE0422000115	4.6366
IMMIR1PHL.Bridgman.Sawyer.BE0463000321	6.6783
IMMIR1PHL.Buchanan Hydro.River Rd.BE0518000004	3.7704

IMMIR1PHL.Buchanan Hydro.River Rd.BE0518000131	1.6778
IMMIR1PHL.Buchanan Hydro.River Rd.BE0543000020	0.7405
IMMIR1PHL.Buchanan Hydro.River Rd.BE0570000201	2.8228
IMMIR1PHL.Buchanan Hydro.Town.BE0569000103	1.5334
IMMIR1PHL.Buchanan Hydro.Town.BE0569000241	1.8396
IMMIR1PHL.Buchanan Hydro.Town.BE0569000242	2.7196
IMMIR1PHL.Buchanan South.Clark.BE0598000035	2.1472
IMMIR1PHL.Buchanan South.South.BE0680000013	1.9523
IMMIR1PHL.Buchanan South.Terre Coupe.BE0568000064	12.1722
IMMIR1PHL.Buchanan South.Terre Coupe.BE0568000078	3.4267
IMMIR1PHL.Buchanan South.Terre Coupe.BE0620000015	2.7346
IMMIR1PHL.Cameron.Juice.VB0593000181	1.2531
IMMIR1PHL.Colby.West.VB0723000023	1.576
IMMIR1PHL.Covert.12KV.VB0271000057	2.0511
IMMIR1PHL.Covert.12kV.VB0303000064	3.8374
IMMIR1PHL.Covert.12kV.VB0329000005	6.0138
IMMIR1PHL.Covert.12kV.VB0329000014	4.9344
IMMIR1PHL.Covert.12kV.VB0331000015	1.4257
IMMIR1PHL.Crystal.Coloma Tie.BE0177000029	0.4445
IMMIR1PHL.Crystal.Coloma Tie.BE0190000112	2.6595
IMMIR1PHL.Crystal.Coloma Tie.BE0204000087	0.4968
IMMIR1PHL.Crystal.Coloma Tie.BE0206000017	0.3591
IMMIR1PHL.Hagar .Michigan Beach.BE0119000061	2.5351
IMMIR1PHL.Hagar .Michigan Beach.BE0129000093	1.5158
IMMIR1PHL.Hagar .Michigan Beach.BE0129000094	1.5374
IMMIR1PHL.Hagar.Riverside.BE0151000044	3.1183
IMMIR1PHL.Hagar.Riverside.BE0151000071	4.0054
IMMIR1PHL.Hagar.Riverside.BE0165000037	3.4414
IMMIR1PHL.Hartford .West.VB0430000001	1.8278
IMMIR1PHL.Hartford .West.VB0551000114	11.142
IMMIR1PHL.Hawthorne.Industrial.BE0215000256	2.7103
IMMIR1PHL.Hawthorne.Industrial.BE0215000273	5.9641
IMMIR1PHL.Hawthorne.Industrial.BE0229000108	2.0174
IMMIR1PHL.Hickory Creek.Niles.BE0247000342	3.1658
IMMIR1PHL.Kalamazoo.Schoolcraft.KA0587000038	2.4292
IMMIR1PHL.Kalamazoo.Schoolcraft.KA0587000115	1.5706
IMMIR1PHL.Kalamazoo.Schoolcraft.KA0587000354	4.0367
IMMIR1PHL.Lakeside .Union Pier.BE0579000039	1.5543
IMMIR1PHL.Lakeside.New Troy.BE0508000085	2.6487
IMMIR1PHL.Lakeside.Union Pier.BE0552000372	2.2272
IMMIR1PHL.MOTTVILLE.MOTTVILLE.SJ0511000015	3.2485
IMMIR1PHL.MOTTVILLE.MOTTVILLE.SJ0511000050	1.251
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IMMIR1PHL.Niles.Bertrand.BE0599000146	1.6251
IMMIR1PHL.Niles.Bertrand.BE0627000129	2.6905
IMMIR1PHL.Niles.Bertrand.BE0656000081	0.3438
IMMIR1PHL.Niles.East.CA0557000007	2.191
IMMIR1PHL.Niles.North.BE0501000021	4.3658
IMMIR1PHL.Niles.North.BE0504000037	0.0696
IMMIR1PHL.Niles.South.BE0687000152	5.106
IMMIR1PHL.Oronoko.Red Bud.BE0411000019	1.1528
IMMIR1PHL.Oronoko.Red Bud.BE0411000140	3.5526
IMMIR1PHL.Oronoko.Red Bud.BE0412000023	3.4834
IMMIR1PHL.Pearl St.Fairplain North.BE0216000314	3.357
IMMIR1PHL.Pearl St.Fairplain North.BE0216000948	1.8441
IMMIR1PHL.Pokagon.12KV.CA0487000013	3.4945
IMMIR1PHL.Riverside.Klock Park.BE0200000170	1.0435
IMMIR1PHL.Saulk Trail.Eagle Lake.CA0566000001	2.97
IMMIR1PHL.Saulk Trail.Eagle Lake.CA0566000043	1.938
IMMIR1PHL.Schoolcraft.Schoolcraft.KA0587000009	2.4618
IMMIR1PHL.Schoolcraft.Schoolcraft.KA0587000038	2.3488
IMMIR1PHL.Schoolcraft.Schoolcraft.KA0587000115	0.8941
IMMIR1PHL.Schoolcraft.Schoolcraft.KA0587000354	5.1026
IMMIR1PHL.Sister Lakes.Sister Lakes.CA0126000076	10.9451
IMMIR1PHL.Sister Lakes.Sister Lakes.VB0718000099	9.1207
IMMIR1PHL.Sodus .Bainbridge.BE0272000004	1.7014
IMMIR1PHL.Sodus .Bainbridge.BE0289000007	3.7014
IMMIR1PHL.Sodus.Bainbridge.BE0255000083	3.2732
IMMIR1PHL.Sodus.Bainbridge.BE0272000004	0.9448
IMMIR1PHL.Sodus.Bainbridge.BE0287000166	3.8746
IMMIR1PHL.Sodus.Bainbridge.BE0289000007	0.8215
IMMIR1PHL.Sodus.Sodus.BE0269000004	2.7992
IMMIR1PHL.Sodus.Sodus.BE0301000089	0.43
IMMIR1PHL.Stevensville .Red Arrow.BE0294000062	4.8616
IMMIR1PHL.Stevensville .Red Arrow.BE0312000001	10.7195
IMMIR1PHL.Stone Lake.Diamond.CA0377000012	3.6085
IMMIR1PHL.Stubey Rd.West.SJ0572000028	0.4332
IMMIR1PHL.Stubey Rd.West.SJ0573000029	0.449
IMMIR1PHL.THREE OAKS.1-12KV.BE0584000014	1.1467
IMMIR1PHL.THREE OAKS.1-12KV.BE0584000023	1.7844
IMMIR1PHL.THREE OAKS.1-12KV.BE0606000031	1.095
IMMIR1PHL.THREE OAKS.1-12KV.BE0607000016	2.2819
IMMIR1PHL.THREE OAKS.1-12KV.BE0608000035	1.3038
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IMMIR1PHL.THREE OAKS.1-12KV.BE0610000010	2.2373
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IMMIR1PHL.THREE OAKS.1-12KV.BE0668000007	1.3939
IMMIR1PHL.THREE OAKS.1-12KV.BE0698000014	1.1216
IMMIR1PHL.Three Oaks.Warren.BE0581000095	1.9937
IMMIR1PHL.Three Rivers.Corey Lake.SJ0342000038	6.4439
IMMIR1PHL.Three Rivers.Corey Lake.SJ0346000161	1.8087
IMMIR1PHL.Three Rivers.State Street.SJ0324000284	1.8848
IMMIR1PHL.Valley.Valley.VB0682000385	1.3318
IMMIR1PHL.Vicksburg.Richardson.KA0547000141	0.3729
IMMIR1PHL.West St..Millbrug.BE0158000044	1.131
IMMIR1PHL.West St.Coloma.BE0102000033	0.4805
IMMIR1PHL.West St.Coloma.BE0143000022	1.5075
IMMIR1PHL.West St.Coloma.BE0144000211	0.823
IMMIR1PHL.West St.Millbrug.BE0158000044	1.1354
IMMIR1PHL.West St.Millbrug.BE0194000203	2.5428
IMMIR1PHL.West St.Millbrug.BE0195000001	3.298
IMMIR1PHL.West St.Paw Paw Lake.BE0104000036	1.995
IMMIR3PHL.Almena.Bloomingdale.VB0173000031	0.0669
IMMIR3PHL.Almena.Bloomingdale.VB0259000001	0.0725
IMMIR3PHL.Almena.Bloomingdale.VB0469000065	0.6217
IMMIR3PHL.Almena.Mattawan.VB0523000162	1.4794
IMMIR3PHL.Almena.Mattawan.VB0524000035	0.1631
IMMIR3PHL.Berrien Springs Hydro.North.BE0396000058	4.0744
IMMIR3PHL.Berrien Springs.South.BE0415000029	1.0035
IMMIR3PHL.Berrien Springs.South.BE0416000009	1.9295
IMMIR3PHL.Berrien Springs.South.BE0418000104	0.7488
IMMIR3PHL.Bridgman.Manley.BE0329000058	4.0205
IMMIR3PHL.Bridgman.Manley.BE0403000139	6.0139
IMMIR3PHL.Bridgman.Manley.BE0403000241	1.5147
IMMIR3PHL.Bridgman.Sawyer.BE0422000103	1.3425
IMMIR3PHL.Bridgman.Sawyer.BE0443000120	0.1923
IMMIR3PHL.Buchanan Hydro.River Rd.BE0544000059	7.6336
IMMIR3PHL.Buchanan Hydro.River Rd.BE0570000249	1.7854
IMMIR3PHL.Buchanan Hydro.Town.BE0569000269	4.9688
IMMIR3PHL.Buchanan Hydro.Town.BE0570000028	4.8911
IMMIR3PHL.Buchanan Hydro.Town.BE0570000172	1.2648
IMMIR3PHL.Buchanan Hydro.Town.BE0597000262	1.9888
IMMIR3PHL.Buchanan South .Terre Coupe.BE0594000035	1.0714
IMMIR3PHL.Buchanan South .Terre Coupe.BE0594000035	1.4357
IMMIR3PHL.Buchanan South.Clark.BE0596000040	1.2756
IMMIR3PHL.Buchanan South.Terre Coupe.BE0594000035	0.3907
IMMIR3PHL.Cameron.Lawton 34.5KV.VB0592000276	1.1651
IMMIR3PHL.Covert.12kV.VB0271000012	0.6946
IMMIR3PHL.Covert.12kV.VB0332000063	14.0468

IMMIR3PHL.Crystal.Coloma.BE0204000053	1.0818
IMMIR3PHL.Hagar .Michigan Beach.BE0129000248	2.7819
IMMIR3PHL.Hagar.Michigan Beach.BE0128000170	4.6802
IMMIR3PHL.Hagar.Riverside.BE0140000019	0.4973
IMMIR3PHL.Hagar.Riverside.BE0141000094	0.1719
IMMIR3PHL.Hartford .West.VB0479000071	2.3013
IMMIR3PHL.Hartford .West.VB0552000120	1.5796
IMMIR3PHL.Hartford.East.VB0504000017	1.3973
IMMIR3PHL.Hawthorne.Industrial.BE0229000020	5.6765
IMMIR3PHL.Hawthorne.Shoreham.BE0245000004	1.2555
IMMIR3PHL.Hawthorne.Shoreham.BE0245000020	1.0182
IMMIR3PHL.Hickory Creek.Niles.BE0247000308	3.3442
IMMIR3PHL.Kalamazoo.Schoolcraft.KA0586000033	1.389
IMMIR3PHL.Kalamazoo.Schoolcraft.KA0587000146	2.8024
IMMIR3PHL.Kalamazoo.Schoolcraft.KA0611000129	2.7812
IMMIR3PHL.Lakeside .Union Pier.BE0552000202	1.3662
IMMIR3PHL.Lakeside .Union Pier.BE0578000010	13.3832
IMMIR3PHL.Lakeside .Union Pier.BE0578000015	6.1631
IMMIR3PHL.Lakeside.Mustang.BE0528000039	0.932
IMMIR3PHL.Lakeside.Mustang.BE0553000114	3.8042
IMMIR3PHL.Main St.Riverview.BE0201000585	1.9318
IMMIR3PHL.Moore Park.Portage.SJ0253000010	2.4178
IMMIR3PHL.MOTTVILLE.MOTTVILLE.SJ0534000040	1.2514
IMMIR3PHL.MOTTVILLE.MOTTVILLE.SJ0534000044	1.2374
IMMIR3PHL.MOTTVILLE.MOTTVILLE.SJ0534000124	1.1605
IMMIR3PHL.MOTTVILLE.MOTTVILLE.SJ0534000126	1.1261
IMMIR3PHL.MOTTVILLE.MOTTVILLE.SJ0534000260	1.13
IMMIR3PHL.MOTTVILLE.MOTTVILLE.SJ0535000003	1.2103
IMMIR3PHL.Murch.Lake Cora.VB0513000075	2.5543
IMMIR3PHL.New Buffalo.Bison.BE0632000044	0.6594
IMMIR3PHL.New Buffalo.State Line.BE0690000146	2.2568
IMMIR3PHL.Nickerson.Napier.BE0233000192	2.7816
IMMIR3PHL.Niles .East.CA0533000100	1.8893
IMMIR3PHL.Niles .North.BE0527000034	1.1841
IMMIR3PHL.Niles.Bertrand 34.5KV.BE0549000029	1.8151
IMMIR3PHL.Niles.Bertrand.BE0686000018	1.2212
IMMIR3PHL.Niles.East.BE0629000123	1.1263
IMMIR3PHL.Niles.East.BE0629000130	0.07
IMMIR3PHL.Niles.North.BE0504000001	2.7591
IMMIR3PHL.Niles.North.BE0527000034	1.1841
IMMIR3PHL.Niles.North.BE0549000103	2.073
IMMIR3PHL.Niles.North.BE0551000083	0.1212
IMMIR3PHL.Niles.North.BE0551000122	2.481
IMMIR3PHL.Niles.South.BE0628000153	2.8412
IMMIR3PHL.Niles.South.BE0687000145	0.5935

IMMIR3PHL.Niles.South.BE0687000152	2.3291
IMMIR3PHL.Oronoko.Red Bud.BE0412000023	2.8138
IMMIR3PHL.Oronoko.Red Bud.BE041300003	2.8223
IMMIR3PHL.Oronoko.Red Bud.BE0414000082	0.1101
IMMIR3PHL.Pearl St.Fairplain North.BE0216000264	0.3968
IMMIR3PHL.Pearl St.Fairplain North.BE0217000026	6.0846
IMMIR3PHL.Pearl St.Fairplain South.BE0232000100	1.2091
IMMIR3PHL.Pearl St.Plaza.BE0218000383	0.3842
IMMIR3PHL.Pearl St.Plaza.BE0232000154	5.0016
IMMIR3PHL.Pearl St.Plaza.BE0232000448	1.4381
IMMIR3PHL.Pokagon.12kV.CA0439000013	16.8112
IMMIR3PHL.Pokagon.12kV.CA0486000325	1.0223
IMMIR3PHL.Riverside.North Shore.BE0149000009	2.6005
IMMIR3PHL.Riverside.North Shore.BE0149000022	1.2303
IMMIR3PHL.Riverside.North Shore.BE0162000010	2.5892
IMMIR3PHL.Riverside.Paw Paw.BE0174000310	1.0785
IMMIR3PHL.Saulk Trail.Eagle Lake.CA0540000001	10.3642
IMMIR3PHL.Saulk Trail.Eagle Lake.CA0540000048	10.3981
IMMIR3PHL.Schoolcraft.Schoolcraft.KA0586000033	0.2806
IMMIR3PHL.Schoolcraft.Schoolcraft.KA0611000129	1.8535
IMMIR3PHL.Sister Lakes.Sister Lakes.VB0694000020	0.0847
IMMIR3PHL.Sister Lakes.Sister Lakes.VB0718000039	0.0402
IMMIR3PHL.Sister Lakes.Sister Lakes.VB0718000145	4.1496
IMMIR3PHL.Sodus.Bainbridge.BE0224000015	2.7307
IMMIR3PHL.Sodus.Bainbridge.BE0239000085	1.0188
IMMIR3PHL.Sodus.Sodus.BE0268000167	0.1228
IMMIR3PHL.Sodus.Sodus.BE0284000074	0.1424
IMMIR3PHL.Sodus.Sodus.BE0357000017	0.4564
IMMIR3PHL.Stevensville .Red Arrow.BE0294000112	1.6587
IMMIR3PHL.Stevensville .Red Arrow.BE0312000008	1.6385
IMMIR3PHL.Stevensville Red Arrow.BE0294000112	1.6219
IMMIR3PHL.Stevensville.East.BE0313000038	1.3124
IMMIR3PHL.Stevensville.East.BE0313000089	1.0626
IMMIR3PHL.Stone Lake.Diamond.CA0352000162	1.2176
IMMIR3PHL.Stone Lake.Diamond.CA0375000296	3.0485
IMMIR3PHL.Stubey Rd.West.SJ0543000010	1.6634
IMMIR3PHL.Stubey Rd.West.SJ0571000039	0.0915
IMMIR3PHL.THREE OAKS.1-12KV.BE0609000345	3.3273
IMMIR3PHL.THREE OAKS.1-12KV.BE0610000035	1.5445
IMMIR3PHL.THREE OAKS.1-12KV.BE0610000040	1.5095
IMMIR3PHL.Three Rivers.Corey Lake.SJ0270000027	1.2723
IMMIR3PHL.Three Rivers.Corey Lake.SJ0294000181	1.6975
IMMIR3PHL.Three Rivers.Corey Lake.SJ0295000012	1.1604
IMMIR3PHL.Three Rivers.Corey Lake.SJ0318000034	1.0094
IMMIR3PHL.Three Rivers.Westland.SJ0299000036	1.8387

IMMIR3PHL.Valley.Valley 34.5KV.VB0682000281	3.1327
IMMIR3PHL.Valley.Valley 34.5KV.VB0682000361	1.7524
IMMIR3PHL.Valley.Valley.VB0681000257	2.2101
IMMIR3PHL.Valley.Valley.VB0704000002	0.0494
IMMIR3PHL.Vicksburg.East.KA0616000046	3.2688
IMMIR3PHL.Vicksburg.Richardson.KA0545000034	2.0897
IMMIR3PHL.West St.Coloma.BE0132000027	0.1326
IMMIR3PHL.West St.Coloma.BE0133000051	2.8507
IMMIR3PHL.West St.Coloma.BE0133000086	0.1518
IMMIR3PHL.West St.Coloma.BE0133000106	2.7121
IMMIR3PHL.West St.Coloma.BE0133000324	0.1555
IMMIR3PHL.West St.Millbrug.BE0144000044	1.402
IMMIR3PHL.West St.Millbrug.BE0180000026	1.2485
IMMIR3PHL.West St.Millbrug.BE0180000062	1.9495
IMMIR3PHL.West St.Millbrug.BE0181000036	1.1193
IMMIR3PHL.West St.Paw Paw Lake.BE0133000051	3.4036
IMMIR3PHL.West St.Paw Paw Lake.BE0144000106	0.5566
IMMIR3PHL.West St.Ryno.BE0135000404	1.6432
IMMIR3PHL.West St.Ryno.BE0136000520	2.2013
IMMIRCTIE.Baroda/Stevensville.Livingston/South.Circuit Tie	8.2271
IMMIRCTIE.Bridgman/Manley.Baroda/Livingston.Circuit Tie	33.9255
IMMIRCTIE.Buchanan South/Clark.Buchanan Hyrdro/Town.Circuit Tie	16.7991
IMMIRCTIE.Covert/Bangor.12kV/Viking.Circuit Tie	6.17
IMMIRCTIE.Florence Road/Three Rivers.Race Bank/Corey Lake.Circuit Tie	4.6764
IMMIRCTIE.Florence/Mottville.Race Bank/12Kv.Circuit Tie	2.4308
IMMIRCTIE.Main St/Sears.Main St/Riverview.Riverside/Paw Paw Lake.Circuit Tie	5.3183
IMMIRCTIE.Mottville/Florence.Mottville/Race Bank.Circuit Tie.SJ0534000381	1.9994
IMMIRCTIE.Riverside/Riverside.Klock Park/Paw Paw Ave.Circuit Tie	5.3328
IMMIRCTIE.Scottdale/Baroda.Scott/Cleveland.Circuit Tie	0.4772
IMMIRCTIE.Sodus/Eau Claire.Sodus/12KV.Circuit Tie	5.5962
IMMIRCTIE.Stevensville/South.Baroda/Livingston.Stevensville/Red Arrow.Circuit Tie	15.7029
IMMIRCTIE.Three Oaks /Lakeside.12kv/New Troy.Circuit Tie	6.6045
IMMIRCTIE.Three Oaks/Lakeside.12kv/New Troy.Circuit Tie	5.2693
IMMIRCTIE.Valley/Cameron.Valley 34.5KV/Juice 34.5KV.Circuit Tie	2.2076
IMMIRCTIE.Vicksburg/Kalamazoo.West/Eagle.Circuit Tie	9.0159
IMMIRCTIE.West St/Hagar.Coloma/Michigan Beach.Circuit Tie.BE0143000056	7.6347
IMMIRCTIE.West St/Hagar.Coloma/Riverside.Circuit Tie.BE0132000016	16.254
IMMIRCTIE.West St/Hagar.Coloma/Riverside.Circuit Tie.BE0143000046	29.5995
IMMIRCTIE.Wheeler Street/Moore Park.Fisher Lake/Rocky.Circuit Tie	1.4548
IMMIRRELO.Almena.Bloomingdale 34.5KV.VB0349000001	1.0545
IMMIRRELO.Almena.Bloomingdale 34.5KV.VB0470000063	2.1621
IMMIRRELO.Almena.Bloomingdale 34.5KV.VB0470000290	2.1679
IMMIRRELO.Almena.Gobles 34.5KV.VB0206000002	1.6941
IMMIRRELO.Almena.Gobles 34.5KV.VB0234000105	2.9076
IMMIRRELO.Almena.Gobles 34.5KV.VB0235000016	2.6975

IMMIRRELO.Almena.Gobles 34.5KV.VB0263000069	1.3383
IMMIRRELO.Almena.Mattawan 34.5KV.VB0499001011	2.5127
IMMIRRELO.Almena.Mattawan 34.5KV.VB0519000006	1.0742
IMMIRRELO.Almena.Mattawan 34.5KV.VB0521000043	1.0751
IMMIRRELO.Almena.Paw Paw.VB0542000017	1.3548
IMMIRRELO.Almena.Paw Paw.VB0542000034	1.351
IMMIRRELO.Almena.Red Arrow.VB0473000105	1.3697
IMMIRRELO.Almena.Red Arrow.VB0495000026	1.076
IMMIRRELO.Almena.Red Arrow.VB0495000027	1.0745
IMMIRRELO.Almena.Red Arrow.VB0498000032	3.4269
IMMIRRELO.Bangor.Viking.VB0248000017	1.5558
IMMIRRELO.Bangor.Viking.VB0278000010	1.1959
IMMIRRELO.Bangor.Viking.VB0305000033	1.8345
IMMIRRELO.Baroda.Baroda.BE0389000007	2.5915
IMMIRRELO.Baroda.Livingston.BE0371000003	1.2094
IMMIRRELO.Berrien Springs.South.BE0377000003	1.7391
IMMIRRELO.Berrien Springs.South.BE0417000032	4.5107
IMMIRRELO.Berrien Springs.South.BE0480000051	1.2251
IMMIRRELO.Bridgman.Baroda.BE0488000015	4.3397
IMMIRRELO.Bridgman.Baroda.BE0488000015.	4.851
IMMIRRELO.Bridgman.Baroda.BE0512000032	1.3496
IMMIRRELO.Bridgman.Baroda.BE0535000029	1.2745
IMMIRRELO.Bridgman.Manley.BE0346000019	1.8937
IMMIRRELO.Buchanan Hydro.River Road.BE0471000035	2.0041
IMMIRRELO.Buchanan Hydro.River Road.BE0474000034	1.297
IMMIRRELO.Buchanan Hydro.River Road.BE0493000047	2.9458
IMMIRRELO.Buchanan South.South.BE0622000005	1.0767
IMMIRRELO.Buchanan South.South.BE0681000066	2.1227
IMMIRRELO.Buchanan South.South.BE0712000001	1.3889
IMMIRRELO.Buchanan South.Terre Coupe.BE0568000064	8.1174
IMMIRRELO.Buchanan South.Terre Coupe.BE0594000035	2.5272
IMMIRRELO.Buchanan South.Terre Coupe.BE0594000104	2.5337
IMMIRRELO.Buchanan South.Terre Coupe.BE0649000001	2.3473
IMMIRRELO.Colby.West.CA0227000014	2.0908
IMMIRRELO.Covert.12KV.VB0329000005	4.4475
IMMIRRELO.Covert.12KV.VB0329000006	4.4669
IMMIRRELO.Covert.12KV.VB0329000009	4.4739
IMMIRRELO.Covert.12KV.VB0329000015	0.4507
IMMIRRELO.Covert.12KV.VB0332000076	1.0753
IMMIRRELO.Covert.12KV.VB0360000002	4.4874
IMMIRRELO.Covert.12KV.VB0360000004	4.4994
IMMIRRELO.Covert.12KV.VB0360000008	4.5486
IMMIRRELO.Crystal.Coloma Tie.BE0191000036	5.7341
IMMIRRELO.East Watervliet.County Line.BE0148000005	1.6609
IMMIRRELO.East Watervliet.Panther.VB0453000011	1.5179

IMMIRRELO.East Watervliet.Panther.VB0477000013	5.8885
IMMIRRELO.Florence .Racebank.SJ0438000009	2.6503
IMMIRRELO.Florence.Racebank.CA0388000031	1.7823
IMMIRRELO.Florence.Racebank.SJ0390000018	1.7768
IMMIRRELO.Florence.Racebank.SJ0421000046	1.2436
IMMIRRELO.Hagar.Michigan Beach.VB0390000020	4.1353
IMMIRRELO.Hagar.Michigan Beach.VB0422000194	4.1383
IMMIRRELO.Hagar.Riverside.BE0154000195	1.9258
IMMIRRELO.Hagar.Riverside.BE0166000015	2.4474
IMMIRRELO.Hagar.Riverside.BE0179000079	1.6635
IMMIRRELO.Hartford .East.VB0555000001	1.1989
IMMIRRELO.Hartford .West.VB0478000013	1.448
IMMIRRELO.Hartford.East.VB0531000159	1.1485
IMMIRRELO.Kalamazoo.Eagle .KA0588000021	2.7428
IMMIRRELO.Kalamazoo.Eagle .KA0590000048	2.7632
IMMIRRELO.Kalamazoo.South.KA0635000060	1.6403
IMMIRRELO.Lakeside.Mustang.BE0555000024	4.9795
IMMIRRELO.Lakeside.New Troy.BE0532000084	3.1087
IMMIRRELO.Lakeside.New Troy.BE0557000043	1.7836
IMMIRRELO.Moore Park.Rocky.SJ0227000022	1.0741
IMMIRRELO.Mottville.Mottville.SJ0535000179	1.2867
IMMIRRELO.New Buffalo.Casino.BE0634000038	2.6496
IMMIRRELO.New Buffalo.Casino.BE0665000027	1.1621
IMMIRRELO.New Buffalo.Grand Beach.BE0660001100	1.6677
IMMIRRELO.New Buffalo.State Line.BE0666000027	1.5718
IMMIRRELO.Niles.Bertrand 34.5KV.BE0684000018	1.3519
IMMIRRELO.Niles.East.CA0535000064	2.5226
IMMIRRELO.Niles.East.CA0559000088	1.5347
IMMIRRELO.Niles.North.BE0526000033	3.5471
IMMIRRELO.Niles.North.BE0551000205	1.6876
IMMIRRELO.Niles.North.BE0601000058	1.076
IMMIRRELO.Niles.North.CA0509000023	1.6915
IMMIRRELO.Oronoko.Red Bud.BE0452000009	1.6227
IMMIRRELO.PIgeon River.Elkhart Street.SJ0541000016	1.4564
IMMIRRELO.Pokagon.12KV.CA0343000068	1.458
IMMIRRELO.Rickerman.Galien.BE0560000019	1.1735
IMMIRRELO.Rickerman.Galien.BE0674000004	1.2518
IMMIRRELO.Rickerman.Sawmill.BE0642000008	2.463
IMMIRRELO.Rickerman.Sawmill.BE0642000478	1.5107
IMMIRRELO.Rickerman.Sawmill.BE0671000006	1.1797
IMMIRRELO.Rickerman.Sawmill.BE0704000041	2.4405
IMMIRRELO.Saulk Trail.Eagle Lake.CA0540000048	11.3758
IMMIRRELO.Saulk Trail.Eagle Lake.CA0540000098	1.0685
IMMIRRELO.Saulk Trail.Eagle Lake.CA0542000006	11.3369
IMMIRRELO.Saulk Trail.Eagle Lake.CA0592000029	1.106

IMMIRRELO.Scottdale.East.BE0283000058	1.155
IMMIRRELO.Scottdale.Scott.BE0298000021	2.086
IMMIRRELO.Scottdale.Scott.BE0299000101	3.6155
IMMIRRELO.Sodus.Bainbridge.BE0224000013	1.0545
IMMIRRELO.Sodus.Bainbridge.BE0224000040	3.4643
IMMIRRELO.Sodus.Sodus.BE0303000070	1.2559
IMMIRRELO.Stone Lake.Diamond.CA0354000021	1.2419
IMMIRRELO.Stubey Rd.West.SJ0519000034	1.4951
IMMIRRELO.Stubey Rd.West.SJ0520000018	1.3784
IMMIRRELO.Stubey Rd.West.SJ0548000043	2.1751
IMMIRRELO.Stubey Rd.West.SJ0570000063	6.2014
IMMIRRELO.Stubey Rd.West.SJ0573000029	1.3876
IMMIRRELO.Stubey Rd.West.SJ0626000018	1.7456
IMMIRRELO.Three Oaks.Cannon.BE0698000011	4.8534
IMMIRRELO.Three Oaks.Cannon.BE0699000001	2.5314
IMMIRRELO.Three Oaks.Cannon.LP0111000009	5.1648
IMMIRRELO.Three Oaks.Warren.BE0581000059	2.1428
IMMIRRELO.Three Oaks.Warren.BE0581000095	1.994
IMMIRRELO.Three Rivers.Corey Lake.SJ0317000069	1.5441
IMMIRRELO.Three Rivers.Corey Lake.SJ0320000016	5.5099
IMMIRRELO.Three Rivers.Westland.SJ0298000034	1.0748
IMMIRRELO.Vicksburg.East.KA0596000011	1.8201
IMMIRRELO.Vicksburg.East.KA0596000025	1.6892
IMMIRRELO.Vicksburg.East.KA0640000048	1.2579
IMMIRRELO.Vicksburg.East.KA0641000013	1.4357
IMMIRRELO.Vicksburg.Richardson.KA0544000072	1.2253
IMMIRRELO.Vicksburg.Richardson.KA0545000088	1.3488
IMMIRRELO.West St.Coloma.BE0102000016	1.8755
IMMIRRELO.West St.Coloma.BE0102000143	4.9805
IMMIRRELO.West St.Coloma.BE0103000017	1.2074
IMMIRRELO.West St.Coloma.BE0111000019	5.0175
IMMIRRELO.West St.Coloma.BE0123000010	5.1301
IMMIRRELO.West St.Coloma.BE0123000011	1.5041
IMMIRRELO.West St.Coloma.BE0131000082	1.2949
IMMIRRELO.West St.Millburg.BE0180000013	1.5409
IMMIRRELO.West St.Millburg.BE0195000016	3.0612
IMMIRRELO.West St.Ryno.BE0159000049	1.9187
IMMIRRURD.Almena.Gobles.VB0204000079	0.0024
IMMIRRURD.Almena.Gobles.VB0205000087	0.0195
IMMIRRURD.Almena.Gobles.VB0263000020	0.1608
IMMIRRURD.Almena.Gobles.VB0447000017	0.0425
IMMIRRURD.Almena.Mattawan.VB0476000026	0.2195
IMMIRRURD.Almena.Mattawan.VB0476000049	0.2446
IMMIRRURD.Almena.Mattawan.VB0476000081	0.2924
IMMIRRURD.Almena.Mattawan.VB0499000021	1.3568

IMMIRRURD.Almena.Mattawan.VB0522000103	0.1145
IMMIRRURD.Almena.Mattawan.VB0522000136	0.0859
IMMIRRURD.Almena.Mattawan.VB0545000013	0.2056
IMMIRRURD.Almena.Mattawan.VB0545000079	0.3212
IMMIRRURD.Almena.Mattawan.VB0548000005	0.2005
IMMIRRURD.Bangor .Industrial.VB0311000242	1.2359
IMMIRRURD.Baroda.Livingston.BE0365000119	1.2191
IMMIRRURD.Berrien Springs.North.BE0434000030	1.6122
IMMIRRURD.Cameron.Lawton.VB0593000126	0.2579
IMMIRRURD.Colby.West.CA0251000050	1.6207
IMMIRRURD.Crystal.Coloma.BE0204000349	1.7174
IMMIRRURD.Crystal.LMC.BE0219000375	0.5677
IMMIRRURD.Eau Claire.12KV.BE0359000151	1.3612
IMMIRRURD.Hagar.Riverside.BE0151000291	0.0013
IMMIRRURD.Hagar.Riverside.BE0153000008	0.0663
IMMIRRURD.Hagar.Riverside.BE0153000024	0.0211
IMMIRRURD.Hagar.Riverside.BE0154000127	0.2238
IMMIRRURD.Hagar.Riverside.BE0154000163	0.2392
IMMIRRURD.Hagar.Riverside.BE0179000019	0.097
IMMIRRURD.Hartford .West.VB0503000739	2.1976
IMMIRRURD.Hartford .West.VB0504000589	2.759
IMMIRRURD.Hartford .West.VB0527000108	2.45
IMMIRRURD.Hawthorne.Industrial.BE0215001488	1.7999
IMMIRRURD.Hawthorne.Industrial.BE0229000385	3.9174
IMMIRRURD.Hickory Creek.Niles.BE0247000204	1.4717
IMMIRRURD.Hickory Creek.Niles.BE0247000338	1.5951
IMMIRRURD.Hickory Creek.Niles.BE0247000341	1.7884
IMMIRRURD.Hickory Creek.Niles.BE0247000479	1.291
IMMIRRURD.Hickory Creek.Niles.BE0247000550	1.1694
IMMIRRURD.Hickory Creek.Niles.BE0247000638	1.5238
IMMIRRURD.Hickory Creek.Niles.BE0263000097	1.4636
IMMIRRURD.Hickory Creek.Niles.BE0263000255	1.1372
IMMIRRURD.Hickory Creek.Niles.BE0263000256	1.1236
IMMIRRURD.Hickory Creek.Niles.BE0264000397	1.6291
IMMIRRURD.Lakeside .Union Pier.BE0552000186	1.0766
IMMIRRURD.Lakeside .Union Pier.BE0578000306	1.0481
IMMIRRURD.Lakeside .Union Pier.BE0578000527	1.0633
IMMIRRURD.Langley.Park St.BE0216001121	2.3719
IMMIRRURD.Moore Park.Portage.SJ0275000344	0.401
IMMIRRURD.Moore Park.Portage.SJ0301000126	1.4115
IMMIRRURD.Moore Park.Portage.SJ0302000027	1.4576
IMMIRRURD.Moore Park.Railroad.SJ0230000002	1.2192
IMMIRRURD.MOTTVILLE.MOTTVILLE.SJ0511000081	1.1016
IMMIRRURD.MOTTVILLE.MOTTVILLE.SJ0535000184	1.2271
IMMIRRURD.MOTTVILLE.MOTTVILLE.SJ0536000074	1.0646

IMMIRRURD.Niles.Bertrand 34.5KV.BE0599000118	1.2079
IMMIRRURD.Niles.Bertrand.BE0548000119	0.0513
IMMIRRURD.Niles.Bertrand.BE0548000121	0.0324
IMMIRRURD.Niles.Bertrand.BE0573000167	0.0029
IMMIRRURD.Niles.Bertrand.BE0573000226	0.3511
IMMIRRURD.Niles.Bertrand.BE0573000234	0.0337
IMMIRRURD.Niles.Bertrand.BE0573000252	0.0568
IMMIRRURD.Niles.Bertrand.BE0573000259	0.0323
IMMIRRURD.Niles.Bertrand.BE0655000001	0.0658
IMMIRRURD.Niles.Bertrand.BE0656000008	0.1095
IMMIRRURD.Niles.Bertrand.BE0687000347	0.889
IMMIRRURD.Niles.Bertrand.BE0717000096	0.0454
IMMIRRURD.Oronoko.Red Bud.BE0432000086	1.1327
IMMIRRURD.Pearl St.Fairplain North.BE0216000863	0.083
IMMIRRURD.Pearl St.Fairplain North.BE0216001060	0.1054
IMMIRRURD.Saulk Trail.Eagle Lake.CA0545000010	1.59
IMMIRRURD.Saulk Trail.Mohawk.CA0564000161	1.6791
IMMIRRURD.Schoolcraft.Schoolcraft.KA0590000012	1.9447
IMMIRRURD.Scottdale.East.BE0265000164	1.2764
IMMIRRURD.Scottdale.East.BE0266000035	1.3602
IMMIRRURD.Scottdale.East.BE0283000136	1.4123
IMMIRRURD.Stevensville.South.BE0312000597	0.7713
IMMIRRURD.Stevensville.South.BE0312000598	1.5889
IMMIRRURD.Stubey Rd.West.SJ0543000039	0.0626
IMMIRRURD.Stubey Rd.West.SJ0569000035	0.0247
IMMIRRURD.Stubey Rd.West.SJ0574000009	0.015
IMMIRRURD.Stubey Rd.West.SJ0574000034	0.1384
IMMIRRURD.Stubey Rd.West.SJ0574000076	0.2969
IMMIRRURD.Stubey Rd.West.SJ0626000014	0.0326
IMMIRRURD.THREE OAKS.1-12KV.BE0610000016	1.3445
IMMIRRURD.THREE OAKS.1-12KV.BE0636000039	1.0581
IMMIRRURD.THREE OAKS.1-12KV.BE0638000200	1.0363
IMMIRRURD.THREE OAKS.1-12KV.BE0638000211	2.8279
IMMIRRURD.THREE OAKS.1-12KV.BE0668000058	1.3427
IMMIRRURD.THREE OAKS.1-12KV.BE0698000054	1.0773
IMMIRRURD.Three Rivers.Westland.SJ0323000219	2.3544
IMMIRRURD.Three Rivers.Westland.SJ0323000231	2.2845
IMMIRRURD.West St.Coloma .BE0122000096	0.0517
IMMIRRURD.West St.Paw Paw Lake.BE0134000034	0.1518
IMMIRRURD.West St.Paw Paw Lake.BE0144000423	1.0739
IMMIRRURD.West St.Paw Paw Lake.BE0145000166	0.0173
IMMIRRURD.West St.Paw Paw Lake.BE0145000190	0.0783