Records, PRC, PRC

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Sent: Wednesday, July 6, 2022 4:41 PM
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BEFORE THE NEW MEXICO PUBLIC REGULATION COMMISSION

IN THE MATTER OF AN INQUIRY INTO ELECTRIC PUBLIC UTILITIES' VEGETATION MANAGEMENT PLANS AND PROCEDURES) Case No. 22-00154-UT

PUBLIC SERVICE COMPANY OF NEW MEXICO'S RESPONSE TO NOTICE OF INQUIRY

Public Service Company of New Mexico ("PNM") respectfully submits this Response to the Notice of Inquiry issued by New Mexico Public Regulation Commission's ("Commission") on June 15, 2022. The Commission issued the Notice of Inquiry pursuant to NMSA 1978, Section 62-6-25 i to collect in this docket, all New Mexico electric public utility and rural electric co-operative vegetation management plans and other wildfire protection practices, for the purpose of reviewing the assumptions, methods, and standards underpinning these plans, to identify best practices under the increasingly severe weather and climate conditions presently occurring, and to obtain recommendations for best practices in wildfire management in the urban/wildland interface and in forested areas throughout the State of New Mexico.

Below, PNM provides responses to the specific inquiries identified in the Notice of Inquiry at Ordering Paragraph A.

A. All investor-owned electric utilities and rural electric cooperative organizations shall provide the Commission:

a. a copy of their current vegetation management plan

Please see PNM Exhibit A for its Vegetation Management Plan. A high-level overview is also provided below.

PNM has a Vegetation Management (VM) program which is currently staffed with three Foresters and a Vegetation Program Manager who oversees the work of contracted tree crews. The Vegetation Management Department is responsible for inspection, patrolling, and trimming Transmission, Distribution and secondary voltages as described below. PNM follows industry standard vegetation trimming techniques, including natural pruning to direct the growth of trees away from power lines. PNM follows species-dependent clearance specifications that match industry standards, to account for three-years of vegetation clearance. PNM uses vegetation related outage data, patrol results and customer requests to inform its workflow.

Current VM work cycles are as follows:

Transmission – The North American Electric Reliability Corporation (NERC) outlines all utility's transmission line vegetation program compliance requirements through NERC Standard FAC-003 which applies to transmission lines 200kV and above. NERC FAC-003-4 lines (200kV and above) are generally patrolled annually, but at intervals of not more than 18 months. The remainder of the Transmission system is patrolled on an as needed basis with a focus on areas known to have rapid vegetation growth due to proximity to water such as riparian areas. Work on NERC lines takes place on a 5-year cycle to maintain clearances and control vegetation. Non-NERC lines are patrolled every two years and work is performed on an as-needed basis as determined by patrol information, tree-related outages, work requests or field observations. These transmission lines are now being maintained on a 5-year cycle through Integrated Vegetation Management (IVM) techniques to control vegetation regrowth. This is a long-term approach that works by reclaiming the ROW and managing for future workload.

Distribution- Work on PNM's distribution lines is performed according to a schedule determined at the beginning of each year. The schedule is prepared based upon available vegetation-related

outage data, customer requests and observed field conditions. Work is performed on the 3-phase portion of the feeder system. Priority is given and adjustments made to the work schedule for areas known to experience high fire danger in which all parts of the feeder system are worked, not just the 3-phase portions. Other portions of the circuits are worked on an as needed basis or during construction/replacement, i.e., capital work. A dedicated patrol of identified feeders is performed to document capital maintenance items in need of repair and to identify any tree work that needs to be completed prior to the capital maintenance work commencing.

Compliance- PNM ensures compliance to the NERC standards which detail requirements including but not limited to vegetation control methods, inspection frequency, annual work plan, imminent threat procedure, minimum clearance distances, maintenance strategies. Vegetation clearance on all NERC lines is maintained on a 5-year cycle. To document compliance, the Vegetation Management Department provides regular updates to the internal Compliance Department. PNM vegetation management practices are also subject to periodic compliance reviews by WECC and NERC.

Light Detection and Ranging ("LiDAR") - LiDAR data were collected in 2014 on all NERC lines (200kV and above) prior to the ROW Clearing Project. LiDAR data are collected by contractors using fixed wing aircraft or helicopters that physically survey lines to identify locations that needed vegetation work and for trees of concern located off PNM's ROW. Using viewing tools, work prescriptions were created and sent to PNM's Environment& Land Department to secure appropriate clearances. After environmental clearances were secured, the work was assigned to tree crews for work completion.

LiDAR data were also collected in 2021/2022 for all the PNM transmission and distribution lines within the HFAs. The data are currently being analyzed for encroachment of vegetation into

PNM's ROW, as well as for performing an asset inspection and inventory. The data will be used to develop future work plans and help PNM prioritize the work.

Contractors- PNM's Vegetation Management contractor, Trees LLC, has a wildfire prevention program which is well developed and includes annual training for all of their employees. Trees LLC crews have firefighting tools on all their trucks and as a matter of practice stage their tools at each job site, so they are ready to use at a moment's notice. PNM Foresters make regular field visits and monitor work by tree crews for compliance; job safety tailboard sessions are routinely assessed during site visits.

b. a copy of any other wildfire protection practices engaged in by the utility.

Please see PNM Exhibit B for its Wildfire Mitigation Plan. A high-level overview is also provided below.

PNM has a Wildfire Mitigation Plan (WMP) which enhances grid resiliency and public safety through new strategies, technologies, and operating guidelines. The WMP incorporates operating and maintenance as well as capital projects on PNM's system. Through the WMP, PNM has:

- Identified HFAs describing the areas of PNM's service territory where the risk and hazard of destructive wildfires is the greatest. The HFAs will be used to prioritize vegetation management, inspection, and maintenance of PNM facilities.
- Increased situational awareness of escalating fire weather conditions and augmented existing plans to reduce ignition likelihood from system operations and from field personnel. This information is being shared with PNM's field personnel and external contractors to assist in making daily assignments and decision making.

- Developed a fire classification scheme that will govern response, internal reporting, and external communications during wildfire events.
- Employed the use of (remotely sensed) LiDAR in the HFAs to identify vegetation conditions and hazard trees on approximately 685 miles of transmission facilities and 2119 miles of distribution facilities.
    - The data will also be used to verify existing asset inventory and a virtual inspection will be conducted to determine the condition of assets.
    - Analysis of the LiDAR data will yield priorities for future work plans and funding requests.
- Provided internal divisions and external partners a daily Situational Awareness Report which provides enhanced weather and fire danger information to assist in decision making for operations.
- Utilized Indji Watch software which provides alerts at various wind thresholds, indicates fires near PNM's service territories, and current Red Flag alerts.
- Developed operating guidelines that modify automated utility line reclosing operations on the system to help reduce wildfire risk.
    - PNM's Transmission Operators disable available reclosers associated with each of the transmission lines within that HFA during "Extreme" fire weather days.
    - PNM's Distribution Operations has conducted a pilot program disabling reclosing on select feeders within an HFA during "Extreme" fire weather days and will complete a final guideline by the end of 2022.

- Developed a dynamic Avian Protection Plan (APP). Wildlife protection measures currently implemented by PNM can provide wildfire protection by covering or distancing energized parts thereby lessening the potential for arcing from animal contacts with PNM facilities.
- Developed and provided training on fire prevention and safety for most of its field and operational personnel to help raise awareness of the WMP, fire safety and awareness, and ways to prevent wildfire.

Respectfully submitted this 6th day of July 2022.

PUBLIC SERVICE COMPANY OF NEW MEXICO

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GCG #529661

PNM Exhibit A

Is contained in the following 11 pages.

Vegetation Management Guidelines

At PNM, our roots in New Mexico go all the way back to the very first electric and gas operations in Albuquerque. Throughout more than a century serving New Mexico businesses and families, we've changed and grown, but our commitment has remained steadfast: Bring safe, reliable, clean power to the communities we serve.

The following information is intended as a guide for use when performing vegetation management services. Vegetation management includes the services of distribution and transmission line clearance, overhead safety inspection program and substation weed control. Regardless of the service performed, every work site has its own safety and work requirements.

Note: This information addresses procedures for Public Service Company of New Mexico (PNM/PNMRServCo.) operating employees and is not intended for use as personal safety guidelines. Contractors who are performing vegetation management services are required to have a copy of this information with them in the field.

Overview

Fires or electrical hazards and accidents can occur if vegetation is not controlled or cleared around power lines, resulting in serious risks to people and property and significant costs to the community. The purpose of this document is intended as a guide for use when performing vegetation management along its Right of Way (ROW) and to clarify the responsibilities for controlling and clearing vegetation around power lines on or near Public Service Company of New Mexico (PNM/PNMRServCo.) territory. This is accomplished through adherence to Integrated Vegetation Management (IVM) principles and ANSI 300 Tree Care Operations practices. Other objectives include adherence to all regulatory and legal requirements, continuous environmental improvement, and adherence to ANSI Z133 worker safety practices.

The responsibilities are set out in these guidelines and depend on:

- The type of power lines i.e., whether distribution (voltages of 120 volts to 46,000 volts), or transmission (voltages greater than 46,000 volts).
- The location of the vegetation that could interfere with the power line; and
- Whether the vegetation is naturally occurring or has been planted or cultivated.

PNM's objectives for maintaining the vegetation along existing ROW, easements and access roads are:

- Protect public and worker safety and minimize the risks to facilities from fires
- Ensure power system reliability by proper vegetation management
- Comply with latest industry standards and follow mandatory state and federal reliability standards
- Reduce the risk of wildfires caused by vegetation growing into or falling onto power lines and facilities
- Manage incompatible vegetation.
- Maintain flexibility to accommodate changes in transmission and distribution system operation and maintenance requirements

Safety Requirements

All personnel performing vegetation management work on or near PNM or rights of way shall follow approved safety guidelines and procedures. All personnel performing work for PNM shall comply with all applicable governmental safety and health regulations, and the safety and health provisions of their contracts.

Vegetation Management Program specifications shall adhere to the industry accepted standards of ANSI A300, ANSI Z133.1, OSHA 1910.269, and NESC. Contract line clearance tree workers must meet the requirements of these standards as well as any other applicable federal, state, or local laws, codes, or regulations.

American National Standard Institute (ANSI) A-300
The ANSI A-300 is the American National Standard Institute's standard for the care and maintenance of trees, shrubs, and other woody plants. The standard is intended as a guide for federal, state, municipal, and private authorities including property owners, property managers, and utilities. Whenever possible and practical, contractor tree workers are expected to adhere to this standard when pruning trees near electric facilities. The International Society of Arboriculture booklet titled "Best Management Practices for Utility Pruning of Trees" provides a good working summary of the principals included in ANSIA-300. Contract tree workers are expected to have a copy of this booklet in the field for reference purposes.

ANSI Requirements (Z-133.1)
ANSI Z-133 is the American National Standard Institute's standard for Arboricultural Operations containing the safety requirements for Pruning, Repairing, Maintaining, Removing Trees, and Cutting Brush. It has the force of law because it is the document an OSHA compliance officer would reference when identifying safety violations of employees engaged in tree work. Therefore, it is considered the definitive safety standard for arboricultural operations.

In short, ANSI Z-133 defines an electric hazard to exist anytime a tree worker, tool, tree or any other conductive object is closer than 10 feet from an energized conductor with a voltage of 50,000 volts or less. ANSI Z-133 provides tables that outline minimum approach distances for both qualified and non-qualified tree workers based on voltage and elevation.

Contractor managers are required to provide ANSI Z-133 minimum approach distance tables to their employees.

Occupational Safety and Health Administration (1910.269)
OSHA 1910.269 is the Occupational Safety and Health Administration's vertical standard pertaining to the generation, transmission, and distribution of electricity. A specific section of OSHA 1910.269 requires that everyone performing tree work in proximity to electric hazards must be qualified and their training must be documented.

National Electric Safety Code
The National Electric Safety Code is the American National Standard for safe design, construction, operation, and maintenance of electric supply and communication lines and equipment. It states that any vegetation that may damage ungrounded conductors around overhead lines should be pruned or removed, and that management should be performed as experience dictates. Factors to consider in determining the extent of vegetation management required include line voltage, species' growth rates and failure characteristics, Right of Way limitations, vegetation location in relation to the conductors, potential combined movement of vegetation and conductors during routine winds and sagging of conductors.

All employees and contractors must be aware of the nature and characteristics of the electric facilities before work begins. Contractors need to understand that the electric facilities must remain energized during the performance of work unless special arrangements are made with an authorized PNM representative.

The following procedures pertain to contractors performing vegetation management work for PNM:

- The contractor shall obtain full information as to the voltage of its circuits and minimum approach distances before starting the work.
- The contractor shall always conduct work in a manner to safeguard the public from injury and property from damage.
- The contractor must use all necessary protection for its employees and the public, and guard against interference with normal operation of the circuits. If, in the judgment of the contractor's general foreman/supervisor, it is too hazardous to prune or remove trees with the circuits energized, the contractor must contact an authorized PNM representative(s). If appropriate, PNM will de-energize circuits to ensure the safe pruning or removal of the tree(s). Should the contractor knock down or come into contact with PNM conductors (power lines), the contractor must notify PNM immediately and take the necessary protective measures. All contractor-caused electric service interruptions are subject to repair at the contractor's expense.
- In the event a contractor becomes aware of any dangerous, broken, loose, or faulty PNM line facilities in the normal course of its line clearance performance, the contractor shall promptly advise PNM as to the exact equipment location(s) and nature of the condition found.
- Any contractor personnel entering substation equipment yards must be qualified employees (OSHA 1910.269). Contractor personnel must notify dispatch prior to entering any substation, must lock the gate behind them while in the substation, notify dispatch when leaving the substation, and must close and lock the gate behind them.

Notification

PNM expects its contractors to make a diligent effort to inform property owners or occupants by phone, personal contact, door hanger, or mailer in advance to inform about vegetation management work. PNM Contractor is accountable for getting property access and in writing permission for removals when needed and should actively pursue as many removals as possible.

Environmental Services Department must be notified prior to work commencing on, including but not limited to, State, Federal or tribal lands, as per PNM policy. The Contractor shall acquire all certifications/permits required for pruning and removing of trees for any municipality, state, tribal or federal agency in which the Contractor's crews will be performing work.

Contractor shall notify all city and town authorities or other officials as appropriate prior to pruning or removing any publicly owned trees.

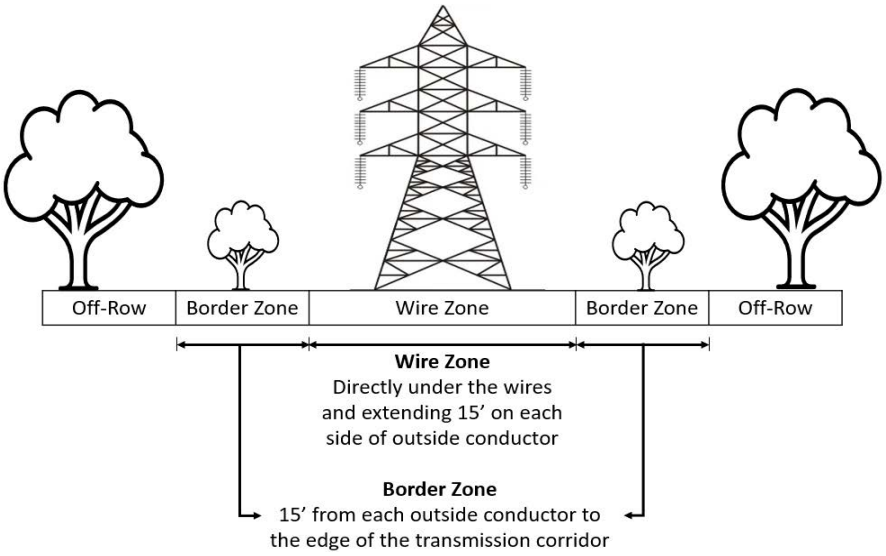
In the event that a property owner denies access to the work scheduled, the Contractor Crew Foreman will notify the Contractor General Foreman and or the PNM Supervisor and move on to the next job site. The Contractor General Foreman and or the PNM Supervisor will then work to secure access so that the scheduled work can be completed. If the refusal is turned over to PNM, work will not be performed until PNM has notified the Contractor that access has been granted and this shall be documented.

In the event that the Contractor encounters conditions prohibiting performance of Work, the Contractor Crew Foreman will make all reasonable efforts to secure access and document in work management program. Contractor shall notify PNM after all reasonable efforts to secure access have failed. A locked gate shall not, in and of itself, constitute “No Access”.

Pruning Guidelines

All tree pruning shall be governed by approved principles of modern arboriculture and shall adhere to Tree Care Industry Association (TCIA), International Society of Arboriculture (ISA), ANSI A300 and Z133 standards and the natural pruning method. Utility representatives, in cases, can grant exceptions to these pruning standards where mechanical trimming equipment is used. Pruning shall be done in a manner that protects current tree health and with regard for future growth and development.

Transmission Voltage (46kV or above) - Wire zone/Border zone



The wire/border zone concept developed by Bramble and Byrnes should be used for all vegetation management considerations when site conditions permit which will allow for different vegetation types and heights in the Right-Of-Way.

The "wire zone" is defined as the area under the power line and extending fifteen (15) feet beyond each side of the outside conductor, this area shall contain only low-growing plant community of grasses, herbs, and shrubs that have a mature height of less than five (5) feet tall.

The "border zone" is defined as the area that goes from the edge of the wire zone to the edge of the easement, this area may consist of low-growing plant and tree species that mature at fifteen (15) feet or less.

The wire zone/border zone concept does not require removal of trees that do not exceed the fifteen (15) feet vertical clearance at mature height or have the potential of falling and interfering with the conductors. The "off-row" shall also be inspected for trees that are dead, dying, diseased, structurally defective, leaning, or significantly encroaching since they may be at risk of arcing or falling into overhead lines and might need to be removed.

Transmission and Distribution line clearance

If the wire zone/border zone clearance cannot be kept, the following clearances shall be maintained.

Transmission Line Guidelines (voltage - 46kV or above)
Trees affecting or potentially affecting a transmission line should be considered for pruning or removal. Note: (1) Lines that fall under the jurisdiction of NERC FAC-003 will be maintained

to ensure compliance with the standard. (2) Where the amount to be removed in order to obtain adequate clearance will have an adverse impact on the overall long-term health of the tree, the tree will be considered for removal. This clearance should be a minimum of fifteen (15) feet.

Distribution Lines (voltage < 46kV)

1. **Under-clearance**
Any tree affecting or potentially affecting a primary distribution line shall be trimmed to prevent any involvement with the line for a period of time no less than three (3) years. This clearance shall be a minimum of six (6) feet for coniferous trees and ten (10) feet for deciduous trees. Note: Where the amount to be removed in order to obtain adequate clearance will have an adverse impact on the overall long-term health of the tree, the tree should be considered as a removal candidate.

2. Overhang Clearance
Clearance for overhangs will depend on tree species and conditions. Trees shall be trimmed to avoid contact with primary lines under average snow and ice conditions for a minimum of three years. This clearance shall be a minimum of fifteen (15) feet.

3. **Side-clearance**
Any tree growing beside primary conductors shall be trimmed to prevent any involvement with the lines for a period of time no less than three (3) years. This clearance shall be a minimum of five (5) feet. Special attention will be given to climbable trees, so that trees shall not grow within three (3) feet of the conductors for a period of three (3) years. Climbable trees are defined as having sufficient handholds and footholds to permit an average person to climb easily without the use of a ladder or other special equipment. In areas with adverse weather conditions (wind, snow, or ice), it is necessary to trim trees so they will not bend or blow over into primary conductors for a period of time no less than three (3) years.

Brush Clearance
Brush should be considered for treatment with herbicide or cut as close to ground level as practical and chemically treated to prevent resprouting.

Unless otherwise instructed, vines ascending all poles and guy wires should be cut in a gap near ground level. Vines should be treated with herbicides below the cut. For accounting purposes, a vine that requires this type of treatment shall be tallied as one (1) brush unit.

Other Clearances
Pruning for cabled Secondary Conductors, Service Drops, Streetlight Circuits, Guy Wires, and poles should be considered on a case-by-case basis.

Dead wood should be considered for removal when PNM directs the Contractor to do so.

Padmounted equipment doors require ten (10) feet of clearance. All other sides require three (3) feet of clearance.

Tree Removal Considerations

- Trees growing in the right-of-way (ROW).
- Trees less than 4 inches in Diameter at Breast Height (DBH) will be considered as brush and shall be removed from ROW.
- Tall-growing tree species and brush within the width of the right-of-way.
- Trees where the amount to be pruned in order to obtain adequate clearance will have an adverse impact on overall long-term health.
- Second growth from stumps cut on previous pruning cycles and treat with herbicide to prevent regrowth.
- Trees growing around utility equipment within clearance area.
- In or outside the ROW, trees which are dead, declining, having structural defects shall be consider for removal.
- Trees that cannot be pruned to ANSI A300 standards
- Consider cost effectiveness – where tree pruning costs more or equal to tree removal.

Trees that are removed shall be cut as close to ground level as safely possible. Stumps that are in fencerows or consist of interfering material such as metal, cement, and rocks will be cut off above the interfering material. All stumps will then be treated with an approved herbicide unless property owner requests the stump not to be treated or if the warning label warns against treatment. Unless other arrangements have been made, PNM and its contractors will not grind out stumps.

Prior to removal, the contractor must obtain signed consent from property owner or occupant to remove vegetation. Verbal permission may only be used in the instance that the property owner or occupant is unable to provide written consent. All trees and brush should be cut as close to the ground as safely possible.

Disposal

Unless specified otherwise, the contractor shall dispose of all debris small enough to feed through a chipper resulting from their tree removal and pruning operations unless other agreements have been made with the property owner. Wood too large to be chipped shall be cut into fireplace lengths (approximately 18” lengths) and stacked at the site near the base of the tree. Disposal or use of any wood left on site will be the responsibility of the property owner.

Disposal of chips, wood and brush is the responsibility of the contractor. Contractor shall accommodate customer requests for wood debris (green waste) delivery, when feasible.

Herbicides

If required by PNM, the contractor shall provide all necessary herbicide products, for cut stump, basal and foliar treatment, unless provided by PNM and comply with applicable laws regarding the application, storage and handling including licensure. All crews must be able to apply herbicide according to all applicable federal, state, and local laws and regulations.

The Contractor shall use the most effective herbicide available for any given situation to prevent regeneration of vegetation and subject to approval by PNM. The applicable Material Safety Data Sheet (MSDS) shall be submitted as part of the approval process. Herbicides shall be applied according to manufacturer label. Consideration must be given to the surrounding vegetation and soil conditions to prevent damage to other flora and fauna or surface water or ground water. Under the judgement of the Contractor, work can be skipped in any portion of a line when damage to crops, orchards, or ornamental plantings may result from the treatment. If work is skipped, it must be reported to the appropriate PNM representative.

In the case that the property owner refuses to have the herbicide treatment, all work must end immediately until any disputes are resolved. If a legitimate refusal is given such as organic farming or customer chemical sensitivity, the property owner shall be advised to keep the area free of brush which would eliminate the need for such treatment.

It is the Contractor's responsibility to provide its workers with appropriate protective equipment and current label and Material Safety Data Sheet (MSDS) for the herbicide being applied and must properly dispose of all herbicide containers. If there are any spills, they shall be reported to the general foreman/supervisor and PNM Environmental Services as soon as possible and the spillage must be documented including the type of product and amount of spillage per PNM policy. If necessary, it must also be reported to the corresponding state or federal agencies. The contractor is responsible for any damages for such leakages.

Contractor shall warranty herbicide treatment for one (1) year after application and the Contractor shall treat any new growth identified at their own expense.

Customer Requested Pruning

When PNM receives a customer requested tree trim, a representative will be sent to make an assessment. Under some circumstances, a customer request may be answered by standard letter. If work is required before routine maintenance is scheduled, a contractor will be sent to complete the necessary work.

Emergency and After-Hours Work

In the event of an emergency and when specifically requested by PNM, the Contractor will make crews available to perform work after hours, weekends, and holidays necessitated by the emergency. On such emergencies, only essential work shall be done to clear vegetation as required to rapidly restore electric service. Fallen trees, broken limbs, and all trimmings and cut vegetation associated with service restoration are left on site. Contractor shall not inform customers that PNM will return at a later date to clean up the trimmings and cut vegetation.

Contractor Guidelines

The appearance and conduct of the Contractor's crews and the appearance and condition of the Contractor's vehicles and equipment are important factors in achieving the required level of customer satisfaction.

Crew members shall always maintain a neat appearance and shall wear clothing (such as T-shirts, sweatshirts, jackets, etc.) displaying Contractor's color. At least the foremen shall display or carry a personal photograph identification tag identifying themselves and the Contractor.

Crews shall adhere to the following guidelines. However, the following guidelines are neither intended to be nor should they be considered to be inclusive.

- crews shall be courteous to customers at all times.
- crews shall not engage in "horseplay" while on the job.
- crews shall not use customers' property (i.e., patios, picnic tables, etc.) for breaks.
- crews shall not leave refuse from lunches, etc. on private or public property.
- crews shall refrain from climbing over or standing on any fence, garage, tool shed, etc. unless necessary to access work and only when it can be done safely and without damaging customers' property.

All contractor General Foremen/Supervisors should be Certified Arborists through the International Society of Arboriculture (ISA) when eligible to sit for the exam. An attempt will be made to take exam at a minimum every twelve (12) months.

PNM requires all Contractors to participate in PNM specific annual training, including: Environmental, Avian Awareness, Wildfire, and System Operations.

Revision History - Vegetation Management Guidelines

Version	Updated By	Date	Notes
1	T. Petzold	3/11/22	Finalized version 1
2	T. Petzold	6/22/22	Overview updated

PNM Exhibit B

Is contained in the following 91 pages.

Public Service Company of New Mexico

Wildfire Mitigation Plan

June 2022

Contents

1.1 Introduction

In recent years, the western United States has seen an increase in damaging wildfire activity. A contributing factor to this increase is climate change. Both climatologists and fire scientists anticipate longer fire seasons and more extreme fire behavior in future years. This new normal will require new coping stratagems.

To address these changing climatic conditions, the Public Service Company of New Mexico has compiled this Wildfire Mitigation Plan (WMP). The Plan covers wildfire risk drivers, and programs and strategies to mitigate them. Part of the overall strategy is an increased PNM role as a community partner highlighting collaboration and communication.

PNM recognizes that an effective wildfire strategy includes a culture that ranks safety over reliability. This will require a fundamental shift in operating philosophy for utilities outside California. Devastating and deadly fires have already caused changes to the reliability vs. safety paradigm in the Golden State. PNM has decided to make this shift and will be a role model for other New Mexico and western US utilities. This change will cause ripples throughout the entire PNM organization and affect Corporate Goals, Key Performance Indicators, and budget allocations to name a few.

Several recent events have precipitated PNM's recognition of its need for a WMP. Catastrophic and fatal fires in California (2018) resulted in a resolve to not let a repeat happen; Wildfire Mitigation Plans are now required by regulation of all utility companies in California. Utilities outside California have taken notice and begun creating WMPs tailored to their specific circumstances. A Western Energy Coordinating Council (WECC) letter dated May 2019 addressing reliability preparedness outlines higher risk across the Western Interconnection and provides maintenance, planning, operations, and training recommendations in preparation for fire season. EEI and EPRI have both increased their activity regarding wildfire ignition prevention.

Consequently, the PNM Board of Directors identified wildfire as a potential risk to be monitored in May of 2019 and a formal Wildfire Mitigation Plan has been drafted to fit the needs of Public Service Company of New Mexico.

An outside consultant was hired to assess current PNM wildfire risks and mitigation efforts, and to provide recommendations on leading industry practices and strategies to further reduce PNM's wildfire risks. These assessments and recommendations comprise this Wildfire Mitigation Plan.

Objectives

This WMP will serve as a blueprint to help reduce the risk of PNM infrastructure or operations from being the cause of unwanted wildland fire ignitions. In doing so, the plan will also enhance grid resiliency and public safety through new strategies, technologies, and operating guidelines. PNM intends to collect ignition data and review it for trends that could point to new mitigation strategies. Though unlikely, Public Safety Power Shutoffs (PSPS) will be addressed as part of this plan. PNM is committed to customer outreach and communications to minimize impacts from PSPS events.

Purpose

The purpose of this effort is to develop a PNM wildfire risk awareness and mitigation strategy that becomes part of a fire safe culture across the PNM enterprise.

Key stakeholders

Executive sponsor: Todd Fridley
Project sponsor: Wesley Gray
Project team leader: Thaddeus Petzold
Core team members: Alwyn VanderWalt, Anne Beard, Jeff Nawman, Ray Vigil, Robert Jarrett, Paul Dunagan, Jack Ingalls, Corey Plant, Wilson Guin, Darin Davis, Matt Holbert, Chris Carpenter, Mike Davis, Gary Snyder, Tracy Nickell, David

McKay, Maddie Martinez, Bruce Ashburn, Kelsey Martinez, Claudette Horn, Jeffrey McDonald, Meaghan Cavanaugh, Anthony Lovato, Travis Suazo, Justin Clemens, Manuel Sanchez, Gathen Garcia.

Overview of PNM

PNM, in operation since 1917, is a subsidiary of PNM Resources Inc., which is an investor-owned holding company of energy and energy-related businesses and provides electric service throughout the state of New Mexico. One of the primary engagements of PNM is the regulated transmission of electricity.

Through its subsidiaries, PNM and Texas New Mexico Power, PNM Resources serves 739,000 electric customers in New Mexico and Texas via 4,143 miles of transmission lines and approximately 75,000 acres of ROW easements. Of this, approximately 25,000 acres of ROW's require active vegetation management.

PNM Resources and its subsidiaries operate under a policy of environmental sustainability which requires employees to consider the long-term financial, environmental, and social impacts of the business decisions they make.

PNM's transmission system traverses a wide variety of terrain and vegetation communities, from the heavily populated urban areas of Albuquerque to the steep hills and ridges of the Sandia Mountains, as well as the Carson, Cibola, and Santa Fe National Forests. In addition, PNM's transmission lines also cross the Rio Puerco, San Juan, and Rio Grande rivers in numerous locations. Apart from the wooded areas, one similar aspect of most of the transmission ROW's is that they support sparse vegetation that requires minimal management.

NM Flora and Geography

New Mexico has mostly hot, semiarid, or semiarid-continental climate regimes that broadly support steppe and semi-desert vegetation. Steppe vegetation typically is grassland of short grasses and other herbs with locally developed shrub and woodlands. Many species of grasses grow in sparsely distributed bunches. Grama grass is typical. Ground cover generally is sparse; much soil is exposed. Pinyon-juniper woodland grows on the Colorado Plateau. In eastern New Mexico, the grasslands grade into savanna woodland or semi-desert composed of xerophytic shrubs and trees, and the climate becomes nearly arid subtropical. Cacti are present in some places. These areas support limited grazing but are generally not moist enough for crop cultivation without irrigation. Riparian areas support cottonwood and willow. Mountains support a complex of conifers, ranging from pinyon-juniper on the lower slopes, ponderosa pine on mid-slopes, and mixed conifers (e.g., white fir, Douglas fir, Engelman spruce and sub alpine fir) at high elevations.

Highlights of the WMP

- PNM has identified Hazardous Fire Areas (HFA) that will be used to prioritize routine and possibly enhanced vegetation management, maintenance, and inspections.
- PNM has increased Situational Awareness of escalating fire weather conditions and augmented existing plans to reduce ignition likelihood from system operations and from field work.
- PNM has added a fire classification scheme that will govern response, internal reporting, and external communications during wildfire events.
- Knowing when and where fire related outages are occurring is fundamental to reducing their number. PNM has adopted this basic premise for initiating an Ignition Management Plan whereby it will capture and analyze outage and ignition data with the goal of using this information to develop effective risk reduction strategies.

- As a last resort, PNM has adopted the framework for a Public Safety Power Shutoff plan for use when public and grid safety is threatened by hazardous fire weather conditions. 2-0 Risk Analysis and Drivers

2.1 Service Territory Assessment

A landscape level assessment of wildfire potential is essential to understanding wildfire risk. Using a Geographic Information System (GIS), PNM has completed an assessment of wildfire risk across its service territory. This assessment identified the areas of highest risk across the PNM service territory. These areas have been called HFAs.

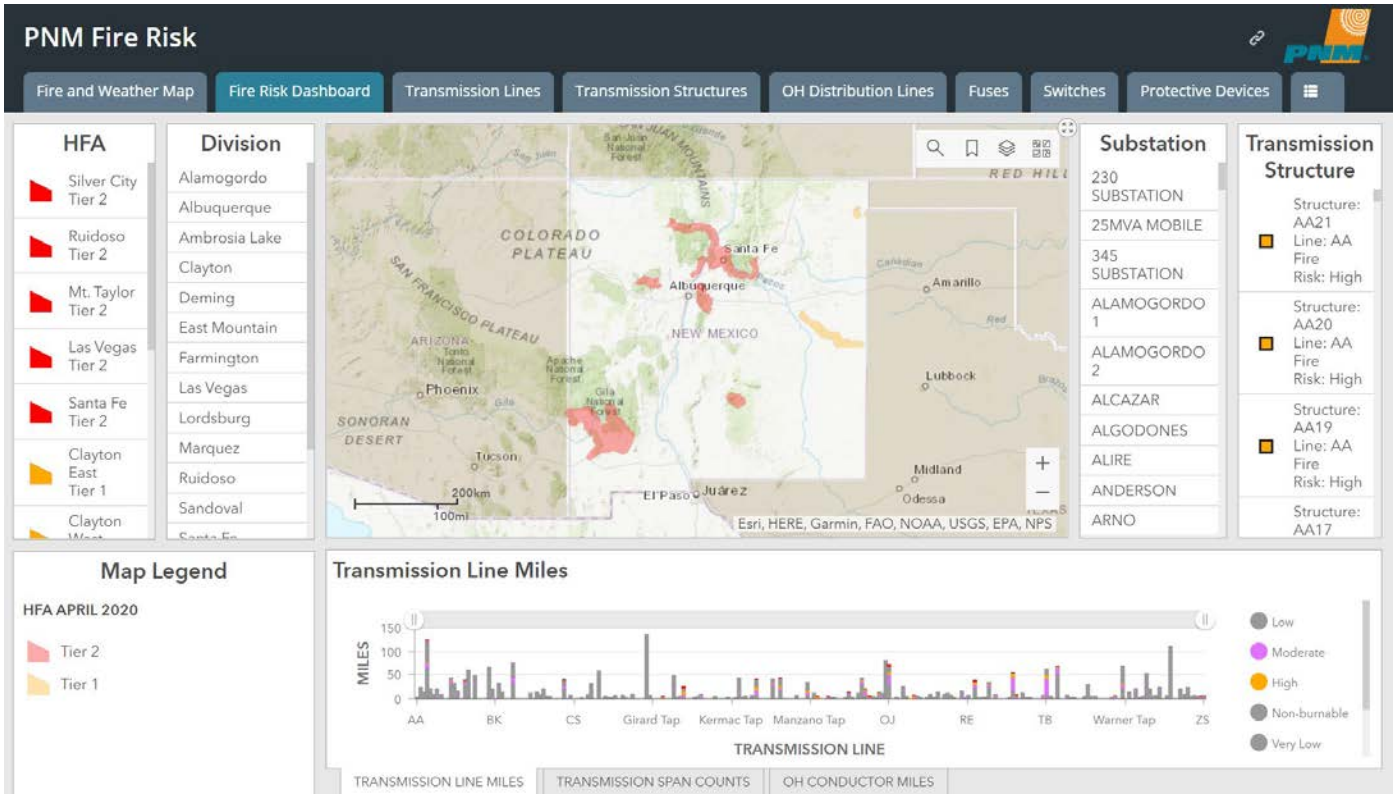
These HFAs will be used for a variety of purposes including the prioritizing of fire hardening activities, enhanced inspection and maintenance activities, field work restrictions during critical fire weather, and making system operation decisions. PNM will also find its HFAs useful when collaborating with external partners and stakeholders.

A simple process was used to define the HFA. The HFA team decided to leverage the publicly available United States Forest Service Wildfire Hazard Potential (WHP) dataset that was already in use in the PNM Fire Risk Dashboard.

An example of this process and maps showing the HFAs is contained in Appendix B.

The PNM Fire Risk Dashboard mentioned above is maintained by the Drafting and Geographic Information System (DGIS) Department. The dashboard is loaded with excellent situational awareness information. The Fire and Weather Map contains current and recent fire information plus wind and temperature readings which are easy to interpret. In the Fire Risk Dashboard viewer, the user can click on any number of equipment types and view them relative to fire risk; this includes a quantification of Transmission and Distribution line miles and equipment counts (see graphic below). Also, in the dashboard, HFAs can be individually selected. Substation and Transmission structures, among other facilities, within the HFA are listed for ready reference.

PNM Fire Risk Dashboard



While defining the HFA, PNM's Outage Management System (OMS) was queried for outages that had a mention of "fire" in the data. When the locations of these outages were plotted, a significant number of the outages fell within the Bosque area running along the Rio Grande River. This is a riparian area is dense with Cottonwood trees and located adjacent to residential development. If ignited, pockets of flammable cottonwoods can pose a significant risk to surrounding homes. Because of this concentration of potential company facility caused ignitions, abundant fuel load and proximity to values at risk, the Bosque was included as an HFA. Maps of each individual HFA, as well as PNM line statistics are contained in Appendix C.

Results

A polygon GIS layer called HFA_FINAL_JUNE_2020 has been created for use within the PNM enterprise. DGIS will own and manage this new HFA layer.

Table 1 provides a data dictionary for the shapefile's attribute table. Each HFA is attributed with the information contained in these cells.

Table 2 provides a quick reference look at each HFA polygon and how it interacts with other spatial data of interest.

Table 1. Attribute table for the PNM Hazardous Fire Area GIS layer.

Attribute	Description	
HFA Name	Each Hazardous Fire Area has a unique name. In most cases the name corresponds to the general geographic area or a prominent landmark nearby.	
Tier	Each HFA is assigned a Tier designation of either 1 or 2. Tier 1 represents an increased level of wildfire risk. Tier 2 represents the highest level of wildfire risk.	
Tier Name	Each HFA is assigned a Tier Name adjective. Wildfire risk in Tier 1 is considered **Elevated** and Tier 2 is considered **Extreme.**	
Utility Discipline	Utility Discipline describes the general voltage class(es) found in the HFA. The values available are Transmission, Distribution, or Transmission and Distribution.	
County (Warning Area)	County Warning Areas (CWA) boundaries are used to delineate the area of responsibility for each Weather Forecast Office. From the NWS: "*The group of counties for which a National Weather Service Forecast Office is responsible for issuing warnings.*"	
NWS Fire Zone	From the National Weather Service (NWS): *This data set is used to delineate the Fire Weather Zones that are used by NWS in the fire weather forecast program*. These are areas of homogenous fire weather. Fire Weather Watches, Red Flag Fire Weather Warnings (RFW) and their attendant alerts are issued by NWS Fire Zone. Knowing which Fire Weather Zone, a particular HFA is coincident with is critical when making operational decisions.	
Land Ownership	This will be an extra-GIS dataset that shows ownership within an HFA. It will be used to identify various external stakeholders who may be involved with PNM's fire prevention program.	
Fire Hx	Fire history (Fire Hx) is a layer depicting historic fire perimeters taken from the USFS and GeoMAC. Values of **Absent** or **Present** are indicative of presence of Fire History in that HFA. http://rgis.unm.edu/rgis6/dataset.html?uuid=29b84830-1fd2-44dd-a8f7-1b824dee2797	
Predictive Service Area	PSAs describe 7-day significant fire potential in pre-defined areas of homogenous fire risk. It is issued by the Southwest Coordination Center about 10:00 MT daily during "fire season". https://fsapps.nwcg.gov/psp/npsg/download.html	

Table 2. HFA Traits and Characteristics

HFA Name	*Type of facilities*	*Area (Sq. mi)*	*Fire weather zone*	*Predictive service area (primary)*	*PNM Division*
Bosque	Trans & Dist.	29	NM106	SW09 South/Central NM Lowlands	Sandoval, Albuquerque, Valencia
Clayton East	Trans & Dist.	13	NM104	SW13 Northeast NM/NW TX	Clayton
Clayton West	Trans & Dist.	97	NM104	SW13 Northeast NM/NW TX	Clayton
Fort Sumner 3	Trans only	819	NM108	SW13 Northeast NM/NW TX	Transmission group
Las Vegas	Trans & Dist.	135	NM103	SW10 Sangre de Christo Mtns	Las Vegas
Mt. Taylor	Trans & Dist.	298	NM105	SW07 Northwest NM Mtns	Ambrosia Lake, Marquez
Ruidoso	Trans & Dist.	312	NM113	SW12 South/Central NM Mountains	Ruidoso
Sandia Mtns	Trans & Dist.	492	NM107	SW11 Central NM Mtns & Plains	East Mountain
Santa Fe	Trans & Dist.	961	NM102	SW10 Sangre de Christo Mtns SW07 Northwest NM Mtns	Santa Fe
Santa Fe East	Transmission	251	NM103	SW10 Sangre de Christo Mtns	Santa Fe
Santa Fe North	Trans & Dist.	704	NM102	SW07 Northwest NM Mtns	Santa Fe
Silver City	Trans & Dist.	2867	NM110	SW08 White Mtns & Gila Region	Silver City

Recommendations/Opportunities

PNM should incorporate the HFA into its business decision process whenever possible. In particular, work restrictions, system operations, fire hardening, engineering and construction considerations as discussed in other sections of this WMP will be informed by the HFA. (Implemented in 2021)

PNM should implement a training program geared toward the Wildfire Mitigation Plan in general and the HFAs more specifically. Included in training are segments on how the new HFAs were developed, what they will be used for, how the HFAs will inform ignition mitigations, and some basic training on fire weather conditions including RFWs. Basic fire behavior, ignition sources, and fire safety when responding to a wildfire are also covered in the new training. (Appendix C) (Implemented in 2021)

Externally, cooperators and partners should be notified about the HFAs and provided the daily situational awareness reports. The HFAs represent areas of highest risk driven largely by hazardous fuel conditions present in them, it is also logical to think that the HFA also represents areas where PNM facilities are at highest threat from fires of outside origin (non-powerline ignitions). Training to bring attention to this is being developed. (Notification to partners began in 2020)

HFA data and area boundaries will be reviewed and maintained annually. Checks for accuracy, relevance, and system expansion will necessitate revisions or expansions.

Other Recommendations

1. Utilize the HFAs to prioritize emergent work.
2. Prioritize inspection and maintenance cycles for facilities within the HFAs.
3. Utilize the HFAs as a driver for future work to improve resiliency of the system, and start planning and budgeting now for system hardening and maintenance activities.
4. Utilize the HFA to help focus operating units on fire weather situational awareness.
5. Annual maintenance and updates of WMP and HFA layers.
6. Querying of internal and external stakeholders on the efficacy of the current HFA boundaries and establish a mechanism to collect suggested edits.
7. Regularly consider utilizing alternative technologies to assist in situational awareness, vegetation assessments, and current conditions in HFAs.

Rationale/Benefits

Internally, the HFAs help focus PNM's risk reduction activities on the areas where the most benefit can be derived. Having defined HFAs will allow PNM to plan risk reduction work and make appropriate budget allocations that are scaled to the issue.

The HFA will also provide a tool for PNM to use when communicating externally, whether with its partners or its customers. Any outreach by PNM to agency partners can highlight the HFAs as areas of most concern for alerting and response.

2.2 Substation Assessment

Although equipment fires in substations are rare, they can be high consequence events. To determine which substations were at highest risk of having an internal equipment fire spread and cause damage outside the perimeter, an onsite assessment was performed on select substations.

In general, the assessment looked at the configuration of the substation itself, its siting on the landscape relative to wildland fuels, and the proximity of any development at risk.

A Geographic Information System (GIS) was used to determine which PNM substations were within an HFA, or within a 500-foot buffer of an HFA. Of the original 56 candidate substations, aerial imagery was used to eliminate 18 substations based on location and proximity to wildland fuels, and assets at risk (development). Site visits were performed on the remaining 38 substations. Each visited substation was assessed using the following attributes and scoring.

The following tables list the attributes and their scoring.

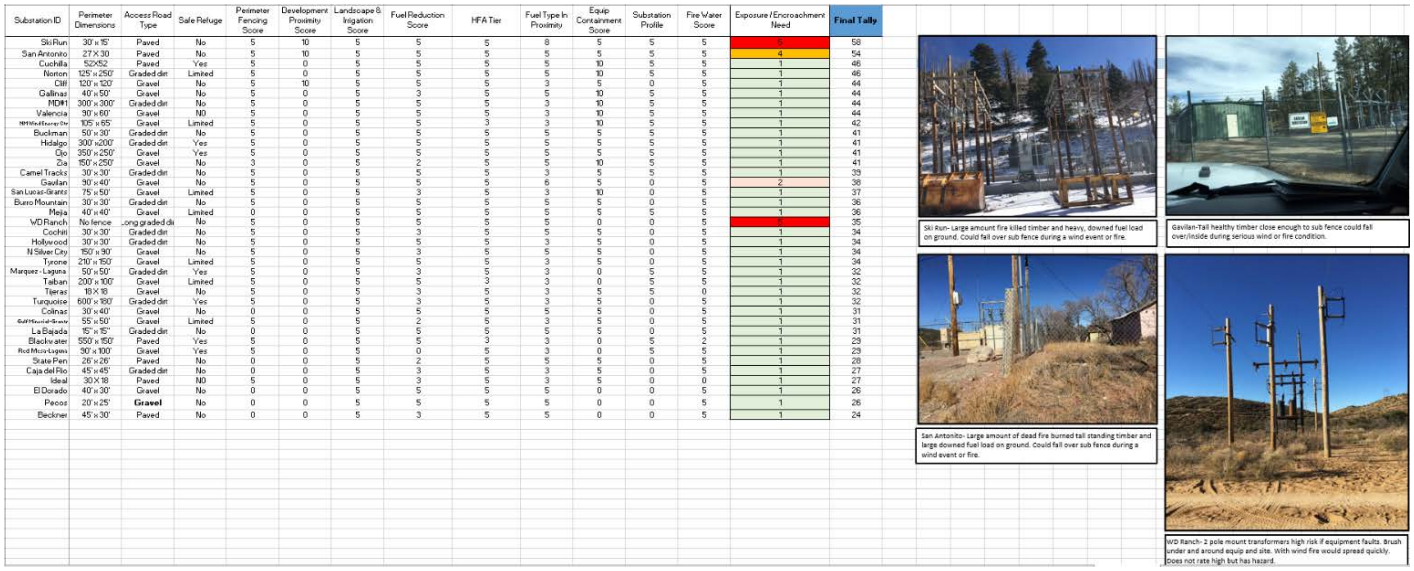
Substation name
Voltage class
Perimeter dimensions
Access road
Paved
Gravel
Graded dirt
Suitable for safe refuge
Yes
No
Limited
Perimeter fence material
Open chain link -5
Chain link w/slats -3
Concrete block -0
Development in proximity regardless of fencing or vegetation
Within 100' of perimieter - 10
Beyond 100' of perimeter - 0
Landscaping / Irrigation outside fence
No - 5
Yes - 0

Fuel type in proximity
Brush - 5
Grass - 3
No vegetation - 0
Equipment containment
Transformer without blast wall - 5
Transformer with blast wall - 0
Capacitor bank exposed - 5
Capacitor bank contained - 0
Substation profile
high profile - 5
low profile - 0
Is firefighting water available?
No - 5
Yes, Inside fence - 2
yes, outside fence - 0
Exposure/encroachment Issue
Immediate need, urgent 5
Delayed 4
Before upcoming fire season / wind event 2
Perform during scheduled maint 1
Total score

This table gives a detailed description of select attributes.

Perimeter fencing	Was the fencing solid, chain link, or did it have slats.
Development proximity	How far away from the substation was any development (homes, businesses or other improvements that could be damaged by fire).
Landscape & irrigation	Presence of landscape and irrigation outside the fence.
Fuel reduction	Distance of any fuel reduction from the perimeter fence.
Fuel type in proximity	Type of fuel in general proximity to the substation. An indicator for fire ignition and fire intensity.
Equipment containment	Transformers with / without blast walls, capacitors exposed or contained.
Substation profile	Equipment at ground level or elevated above. Elevated would indicate higher chance of equipment fire escaping.
Fire Water score	Whether or not water for fire suppression was available.
Final Tally	Total score of all attributes.
Exposure /Encroachment	Indicates presence of, and urgency of remediation for any vegetation or timber posing a threat.

The following image shows all the assessed substations sorted on their **Final Tally** score. The overall range was 58-24. The complete Excel workbook is available as a separate document. Note that the **Exposure / Encroachment** column is colored according to urgency of remediation.



Substation ID	Perimeter Dimensions	Access Road Type	Safe Refuge	Perimeter Fencing Score	Development Proximity Score	Landscape & Irrigation Score	Fuel Reduction Score	HFA Tier	Fuel Type In Proximity	Equip Containment Score	Substation Profile	Fire Water Score	Exposure / Encroachment Need	Final Tally
Ski Run	30' x 15'	Paved	No	5	10	5	5	5	8	5	5	5	5	58
San Antonito	27 X 30	Paved	No	5	10	5	5	5	5	5	5	5	4	54
Cuchilla	52x52	Paved	Yes	5	0	5	5	5	5	10	5	5	1	46
Norton	125' x 250'	Graded dirt	Limited	5	0	5	5	5	5	10	5	5	1	46
Cliff	120' x 120'	Gravel	No	5	10	5	5	5	3	5	0	5	1	44
Gallinas	40' x 50'	Gravel	No	5	0	5	3	5	5	10	5	5	1	44
MDH1	300' x 300'	Graded dirt	No	5	0	5	5	5	3	10	5	5	1	44
Valencia	90' x 60'	Gravel	N0	5	0	5	5	5	3	10	5	5	1	44
[redacted]	105' x 85'	Gravel	Limited	5	0	5	5	3	3	10	5	5	1	42
Buckman	50' x 30'	Graded dirt	No	5	0	5	5	5	5	5	5	5	1	41
Hidalgo	300' x200'	Graded dirt	Yes	5	0	5	5	5	5	5	5	5	1	41
Ojo	350' x 250'	Gravel	Yes	5	0	5	5	5	5	5	5	5	1	41
Zia	150' x 250'	Gravel	No	3	0	5	2	5	5	10	5	5	1	41
Camel Tracks	30' x 30'	Graded dirt	No	5	0	5	5	5	3	5	5	5	1	39
Gavilan	90' x 40'	Gravel	No	5	0	5	5	5	6	5	0	5	2	38
San Lucas-Grants	75' x 50'	Gravel	Limited	5	0	5	3	5	3	10	0	5	1	37
Buro Mountain	30' x 30'	Graded dirt	No	5	0	5	5	5	5	5	0	5	1	36
Mejia	40' x 40'	Gravel	Limited	0	0	5	5	5	5	5	5	5	1	36
WD Ranch	No fence	Long graded dirt	No	5	0	5	5	5	5	0	0	5	5	35
Cochiti	30' x 30'	Graded dirt	No	5	0	5	3	5	5	5	0	5	1	34
Hollywood	30' x 30'	Graded dirt	No	5	0	5	5	5	3	5	0	5	1	34
N Silver City	150' x 90'	Gravel	No	5	0	5	3	5	5	5	0	5	1	34
Tyrone	210' x 150'	Gravel	Limited	5	0	5	5	5	3	5	0	5	1	34
Marquez - Laguna	50' x 50'	Graded dirt	Yes	5	0	5	3	5	3	0	5	5	1	32
Taiban	200' x 100'	Gravel	Limited	5	0	5	5	3	3	0	5	5	1	32
Tijeras	18 X 18	Gravel	No	5	0	5	3	5	3	5	5	0	1	32
Turquoise	600' x 180'	Graded dirt	Yes	5	0	5	3	5	3	5	0	5	1	32
Colinas	30' x 40'	Gravel	No	0	0	5	5	5	5	5	0	5	1	31
[redacted]	55' x 50'	Gravel	Limited	5	0	5	2	5	3	5	0	5	1	31
La Bajada	15" x 15"	Graded dirt	No	0	0	5	5	5	5	5	0	5	1	31
Blackwater	550' x 150'	Paved	Yes	5	0	5	5	3	3	0	5	2	1	29
Rod Mora-Lujan	90' x 100'	Gravel	Yes	5	0	5	0	5	3	0	5	5	1	29
State Pen	26' x 26'	Paved	No	0	0	5	2	5	5	5	0	5	1	28
Caja del Rio	45' x 45'	Graded dirt	No	0	0	5	3	5	3	5	0	5	1	27
Ideal	30 X 18	Paved	N0	5	0	5	3	5	3	5	0	0	1	27
El Dorado	40' x 30'	Gravel	No	0	0	5	5	5	5	0	0	5	1	26
Pecos	20' x 25'	Gravel	No	0	0	5	5	5	5	0	0	5	1	26
Beckner	45' x 30'	Paved	No	0	0	5	3	5	5	0	0	5	1	24

Ski Run- Large amount fire killed timber and heavy, downed fuel load on ground. Could fall over sub fence during a wind event or fire.

Gavilan-Tall healthy timber close enough to sub fence could fall over/inside during serious wind or fire condition.

San Antonito- Large amount of dead fire burned tall standing timber and large downed fuel load on ground. Could fall over sub fence during a wind event or fire.

WD Ranch- 2 pole mount transformers high risk if equipment faults. Brush under and around equip and site. With wind fire would spread quickly. Does not rate high but has hazard.

Exposure/encroachment Issue
Immediate need, urgent 5
Delayed 4
Before upcoming fire season / wind event 2
Perform during scheduled maint 1

Recommendations

Treatments for high scoring substations include regular vegetation maintenance, oil containment for exposed equipment such as transformers and capacitors, and solid, non-combustible fencing where there is a danger of fire spreading through the fence and outside the perimeter. Security fencing might also help prevent vandalism and its potential to cause fires. Consideration should be given to irrigated and/or fire-resistant vegetation planting around perimeters where fire hazard is high, water is available, and environmental concerns will not be prohibitive.

Rationale

Equipment fires in electric substations are low frequency, high consequence events. In the event of an electric equipment failure, fire may result and spread to the surrounding area. This could create a complex incident with a Class B & C fire within the substation and a running vegetation fire outside.

Response from appropriately trained and equipped suppression resources may be delayed at best and non-existent at worst. Proper vegetation maintenance inside and outside the perimeter, and good housekeeping routines within the confines of a substation will help to minimize the risk of an equipment fire spreading to surrounding areas.

Having a pre-fire response plan that includes appropriately equipped and trained first responders could be important if there is a catastrophic equipment failure and fire as a result. The longer an equipment fire burns, the more likely it will be to escape the confines of the substation.

All PNM substations were not assessed. The conditions found in the substations that were assessed and the recommendations made for them may be widely applicable across the PNM substation inventory.

3 Overview of Preventative Programs and Strategies

3.1 Vegetation Management

PNM has an effective Vegetation Management (VM) program. It is staffed with 3 Foresters plus a Vegetation Program Manager that oversee the work of contracted tree crews. The Vegetation Management Department is responsible for inspection, patrolling and trimming Transmission, Distribution and secondary voltages as described in detail below. PNM follows industry standard trimming techniques including natural pruning to direct the growth of the tree away from power lines. PNM has species-dependent clearance specifications that match industry standards including three-year's worth of clearance. It uses vegetation related outage data, patrol results and customer requests to inform its workflow.

Current work cycles described.

Transmission – NERC FAC-003-4 lines (200kV and above) are patrolled annually, with no longer than 18 months in between. The remainder of the Transmission system is patrolled on an as needed basis with a focus on areas known to have rapid vegetation growth due to proximity to water i.e. riparian areas. Work on NERC lines takes place on a 5-year cycle to maintain clearances and control undesirable vegetation. Work on non-NERC lines occurs on an as-needed basis as determined by patrol information, tree-related outages, work requests or field observations.

In 2014-2018 PNM completed a ROW Clearing project that cleared all 200kV and above lines of all tree species on the entire legal width of the ROW. The project encompassed nearly 1100 miles of Transmission lines or approximately one-third of the Transmission system. They are now being maintained on a 5-year cycle through Integrated Vegetation Management (IVM) techniques to control regrowth of incompatible species. This is a long-term approach that works by reclaiming the right-of-way and managing for future workload. Most of the lines are in the Northern portion of the state and traverse multiple HFA's.

Distribution- Work is performed according to a schedule determined at the beginning of each year. The schedule is created based upon available vegetation-related outage data, customer requests and observed field conditions. Work is performed on the 3-phase portion of the feeder. Adjustments to this work are made in areas known to experience high fire danger in which all parts of the feeder are worked rather than only the 3-phase portions. Other portions of the circuits are worked on an as needed basis or during capital work. Work plans are adjusted based upon emergent work or fluctuating funding levels.

A dedicated patrol (ALPS – Automated Line Patrol) on identified feeders is performed to document capital maintenance items in need of repair and to identify any tree work that needs to be completed prior to the capital maintenance work commencing.

Compliance- Vegetation clearance on all NERC lines is maintained on a 5-year cycle. To demonstrate compliance**,** Vegetation Management provides regular updates to the internal Compliance Dept. PNM has passed multiple WECC Compliance audits with no findings.

Metrics- Currently, the Vegetation Management Department tracks metrics on Preventive Maintenance and Reactive Maintenance miles of work completed for both Transmission and Distribution. Costs per mile are

tracked and available for analysis. PNM captures data on its annual plan and annual inspections for Transmission work which is used to demonstrate compliance against NERC standards. Other information is collected in the GIS software program called Clearion however several reports either do not work or need updating. PNM is currently going through a software upgrade which will correct these issues. The upgrade will go live in October of 2020.

Secondary- PNM clears secondary lines in certain circumstances, for example due to emergent work, customer requests, safety concern, capital work, location in a high fire danger area, etc.

Enhanced inspections/trimming- Areas of high fire danger such as Ruidoso receive extra attention. All open wire lines including secondary are cleared in addition to a focused hazard tree removal program as trees are identified by company or Village personnel.

Going forward, work in the newly formed HFA will be prioritized above other areas and feeders with tree-related outages. PNM may patrol these feeders on a regular basis in the future to ensure no potential ignition sources go unnoticed and emergent work is identified in a timely manner.

LiDAR- LiDAR data was collected in 2014 on all NERC lines (200kV and above) prior to the ROW clearing project. It was used to identify locations that needed vegetation work and for trees of concerns located off ROW. Using viewing tools, work prescriptions were created and sent to Environmental Department to secure appropriate clearances. After environmental clearances were issued the work packets were issued to tree crews for work completion.

LiDAR data was also collected in 2021/2022 for all the transmission and distribution lines within the HFAs. The data is currently being analyzed for encroachment of vegetation into the ROW, as well as performing and asset inspection and inventory. The data will be used to develop future work plans and help PNM prioritize the work.

Contractors- PNM's Vegetation Management contractor, Trees LLC has a wildfire prevention program which is well developed and includes annual training for all employees. Trees LLC crews have firefighting tools on all of their trucks and as a matter of practice stage their tools at each job site, so they are ready to use at a moment's notice. PNM foresters make regular field visits and monitor all work by tree crews for compliance; job safety tailboard sessions are routinely assessed during site visits. A yet-to-be-determined RFW communication protocol will include contractors.

Recommendations

1. PNM should consider increasing Vegetation Management funding to a level so that shorter cyclical maintenance periods can be established.
2. PNM should prioritize all feeders in the HFA for completion of inspection and trimming prior to fire season each year. Further, PNM should consider an additional inspection and trim of HFA areas that experience extreme winds if those winds occur after an annual inspect/trim but before or during fire season. This is in keeping with best practices as learned in California.
3. PNM should perform a comprehensive LiDAR capture of PNMs entire system to establish a baseline.

4. Where possible, PNM should try to increase trim clearances, extending them beyond those that are currently achieved.
5. PNM should ensure regularly review software needs and verify that current software provide the necessary metrics to drive work plans and provide adequate tracking to work completed.
6. Ensure that Vegetation Management databases, metrics and records are available across all PNM lines of business. This is an emerging best practice among electric utilities. The value and efficacy of cross-functional data access cannot be overstated. Especially important initially will be access to this data by the Line Department and Transmission maintenance crews.
7. Seek to make VM inspection data as accessible as possible to other PNM lines of business. Consolidate into enterprise level databases (i.e. SAP, Salesforce)
8. Consider requiring vegetation inspections (and tree work if necessary) in any recently burned areas.

Rationale / Benefits

Enhanced inspect/trim cycles have been shown to be effective in preventing wildfire ignitions. They are being widely used in the western US. PNM would benefit by applying them to its HFA.

When equipment fails (or in the case of expulsion fuses, operates normally), molten metal can fall to the ground and cause an ignition. Clearance around poles removes flammable fuels and prevents ignitions. In certain circumstances this is a requirement in California, and it is becoming a common adopted practice in other states. A small pilot program requiring a 10-foot radius cleared to bare mineral soil around poles with certain types of equipment (fuses, lightning arrestors, etc.) in one or two HFA's with high-outage or high-equipment failure rates would be ideal as a proof of concept. PNM may find that the ignition reduction benefits far outweigh the cost of such a program. It would also potentially help convince its regulator and insurers of its commitment to fire prevention and risk reduction.

Enhanced data sharing will improve efficiencies and reduce risks by allowing for better collaboration across business units. One example of this is where GIS can be leveraged to display and analyze outages where vegetation is listed as a contributing cause. Assuming PNM is like most other utilities, the siloing of data can be a detriment to better cross-functionality.

Current LiDAR data is 6 years old. Fresh LiDAR data across the entire system would help identify where work is currently needed. It would also establish a benchmark for emerging programs and strategies coming about as a result of this WMP.

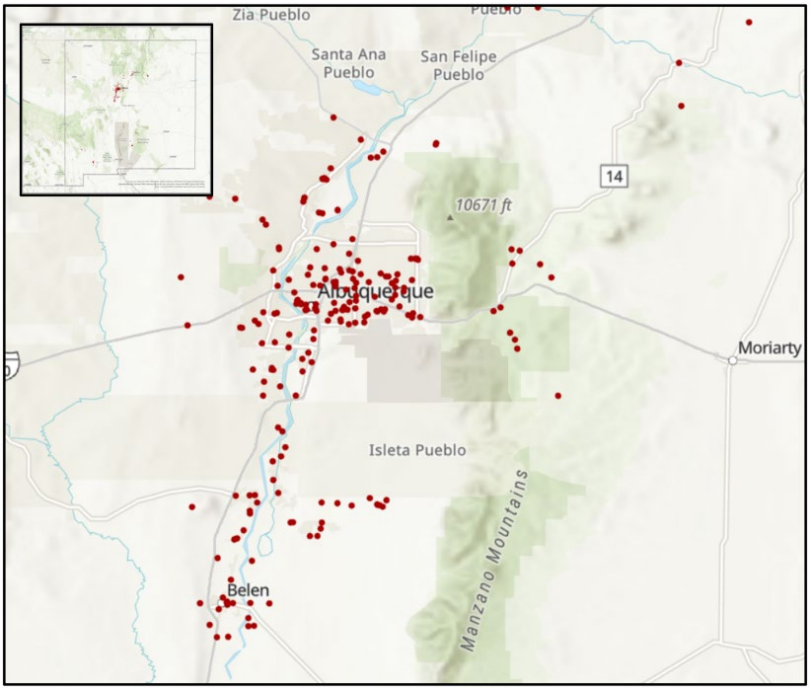
Increased and consistent, year-round VM funding will allow for cyclical, scheduled and routine maintenance rather than the current approach that relies on inspections and customer requests. The latter can put PNM at risk for ignition if hazardous conditions are not noticed and remediated.

3.2 Outage Management and Ignition Management

Outage information from both Transmission and Distribution systems provide valuable information to the utility. PNM collects transmission and distribution outage data into separate Outage Management Systems (OMS).

The Distribution OMS data includes a cause code of "fire". This allows the filtering of outage records with a mention of "fire" and can be used to produce reports in support of fire prevention efforts. The data collected also includes other information such as Outage ID, Outage Start/Restore times, Duration, Customers affected, Interrupting Device, Lat/Lon, Feeder, Division, and Operator Comments. These attributes are potentially useful to inform risk reduction and ignition management strategies. Recommendations are made below for additional attribute capture. Knowing when and where outages are occurring can help the utility understand what is causing them; this knowledge is essential to taking informed steps to reduce them.

Existing outage data has been used to map the locations of outages where "fire" was mentioned (see map at right). 308 outages were pulled from 4/2005 to 12/2019. This information helped validate the Service Territory Inventory section of the WMP. The Bosque was already known locally to be an area of concern though it was not specifically highlighted in the USFS Wildfire Hazard Potential data. There is a dense concentration of utility ignitions in the Bosque area. Mapping outage data with a mention of "fire" substantiated local knowledge and caused the Bosque to be included as an HFA. Future risk and ignition reduction efforts will include the Bosque HFA.



An analysis of Distribution outages with mention of fire yielded the following statistics (see graph). There was no discernable trend either up or down in the total number of outages mentioning "fire" though 2009 saw a significant spike. This was likely due to 15 separate outages mentioning "fire" on October 1.

Planned enhancements include an OMS mobile platform that will allow Distribution line crews to interact with outage data in real time. This will allow a look at additional outage locations and improve communications with Operators regarding outage status. It also will allow the capture of useful data such as weather conditions, construction types, and cause codes. A new feature in the Transmission OMS allows for the tracking of fire as a cause code for the first time. This should prove useful in building metrics that can help inform and prioritize risk reducing work on the Transmission system.

Recommendations- Outage Management

1. Implement a comprehensive Ignition Management Program as described below.
2. Capture additional outage data to include attributes such as evidence of heat that could lead to ignition, type of equipment involved and root cause of failure.
3. Short of a more comprehensive data capturing effort, at a minimum PNM should capture information on wire down events in a format conducive to, and with the intent of, informing root cause analysis. This will yield metrics and

trends to inform future design, budgeting, and fire hardening efforts. Some suggested attributes to capture include conductor type, size, age, number of splices in the failed span, connector types, voltage class and outside influences such as vegetation contact or weather, etc.

4. Continue to explore internal opportunities for the sharing of outage data as fire prevention efforts at the Company mature and business groups become more focused on reducing risk. This can be accomplished by:
    a. Leveraging the Wildfire Risk Dashboard to display relevant outage data including location and weather conditions at the site.
    b. Develop and incorporate a systematic process for the pushing of outage data with mention of "fire" to appropriate PNM business groups (Risk, Insurance, legal, claims). Make discussion of outages with actual or potential fire ignitions a regular and routine topic with these groups. This will help foster culture at PNM and increase overall corporate awareness regarding PNM's risk reduction efforts.
    c. Make outages with cause code/ mention of "fire" a Key Performance Indicator (KPI) for targeted business groups i.e., Line Dept, DOC, PWOPS, Risk Management.
    d. Tie corporate goals to a downward trend in outages with a cause code/mention of "fire".
    e. Collect all outage information, both Transmission and Distribution into one database. This will allow for better overall collaboration and data sharing. This is a lesson learned from certain California Utilities.

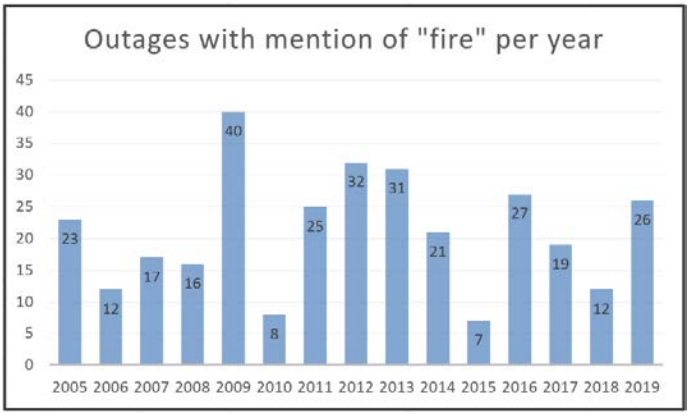
Recommendations- Ignition Management Program

The purpose of an Ignition Management Program (IMP) is to collect data on utility caused ignitions and near-ignitions (ignitions). This data will be used to determine the "when, where, and why" of what is causing PNM ignitions. Once PNM knows this, it can take informed steps to reduce the instance of ignition and thereby reduce its wildfire risk profile. The Ignition Management Program approach can be summarized as "Collect-Analyze-Act".

The inspiration for this IMP comes from a standard fire agency process where wildfire starts (ignitions) within an administrative unit, usually a "Battalion", are tracked throughout the year and assembled annually. The data is categorized into cause-descriptive groups such as Arson, Playing with Fire, Debris Burning, Escaped Campfire, Fireworks and so forth. Once the data has been sorted into these cause-related groups, trends begin to emerge, predictions can be made, fire prevention priorities can be set, and data informed strategies implemented to reduce them.

In the utility setting, PNM can harvest ignition-cause data to drive metrics regarding location, equipment type, initiating event, seasonality, voltage class, etc. Once trends begin to emerge in the data, decisions regarding budget and work prioritization can take place.

In the utility environment, ignition data can be collected, analyzed, and then assigned to a Mitigation Owner (MO). This MO should be from the line of business most logically associated to the cause of the ignition, for example, vegetation caused ignitions would become the responsibility of the Vegetation Management Department to track and provide solutions.



Trouble calls present an ideal opportunity to collect ignition information; currently, Trouble men capture specific information each time they respond to an outage call. This information is then ingested into the Outage Management System (OMS). A "Fire Form" can be added to their capturing/reporting routine. Experience has shown that the Fire Form can be filled out in less than 2 minutes. This process will provide

valuable information that is not currently being captured. It could change the way PNM prioritizes fire hardening work and allocates budgets.

An IMP will involve the following groups.

- Trouble men will collect the information while at the scene of an outage. Other sources of ignition data such as from field operations may be identified later. Line Dept. and Vegetation Management personnel may also encounter and capture ignition information once an IMP process is built out.
- Information Technology will be crucial to the implementation of an IMP. The best scenario would be to engage the IT Department before a scheduled upgrade to the OMS. In any case, multiple meetings will be required to flesh out the "requirements" of the IMP.
- Mitigation Owners (MO) will ultimately be assigned responsibility for mitigating the ignitions that are assigned to their line of business. Ideally, the MO would receive a routine (daily, weekly, monthly) push of collected data identified as being their responsibility. In turn they would review, make remediation recommendations, and follow up to see that results are occurring as desired or make appropriate adjustments in their remediations.
- OMS administrators will be essential to the project and need to understand its importance and potential benefits. They would be involved with the design and architecture of the data management system.
- Funding will need to be allocated to the project, so expect a finance component.

Benefits

Wire down and other ignition events in HFA, particularly during Red Flag conditions create a risk of potentially catastrophic wildfires. Learning from trends and metrics revealed by enhanced data collection efforts can lead to more focused and effective risk reduction at PNM.

Wire down information can help inform where fire prevention work should be focused. Knowing where and why wire down events are occurring will be beneficial to internal groups such as Design, Engineering, Standards and Line Maintenance. Enhanced data sharing across lines of business can help with this. Do Design, Engineering and Standards currently have access to wire down data? If not, it would be beneficial for them to have access to it.

Both an enhanced outage data collection strategy, and an IMP will provide useful metrics that are not currently available. They can be useful to help prioritize work and to track the effectiveness of existing strategies. They can also be used to justify current budgets or redirect funds for more efficient use.

One benefit of enhanced OMS data collection would be to "feed" an IMP. Improved awareness of ignition occurrence across the enterprise will allow for a data driven approach to risk reduction.

An IMP will provide information on Company ignitions that does not currently exist. Knowing when and where the Company is having ignitions (and near ignitions) is critical to making sound, science-based decisions. Experience has shown that once it is implemented, an IMP will immediately begin to provide useful and actionable information.

If enterprise-wide changes to the OMS are not possible at the present time, PNM should consider a pilot program restricted to the HFA.

Aside from an actual data driven approach, budget allocations and work priorities will continue to be informed by tradition and best estimates.

3.3 Engineering and Tech Solutions

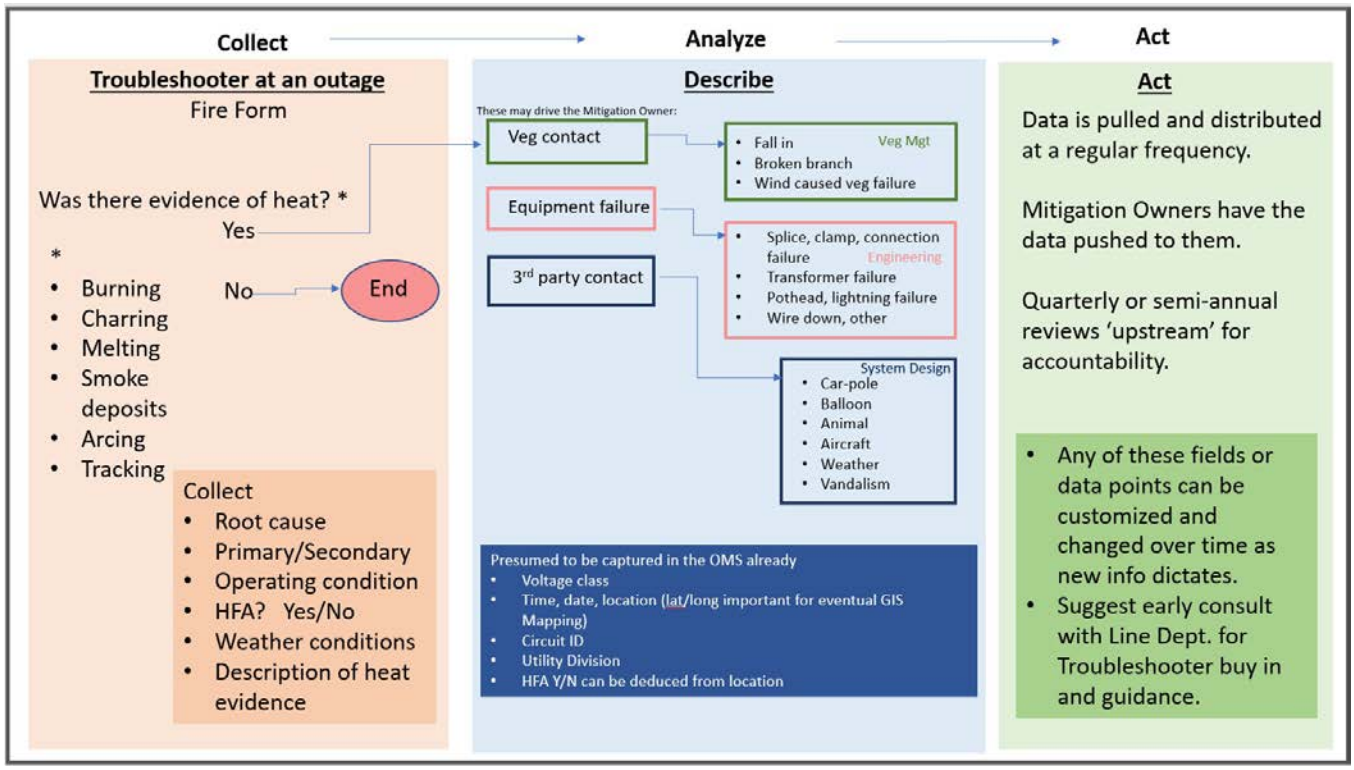
PNM designs its system to meet customer and utility needs ensuring that facilities are following the National Electrical Safety Code (NESC) and other applicable standards. Now that PNM has identified HFAs, the company is desiring to modify its automation practices and material specifications, incorporating technical fire prevention solutions to its facilities in the most vulnerable areas. To that end, PNM is currently researching literature on fire-safe materials, construction and design processes, and engineering and tech solutions as described below. Some of these materials include wildfire mitigation product catalogs from manufacturers. Also, PNM is using the **Cal Fire Powerline Fire Prevention Field Guide** for reference and guidance on best practices. https://osfm.fire.ca.gov/media/11015/2020-power-line-fire-prevention-field-guide_20200818.pdf

To gain additional knowledge, PNM has attended webinars hosted by WECC, EEI, and EPRI as well as attendance in person at a two-day EPRI Grid Resilience and Safety for Extreme Weather Advisory meeting in San Diego during February 2020. This will be an on-going training requirement to ensure that the PNM wildfire mitigation plan is continually being updated with current information and training that other utilities and specific organizations like WECC, EPRI and EEI provide.

Below is a summary of PNM's ongoing study and current activities relating to the use of engineering and technical solutions.

PNM is currently driving toward an approved spec for Transformers with Internal Fault Devices (IFD) which prevent closing in on a faulted transformer. The IFD gives a visual indication if the unit has experienced an internal fault. Closing in on a transformer with an internal fault can result in injuries to linemen and equipment fire that can spread to the vegetation. Transformer specifications are in the process of being finalized and manufactures will provide pricing.

- *Currently*: Completed a new transformer specification that will include IFDs.



Graphic depicting an Ignition Management Workflow

- *Recommendation*: Continue current process and start getting new transformers with IFDs. Determine if there is a way to map this data back to DOC to increase the fault locating efforts to determine the issue and reduce the risk of a fire.
- *Benefit*: Helps quickly identify problems with transformers and prevents closing in on a fault and potentially causing an arc, fire, or other issue.
- *Challenges*: Finalizing specification to start getting new transformers installed. Working with manufacturers to meet new standards. Using up existing inventory.
- *Priority*: New construction high, existing equipment change outs low except for failed or overutilized transformers where equipment will meet the new specification. Proactive change out of adequate existing equipment in HFA areas to be evaluated on case-by-case bases.
- *Timeline*: Specification done. Implementation with new transformers may take a year or more due to concerns going out for bid with current transformer lead time issues from manufacturers.

Capacitors banks are in the process of being equipped with SCADA communication to send real-time data back to DOC. A feature included in the bank is neutral current sensing – it can detect when a bank has either a blown fuse, a bad capacitor can or a stuck switch. These items can cause a fire hazard, whereas a neutral sensor can prevent it.

- *Currently*: PNM is collecting capacitor bank data on neutral sensing, voltage sensing and counter operation. In the future, research will be conducted on other features the controller offers, i.e. harmonic sensing,
- *Benefit*: Having SCADA equipped capacitor banks are benefiting distribution planning to give more accurate modeling and sending live data to the Distribution Operations Center to help decide if a bank is functioning correctly. If the bank is not operating properly, troubleshooting or forced operation could create an arc flash.
- *Challenges*: The additional labor to change out old Beckwith controllers with this new updated controller. Communication signal strength and bandwidth may not be compatible in certain locations due to terrain or heavily utilized communication towers. Also, dead zones in communication coverage may be present.
- *Priority*: Medium; this is a continuous process.
- *Timeline*: Not all capacitor banks will be upgraded due to low communication system bandwidth. Once an upgrade in communication system is improved, a more accurate timeline can be given.

Communication upgrade to retrieve data in the field

- *Currently*: Most electronic devices can send live data back to Distribution Operation Center (DOC) to notify them of any potential hazard. To send this data, communication is an essential. Upgrading communication can give us data in isolated areas and which will enable installation of more advance devices.
- *Recommendation*: Research the need to better expand and harden the communication system in HFAs for better monitoring. Add SCADA communications to monitor line performance.
    - Look into overlaying the communication coverage over the HFA's to determine discrepancies and where the opportunity is to strengthen communication paths.
- *Benefit*: Live data sent to DOC which will enhance decision making.
- *Challenges*: Knowing how to organize data and how to react to it effectively.
- *Priority*: Medium-High
- *Timeline*: Depends as it will take time to upgrade to communication system.

Communicated Fault Current Indicator (FCI)

The SEL-FLT and SEL-FLR System can quickly indicate a fault, loss of current, or disturbance and it reports accurately load data to give distribution system operators better visibility into system conditions and speed up fault location.

- *Currently*: A standard FCI is being utilized and crews must manually locate an FCI to determine if a fault is on the line.
- *Recommendation*: Utilizing SEL-FLT and SEL-FLR system can give guidance to DOC to determine if and where hazard is occurring on the line. A trial in high fault/hard to troubleshoot areas is recommended.

- *Benefit*: Reduces time to locate fault. The device can distinguish between permanent and momentary faults or losses of load in applications where automatic reclosing is applied.
- *Challenges*: The cost for annual maintenance of the device. Communication signal strength and bandwidth may not be compatible in certain locations due to terrain or heavily utilized communication towers.
- *Priority*: Medium-low as more research and trial needs to be conducted.
- *Timeline*: A trial can at least be conducted by early 2021.

Additional recommended engineering and tech solutions and research opportunities

- Replace all older reclosers with modern equipment capable of detecting sensitive earth fault conditions, and provide for automation and remote control.
- Upgrade all feeder relays to solid-state digital relays to improve sensing and functionality.
- Investigate fault locating sensors and other options for pinpointing fault locations on HFA feeders.
- Modernize / upgrade distribution system RTU's to provide more functionality.
- As an alternative to undergrounding, PNM will explore the relative merits of a pilot surface installation. This new method reduces exposure to trees, wind, and animal contact. No historical performance data is available. Need to include studies of existing use cases, especially relating to fault count reduction, cost analysis and performance.
- Distribution Standards is working with Protection group to include appropriate controllers in approved designs.
- Selected and coordinated ultra-high-speed transmission relays, switches, and breakers to shorten fault durations and limit energy flow to faults and potential ignition scenarios.
- Selected implementation of feeder and recloser relaying that detects high impedance faults and incorporates future capability to communicate with each other and adjust behavior on high fire risk days and synchronize and coordinate in real time.
- Using advanced transmission relaying technology to detect incipient faults before they occur on transmission lines.
- Continue researching how these devices are used in the utility industry and determine how they can be incorporated into the PNM system.

Other

- Additional funding for Engineering staff dedicated to fire prevention will help shorten design turn-around times and allow an emphasis on fire prevention efforts.

3.4 Design and Construction

Although PNM does not currently have a formal fire prevention practice for design and construction, the company designs its facilities to be safe and reliable following NESC provisions Grade B construction; being in compliance with the NESC increases the overall safety of PNM lines.

Design and Construction specific to HFAs

PNM HFAs are newly identified, and PNM has already begun to include them into its planning and design process. Following are some examples of how HFAs are being used in Design and Construction:

- PNM is currently considering the use of steel poles in HFA. The HFA will be prioritized for steel pole use.
- Revising ruling spans for HFA by standardizing a lower maximum pole to pole span distance in HFAs to reduce wire sag, wire blow-out, and wire movement that could create an unintentional contact between conductors, vegetation, or other obstructions.
- PNM is enhancing and hardening communication schemes for HFA monitoring.
- PNM is inspecting its circuits in HFAs to identify older Rural Electrification Administration (REA) standards and bringing them up to current standards.
- Detailed inspection for HFAs.

Wildlife Protection

One of the top ignition methods for starting wildfires from electrical lines is wildlife accidently making electrical connection and starting an electrical arc or fire. Wildlife protection measures currently implemented by PNM can provide some wildfire protection measures by covering or distancing energized parts thereby lessening the potential for arcing from animal or object (branches, balloons, etc.) contacts with our facilities. To address this, PNM has implemented the following:

- PNM has an approved dynamic Avian Protection Plan (APP) of which every relevant Distribution Standard drawing reference for compliance, by either isolation whenever possible or by insulation. Minimum clearances, vertically, horizontally, and diagonally must adhere to the APP and by the Avian Powerline Infrastructure Committee (APLIC).
- For underground systems, varmint proofing utilizing Quickrete to form an impermeable layer at the bottom of the equipment to isolate the equipment from wildlife.
- Or an overhead system where items like a squirrel guard, pin insulator covers, cut out covers, line covers and so on and so forth are utilized to reduce wildlife from entering critical zones.
- PNM utilizes raptor safe design (5' isolation or insulation) in all hot wings identified areas. Examples include 10-foot crossarms and appropriate covers (wire, bushing, cutout, arresters, etc.) on exposed live parts. PNM also has bird guarding on some equipment as standard and installs bird guarding where birds have been an issue regardless of "Hotwings" designation. We also install insulated jumper wires for all equipment jumpers.

Wind loading

- *Currently:* PNM designs for light loading per the NESC in some Southern regions which call for increased wind loads instead of an ice load. Heavy loading per the NESC is used in the mountains east of Albuquerque and Clayton.
- *Recommendation*: Conduct a wind loading study to evaluate if PNM needs to alter the design standards to different grades of construction and accommodate local condions as provided in the NESC.
- *Benefit:* A wind study would confirm that PNM is designing to actual conditions.

- NESC Medium loading Grade B includes a lot of extreme conditions and safety factors but increasing the loading as appropriate to actual conditions may increase the safety factor in design. Decision to make changes at PNM will depend on the results of the wind study.
- *Challenges:* Most structural design for line extensions and replacements outside of major installations with communication lines relies heavily on general standards. Distribution engineering does not have the expertise or resources to customize structural analysis in individual areas. Major conductor upgrades and joint use attachments do a full structural review. Consider software and training needs as appropriate.

Non-Wood Poles

- There is no formalized process currently to use steel poles for hardening or fire mitigation. Fiberglass poles are used where weight is a major consideration (such as when helicopter is being used).
- *Currently:* a variety of steel poles are approved and may be used for replacement of wood poles. PNM use cases for steel poles are tangent, angle, and dead-end. Steel poles are primarily used when structural requirements dictate; specific situations may call for their use instead of wood poles.
- *Recommendation:* Continue researching as a wildfire mitigation option. Standards is conducting an internal review and analysis on how frequently we can deploy these steel poles (one pole every mile). Another alternative is utilizing truncated transmission poles buried deeper or ductile iron poles.
- *Benefit:* Some non-wood poles may prevent pole fires.
- *Challenges:* Current steel poles are not fire resistant, and specification should be evaluated to understand if adding fire resistance requirements are appropriate.
    - Steel poles have a 26+ week lead time.

Overhead Fusing

- *Currently:* PNM uses expulsion cutout fuses for most of its distribution system. These fuses can expel hot fragments that may cause an ignition.
- *Recommendation:* research appropriate fire-safe fuse alternatives, such as current limiting fuses, trialing them in different areas with PNM crews, and selecting the best fuses to use going forward in HFAs. A proactive change-out within HFAs would also be helpful. Possible alternatives:
    - Non-Expulsion Fuse
    - Liquid Filled Fuse
    - Energy Limiting Fuse (ELF)
    - S&C Fault Tamer Fuse
    - SMU-20 Fuses
    - S&C VacuFuse
- *Benefit:* This will reduce ignition sources from fuses without looking at system redesign.
- *Challenges:* This change will require research, trial, and approval (potentially 6 months) and budget to implement on new construction or a proactive replacement program. Potential coordination studies may be needed depending on fuses available. Smallest current limiting fuses seem to be 20A, while PNM regularly uses 15A overhead fuses on lateral lines and as low as 3A overhead fuses on transformers, so current limiting fuses may have limited application. Fuses are generally O&M items, so a massive change-out will need to be O&M budgeted or work with Plant Accounting if there is an appropriate capital project. There can be long lead times when ordering fuses. PNM will need to evaluate compatibility with current fuse holders and understand impacts to trouble truck material stocking levels.
- *Priority:* New standards should be developed and change-out should occur as a high priority.

- *Timeline:* New standard and starting to change out fuses as early as Q1 2021 may be possible if feasibility studies can be performed.

Lightning Arrestors

- *Currently:* PNM uses standard overhead arresters for transformers, risers, arrester stations, equipment, etc.
- *Recommendation*: researching appropriate fire-safe arrester alternatives, trialing them in different areas with PNM crews, and selecting the best for use going forward in HFAs. A proactive change-out within HFAs will be planned and implemented.
- *Benefit:* Eliminates a possible ignition source.
- *Challenges:* There are many different options. Prioritize research to focus on types and kinds needed to equip highest lightning-prone areas of the HFA. Develop a plan to use existing stock in PNM's least fire prone areas. Gain efficiencies by coordinating the lightning arrestor assessment with that of other equipment types and coordinate with a comprehensive plan.
- *Priority:* High. Akin to fire-safe fuses.
- *Timeline:* 6 months for initial standards, can then work on proactive change-out.

Protection Coordination Analysis

- *Currently:* Protection analysis is prioritized for customer jobs and when problems exist on the system.
- *Recommendation:* Hire a contractor to look at a feeder holistically, and propose improvements where possible to minimize SAIDI, miscoordination, and low fault current issues.
- *Benefit:* Ensures proper coordination throughout feeder, looks at optimal SAIDI and fire exposure reduction, can utilize existing equipment, can incorporate new equipment and philosophies as available.
- *Challenges:* Finding proper contractor to follow PNM standards, coordinating information gathering such as correcting mapping errors and current settings, good guidance on where PNM draws the line on cost / benefit, designing the result into ArcFM and Maximo.
- *Priority:* Medium-High - Coordinate with contractor to develop a plan to incorporate PNM equipment standards, mapping and protection standards and move forward with the poorest performing feeders, prioritizing those in an HFA, to fine tune the process in regard to the aforementioned criteria.
- *Timeline*: Variable depending upon availability and sourcing of contractor protection engineers as well as distribution engineering resources for writing work orders –. The company has many resource needs and should place focus on prioritizing these needs to determine realistic timelines. Construction, programming, and communication – roughly 72 man-hours per unit over 6-8 weeks.

Switches

- *Currently:* PNM uses riser disconnect switches (RDS), for backbone risers, cutouts with fuses or solid blades for 200A and lower risers, bypass blades for reclosers, sectionalizers, regulators, etc., gang operated load break, GOLB, switches with interrupters for 3 phase line switching, and Scada-Mates on main backbone lines for 3 phase switching. Current practice is sufficient except for risers. There are legacy constructions that do not meet current standard including single bypass blades and switches without interrupters.
- *Recommendation:* A replacement for RDS's is being investigated, and wildfire concerns will be considered when looking for replacements. RDS replacements may need feeder designs that do not require interruption of load or ability to interrupt load with an interrupter or something similar. Switches in HFA areas should be inspected and replaced if they do not have interrupters. Older switches without interrupters often use air as the arc-interrupter, which can cause arcs that may ignite a fire. For this reason, Cal Fire does not exempt this

equipment and PNM should look at replacing this equipment. Increasing use of Scada-Mates may assist in troubleshooting, sectionalizing, etc.

- *Benefit:* Interrupters prevent an in-air arc when the switch is operated. More communication allows for better awareness and quicker switching operation.
- *Challenges*: Currently, more research is needed for RDS switches. Engineering resources will be an issue for installing replacement switches.
- *Priority:* Non-standard switches in HFA will be prioritized for replacement first. RDS switches depend on application. SCADA is as needed and is useful.
- *Timeline:* The company needs to fully identify its engineering requirements and prioritize the work, as resources are scarce, before realistic timelines can be identified.

Cross arms

- *Currently:* PNM uses wood, fiberglass, and metal cross arms.
- *Recommendation:* Evaluate the effectiveness, longevity, and fire hardening benefits of "Fire-Guard" coatings of wood cross-arms in identified HFAs or the use of fiberglass for its fire preventive and longevity characteristics.
- *Benefit:* This may help with minimize wires falling to the ground and pole fires.
- *Challenges*: Time needed to pre-coat the wood arms.
- *Priority*: To be determined upon assessment of Fire-Guard.
- *Timeline:* Fire-Guard should NOT be applied during extreme hot or cold temperatures. Recommended ambient temperature for application is 50 F to 85 F.

Covered wire, tree wire, aerial cable systems

Utilizing overhead covered conductors is an option open to PNM. Research is required to determine how line ampacity would be affected. For example, use of 795 AAC conductor instead of 397 could require more poles in line due to the added weight of the covered 795 AAC.

- *Currently*: Covered conductor has been brought up multiple times at Distribution Standards Committee (DSC) and bids for Hendrix Cable were solicited for a project. Heretofore, there has been little interest in pursuing these options.
- *Recommendation:* PNM will explore the use of these wire types for use in forested areas or tight ROWs to prevent the risk of faults. Further investigation and data gathering would be needed to understand where this mitigation makes more sense than other mitigation options.
- *Benefit:* Reduce the risk of faults that are commonly associated with bare conductors, such as animals, vegetation and flying debris.
- *Challenges*: Redesign required due to more mechanical loading and ice loading. Ampacity will drop as compared with using bare conductor. According to an EPRI study, covered conductors are more susceptible to burndowns and conductor damage from arcing. Changes in supply chain and warehousing will be required to keep these in stock. Will also need accessories such as connectors, ties, insulators, etc. Need special tools to work on aerial conductor (such as to remove insulation in middle of conductor). Finally, some concern if working on the line hot is allowable with minimum approach distances if using an aerial system (PNM did not work those lines hot when on storm restoration to other utilities).
- *Priority:* Medium-low as this has not been incorporated to the PNM system, and further research is needed to sort out loading, ampacity, and redesign activities.
- *Timeline:* A study needs to be conducted and shall begin at the end of 2020 and a possibility to trial this in 2021.

Insulation

- *Currently*: Insulation is designed to the voltage of the circuit and is either 5kV, 15kV, or 25kV class. In some limited situations a higher voltage class is used such as when lower voltage classes are not available or other factors such as working clearance make another insulation preferred. Insulation is a consideration on many kinds of equipment such as insulators, cables, terminations, transformers, protective devices, etc.
- *Recommendation:* Standardize all insulators in HFAs to be 25kV class. Exceptions may be made when exact voltage is needed such as transformers, devices with transformers, etc.
- *Benefit:* Higher voltage ratings of insulators will help increase basic insulation level, Basic Impulse Level (BIL), ratings, make it harder for a flash-over event to occur, and allow for more deterioration or damage before failure. 25kV standards currently exist for some circuits in Silver City with that voltage.
- *Challenges:* Increase in warehouse and truck stock. PNM may want a fire-resistant insulator and will explore options of what is currently and soon-to-be available.
- *Priority:* Medium.
- *Timeline:* Can implement quickly, but currently PNM has no stock of materials.

Primary connectors (Hotline Clamps and Ampacts)

- *Currently:* Hotline clamps do not have springs. PNM currently attaches to a fire-on stirrup known as Ampact attached onto the primary line. Ampacts (wedge connectors) are the preferred electrical connector for primary and are very reliable.
- *Recommendation:* No change is needed. Adjustments in recommendations will be made to clearly indicate to use a stirrup with a hotline clamp. Any items on primary that can be improved by changing to Ampact will be looked at as well.

Additional Fire Prevention Measures Currently Followed at PNM

- The use of Completely Self-Protected transformers, CSPs, in Albuquerque and surrounding metro area, Santa Fe, Las Vegas, Clayton, and Deming for single phase applications. This eliminates the use of cutout fuses which, in turn, reduces likelihood of spark and ignition. Other areas use conventional transformers, which can have their fuses changed to fire-safe fuses.
- Covered wire is used on all equipment for jumpers.
- Pilot projects have been started using Trip savers on lateral lines in heavily forested areas, especially where fuses blow more frequently. Not a common practice yet.
- Recommendation: Inspect all conventional transformers located in HFA's and generate a replacement program to upgrade to CSP type transformers. Look at existing jumpers and see if they need to be upgraded to covered wire depending on the proximity to HFA. Estimate timeline to start installing Trip savers in designated location is by the end of 2020.

Additional Recommendations/Opportunities

- Change out open wire secondary in HFA. Replace with covered wire. Target poor performing circuits and circuits with high vegetation contacts/outages.
- Add SCADA communications. Prioritize low performing feeders in HFA.
- Explore the use of taller poles in certain hazardous fire applications.
- Establish a 10' radius to mineral soil (clearance) around the base of HFA poles with 'non-exempt equipment' as seen in the California Powerline Fire Prevention Field Guide (see Appendix).

- PNM will conduct a comprehensive review and make revision to construction standards for the HFA.
    - Non-expulsion fuses
    - Wider cross arms
    - Covered tree wire where desirable/applicable
- Add HFAs as a layer in ArcFM similar to Hotzones and Hotwings zones for easy identification.
- Train PNM and contract personnel on the intent and contents of the PNM WMP.
- Flag work order cover sheets to let crew know the work is in an HFA.
- Include a checklist for Designers to fire harden in the HFA. The checklist could potentially allow only "HFA approved" equipment. Such an "HFA approved" list of equipment needs to be developed. Research to see if raptor nest relocation and/or separate nesting boxes could be an effective strategy at PNM. Prioritize HFAs that host raptors.
- Expanding Avian-safe designs to all HFAs. PNM is already comfortable with those designs.
- Suggestion to create a sub-team within the distribution standards committee to meet on a regular basis to evaluate, prioritize, and recommend HFA standards and practices, or hire an outside consulting firm to do the same for PNM.
- System wide hardening of facilities around escape routes and crossings including Bosque areas. Key structures within a segment of line are identified for hardening efforts.
- "Sacrificial" structures are identified and designed to prevent further damage in case of nearby poles failing.
- PNM is currently exploring the affects from residual heat and smoke on conductors post fire. It is exploring what sorts of inspection and testing routines might be available.

3.5 Inspection and Maintenance

While PNM does perform numerous inspections on its transmission and distribution facilities, there is little formalized structure or routine around its processes. Annual visual inspections are performed though currently there is no documented wood pole intrusive inspection program for T&D.

PNM is exploring the purchase of new drills that will enhance intrusive inspections on the worst performing T&D feeders and circuits.

Specific to Transmission inspections, PNM maintains an inspection list dating back to 2008 on its S://drive. There is also a Transmission Asset Maintenance and Inspection System (TAMIS) tracking system. OSMOSE performs pole inspections on NERC lines. These disparate databases do not lend themselves to readily access to asset health information.

Aerial patrols (helicopter) are routinely used in areas where the terrain is untraversable. Likewise, aerial patrols (drone) are not routinely used aside from where they are necessary due to inaccessibility. Cost was cited as a factor limiting drone use.

Infrared inspections are currently limited to annual substation inspections or are performed on an as-needed basis. An example of this is the recent work done at the airport and on the downtown network.

LiDAR data has been collected but not systematically. Focus has been mainly on Transmission and new construction.

Currently, southern area distribution main feeder lines are patrolled by ground annually, Transmission lines bi-annually. Northern and Southern determine their worst performing feeders and perform a “find and fix” on them.

The PNM GIS system does not currently include data on asset age or condition though it has that capability. It is felt that this age and condition is known locally, anecdotally.

Specialty programs such as for splice assessment are nonexistent.

Recommendations/Opportunities

Data management can be improved by using a single database for all asset inspections. PNM should move toward a consolidation of its asset health and inspection databases.

Drone use might be increased to limit foot patrols in hazardous terrain and to limit helicopter use in densely populated or other sensitive areas. Drone use on USFS lands is not clear-cut. Many restrictions apply. Specific use cases might be argued successfully, but only as allowed by FAA regulation; flights over Primitive and Wilderness areas are always prohibited.

Aerial Patrol routines will be established, carried out and documented in a centralized database. HFA areas will be prioritized for annual patrols of T&D lines.

PNM will establish a requirement for infrared inspections in HFA annually on Transmission lines and bi-annually on Distribution lines. Infrared inspections will be performed more frequently on switchgear and elbows known to be problematic or in sensitive/HFA areas.

Collect LiDAR data on all Transmission lines every 10 years.

Collect LiDAR on all T&D lines on all HFAs (before 2021 fire season).

Incorporate Vegetation Management Department data needs into the next round of LiDAR collection. Consult with VM before flights are planned.

All T&D lines in HFA areas of Northern, Metro, and Southern will be ground patrolled annually prior to peak fire season.

PNM will develop an enterprise-wide mechanism to prioritize asset inspections. When first establishing this routine, priority should be given to worst performing feeders and circuits in HFA areas. This prioritization regimen should be used as a template for future routines and cycle intervals.

PNM will launch a pole testing program aimed at preventive treatments (internal, external, and stubbing).

PNM will explore how to implement a formal and routine Corona/IR inspection and documentation regimen for bad connections. Data would be captured in the cross-functional database mentioned above.

PNM will explore how it might collect asset information such as wire type, asset age, pole construction, cross arm width, etc. into its enterprise GIS system to make the data available across multiple lines of business.

Rationale/Benefits

A single repository for asset inspection data would benefit cross-functional groups. Many groups (GIS, Risk Management, Line Dept., Asset management, etc.) would benefit from this.

A documented pole testing program would not only increase reliability but could be useful if future wildfire litigations arise.

Annual aerial patrols would help identify structural issues and enhance both reliability and fire safety.

Proposed infrared inspections would help identify failing connections before actual failure.

Enhanced LiDAR inspections would help identify asset structural defects as well as vegetation clearance issues. This twofold use of the data provides added efficiency.

Enhanced ground patrols would lead to risk reduction by identifying hazardous conditions.

PNM will embark on a structured and systematic effort to collect and record asset age and condition data. This will be captured in the shared database described above. Priority will be given to worst performing feeders and circuits in HFA areas. Robust GIS data makes information available across multiple business units.

3.6 System protection from wildfire

Vulnerability of infrastructure is predicated on the type of materials and construction used, and its proximity to wildland fuels. Heat intensity and duration of flame impingement are key in predicting the survivability of electric structures. Age and overall condition are especially important when determining survivability of wooden structures. Checking and cracking can host embers that eventually ignite and can cause damage, if not complete failure. Heat can cause steel and aluminum structures to weaken and fail. Fiberglass begins to deform when subjected to heat. Wildfires from any cause can inflict damage to PNM's electric system. Damage can be costly and cause prolonged outages. PNM currently does not have a formal, enterprise-wide program in place to identify and pre-treat its assets with fire resistive/fire retardant coatings or wraps, or fire hardened designs.

Recommendations/Opportunities

PNM may opt to contract out for an analysis and recommendations for fire protection treatment, or it may decide to do the work internally. In either case, a list of critical assets will be needed. PNM will complete the identification of critical assets as soon as practical. Likely candidates for critical asset consideration are:

- Transmission lines without redundancy.
- T&D lines that serve critical customers such as hospitals, prisons, pumping stations, schools, Fire Depts, etc.
- Transmission corridors with multiple circuits in vulnerable areas.
- T&D structures whose failure might have a cascading effect.
- Vulnerable mountaintop communication sites, the loss of which could cripple system operations

External solution

- PNM will engage a contractor to conduct an analysis of its pre-identified critical assets. This analysis will determine their vulnerability based on their construction type and fire behavior characteristics of wildland fuels adjacent to them. The analysis will result in a prioritized list of assets and treatment options. Typical vulnerability considerations should include the following:
    - Type of construction (wood, steel, aluminum)
    - Flame lengths expected at the site derived from the Behave fire modeling software. Behave provides calculations such as flame length and rate of spread for each fuel model encountered at a given (structure) location. Publicly available data will be used for this analysis.

- The contractor will provide site specific treatments tailored to PNM-defined needs and budget. Treatments include:
    - Coating and wrap recommendations.
    - Vegetation treatments including thinning and vegetation removal.
    - Recommendations for fire hardened construction techniques.

Internal solution

- Once PNM has identified its critical assets as described above, it will:
    - Apply the wrap or coating of its choice, prioritizing the HFA in Divisions with the highest historical instance of fire damage.
        - PNM has some experience with OSMOSE Fire Guard. This is a good option and its familiarity might be an advantage.
        - PNM should explore the use of FireSheath® WFS Net™ as an alternative to Fire Guard.

- Consult with PNM Vegetation Management to determine best practices for thinning and removal of vegetation.
  - Additional reference can be found in the "Vegetation Clearance Distances to Prevent Wildland Fire Caused Damage to Telecommunication and Power Transmission Infrastructure" document[1]
- Enable Transmission and Distribution Standards to make fire hardening design recommendations, again prioritizing the HFA in Divisions with historically high instance of fire damage.

Additional Rules of Thumb

- Avoiding areas of heavy timber when siting new facilities.
- Follow ridgetops and avoid traversing steep slopes.
- When crown cover is greater than 40%, negotiate wider ROW corridors. In existing installations, reduce timber crown closure within 100' of structures to below 40%.
- Avoid areas with a history of frequent fires (repeated burns) for siting purposes.
- Avoid siting in areas where ecological, biological, or cultural concerns make maintenance and fire prevention/fuel reduction/vegetation management difficult.
- Work with land managers/owners to locate corridors along planned or existing fuel breaks or roads.
- Coordinate the new sites to provide maintenance and patrolling access.

Rationale/Benefits

- PNM will benefit from having a comprehensive plan for asset protection. Both wildfire survivability and reliability will be enhanced by this effort.
- Efficiencies can be realized when combining protective vegetation work with routine and enhanced vegetation inspections and trimming.
- Improved internal PNM collaboration between Distribution Standards, Engineering, and Design groups will show benefits in treatment effectiveness, cost, research implementation, and internal information sharing.

[1] B.W. Butler, U.S. Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory, Missoula, MT; J. Webb, Forest Stewardship Concepts, Ltd, fsc@amigo.net, 719-852-2690, Monte Vista, Colorado; J. Hogge, Brigham Young University, Provo, Utah; T. Wallace, U.S. Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory, Missoula, MT. Also, in the Appendix.

4 Fire Weather Operating Plan

4.1 Situational Awareness and Operational Practices

Fire safe utility system operation and field work depends on good situational awareness (SA). Used in this sense, SA is defined as an understanding of wildland fuel and weather conditions, and how they affect the burning environment. SA can be broadly applied as when describing fire season across a service area, or it can be a daily snapshot of burning conditions in a region.

This section will describe various SA options available to PNM and make recommendations on its use.

PNM does not currently have a Meteorological Department. To enhance its weather SA, PNM researched and assessed vendors that provide weather intelligence by subscription. Weather Sentry and Indji Watch were explored. PNM personnel had a trial period of Weather Sentry and are currently working out details for a trial of Indji Watch. One advantage that Indji Watch has over other providers is that it provides fire alert notifications that notify of fires within specified distances of PNM assets.

California utilities use a Fire Potential Index (FPI) to describe daily conditions that may lead to a significant fire from utility operations. The FPI is a calculated index that combines dead fuel moisture, live fuel moisture and weather information. It is calculated daily across a service area and governs crew work. An FPI can also guide system settings (like reclosing) when the FPI trends up in response to seasonal changes (fire season). PNM investigated an FPI with Descartes Labs. Currently, it does not appear that an FPI is likely to be ready for PNM's immediate use. PNM will continue to explore options for a calculated FPI. An FPI proxy will be discussed in the Recommendations section.

PNM does not own or operate any mountaintop cameras. These are in common use in California and are being considered for use by utilities in other western states. Mountain top cameras provide a utility with information on a fire's burning intensity. Multiple cameras can be used to triangulate the fire's location. Typically, camera installations are a cooperative effort involving entities such as electric utilities, fire agencies, academia, and other infrastructure providers. See www.Alertwildfire.org for more information.

Some utilities have adopted the use of different Operating Conditions as fire risk ebbs and flows throughout the year. Operating Conditions of Normal, Elevated and Extreme/Red Flag are used to govern field and system operations. Normal and Elevated roughly but not exactly approximate winter and fire season. PNM does not currently have a formalized procedure for transitioning from one Operating Condition to another. Recommendations for doing so will be made below.

Recommendations/Opportunities

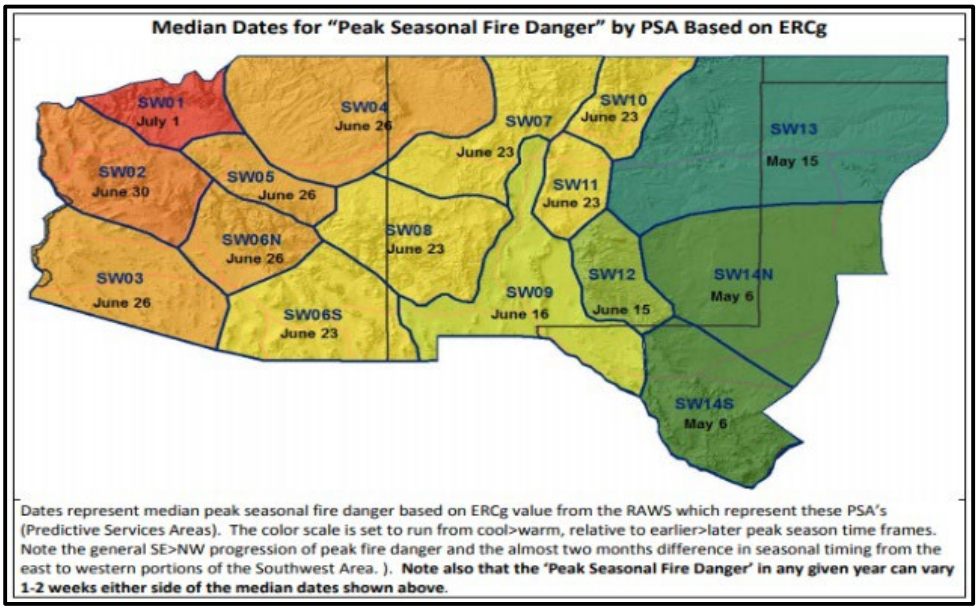
Understanding PNM Fire Season

In general, fire season begins in the spring when the landscape becomes receptive to ignitions. As the fire season moves into the summer, burning conditions become more critical. The wildland fire agencies (USFS, BLM, etc.) use fire season dates to determine staffing and operational levels.

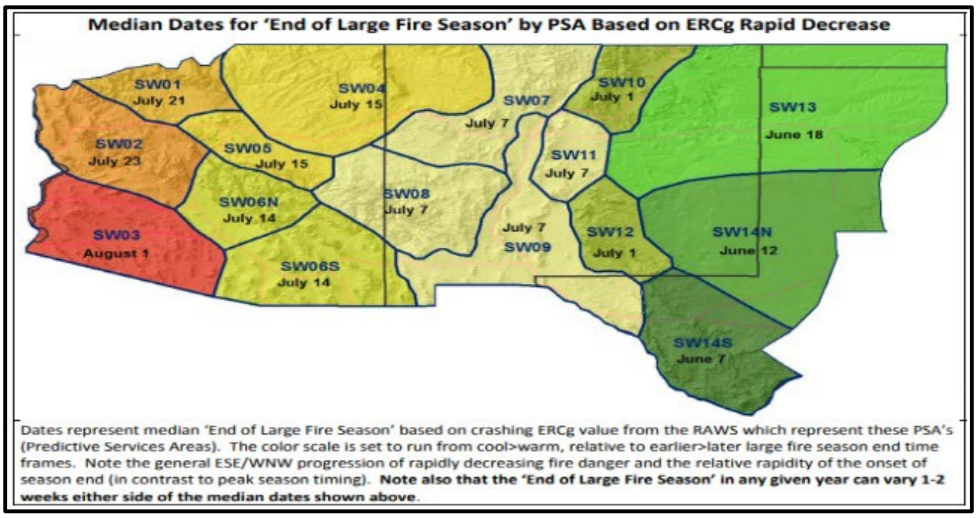
In the following two graphics, median Peak Fire Danger and End of Large Fire Season dates are displayed by Predictive Service Area (PSA). The basis for this is a factor known as Energy Release Component (ERC), a calculated output from the National Fire Danger Rating System. PSAs are areas of homogenous fire weather used by the National Wildfire Coordinating Group when providing 7-Day Significant Fire Potential forecasts.

From the USFS ERC Fact Sheet: "The ERC is a number related to the available energy (BTU) per unit area (square foot) within the flaming front at the head of a fire. The ERC is considered a composite fuel moisture index as it reflects the contribution of all live and dead fuels to potential fire intensity. As live fuels cure and dead fuels dry, the ERC will increase and can be described as a build-up index. The ERC has memory. Each daily

calculation considers the past 7 days in calculating the new number. Daily variations of the ERC are relatively small as wind is not part of the calculation."

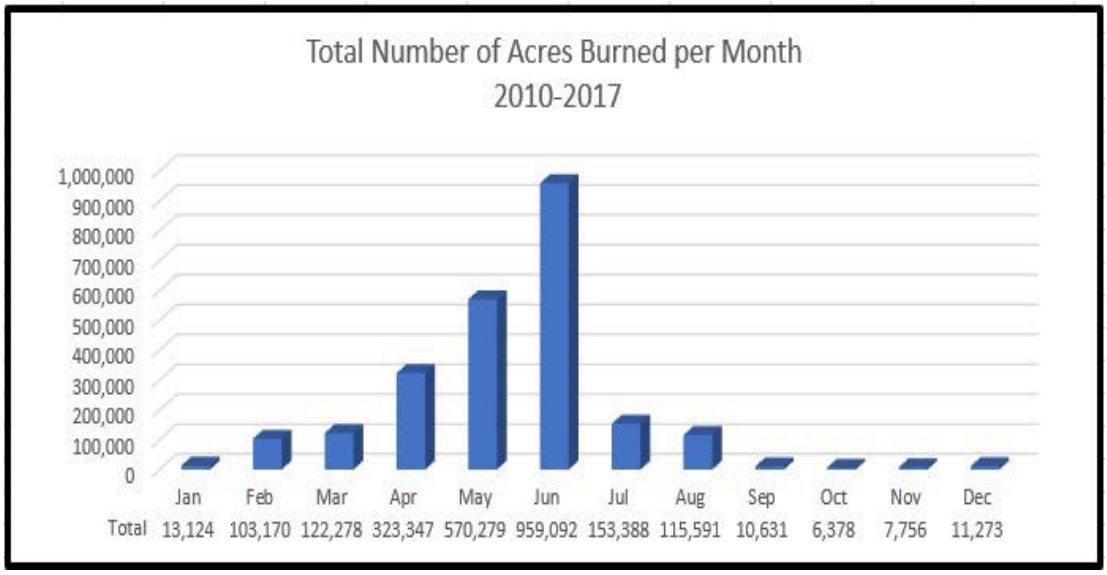


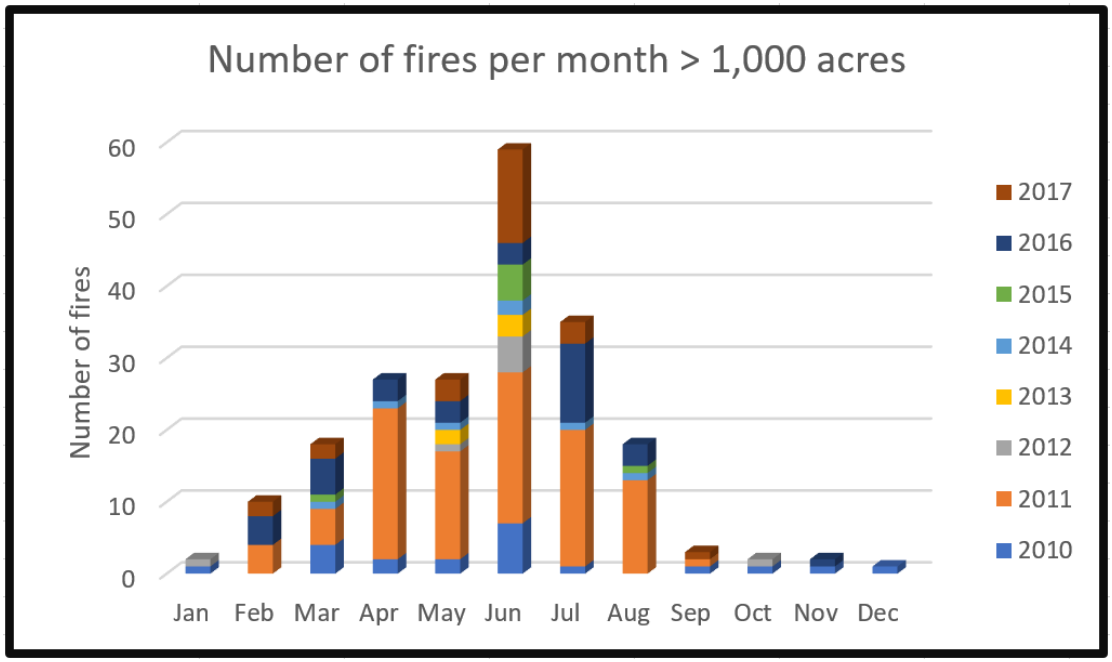
New Mexico, "Peak Seasonal Fire Danger" occurs in late June and "End of Large Fire Season" is typically during July. PNM needs transition to Elevated Operating Condition before "Peak Seasonal Fire Danger" arrives. "Peak Seasonal Fire Danger" is a short period of time and any system operation adjustments geared toward maximum fire prevention will typically be of short duration.



Source: https://gacc.nifc.gov/swcc/predictive/outlooks/peak_ending_timeframes/SW_season_timing.pdf

Another way to look at fire season onset is by noting the uptick in number of historical acres burned by month. The following graphs support the images and dates above. Over the study period of 2010-2017, they clearly show a spike in acres burned in June. Both graphs on this page represent state-wide New Mexico fire data. The top graph shows the total number of acres burned per month and the lower graph shows the number of fires that burned more than 1,000 acres per month over the same years. 2017 is the last year that comprehensive data was available from the USFS.



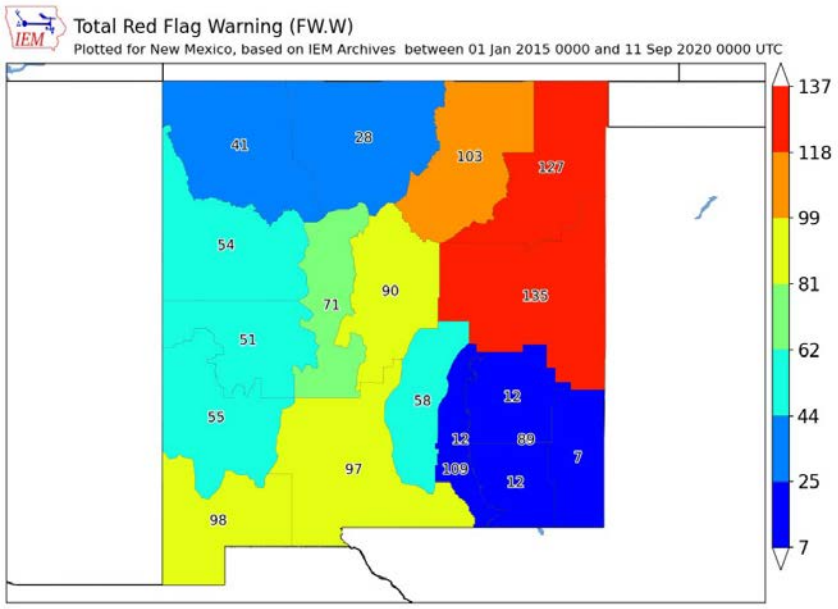


When the landscape can host fires of this size, PNM will assume that larger and more significant fires could occur and make operational changes described in the following sections.

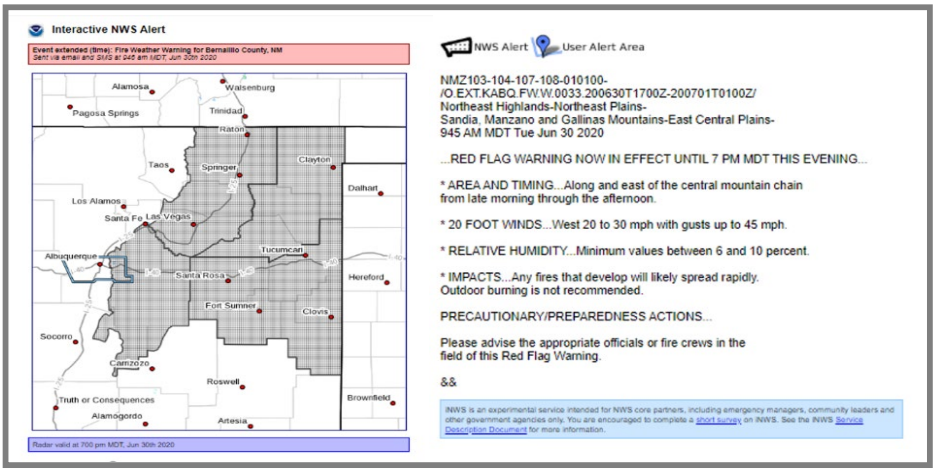
Red Flag Warnings

RFWs are issued by the National Weather Service (NWS) when fuel and weather conditions combine to produce critical burning conditions. They are issued for Fire Weather Zone(s) and for a finite period. Red Flag Fire Weather Warnings (RFW) provide PNM critical situational awareness useful for making operational decisions.

In New Mexico, RFWs begin to ramp up in March, peak in April and drop off significantly in July.



This graphic depicts the number of RFW by Fire Weather Zone from January 2015 through September 11, 2020

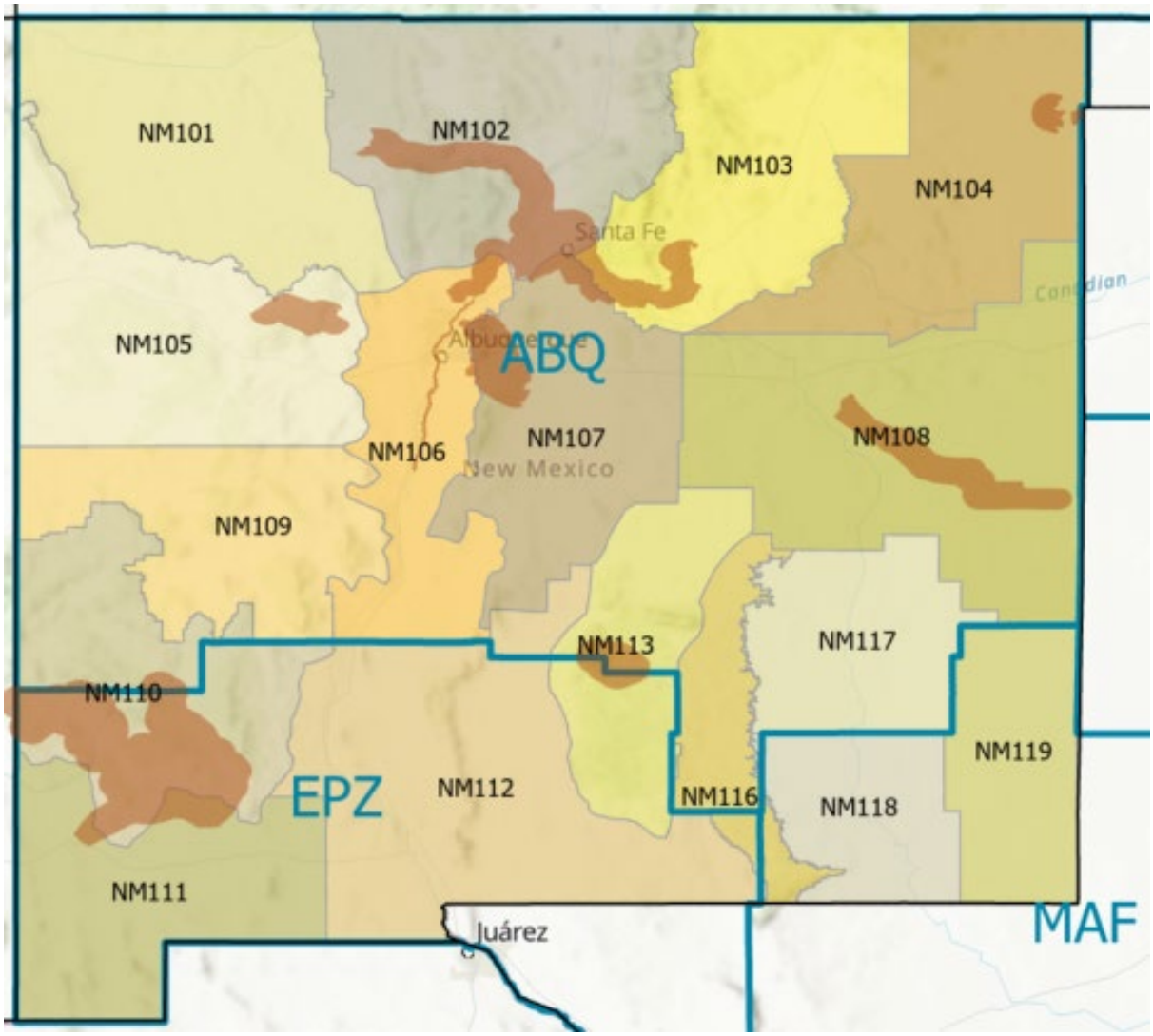


Sample Red Flag Warning

Criteria for issuance of an RFW varies from region to region and even differs between NWS offices. Typically, wind speeds above 25 miles per hour, relative humidity below 15% and 10-hour fuel moistures at or below 8% for one day combine to produce Red Flag conditions.

The majority of PNM service area is covered by two different NWS forecast offices, Albuquerque and El Paso, Tx.

Fire Weather Zones NM118 and NM 119 in the southeastern corner of the state do not contain any HFA. They are covered by the Midland/Odessa Forecast Office

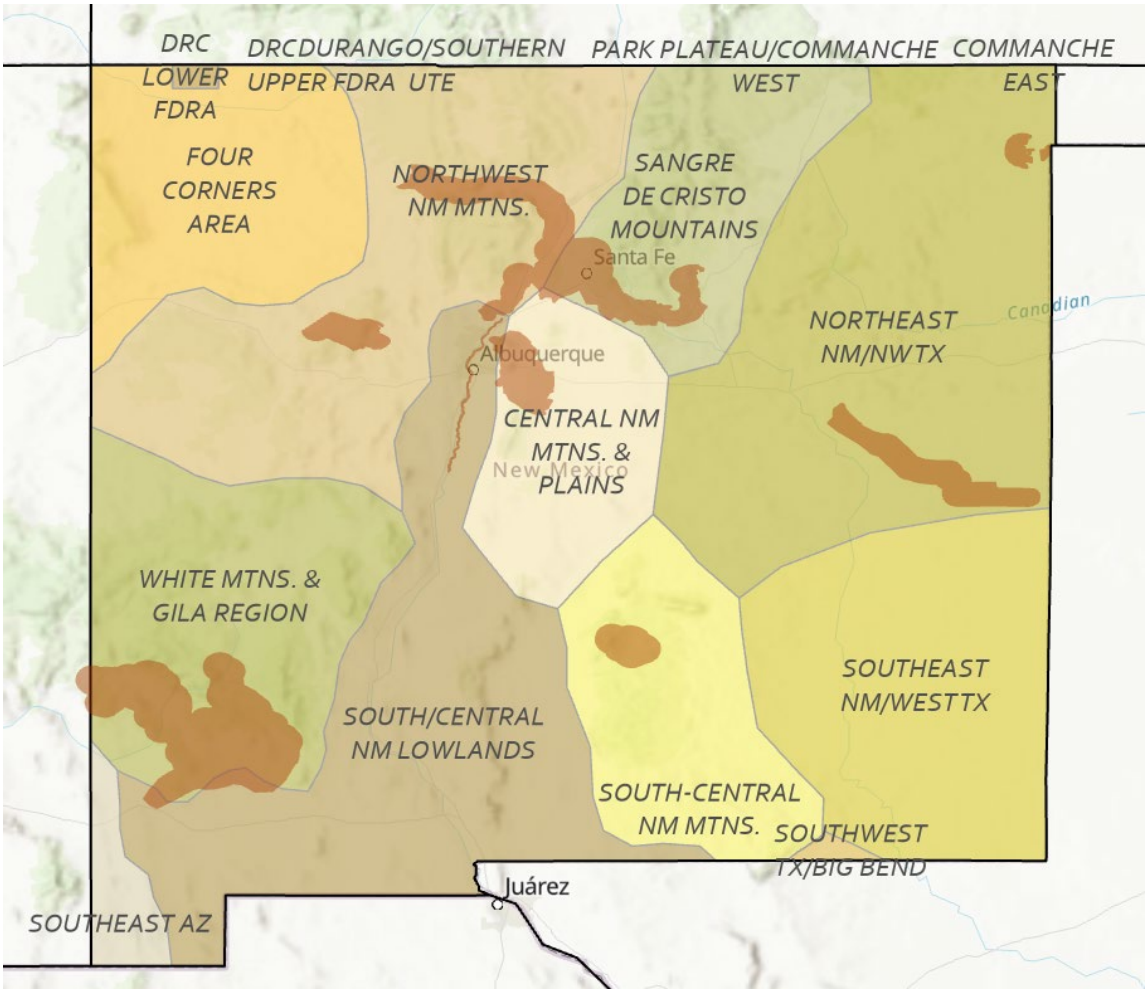


Other Situational Awareness Products

Predictive Service Areas

This map shows the Predictive Service Areas (PSA) that cover New Mexico. PSAs are used by the wildland fire agencies to describe Significant Fire Potential in a seven-day running forecast. They depict areas of homogenous fire and weather conditions by combining fuel dryness with significant weather triggers. This product is useful to PNM for project planning and can also be used to gather useful SA.

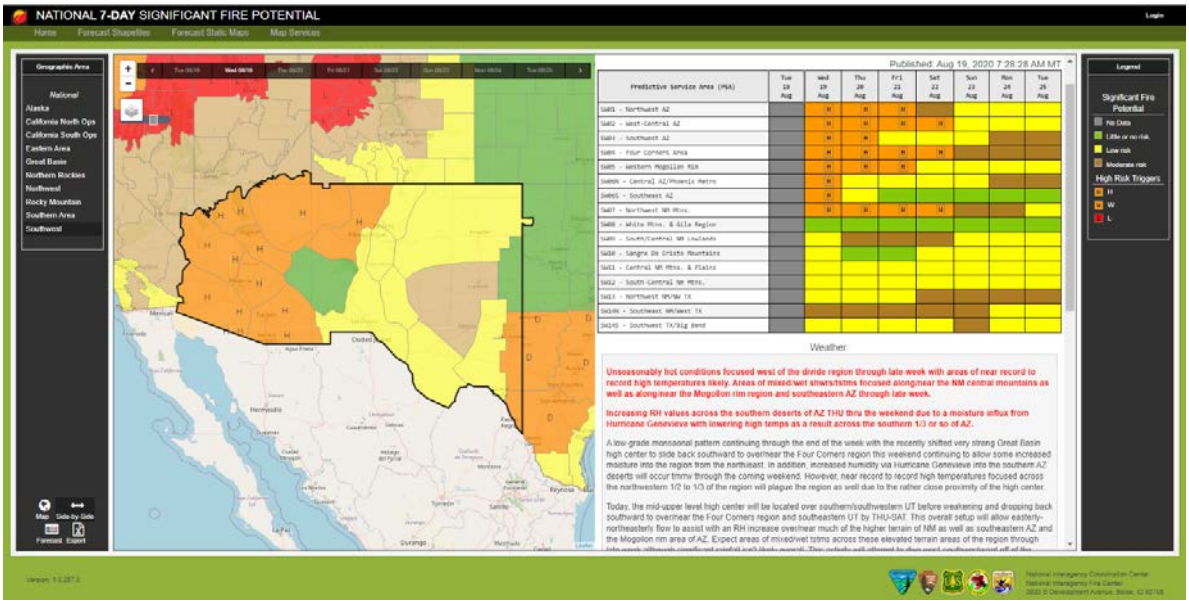
There will be times when PSA and RFWs are not in perfect agreement. Given the intended purpose of each product, this is understandable. When this happens, PNM will defer to the product advertising the most hazardous conditions.



Predictive Service Area intel can be found at

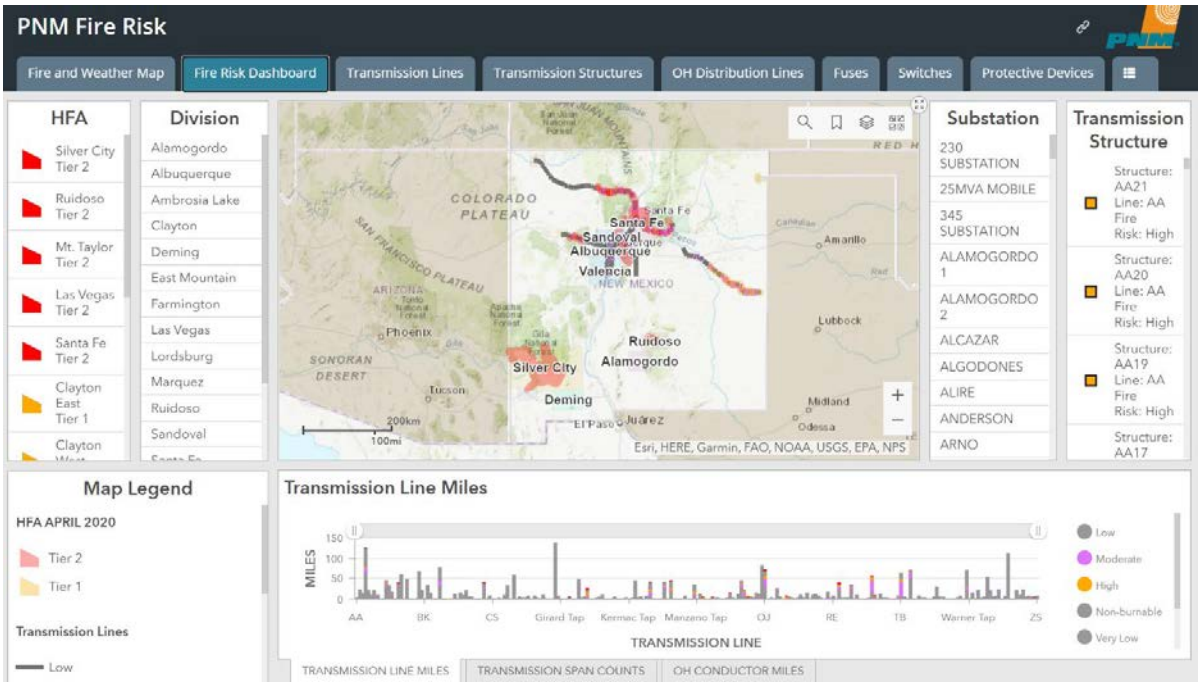
https://fsapps.nwcg.gov/psp/npsg/forecast/#/outlooks?state=sideBySide&gaccId=10

Following is a look at New Mexico and surrounding areas within the Southwest Area Geographic Coordination Center zone of influence. The Seven Day Significant Fire Potential Forecast matrix covers individual PSA areas as depicted on the previous map. This data is available via webservice and can be incorporated into the PNM Fire Risk Dashboard.

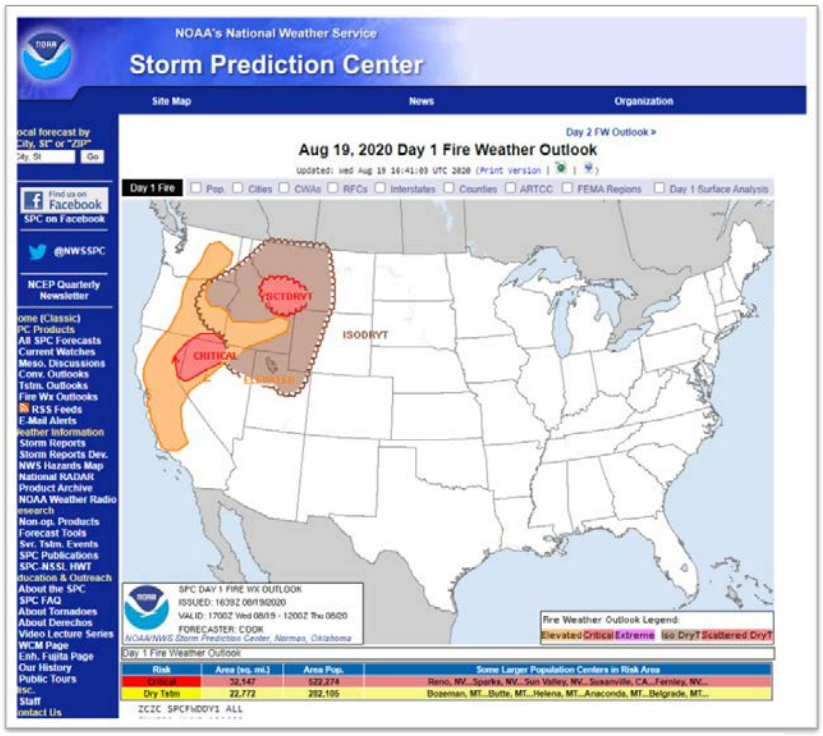


https://fsapps.nwcg.gov/psp/npsg/forecast/#/outlooks?state=sideBySide&gaccId=10

PNM Fire Risk Dashboard



Storm Prediction Center

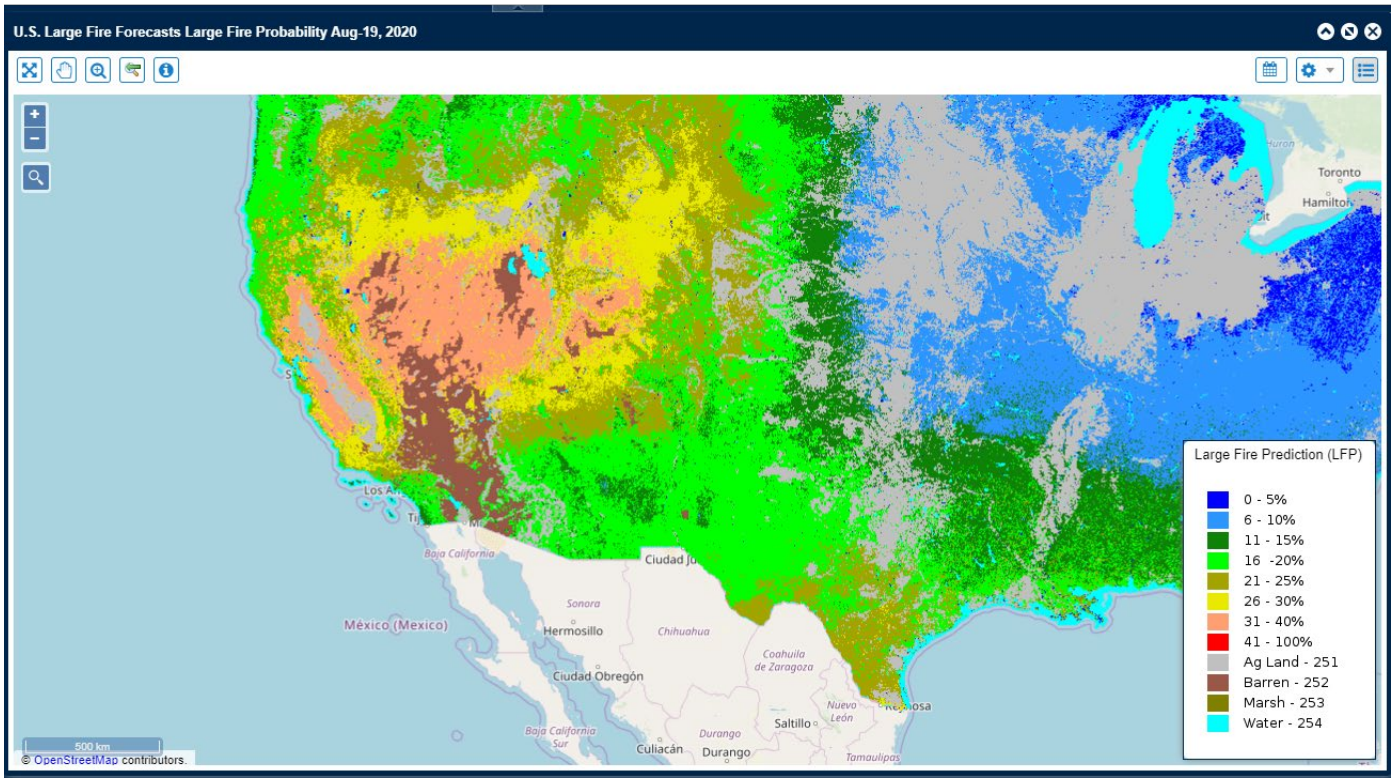


The NWS Storm Prediction Center issues a product that can be useful, especially when used in conjunction with other intel. This product is updated daily. It offers GIS shapefiles as a download.

https://www.spc.noaa.gov/products/fire_wx/fwdy1.html

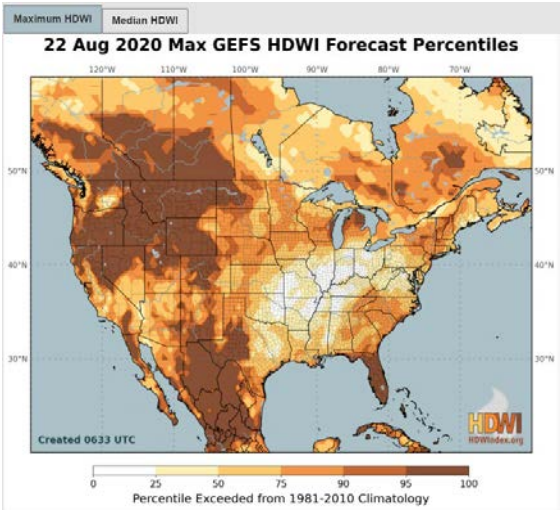
USGS Large Fire Probability

This product shows the probability that a 1-acre fire will grow to exceed 100 acres. It is updated daily and available as a GIS download.



https://firedanger.cr.usgs.gov/viewer/index.html

Hot Dry Windy Index



The Hot Dry Windy Index is a collaborative effort between the USFS and academia. It is available at https://www.hdwindex.org/index.html. It shows promise to be useful for PNM's SA. It plots data from NWS models and displays an index comparing the lower atmosphere to 30 years of climatology and how the lower atmosphere might affect fire behavior. The index does not take fuel moisture into consideration.

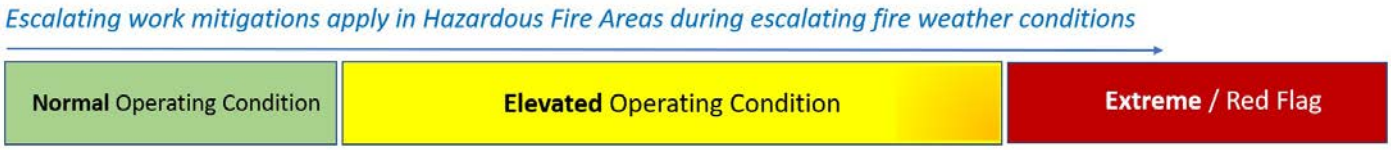
All the above websites can be used by PNM to gather SA that will be useful when making system and field operational decisions. This SA coupled with the following discussion on Operating Conditions will provide guidance and rigor to help reduce the risk of PNM causing a significant wildfire.

Operating Conditions

As fire conditions change through the year, PNM Operating Conditions need to change with them. These Operating Conditions are closely tied to fire season and affect system operations such as recloser settings, post-fault test procedures, and field crew work mitigations/fire prevention activities.

Based on the above products PNM will begin fire season (transition to Elevated Operating Condition) April 1 each year. PNM will engage internal stakeholders such as Distribution Operations, Power Ops, Vegetation Management annually during the middle of March to confirm the April 1 date since seasonal variations in rainfall, air and soil temperatures will affect landscape receptivity to ignition. Transition out of Elevated (fire season) back to Normal Operating Condition will occur when significant wetting rains cause the landscape to stop responding to sources of ignition. Historic data suggests that this will be approximately September 1.

The following graphic depicts how fire conditions escalate through the year and consequently, through the three Operating Conditions mentioned earlier in this chapter. Normal Operating Condition implies that normal fire precautions such as tailboard discussion and documentation, fire tools at the job site, etc. are adequate to prevent work-activity related fires. Elevated and Red Flag/Extreme Operating Conditions require additional work mitigations as reflected in the following matrices. Discussions are being held to add a wildfire risk work screening process to a web portal like that used by Environmental Services. In addition, wildfire enhancements to tailboard sessions will be made.



Recommended Operating Condition Actions

- Turn reclosing off in all HFAs at the beginning of Elevated Operating Conditions. (Implemented on Transmission systems in 2021, Pilot trials on Distribution system in 2022)
- Require full patrol prior to testing any faulted line in HFA during Elevated Operating Condition. (Implemented in 2021)
- Require all field work, whether in HFA or non-HFA area where wildland fuels can carry fire, and activities either listed or capable of causing an ignition ("at-risk work") performed by both PNM and contract personnel abide by the mitigations on the following Escalating Work Restriction Matrices.

Fire Potential Index

As mentioned in the opening paragraphs of this section, PNM does not currently have a Fire Potential Index. It is recommended that PNM fund development of an FPI.

In the interim, daily fire danger is described in a Daily Situational Awareness product that is pushed to the Wildfire Situational Awareness distribution list.

Following is a sample Daily SA push from June 3, 2021. It lists each PNM HFA, the Operating Condition for that day in that particular HFA, the Remote Automated Weather station and the National Weather Service Fire Weather Zone associated with that HFA.

The Normal – Elevated – Extreme/Red Flag Operating Condition classification regimen in the Daily SA push is meant to work alongside the Escalating Work Restriction matrices in section 4.2. The classification regimen is adapted from the National Fire Danger Rating System (NFDRS) which is use by federal wildland fire agencies for many purposes including setting staffing and dispatch levels, and as decision guidance for when to close public access to certain federal lands.

In the NFDRS, RAWS observations are combined with weather forecasts daily to produce multiple fire behavior indices and fire danger adjectives. PNM uses the NFDRS fire danger rating adjective in conjunction with a simple, risk-averse algorithm to describe its Operating Condition.

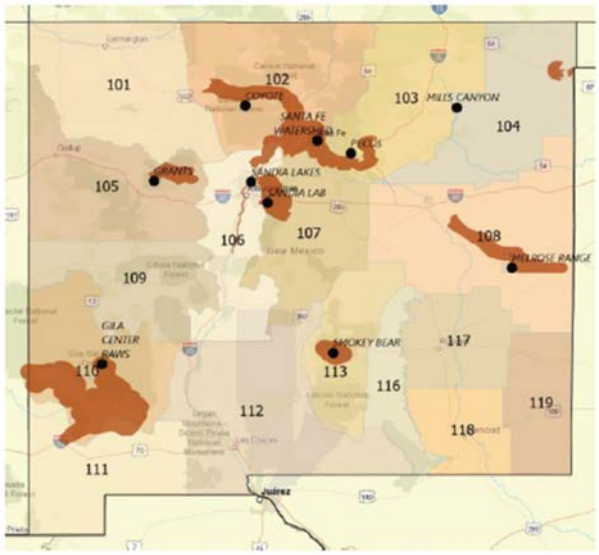
June 3, 2021

Public Service New Mexico
Daily Fire Danger

HFA	Operating Condition	RAWS Station	NWS Fire Wx Zone	Link to WMP Operating Condition section; scroll to appropriate HFA for appropriate work restrictions
Santa Fe North	Elevated	Coyote 290202	NM102	
Bosque	Elevated	Sandia Lakes 290706	NM106	
Santa Fe	Elevated	Santa Fe Watershed 290901	NM102	
Clayton East/West	Normal	Mills Canyon 291101	NM104	
Santa Fe East	Elevated	Pecos 291202	NM103	
Las Vegas	Elevated	*Pecos 291202*	*NM103*	
Mt. Taylor	Elevated	*Grants 291302*	*NM105*	
Sandia Mts	Elevated	Sandia Lab 291408	NM107	
Ft. Sumner	Normal	Melrose Range 291901	NM108	
Silver City	Elevated	Gila Center 292011	NM110	
Ruidoso	Normal	Smokey Bear 292203	NM113	

Operating Condition	Description
Normal	Fuels do not readily ignite from small fire brands or mild heat sources. Fires in cured grasses may burn freely for a few hours after rainfall. Any fire intensity is expected to be low with little potential for spotting. Typically, extinguishment will not pose a problem.
Elevated	Fine dead fuels ignite readily from most ignition sources. Expect moderate to rapid fire spread, short to medium-range spotting and difficulty of containment unless attacked when small. Fires in cured grass will spread quickly with the influence of wind and slope. Fires in timber fuels may spread slowly to moderately fast, especially with wind and topographic influence.
EXTREME	Fires start easily from all causes, spread rapidly, and pose significant difficulty of control. Long-range spotting may occur. Fires will be dangerous to attack and cannot be controlled except when discovered immediately upon ignition; extreme caution is indicated.

Disclaimer: This Daily Situational Awareness package is provided to give a relative indication of fire danger for a given area. It is prepared will all due diligence but cannot guarantee that even with strict adherence to Operating Conditions or Operational Matrices, ignition and subsequent consequential wildfire will not occur.



Daily SA User Guide	Daily SA User Guide
Albuquerque Fire Weather page NWS	Fire Weather
El Paso Fire Weather page NWS	El Pasos Fire Weather Page
7-Day Significant Fire Potential	National 7-Day Significant Fire Potential (nwcg.gov)
Storm Prediction Center Fire Outlook	Storm Prediction Center Fire Weather Forecasts (noaa.gov)
National Weather page	National Weather Service

Decision making: In the moment vs. Operating protocols

To this point, reliability has been the main influence driving operational decisions. PNM is in a position where that model is being challenged. Reliability is still an important goal and carries financial incentives. That said, risk mitigation and fire safety need to be considered alongside reliability when determining corporate-wide goals.

There are clear examples of utilities in California not being 'Learning Organizations". They did not take advantage of expensive lessons learned by other California utilities and are now going through bankruptcy. Fire safety should drive decisions made in the moment, especially in PNM's Hazardous Fire Areas during critical fire weather.

Rationale/Benefits

Climate change continues to affect burning conditions in the western US. At the time of this writing hundreds of thousands of acres are burning in the west. Colorado is experiencing its largest wildfire in modern history. The PNM service area has the potential to experience fires of this magnitude.

PNM does not currently have a Meteorological Department or staff, nor does it currently glean much situational awareness from the many tools and products listed in this section. By hiring a Wildfire Manager, PNM would increase its awareness of the burning environment and be able to operate in a more fire safe manner. A Wildfire Manager would collect and synthesize information from these sources and distribute SA across all PNM operations.

All investments PNM makes into situational awareness and weather-informed operational practices will reduce the likelihood that its facilities and field operations will causing an ignition.

The hiring of a Wildfire Manager would send a message throughout the company that reinforces its commitment to instill a fire safe culture and reduce its wildfire risk.

4.2 Escalating Work Restriction Matrices

PNM will require that all "at-risk" construction and maintenance work in HFAs or in other areas where native wildland applied by task and Operating Condition; they are not necessarily cumulative. fuels can carry fire utilize these Escalating Fire Weather Mitigations in the following matrices. This legend explains the symbols and defines the level of mitigation for each activity and Operating Condition. Mitigations are selected for each Operating Condition and activity.

☑	**Allowed**	There are no restrictions for this activity at this Operating Condition
mitigate	**1. Designated Fire Watch** **2. Dedicated Fire Patrol** **3. 150 gallons of water, pump & hose (type VI)**	Escalating mitigations appropriate to the task and Operating Condition. **Designated Fire Watch**- responsible for a fire sweep of the area after the day's work is finshed. May participate in other work activities during the day. **Dedicated Fire Patrol** may not join in work activities. Must standby in case of ignition.
☒	**Not allowed**	This activity cannot be performed during this Operating Condition

Santa Fe, Santa Fe East, Santa Fe North, Bosque, East Mountains, Ft. Sumner, Mt. Taylor

General Activity	Specific Description	Normal	Elevated	Extreme/Red Flag
Fire Tools required year round when traveling or working in PNM Hazardous Fire Areas				
Vehicle operations	Travel on paved roads or improved roads with no vehicle/vegetation contact	☑	☑	☑
	Travel off-road or un-maintained road or travel with vehicle/vegetation contact	☑	m1	m3
Inspections / Surveying	Patrols, inspections, etc. where there is no at risk activity aside from the driving/parking of vehicles	☑	Must follow Vehicle Operation requirements above. Note requirements for on/off road and vehicle/vegetation contact.	
Access road maintenance	Grading, culverts, water bars, etc,	☑	m3	☒
Equip. Maintenance / Replacement	Routine equipment maintenance or replacement such as crossarms, insulators, etc.	☑	Must follow Vehicle Operation requirements above. Note requirements for on/off road and vehicle/vegetation contact.	
Pole replacement	Routine replacement of wooden poles	☑	Must follow Vehicle Operation requirements above. Note requirements for on/off road and vehicle/vegetation contact.	
Tree trimming	Routine tree trimming of right-of-ways	☑	Must follow Vehicle Operation requirements above. Note requirements for on/off road and vehicle/vegetation contact.	
Grinding	Use of a grinder to cut locks, pipe, etc.	☑	m1	m2
Chainsaw use	Use of a chainsaw to cut branches, poles, etc.	☑	m1	m2
Internal Combustion engine use	Use of equipment with internal combustion engines suchas excavator, backyard cart, muck truck, ATV, etc.	☑	m1	m2

Clayton East, West

General Activity	Specific Description	Normal	Elevated	Extreme/Red Flag
Fire Tools required year round when traveling or working in PNM Hazardous Fire Areas				
Vehicle operations	Travel on paved roads or improved roads with no vehicle/vegetation contact	☑	☑	☑
Vehicle operations	Travel on paved roads or improved roads with no vehicle/vegetation contact	☑	☑	☑
	Travel off-road or un-maintained road or travel with vehicle/vegetation contact	☑	m1	☒
	Travel off-road or un-maintained road or travel with vehicle/vegetation contact	☑	m1	☒
Inspections / Surveying	Patrols, inspections, etc. where there is no at risk activity aside from the driving/parking of vehicles	☑	Must follow Vehicle Operation requirements above. Note requirements for on/off road and vehicle/vegetation contact.	
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Internal combustion engine use	Use of equipment with internal combustion engines suchas excavator, backyard cart, muck truck, ATV, etc.	☑	m1	m2

Las Vegas

Ruidoso

		Operating period		
General Activity	**Specific Description**	**Normal**	**Elevated**	**Extreme/Red Flag**
Fire Tools required year round when traveling or working in PNM Hazardous Fire Areas				
Vehicle operations	Travel on paved roads or improved roads with no vehicle/vegetation contact	☑	☑	☑
	Travel off-road or un-maintained road or travel with vehicle/vegetation contact	☑	m1	☒
Inspections / Surveying	Patrols, inspections, etc. where there is no at risk activity aside from the driving/parking of vehicles	☑	Must follow Vehicle Operation requirements above. Note requirements for on/off road and vehicle/vegetation contact.	
Pole replacement	Consider the risk from the activity itself and the Vehicle travel to accomplish it.	☑	**Must follow Vehicle Operation requirements above. Note requirements for on/off road and vehicle/vegetation contact.**	
Tree trimming	Consider the risk from the activity itself and the Vehicle travel to accomplish it.	☑	**Must follow Vehicle Operation requirements above. Note requirements for on/off road and vehicle/vegetation contact.**	

Silver City

		Operating period		
General Activity	**Specific Description**	**Normal**	**Elevated**	**Extreme/Red Flag**
Fire Tools required year round when traveling or working in PNM Hazardous Fire Areas				
Vehicle operations	Travel on paved roads or improved roads with no vehicle/vegetation contact	☑	☑	☑
	Travel off-road or un-maintained road or travel with vehicle/vegetation contact	☑	m1	☒
Inspections / Surveying	Patrols, inspections, etc. where there is no at risk activity aside from the driving/parking of vehicles	☑	Must follow Vehicle Operation requirements above. Note requirements for on/off road and vehicle/vegetation contact.	
Pole replacement	Consider the risk from the activity itself and the Vehicle travel to accomplish it.	☑	**Must follow Vehicle Operation requirements above. Note requirements for on/off road and vehicle/vegetation contact.**	
Tree trimming	Consider the risk from the activity itself and the Vehicle travel to accomplish it.	☑	**Must follow Vehicle Operation requirements above. Note requirements for on/off road and vehicle/vegetation contact.**	

Recommendation summary

- Establish April 1 as the transition to Elevated Operating Condition (fire season)
- Hire a Wildfire Manager to strengthen PNM expertise in this area
- Fund the development of a Fire Potential Index
- Leverage the existing PNM Fire Risk Dashboard to collect and display information described above in this section
- Operate to the Escalating Work Restriction Matrices
- Turn off reclosing in HFA during Elevated Operating Condition
- Partner to install mountain top cameras
- Require full patrol of faulted lines before allowing testing

Rationale/Benefits

Climate change continues to affect burning conditions in the western US. At the time of this writing hundreds of thousands of acres are burning in the west. Colorado is experiencing its largest wildfire in modern history. The PNM service area has the potential to experience fires of this magnitude.

PNM does not currently have a Meteorological Department or staff, nor does it currently glean much situational awareness from the many tools and products listed in this section. By hiring a Wildfire Manager, PNM would increase its awareness of the burning environment and be able to operate in a more fire safe manner. A Wildfire Manager would collect and synthesize information from these sources and distribute SA across all PNM operations.

All investments PNM makes into situational awareness and weather-informed operational practices will reduce the likelihood that its facilities and field operations will causing an ignition.

The hiring of a Wildfire Manager would send a message throughout the company that reinforces its commitment to instill a fire safe culture and reduce its wildfire risk.

4.3 Public Safety Power Shutoff (PSPS)

PNM has recognized the need for a formal Public Safety Power Shutoff (PSPS) program. PSPS is the term used when an electric utility purposely shuts off power as a fire prevention measure. As a last resort, PNM may deenergize powerlines for public safety and to prevent them from being the cause of a wildfire ignition during the most extreme weather and burning conditions. The PNM PSPS plan detailed below generally meets the requirements of this section of the New Mexico Administrative Code:

> **Authority:** ***F. Curtailment of service plan.*** *Each utility shall have in place a plan for curtailment of service that may need to be instituted to maintain system reliability and integrity. Each plan shall be consistent with applicable NERC and other reliability standards. The plan shall identify various levels of curtailment and conditions that an electric utility must experience for each level as well as specifying the type of actions the utility must undertake to contain or reverse a potential emergency. Each plan must also prescribe the minimum documentation required at each level. The plan must also include information dissemination to customers, the public and governmental entities. Each utility will periodically review and update the plan and will submit a copy of the most current plan version to the records division of the commission as a company rule pursuant to 17.9.210 NMAC. [6/30/1988; 17.9.560.15 NMAC - Rn, NMPSC 560.45-560.49 & A, 6/15/2005; A, 12-31-12]*

Recommendations/Opportunities

Making wildfire safety a priority

In fire prone areas of New Mexico, balancing reliability with safe system operations is a necessity. PNM will not use a 'recipe' approach to PSPS. There is no predefined set of circumstances for the initiation of a PSPS event. PNM will turn off power when conditions threaten to damage the grid. The various considerations for this are discussed below. Once conditions improve, PNM will restore power as quickly as possible.

Typically, PNM will notify its customers and governmental partners ahead of a PSPS event. There may be times when this is not possible.

Considerations for initiating a PSPS

Weather and burning conditions

One of the chief considerations for contemplating a PSPS is the declaration of an RFW. The NWS issues an RFW when wind speed, fuel moisture and relative humidity combine to create extreme burning conditions.

RFWs are issued for one or more Fire Weather Zones (FWZ) and extend for a specified period when burning conditions are expected to be extreme. Often, a declaration of Red Flag is preceded by a Fire Weather Watch (FWW). The FWW indicates that an RFW is likely. These events are usually advertised 48-72 hours in advance but in some cases, conditions develop rapidly and there is not much warning before an alert is issued.

PNM will receive alerts when an RFW event is expected. It is exploring several options for a subscription service to provide this intel. PNM has also opened an account with the NWS that will allow it to receive pushed Red Flag (and other) alerts from the NWS.

Fire indices from land management agencies such as the United States Forest Service and Bureau of Land management LM also provide useful situational awareness. Predictive Service Areas (PSAs) used by the Southwest Coordinating Group (federal and state wildfire agencies) convey likelihood of Significant Fire Potential over a given geographic area. These PSA are integrated into PNM 's plan for gathering SA.

PNM has analyzed its service territory and mapped its most HFAs). Each HFA is associated to one or more FWZ and PSAs. Anytime there is an RFW, the HFAs that are associated with that FWZ will observe more stringent Red Flag operating protocols[i].

Agency input

PNM has established good relationships with its local, county, tribal, state, and federal partners. The availability of firefighting resources (especially aircraft) can be important factor when considering PSPS; because if firefighting resources are scarce, wildfires can grow rapidly. When burning conditions warrant, fire personnel are augmented with additional staff, which is a good indicator of burning criticality. If evacuations are in place, electricity might be needed to keep traffic moving smoothly. If first responders are working near a going fire, they may ask for circuits to be deenergized for their own safety; if this happens, it may be difficult to patrol and restore service until a later time.

Multiple uncontrolled fires burning in or near PNM's service areas may indicate critical burning conditions and PSPS may be warranted.

Field observations

PNM will send out Field Observers (FOBs) when conditions indicate a PSPS is possible. The FOBs will be assigned to areas where hazardous vegetation is expected to experience high winds. Their job is to report swaying conductors, blowing debris and wind caused vegetation failures. If these are observed, a PSPS may be initiated.

System Health

Outages that coincide with extreme burning conditions, strong winds and wildland fuels are an indicator that PSPS should be considered. Winds that are expected to approach or exceed design criteria may lead to a PSPS. Numerous system alerts, faults, or alarms in areas of extreme wind and burning conditions are an indication that PSPS might be necessary to protect public safety.

Alternatives to PSPS

PNM will explore alternatives to PSPS. Alternatives might include system fire hardening, adjusted recloser operations and settings; changes in patrol and test policies; etc. Alternatives that include strategic undergrounding and distributed generation would be explored as funds are available.

Communicating A PSPS

As in the following graphic, customer, governmental, and first responder partners will need to be kept apprised of PNM's intentions. When a Red Flag is issued, communications should begin in earnest. Preparing customers in the Spring for the eventuality of a PSPS is recommended. Communication to governmental and first responding entities would begin as soon as practical once PNM has a working PSPS protocol in place. Corporate Communications and Public Relations will be key in defining PSPS messaging and communication strategies.

Community Support

PNM will want to support customers during times of PSPS. It may wish to set up Resource Centers where cell phone and computer battery charging, snacks, water, ice and most importantly, information are available. The Red Cross and other, similar organizations should be contacted and enlisted to help with this important activity as this provides them a good outlet for their messaging as well.

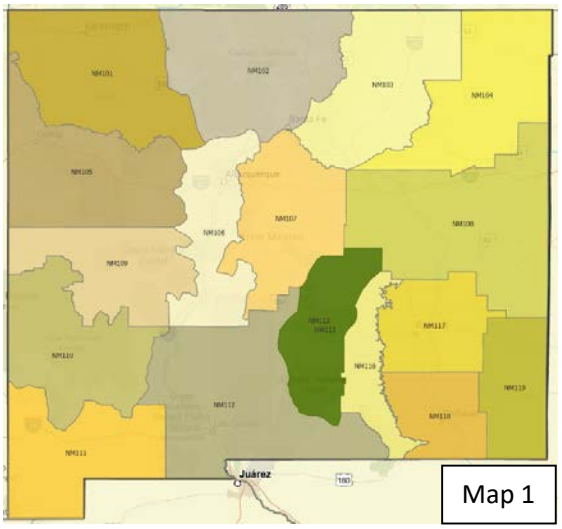
Typical PSPS event timeline and action points

7-10 days ahead First signs	3-6 days ahead Monitoring	2 days ahead Communicating	1 day ahead Continued monitoring and communications	Day of PSPS Power may be turned off and plans for restoration begun	Restoration Patrol, repair, re-energize, document
Strong winds* appear in the long-range forecast and wind damage to the electric system is possible. *This information will not be publicly available from the NWS this far in advance. Though it may be buried in the NWS Forecast Discussion. The best sources for this intel are meteorological staff or contracting with a subscription weather service.	**Forecast is still indicating that winds are anticipated to approach or exceed design criteria in PNM HFA areas.** Fire Weather Watches, Red Flag Warnings and High Wind Warnings are likely to be issued late in this period. **This is not always the case. At times, these conditions arise quickly and catch forecasters by surprise. Multiple sources of intel are recommended.* A parallel source for this intel is the "High Risk for Large Fire Potential" on the 7 Day Significant Fire Potential product for select Predictive Service Areas. This is likely to be the first place this information will show up publicly.	**Forecast confidence is increasing.** Red Flag Warning(s) for specific Fire Weather Zones are usually issued by this point and details are being refined.	**Forecast confidence is high.** Red Flag Warning details including affected Fire Weather Zones and Red Flag start/stop times should be issued by now. NWS and GACC predictions should be in good alignment now.	**Red Flag is declared.** **Predictive Service Area should indicate High Risk for Large Fire Potential.** Numerous wind caused outages are noted. System health is closely monitored. Field Observers report swaying lines, blowing debris and vegetation failure.	**Red Flag Expires.** Winds begin to decrease and are expected to remain below design criteria. 7 Day Significant Fire Potential may remain "High Risk" even after expiration of Red Flag.
Closely monitor changing conditions in the forecast. These sources of information should be consulted regularly for updates. • NWS forecast discussions • NWS Fire Weather forecast: https://www.weather.gov/epz/fireweather • https://www.weather.gov/abq/forecasts-fireweather-firedanger • Predictive Service Area 7 Day outlooks: https://fsapps.nwcg.gov/psp/npsg/forecast/#/outlooks?state=sideBySide&gaccId=10	Specific areas where 'design criteria exceeding winds' are expected are noted for continued monitoring. Consult National Weather Service, or Southwest Coordination Center contacts or the subscription weather service for granular wind and weather forecasts. PSPS event planning process should begin. Begin monitoring Service Territory for increased wildland ignitions from any cause. • http://inciweb.nwcg.gov	Areas expected to exceed design criteria are refined and used in the planning process. Preliminary notifications begin for affected customers and public officials. Preparations are made if Resource Centers are being opened. Continue monitoring service area for uncontrolled wildland fires.	Additional messaging to affected customers and public officials. Coordination with first responders. RE-energization patrol plans are readied. Continue monitoring service area for uncontrolled wildland fires.	Winds are monitored by all available means. Outages are monitored and used to inform PSPS decision. **Decision is made to initiate PSPS.** Notification to customers and public officials that power has been shut off. PSPS information is distributed through various media outlets. Resource Centers are opened. Conditions are monitored for improvement. Close contact is maintained with NWS and GACC.	When safe to do so, power is restored after proper patrols have been completed and necessary repairs made. Document damage and repairs made.

General steps and conditions leading up to, during and after PSPS

1. Fire weather is forecast to be extreme. Damaging winds are expected.
2. Geographic extent of extreme weather is determined.
3. Affected circuits / areas are identified.
4. Affected customers are identified.
5. Customers, agencies, critical partners, etc. are notified.
6. Field observations, system health, agency inputs indicate PSPS
7. Power is turned off until winds trend downward and are expected to remain below threshold levels.
8. Decision is made to re-energize, patrols are completed, repairs documented, and power is restored.

Making geographic associations and assignments for weather monitoring.



Map 1

New Mexico's National Weather Service Fire Weather Zones. *Map 1*

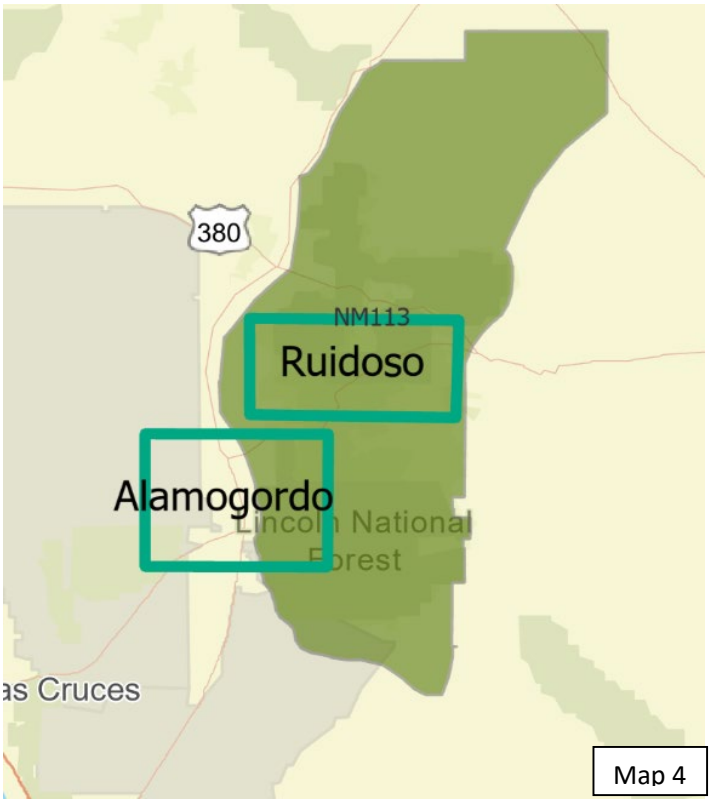
Map 2

The NWS issues Red Flag Warnings by Fire Weather Zone.

The Red Flag Warning may affect more than one Fire Weather Zone. *Map 2*

Map 3

For illustration purposes, NM113 will be representative of the association process that will be done for each FWZ/Division/HFA circuit in the PNM service area. *Map 3*



Map 4

The PNM Ruidoso and Alamogordo Divisions are associated to the NM113 Fire Weather Zone.

When there is a Red Flag declared in NM113, the Ruidoso and Alamogordo Divisions are automatically affected; they adopt the more stringent Red Flag operating protocols.

Map 4

Map 5

The Ruidoso HFA is associated with its respective PNM Division.

When there is a Red Flag declared in NM113, the Ruidoso Division and HFA are automatically affected.

Map 5

Map 6

Map 7

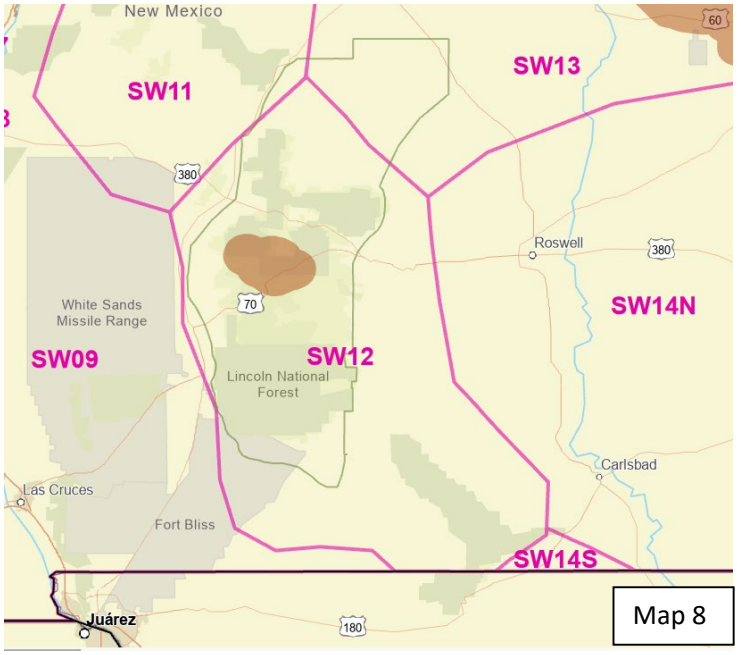
Circuits and circuit segments that may be subject to PSPS should be pre-identified. Personnel from the Line Department should be included in this identification process. Criteria for PSPS candidacy include:

- Poor performing circuits
- Maintenance status
- Significant outage history
- Vegetation interaction history
- Any temporary configuration status
- Ability to isolate
- Local knowledge

Monitoring winds in these areas

Short of real time observations from PNM owned weather stations (met stations), here are options for obtaining wind intel:

1. Associate a Remote Automated Weather Station (RAWS) to each circuit/segment. This should be done for each HFA. Consultation with Division personnel who have local knowledge will be key to make these associations. RAWS provide once per hour readings; not generally thought to be adequate for PSPS. Utility owned met stations report observations 6x per hour. RAWS are owned by various entities such as fire agencies, airport authorities, academia, etc. URL access is listed below.
2. Use forecasted wind speeds in conjunction with Field Observers. The FOBs would be sent to areas of concern during periods of critical weather. Local knowledge would be important during this scenario.



Map 8

Predictive Service Areas (PSA) are used by wildland fire agencies to communicate fire potential. PSAs usually cover a period of 7 days. They are updated at 10:00 AM MT daily during Fire Season. PSAs are a good supplement to NWS Red Flag declarations. *Map 8*

Table of associations

PNM will engage field personnel with knowledge of weather and other fire conditions to review and edit the following table. A PNM Wildfire Manager would be able to guide the company in this process and provide valuable expertise.

Real time wind and humidity data from RAWS stations is available at:

https://mesowest.utah.edu/cgi-bin/droman/mesomap.cgi?state=NM&rawsflag=3

PSA data is available at:

https://fsapps.nwcg.gov/psp/npsg/forecast/#/outlooks?state=sideBySide&gaccId=10

HFA	Division	Fire Weather Zone	NWS Office	RAWS Station	Lat Long	Predictive Service Area	Circuits
Ruidoso	Ruidoso	NM113	EPZ	Smokey Bear	33.35, -105.686	SW12	TBD
Santa Fe	Santa Fe		ABQ			SW10	TBD
Santa Fe East	Las Vegas	NM103	ABQ	Pecos	35.54, -105.50	SW10	TBD
Santa Fe North	Santa Fe	NM102	ABQ	Coyote	36.07, -106.65	SW07	TBD
Las Vegas	Las Vegas	NM103	ABQ	Pecos	35.54, -105.50	SW 10	TBD
Mt. Taylor	Marquez	NM105	ABQ	Grants	35.24, -107.66	SW07	TBD
Silver City	Silver City	NM110	EPZ	Burro Mountain	32.67, -108.54	SW08	TBD
Bosque	Valencia	NM106	ABQ	Sandia Lakes	35.23, -106.60	SW09	TBD
Ft. Sumner	Trans	NM108	ABQ	Melrose Range	34.28, -103.71	SW13	TBD
Clayton West	Clayton	NM104	ABQ	Mills Canyon	36.05, -104.32		TBD
Clayton East	Clayton	NM104	ABQ	Mills Canyon	36.05, -104.32	SW13	TBD
Sandia Mts	East Mountain	NM107	ABQ	Sandia Lab Oak Flats	35.00, -106.41 35.00, -106.32	SW11	TBD

Summary

- PNM electric facilities may experience occasional fire season winds that approach or exceed design criteria.
- Critical burning conditions can be expected during fire season. In fact, critical fire conditions are likely to increase due to climate change and its effect on length of fire season and fuel conditions.
- PNM should decide when wind, burning conditions and system health indicate that a PSPS should be initiated.
    - RFW, Significant Large Fire Potential should be considered.
    - Other factors to consider when contemplating PSPS are multiple wind caused outages; multiple uncontrolled wildfires in or near the service area; indications of blowing debris; vegetation failure or significant movement of electrical facilities. Agency inputs should be considered.
- The decision to initiate a PSPS is difficult. The idea is new to PNM. It goes against the grain of electric utilities to turn power off absent an actual emergency. Conditions described in this document, when present and taken together constitute an emergency. A balance of public safety, potential liability, and damage to company reputation must be weighed.
- Typically, the Emergency Operations Center will be activated during these critical times.
- Ultimately, this is an Executive level decision that is best made in collaboration with SMEs from operational, regulatory, and legal groups.
- Conduct a wind study of those portions of the service area that present the most likely candidates for PSPS contemplation.

Rationale and Benefits

PNM may need to initiate a PSPS for public safety and system health. This plan and the steps and considerations it details are necessary components of a PSPS. They mimic the steps and considerations taken at other utilities where PSPS has been used. Lessons learned have been incorporated into the PNM PSPS plan.

5 Emergency Preparedness

5.1 Wildfire Response and Recovery

According to PNM's 2019 Incident Management Guide (IMG), any incident that could have a serious impact on the operation/business of the Company triggers an Incident Management Team to be assembled and the Incident Management Communications Model to be initiated. Wildfire incidents may meet this requirement. The IMT members include the CEO, several VPs and the department director that oversees security. The Communication Model requires twice daily business unit calls to provide incident intel for the twice daily Executive Officer conference calls that are regularly scheduled for 9:00 am and 6:00 pm. In these Executive calls, incident objectives are established and communicated to affected business units and the Corporate Communications Department for appropriate action. This section of the WMP is presented.

The Crisis Management Team (CMT) will be responsible for managing wildfires that rise to Level 4 based on the Fire Classification Table (Table 1) below. The CMT may provide assistance on lower level incidents when the knowledge or experience of the Crisis Management Team are requested.

Aside from media reports and calls directly from 911/ agency command centers informing of fires directly impacting electric facilities, PNM does not have a standing process for learning about (discovering), monitoring, or communicating status of wildfires that may impact PNM operations and facilities. The following recommendations are intended to bring standardization and consistency to this important aspect of doing business in a wildfire prone setting.

Cooperation and collaboration

PNM routinely cooperates with land managers and emergency first responders. 911 centers have been provided with PNM operations centers emergency phone numbers, including:

- Distribution Operations Center (DOC)
- Corporate Security
- Corporate Communications
- Line crews on the scenes of incidents
- Contract Security companies working on PNM property

PNM also routinely collaborates with first responders as described here:

- Training and evacuation drills
- Tabletop exercises - law enforcement is invited to our annual Cyber and Physical Security Incident Response plan exercise.
- On the scene of incidents: such as motor vehicle accidents, transformer fires, and copper theft
- Annual Fire Drills are observed by the Fire Marshalls Office and they provide constructive advice.
- Familiarization tours of our facilities are provided to first responders who may respond the facilities
- At the enterprise-wide PNM Annual Safety Day, fire personnel are invited to provide hands on fire safety and fire extinguisher use. Demonstrations on electrical hazards and safety and exhibits by first responders of firefighting equipment, medical personnel and law enforcement are included.
- Downtown business community meetings

In return, PNM provides electric safety for first responders and hosts Balloon Rescue training prior to the Albuquerque International Balloon Fiesta. This familiarizes first responders with techniques to recue balloonists entangled in electric conductors. Electric crews are on standby during this event.

During the semi-annual North American Electric Reliability Corporation (NERC) Grid-Exercise (GridEx) nationwide electrical utility resiliency exercise, first responders, NM National Guard, federal, state, and local authorities are provided briefed on PNM's operations and participate in the exercise.

In all, cooperation and collaboration between PNM and its first responder community is good. PNM would benefit from more rigor around the classification of wildfires. This would lead to a better understanding of roles and responsibilities of various groups and individuals involved with the response to, recovery from, and company communications regarding wildfires. Recommendations are made below.

Recommendations/Opportunities

The following recommendations follow the predictable **life cycle of a typical wildfire** incident from discovery through demobilization (demob). Most wildfires within the PNM service area will come and go without any impact on PNM facilities or employees. Other fires require considerable coordination. The following recommendations are intended to provide needed guidance.

Fire Discovery

PNM will leverage a subscription wildfire alerting service (potentially from Descartes Labs or Indji Watch) to learn of potentially consequential fires. Other sources for discovery for new fires are:

- Field personnel
- Agency collaboration and notifications
- News reports
- PNM Wildfire Manager if available

Reporting group

- A formal process for new fire discovery, especially from external sources such as from a subscription service, will be created. These alerts would go directly to the Wildfire Manager (WM). The WM position would play a key role in PNM's overall response to wildfire planning and preparation. The need for a WM would continue throughout the year. During the fire season months, he/she would take the lead on wildfire monitoring and response coordination. During the non-fire season, the WM would act as the company's wildfire Subject Matter Expert. More on the WM position will be found in the Appendix.
- An internal notification to all appropriate business groups would be sent advising of this new standard protocol.

Evaluate/ Classify / Monitor

PNM will create a system for consistent evaluation and classification of fires relative to their likelihood to impact PNM facilities.

- See Fire Classification level recommendations in Table 1 below.
- See Fire Classification threshold recommendations in Table 4 below.
- The PNM WM would be tasked with monitoring fires upon their discovery.
- Establish a normal monitoring frequency. Suggest twice daily unless another frequency is dictated by burning conditions or proximity to PNM facilities. Recall the 9:00 am and 6:00 pm Executive call schedule. Suggest 8:00 am and 5:00 pm monitoring to allow time for reporting preparation.
- Leverage these and other sources for fire information:
    - PNM's Fire Risk Dashboard
    - Indji Watch
    - Descartes Labs
    - PNM field personnel
    - InciWeb
    - INC209 system (may be available to PNM via the USFS/BLM, this need to be explored with the agencies.)
    - News media
    - Agency contacts

- Field personnel at scene
- PNM Wildfire Manager, if available

Communicate Fire Information

Information about on-going fires needs to be pushed to business units for their own Situational Awareness and incorporation into their operations.

- The Wildfire Manager is tasked with publishing an initial Fire Update Form (Table 2) to a yet-to-be-established *Wildfire Notification Distribution List* for all Level 2 to Level 4 fires. Multiple *Wildfire Notification Distribution List*s are not advised. This *Wildfire Notification Distribution List* will be established immediately and updated as needed but not less than once annually just prior to fire season. At a minimum, the following shall be included on the *Wildfire Notification Distribution List*:
  - Crisis Management
  - On-Duty for DOC, PWOPS
  - Others- this is a PNM decision. Certain VPs, Directors, and Managers would benefit from this information.
  - Urgent updates need to be sent when the status or likelihood of impact from an incident changes significantly.
  - Leverage the existing PNM Fire Risk Dashboard to display fire and facility information.

Respond as appropriate

Response shall be appropriate to incident complexity and potential for impact.

- Establish thresholds for response to scene. Make them repeatable and easily understood. For example, respond when:
  - PNM is currently or expected to be impacted by the fire or suppression activities.
  - The fire is significant in size and/or fire weather is extreme; Red Flag or High Wind Watch is declared by the NWS.
  - PNM was involved with the origin of this fire
  - Fire is burning in an inaccessible area with PNM facilities close by.
  - See table 4 for suggested trigger thresholds.
  - Set criteria for demob. De-escalate the incident when appropriate.

Table 1: Fire Classification

Fire Classifications[1]		

Level 1 Not significant[2]	These fires pose no threat and require no action by PNM. ***Recommendation:*** 1. ***Do not over-communicate insignificant fires.*** ***2. Monitoring requires time and effort. Do not waste either on fires of no consequence.***	On scene response to fires at Level - Level 3 is handled by the PNM Division personnel. Daily monitoring and **updating is handled by DOC.**
Level 2 Monitor[3] **only** Impacts to PNM business not expected. Good Situational Awareness dictates monitoring	These fires require monitoring. Periodic updates will be made. ***Recommendation:*** ***1. Decide early if this fire needs to be communicated for situational awareness.*** ***2. If a formal Fire Update Form is sent to "Open" a fire, that fire should also be "Closed" with a final update at the conclusion of the fire.*** 3. ***Determine the frequency of formal updates, then stick to it.*** ***4. Consider expected weather when deciding on "Monitor Only" status. A fire not otherwise worthy of monitoring, might be if a Red Flag is expected.***	
Level 3 Respond[4] Moderate business impacts possible	These fires require a PNM Company Rep (CoRep) to respond to the incident. The fire may impact PNM facilities. The CoRep acts a conduit between the Company and the incident. ***Recommendations:*** ***1. The CoRep will be someone from the Region/Division where the fire is located. Likely a combination of both until the program matures and roles are better defined.*** ***2. The CoRep should have authority to speak for the Company.*** 3. ***All 'fire going' personnel should have basic fire safety and Incident Command System (ICS) training.*** ***4. If a PNM Wildfire Manager is available, he/she may fill the CoRep position.***	
Level 4 Staff[5] Significant business impacts expected or PNM facilities are involved with the origin of the fire	These fires require a CoRep on scene and significant business, logistical and planning support from an ICS-type organization. ***Recommendations:*** ***1. Establish an Incident Management organization in keeping with good ICS principles. (appropriate and scaled for the incident)*** ***2. PNM leadership will be involved in the organizational structure for this level of event.*** ***3. Establish a planning cycle appropriate to the event.*** ***4. Establish communication protocols appropriate to the event.*** ***5. Organizational structure is scaled to match incident complexity.***	Crisis Management takes a lead role when fires are classified as Level 4. These may be fires with significant impact to PNM resources, or fires that originate from PNM assets.
Level 0 Demob	These are fires that are no longer staffed with any PNM personnel; monitoring and updates are no longer required. ***Recommendation:*** 1. ***PNM consider establishing a protocol for documentation of useful information for future reference.*** ***2. PNM perform After Action Reviews as often as possible to record lessons learned.***	

1. Fires are classified based on how likely they are to impact PNM facilities or require a PNM response. Current and expected fire weather should be considered when classifying fires.
2. These fires need not take up company resources but once they have been reported, they should be 'closed', meaning a 'Final' report should be sent to finish the event. Current and expected Fire Weather should be taken into consideration when classifying fires.

3. These fires should be monitored with updates made at periodic intervals (suggest twice daily) with urgent updates made to alert of significant developments on the incident.
4. These fires require someone from PNM on scene to provide for firefighter, public and PNM personnel safety. They are charged with speaking for the Company and authorized to do so.
5. These fires require planning and coordination at the Corporate level. Impact from these fires may severe and costly. Assessment, repair, and restoration is anticipated and may be prolonged and complex.

Table 2: Sample Fire Update Form

Fire Update	
Fire Name	Turkey
Fire Classification	Level 2 Monitor
General fire area	North of Silver City
Fire start date	6/8/2020
Fire Cause	Lightning
Update date, time	6/10, 12:00
PMN Division	Silver City
General conditions	Fire continues to burn. Perimeter is 35% contained as of 06:00 today.
Company impacts	No impacts to date.
Company response	PNM personnel remain on scene/in contact with IC.
Next update	18:00

Table 3 Additional Roles During Fires

Group	Contributions
	• Maintain Situational Awareness.

PWOPS	• Operate system with fire conditions in mind. • Maintain communication with the PNM at scene point of contact. • Schedule work, outages, and maintenance. appropriate to fire situation. Communicate same. • Communicate needs to other lines of business that may be impacted. • Communicate with neighboring utilities that might be affected.
DOC	• Maintain Situational Awareness • Operate system with fire conditions in mind • Maintain communication with the PNM at scene point of contact • Schedule work, outages, and maintenance appropriate to fire situation. Communicate same. • Communicate needs to other lines of business that may be impacted
Corporate Communications	• Generate talking points about the fire and PNM's response to it.
Crisis Management	• Provide guidance for step by step handling of Level 4 fires • Facilitate internal discussions • Facilitate planning meetings • Produce Incident Action Plan (IAP) for each operational period

Table 4 Trigger Thresholds for Classifying Fires

Level 1	• No impacts are expected.

Level 2	• These fires require monitoring for good situational awareness, but no field response is anticipated.
Level 3	• Any fire that upon **First Discovery**, might cause an impact to PNM facilities or employees should have an on-scene response to glean initial intel on the fire's potential. It does not need to be classified as Level 3 at this point. The purpose of the response is to make a proper classification. • Any fire that has been previously classified as Level 2 that now requires an on-scene response should be promoted to Level 3. • Any fire that prompts a request from a fire agency for PNM response to ensure firefighter or public safety should be classified as Level 3. • Any wildfire that causes any damage or injury should be classified as Level 3 at a minimum. • Any wildfire starting in an HFA during Red Flag or where the PSA Significant Fire Potential is High due to wind, heat or lightning should be classified as Level 3 at a minimum. If initial reports indicate significant fire growth or difficulty in control, it should be elevated to Level 4 immediately.
Level 4	• Any wildfire "of consequence" caused by PNM personnel or facilities that requires both field response and corporate support (Financial, Legal, ICS, Planning, etc.) should immediately be classified as Level 4. • If PNM has had trips, alarms or recloser activity in the fire area, the fire should be classified as Level 4 immediately. • Any wildfire that causes injury or damage and may have been started by PNM facilities or personnel should be classified as Level 4 immediately.

Table 5 Sample Objectives for use in an Incident Action Plan

Maintain a PMM response to fire7/24
Assign PNM CoRep to work within the fire's ICS structure
Complete a full damage assessment by end of X (next Operational Period)
Complete full restoration by end of X (next Operational Period)
Have Ruidoso Division staffed with a repairman 7/24 for the duration of the Red Flag
Staff DOC with one extra operator for the next 36 hours
Turn off reclosing in all Silver City HFAs until 18:00 Thursday
Do a focused inspection of the x, y, z circuits in advance of the Red Flag
Send notifications to all those affected that a Public Safety Power Shutoff is possible in portions of the xx circuit

Response and Recovery

Response considerations

PNM will provide a response to any fire that poses a threat to PNM facilities. PNM employees will consider public, firefighter and utility company employees' safety when responding to, or working on an active fire. All responding PNM personnel that could be called upon to respond during an active fire will be trained in basic fire behavior and fire safety and have a rudimentary understanding of Incident Command Principles. Especially important is the concept of "single point of contact" (POC) whereby one and only one PNM person at the fire

scene has the responsibility and authority to speak for the Company. The PNM POC should be assigned by the PNM Incident Commander (IC) who will usually be the PNM Wildfire Manager. In his/her absence either Vegetation Management or the DOC will make the POC assignment. Another important consideration is that of accountability. Someone must know that an employee has been assigned to the fire and they must be able to communicate with that person either by phone or radio. Positive communications are critical to safe operations.

When at the scene, the PNM POC will engage the fire IC, notify him/her of his/her presence and intentions. Plans for assessment and restoration will be developed in concert with the fire IC and carried out when the area has been declared safe. De-energization and subsequent re-energization of conductors for firefighter/public safety will be coordinated through the on-scene PNM POC when available.

The PNM POC may be called upon by PNM to provide periodic updates in accordance with other portions of this section. This would entail current fire status, updates to likelihood and severity of company impacts and contemplated actions by the fire agency. High level corporate communications will be dependent on this information.

Recovery

Assessment. Post-fire recovery needs to be coordinated internally and externally. All lines within a fire perimeter need to be patrolled before being put back into service. Safety of crews working around powerlines is paramount. PNM will work with fire personnel to ensure safe access to the fire area. Vegetation Management teams may be needed to assess for damage prior to re-energization of de-energized lines.

Planning. After an assessment is completed, PNM personnel directed by the appropriate control authority, will meet to develop an integrated plan for restoration.

Logistics. Appropriate to the size and complexity of the restoration effort, PNM will muster tools, supplies, equipment, and internal personnel and contractors in anticipation of when the fire area has been declared safe for utility company operations. The restoration plan should be thorough and well communicated, and restoration efforts directed by the appropriate control authority. Different types of work, demolition, and construction for example, may proceed concurrently if this can be done safely.

Restoration. PNM will strive to restore customer service as soon as is safely practical after a fire incident. A combination of temporary and permanent structures may be necessary until all lines can be completely restored. If the fire damage occurred in an HFA, fire hardened reconstruction such as steel or composite poles, wider cross arms, taller poles, heavier conductor, etc. should be considered.

Cooperation and Collaboration

During the semi-annual North American Electric Reliability Corporation (NERC) Grid-Exercise (GridEx) nationwide electrical utility resiliency exercise, PNM could expand invitees to include the USFS, Bureau of Land Management, and communities where we have rural facilities and transmission lines.

Though the NWS is not a first responder agency per se, PNM would be well advised to include them in any PNM event having to do with wildfire training and fire season preparations. Any inroads that PNM can build with the NWS will pay dividends as PNM continues to develop use-cases for weather situational awareness and forecasting.

Neighboring electric utilities should also be included, especially those with direct interconnects with PNM.

Rationale/Benefits

Having a Wildfire Response Plan will provide guidance to PNM with a consistent, established, and predictable response to wildfire events. Once operating parameters are documented and shared across functional groups, the Wildfire Response Plan can begin to evolve and mature. As climate change drives increased fire activity in New Mexico, PNM will be more prepared to respond in an organized and effective manner.

6 Customer Support

6.1 Customer Support

PNM recognizes that fire prevention and safety tips, and reminders are an important public service it can provide to its customers. Before wildfire season starts, Corporate Communications works to get fire prevention and safety messaging ready for customers. A press release with wildfire safety information is sent statewide to television, print, and radio media. Safety/prevention tips are posted on social media platforms such as Twitter, Facebook, and Instagram during fire season. The Energy Works newsletter may also be used as an additional resource to deliver valuable information to customers during wildfire season. PNM also has a safety section on the PNM.com website that contains wildfire safety

topics, as well as other sections with valuable safety tips regarding storm safety, kid safety, hot air balloon safety and more.

During an incident, Corporate Communications' primary role is to ensure that customers and employees are informed and have the tools and information they need to stay safe. Corporate Communications works with media outlets at times during wildfire events. Incident related communications pass to and from media outlets through Corporate Communications; either media outlets or Corporate Communications may initiate the exchange of relevant utility information.

During an incident, PNM may initiate communications to those customers who have signed up for text service and are potentially affected by fire-caused power outages. Additionally, messaging is sent via television, radio, social media, text messages, and pre-recorded phone calls as the situation demands, and PNM resources are available.

During extended, complex, or multiple incidents, the Corporate Communications team may be augmented by personnel from Customer Service. These Customer Service personnel will work closely with Corporate Communications to ensure consistent customer messaging.

After a wildfire incident, PNM will post and publish information relative to outages and restoration efforts, as well as handle any follow-up questions that the news media may have. Corporate Communications may also be asked to provide support to the PNM Regulatory department if the PRC requests any information during an Open Meeting.

Low Income Customer Support

PNM has numerous programs in place to help low income customers during and after wildfires. The Public Affairs/Community Outreach Team supports organizations such as the American Red Cross to provide low income customer support and could possibly do so during and after wildfire events.

PNM is looking into the possibility of helping form a statewide non-profit to help acquire additional funding for post incident support.

Following is a list of programs and examples of how PNM may aid its low-income customers to help them through a wildfire event. Each event and PNM's ability to assist will be different.

Assistance immediately after the event-

- Partner with various community organizations such as the Red Cross, or Salvation Army and provide volunteers to help as needed for meals, serving preparation, etc.
- Provide access to utility company representatives as needed.

Assistance after the fire has been put out-

- Provide electric bill assistance from the PNM Good Neighbor Fund.
- Assess the community needs to determine if any crisis situations exist within families and work to help them find solutions.
- Provide relaxed emergency assistance guidelines to be able to help more people with higher assistance amounts.
- Provide payment plans for electric bills.
- Suspended disconnect for non-payment for fire affected homes/accounts.
- Provide access to utility company representatives and Good Neighbor Fund agency employees.
- Assist with deposit waivers when able or offer deposit billing solutions.
- Partner with various community organizations, to secure more assistance dollars for families.

Recommendations/ Opportunities

Corporate Communications will continue to refine plans to establish a webpage for fire events containing information on shelter openings, phone numbers, available PNM resources, fire maps, and other information useful to employees and customers affected by the fire.

Since web access can be limited during and following wildfire events, PNM should explore expanding its use of pre-recorded phone messages to help keep customers informed.

The PNM website and digital footprint needs modernization. The website is slow to update fresh content. Some web pages are not created within the original architecture. A comprehensive assessment should be made, and recommendations for improvement furnished enterprise wide. Information important to customers such as outage information and restoration estimates should be prioritized on Company websites and in media spots.

Communicating PNM's emphasis on fire prevention, safety and wildfire mitigation efforts is important. Funding should be allocated to ensure adequate messaging and market saturation. The fire prevention, safety, and risk mitigation message should not be overshadowed by other initiatives. A fire safe and risk averse culture at PNM needs strong and consistent internal and external messaging that reinforces these values.

The PNM.com website should be updated with information on the PNM Wildfire Mitigation Plan. Bullet points stating the intent of the plan and actions that have already taken place would help raise public awareness of the WMP.

PNM should provide information on its website about its programs to assist low income customers following wildfire events. This should include detailed contact information and information on how to access PNM assistance.

PNM needs to ensure proper planning is in place, funds are available and that internal resources are adequate to meet expected customer needs during and following significant wildfire events as PNM has relatively limited personnel and resources available for this type of assistance.

PNM should preplan communication protocols with other utility partners such as adjoining electric utilities, water, and telecommunication services.

Rationale/Benefits

Wildfires can have a devastating impact on any community. Power may be out for an extended period. PNM's customers will benefit by improved communication and information access, particularly those customers that require power for medical devices.

Increased communication and access to information can help ease the financial burden experienced by its customers at an especially traumatic time.

PNM benefits by giving back to its communities. Its reputation and customer satisfaction are enhanced by programs that reinvest in its customers.

Appendix A – Revision/Update History

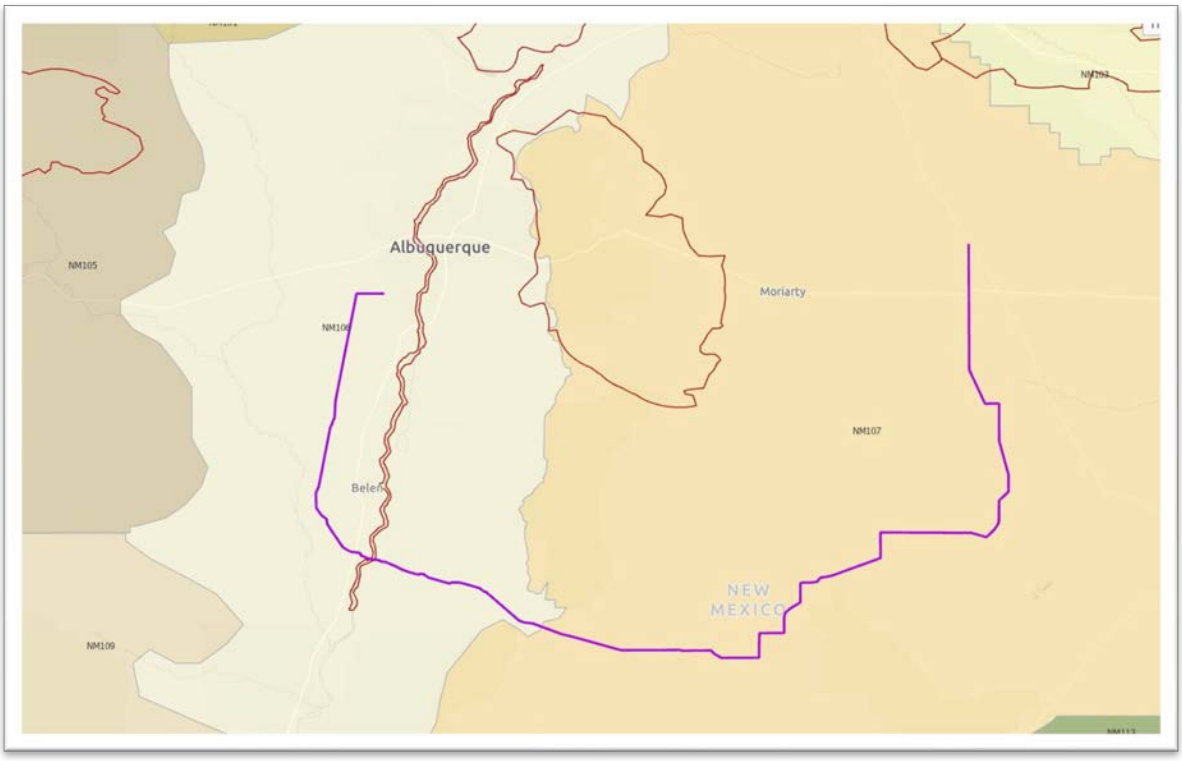
Version	Update by	Date	Approved by	Notes
1	WMP core team	September 2020	Todd Fridley	Initial release
2	WMP core team	December 2020	Jeff Nawman	Added the Substation Assessment results
3	WMP core team	June 2021	Anne Beard	Added: Daily Situational Awareness section Updated: Training section content moved to Appendix C. Link to original assessment also provided
4	WMP core team	July 2021	Anne Beard	Removed duplicate FPI graphic
5	WMP Team	June 2022	Wesley Gray	Updated plan with current developments, formatting

Appendix B – Defining HFAs

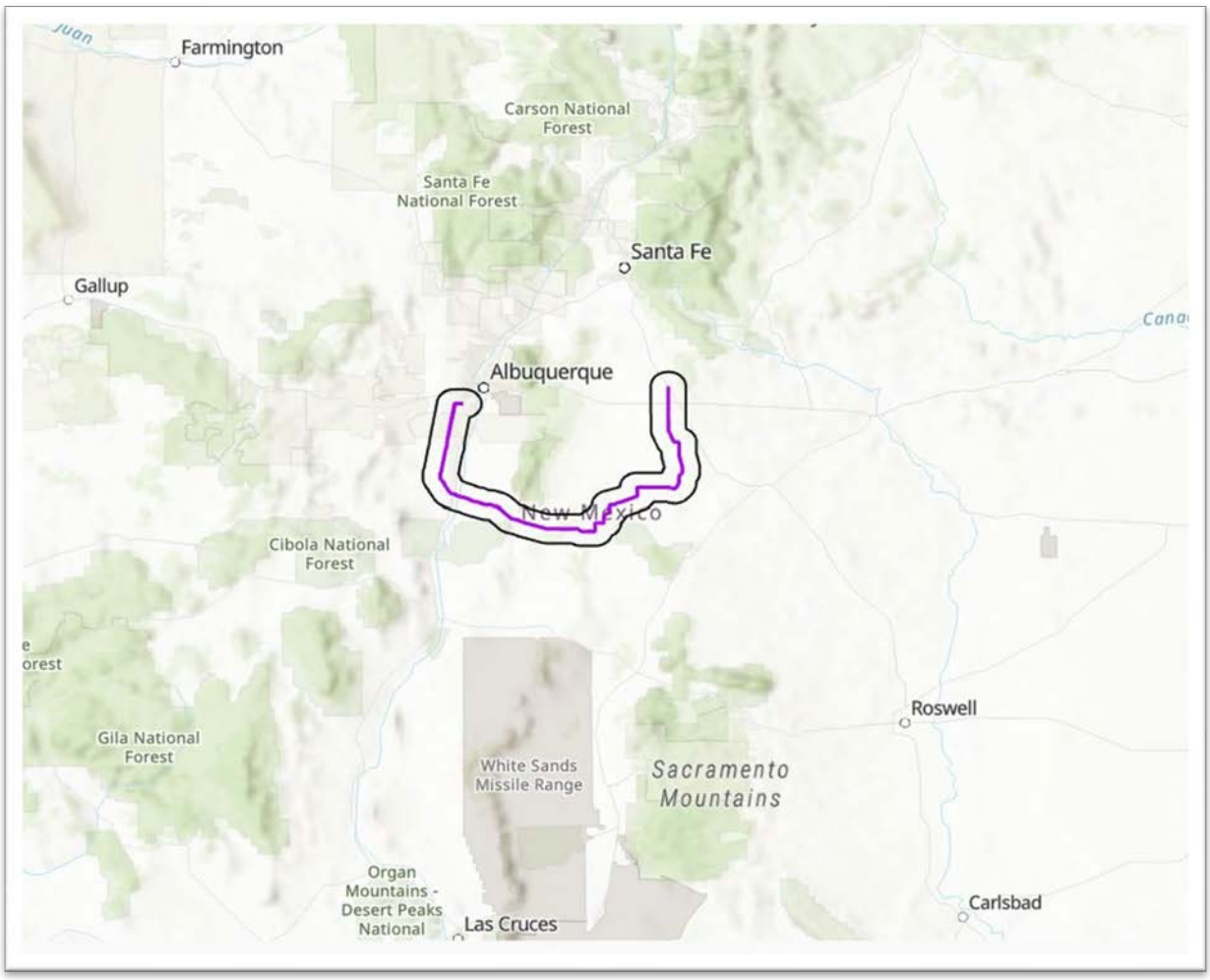
PNM utilized a simple process to define the HFAs. The HFA team decided to leverage the publicly available United States Forest Service Wildfire Hazard Potential (WHP) dataset that was already in use in the PNM Fire Risk Dashboard.

To illustrate the process used, a sample transmission line route is shown.

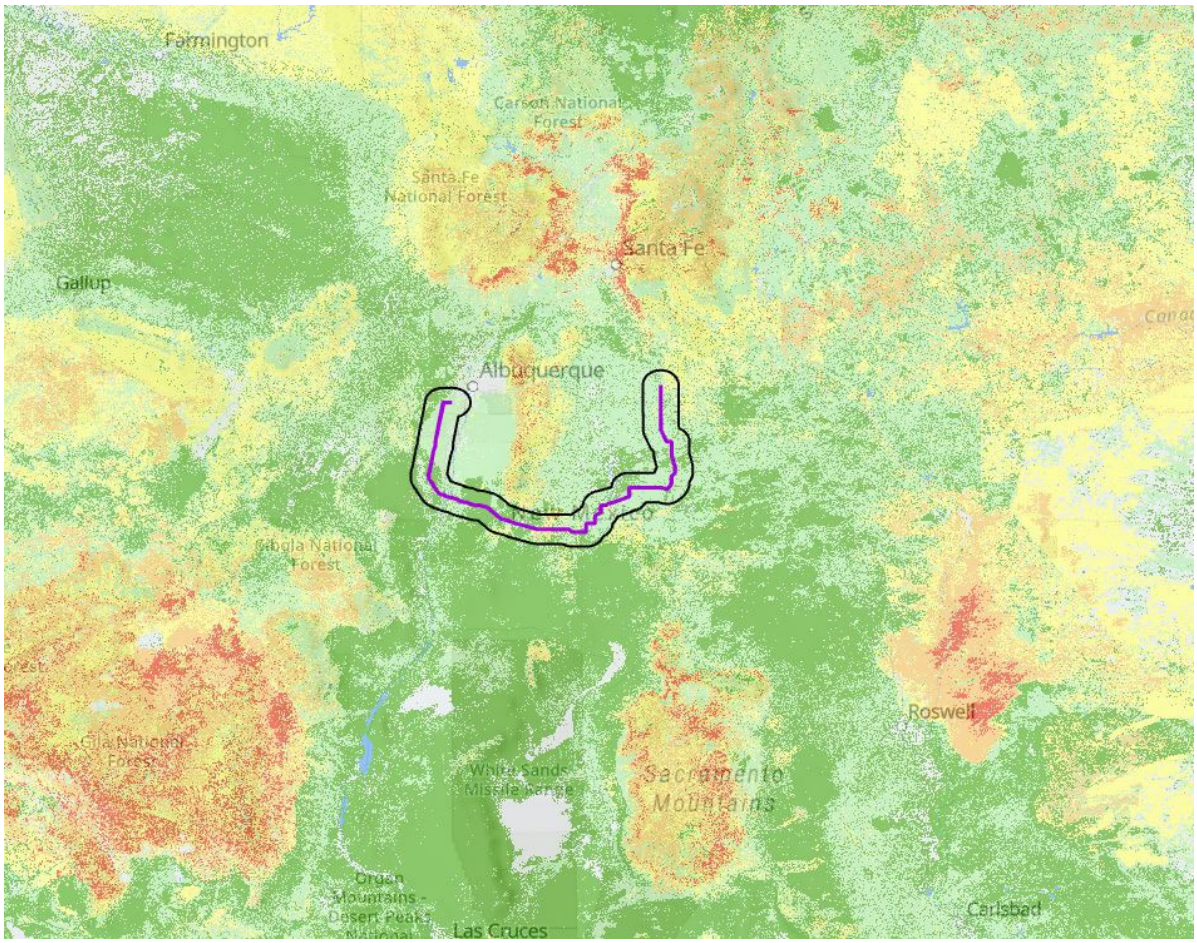
Map 1: The team started with a proposed PNM Transmission line.



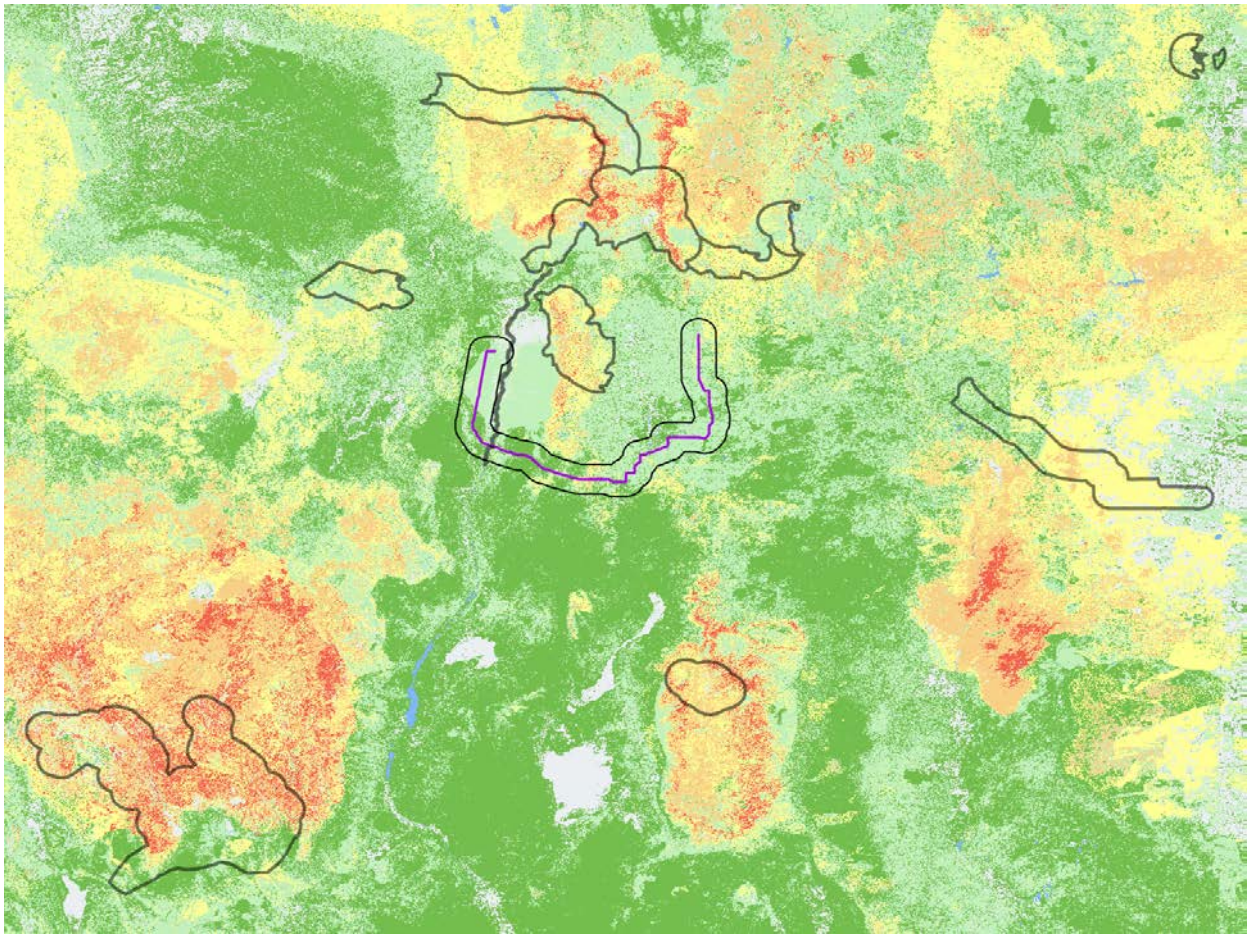
Map 2: The lines are buffered by 5 miles on each side to create a service-area wide polygon called “Rough HFA”.



Map 3: The Rough HFA was superimposed over the WHP data. Areas of dense Moderate, High, or Very High WHP that fell into the Rough HFA polygon were aggregated or captured into discreet polygons that became HFA areas.

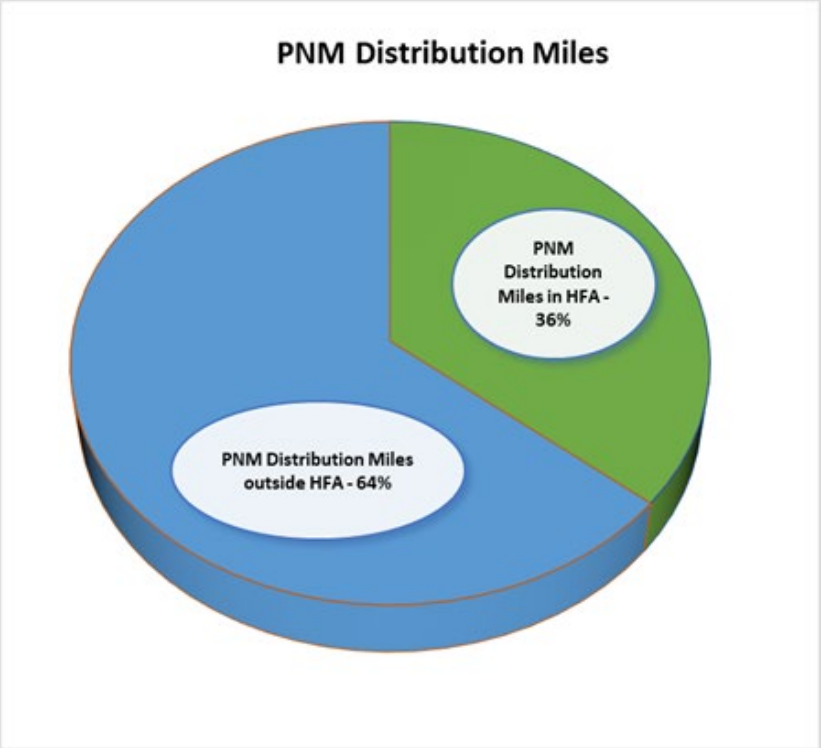


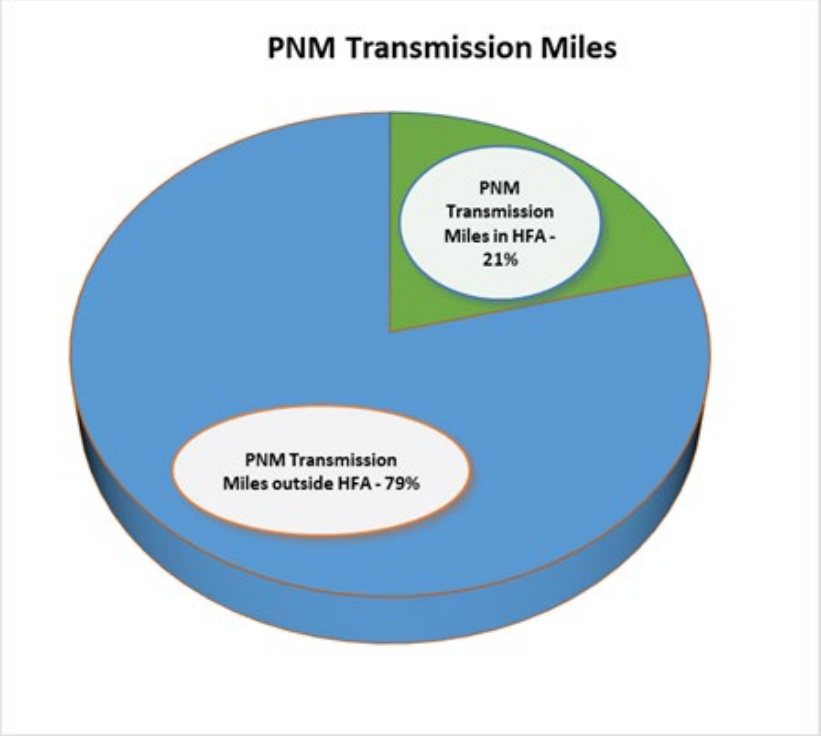
Map 4: The HFA areas were refined to make sure that they did not unnecessarily intersect, bisect, or divide feeders. When it was necessary to bisect a feeder, a logical point such as a switch location was chosen.

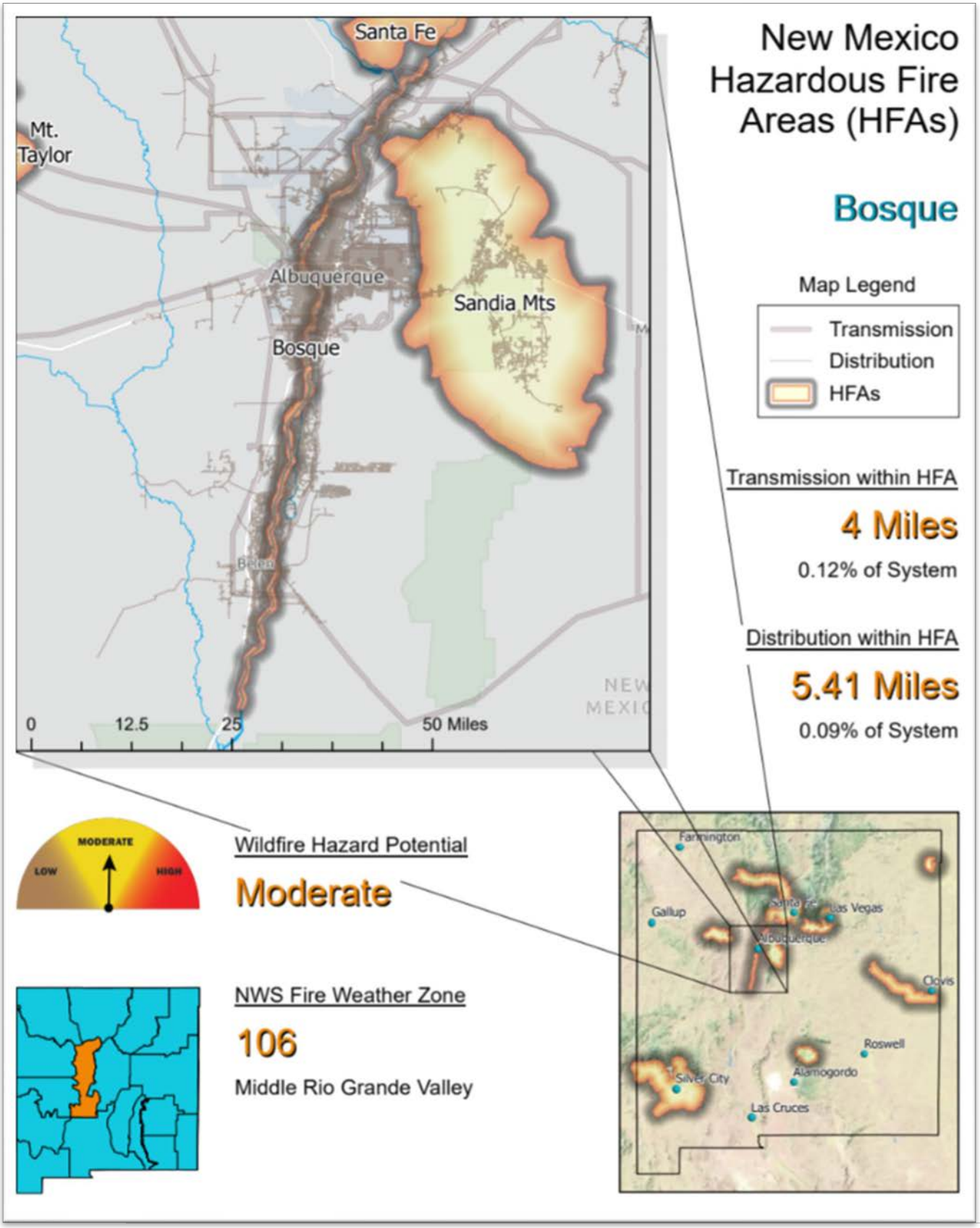


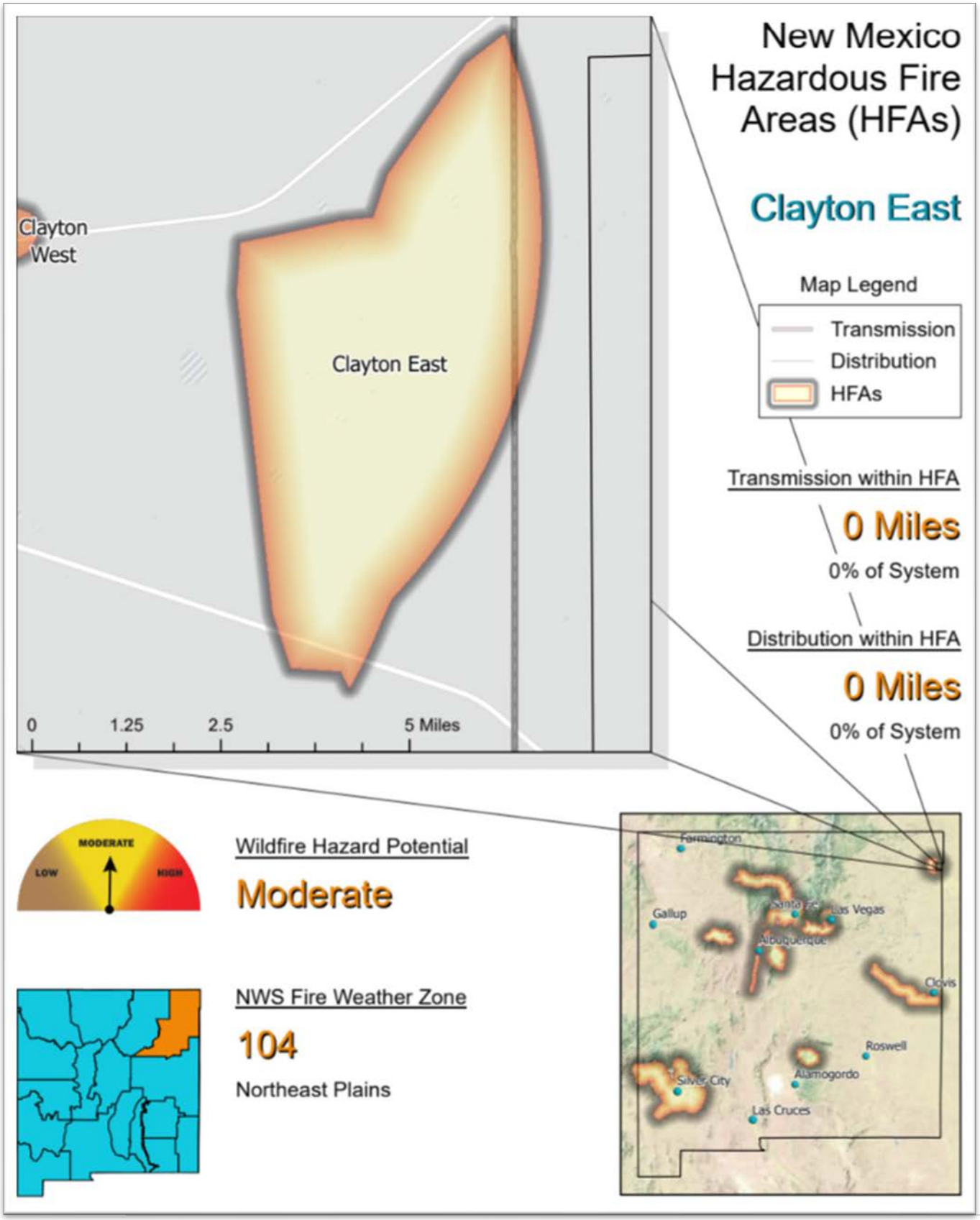
Appendix C – PNM HFAs and Line Statistics

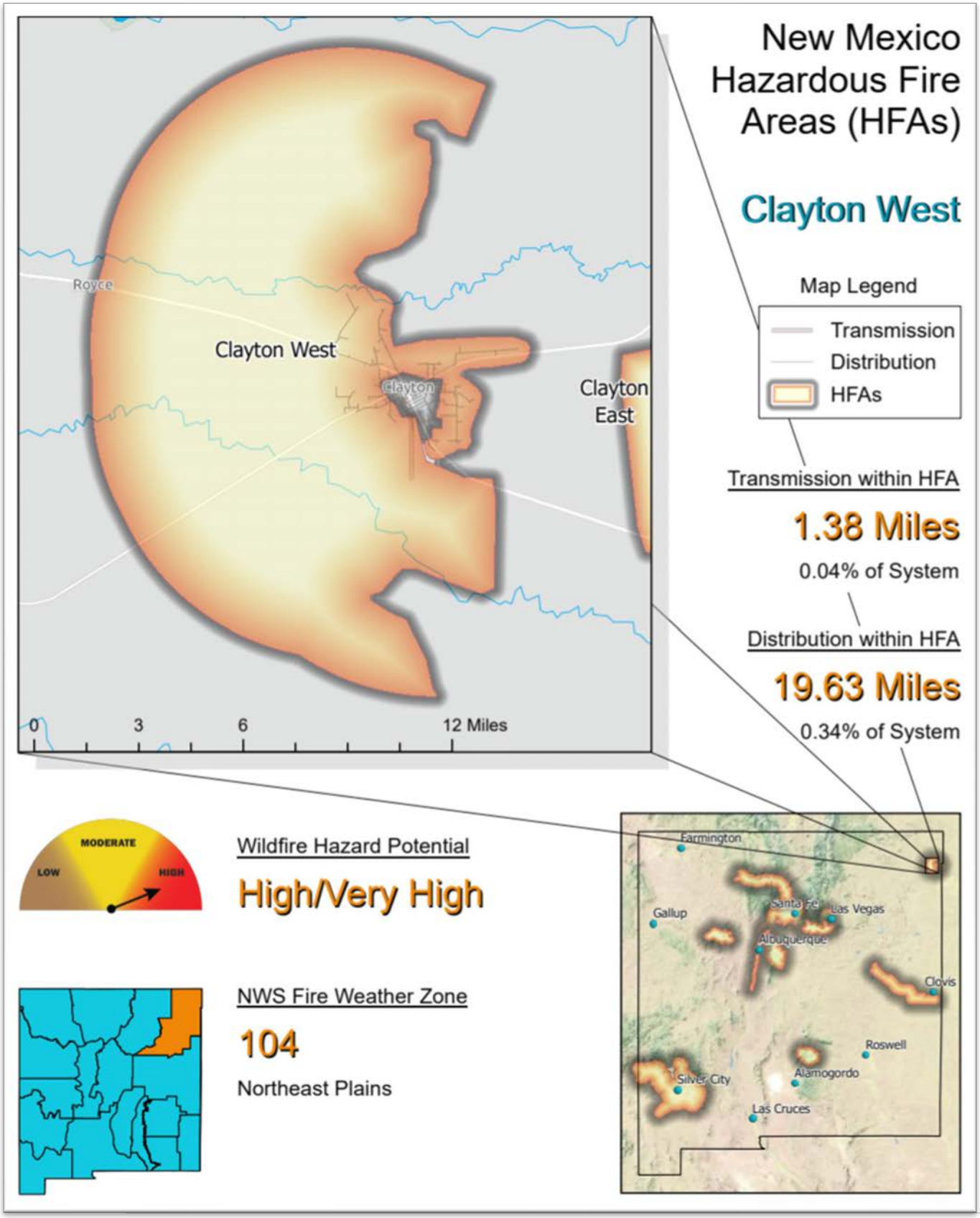
A summary of the miles of line within HFAs and maps of the idenfified HFA areas.

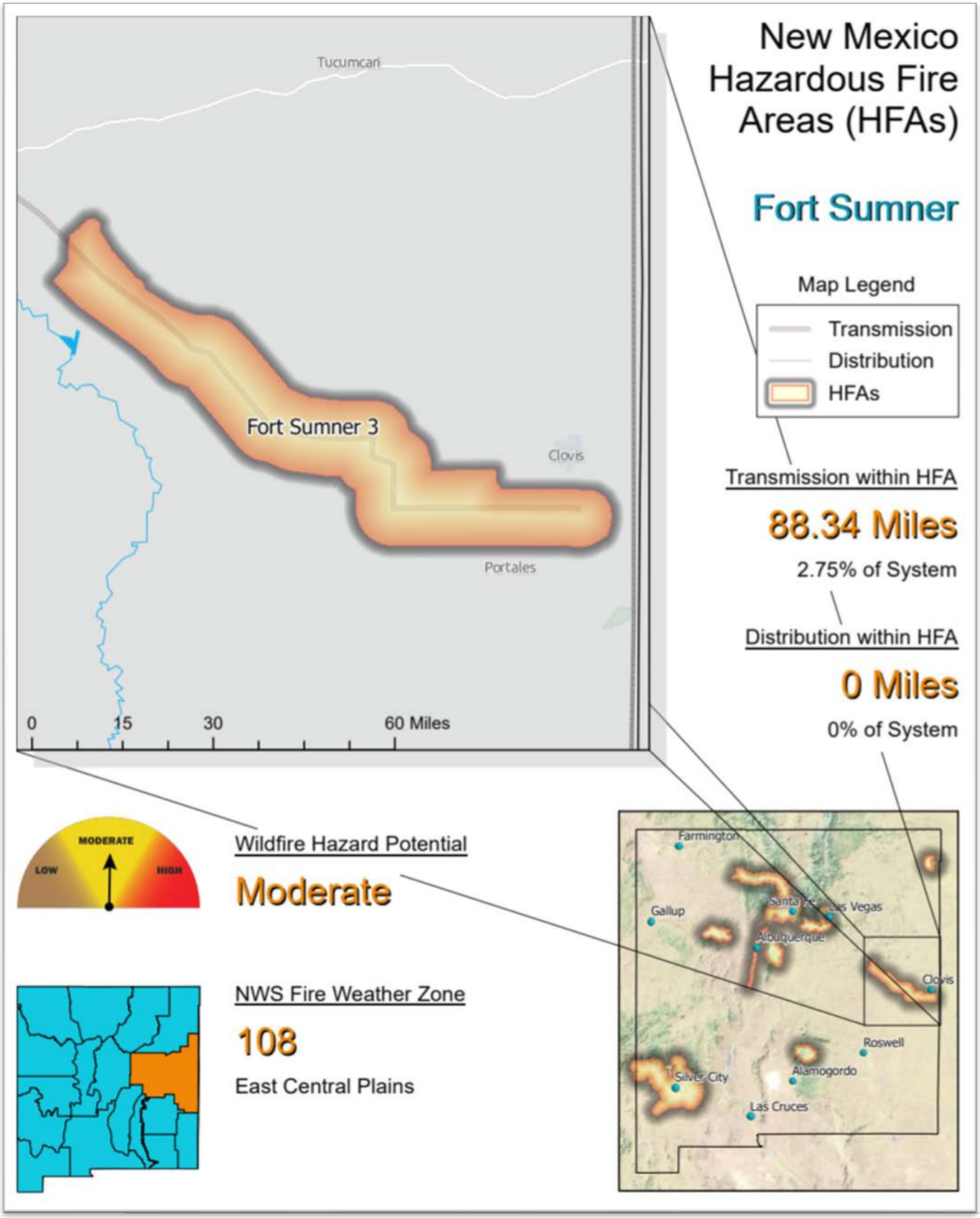


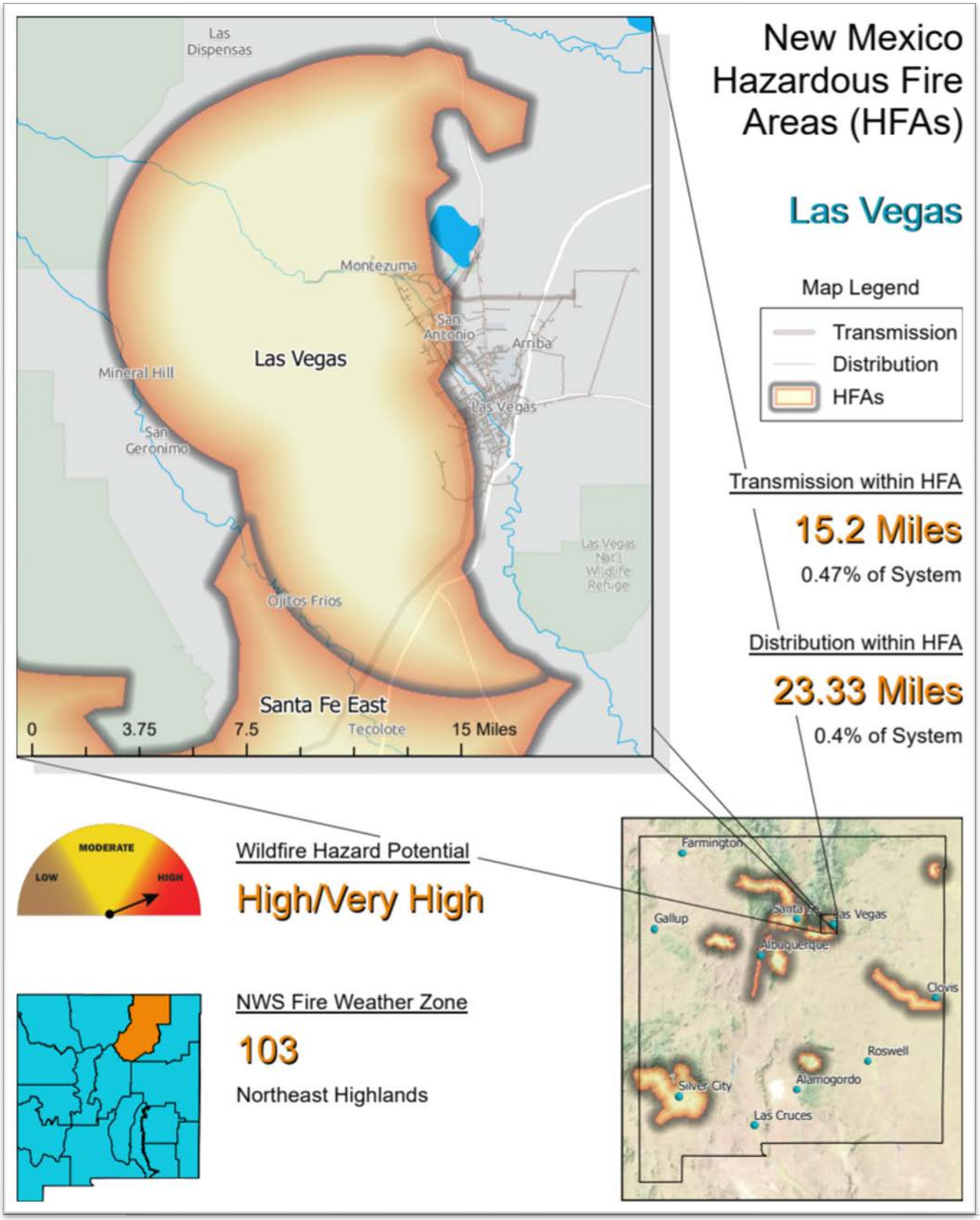


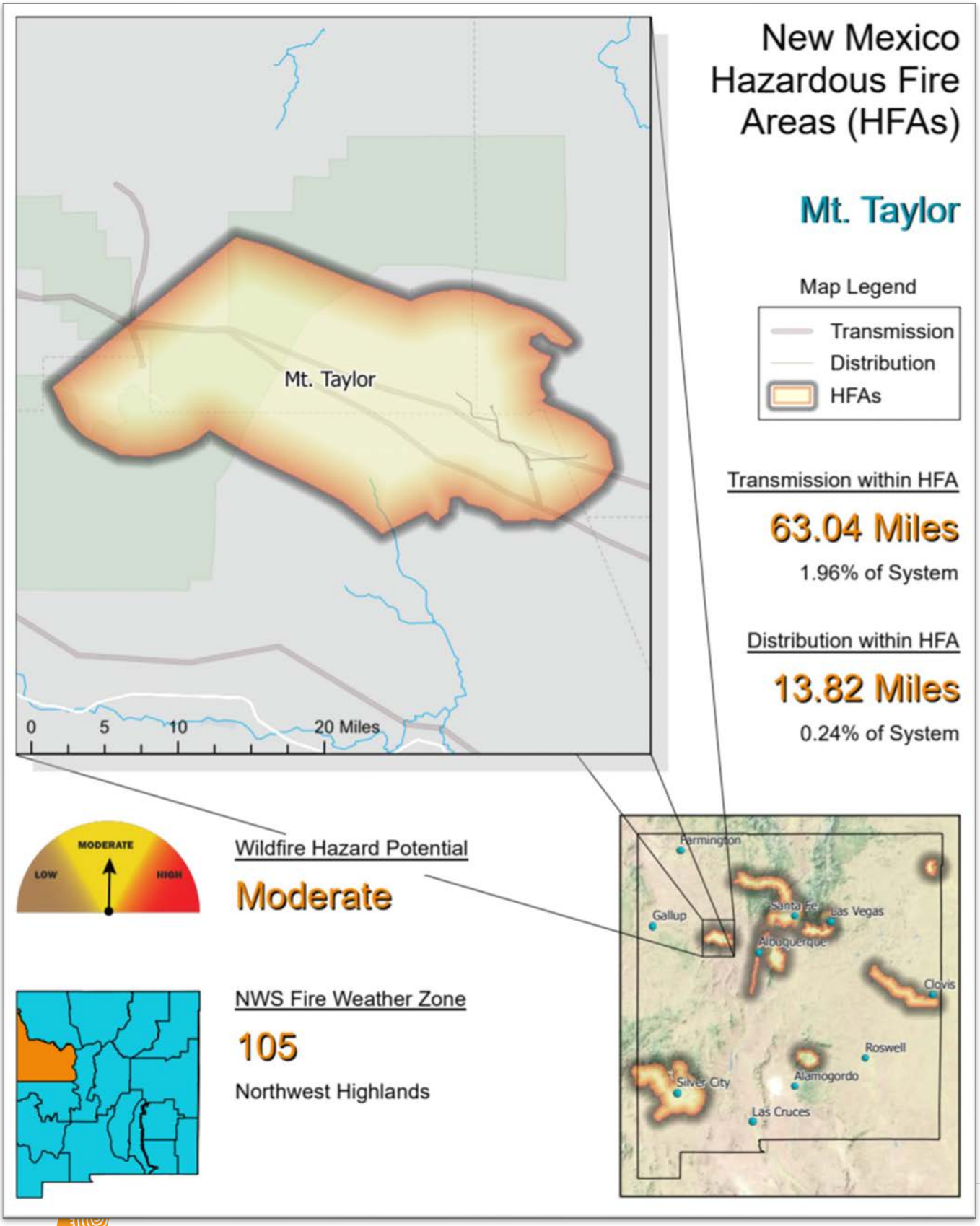

New Mexico Hazardous Fire Areas (HFAs)
Bosque
Map Legend
Transmission
Distribution
HFAs
Santa Fe
Mt. Taylor
Albuquerque
Sandia Mts
Bosque
0
12.5
25
50 Miles
Transmission within HFA
4 Miles
0.12% of System
Distribution within HFA
5.41 Miles
0.09% of System
MODERATE
LOW
HIGH
Wildfire Hazard Potential
Moderate
NWS Fire Weather Zone
106
Middle Rio Grande Valley
Farmington
Gallup
Las Vegas
Albuquerque
Clovis
Roswell
Alamogordo
Silver City
Las Cruces

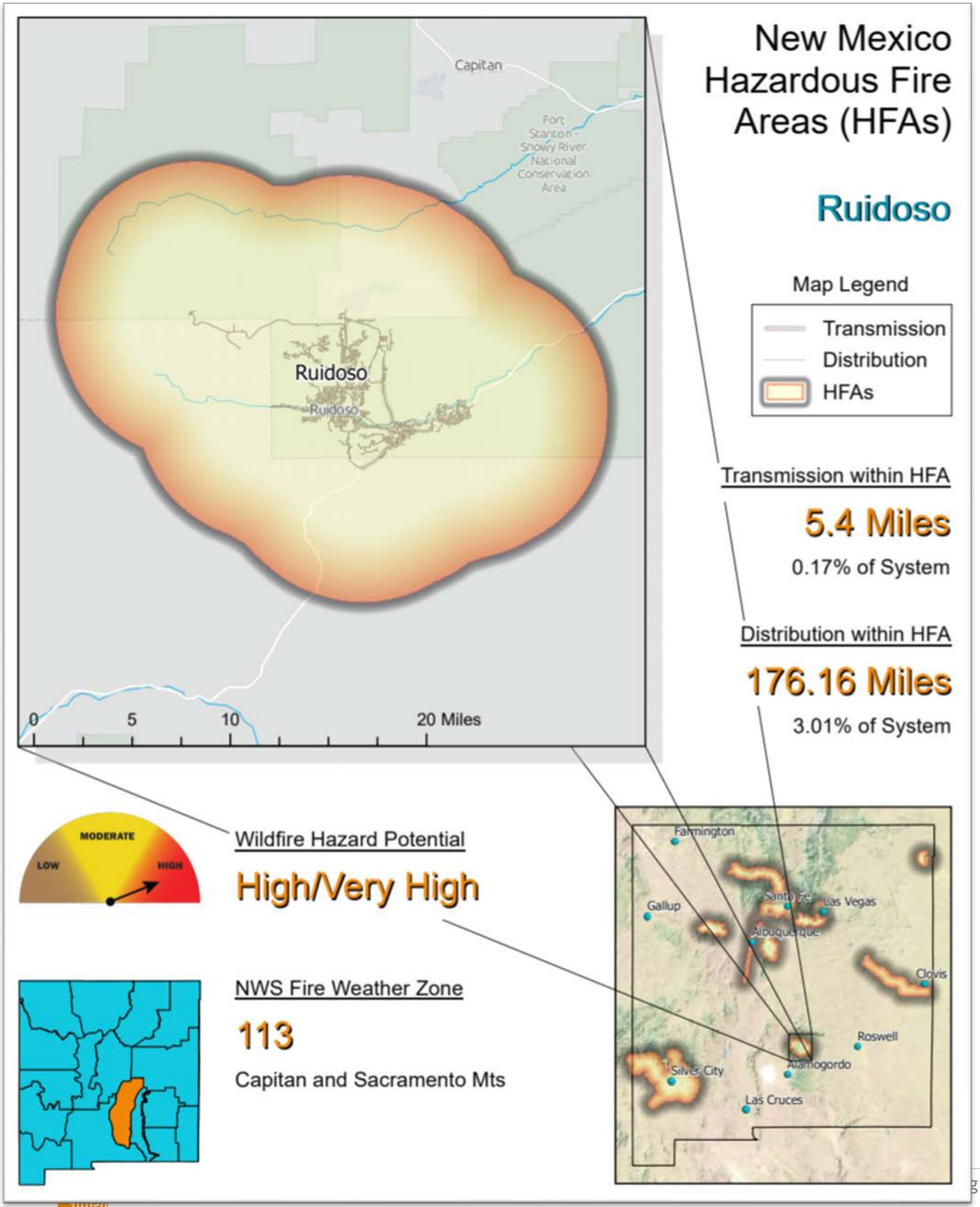

New Mexico Hazardous Fire Areas (HFAs)
Clayton East
Clayton West
Clayton East
Map Legend
Transmission
Distribution
HFAs
Transmission within HFA
0 Miles
0% of System
Distribution within HFA
0 Miles
0% of System
0
1.25
2.5
5 Miles
MODERATE
LOW
HIGH
Wildfire Hazard Potential
Moderate
NWS Fire Weather Zone
104
Northeast Plains
Farmington
Gallup
Santa Fe
Las Vegas
Albuquerque
Clovis
Roswell
Silver City
Alamogordo
Las Cruces

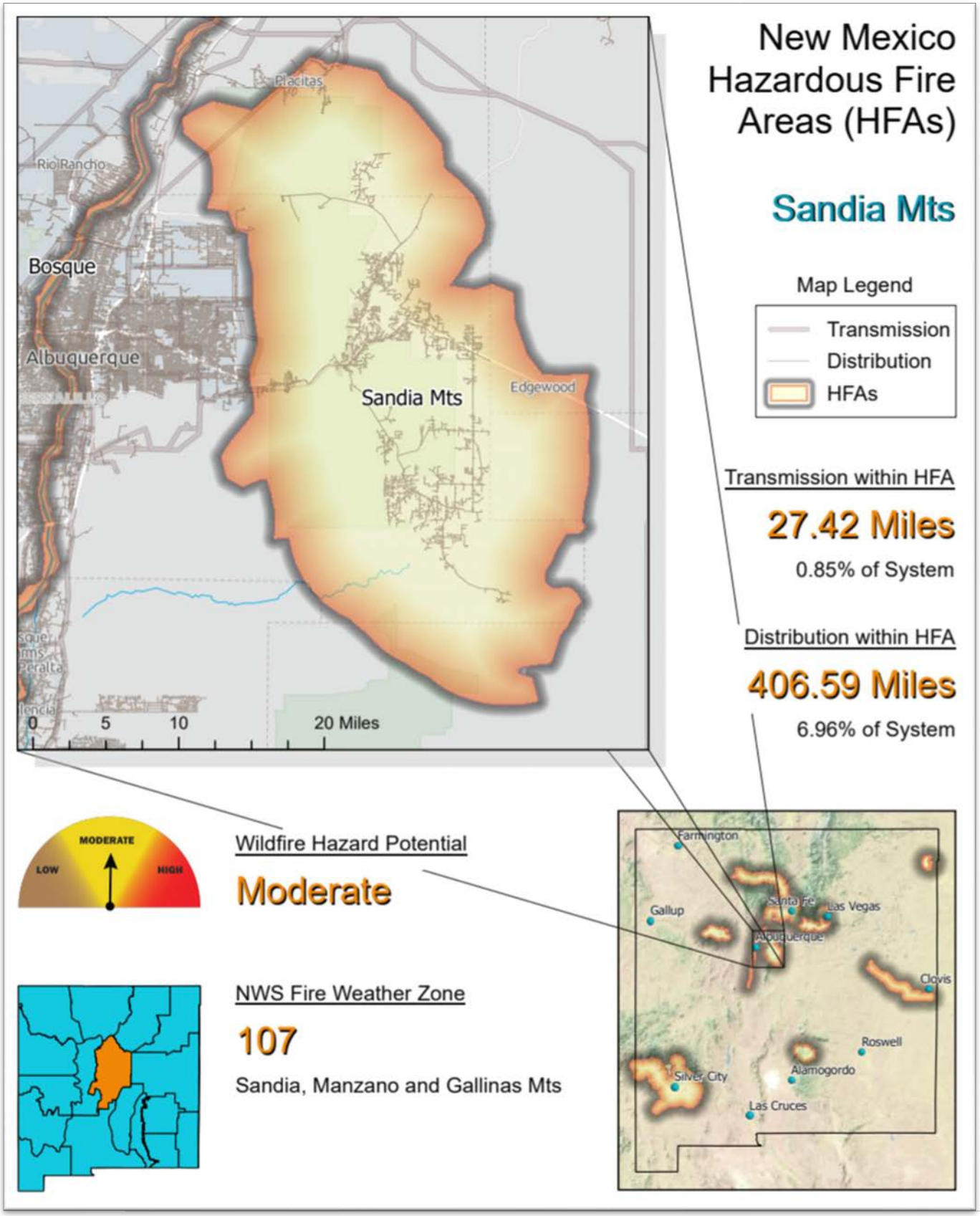

New Mexico Hazardous Fire Areas (HFAs)
Clayton West
Map Legend
Transmission
Distribution
HFAs
Royce
Clayton West
Clayton
Clayton East
0
3
6
12 Miles
Transmission within HFA
1.38 Miles
0.04% of System
Distribution within HFA
19.63 Miles
0.34% of System
MODERATE
LOW
HIGH
Wildfire Hazard Potential
High/Very High
NWS Fire Weather Zone
104
Northeast Plains
Farmington
Gallup
Santa Fe
Las Vegas
Albuquerque
Clovis
Roswell
Alamogordo
Silver City
Las Cruces

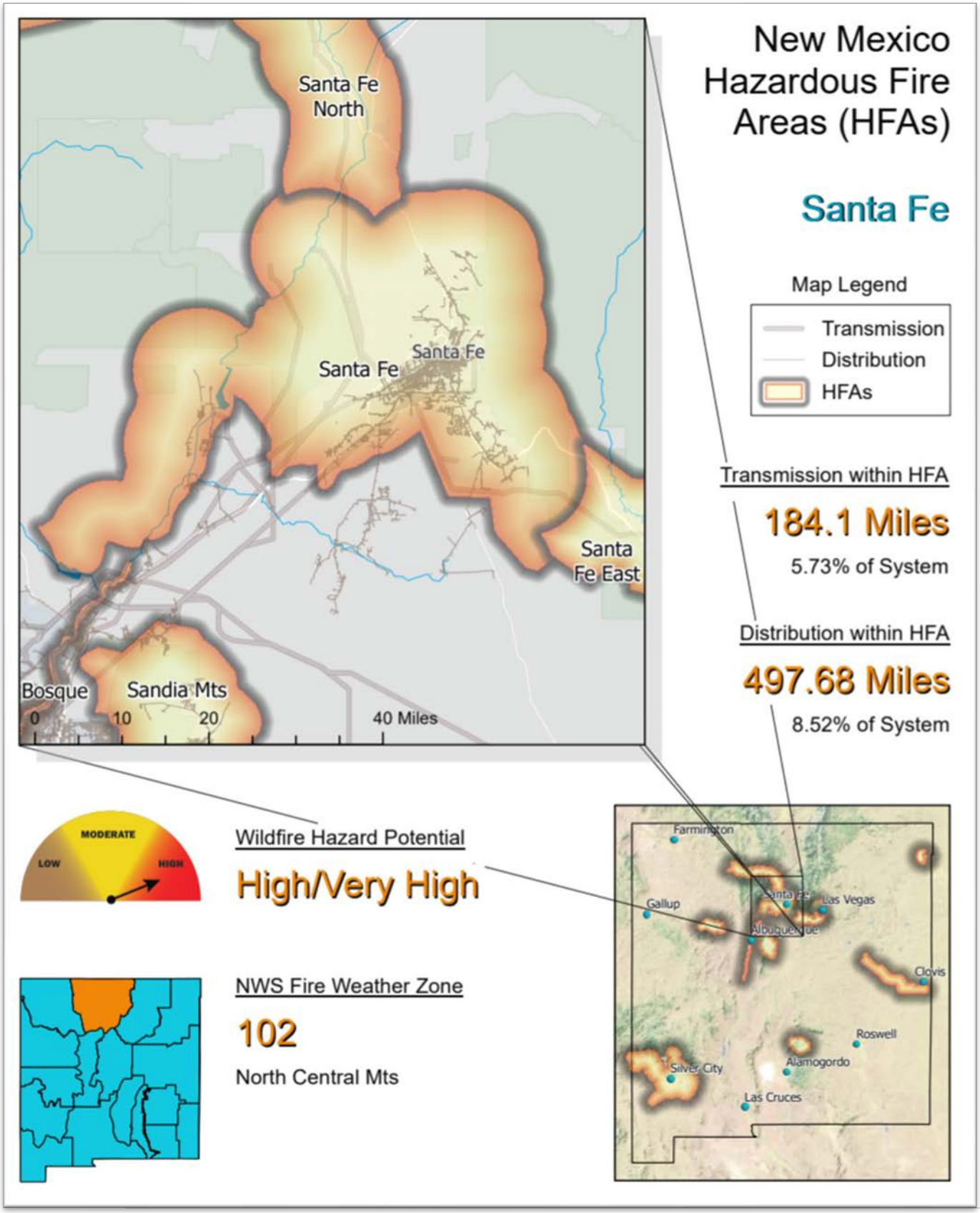

New Mexico Hazardous Fire Areas (HFAs)
Fort Sumner
Tucumcari
Fort Sumner 3
Clovis
Portales
0
15
30
60 Miles
Map Legend
Transmission
Distribution
HFAs
Transmission within HFA
88.34 Miles
2.75% of System
Distribution within HFA
0 Miles
0% of System
MODERATE
LOW
HIGH
Wildfire Hazard Potential
Moderate
NWS Fire Weather Zone
108
East Central Plains
Farmington
Gallup
Santa Fe
Las Vegas
Albuquerque
Clovis
Roswell
Alamogordo
Silver City
Las Cruces

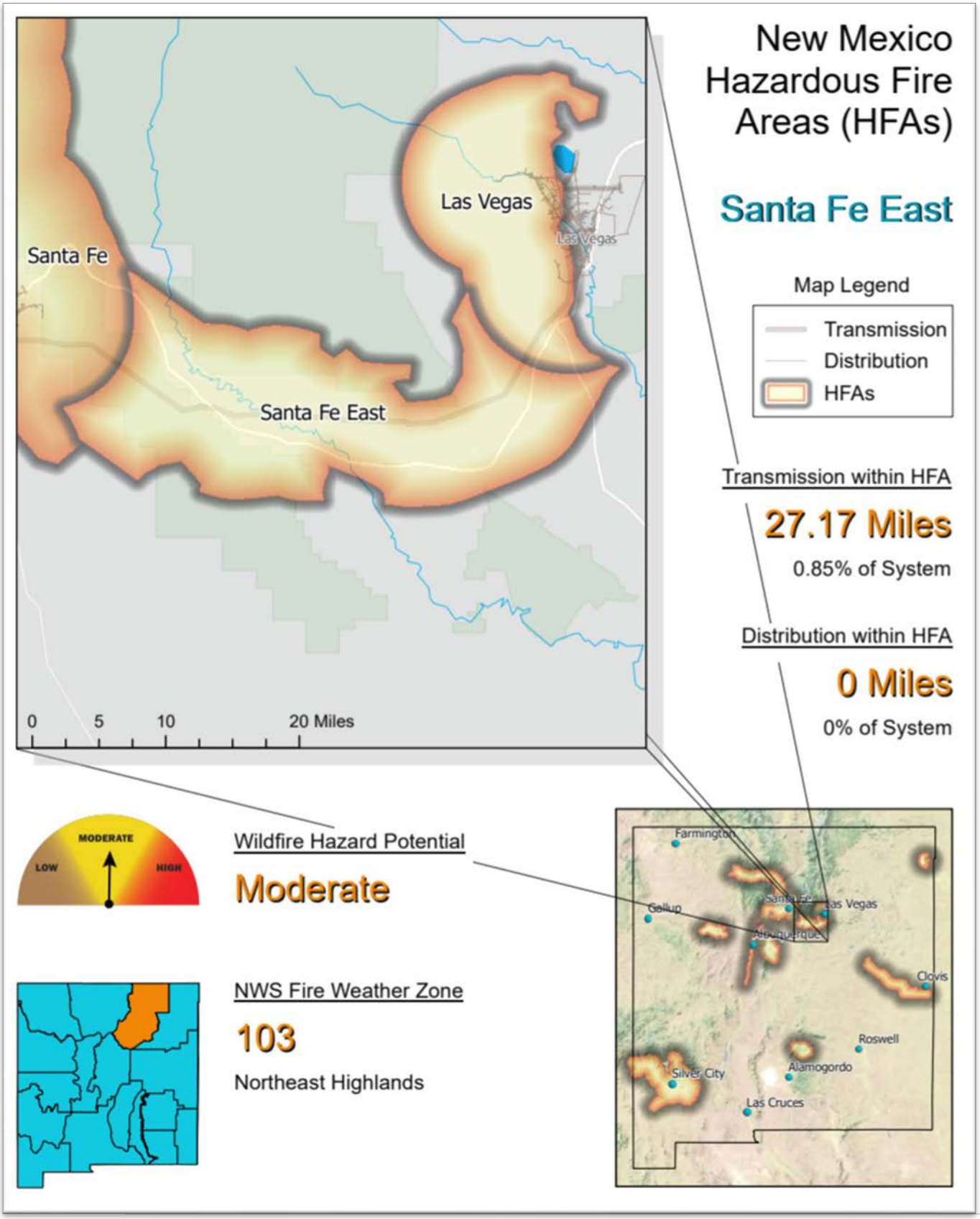

New Mexico Hazardous Fire Areas (HFAs)
Las Vegas
Map Legend
Transmission
Distribution
HFAs
Transmission within HFA
15.2 Miles
0.47% of System
Distribution within HFA
23.33 Miles
0.4% of System
Las Dispensas
Montezuma
San Antonio
Arriba
Las Vegas
Mineral Hill
San Geronimo
Las Vegas Nat'l Wildlife Refuge
Ojitos Frios
Santa Fe East
Tecolote
0
3.75
7.5
15 Miles
MODERATE
LOW
HIGH
Wildfire Hazard Potential
High/Very High
NWS Fire Weather Zone
103
Northeast Highlands
Farmington
Gallup
Santa Fe
Las Vegas
Albuquerque
Clovis
Roswell
Alamogordo
Silver City
Las Cruces

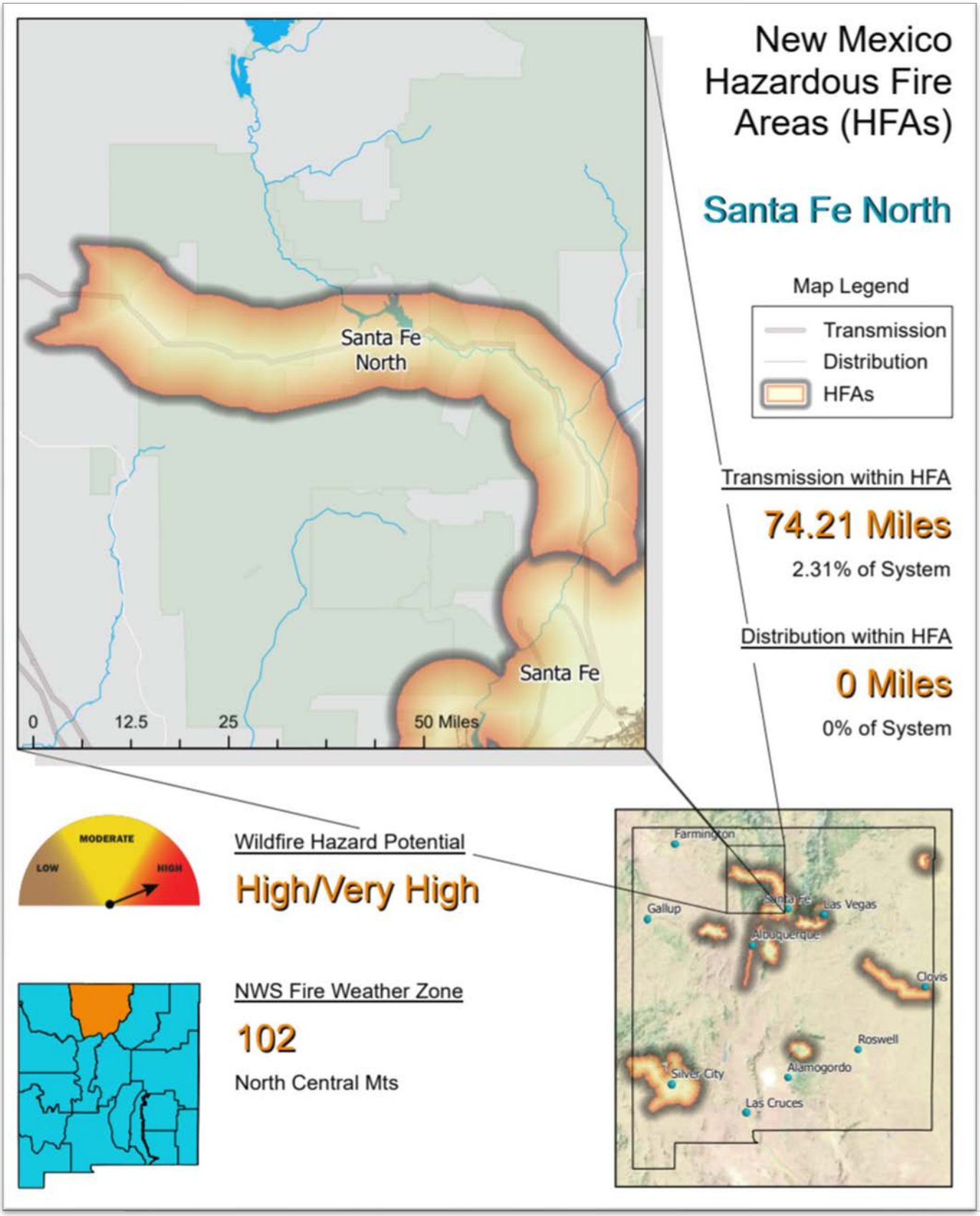

New Mexico Hazardous Fire Areas (HFAs)
Mt. Taylor
Mt. Taylor
Map Legend
Transmission
Distribution
HFAs
Transmission within HFA
63.04 Miles
1.96% of System
Distribution within HFA
13.82 Miles
0.24% of System
0
5
10
20 Miles
MODERATE
LOW
HIGH
Wildfire Hazard Potential
Moderate
NWS Fire Weather Zone
105
Northwest Highlands
Farmington
Gallup
Santa Fe
Las Vegas
Albuquerque
Clovis
Roswell
Alamogordo
Silver City
Las Cruces

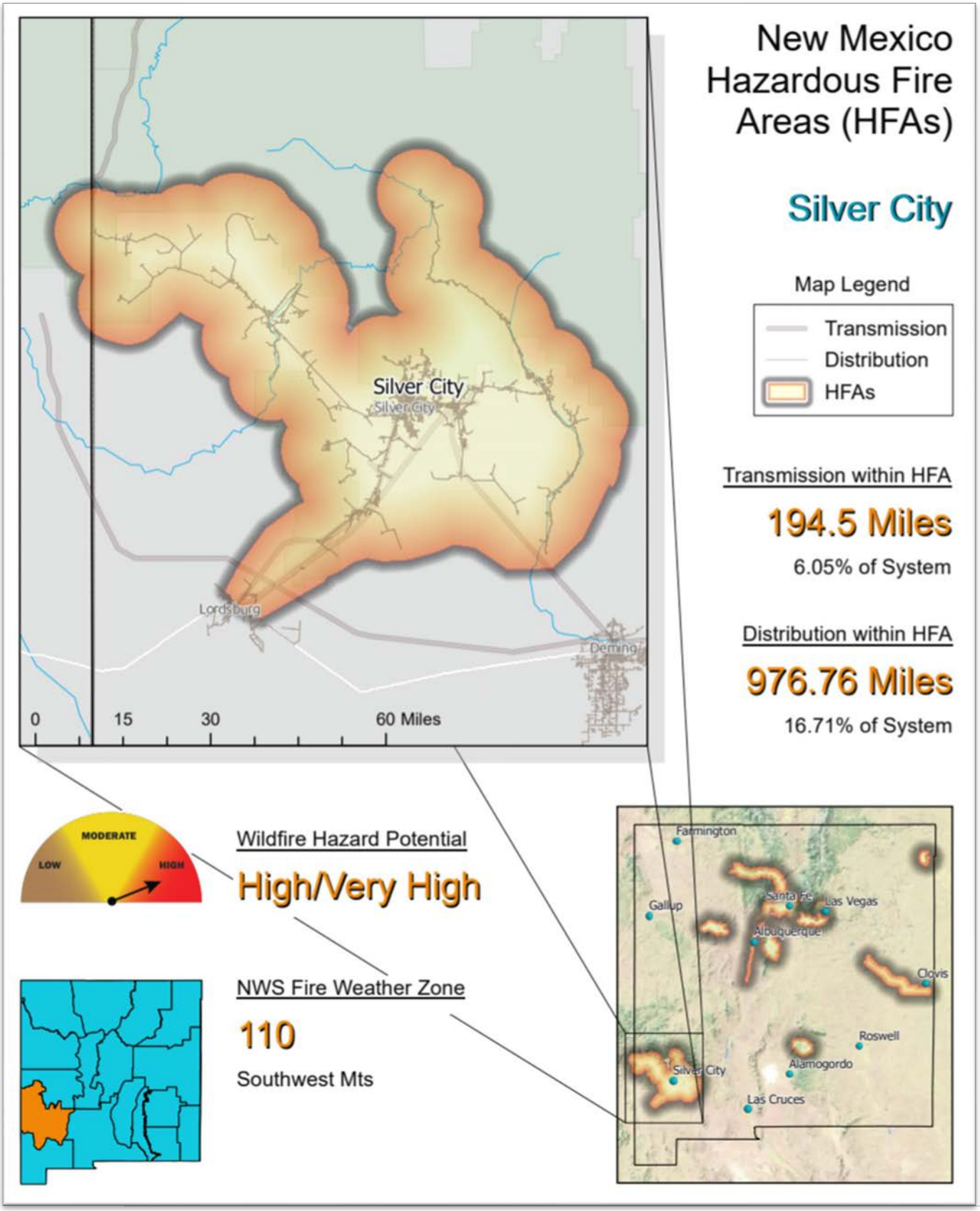

New Mexico Hazardous Fire Areas (HFAs)
Ruidoso
Capitan
Fort Stanton - Snowy River National Conservation Area
Ruidoso
Ruidoso
Map Legend
Transmission
Distribution
HFAs
Transmission within HFA
5.4 Miles
0.17% of System
Distribution within HFA
176.16 Miles
3.01% of System
0
5
10
20 Miles
MODERATE
LOW
HIGH
Wildfire Hazard Potential
High/Very High
NWS Fire Weather Zone
113
Capitan and Sacramento Mts
Farmington
Gallup
Santa Fe
Las Vegas
Albuquerque
Clovis
Roswell
Alamogordo
Silver City
Las Cruces


New Mexico Hazardous Fire Areas (HFAs)
Sandia Mts
Map Legend
Transmission
Distribution
HFAs
Placitas
Rio Rancho
Bosque
Albuquerque
Sandia Mts
Edgewood
0
5
10
20 Miles
Transmission within HFA
27.42 Miles
0.85% of System
Distribution within HFA
406.59 Miles
6.96% of System
MODERATE
LOW
HIGH
Wildfire Hazard Potential
Moderate
NWS Fire Weather Zone
107
Sandia, Manzano and Gallinas Mts
Farmington
Gallup
Santa Fe
Las Vegas
Albuquerque
Clovis
Roswell
Alamogordo
Silver City
Las Cruces


New Mexico Hazardous Fire Areas (HFAs)
Santa Fe
Map Legend
Transmission
Distribution
HFAs
Santa Fe North
Santa Fe
Santa Fe
Santa Fe East
Bosque
Sandia Mts
0
10
20
40 Miles
Transmission within HFA
184.1 Miles
5.73% of System
Distribution within HFA
497.68 Miles
8.52% of System
MODERATE
LOW
HIGH
Wildfire Hazard Potential
High/Very High
NWS Fire Weather Zone
102
North Central Mts
Farmington
Gallup
Las Vegas
Albuquerque
Clovis
Roswell
Silver City
Alamogordo
Las Cruces


New Mexico Hazardous Fire Areas (HFAs)
Santa Fe East
Map Legend
Transmission
Distribution
HFAs
Las Vegas
Santa Fe
Santa Fe East
0
5
10
20 Miles
Transmission within HFA
27.17 Miles
0.85% of System
Distribution within HFA
0 Miles
0% of System
MODERATE
LOW
HIGH
Wildfire Hazard Potential
Moderate
NWS Fire Weather Zone
103
Northeast Highlands
Farmington
Gallup
Las Vegas
Clovis
Roswell
Alamogordo
Silver City
Las Cruces


New Mexico Hazardous Fire Areas (HFAs)
Santa Fe North
Map Legend
Transmission
Distribution
HFAs
Santa Fe North
Santa Fe
0
12.5
25
50 Miles
Transmission within HFA
74.21 Miles
2.31% of System
Distribution within HFA
0 Miles
0% of System
MODERATE
LOW
HIGH
Wildfire Hazard Potential
High/Very High
NWS Fire Weather Zone
102
North Central Mts
Farmington
Gallup
Santa Fe
Las Vegas
Albuquerque
Clovis
Roswell
Silver City
Alamogordo
Las Cruces


New Mexico Hazardous Fire Areas (HFAs)
Silver City
Map Legend
Transmission
Distribution
HFAs
Silver City
Silver City
Lordsburg
Deming
0
15
30
60 Miles
Transmission within HFA
194.5 Miles
6.05% of System
Distribution within HFA
976.76 Miles
16.71% of System
MODERATE
LOW
HIGH
Wildfire Hazard Potential
High/Very High
NWS Fire Weather Zone
110
Southwest Mts
Farmington
Gallup
Santa Fe
Las Vegas
Albuquerque
Clovis
Roswell
Alamogordo
Silver City
Las Cruces

Appendix D - Substation Assessment

A summary of the Substation Assessment may be found in the following slides. The original assessment document may be found via this link.

Purpose: to assess each substation for the likelihood of an equipment fire escaping and causing damage to the surrounding area

56 original candidate substations within 500' of the Hazardous Fire Area

- 18 were eliminated by GIS and remote assessment
- 38 were site visited between Nov. 30 & Dec. 11, 2020
- Capstone Fire and Safety Management & PNM Substation Personnel

Attributes and their scoring

Substation name
Voltage class
Perimeter dimensions
Access road
Paved
Gravel
Graded dirt
Suitable for safe refuge
Yes
No
Limited
Perimeter fence material
Open chain link 5
Chain link w/slats 3
Concrete block 0
Development in proximity regardless of fencing or vegetation
Within 100' of perimieter - 10
Beyond 100' of perimeter - 0
Landscaping / irrigation outside fence
No - 5
Yes - 0

Fuel type in proximity
Brush - 5
Grass - 3
No vegetation - 0
Equipment containment
Transformer without blast wall - 5
Transformer with blast wall - 0
Capacitor bank exposed - 5
Capacitor bank contained - 0
Substation profile
high profile - 5
low profile - 0
Is firefighting water avaialble?
No - 5
Yes, inside fence - 2
yes, outside fence - 0
Exposure/encroachment issue
Immediate need, urgent 5
Delayed 4
Before upcoming fire season / wind event 2
Perform during scheduled maint 1
Total score

Each substation was scored by the same team. A final relative ranking shows how the substations compared to others.

Four PNM substations had Exposure / encroachment issues

Exposure/encroachment Issue
Immediate need, urgent 5
Delayed 4
Before upcoming fire season / wind event 2
Perform during scheduled maint 1

Recommendations

- Address immediate issues at Ski Run, San Antonio, WD Ranch
- Initiate a routine vegetation maintenance regimen inside and outside
- Initiate a clean-up of piled, accumulated flammable debris within each substation- good for fire prevention and ignition reduction
- Consider solid, non-flammable fencing on the riskier substations
- Consider containment around susceptible equipment (cap banks, etc.)
- Preplan for equipment fires. Who will respond to a major transformer fire? Are they trained and equipped for that type of incident?

Final tally and Exposure / Encroachment scoring

Substation ID	Perimeter Dimensions	Access Road Type	Safe Refuge	Perimeter Fencing Score	Development Proximity Score	Landscape & Irrigation Score	Fuel Reduction Score	HFA Tier	Fuel Type-In Proximity	Equip Containment Score	Substation Profile	Fire-Water Score	Exposure / Encroachment Need	Final Tally
Ski Run	30' x 15'	Paved	No	5	10	5	5	6	8	5	5	5	4	58
San Antonio	27 X 30	Paved	No	5	10	5	5	5	5	5	5	5	4	54
Cuchilla	52952	Paved	Yes	5	0	5	5	5	5	10	5	5	1	46
Neron	125' x 250'	Graded dir.	Limited	5	0	5	5	5	5	10	5	5	1	46
Cliff	120' x 120'	Gravel	No	5	10	5	5	5	3	5	0	5	1	44
Gallinaz	40' x 50'	Gravel	No	5	0	5	3	5	5	10	5	5	1	44
NEW1	300' x 300'	Graded dir.	No	5	0	5	5	5	3	10	5	5	1	44
Valencia	90' x 60'	Gravel	NO	5	0	5	5	5	3	10	5	5	1	44
[redacted]	105' x 65'	Gravel	Limited	5	0	5	5	5	3	10	5	5	1	42
Buckman	50' x 30'	Graded dir.	No	5	0	5	5	5	5	5	5	5	1	41
Hidalgo	200' x 200'	Graded dir.	Yes	5	0	5	5	5	5	5	5	5	1	41
Dpl	350' x 250'	Gravel	Yes	5	0	5	5	5	5	5	5	5	1	41
Zia	150' x 250'	Gravel	No	3	0	5	2	5	5	10	5	5	1	41
Camel Tracks	30' x 30'	Graded dir.	No	5	0	5	5	5	3	5	5	5	1	39
Gavilan	30' x 40'	Gravel	No	5	0	5	5	5	6	5	0	5	2	38
Enclosure Grant	75' x 50'	Gravel	Limited	5	0	5	3	5	3	10	0	5	1	37
Buro Mountain	30' x 30'	Graded dir.	No	5	0	5	5	5	5	5	0	5	1	36
Mejia	40' x 40'	Gravel	Limited	0	0	5	5	5	5	5	5	5	1	36
WD Ranch	No fence	...ong graded da	No	5	0	5	5	5	5	0	0	5	4	35
Cochiti	30' x 30'	Graded dir.	No	5	0	5	3	5	5	5	0	5	1	34
Hollywood	30' x 30'	Graded dir.	No	5	0	5	5	5	3	5	0	5	1	34
N Silver City	150' x 50'	Gravel	No	5	0	5	3	5	5	5	0	5	1	34
Tyrone	210' x 150'	Gravel	Limited	5	0	5	5	5	3	5	0	5	1	34
Maquez - Lapaz	50' x 50'	Graded dir.	Yes	5	0	5	3	5	3	0	5	5	1	32
Tuban	200' x 100'	Gravel	Limited	5	0	5	5	5	3	0	5	5	1	32
Terrar	165' ft	Gravel	No	5	0	5	3	5	3	5	5	0	1	32
Turquoise	600' x 100'	Graded dir.	Yes	5	0	5	3	5	3	5	0	5	1	32
Colmar	30' x 40'	Gravel	No	0	0	5	5	5	5	5	0	5	1	31
[redacted]	55' x 50'	Gravel	Limited	5	0	5	2	5	3	5	0	5	1	31
La Bajada	75' x 75'	Graded dir.	No	0	0	5	5	5	5	5	0	5	1	31
Blackwater	1500' x 150'	Paved	Yes	5	0	5	5	3	3	0	5	2	1	29
[redacted]	30' x 100'	Gravel	Yes	5	0	5	0	5	3	0	5	5	1	29
State Pen	26' x 26'	Paved	No	0	0	5	2	5	5	5	0	5	1	28
Caja del Rio	45' x 45'	Graded dir.	No	0	0	5	3	5	3	5	0	5	1	27
Ideal	30' X 10'	Paved	NO	5	0	5	3	5	3	5	0	0	1	27
El Dorado	40' x 30'	Gravel	No	0	0	5	5	5	5	0	0	5	1	26
Pecos	20' x 25'	Gravel	No	0	0	5	5	5	5	0	0	5	1	26
Beckner	45' x 30'	Paved	No	0	0	5	3	5	5	0	0	5	1	24

Ski Run- Large amount fire killed timber and heavy, downed fuel load on ground. Could fall over sub fence during a wind event or fire.

Gavilan-Tall healthy timber close enough to sub fence could fall over/erode during serious wind or fire conditions.

San Antonio- Large amount of dead fire burned tall standing timber and large downed fuel load on ground. Could fall over sub fence during a wind event or fire.

wd ranch- 2 pole mount transformers high risk if equipment faults. brush under and around equip and site. With wind fire would spread quickly. Does not rate high but has hazard.

This report was prepared by Wildfire Mitigation Strategies for Public Service Company of New Mexico. The work presented in this report represents Wildfire Mitigation Strategies' professional judgment based on the information available at the time this report was prepared. Given the unpredictable and capricious nature of wildfire behavior, Wildfire Mitigation Strategies is not responsible for the reader's use of, or reliance upon, the report, nor any decisions based on the report. WILDFIRE MITIGATION STRATEGIES MAKES NO REPRESENTATIONS OR WARRANTIES, EXPRESSED OR IMPLIED. Readers of the report are advised that they assume all liabilities incurred by them, or third parties, as a result of their reliance on the report, or the data, information, findings and opinions contained in the report.

BEFORE THE NEW MEXICO PUBLIC REGULATION COMMISSION

IN THE MATTER OF AN INQUIRY INTO ELECTRIC PUBLIC UTILITIES' VEGETATION MANAGEMENT PLANS AND PROCEDURES	**)** **)** **)**	**Case No. 22-00154-UT**

CERTIFICATE OF SERVICE

I **HEREBY CERTIFY** that a true and correct copy of **Public Service Company of New Mexico's Response to Notice of Inquiry** was emailed to parties at the email addresses below on July 6, 2022:

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