PUERTO RICO
PLANNING BOARD
GOVERNMENT OF PUERTO RICO

2026

LOCAL HAZARD MITIGATION PLAN

Municipality of JAYUYA

LOCAL HAZARD MITIGATION PLANS

Protect Through Planning

PROFESIONAL LICENSED PLANNER CERTIFICATION

As per Act 160-1996 as amended (20 L.P.R.A § 3501 - 20 L.P.R.A § 3515), I holder of Puerto Rico Professional Planning License number ___, certify that this document has been prepared using the best available sources and is in accordance with the best practices of the planning profession as of _____, 2026. And I certify this herewith my professional seal.

FEMA Approval

This Local Hazard Mitigation Plan for the Municipality of Jayuya was approved by FEMA on

_____

Statement of Funding

This Local Hazard Mitigation Plan was prepared for the Municipality of Jayuya and the Puerto Rico Planning Board by the consulting firm AtkinsRéalis Caribe, LLP as per the stipulations of contract number 2026-000032 and any amendment thereof, duly registered in Puerto Rico's Office of the Comptroller.

Language Requirement

In Accordance with Presidential Executive Order #14224, the 2026 version of the Jayuya Local Hazard Mitigation Plan has been prepared in English for submission and consideration of FEMA.

A non-certified translation of the final draft for public discussion and the final approved LHMP to Spanish was prepared for the benefit of the population that is not English proficient.

Should any discrepancy arise between the English and the Spanish text, the English one shall prevail.

Statement on maps

The maps presented on this document are related to a planning exercise. It is not the intention of these maps to establish any regulatory requirement, procedure or benefit.

Government Officials

Municipality of Jayuya

Hon. Jorge L. González Otero
Mayor

Puerto Rico Planning Board

Héctor Morales Martínez, esq.
President

Rebeca Rivera Torres, PLP
Alternate Member

Luis Lamboy Torres, PLP
Alternate Member

Emanuel Gómez Veléz, PLP
Alternate Member

Collaborators

Municipality of Jayuya

Edilberto Santiago Negrón
Jeniffer Rivera Vélez
Adrián A Bennette Rodríguez
Miguel J. Figueroa Cancel
Lissette de Hoyos Gómez
Delimar Rivera González
Idalia Pérez Abruña
Gaudy Vázquez Colón
Karina I. Soto Martínez
Giomary Olivera Medina

Puerto Rico Planning Board

Ivette Colon, PLP
Vanessa Marrero, PLP
Erica Rivera Felicié, PLP
Onix Concepción Rodríguez, PLP

AtkinsRealis Caribe, LLP

William Pitre Cipolla, PMP, PLP
Ivelisse R. Gorbea Class, PLP
Yashira Santos, SIT, BSCE
Juan Rotger, PE
Yesenia Rodríguez, MArch, MLArch
Marsha Caride
Celso Ruiz, PMP
Ronald Pérez, PMP, PE
Alexander Burke, AICP
Hannah Heath

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List of Acronyms

ABFE	Advisory Base Flood Elevation
ACS	American Community Survey
AMMED	Municipal Agency for Disaster and Emergency Management, by its Spanish acronym
BFE	Base Flood Elevation
BLE	Base Flood Engineering
BRIC	Building Resilient Infrastructure and Communities
CDBG-DR	Community Development Block Grant - Disaster Recovery
CDBG-MIT	Community Development Block Grant - Mitigation
CEACC	Committee of Experts and Advisors on Climate Change
COR3	Central Office for Recovery, Reconstruction and Resiliency
CRS	Community Rating Systems
DEM	Digital Elevation Model
DHS	Department of Homeland Security
DNER	Department of Natural and Environmental Resources
DPS	Department of Public Safety
DTOP	Department of Transportation and Public Works
EAL	Expected Annual Loss
EOP	Emergency Operation Plan
EPA	Environmental Protection Agency
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FIRM	Flood Insurance Rate Map
FIS	Flood Insurance Study
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
GIS	Geographic Information System
HMGP	Hazard Mitigation Grant Program
HUD	U.S. Department of Housing and Urban Development
IFRC	International Federation of the Red Cross
IRRM	Interim Risk Reduction Measures
LHMP	Local Hazard Mitigation Plan
LUMA	Luma Energy
MHHW	Mean Higher High Water
mph	Miles per hour
MSL	Mean Sea Level
NCEI	National Centers for Environmental Information

NDRF	National Disaster Recovery Framework
NID	National Inventory Dams
NIMS	National Incident Management System
NIST	National Institute of Standards and Technology
NOAA	National Oceanic and Atmospheric Administration
NTHMP	National Tsunami Hazard Mitigation Program
OGPE	Permit Management Office, by its Spanish acronym
OMME	Municipal Emergency Management Office
OPM	Municipal Public Works, by its Spanish acronym
PRASA	Puerto Rico Aqueduct and Sewers Authority
PRDOH	Puerto Rico Department of Housing
PREMB	Puerto Rico Emergency Management Bureau
PREPA	Puerto Rico Electric Power Authority
PRHTA	Puerto Rico Highway and Transportation Authority
PRPB	Puerto Rico Planning Board
PRSN	Puerto Rico Seismic Network
PT	Territorial Plan, by its Spanish acronym
PUT-PR	Puerto Rico Land Use Plan, by its Spanish acronym
SHMO	State Hazard Mitigation Officer
SFLA	Southern Federal Land Assessment
UHI	Urban Heat Island
USACE	United States Army Corps of Engineers
USDA	United State Department of Agriculture
USDOT	United States Department of Transportation
USGS	United States Geological Survey
VSL	Value of Statistical Life

Executive Summary

This document constitutes the 2026 update of the Local Hazard Mitigation Plan (LHMP) for the Municipality of Jayuya, Puerto Rico. The plan identifies natural hazards that may affect the municipality, evaluates risks to people, property, critical facilities, infrastructure, and FEMA Community Lifelines, and establishes mitigation strategies intended to reduce future losses and strengthen community resilience. The plan was prepared in accordance with the Robert T. Stafford Disaster Relief and Emergency Assistance Act, the Disaster Mitigation Act of 2000, and 44 CFR Part 201 through a coordinated effort involving the Municipality of Jayuya, the Puerto Rico Planning Board, stakeholders, and the public. The update was funded through the Puerto Rico Planning Board and prepared by AtkinsRéalis Caribe, LLP.

Introduction and Background

The Municipality of Jayuya and the Puerto Rico Planning Board updated the LHMP to provide a coordinated framework for reducing hazard-related risks and protecting residents, property, infrastructure, natural resources, and essential services. This document represents the second update of the municipal LHMP. The previous FEMA-approved plan was adopted in 2020. The 2026 update reflects current conditions, updated technical information, revised federal guidance, and mitigation priorities for the next planning cycle while maintaining eligibility for federal mitigation assistance programs.

The primary objectives of the plan are to:

- Identify and evaluate natural hazards threatening the municipality.
- Reduce risks to life, property, critical infrastructure, and community lifelines.
- Promote interagency coordination, public participation, and long-term resilience.

Public Policy Framework

The plan is consistent with applicable federal, Commonwealth, and municipal regulations governing hazard mitigation, emergency management, land-use planning, floodplain management, and resilience. Key federal authorities include the Stafford Act, Disaster Mitigation Act of 2000, National Flood Insurance Act, FEMA mitigation planning regulations (44 CFR Part 201), and the National Incident Management System. Relevant Puerto Rico policies include Act 161-2009, Act 33-2019, Act 107-2020, the Puerto Rico Land Use Plan, the Puerto Rico State Hazard Mitigation Plan, and the Puerto Rico Mitigation Action Plan.

Planning Process

The 2026 LHMP update was prepared through collaboration among the Municipality of Jayuya, the Puerto Rico Planning Board, the Planning Committee, stakeholders, and the public. Public outreach included community meetings, public notices, stakeholder coordination, surveys, and opportunities to review and comment on the plan.

Community input identified flooding, drainage deficiencies, landslides, roadway accessibility issues, and concerns regarding future development as recurring challenges requiring mitigation attention. The plan also incorporates FEMA Community Lifelines to evaluate essential services and identify opportunities to reduce cascading impacts during disasters.

Municipal Profile

Jayuya is a mountainous municipality located within Puerto Rico's Cordillera Central and encompasses approximately 39.4 square miles, including eleven wards (barrios): Coabey, Collores, Jauca, Jayuya Abajo, Mameyes Arriba, Pica, Pueblo, Río Grande, Saliente, Veguitas and Zamas. The municipality's rugged topography, steep slopes, abundant river systems, and dispersed rural development pattern contribute to its vulnerability to landslides, flooding, earthquakes, tropical cyclones, drought, and other natural hazards.

Demographics and Social Vulnerability

The municipality has a population of approximately 14,566 residents, of which over 42 percent are considered socially vulnerable due to age-related factors alone. Additional factors including poverty, disability, food assistance dependency, and limited transportation access further increase vulnerability during disasters. Nearly 47 percent of residents live below the poverty level, approximately 25 percent of the population live with a disability, and roughly 61 percent of households receive food assistance.

Housing and Infrastructure

Jayuya contains more than 6,300 housing units, many of which were constructed before current building code standards. Older housing stock may be more susceptible to the effects of earthquakes, flooding, tropical cyclone winds, and other hazards.

The LHMP evaluates critical infrastructure using the FEMA Community Lifelines framework, including public safety facilities, emergency shelters, healthcare facilities, water systems, transportation infrastructure, communications systems, energy infrastructure, and hazardous materials facilities. Protecting these lifelines remains a

priority because disruptions can significantly affect emergency response and recovery operations.

Recent Development

Development activity is concentrated primarily within and surrounding Barrio Pueblo, Jayuya Abajo, Río Grande, Veguitas, Coabey, and portions of Mameyes Arriba, reflecting continued investment in areas with established access to transportation corridors, utilities, and community services. Additional scattered development is observed throughout Collores, Zamas, Jauca, Pica, and Saliente, indicating continued occupancy and incremental growth in rural sectors.

Hazard Profiles and Risk Assessment

The plan evaluates eight hazards affecting Jayuya:

- Earthquake
- Landslides
- Flooding
- Tropical Cyclones and Extreme Winds
- Extreme Heat
- Drought
- Wildfire
- Pandemic/Epidemic

Each hazard assessment examines hazard characteristics, geographic extent, previous occurrences, future probability, vulnerable populations, critical infrastructure exposure, community lifelines, and future development considerations.

Earthquake

Earthquake hazards affect the entire municipality. FEMA HAZUS modeling indicates that all residents, structures, and critical facilities are exposed to seismic shaking. Total earthquake exposure is estimated at approximately $172.98 billion, including over $1.54 billion in building value exposure and $171.44 billion in population-equivalent exposure. Expected annual losses are estimated at approximately $2.1 million. The highest seismic hazard occurs within Mameyes Arriba, Río Grande, Coabey, and portions of Jayuya Abajo, where the greatest spectral acceleration and displacement values were identified. The 2020 southwest Puerto Rico earthquake sequence demonstrated the island-wide impacts that significant seismic events can generate, including disruptions to transportation, utilities, communications, healthcare, and emergency services.

Landslides

Due to its mountainous terrain, landslide susceptibility is widespread throughout Jayuya. Areas classified as having High, Very High, and Extremely High landslide susceptibility occur throughout nearly every ward, particularly within Jauca, Zamas, Veguitas, Saliente, Collores, Coabey, Río Grande, Mameyes Arriba, and portions of Jayuya Abajo. Historical evidence from Hurricane María confirms widespread slope failures throughout the municipality, with more than 200 documented landslides. Landslides represent one of the municipality's most significant threats because they can isolate communities, damage transportation routes, disrupt utilities, and restrict emergency access even when direct structural losses are limited.

Flooding

Flooding remains one of the most significant natural hazards affecting Jayuya. Flood-prone areas are concentrated along the Río Grande de Jayuya corridor, tributary stream systems, and associated floodplains affecting Barrio Pueblo, Jayuya Abajo, Coabey, Veguitas, and surrounding communities. FEMA National Risk Index data estimate flood exposure at approximately $12.15 billion, including $193.9 million in building exposure and over 1,000 exposed residents. Expected annual losses are estimated at approximately $8,800; however, HAZUS modeling reveals significantly larger potential losses during major flood events.

The analysis also demonstrates that substantial damages may occur outside FEMA-designated floodplains due to tributary flooding, flash flooding, and localized drainage deficiencies. Flooding threatens multiple community lifelines, including healthcare, emergency services, transportation infrastructure, energy facilities, water systems, and residential neighborhoods.

Tropical Cyclones and Extreme Winds

Tropical cyclones represent one of the highest-risk hazards because they affect the entire municipality’s population of 14,566 residents and all critical facilities and infrastructure. Historical events, including Hurricanes Irma, María, and Fiona, demonstrated the municipality's vulnerability to wind damage, flooding, landslides, storm surge, infrastructure failures, and prolonged utility outages. Tropical cyclones have the potential to affect all FEMA Community Lifelines simultaneously. Mitigation priorities include infrastructure hardening, emergency power improvements, vegetation management, shelter enhancements, and strengthening communications and utility systems.

Extreme Heat

Although Jayuya's predominantly rural character limits widespread urban heat island development, vulnerable populations including older adults, persons with chronic medical conditions, and socially vulnerable households remain at risk. Approximately 20 percent of the population is 65 years of age or older. Extreme heat places additional stress on public health systems, energy infrastructure, and vulnerable populations, especially during prolonged power outages.

Drought

Drought remains an important hazard due to Jayuya's dependence on locally derived watershed resources and precipitation-dependent water supplies. Historical drought periods, including the 2014-2016 drought and recent drought conditions documented by the U.S. Drought Monitor, demonstrate the municipality's vulnerability to prolonged water shortages. Drought threatens water supply reliability, agriculture, public health, and economic activity. Although direct structural losses are difficult to quantify, drought can significantly affect community well-being through water rationing, agricultural impacts, and increased wildfire risk. Future climate variability is expected to increase both the duration and severity of drought conditions.

Wildfire

Wildfire risk in Jayuya is generally concentrated in forested, vegetated, and rural areas where drought and elevated temperatures increase fuel availability. Although the municipality's wildfire exposure is lower than that associated with flooding or tropical cyclones, the risk is expected to increase due to changing climatic conditions. Wildfires can threaten residences, transportation infrastructure, communication systems, utility networks, watersheds, and natural resources. The municipality recorded fourteen wildfire incidents during 2024. Future warming trends and extended drought periods may increase wildfire occurrence within areas not historically affected by fire.

Pandemic/Epidemic

Pandemic and epidemic events affect the entire municipal population irrespective of geographic location. The COVID-19 pandemic demonstrated the potential for widespread disruptions to healthcare, government operations, education, businesses, and community services. Jayuya's vulnerability is influenced by its aging population, socioeconomic challenges, and dependence on public healthcare systems. Approximately 494 residents lack health insurance coverage, while more than 70 percent of residents rely on public healthcare programs. Continued public health

preparedness, healthcare coordination, and continuity planning remain essential components of community resilience.

1. Introduction and Background

The Municipality of Jayuya and the Puerto Rico Planning Board (PRPB) are dedicated to protecting the well-being of Puerto Ricans by fostering cultural, social, and economic growth while prioritizing public health and safety. In this effort, the Municipality and the PRPB have agreed on a joint effort to update the Municipality's Local Hazard Mitigation Plan (LHMP). The LHMP provides a structured and comprehensive approach to reducing risks associated with natural hazards and strengthening overall community resilience. In recent years, Jayuya has faced considerable impacts from natural disasters, emphasizing the urgent need for proactive actions to reduce vulnerabilities and safeguard critical infrastructure. These experiences highlight the importance of implementing a coordinated and systematic hazard mitigation strategy that is consistent with federal, state, and local policies.

An LHMP identifies and evaluates potential natural hazards and defines actions designed to reduce or eliminate risks to people, property, and the environment. The plan supports the municipality's land use planning efforts by establishing measures that assist Jayuya in achieving its long-term sustainability and resilience objectives.

This LHMP complies with the requirements set forth by the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act) and the federal regulations derived from it. Under this legislation, local governments in states and territories are required to develop and formally adopt a hazard mitigation plan as a condition for eligibility to receive certain types of funding administered by the Federal Emergency Management Agency (FEMA).

Risk mitigation plays a critical role in guiding future development and enhancing existing municipal infrastructure. To ensure an effective mitigation strategy, the LHMP is regularly updated to reassess natural hazards that may threaten the lives and property of residents and to incorporate appropriate and responsive mitigation measures.

This document represents the second revision of the LHMP for the Municipality of Jayuya. The last LHMP Update plan received FEMA approval on May 22, 2020 (Autonomous Municipality of Jayuya, 2020). This 2026 update reflects evolving conditions and circumstances that have influenced the municipality over the past five years and incorporates newly enacted laws, programs, and regulatory requirements. Through this update, Jayuya aims to preserve its eligibility for federal mitigation funding prior to future catastrophic events and to present a strengthened plan aligned with current standards and best practices.

The development of this plan was conducted through a coordinated process that incorporated input from state and local agencies, non-governmental organizations, and the public. The overarching goal is to enhance the municipality's capacity to anticipate, reduce, and effectively respond to natural hazards that may affect its jurisdiction.

The primary objectives of the LHMP are to:

- Identify and evaluate natural hazards that pose risks to the municipality.
- Establish strategies and actions to reduce or eliminate long-term threats to life, property, and critical services.
- Encourage interagency coordination and promote community involvement in disaster preparedness and mitigation initiatives.

1.1 Applicable Public Policies

This section outlines the relevant federal and state public policies that guide the development of the 2026 Jayuya LHMP. The overview provided is not intended to be comprehensive. Additional public policies are referenced throughout the document, particularly in Section 5.1.

1.1.1 Federal Policies

1.1.1.1 Federal Laws

Stafford Act and Disaster Mitigation Act of 2000

The Stafford Act is primarily aimed at reducing loss of life and property, alleviating human suffering, minimizing economic impacts, and lowering the costs associated with disaster assistance. In 1988, Congress amended the Act to create the Hazard Mitigation Grant Program (HMGP), which became the principal source of federal mitigation funding following a disaster declaration by the President of the United States. Through this program, funds are made available to states and territories to implement cost-effective measures that reduce the risk of damage and losses from future hazard events.

Disaster Mitigation Act of 2000

Enacted on October 30, 2000, the Disaster Mitigation Act of 2000 (DMA 2000) further amended the Stafford Act to enhance disaster planning, response, and recovery at all levels of government. This legislation establishes eligibility requirements for municipalities to access federal mitigation funding, including the preparation and adoption of a Local Hazard Mitigation Plan (LHMP). An LHMP demonstrates

a jurisdiction's commitment to reducing risks associated with natural hazards and serves as a decision-making tool for implementing preventive and mitigation actions. It also provides a framework for the State to deliver technical assistance and establish funding priorities.

In accordance with DMA 2000 requirements, this LHMP is comprehensive and coordinated, incorporating the participation of state, local, and regional agencies, non-governmental organizations, and members of the public.

National Flood Insurance Act

The National Flood Insurance Act established the National Flood Insurance Program (NFIP) to provide affordable flood insurance coverage to homeowners, businesses, and renters located in flood-prone areas. The program was designed to reduce the financial burden on individuals and the federal government in the aftermath of flood-related disasters.

The Act also encourages participating communities to adopt and enforce minimum floodplain management standards aimed at reducing future flood risks. Communities that comply with these requirements become eligible for NFIP benefits and programs.

Access to flood insurance enables property owners to recover more rapidly following flood events without relying solely on federal disaster assistance. Supporting legislation, such as the Flood Disaster Protection Act of 1973, further requires federally regulated lenders to mandate flood insurance coverage for properties located in high-risk flood zones and financed through federally backed mortgages.

The Federal Emergency Management Agency (FEMA) has recognized the Municipality as part of the region that is within the PRPB's coverage within the National Flood Insurance Program. The municipality can request updates and amendments to flood hazard maps utilized by the NFIP through the PRPB.

Additionally, through participation in the Flood Mitigation Assistance Program, the municipality has identified specific mitigation strategies to reduce flood-related risks. Funding has also been allocated for the acquisition of structures located in high-risk flood areas as part of ongoing efforts to decrease vulnerability and exposure to future flood events.

1.1.1.2 *Federal Regulations*

Mitigation Planning - 44 CFR Part 201

This section of the Code of Federal Regulations describes the rules and procedures governing hazard mitigation planning as mandated under the Stafford Act. It outlines the requirements for the preparation and adoption of mitigation plans, which serve as the primary tool for reducing risks posed by natural hazards at the local level. Additionally, this section establishes the policies and planning processes that guide hazard mitigation efforts, underscoring the role of mitigation plans in directing the effective allocation of resources for disaster risk reduction.

FEMA Local Hazard Mitigation Planning Guide

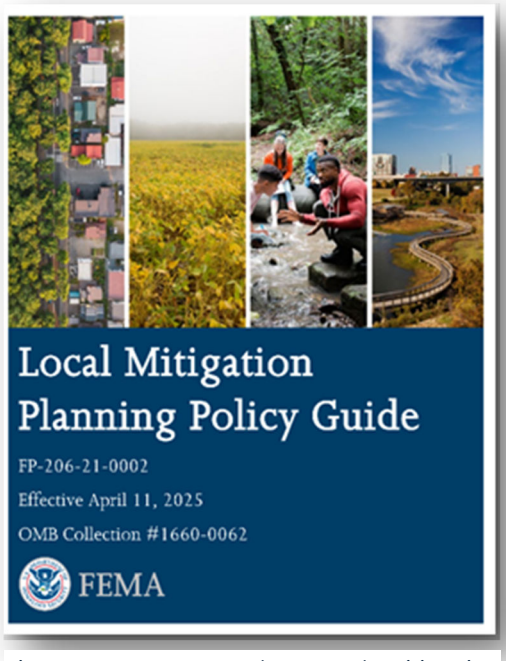


Figure 1: FEMA Local Hazard Mitigation Planning Guide Cover

The Local Hazard Mitigation Planning Policy Guide published by FEMA establishes the official framework and guidance that local governments are required to follow when preparing, reviewing, and updating their Local Hazard Mitigation Plans (LHMPs). This guidance is designed to ensure compliance with the requirements set forth in the Code of Federal Regulations (44 CFR Part 201).

The policy guide emphasizes data-driven planning tailored to local capacities, while prioritizing equity and inclusive stakeholder participation. It encourages communities to integrate hazard mitigation into broader planning and decision-making processes, thereby strengthening long-term resilience and reducing vulnerability to natural hazards (FEMA, Local Mitigation Planning Policy Guide, 2025).

The guide identifies the essential components that every mitigation plan is required to address. In addition, it provides practical resources such as resolution templates, checklists, and plan review criteria to support local governments throughout the planning process. The guide also explains FEMA's plan review and approval process, which may result in full approval, conditional approval pending formal adoption, or return of the plan for revisions and corrections.

Local Mitigation Planning Handbook

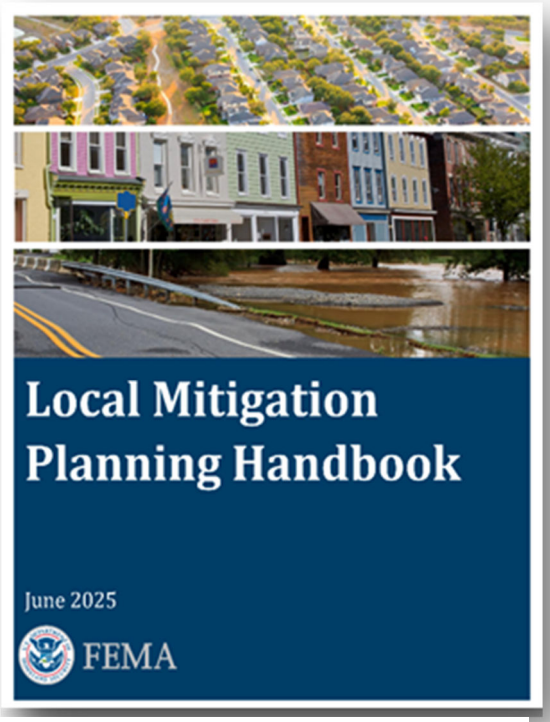


Figure 2: Cover of FEMA's Local Mitigation Planning Handbook

The *Local Mitigation Planning Handbook* is an operational resource developed by FEMA to assist local governments, including municipalities and special districts, in the development or update of their Local Hazard Mitigation Plans. This handbook serves as a companion to FEMA's mitigation planning policy guidance and offers a detailed, step-by-step methodology for complying with the requirements outlined in Title 44 of the Code of Federal Regulations, Part 201.

The primary purpose of the handbook is to support communities in identifying the natural hazards they face, evaluating institutional and administrative capabilities, and formulating effective strategies to reduce disaster-related impacts (FEMA, 2025). Ultimately, the handbook promotes the creation of safer and more resilient communities that are better prepared to anticipate, withstand, and recover from adverse events.

National Disaster Recovery Framework

The National Disaster Recovery Framework (NDRF) is a guide created by FEMA in the United States that establishes how recovery should be organized and coordinated after a disaster. Its main objective is to help affected communities rebuild in a stronger, more equitable, and more resilient way, involving all levels of government—local, state, tribal, territorial, and federal—along with private and community organizations.

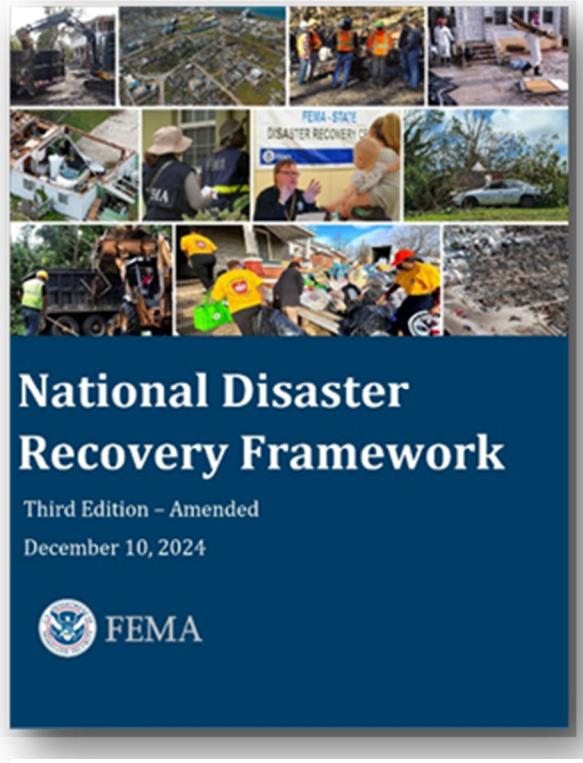


Figure 3: National Disaster Recovery Framework Cover

This framework promotes recovery that not only restores what was lost but also improves pre-disaster conditions. To achieve this, the NDRF defines guiding principles, specific roles for the actors involved, and coordination structures that facilitate collaboration among agencies. It also emphasizes the importance of planning before a disaster occurs and ensuring that recovery goals are defined by the affected communities themselves.

National Flood Insurance Program

The National Flood Insurance Program (NFIP), administered by FEMA, provides affordable flood insurance coverage to property owners, renters, and businesses while encouraging effective floodplain management practices to reduce future flood risks. Established in 1968, the NFIP supports communities in minimizing flood-related losses by requiring the adoption and enforcement of local floodplain management regulations. The program also offers insurance coverage for both structures and their contents in more than 22,000 participating communities nationwide.

Because most standard homeowners' insurance policies do not cover flood damage, the NFIP plays a critical role in protecting lives and property while reducing long-term disaster recovery costs. Additional information regarding the Municipality of Jayuya's participation in the NFIP is provided in Section 4.2 of this plan.

National Earthquake Hazards Reduction Program

The National Earthquake Hazards Reduction Program (NEHRP) was established under the Earthquake Hazards Reduction Act of 1977 to advance the development, dissemination, and application of knowledge, tools, and practices that reduce risks associated with seismic events. This objective is achieved through coordinated, multidisciplinary, and interagency collaboration among NEHRP's participating federal

agencies and partners, including local jurisdictions such as the Municipality of Jayuya.

The National Institute of Standards and Technology (NIST), within the U.S. Department of Commerce, serves as the lead agency for NEHRP. The program is further supported by three cooperating federal agencies: the Federal Emergency Management Agency (FEMA), the National Science Foundation (NSF), and the United States Geological Survey (USGS). Each agency contributes expertise and complementary activities related to research, preparedness, mitigation, and public safety.

National Incident Management System

The National Incident Management System (NIMS) is a standardized framework developed by the U.S. Department of Homeland Security and administered by FEMA to guide incident management across the nation. Its purpose is to enable effective coordination and cooperation among governmental agencies, private sector organizations, and community-based entities at all jurisdictional levels during the prevention, preparedness, response, and recovery phases of emergencies and disasters.

NIMS establishes a common organizational structure, terminology, and set of processes to ensure seamless coordination regardless of the incident's type, size, or complexity. Core components of the system include resource management, interoperable communications, ongoing preparedness activities, and the Incident Command System (ICS), which defines clear roles, responsibilities, and command structures during emergency operations.

Implementation of NIMS is also a prerequisite for jurisdictions seeking access to certain federal preparedness and response funding. By adopting NIMS, jurisdictions enhance operational efficiency, reduce duplication of efforts, and promote the effective and coordinated use of available resources.

1.1.2 Government of Puerto Rico Policies

1.1.2.1 Puerto Rico Laws

Act No. 161-2009, as Amended

Act No. 161-2009, known as the *Puerto Rico Permits Reform Act*, establishes a modern legal and administrative framework designed to comprehensively restructure the Commonwealth's permitting system. The primary goal of the Act is to create a

transparent, efficient, and streamlined process for the submission, evaluation, approval, or denial of permits issued by the Government of Puerto Rico.

To accomplish this objective, the law created the Office of Permits Management (OPM), consolidating permitting responsibilities that were previously distributed across multiple agencies. This centralization reduced procedural delays and improved consistency in the application of permitting standards. The Act also introduced specialized roles—including Authorized Professionals, Permit Managers, Service Representatives, and Permit Officers—each with defined responsibilities intended to expedite reviews and professionalize the permitting process.

A further objective of Act No. 161-2009 is to enhance oversight, accountability, and transparency within the permitting system. By strengthening internal controls and standardizing procedures, the Act seeks to ensure compliance while reducing administrative inefficiencies.

From a public policy perspective, the Act aims to promote economic development while safeguarding environmental protection. Legislative intent emphasizes that an efficient permitting system is essential to attract investment, encourage construction activity, support long-term job creation, and eliminate bureaucratic barriers that previously hindered economic growth. Analyses of the Act also highlight its role in centralizing governmental functions and implementing an Integrated Permitting System to reduce fragmentation, improve interagency coordination, and ensure regulatory uniformity throughout Puerto Rico.

Act No. 33-2019, as Amended

Act No. 33-2019 establishes the public policy of the Government of Puerto Rico regarding mitigation, adaptation, and resilience in response to observed variations in temperature and precipitation patterns. The legislation formally recognizes the need for integrated governmental action, including at the municipal level, to address the impacts of environmental instability.

This Act calls for the incorporation of concrete mitigation, adaptation, and resilience measures into territorial and land use planning instruments. By doing so, it promotes a proactive approach that strengthens communities' capacity to withstand environmental stressors and reduces long-term risks to public safety, infrastructure, and natural resources.

Act No. 107-2020, as Amended

Act No. 107-2020, as amended, known as the *Puerto Rico Municipal Code*, significantly expands the authority, responsibilities, and operational autonomy of municipal governments. The Code promotes local self-governance and enhances municipalities' capacity to manage their own affairs, including disaster preparedness and risk reduction.

Among the responsibilities granted to municipalities is the authority to design and implement programs and measures to prevent, respond to, and recover from emergencies, natural disasters, catastrophic accidents, and other hazardous events. This expanded role reinforces the importance of municipal governments in protecting public safety and community well-being.

The Municipal Code also grants municipalities enhanced autonomy over land use regulation within their jurisdictions. This authority includes the application of tools such as the transfer of development rights and the evaluation and issuance of construction permits, enabling municipalities to incorporate hazard mitigation principles directly into development decisions. These powers are essential for reducing exposure to natural hazards and safeguarding lives and property.

Overall, the Municipal Code recognizes territorial planning as a critical instrument for risk mitigation and establishes a legal framework that enables municipalities to take proactive, locally tailored actions to protect their communities from natural hazards and other adverse events.

1.1.2.2 Puerto Rico Regulations

Puerto Rico Land Use Plan (PUT-PR by its Spanish acronym) - 2015



Figure 4: Puerto Rico Land Use Plan Coversheet

In compliance with Act No. 550-2004, as amended, the Puerto Rico Land Use Plan (PUT, by its Spanish acronym) constitutes the primary territorial planning instrument prepared by the Puerto Rico Planning Board. The Plan is intended to direct land use, development, and conservation activities throughout the island in a coordinated, sustainable, and resilient manner, guided by a long-term planning horizon of ten (10) years (PRPB, 2015).

One of the primary functions of the Puerto Rico Land Use Plan (PUT) is to classify land throughout the Commonwealth into specific land use categories. Land classification serves as a land administration framework that establishes the types of zoning districts and allowable uses that may be applied to individual parcels. Under the PUT, land is classified according to the following scheme:

- Urban Land (SU, by its Spanish acronym):

  This category includes areas that are already developed and served by the necessary infrastructure and public services.

- Land for Development:

  This classification applies to land identified as suitable for future development and is subdivided into two categories:

  - Programmed Development Land (SUP, by its Spanish acronym): Land scheduled for development under established programs or plans.

- Non-Programmed Development Land (SUNP, by its Spanish acronym): Land available for development that has not yet been assigned to a specific development program.

- Rustic Land:

  Rustic lands are designated for protection, conservation, or limited use due to their environmental, agricultural, or ecological value. This classification is further subdivided into:

  - Common Rustic Land (SRC, by its Spanish acronym): Areas suitable for limited, low-intensity uses.

  - Specially Protected Rustic Land (SREP, by its Spanish acronym): Areas subject to heightened protection due to their environmental, natural, or cultural significance.

The PUT-PR aims to coordinate and harmonize land use planning efforts among state agencies and municipalities. It serves as the foundation for the preparation of municipal Land Use Plans (Planes de Ordenación Territorial, POT, by its Spanish acronym), which are adopted for an eight-year planning period (PRPB, 2015).

Currently, the PUT-PR is in the process of being updated for the 2026 -2032 planning cycle. This revision will incorporate robust citizen participation, clearly defined compliance and performance metrics, and an inclusive planning approach that integrates economic development, green infrastructure, sustainable transportation systems, and the conservation of natural resources.

Puerto Rico State Natural Hazard Mitigation Plan (2026)

Similar to requirements for local jurisdictions, the Stafford Act mandates that states and territories develop a hazard mitigation plan covering their entire jurisdiction. In the

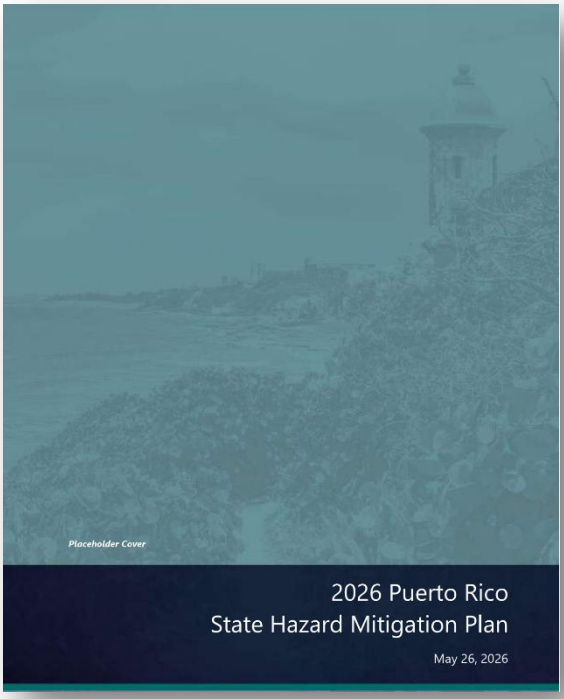


Figure 5: Puerto Rico SHMP Cover

case of Puerto Rico, the most recent State Hazard Mitigation Plan was completed in 2026. The Puerto Rico 2026 State Hazard Mitigation Plan outlines long-term strategies to address natural hazards that have the potential to disrupt daily activities, damage property, and threaten human life. These hazards—which in many cases are intensified by changing environmental conditions—can escalate into disasters that affect not only individuals, but entire communities, with wide-ranging impacts on public health, infrastructure, economic stability, and natural ecosystems (NMEAD, 2026).

This plan provides a comprehensive framework for identifying risks and implementing actions aimed at reducing vulnerability to these hazards. Through its emphasis on mitigation, the plan seeks to enhance community resilience, safeguard critical infrastructure and systems, and promote sustainable development across Puerto Rico (NMEAD, 2026).

The Municipality of Jayuya reviewed the Puerto Rico 2026 State Hazard Mitigation Plan during the preparation of this LHMP update. Relevant risk profiles, state capabilities, mitigation goals, and relevant state actions were considered during the risk assessment, capacity assessment, and development of the municipal mitigation strategy.

Puerto Rico Mitigation Action Plan, CDBG-DR MIT (2021, 2025)

Originally approved by the U.S. Department of Housing and Urban Development (HUD) in 2021 and subsequently amended in August 2025, the Puerto Rico Mitigation Action Plan for the Community Development Block Grant–Mitigation (CDBG-MIT) Program is a strategic planning document prepared by the Puerto Rico Department of Housing (PRDOH). The plan establishes the framework for the administration and management of federal mitigation funds allocated by HUD under the CDBG-MIT program

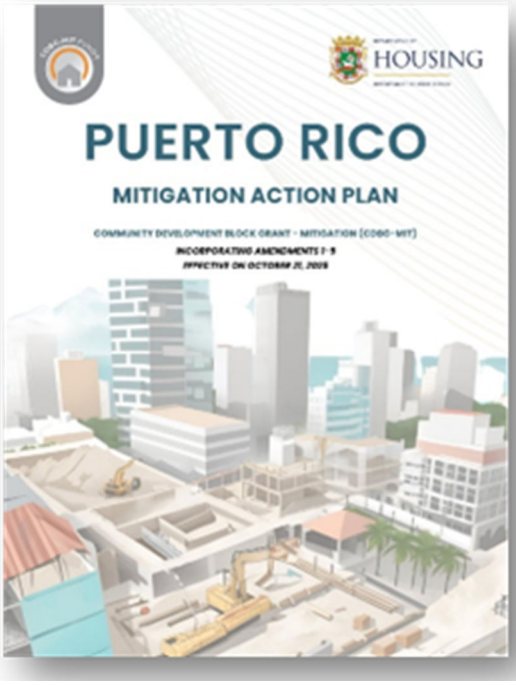


Figure 6: Puerto Rico Mitigation Action Plan, CDBG-DR MIT Cover

Its primary objective is to reduce risks and vulnerabilities to future disasters by enhancing the resilience of infrastructure, communities, and critical systems. Although these funds were appropriated by Congress to Puerto Rico following Hurricanes Irma and María in 2017, CDBG–MIT funding differs from CDBG–Disaster Recovery (CDBG-DR) in that it is specifically focused on preventing and mitigating future impacts. Accordingly, CDBG-MIT resources are directed toward sustainable, high-impact mitigation projects and are not required to be directly linked to disaster recovery activities associated with those hurricanes (PRDOH, 2025). This plan is designed to reduce exposure to hazards, safeguard lives and property, and enhance emergency response capabilities through targeted investments in infrastructure, housing, and land-use planning (PRDOH, 2025)

Other relevant planning regulations will be discussed as part of subchapter 5.1

1.1.3 Municipal Policies



Figure 7: Jayuya Local Hazard Mitigation Plan

Jayuya Local Hazard Mitigation Plan (2020)

Adopted by the Municipality in 2020, this is the most recent Hazard Mitigation Plan for the Municipality of Jayuya . The identified hazards are divided into natural and anthropogenic.

The 2020 Hazard Mitigation Plan established a portfolio of 34 mitigation strategies aimed at reducing the vulnerability of the Municipality of Jayuya to the primary natural hazards identified during the planning process. The initiatives focused on planning

measures, structural projects, institutional capacity building, public education, and emergency preparedness.

- **Flooding:** Strategies focused on stormwater management, channel improvements, drainage system upgrades, bridge replacement and elevation, watershed protection, and land use controls to reduce exposure to flood-prone areas.

- **Landslides and Erosion:** Initiatives emphasized the identification of landslide-prone areas, slope stabilization, retaining wall construction, erosion control measures, and protection of vulnerable terrain to reduce damage to homes, roads, and critical infrastructure.

- **Hurricanes and High Winds:** Strategies promoted structural strengthening of homes and public infrastructure, enforcement of building codes, relocation of structures located in high-risk areas, and projects designed to improve the resilience of essential services.

- **Earthquakes:** Actions focused on enhancing the structural integrity of buildings and critical infrastructure through compliance with current building codes and the incorporation of mitigation measures into reconstruction and development projects.

- **Drought:** Initiatives included watershed protection, water conservation measures, and public education efforts to encourage efficient water use and safeguard water supply resources.

- **Wildfires and Vegetation Fires:** Strategies supported public awareness, interagency coordination, and natural resource management practices to reduce wildfire risk and associated impacts on communities and the environment.

Jayuya Municipal Recovery Plan



Figure 8: Jayuya Municipal Recovery Plan Cover

As part of the CDBG-DR funds assigned by Congress to Puerto Rico in the aftermath of hurricanes Irma and María, municipalities were able to develop a recovery plan to guide recovery efforts and resiliency in the event of future stressors. In essence, the Municipal Recovery Plans:

- Identify local post-disaster needs created or worsened by Irma and María
- Establish short-, medium-, and long-term recovery priorities
- Integrate resilience and hazard mitigation strategies
- Serve as a policy and project roadmap for future funding decisions

Each Municipal Recovery Plan has a list of recovery and resiliency projects that might be considered as new mitigation strategies for the LHMP.

1.2 Scope and Previous Versions

1.2.1 Primary Objectives

The primary objectives of the LHMP are to:

- Identify and assess natural hazards that pose a risk to the municipality.
- Develop strategies and actions to reduce or eliminate long-term risks to life, property, and essential services.
- Promote interagency coordination and community engagement in disaster preparedness and mitigation efforts.

1.2.2 Previous FEMA Comments

The following recommendations and requirements were made by FEMA upon approving the previous 2020 LHMP for Jayuya.

FEMA Comment

E1. The jurisdiction approved the Municipal Ordinance number 70, series 2019 – 2020 on May 8, 2020. That Municipal Ordinance adopts the Mitigation Plan for Municipality of Jayuya. Municipal Ordinance should be incorporated to the Plan when final version is submitted to FEMA.

Municipality's response

Copy of the Municipal Ordinance was included as part of Appendix A.

1.3 LHMP Organization

Table 1 shows the layout for the 2026 of Jayuya LHMP. To help LHMP reviewers and the public understand compliance, the table includes a column specifying which FEMA-required element (FEMA, 2025) is addressed by each section.

Table 1: LHMP Organization

Chapter #	Title	Description	Review Tool Elements met
N/A	Executive Summary	This section summarizes the most important findings from the planning process and explains how they are addressed in the LHMP.	Local Element
Chapter 1:	Introduction	This chapter discusses the planning background for Jayuya It explains the organization of the LHMP and the most significant changes in the 2026 version compared to the 2020 version. It also addresses the public policies relevant to the update of the LHMP, and the planning process followed, including citizen	E2-a, A1-a, A1-b, A4-a, A2-a, A3-a

Chapter #	Title	Description	Review Tool Elements met
		participation and stakeholder involvement.	
Chapter 2	Municipal Profile	The municipal profile describes the municipality's relevant characteristics, including physical features, infrastructure, and demographic and socioeconomic traits.	E1-a
Chapter 3	Hazard Profiles and Risk Analysis	This section is the most extensive in the plan. It covers the hazards identified for Jayuya and examines the risks associated with each one.	B-1a, B-1b, B1-c, B1-d, B-e, B2-a, B2-b, E1-a
Chapter 4	Mitigation Capabilities	This chapter elaborates on the municipality's capabilities to implement the mitigation strategies that will be proposed in Chapter 6.	C1-a, C-1b
Chapter 5	Mitigation Strategies	This chapter establishes the mitigation goals of the Plan and the actions the municipality will take to reduce the risks associated with the identified natural events. It also serves to update the status of the mitigation actions included in the 2020 Plan.	C3-a, C4-a, C4-b, C5-a, C5-b, E2-b
Chapter 6	Plan Maintenance	This chapter addresses the process for evaluating the effectiveness of the plan. It also explains the procedure for making modifications or updates to the plan.	D1-a, D2-a, D2-6, D2-c, E2-c

Chapter #	Title	Description	Review Tool Elements met
Chapter 7	Adoption and Approval	This section includes information on the adoption of the plan by the municipality, FEMA's approval, and the expiration date of the 2026 Local Hazard Mitigation Plan.	F1-a, F1-b
N/A	References	This section presents the sources used in updating the plan.	A4-a
N/A	Appendixes	This section includes all appendices and supplementary information related to the planning process of the Plan.	

1.4 Changes to the Jayuya LHMP (E2-a)

Table 2 shows the most significant changes that the 2026 version has from the 2020 version.

Table 2: Changes to the Jayuya LHMP

Element	Justification
Plan Language	Following Presidential Executive Order #14224, the 2026 version of Jayuya LHMP has been originally prepared in English for submission and consideration of FEMA. An official translation of the final draft for public discussion and the final approved LHMP to Spanish will be prepared for the benefit of the population that are not English proficient.
Plan organization	The organization and chapters of the document have been modified to follow the template used in local mitigation plans prepared by the Puerto Rico Planning Board. However, this template has been adapted in the current plan to comply with current federal public policy.
Discussion of FEMA Lifelines	As per the Local Hazard Mitigation Policy, FEMA Lifelines are discussed as well as the strategies to mitigate hazard impacts on them.
Elimination of non-applicable public policy	For clarity and better readability, references to redundant public policy gaps have been removed.
Change to the name of hurricane: hazard	The hazard identified in the 2020 Plan as “hurricane” has been changed to “Extreme winds” to include wind events that are not necessarily associated with a hurricane or tropical storm.
Update of census data	The municipality and PRPB have chosen to use the most recent version of the American Community Survey for evaluating demographic data. In this case it has chosen to evaluate the data sets from the 2024 five-year American community survey. The five-year survey is chosen since there is more information in them than in the one-year survey. If any other dataset is used, it will be indicated in a footnote.

Element	Justification
Action Plan	The tables of mitigation strategies that were in different sections in the 2020 Plan are now located in a single section (section 6.2). The table format has been modified to be easier to read, and several columns have also been added to provide valuable information for the reader.
All the LHMP	Attention has been given to ensure that the content of the Plan does not reveal any personally identifiable information (PII).

2. Planning Process

2.1 Planning Process Regulation

This LHMP was updated following the above-mentioned applicable public policies and procedures mentioned in Chapter 1.

This LHMP seeks to aid the municipality in the task of preventing loss of life and property by the effects of natural hazards. Chapter 1 serves as a general introduction, Chapter 2 discusses the planning process followed, as well as stakeholder and public participation involvement. The LHMP identifies a general profile of the municipality using information provided by the US Census, such as population distribution, employment, housing stock, etc. (see Chapter 3 for more information). After describing the Municipality general profile, the Plan goes on to evaluate all identifiable natural hazards that can affect the municipality and its population, including the effects on lifelines, properties, population exposure, natural resources, etc. (see Chapter 4 for more information).

Chapter 5 defines the capabilities that the municipality has for implementing the LHMP. While Chapter 6, establishes the mitigation actions that the municipality will execute for the next five years. Chapter 7 discusses the provisions for LHMP Maintenance and Chapter 8 discusses the adoption and approval of the LHMP. The various appendixes hold supporting information.

2.2 General Description of the 2026 LHMP

This LHMP seeks to aid municipality in the task of preventing loss of life and property by the effects of natural hazards. Each chapter can be summarized as follows

- Chapter 1 serves as a general introduction, discussing applicable policies and changes implemented from the previous 2020 version.
- Chapter 2 – Presents the process and methodology followed in the preparation of this LHMP, including aspects of public participation and stakeholder engagement.
- Chapter 3 discusses the planning process followed, as well as stakeholder and public participation involvement. The 2026 Yabucoa LHMP provides a general profile of the municipality using information provided by the US Census, such as population distribution, employment, housing stock, etc. (see Chapter 3 for more

information). After describing the Municipalities general profile, the Plan goes on to evaluate all identifiable natural hazards that can affect the municipality and its population, including the effects on lifelines, properties, population exposure, natural resources, etc. This chapter also identifies lifelines, critical infrastructure and recent developments in the municipality.

- Chapter 4 – Presents the nature, extent and exposure of all the identified natural hazards that were identified for the municipality. This discussion includes
    - Affected areas
    - Risk magnitude
    - Past events
    - Future risk probability
    - Estimated losses
    - Affected lifelines and critical infrastructure
    - Affected natural and cultural resources
    - Future conditions

This chapter also explains methodology used to evaluate the hazards as well as prioritization and available planning mechanisms.

- Chapter 5 - Identifies the capabilities that the municipality has for implementing the LHMP.
- Chapter 6 - Establishes the mitigation actions that the municipality will execute for the next five years.
- Chapter 7 discusses the provisions for LHMP maintenance, revision and update
- Chapter 8 discusses the adoption and approval of the LHMP.
- Appendixes A to G hold supporting information.

2.3 History of the LHMP

The original LHMP approval was completed in July 2012, and a revision was approved in 2020 (Municipality of Jayuya, 2020). This new 2026 version responds to changes in conditions and circumstances that have affected the municipality over the past five years. It also reflects changes based on updated FEMA Guidelines published in 2025.

2.4 Plan Preparation, Revision Schedule and Methodology (A1-a)

The Municipality in accordance with the Planning Board followed the natural hazard mitigation planning process established by FEMA in the *Local Mitigation Planning Policy Guide* and the *Local Mitigation Planning Handbook*, as well as recommendations provided by COR3's mitigation planning staff.

The planning process for the 2026 update of the Yabucoa LHMP officially began with a kickoff meeting between the Mayor of Yabucoa and PRPB staff on December 16, 2025. On that same date, the Municipality and the PRPB signed a formal letter of agreement, a copy of which is included in Appendix B. Subsequently, the PRPB retained AtkinsRéalis Caribe, LLP to provide technical and professional support throughout the mitigation planning process.

The revision phase concluded with the formal submission of the final draft to the State Hazard Mitigation Officer within the Central Office for Recovery, Reconstruction, and Resiliency (COR3) on **[date]**. From the December 16, 2025 kickoff meeting through the submission of the final draft, the planning and revision process lasted **[number] days**.

Planning Process Methodology

This section outlines the six-phase process for updating, reviewing, adopting, and implementing the Local Hazard Mitigation Plan (LHMP). The process integrates municipal coordination, public and stakeholder participation, hazard and risk assessment, mitigation strategy development, and state and federal review to produce a compliant and locally informed plan. Figure _ below details the sequential order of the LHMP development phases

Phase 1 – Initiation and Committee Formation

1. Execute the agreement between the municipality and the Puerto Rico Planning Board (PRPB).
2. Establish the Municipal Planning Committee.
3. Conduct the initial Planning Committee meeting. During this meeting, begin reviewing and updating the mitigation strategies included in the 2020 Local Hazard Mitigation Plan (LHMP).

Phase 2 – Public and Stakeholder Engagement[1]

4. Conduct an initial public meeting to announce the LHMP update process and provide an opportunity for community input.
5. Notify stakeholders of the LHMP update process and issue requests for information.

Phase 3 – Municipal and Hazard Assessment

6. Update the municipal profile.
7. Review the natural hazards evaluated in the previous LHMP and determine whether they remain relevant to the municipality.
8. Determine whether additional hazards or updated analyses should be included.
9. Prepare the revised hazard profiles and risk analyses.

Phase 4 – Mitigation Strategy Review

10. Apply the STAPLEE methodology to evaluate and update the mitigation strategies.
11. Identify any mitigation strategies that should be withdrawn and document the reasons for their withdrawal.
12. Identify new mitigation strategies that should be added, including appropriate recommendations received from the public and stakeholders.

Phase 5 – Draft Preparation and Public Review

13. Prepare the initial LHMP update draft for public and stakeholder review. The draft, considered approximately 90 percent complete, must include a non-certified Spanish translation.
14. Publish digital English and Spanish versions on the PRPB website. Make Spanish hard copies available at designated municipal facilities and at the PRPB's main office. Include the locations and availability of all digital and printed copies in the public meeting notice.
15. Submit a digital courtesy copy of the initial draft to the State Hazard Mitigation Officer (SHMO). During this review period, the SHMO functions are administered through the Central Office for Recovery, Reconstruction and Resiliency (COR3).

[1] Note that for the 2020 revision the Municipality and the PRPB used the roundtable discussion methodology mainly for data gathering from stakeholders. For the 2026 revision both municipality and PRPB decided not to use roundtables because in comparison to 2020 data from stakeholders was more available and forthcoming.

16. Coordinate a public meeting to discuss the LHMP and publish notice of the meeting in a local newspaper at least 15 days before the meeting.
17. Provide additional notice through the municipality's social media platforms. The municipality and PRPB must also send notification letters to stakeholders.
18. Conduct the public meeting. Provide participants with an opportunity to validate local conditions and the hazard analysis prepared by the technical team and to prioritize hazards using the planning-poker technique.
19. Provide the public and stakeholders with a seven-calendar-day period to submit written comments.
20. Review all comments received and determine whether changes to the LHMP draft are necessary.
21. Incorporate approved revisions and prepare the final draft.

Phase 6 – State and Federal Review, Adoption, and Implementation

22. Submit the final draft to the SHMO for review.
23. Address any changes or clarifications requested by the SHMO before the plan is forwarded to the Federal Emergency Management Agency (FEMA).
24. Obtain FEMA's Approved Pending Adoption (APA) determination, subject to any additional revisions or clarifications requested by FEMA.
25. After receiving the APA determination, formally adopt the LHMP through a resolution of the Municipal Legislature or an executive order issued by the mayor. Submit proof of adoption to FEMA.
26. Obtain FEMA's final LHMP approval letter.
27. Prepare the final administrative record, including the final English version, FEMA's approval letter, documentation of municipal adoption, and the final Spanish version. Submit the required English-language record to FEMA; publish the English and Spanish versions on the PRPB website; provide digital copies to the municipality; and retain Spanish hard copies at the municipality and PRPB.
28. Implement the monitoring, evaluation, public-participation, and revision procedures established in Chapter 7 until the next five-year comprehensive update.

Completion of these six phases results in a formally adopted and federally approved LHMP that reflects local conditions, community priorities, and applicable planning requirements. Continued monitoring, evaluation, and public engagement will support

implementation of the mitigation strategy and keep the plan current until the next five-year update.

Figure 9: LHMP Development Phases



2.5 Planning Committee (A1-a, A1-b)

To support the revision of the Jayuya LHMP, a Planning Committee was established, comprised of representatives from several municipal dependencies who were designated to guide the process. The members of the Committee are:

Table 3: LHMP Planning Committee

Name	Position & Office	Email	Contact Number
Edilberto Santiago Negrón	Director, Emergency Management Municipal Office	esantiago@jayuya.puertorico.pr	787.374.8051
Jeniffer Rivera Vélez	Administrative Assistant	Je.rivera@jayuya.puertorico.pr	787.304.1976 Ext. 1408
Adrián A Bennette Rodríguez	Project Coordinator	abenett@jayuya.puertorico.pr	787.304.1976 Ext. 1101
Miguel J. Figueroa Cancel	Municipal Public Works	m.figueroa@jayuya.puertorico.pr	787.304.1976 Ext.2001
Lissette de Hoyos Gómez	Director, Federal Programs	idehoyos@jayuya.puertorico.pr	787.304.1976 Ext. 1901

Name	Position & Office	Email	Contact Number
Delimar Rivera González	Director, Financial Officer	drivera@jayuya.puertorico.pr	787.304.1976 Ext. 1201
Idalia Pérez Abruña	Municipal Consultant	iperez@jayuya.puertorico.pr	787.304.1976 Ext.1901
Gaudy Vázquez Colón	Director, Municipal Housing	g.vazquez@jayuya.puertorico.pr	787.304.1976 Ext. 1801
Karina I. Soto Martínez	Director, Activities	k.soto@jayuya.puertorico.pr	787.304.1976 Ext. 1420
Giomary Olivera Medina	Coordinator, Tourism Office	golivera@jayuya.puertorico.pr	787.304.1976 Ext. 2503

The designation letter for the Planning Committee is included in Appendix B. This appendix also compiles the meeting minutes, documentation of the materials discussed throughout the process, and accompanying photographic evidence.

The purpose of the Planning Committee is to guide the development of the plan by bringing together local officials, stakeholders, and community representatives to identify hazards, assess risks, and develop mitigation strategies. The committee ensures that the planning process incorporates local knowledge, public participation, and coordination among agencies while meeting FEMA requirements. Its primary purpose is to help create a practical, community-supported plan that reduces future disaster risks and strengthens long-term resilience (FEMA, Local Mitigation Planning Policy Guide, 2025). Appendix D holds the documentation of the planning committee meetings.

The committee officially held to formal meetings, however informal meetings and exchange of information also played a part in the development of this LHMP.

The details of the official meetings are:

- First official meeting
    - Place: Roberto Sánchez Vilella Government Center San Juan, PR
    - Date: February 2, 2026

    - Purpose – Initiate Planning Committee Activities. Provide update on status of mitigation strategies, prioritize hazards using "planning poker" technique
- Second official meeting
    - TBD
    - DateTBD
    - Purpose – Provide input and impressions of the second public meeting, Discuss new mitigation strategies suggested by the public or by consultants.

2.6 Citizen participation (A3-a)

2.6.1 Community Outreach and Public Participation Strategies

The public participation approach selected for this LHMP revision incorporated the following activities:

- **Distribution of notification letters** to agencies, neighboring municipalities, community leaders, nonprofit organizations, neighborhood associations, business or industrial groups, and other interested stakeholders, informing them that the LHMP revision process had commenced and inviting their input. Documentation of these communications is included in Appendix D.

- **Publication of notices on the Municipality's website and official social media platforms** to inform the public that the LHMP revision was underway. These postings also provided an email address for submitting comments and made available a virtual survey to gather information regarding the community's experiences with natural hazards. Evidence of these public notices is also maintained in Appendix C.

- **Convening an initial community meeting** to introduce the LHMP revision process. This step involved:
    - Issuing a public announcement in a newspaper, on the Municipality's website, and across official social media channels at least 15 days before the meeting.
    - Providing notice of an additional 15-day period for the public to submit comments or suggestions via email or in person at a specified location.

- **Holding a second community meeting** to discuss hazard assessment and analysis with the public and present the draft LHMP for public review and discussion. This stage included:
    - Publishing a newspaper announcement and posting notices on the Municipality's website and official social media outlets at least 15 days before the meeting.
    - Confirming in the announcement that the draft plan was available for review in printed and online versions.
    - Providing notice of an additional 15-day period for the public to submit comments or suggestions via email or in person at a specified location.

2.6.2 Community Outreach and Public Participation Results

First Public Meeting Results

A public meeting notification announcing the initiation of the LHMP update process was published on 2/13/2026 via a local newspaper called "Primera Hora" (See Appendix C). The notification informed the public that the meeting would be held on 2/25/2026 in Municipal Assembly Room, 2nd Floor Mayor's Office, PR-532 at 10:00am.

Second Public Meeting Results

A public meeting notification to present the draft of LHMP was published on Click or tap to enter a date. via _____. The notification informed the public that the meeting would take place on Click or tap to enter a date. in _____ at _____. It also stated that a printed copy of the draft LHMP would be available at _____ during regular work hours. Additionally, the public had the option of accessing the draft LHMP through the webpage _____. Copies of the public notification are included in Appendix C.

During this meeting, participants expressed the following concerns: _____

The Municipality took the following measures to address these citizen concerns: _____. Appendix C includes the notes documented by the planning consulting firm during the activity, along with supporting evidence. All documentation complies with PII protection requirements.

2.7 Stakeholder involvement (A2-a)

After joint evaluation between the Municipality and the PRPB, it was determined that the stakeholders in this planning process were

- Neighboring municipalities
  - Ciales
  - Juana Díaz
  - Orocovis
  - Ponce
  - Utuado
- Central Government Agencies
  - Puerto Rico Highways and Transportation Authority
  - Puerto Rico Department of Education
  - Puerto Rico Department of Health
  - Puerto Rico Department of Housing
  - Puerto Rico Department of Agriculture
  - Puerto Rico Department of Public Safety
  - Puerto Rico Department of Natural and Environmental Resources
  - Puerto Rico Emergency Management Bureau
  - US Environmental Agency
- Utilities Operators
  - Puerto Rico Aqueducts and Sewers Authority (PRASA)
  - Puerto Rico Electric Power Authority (PREPA)
  - Luma Energy
  - GeneraPR

Input from internal stakeholders was obtained through the Planning Committee. Appendix D also includes any written responses or correspondence received from stakeholders during this outreach process.

2.8 Hazard Analysis Data Sources

The following table presents the datasets utilized for the evaluation of each hazard. Table 4 identifies the hazards considered in this LHMP and the corresponding data sources used to support their assessment.

Table 4: Hazard and Risk Assessment of Data Sources

Hazard	Data Sources
Earthquake	USGS, FEMA
Landslides	USGS
Flooding	FEMA
Tropical Cyclone/Extreme Winds	FEMA
Extreme Heat	National Oceanic and Atmospheric Administration (NOAA)
Wildfire	Fire Department Reports
Drought	National Drought Mitigation Center, North American Drought Monitor (NADM)
Pandemic/Epidemic	PR Department of Health

2.9 FEMA Lifelines

The *Local Mitigation Planning Handbook* and the *Local Hazard Mitigation Planning Policy Guide* highlight the importance of integrating critical lifelines into the hazard mitigation planning process. FEMA defines lifelines as essential services that sustain public safety, economic stability, and the continuity of government and daily life before, during, and after an emergency or disaster. These lifelines serve as a framework for prioritizing resources and actions that are essential to reducing loss of life and property and supporting efficient and rapid recovery following hazard events (FEMA, 2023).

FEMA identifies eight (8) primary lifelines:

- **Safety and Security:** Includes law enforcement, fire services, search and rescue operations, government services, and community safety functions.
- **Food, Hydration, and Shelter:** Encompasses food systems, water access, emergency shelter, and agricultural resources.
- **Health and Medical:** Includes medical care, public health services, patient movement, medical supply chains, and healthcare facility management.
- **Energy:** Covers the electrical power grid and fuel supply systems.
- **Communications:** Includes communications infrastructure, responder communications, alert and warning systems, financial services, 911 operations, and emergency dispatch.

- **Transportation:** Encompasses highways, motor vehicle systems, mass transit, railways, aviation, and maritime transportation.
- **Hazardous Materials:** Includes facilities and systems associated with hazardous materials, pollutants, and contaminants.
- **Water Systems:** Includes potable water infrastructure and wastewater collection and treatment systems.

Each of these lifelines is supported by sub-lifelines that allow jurisdictions to more precisely identify vulnerabilities and prioritize recovery actions. Together, they enable emergency managers and decisionmakers to rapidly assess conditions, focus response operations on the most critical needs, and coordinate actions that directly affect human life and community stability.

By monitoring the status and functionality of lifelines, jurisdictions can respond more effectively during emergencies, minimize cascading impacts, and accelerate more resilient recovery. A detailed discussion of lifelines and their relevance to the Municipality of Jayuya is provided in Section 4.5.

3. Municipal Profile

The Municipality of Jayuya is a mountainous municipality located in ccentral region of Puerto Rico. Jayuya is bordered by the municipalities of Ciales and Utuado to the north, to the south with the municipalities of Juana Díaz, Orocovis and Ponce, Ciales to the east and Utuado to the west. Map 1 shows the municipality of Jayuya and adjacent municipalities. Map 2 shows the wards (barrios) into which Jayuya is subdivided.

3.1 Data Sources for Municipal Profiles

Jayuya LHMP has been updated using the most current demographic and socioeconomic data available. Municipal profiles and risk assessments rely primarily on the 2020–2024 Five-Year estimates from the American Community Survey (ACS). When specific information is not available through the ACS, alternative data sources are identified and cited in the corresponding footnotes.

In addition, the plan reflects the most up-to-date knowledge on hazards and mitigation practices. References to relevant plans, studies, and technical reports are provided in page-level footnotes and consolidated in the References section.

GIS layers included in Chapter 3 were mostly provided by the PRPB's GIS Office.

3.2 Brief Historical Background

The Municipality of Jayuya is widely recognized for its strong connection to the Island's Indigenous Taíno heritage. The municipality derives its name from Hayuya, a Taíno cacique (chief) who governed the region prior to Spanish colonization. This cultural legacy has earned Jayuya the distinction of being known as the "Indigenous Capital of Puerto Rico" and continues to shape its cultural identity, traditions, and historical significance.

Settlement of the area expanded during the nineteenth century as agricultural development moved into Puerto Rico's interior mountain region. Favorable climatic conditions, fertile soils, and abundant water resources supported the cultivation of coffee, which became the municipality's principal economic activity and contributed to population growth and the establishment of rural communities throughout the region.

Jayuya was officially established as a municipality on March 9, 1911, following its separation from surrounding jurisdictions. Since its incorporation, the municipality has

maintained a predominantly rural character, with development concentrated in Jayuya Pueblo and scattered settlements throughout its mountainous barrios. Agriculture, particularly coffee cultivation, played a central role in the municipality's economy throughout much of the twentieth century and remains an important part of its historical heritage.

Throughout the latter half of the twentieth century and into the twenty-first century, Jayuya experienced economic and demographic changes similar to those affecting many municipalities in Puerto Rico's interior region. Population shifts, aging infrastructure, and limited development opportunities presented challenges for local growth and service delivery. At the same time, the municipality faced recurring impacts from natural hazards, including hurricanes, floods, landslides, droughts, and seismic activity. These events have underscored the importance of hazard mitigation, infrastructure resilience, emergency preparedness, and sustainable land use planning.

3.3 Geography

The Municipality of Jayuya is located in the central mountainous region of Puerto Rico within the Cordillera Central, the island's principal mountain range. The municipality is situated north of Ponce, east of Utuado, and west of Ciales. Covering approximately 39.4 square miles (102.1 km²), Jayuya is composed of eleven barrios. Barrio Pueblo serves as the municipality's governmental, commercial, and civic hub.

Jayuya's physical landscape is characterized by rugged topography, steep mountain slopes, narrow valleys, and deeply incised river corridors. Elevations vary significantly throughout the municipality, ranging from low-lying river valleys to some of the highest mountain elevations in Puerto Rico. The terrain is dominated by mountainous landforms that strongly influence development patterns, transportation networks, and hazard vulnerability.

The municipality is located within one of Puerto Rico's most environmentally significant mountain regions and includes areas adjacent to several of the island's highest elevations. The steep slopes and complex topography contribute to recurring concerns related to landslides, rockfalls, soil erosion, and infrastructure instability, particularly during periods of intense rainfall associated with tropical storms and hurricanes.

Jayuya is also an important watershed area. Numerous rivers, streams, and tributaries originate within or pass through the municipality, draining toward downstream communities and reservoirs. These water resources provide important environmental and economic benefits; however, they also create exposure to riverine flooding, flash flooding, bank erosion, and sediment transport during major storm events.

Land use within the municipality consists primarily of forested lands, agricultural areas, low-density rural residential development, and limited urbanized areas concentrated around Jayuya Pueblo. Extensive undeveloped and environmentally sensitive lands remain throughout the municipality due to topographic constraints, contributing to watershed protection, ecological diversity, and natural hazard mitigation functions.

The municipality's geography directly influences its hazard profile and mitigation needs. Steep terrain, dispersed rural settlements, mountainous transportation corridors, and an extensive drainage network increase vulnerability to landslides, erosion, flash flooding, infrastructure disruptions, and access limitations during disaster events. As a result, mitigation planning efforts have historically focused on slope stabilization, drainage improvements, bridge and roadway resilience, watershed protection, critical infrastructure hardening, and emergency access enhancement

Jayuya is administratively divided into eleven wards: Coabey, Collores, Jauca, Jayuya Abajo, Mameyes Arriba, Pica, Pueblo, Río Grande, Saliente, Veguitas, and Zamas (Map 2).

Map 1: Jayuya *and Adjacent Municipalities*

Geographic Area



Source: Puerto Rico Planning Board

SPCS PR & VI NAD83

Map 2: Jayuya – Wards Subdivision



3.3.1 PHYSIOGRAPHY

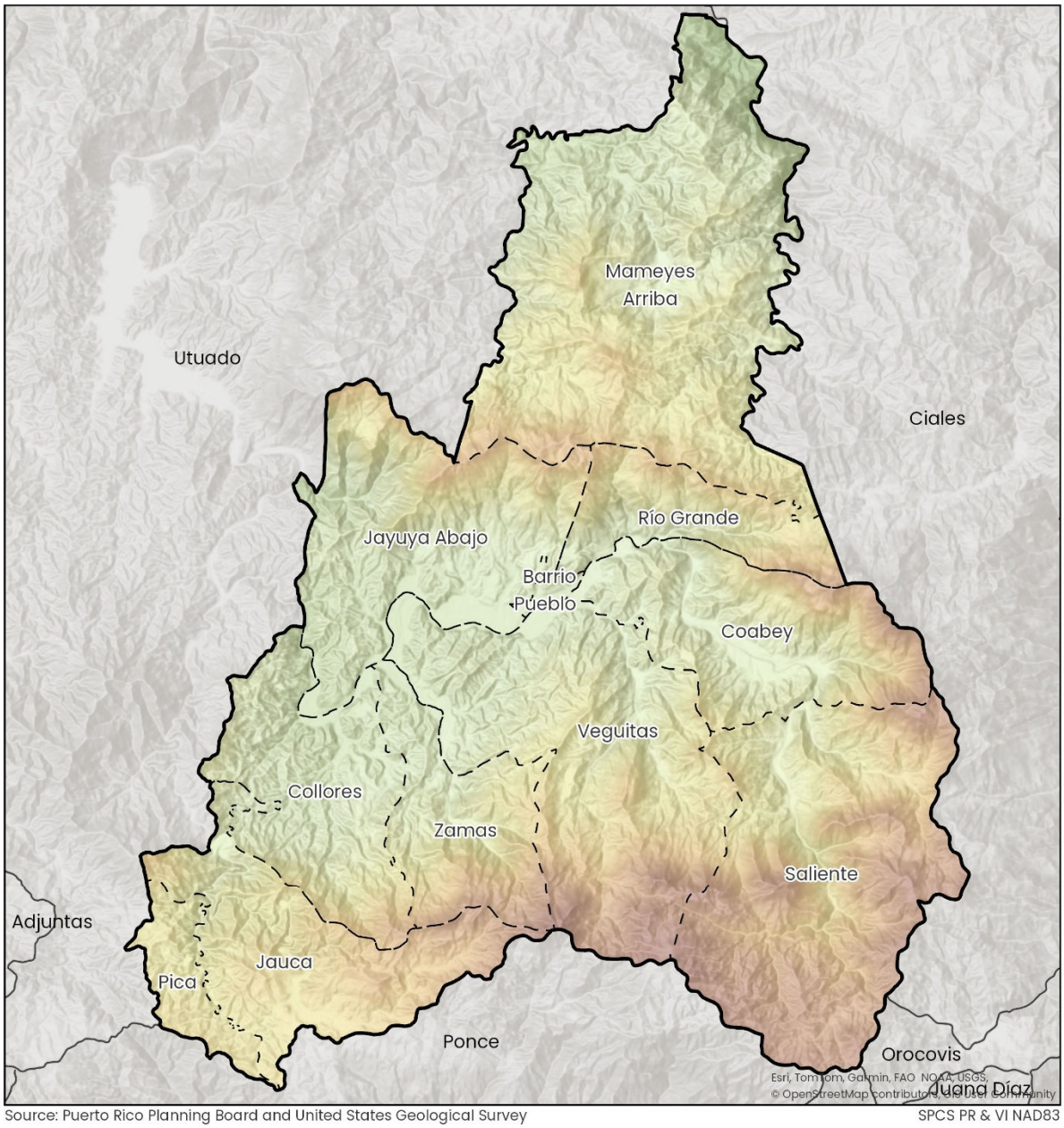
The Municipality of Jayuya is located within the Central Mountain Region (Cordillera Central) of Puerto Rico, one of the Island's principal physiographic provinces. As illustrated in the physiography map, the municipality is characterized by a rugged mountainous landscape dominated by steep slopes, narrow valleys, prominent ridges, and deeply incised drainage channels. Elevation varies considerably across the municipality, ranging from approximately 37 meters (121 feet) above mean sea level in the lower valley areas to more than 1,325 meters (4,350 feet) in the higher mountain sectors, reflecting one of the greatest elevation ranges found among Puerto Rico's municipalities. This mountainous setting is a defining physical characteristic that influences land use, watershed processes, transportation, and hazard vulnerability.

The highest elevations are concentrated in the southern and southeastern portions of the municipality, particularly within the barrios of Saliente, Veguitas, and portions of Jauca and Zamas, where mountain ridges form part of the Cordillera Central. These areas contain steep gradients, shallow soils, and highly dissected terrain. Lower elevations occur primarily along river valleys and in portions of Jayuya Pueblo, Río Grande, and Jayuya Abajo, where development has historically concentrated due to more suitable topographic conditions.

Jayuya's physiography is largely the result of tectonic uplift, volcanic rock formations, and long-term erosional processes that have shaped the central interior of Puerto Rico. The landscape consists of mountainous uplands separated by narrow alluvial valleys through which numerous streams and tributaries flow. These drainage patterns create a dendritic network characteristic of mountainous watersheds and contribute to rapid runoff responses during heavy rainfall events.

Map 3: Jayuya Physiography

PHYSIOGRAPHY



Source: Puerto Rico Planning Board and United States Geological Survey

SPCS PR & VI NAD83

Elevation (Meters)
1325.89
37.4974

Wards
Municipality of Jayuya
Neighboring Municipalities



N

Scale: 1:80,000

0 1,000 2,000 Meters

3.3.2 Geology

The Municipality of Jayuya is located within the Cordillera Central geologic province, the principal mountainous region of Puerto Rico. The municipality is underlain predominantly by Cretaceous-age volcanic and volcaniclastic rocks, which form part of the geologic basement of central Puerto Rico. These rock formations were created through volcanic activity and tectonic processes associated with the development of the northeastern Caribbean region and have been subsequently modified by uplift, faulting, weathering, and erosion over millions of years.

The geologic framework of Jayuya consists primarily of volcanic tuffs, lava flows, volcanic sandstones, mudstones, and intrusive igneous rocks that are characteristic of the interior mountain region. One of the most significant geologic units associated with the municipality is the Jayuya Tuff, a Cretaceous volcanic formation named after exposures identified near the municipality. This formation consists primarily of volcanic ash deposits, crystal-lithic tuffs, and associated sedimentary materials that were deposited during periods of ancient volcanic activity.

The interaction of volcanic bedrock, steep topography, and prolonged weathering has produced extensive residual soils throughout the municipality. These soils vary in depth and stability depending on slope conditions, drainage characteristics, and underlying geologic materials. In many areas, intense weathering of volcanic rocks has created highly erodible soil conditions that may become unstable during prolonged or intense rainfall events. As a result, portions of the municipality are susceptible to slope failures, landslides, rockfalls, and soil erosion. These conditions are particularly common along steep hillsides, stream valleys, roadway corridors, and developed slopes.

Jayuya's geology is also influenced by the broader tectonic setting of Puerto Rico, which is located near the boundary between the Caribbean Plate and the North American Plate. Although the municipality is not located directly on a major mapped fault, regional tectonic activity contributes to seismic hazards affecting Puerto Rico. Earthquakes generated by regional fault systems and plate interactions can produce ground shaking that may trigger slope instability, landslides, and damage to infrastructure within mountainous areas such as Jayuya.

3.3.3 Soils

The Municipality of Jayuya is characterized by soils that have formed primarily from the weathering of volcanic and volcaniclastic parent materials associated with the

Cordillera Central. The municipality's mountainous landscape, high annual rainfall, steep slopes, and extensive drainage network have played a significant role in soil formation and distribution. As a result, soils in Jayuya are generally deep to moderately deep, well-drained, and highly weathered, with physical and chemical characteristics that vary according to elevation, slope position, and underlying geologic materials.

Most soils within the municipality occur on steep uplands and mountainous terrain where erosion, runoff, and slope instability are important factors influencing soil development. These upland soils are generally associated with the Ultisol and Inceptisol soil orders commonly found throughout the interior mountain region of Puerto Rico. The soils are typically acidic, moderate to highly permeable, and contain significant amounts of clay derived from weathered volcanic rock. While many of these soils are suitable for forestry and agricultural activities, their productivity and stability are strongly influenced by slope conditions and erosion potential.

Along river valleys and stream corridors, more recent alluvial deposits have formed deeper and generally more fertile soils. These valley soils are associated with floodplain and terrace environments and have historically supported agricultural activities due to their relatively favorable physical characteristics. However, these same areas may also be subject to flooding, sediment deposition, and streambank erosion during significant storm events.

The interaction between steep topography and highly weathered soils creates conditions that are particularly susceptible to erosion and landslides. Intense rainfall associated with tropical storms and hurricanes can rapidly saturate soils, reducing slope stability and increasing the potential for mass movement. Areas where vegetation has been removed or where slopes have been altered for road construction, development, or agricultural purposes may exhibit even greater susceptibility to erosion and slope failures. These soil characteristics are important considerations in land use planning, infrastructure development, and hazard mitigation activities throughout the municipality.

From a hazard mitigation perspective, soil characteristics directly influence several of the natural hazards affecting Jayuya, particularly landslides, erosion, sediment transport, and flooding. Soil properties such as permeability, drainage capacity, depth, and erodibility affect how water moves across the landscape and how slopes respond to prolonged precipitation. Consequently, understanding local soil conditions is essential for identifying vulnerable areas, evaluating development suitability,

designing infrastructure improvements, and prioritizing mitigation projects aimed at reducing long-term risk.

3.3.4 HYDROGRAPHY

The Municipality of Jayuya is located within the headwaters of several important river systems in the central mountain region of Puerto Rico. As shown in the hydrography map, the municipality contains a dense and highly developed drainage network composed of rivers, perennial and intermittent streams, and numerous tributaries that originate within the steep slopes of the Cordillera Central. The hydrographic system reflects the municipality's mountainous topography and high precipitation patterns, which contribute to rapid runoff and the formation of well-defined watersheds.

The principal watercourse within the municipality is the Río Grande de Jayuya River, which traverses the central portion of the municipality from east to west. The river serves as the primary drainage feature and receives runoff from numerous tributaries draining the surrounding mountain slopes. Other significant waterways include the Saliente River, which drains portions of the eastern and southeastern sectors of the municipality, the Caonillas River along the northwestern portion of the municipal boundary, and the Yunes River, which drains portions of the northern mountainous region. These rivers, together with their tributary systems, form an extensive dendritic drainage pattern typical of Puerto Rico's interior mountain watersheds.

The hydrographic network is characterized by narrow stream valleys, steep channel gradients, and relatively short flow paths from ridge tops to river channels. Because of these characteristics, stormwater runoff can concentrate rapidly during intense rainfall events associated with tropical storms, hurricanes, and severe weather systems. The combination of steep slopes, highly dissected terrain, and abundant surface drainage contributes to elevated susceptibility to flash flooding, channel erosion, streambank instability, sediment transport, and debris accumulation along waterways.

Map 4: Jayuya – Hydrography Map

HYDROGRAPHY



Source: Puerto Rico Planning Board and United States Geological Survey

SPCS PR & VI NAD83

Hydrography
Municipality of Jayuya
Neighboring Municipalities



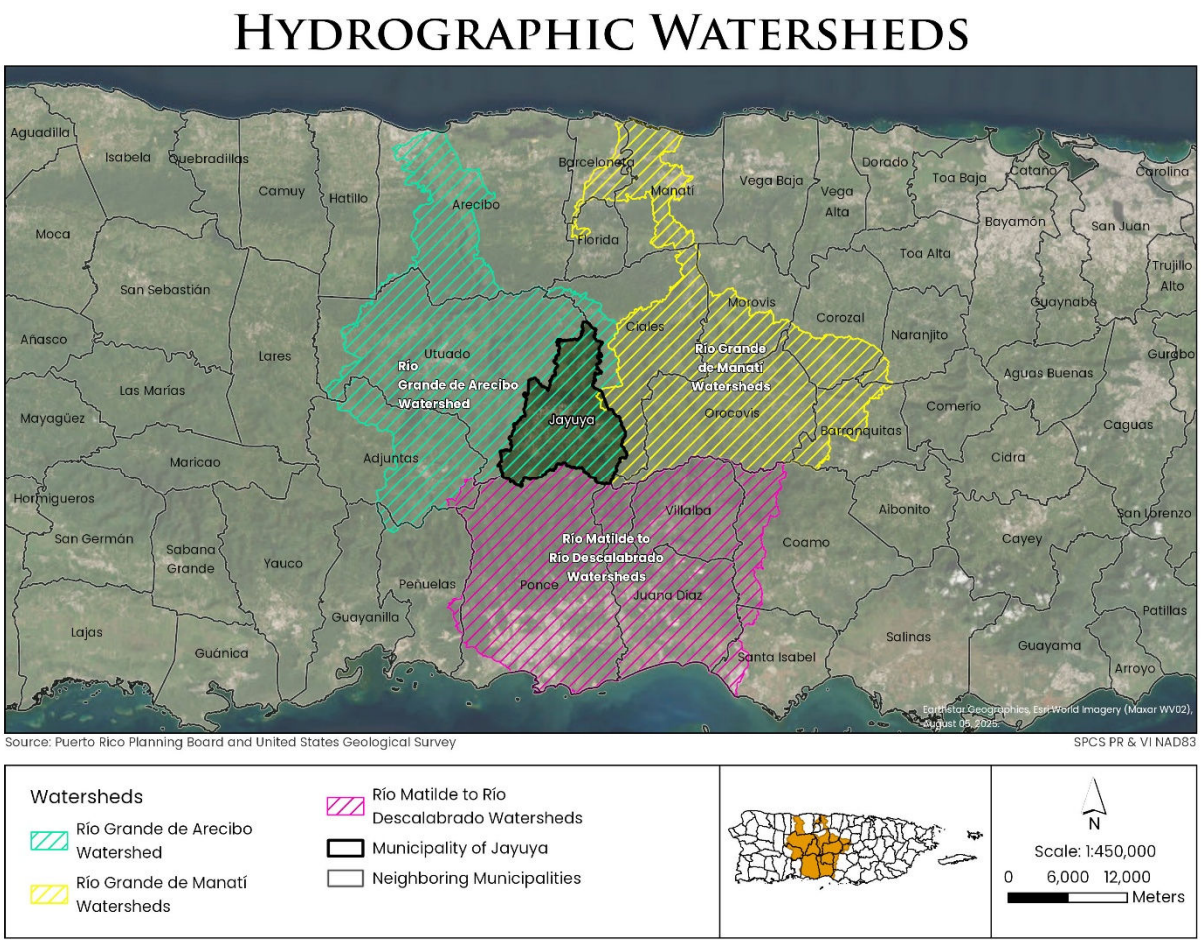
N

Scale: 1:80,000

0 1,000 2,000

Meters

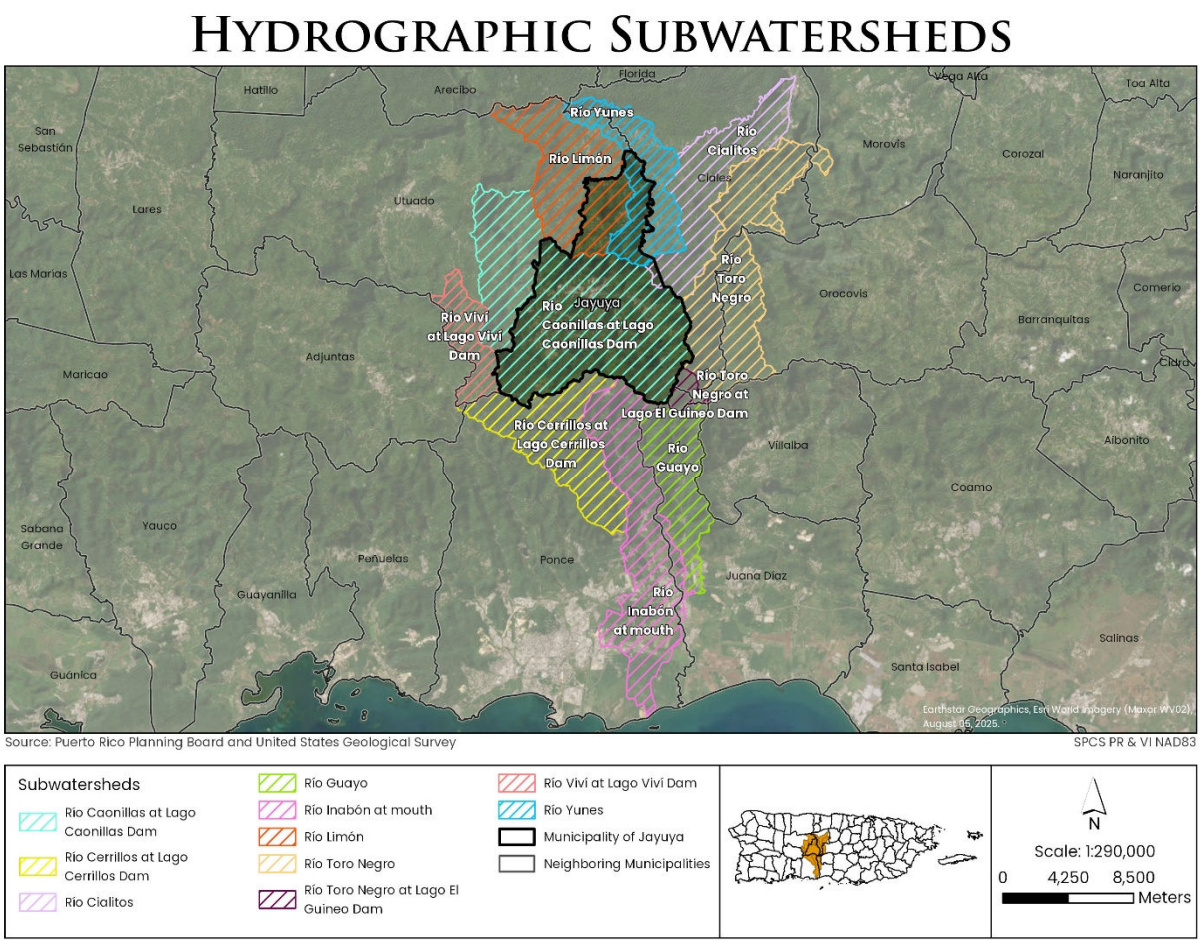
Map 5: Jayuya - Watersheds Map-



Jayuya's rivers and streams provide important ecological, hydrological, and socioeconomic functions. The municipality's watersheds contribute to regional water resources, support aquatic and riparian habitats, recharge groundwater in localized areas, and provide water resources for residential, agricultural, and environmental uses. The extensive drainage network also plays a critical role in regulating runoff from the mountainous landscape and maintaining watershed connectivity throughout the region.

From a hazard mitigation perspective, the municipality's hydrography is a significant factor influencing flood risk and infrastructure vulnerability. Development located adjacent to river corridors, bridges, roadway crossings, culverts, and low-lying valley areas may be exposed to flooding, erosion, and sediment-related impacts during major storm events. Furthermore, the interaction between steep slopes and drainage channels can increase the likelihood of landslides and debris flows affecting transportation routes and critical infrastructure.

Map 6: Jayuya– Subwatersheds -



3.3.5 PRECIPITATION

The Municipality of Jayuya experiences a humid tropical mountain climate characterized by abundant rainfall throughout most of the year. Located within the Cordillera Central, the municipality receives significantly higher precipitation than many coastal areas of Puerto Rico due to orographic uplift, a process whereby moist trade winds are forced upward by the mountainous terrain, resulting in cooling, condensation, and increased rainfall.

Average annual precipitation within the municipality generally ranges from approximately 70 to 100 inches (1,780 to 2,540 mm), with the highest rainfall totals occurring in the higher elevations of the southern and central mountain regions. These precipitation levels support the extensive hydrographic network and watershed systems that originate within Jayuya and contribute to downstream water resources throughout Puerto Rico. (National Weather Service, Figure 14).

3.3.6 Temperature

Regarding temperature, during the winter season the average daily minimum along Puerto Rico's coastline ranges from 19.9°C to 22°C (67.8°F to 71.6°F). In the mountainous interior, winter minimums fluctuate between 15.5°C and 16.6°C (59.9°F to 61.9°F). Winter maximum temperatures reach about 27.7°C (81.9°F) in coastal areas and between 22°C and 26.6°C (71.6°F to 79.8°F) in the interior highlands.

In summer, the average minimum temperature recorded in the mountainous interior ranges from 18.8°C to 21°C (65.8°F to 69.8°F), while coastal minimums range from 22°C to 24.4°C (71.6°F to 75.9°F). Summer maximum temperatures typically average 26.6°C to 29.4°C (79.8°F to 84.9°F) in higher elevations and about 29.4°C (84.9°F) along the coast.

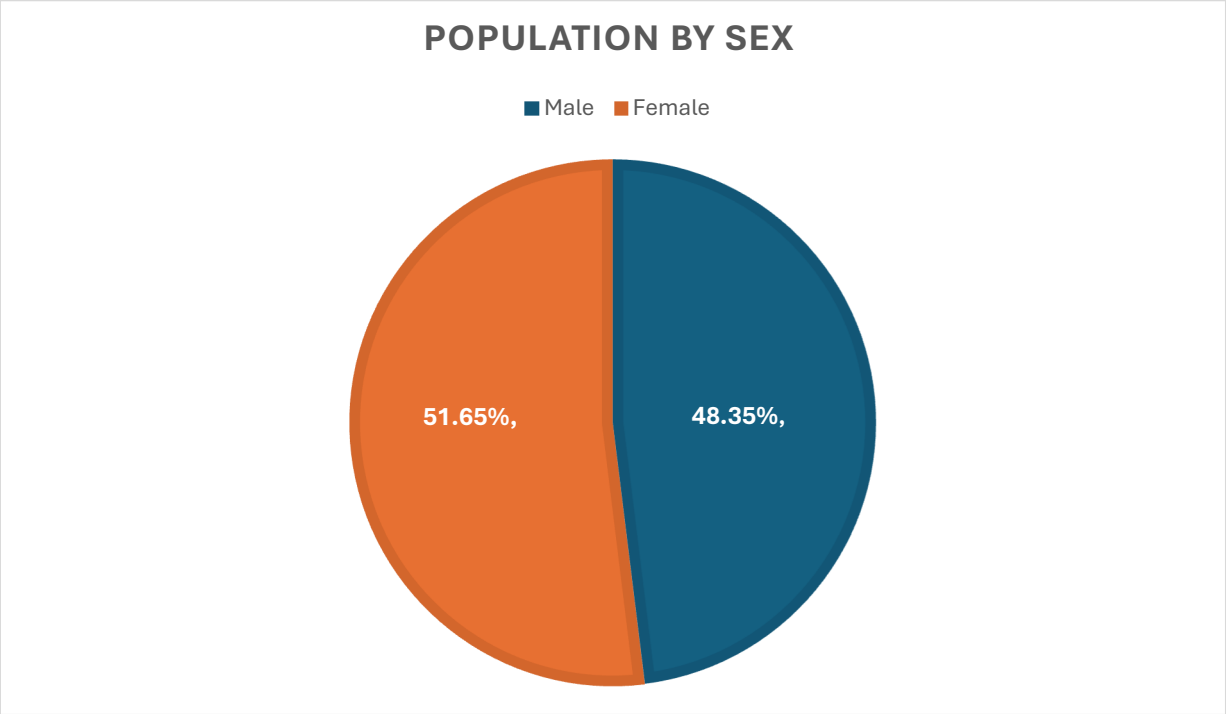
3.4 Demographics

3.4.1 Current Population

According to the 2020 - 2024 American Community Five-Year Estimates Survey (ACS 2024) [2] the total population of Jayuya is 14,566. Of these, 7,042 persons are male and 7,524 are female. The percentage split is 48.35% male, 51.65% female. The sex ratio is of 93.6 males per 100 females (US Census Bureau, 2025).

[2] Unless otherwise stated, all data and analysis are from the 2024 Five-Year American Community Survey (ACS) Data Set for Jayuya.

Figure 10: Jayuya Population by Sex (2024 ACS)



Source: US Census, ACS 2020-2024 Five-years Estimates

According to 2024 ACS a total of 2,941 people in Jayuya was 65 or older (20.19%). This constitutes more than a fifth of the total population of Jayuya while 1,258 people (8.64%) of the population are 75 years of age or older.

Jayuya has 3,205 residents (22% of the population) under the age of 19, including 1,148 children (7.88%) aged 9 years or younger. This LHMP identifies individuals younger than 19 and older than 65 as vulnerable populations due to their increased susceptibility to the impacts of natural hazards. As a result, 6,146 residents, representing 42.19% of Jayuya's population, are considered particularly vulnerable to the effects of a natural disaster.

Table 5 presents the current population of Jayuya by age group, organized into five-year cohorts, and compares the rates of change between the 2019 and 2024 ACS 5-year estimates. The total percentage change shown in Table 5 indicates that Jayuya's population increased by less than 1% during this period. Figure 10 illustrates the same age group distribution in a bar chart, while Figure 11 presents the municipality's population pyramid.

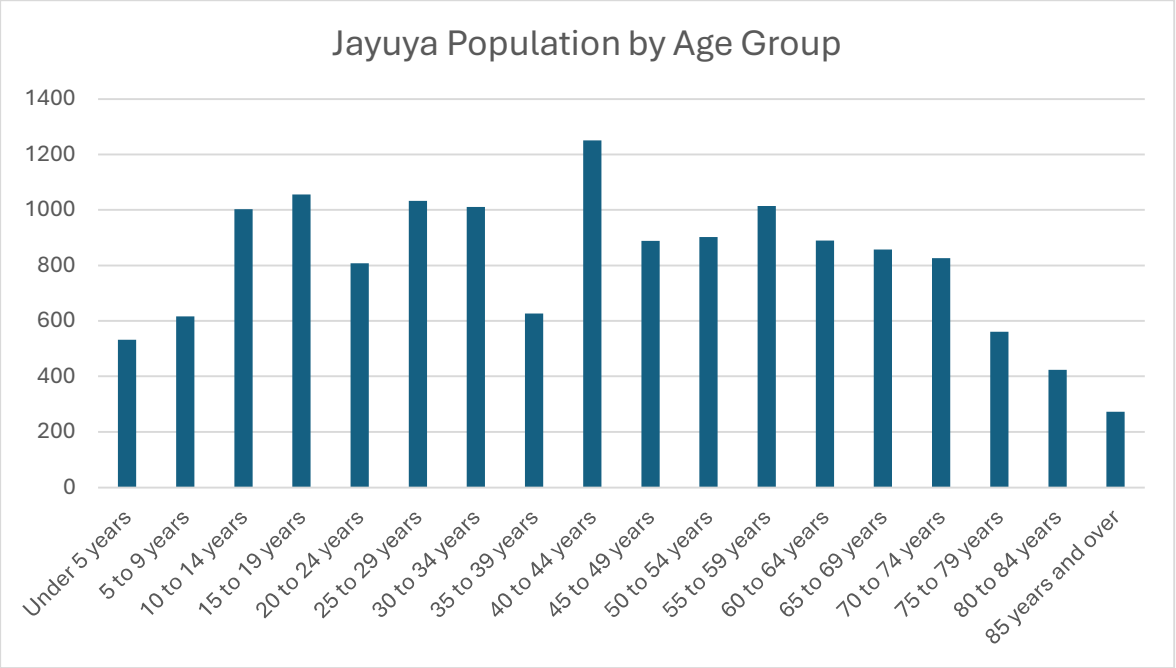
As shown in Figure 11, the irregular shape of the population pyramid reflects a larger proportion of older residents compared to younger age groups. It is particularly noteworthy that the cohorts ranging from under 5 years to 15-19 years of age declined at an average rate of 11.76% between 2019 and 2024. In contrast, the population aged 65 years and older increased at an average rate of 50.81% during the same period. These trends suggest an aging population and highlight the growing demographic significance of older adults within the municipality.

Table 5: Population by Age Group 2024 ACS vs 2019 ACS

Age Cohort	2024	Percentage 2024	2019	Percentage 2019	Percentage change
Under 5 years	532	3.65%	744	5.12%	-28.49%
5 to 9 years	616	4.23%	857	5.89%	-28.12%
10 to 14 years	1,002	6.88%	1017	6.99%	-1.47%
15 to 19 years	1,055	7.24%	950	6.53%	11.05%
20 to 24 years	808	5.55%	1143	7.86%	-29.31%
25 to 29 years	1,033	7.09%	1043	7.17%	-0.96%
30 to 34 years	1,010	6.93%	892	6.14%	13.23%
35 to 39 years	626	4.30%	758	5.21%	-17.41%
40 to 44 years	1,250	8.58%	1,082	7.44%	15.53%
45 to 49 years	888	6.10%	903	6.21%	-1.66%
50 to 54 years	902	6.19%	952	6.55%	-5.25%
55 to 59 years	1,014	6.96%	899	6.18%	12.79%
60 to 64 years	889	6.10%	961	6.61%	-7.49%
65 to 69 years	857	5.88%	720	4.95%	19.03%
70 to 74 years	826	5.67%	706	4.86%	17.00%
75 to 79 years	561	3.85%	419	2.88%	33.89%
80 to 84 years	424	2.91%	138	0.95%	207.25%
85 years and over	273	1.87%	355	2.44%	-23.10%
Total	14,566	100%	14,539	100%	0.19%

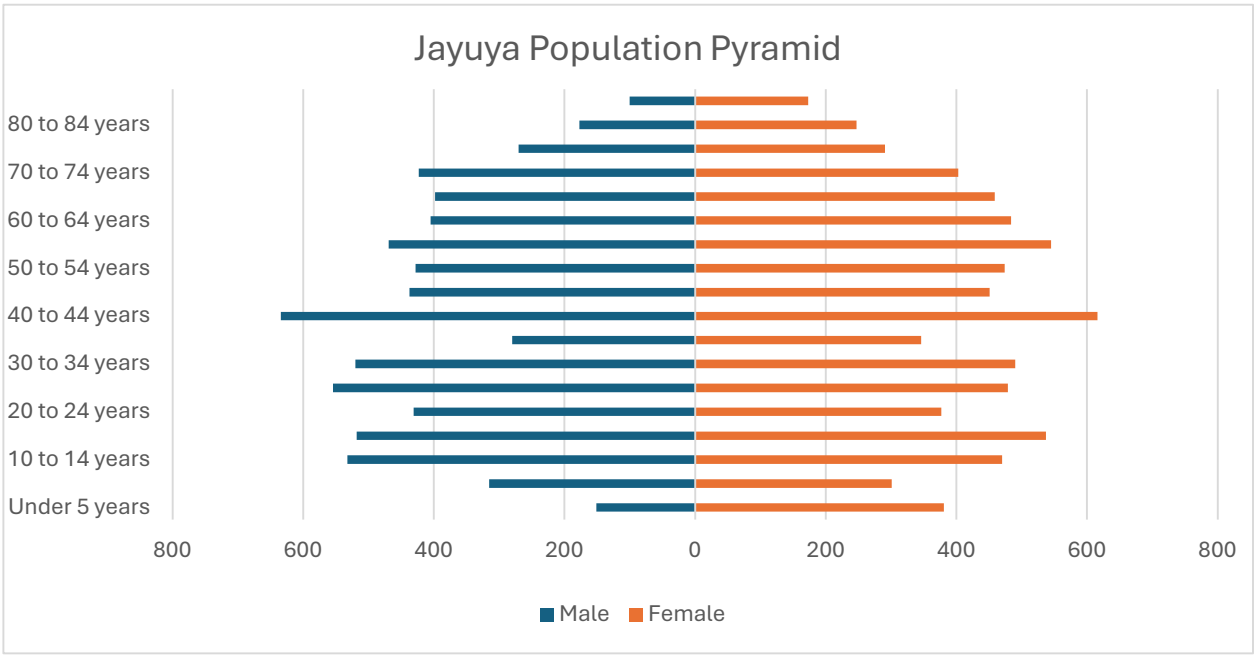
Source: US Census, ACS 2020-2024 Five-years Estimates

Figure 11: Jayuya Population by Age Group (ACS 2024)-



Source: US Census, ACS 2020-2024 Five-years Estimates

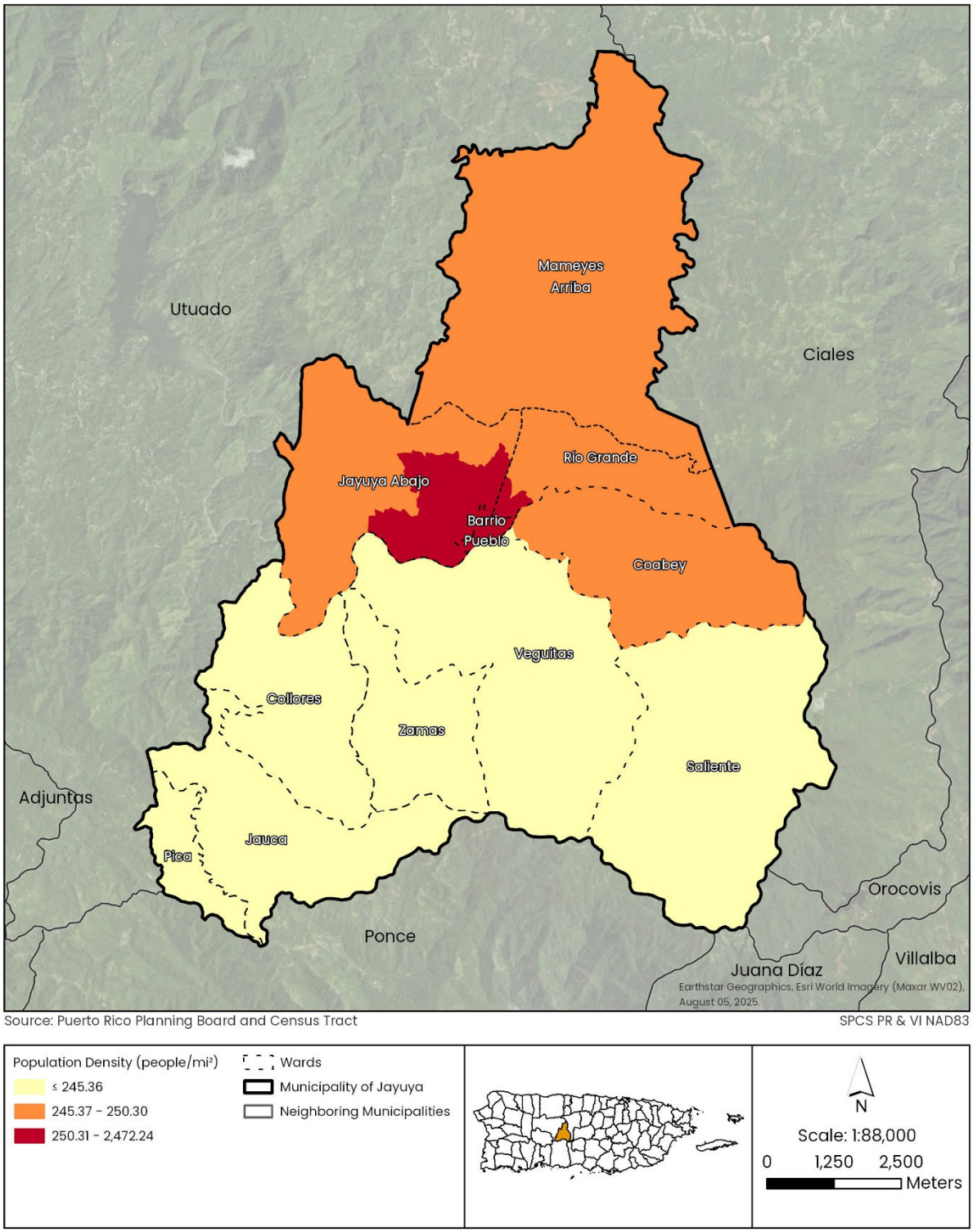
Figure 12: Jayuya Population Pyramid (2024 ACS -Five-years Estimates)



Source: US Census, ACS 2020-2024 Five-years Estimates

The following map shows the population density of Jayuya by census tract. This map shows that the most densely populated census tracts are located in Barrio Pueblo and northern barrios of the municipality (Jayuya Abajo, Coabey, Rio Grande, andMameyes Arriba).

Map 7: Population Density



3.4.2 Socio-economic Characteristics

3.4.2.1 Employment

The 2024 ACS Five-Year Estimates indicate that Jayuya has a labor force participation rate of 42.30%, meaning that slightly less than half of the population aged 16 years and over is actively participating in the labor force (Table 6). Furthermore, Jayuya's labor force participation rate is below that of Puerto Rico, which stood at 46.40% in 2024.

Table 6: Current Labor Force Statistics[3]

Variable	Estimate	Percentage
Population 16 years and over	12,172	
In Labor Force	5,145	42.30%
Civilian Labor Force	5,145	42.30%
Employed	4,407	36.20%
Unemployed	738	6.10%
Armed Forces	0	0.00%
Not in Labor Force	7,027	57.70%
Unemployment rate		14.30%

Source: US Census, ACS 2020-2024 Five-years Estimates

The 2024 ACS estimates showed an unemployment rate for the municipality of 14.30%. In comparison to Puerto Rico the unemployment rate is higher (14.30% for Jayuya vs 10.7% for Puerto Rico).

3.4.2.2 Employment by Industry

The following table below (Table 7), presents employment by industry within the municipality, comparing data from the 2020-2024 Five-Year ACS with the 2015-2019 Five-Year ACS. The final column reflects the percentage change in employment by industry between the two survey periods.

Table 7: Employment by Industry 2024 ACS vs 2019 ACS

Industry	2024	Percentage 2024	2019	Percentage 2019	Percentage change
Agriculture, Forestry, fishing and hunting and mining	118	2.68%	137	4.26%	-13.87%
Construction	263	5.97%	45	1.40%	484.44%

Industry	2024	Percentage 2024	2019	Percentage 2019	Percentage change
Manufacturing	1,270	28.82%	925	28.74%	37.30%
Wholesale Trade	144	3.27%	25	0.78%	476.00%
Retail Trade	606	13.75%	377	11.71%	60.74%
Transportation and warehousing, and utilities	98	2.22%	143	4.44%	-31.47%
Information	23	0.52%	12	0.37%	91.67%
Finance and Insurance, and real estate and rental and leasing	0	0.00%	35	1.09%	-100.00%
Professional, scientific, and management, and administrative and waste management services	204	4.63%	86	2.67%	137.21%
Educational services, health care and social assistance	784	17.79%	667	20.72%	17.54%
Arts, entertainment, recreation, and accommodation and food services	352	7.99%	251	7.80%	40.24%
Other services, except public administration	229	5.20%	117	3.63%	95.73%
Public administration	316	7.17%	399	12.40%	-20.80%
Total employee Population 16 years and over	4,407	100%	3,219	100%	36.91%

Source: US Census, ACS 2020-2024 and 2015-2019 Five-years Estimates

Table 7 shows the following employment characteristics for Jayuya:

- The industry with the highest level of employment in Jayuya in 2024 is Manufacturing accounting for 28.82% of Jayuya workforce.
- In comparison with 2019 ACS data shows that Manufacturing was also the largest employment sector based on the total workforce. Employment in this industry increased by 345 individuals, representing a 37.30% increase between

2019 and 2024. The municipality experienced an overall increase of 1,188 workers, equivalent to a 36.91% growth in the total workforce during the same period.

- Other industries representing more than 10% of the employed population in Jayuya include: Retail Trade industry (13.75%); and educational services, health care and social assistance (17.79%).
- Industries that experienced negative growth between 2019 and 2024 ACS surveys include:
    - Agriculture, forestry, fishing and hunting and mining: decreased by 19 individuals or -13.87%
    - Transportation and warehousing, and utilities: decreased by 45 individuals or -31.47%
    - Finance and insurance, and real estate and rental and leasing: decreased by 35 individuals representing 100% decreased
    - Public administration: decreased by 83 individuals or -20.80%
- The industries that experienced the most significant growth between 2019 and the 2024 surveys were (more than 100%):
    - Construction increased by 218 individuals representing, an 484.44% increase over 2019 estimates.
    - Wholesale Trade increased by 119 individuals or 476% increase regarding 2019 estimates.
    - Professional, scientific, and management increased by 118 individuals or 137.21% increase.
- Other industries that recorded growth include:
    - Retail Trade (229 individuals or 60.74% percentage change).
    - Information (11 individuals or 91.67% increase).
    - Other services, except public administration (112 individuals or 95.73% increase).

3.4.2.3 Poverty Level

The table below shows the estimated poverty status for individuals in the municipality. This information is used to evaluate the economic well-being of individuals and families. The following table is essential for understanding the economic conditions for guiding the development and implementation of policies aimed at reducing poverty as well as the vulnerability of the population. This table shows that approximately 46.90% of the total population of Jayuya was below the poverty level according to 2024 estimates.

Table 8: Jayuya Population Below Poverty Level

Total Population	Number of Individual below the poverty level during the last 12 months	Percentage of the Population below the poverty level in the last twelve months
14,526	6,806	46.90%

Source: US Census, ACS 2024 5- years Estimates

3.4.2.4 Income

According to the 2024 ACS the median household income for Jayuya was $21,796, while the mean household income was $28,520. The following table shows the household distribution by level of income for ACS 2024 5 years estimates.

Table 9: Jayuya: Households by Income Level (2024: 5-year ACS Estimates)

Category	Number of Households	Percentage
Less than $10,000	1,241	23.97%
$10,000 to $14,999	657	12.69%
$15,000 to $24,999	910	17.58%
$25,000 to $34,999	672	12.98%
$35,000 to $49,999	948	18.31%
$50,000 to $74,999	500	9.66%
$75,000 to $99,999	198	3.82%
$100,000 to $149,999	19	0.37%
$150,000 to $199,999	15	0.29%
$200,000 or more	17	0.33%
Total households	5,177	100.00%

Source: US Census, ACS 2024 5- years Estimates. Inflation-Adjusted Dollars by 2024

This table shows that slightly less than one-quarter of all households in Jayuya (23.97%) earn less than $10,000 annually, while 54.2% earn less than $25,000 per year. In comparison, the 2015-2019 ACS 5-year estimates indicate that 35.5% of households earned less than $10,000 annually, and 72.1% earned less than $25,000. These figures suggest a decrease in the proportion of households within the lowest income brackets over time.

3.4.2.5 Population with disabilities

Table 10 presents data on individuals living with disabilities based on the 2020–2024 and 2015–2019 Five-Year Estimates of the American Community Survey datasets.

This Census data shows that the number of individuals living with a disability in Jayuya increased from 2,990 in 2019 to 3,584 in 2024, representing a net increase of 594 individuals (19.87% increase). Most age groups experienced an increase in the number of individuals living with a disability. The exception was the population aged 18 to 34 years and under 5 years which recorded a 7.90% and -100% decrease respectively during the period. According to the 2024 ACS 5-year estimates, individuals living with a disability represent 24.67% of Jayuya's total population. This information is particularly relevant to the LHMP update, as people with disabilities are among the populations most vulnerable to the impacts of natural hazard events and may face additional challenges during preparedness, response, and recovery efforts.

Table 10: Jayuya Population living with disabilities

Age Group	2024	2019	Percentage change
Under 5 years	0	65	-100.00%
5 to 17 years	334	299	11.71%
18 to 34 years	268	291	-7.90%
35 to 64 years	1,422	1,354	5.02%
65 to 74 years	565	522	8.24%
75 years and over	995	459	116.78%
Total Population living with a disability	3,584	2,990	19.87%

Source: US Census, ACS 2024 and 2019 5- years Estimates

3.4.2.6 Population receiving supplemental nutritional support

Table 11 provides information on households in Jayuya that receive food assistance, based on data from the 2020–2024 and 2015–2019 American Community Survey.

Table 11: Population Receiving Food Aid -

Data Set	2024	2019	Net Change	Percentage Change
Total Households in the municipality	5,177	4,837	340	7.03%
Households receiving food assistance	3,157	3,037	120	3.95%
Percent of Households receiving food assistance	60.98%	62.79%	_	_

Source: US Census, ACS 2024 5- years Estimates

In Jayuya more than half of the total households receive food assistance showing this trend in 2024 and 2019 estimates. As shown in this table the number of households in Jayuya increased by 7.03% since 2019 ACS. During the same period, the number of households receiving food assistance increased by 3.95%. From a hazard mitigation

perspective, food security is an important indicator of community vulnerability because households that depend on food assistance may face greater challenges in accessing adequate food following a disaster. Disruptions to transportation networks, supply chains, utility services, and food distribution programs can disproportionately affect these households, potentially increase their vulnerability and slow recovery efforts. Therefore, understanding the distribution and demand for food assistance services can help identify populations that may require additional support before, during, and after hazard events.

3.4.2.7 Health Insurance Coverage

The next table shows the 2020-2024 health insurance coverage for the municipality.

Table 12: Health Insurance Data

Variable	2024 Estimate	Percentage
Civilian noninstitutionalized population	14,526	
With health insurance coverage	14,032	96.60%
With private health insurance	4,454	30.66%
With public coverage	10,235	70.46%
No health insurance coverage	494	3.40%

Source: US Census, ACS 2024 5- years Estimates

The data shows that 494 people (3.40%) in Jayuya have no health insurance at all, while more than two thirds of the population (70.46%) depend on public health coverage. This data will be revisited when discussing the hazard of pandemic/epidemic.

3.4.3 Housing stock and other related details

According to the 2024 ACS estimates, Jayuya had a total of 6,394 housing units of those a total of 1,217 were vacant. This represents 19.03% of the total housing stock of the municipality.

The next table shows the year of construction of the housing units by year of construction.

Table 13: 2024 Housing Units Per Year of Construction

Year Structure Built	Housing Units	Percentage
Built 2020 or later	0	0.00%
Built 2010 to 2019	328	5.13%
Built 2000 to 2009	833	13.03%
Built 1990 to 1999	1,118	17.49%

Year Structure Built	Housing Units	Percentage
Built 1980 to 1989	1,484	23.21%
Built 1970 to 1979	1,411	22.07%
Built 1960 to 1969	589	9.21%
Built 1950 to 1959	264	4.13%
Built 1940 to 1949	251	3.93%
Built 1939 or earlier	116	1.81%
Total	6,394	100%

Source: US Census, ACS 2024 5- years Estimates

The 2024 ACS shows that 62.76% of the housing stock was built between 1970 and 1999. The latest Building Code was adopted by the government of Puerto Rico in 2018, before that the most recent version of the Building Code was adopted in 2011. This means that almost 100.00% of the housing stock was built before the current building code.

Other data offered by the 2024 ACS, is that of the 5,177 occupied housing units, 3,210 (62.00%) were occupied by the owner and 1,967 (38.00%) were occupied by renters.

Finally, Table 14 shows the vehicle available per occupied housing units.

Table 14: Vehicle per Occupied Housing Unit

Variable	Occupied Housing Units	Percentage
No vehicle available	760	14.70%
1 vehicle available	1,794	34.70%
2 vehicles available	1,514	29.20%
3 or more vehicles available	1,109	21.40%
Total Occupied Housing Units	5,177	100%

Source: US Census, ACS 2024 5- years Estimates

The 2024 ACS shows that there are 760 (14.70%) occupied housing units that do not have available vehicles in Jayuya. This represents a critical matter since the development pattern in the municipality is rural and/or suburban, where vehicular transportation is necessary for mobility.

3.5 Critical Infrastructure

Infrastructure refers to the essential physical and organizational systems that support the effective functioning of a society or economy. It includes critical networks such as transportation systems (roads, bridges, railways), energy generation and distribution, water supply, telecommunications, and other services that sustain economic activity

and daily life. Collectively, infrastructure serves as the foundational framework that enables communities and economies to operate reliably and efficiently (NIST, n.d.). Infrastructure is commonly classified into two categories: hard infrastructure and soft infrastructure.

Hard infrastructure refers to the physical facilities and networks that underpin the functioning of a modern society and economy. This includes transportation systems such as roads, bridges, railways, and airports, as well as water systems, electrical grids, and telecommunications networks. These tangible assets enable the movement of people and goods, the distribution of energy and water, and the transmission of information.

Soft infrastructure refers to the institutions, services, and systems that support economic stability, public health, social order, and cultural development. This category includes educational institutions, healthcare systems, law enforcement agencies, emergency response services, parks, and recreational facilities. Unlike hard infrastructure, soft infrastructure is characterized by organizational frameworks and human-centered services that contribute to community well-being and effective governance.

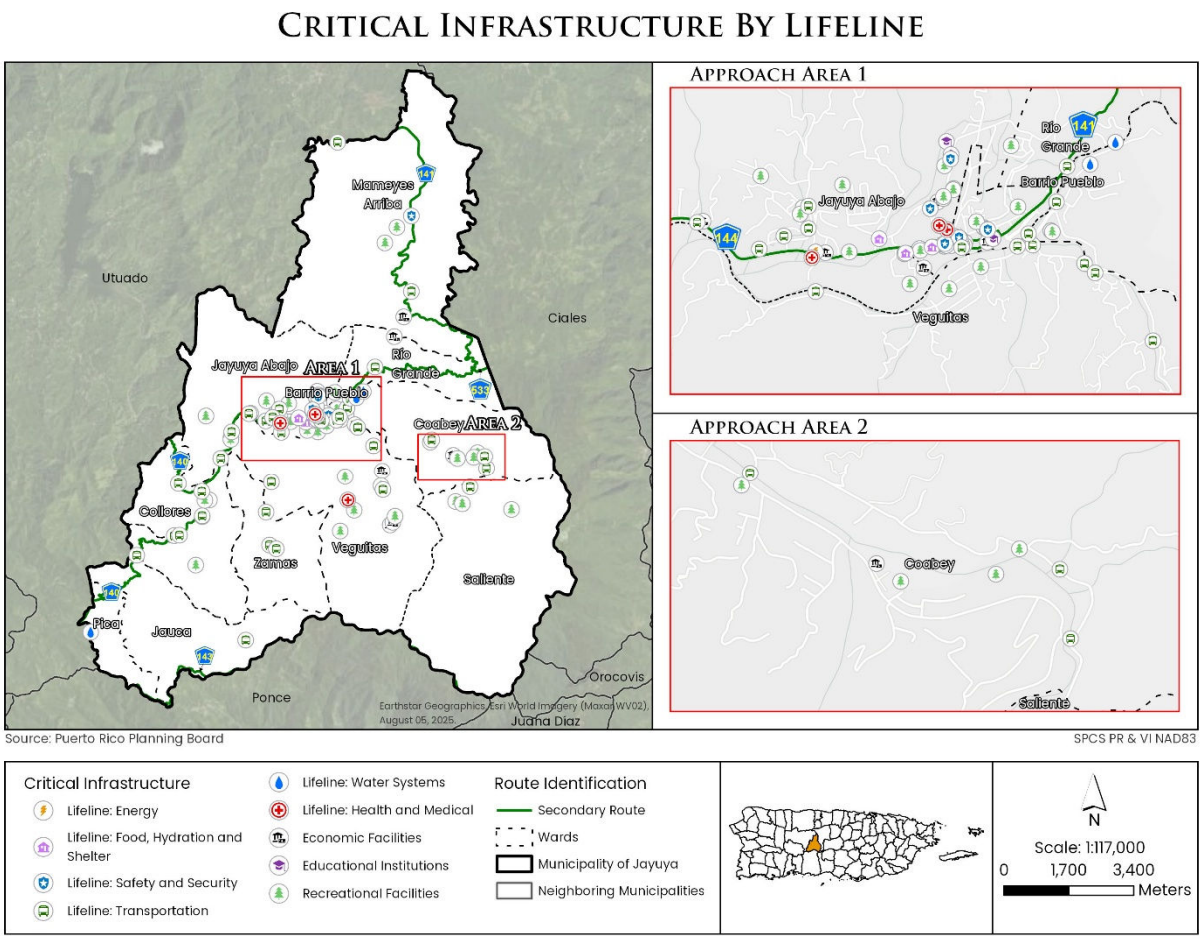
As described in Section 2.8, FEMA defines *Community Lifelines* as the most essential services and systems necessary to sustain the uninterrupted operation of critical government and business functions, while also protecting public health, safety, and economic security. These lifelines constitute the fundamental components of a community and once stabilized, enable all other sectors of society to function effectively. During disaster events, any disruption to these lifelines requires immediate and coordinated action to restore stability and reduce cascading impacts. Accordingly, the assessment of existing infrastructure will be conducted in alignment with FEMA's Community Lifelines framework.

The Municipality of Jayuya contains a diverse network of critical facilities that support community functions before, during, and after hazard events (Map 8, Appendix F). Jayuya's critical infrastructure network consists of public safety, emergency management, healthcare, transportation, water, energy, and food supply facilities that provide essential services to residents and support community resilience. The majority of critical facilities are concentrated within the urban center of Barrio Pueblo, while transportation corridors, water system facilities, and emergency response assets are distributed throughout the municipality's rural wards. Key assets include healthcare facilities, police and fire stations, municipal government buildings, water treatment

and distribution infrastructure, fuel and electrical facilities, and primary roadway networks.

The inventory identifies approximately 62 critical infrastructure assets across the municipality, with a significant concentration along the PR-144 corridor and within the municipal urban center (Appendix F, provided by PRPB). The clustering of multiple lifeline facilities in Barrio Pueblo highlights the importance of protecting this area from natural hazards, as disruptions could affect several essential community services simultaneously. Furthermore, the municipality's reliance on a limited number of regional transportation corridors underscores the importance of maintaining roadway and bridge functionality to preserve access to emergency services and support post-disaster response and recovery operations.

Map 8: Critical Infrastructure by Lifeline



3.5.1 Lifeline: Safety and Security



The purpose of the Safety and Security Lifeline is to protect life and property while maintaining social stability during emergency situations. This lifeline focuses on reducing immediate risks to public safety and personal security through the operation of public safety agencies, controlled access to affected areas, and the prevention of crime, civil unrest, and violence. It also encompasses ensuring safety and security at emergency shelters, distribution centers, and other critical facilities during disaster response and recovery operations.

FEMA indicates that disruption of this lifeline can result in social disorder and heightened community vulnerability, making rapid restoration a critical priority. Response actions require close coordination among federal, state, and local agencies, the deployment of security personnel, the implementation of traffic control measures, and the protection of critical infrastructure.

The Safety and Security Lifeline in Jayuya is composed of facilities and services that support emergency response, public safety, law enforcement, fire protection, and continuity of government operations. These assets include the Municipal Police Headquarters, Fire Station, Municipal Office of Emergency Management (OMME), Municipal Public Works Department, Virtual Surveillance Center, and City Hall (Casa Alcaldía), which are primarily concentrated within the urban center of Barrio Pueblo. Their central location facilitates coordinated emergency response and resource mobilization during disasters.

From a hazard mitigation perspective, these facilities are essential for protecting life and property, coordinating emergency operations, maintaining situational awareness, and supporting response and recovery activities. The concentration of several safety and security facilities within the municipal center highlights the importance of protecting these assets from natural hazards, as disruptions could impair emergency communications, public safety services, and municipal operations affecting the entire community. Appendix F holds a list of all related safety and security Lifeline related assets

3.5.2 Lifeline: Food, Hydration and Shelter



The Food, Hydration, and Shelter Lifeline is intended to ensure that disaster-affected populations have prompt access to essential necessities, including food, potable water, and safe shelter. This lifeline encompasses the provision of ready-to-eat meals, water distribution, the establishment of temporary shelters, and coordination with governmental and volunteer organizations to meet basic human needs. Disruptions to this lifeline pose an immediate threat to life; therefore, rapid response actions are prioritized to restore food availability and housing stability as quickly as possible.

The Food, Hydration, and Shelter Lifeline in Jayuya consists of facilities that support the provision of essential goods, emergency sheltering, and community sustenance during and after disaster events. Based on the municipality's critical infrastructure inventory, key assets within this lifeline include the Econo supermarket, Residencial La Montaña, and the Municipal Stadium, which can serve as important locations for food distribution, temporary sheltering, and emergency support operations.

Most of these facilities are located within or near the municipal urban center, providing accessible locations for residents to obtain necessities and receive assistance during emergencies. These assets play a critical role in maintaining community well-being by supporting the distribution of food, potable water, emergency supplies, and shelter services when normal supply chains or access routes are disrupted.

From a hazard mitigation perspective, maintaining operational continuity and access to these facilities is essential to reducing disaster impacts on vulnerable populations and supporting an effective response and recovery process. . Appendix F holds a list of all related food, shelter and hydration lifeline related assets

3.5.3 Lifeline: Health and Medicine



The purpose of this lifeline is to ensure the continuity of essential medical services and the protection of public health during emergencies and disasters. It focuses on stabilizing healthcare delivery, ensuring access to hospitals, clinics, medications, and healthcare personnel, and maintaining the capacity to respond effectively to life-threatening conditions

FEMA indicates that disruption of this lifeline can have serious consequences; therefore, priority actions focus on restoring medical facilities, deploying emergency response teams, ensuring the availability of critical medical supplies, and coordinating efforts among federal, state, and local agencies

The Health and Medical Lifeline in Jayuya consists of healthcare facilities that provide medical treatment, outpatient services, pharmaceutical access, and public health support to residents during both normal operations and emergency conditions. According to the municipal critical infrastructure inventory, this lifeline includes the CDT Mario Canales Torresola, Concilio de Salud Integral, and Hayuya Pharmacy. These facilities are primarily located within or near the urban center, providing critical access to healthcare services for the municipality's population.

The CDT Dr. Mario Canales Torresola serves as the municipality's principal healthcare facility, providing essential medical care and supporting emergency medical response functions. The Concilio de Salud Integral expands access to primary healthcare services, while Farmacia Hayuya contributes to the continuity of care through the provision of prescription medications and other medical supplies. Together, these facilities support the community's ability to address routine healthcare needs as well as increased medical demands following natural hazard events.

From a hazard mitigation perspective, the continued operation and accessibility of these facilities are essential to protecting public health, treating disaster-related injuries and illnesses, supporting vulnerable populations, and facilitating community recovery. Disruptions caused by flooding, landslides, utility failures, or transportation interruptions could reduce access to critical healthcare services and adversely affect emergency response capabilities. Appendix F holds a list of all related health and medicine lifeline related assets.

3.5.4 Lifeline: Energy



Energy Lifeline is designed to ensure the reliable and safe delivery of electricity, gas, and essential fuels during emergencies and disaster events. This lifeline is vital to sustaining the operation of critical facilities and services, including hospitals, water and wastewater systems, telecommunications, and other infrastructure that depend on uninterrupted energy supply.

FEMA recognizes that disruptions to energy services pose a direct threat to life safety and community stability. Accordingly, priority response actions include the rapid restoration of the electrical grid, the deployment of generators to critical facilities, coordination with fuel suppliers, and the implementation of temporary measures to maintain service continuity.

The Energy Lifeline in Jayuya consists of facilities that support the generation, transmission, distribution, and availability of fuel and electrical power necessary for the continued operation of critical services and community functions. According to the municipal critical infrastructure inventory, the Energy Lifeline includes local fuel service stations and electrical infrastructure that support residential, commercial, and emergency operations throughout the municipality. These facilities are primarily concentrated along the municipality's principal transportation corridors and near the urban center, where they serve both the local population and emergency response agencies. . Appendix F holds a list of all related energy lifeline related assets

3.5.5 Lifeline: Communications

The purpose of this lifeline is to ensure the availability and reliability of essential communication systems during emergencies and disaster events. These systems include telephone networks, internet services, radio, television, and public alert and warning platforms, all of which are critical for coordinating response activities, disseminating timely information, and maintaining communication between authorities and the public.



FEMA indicates that disruption of the Communications Lifeline can severely impair life-saving operations and effective resource management. Accordingly, priority

actions include the restoration of telecommunications infrastructure, deployment of temporary communication solutions such as satellite systems, ensuring redundancy within critical networks, and maintaining accessible communication channels for the public.

The Communications Lifeline in Jayuya encompasses the systems, facilities, and capabilities that enable the transmission of information necessary for emergency management, public safety, government operations, and public awareness before, during, and after hazard events. Although communications facilities are not identified as a distinct category within the municipal critical infrastructure inventory, communications capabilities are supported through key government and emergency response facilities, including the Municipal Office of Emergency Management (OMME), Municipal Police Headquarters, Virtual Surveillance Center, Fire Station, and City Hall (Casa Alcaldía), which facilitate incident coordination, emergency notifications, situational awareness, and interagency communications.

In accordance with FEMA's Community Lifelines framework, reliable communications are essential to supporting all other lifelines by enabling emergency response coordination, dissemination of public information, resource management, damage assessment, and continuity of operations. Effective communications systems are particularly important in Jayuya due to its mountainous terrain, dispersed rural communities, and reliance on transportation corridors that may be impacted by hurricanes, severe storms, flooding, or landslides.

For the current planning mitigation exercise, there a communication site database was not abled to be identified.

3.5.6 Lifeline: Transportation



The purpose of the Transportation Lifeline is to ensure the safe and efficient movement of people, goods, and essential services during emergencies and disaster events. This lifeline supports the continued operation or rapid restoration of land, air, and maritime transportation routes, enabling access to critical resources such as food, potable water, medical care, and emergency response equipment.

FEMA indicates that disruptions to transportation systems directly affect the ability to save lives and distribute essential supplies. Accordingly, priority actions include reopening roadways, repairing damaged bridges, restoring airport and port

operations, and coordinating with state and private entities to maintain the logistics chain. Map 9 shows the roadway network of the Municipality of Jayuya.

The Transportation Lifeline in the Municipality of Jayuya is primarily supported by a network of Puerto Rico state roads and local secondary roads that provide connectivity between urban areas, rural communities, neighboring municipalities, and critical facilities. Due to Jayuya's mountainous topography, transportation infrastructure is concentrated along narrow river valleys and ridgelines, making the road network essential for emergency response, evacuation, delivery of supplies, and restoration of other community lifelines.

The municipality's principal transportation corridors include PR-144, which traverses the municipal center and connects Jayuya with neighboring municipalities including Utuado, Ciales, and Orocovis; PR-143, which provides southern access toward Juana Díaz and Ponce through the Cordillera Central; and PR-140, which serves western and southwestern sectors of the municipality. Additional regional connectivity is provided by PR-141, which links northern sectors such as Mameyes Arriba and Río Grande with adjacent municipalities. The municipal road system is further supplemented by secondary routes including PR-530, PR-531, PR-532, PR-527, PR-528, PR-533, PR-539, PR-613, PR-5141, PR-5144, and PR-5527, which provide access to dispersed rural communities and support local circulation throughout the municipality.

Transportation access is particularly important for connecting population centers in Barrio Pueblo, Río Grande, Mameyes Arriba, Jayuya Abajo, Coabey, Veguitas, Collores, Zamas, Pica, and Jauca. These routes facilitate access to critical facilities, emergency shelters, healthcare services, public safety facilities, and logistical distribution points during emergencies. Appendix F holds a list of all transportation lifeline related assets

3.5.7 Lifeline: Hazardous Materials



The purpose of this lifeline is to prevent hazardous material releases, control spills, and protect communities located near industrial facilities, chemical plants, and hazardous materials transportation corridors.

FEMA indicates that disruption or failure of the Hazardous Materials Lifeline can result in severe consequences, including widespread contamination and the impairment of essential services. Accordingly, priority actions include identifying hazardous materials, activating specialized Hazardous Materials (HazMat) response teams, coordinating with federal and state agencies, and implementing rapid response protocols. Although hazardous materials may be present throughout the municipality, incidents involving hazardous materials are more likely to occur within industrial areas.

3.5.8 Lifeline: Water Systems



This lifeline highlights the critical role of water infrastructure in disaster response and recovery. Its primary objective is to ensure reliable access to and the timely restoration of drinking water and wastewater services, which are essential to public health, safety, and economic stability. The Water Systems Lifeline is structured around two core components: Potable Water Infrastructure, which includes water intake, treatment, storage, and distribution; and Wastewater Management, encompassing the collection, storage, treatment, and discharge of wastewater. By prioritizing the protection and functionality of water systems, FEMA seeks to maintain sanitation, support healthcare services, and minimize cascading impacts on food safety and overall community resilience.

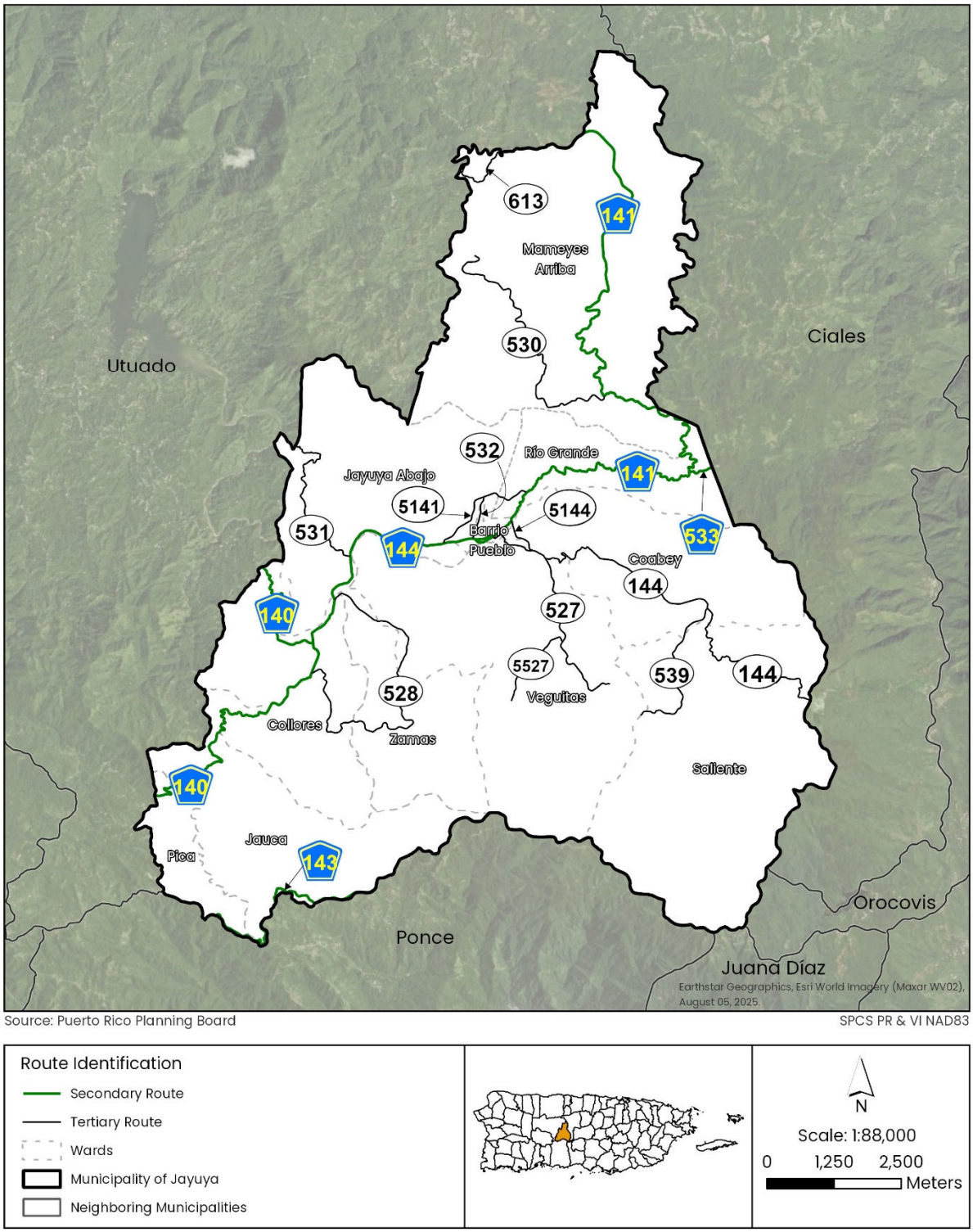
The Water Systems Lifeline in the Municipality of Jayuya supports the delivery of potable water, wastewater collection and treatment, fire suppression capabilities, healthcare operations, emergency shelters, government facilities, businesses, and residential communities throughout the municipality. Reliable water service is essential for protecting public health, sustaining emergency response operations, and supporting the recovery of all other community lifelines following a disaster.

Jayuya's water infrastructure serves both the urban center and dispersed rural communities located throughout the barrios of Jayuya Pueblo, Jayuya Abajo, Río

Grande, Mameyes Arriba, Coabey, Veguitas, Collores, Zamas, Pica, Jauca, and Saliente. Due to the municipality's mountainous terrain and widely distributed population, water service infrastructure relies on a combination of treatment, storage, transmission, pumping, and distribution facilities that convey water across significant elevation changes. As a result, the continued operation of pumping stations, storage tanks, and transmission mains is critical for maintaining service to communities located at higher elevations and remote sectors.

Appendix F holds a list of all related water systems lifeline related assets

Map 9: Roadways



3.6 Recent Development (E1-a)

Hazard mitigation planning must also account for future development conditions. To assess anticipated development trends within the municipality, historical patterns were evaluated using data on construction permits approved between 2020 and 2026. This period begins with the year following approval of the previous hazard mitigation plan. It should be noted that data for 2026 are completed by June 30, 2026.

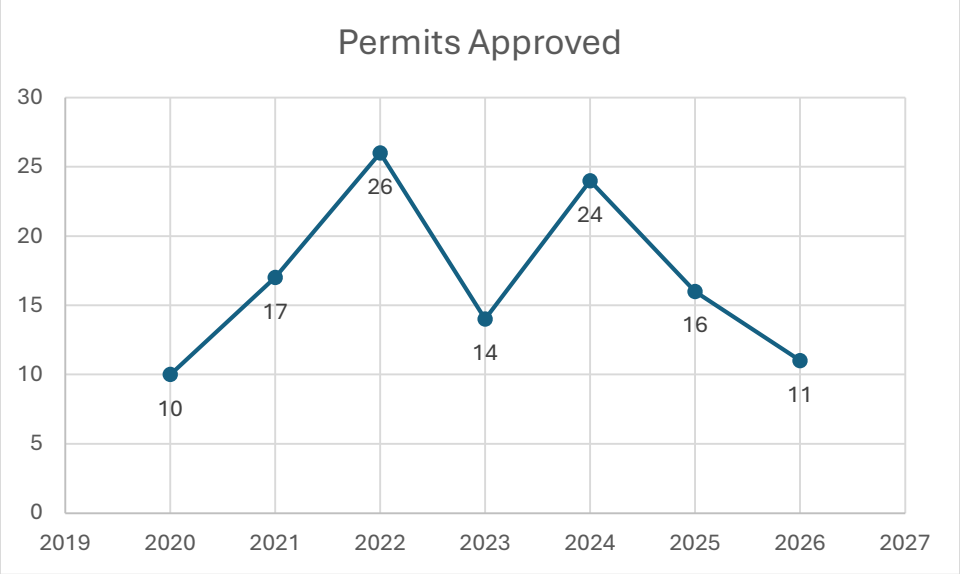
The data indicate a notable increase in construction activity during the COVID-19 pandemic period (2020–2022). This rise in permit approvals may be associated with the availability of federal stimulus funding provided during that time; however, additional analysis would be required to confirm any direct relationship. Based on the available data, the Municipality of Jayuya records an average of 17 construction permits approved per year. Table 8 and Figure 12 present the number of constructions permit approved between 2020 and 2026. Maps 10 and 11 illustrate the spatial distribution of these permits.

Table 8: Jayuya: Construction Permits Approved 2020-20264

Construction Permits 2020-2026	
Year	**Permits Approved**
2020	10
2021	17
2022	26
2023	14
2024	24
2025	16
2026	11

[4] 2026 total only accounts for permits up to June 20, 2026

Figure 13: Jayuya Construction Permits Approved 2020-2026[5] –



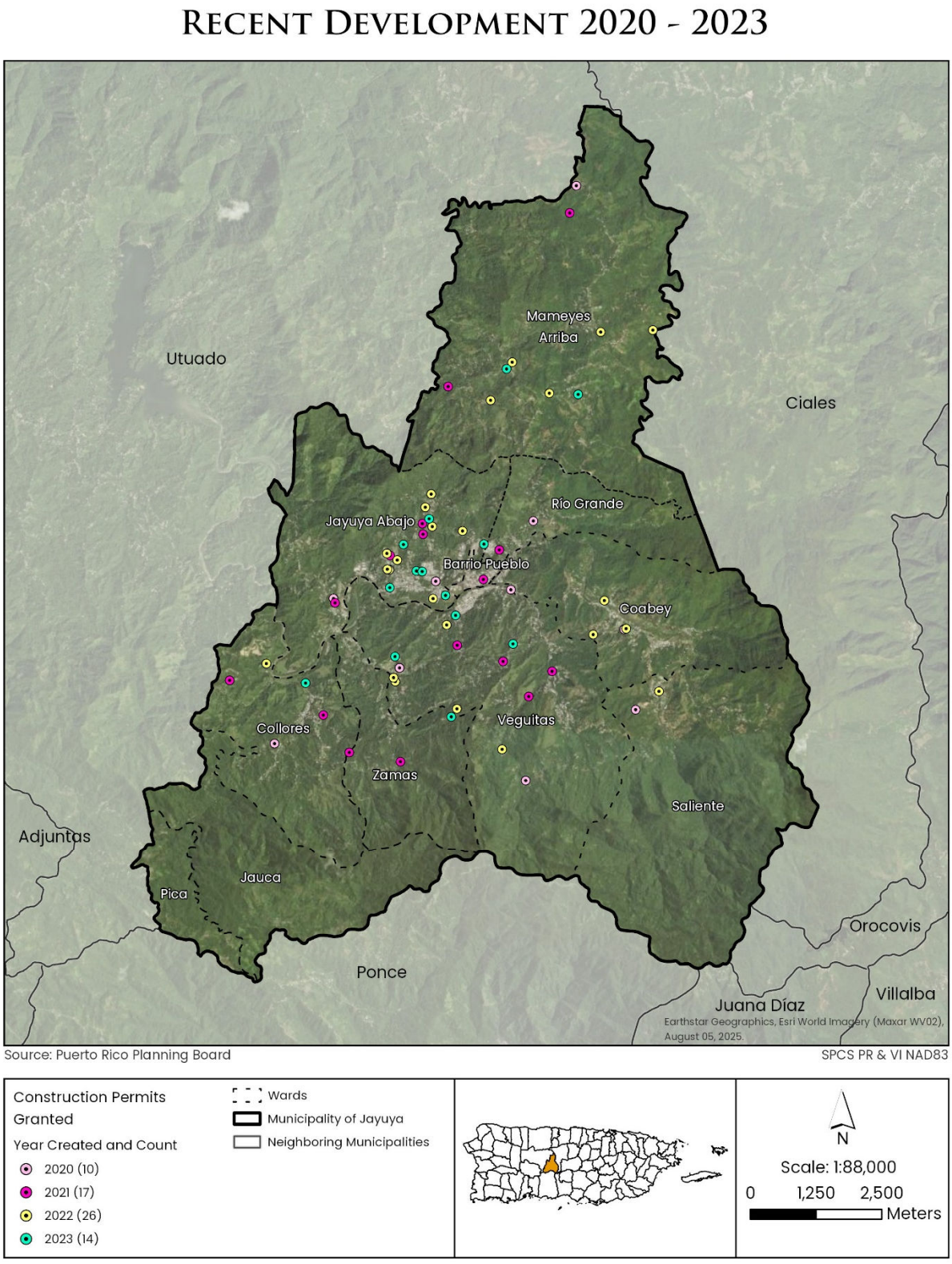
A review of construction permit activity between 2020 and 2026 indicates that recent development within the Municipality of Jayuya has remained generally low to moderate in intensity and dispersed throughout the municipality, consistent with its rural and mountainous character. The mapped permit data show a total of 67 construction permits issued between 2020 and 2023 and 51 permits issued between 2024 and 2026, for a combined total of 118 permitted developments during the update period.

Development activity is concentrated primarily within and surrounding Barrio Pueblo, Jayuya Abajo, Río Grande, Veguitas, Coabey, and portions of Mameyes Arriba, reflecting continued investment in areas with established access to transportation corridors, utilities, and community services. Additional scattered development is observed throughout Collores, Zamas, Jauca, Pica, and Saliente, indicating continued occupancy and incremental growth in rural sectors.

The spatial distribution of permits suggests that recent development has largely occurred as infill development, residential construction, rehabilitation, small-scale commercial improvements, and accessory structures, rather than large-scale subdivisions or major commercial expansion. Development patterns remain closely associated with existing roadway networks, particularly along the PR-144, PR-141, PR-143, and PR-140 corridors and their connecting local roads.

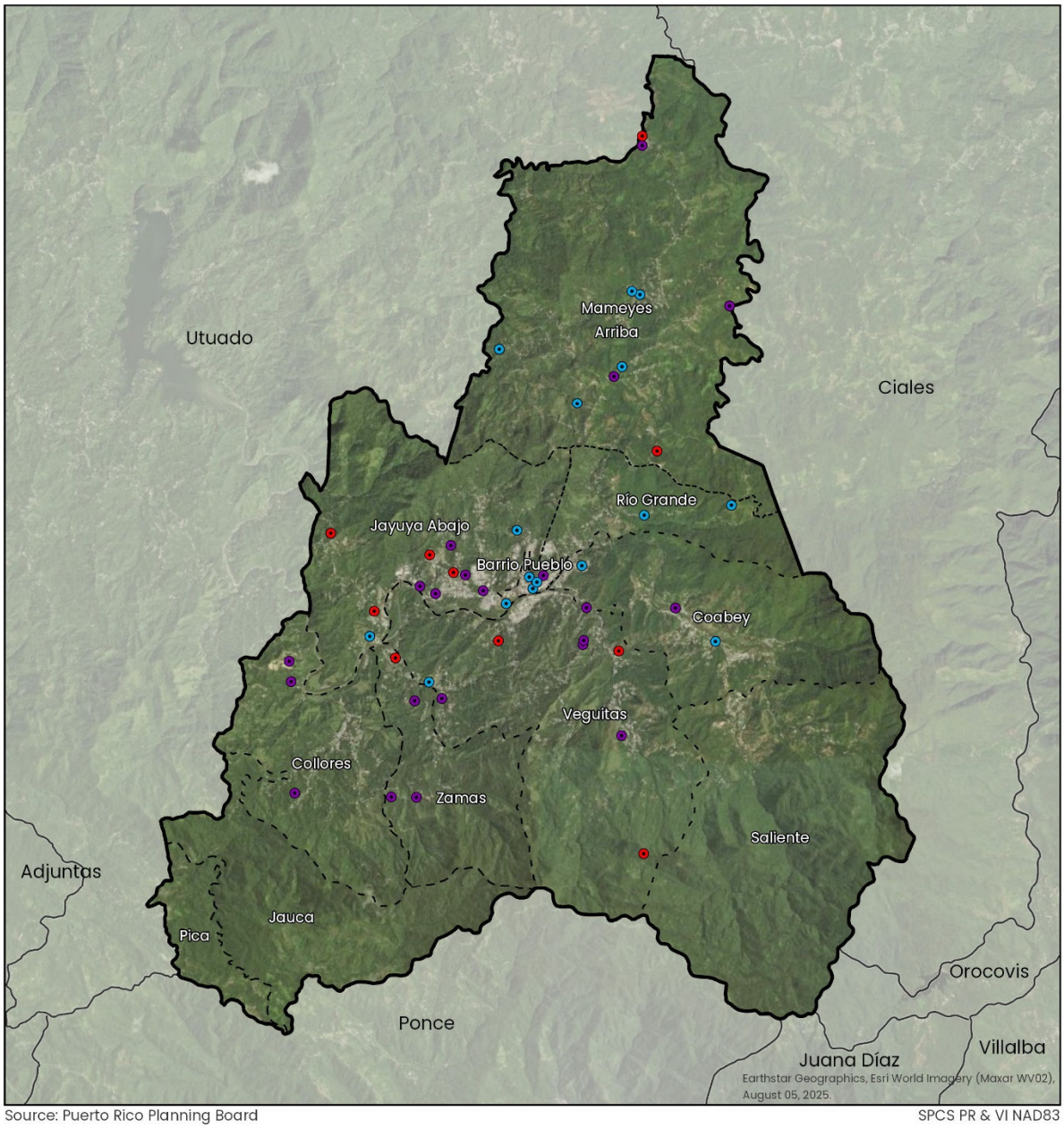
[5] 2026 total only accounts for permits up to June 20, 2026

Map 10: Recent Developments 2020-2023



Map 11: Recent Developments 2024-2026

Recent Development 2024 - 2026



Source: Puerto Rico Planning Board

SPCS PR & VI NAD83

Construction Permits Granted

Year Created and Count

- 2024 (24)
- 2025 (16)
- 2026 (11)

- Wards
- Municipality of Jayuya
- Neighboring Municipalities



N

Scale: 1:88,000

0 1,250 2,500 Meters

4. Hazards Profiles and Risks Analysis (B1-a)

4.1 Note on the Discussion of Hazards

The 2020 LHMP divided the discussion of the considered hazards into two separate and non-continuous sections. This arrangement made the analysis of the hazard cumbersome since the reader had to go back and forth between two different sections of this large document. In order to improve this, this new LHMP discusses both the profile of the hazard and the risk associated in one single section.

4.2 Regulatory Requirements

Federal regulation 44 C.F.R. § 201.6(c)(2) establishes the requirements related to hazard identification and risk assessment for LHMP. The Plan LHMP must include the following:

- An assessment that provides the basis for identifying the proposed activities aimed at reducing losses associated with the identified hazards. Local risk assessments must provide sufficient information to enable the jurisdiction to identify and prioritize appropriate mitigation actions to reduce losses related to the identified hazards. The hazard assessment must include:
    - A description of the type, location, and extent of all natural hazards that may affect the jurisdiction. It must contain information on previous occurrences of hazard events and the probability of future hazards.
    - A description of the jurisdiction's vulnerability to the identified hazards. This description must include a comprehensive summary of each hazard and its impact on the community. This Plan must describe vulnerability in terms of:
        - The number of existing structures, infrastructure, and critical facilities located within identified hazard areas;
        - An estimate of the potential monetary losses to structures identified as vulnerable, along with a description of the methodology used to prepare the estimate; and, lastly,
        - A general description of land use and development patterns within the community so that mitigation options can be considered in future land-use decisions.
    - A description of all structures insured under the National Flood Insurance Program (NFIP) that have experienced repetitive damage from different flood events. It must explicitly indicate whether the community participates in the NFIP and complies with its regulations. It must also include a table showing repetitive property losses along with a table of NFIP claims and losses.

4.3 Hazards that can Affect the Municipality

To determine the hazards to be addressed in this LHMP, the Municipality reviewed and integrated information from the 2026 Puerto Rico State Hazard Mitigation Plan, the 2020 Jayuya Local Hazard Mitigation Plan, and the latest LHMP's of the municipalities that share a boundary with Jayuya.[6] The following table summarizes the hazards addressed in these Hazard Mitigation Plans. A check mark indicates that the hazard was included in the corresponding plan, while an "X" denotes that it was not.

Table 16: Historical Hazards Inventories

Hazard	2026 PRSHMP	2020 Jayuya LHMP	Neighboring Municipalities
Earthquake/Liquefaction	✓	✓	✓
Landslides	✓	✓	✓
Tsunami	✓	✗	✓
Flooding	✓	✓	✓
Storm Surge	✗	✗	✗
Coastal Dynamics	✓	✗	✗
Sea Level Rise	✗	✗	✓
Extreme Winds Hazard	✓	✓	✓
Extreme Heat	✓	✓	✓
Drought	✓	✓	✓
Wildfire	✓	✓	✓
Pandemic/Epidemic	✓	✗	✗
Tropical Cyclones	✓	✓	✓

[6] The Municipalities ofUtuado, Ciales, Orocovis, Juana Diaz, and Ponce.

After reviewing the hazard profiles contained in these documents, the Municipality of Jayuya determined that the following hazards shall be assessed and evaluated as part of the 2026 LHMP:

Table 9: Hazards to be included in the Jayuya 2026 LHMP

Hazard	Included in Jayuya 2026 LHMP	Comments
Earthquake	Yes	It is included given Puerto Rico's location among major fault lines and the 2020 Seismic activity.
Landslides	Yes	It is included given the high propensity for landslides in Jayuya's territory.
Tsunami	No	It is not included in the plan because Jayuya is an inland municipality and is not directly exposed to tsunami hazards.
Flooding	Yes	It is included given the presence of flood zones in the municipality.
Tropical Cyclones/Extreme Winds	Yes	It is included given that the southeastern region of Puerto Rico has been the most recurrent point-of-entry for hurricanes that make landfall in Puerto Rico in recorded history. (National Oceanic and Atmospheric Administration, 2026)
Storm Surge	No	Not applicable to Jayuya
Long Term Coastal Dynamics	No	This hazard is not included in the plan because Jayuya is an inland municipality and does not have a coastline.
Extreme Heat	Yes	A new inclusion, various of Jayuya neighboring communities included this hazard. The Municipality understands

Hazard	Included in Jayuya 2026 LHMP	Comments
		that the inclusion of this hazard in the updated LHMP is warranted.
Drought	Yes	It is included given the 2014-2016 droughts and recent periods of moderate drought
Wildfire	Yes	Jayuya's neighboring communities included this hazard. The Municipality understands that the inclusion of this hazard in the updated LHMP is warranted.
Pandemic/Epidemic	Yes	The municipality of Jayuya included this in the previous LHMP. It will be considered by the LHMP update given the COVID -19 emergency declaration of 2020.

The hazards shall be evaluated in the following order:

Table 10: Order of Hazards to be Assessed

Classification	Hazard
Geological Hazards	Earthquake
	Landslides
Hydrological Hazards	Flooding
Meteorological Hazards	Tropical Cyclone/Extreme Winds
	Extreme Heat

Classification	Hazard
	Drought
Environmental Hazards	Wildfire
Biological Hazards	Pandemic/Epidemic

4.4 Chronology of Events

To prevent duplication of data and for easy reference in the discussion of each hazard profile the reader will find a chronology of events in the discussion of the hazard itself.

4.5 Risk Assessment Methodology

This section describes the methodologies employed to evaluate the identified hazards. Given that each hazard presents distinct characteristics, data needs, and levels of uncertainty, multiple analytical approaches were utilized to ensure a thorough, accurate, and comprehensive risk assessment.

4.5.1.1 HAZUS 6.1

HAZUS is a Geographic Information System (GIS)–based risk assessment tool developed by FEMA to estimate potential losses associated with natural hazards. The software applies scientific modeling and spatial datasets to evaluate the impacts of events such as earthquakes, floods, hurricanes, and tsunamis on buildings, infrastructure, population, and the local economy. HAZUS generates detailed estimates of physical damage, economic losses, and social consequences, thereby supporting hazard mitigation planning, emergency preparedness, and recovery efforts. By integrating data on hazard intensity, exposure, and vulnerability, HAZUS enables decision-makers to prioritize mitigation strategies and allocate resources effectively. The following hazards were evaluated using the HAZUS 6.1 platform:

- Earthquake
- Tropical Cyclone/Extreme Winds
- Flooding

4.5.1.2 Alternative GIS modeling

Certain hazards are not currently modeled in HAZUS; however, they can be evaluated using alternative GIS-based techniques. ESRI® ArcGIS Pro™ 3.6 was utilized to assess hazard vulnerability by incorporating digital risk datasets and the hazard information database previously described. Using these spatial data layers, vulnerability was estimated by identifying the number of critical facilities and buildings located within hazard-prone areas. It is important to note that this method may overestimate exposure levels. In this LHMP, the following hazards were assessed using this GIS-based approach:

- Landslides[7]

4.5.1.3 Stochastic Risk Assessment

The stochastic risk assessment methodology was applied to evaluate hazards that are not addressed by existing hazard models or GIS-based analyses. This method is particularly appropriate for hazards that lack defined geographic boundaries and therefore cannot be reliably examined through spatial analysis. The approach allows for the incorporation of estimated annual losses and impact data; however, the accuracy of the results is highly dependent on the availability and quality of the underlying datasets.

In the case of this LHMP, the hazards evaluated using this methodology are:

- Extreme Heat
- Drought
- Wildfire
- Pandemic/Epidemic

4.6 Earthquake

4.6.1 Description (B1-a)

An earthquake is a sudden movement of the Earth's crust generated by seismic waves that propagate outward in all directions from the focus, or point of origin (FEMA, 1997). The focus is the location within the Earth where the displacement of rocks along a fault initiates, while the epicenter refers to the point on the Earth's surface situated directly above the focus (Puerto Rico Seismic Network, 2019). Earthquakes may occur due to

[7] Correction Notice – The 2020 LHMP erronesly identified that landslides were model using HAZUS. This is incorrect as HAZUS does not model landslide hazards.

changes in pressure within the Earth's crust, including tectonic plate movement, rock rupture, volcanic activity, landslides, or the collapse of underground cavities.

Most earthquakes result from the release of accumulated stress generated by the displacement of rocks along faults within the Earth's outer crust. These faults are generally located along the boundaries of the planet's major tectonic plates. The highest levels of tectonic instability occur at plate margins where slow, opposing movements create substantial pressure due to plates traveling in different directions and at varying speeds. This deformation along plate boundaries causes stress to build in the surrounding rock. When the accumulated stress surpasses the strength of the rock, a rupture occurs, releasing stored energy in the form of seismic waves that propagate outward and produce an earthquake (NMEAD, 2021).

Earthquakes can impact extensive geographic areas, causing tens of billions of dollars in property damage, significant loss of life, numerous injuries, and widespread disruption to the social and economic stability of affected communities. Most structural damage and earthquake-related fatalities result from building collapse triggered by ground shaking (NMEAD, 2021). The severity of impacts depends on the amplitude and duration of seismic shaking, which are influenced by factors such as earthquake magnitude, proximity to the fault rupture, and the local and regional geologic conditions (NMEAD, 2021). Additional hazards associated with earthquakes include landslides where soil and rock masses move downslope and liquefaction, a process in which saturated soils lose their rigidity and behave like a fluid. Liquefaction can cause foundations and structures that rely on soil stability to shift, tilt, or collapse.

Puerto Rico is located near the boundary between the North American and Caribbean tectonic plates, within a subduction zone where one plate gradually descends beneath the other. This tectonic environment is characterized by significant seismic activity and lateral displacement. The relative movement between these two plates is approximately 2 centimeters per year (Puerto Rico Seismic Network, 2019). According to the Puerto Rico Seismic Network, seismic activity in the region is concentrated in eight (8) primary zones:

- The Puerto Rico Trench to the North,
- The North and South Slope Faults of Puerto Rico,
- The "Sombrero Zone", to the Northeast,
- The Mona Passage to the West
- The Mona Canyon to the West,
- The Virgin Islands and Anegada depressions to the East,
- The Muertos Trough to the South,

- The southwest of Puerto Rico

To describe earthquake size, seismology uses three (3) primary terms: intensity, magnitude, and ground acceleration. Intensity measures the level of shaking experienced by structures and the natural environment at a specific location. It varies based on the distance from the earthquake's focus and the duration of the shaking. Magnitude refers to the amount of energy released during the event, as recorded by seismometers. Ground acceleration expresses the force of the seismic waves acting on the ground and is commonly used to characterize the severity of an earthquake (PRSN, 2019).

Earthquakes can generate a variety of secondary hazards, including liquefaction, landslides, seismic wave amplification, and tsunamis. For the purposes of this analysis, the primary secondary hazard of concern is earthquake-induced liquefaction, as it is a condition for which mitigation strategies can be effectively developed once susceptible areas are identified and mapped. Liquefaction refers to the process in which certain saturated soils temporarily lose their structural strength and behave like a dense fluid, significantly reducing their load-bearing capacity (PRSN, 2019). Liquefaction typically occurs in areas underlain by medium- to fine-grained sandy soils that are saturated with water and of relatively recent geologic origin. These conditions are most found along river margins and within Quaternary (Q) alluvial deposits. Another secondary hazard associated with earthquakes is the amplification of seismic waves. Seismic wave amplification occurs in thick alluvial deposits where seismic waves decelerate, increasing their oscillation and causing the ground to experience stronger and more prolonged shaking.

4.6.1.1 Affected Area (B1-B)

The following maps measure the spectral acceleration and spectral displacement in HAZUS run scenarios.

Spectral Acceleration is measure used mainly in earthquake engineering to describe how strongly the ground motion from an earthquake would accelerate a structure with a specific natural period. This measure answers the question "If a building (or any structure) vibrates naturally at a certain period, how much acceleration would it experience during an earthquake?" or, how hard the ground is pushing on the building at a specific vibration period? The higher the spectral acceleration, stronger the forces acting on the structure will be, which can cause structural failure if the building isn't designed for it (USGS, 2019).

Spectral Displacement measures how far a structure is expected to move (deform) during an earthquake, based on its natural vibration period and damping. In other words, it answers: “For a building with a given natural period, what is the maximum displacement it would experience during earthquake shaking?” (National Institute of Building Sciences, 2020).

Furthermore, the maps show the Hazus scenario for .03 seconds and 1.0 seconds. The difference relates to how an earthquake impacts different types of structures based on the natural vibration period the building. The maps showing the 0.3-second scenario can affect buildings that are short, stiff structures like 1 or 2-story buildings. These buildings are rigid, so they vibrate quickly when the ground shakes. While the 1.0-second scenario that is more important for buildings are taller, more flexible structures, like mid- to high-rise buildings. These buildings are taller and less stiff and therefore sway more slowly (over a longer period) during an earthquake (FEMA, Hazus Earthquake Model User Guidance, 2024).

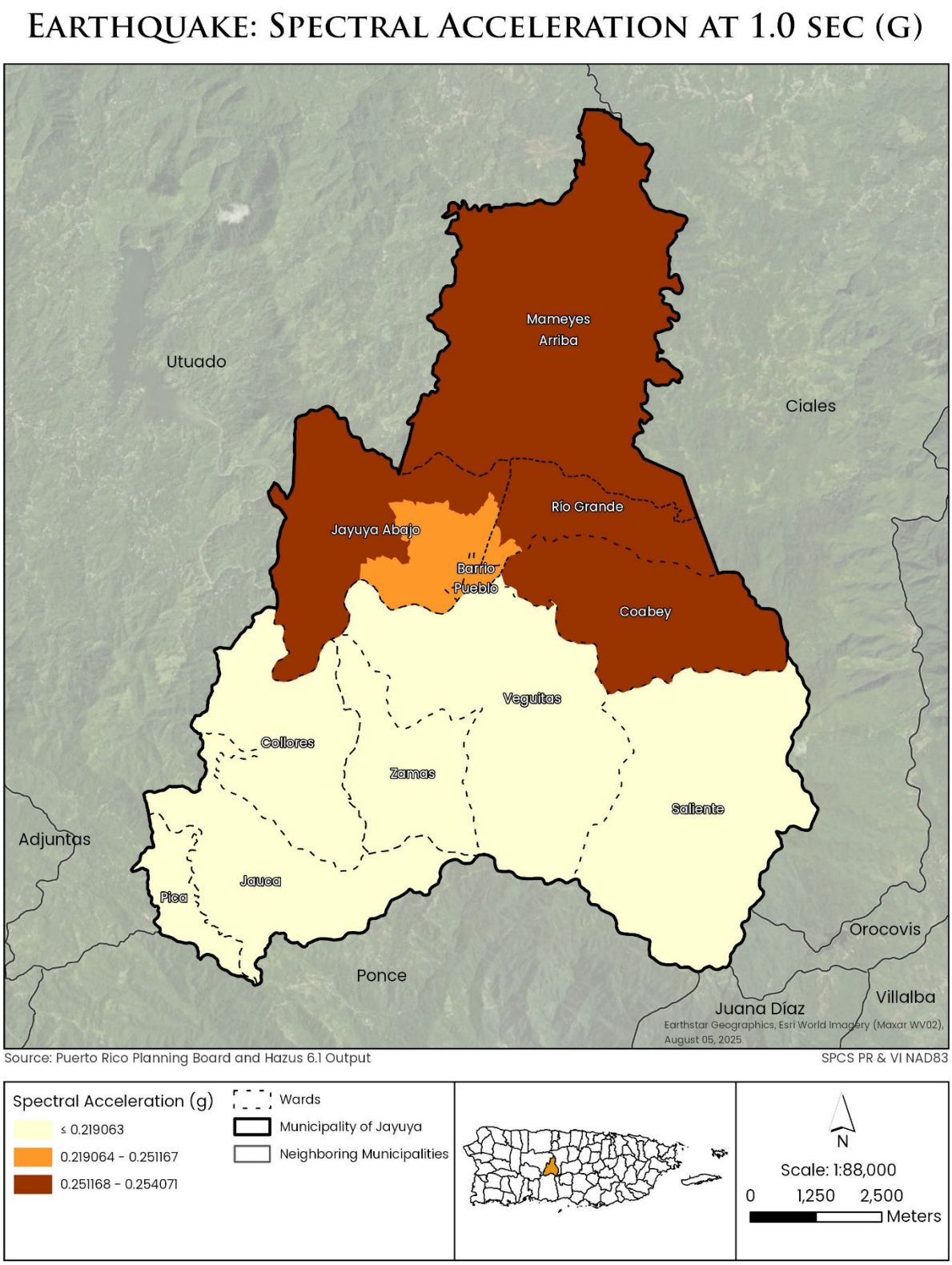
Earthquake hazard affects the entirety of the Municipality of Jayuya. Spectral acceleration mapping developed using HAZUS 6.1 and Puerto Rico Planning Board data indicates variations in expected ground shaking intensity across the municipality (Maps 12 and 13). The highest spectral acceleration values for both the 0.3-second and 1.0-second response periods are concentrated in the northern and central sectors of Jayuya, including the wards of Mameyes Arriba, Río Grande, Coabey, and portions of Jayuya Abajo. These areas exhibit the greatest potential for strong seismic ground motion and, consequently, an increased likelihood of structural damage, infrastructure impacts, and disruption to community services during a significant earthquake event.

Moderate spectral acceleration values are observed within and around the municipality's urban core, including Barrio Pueblo and adjacent portions of Jayuya Abajo. Given the concentration of population, government functions, commercial establishments, and transportation infrastructure in the urban center, earthquake impacts in these areas could result in substantial disruption despite slightly lower ground-motion values than those observed in northern wards.

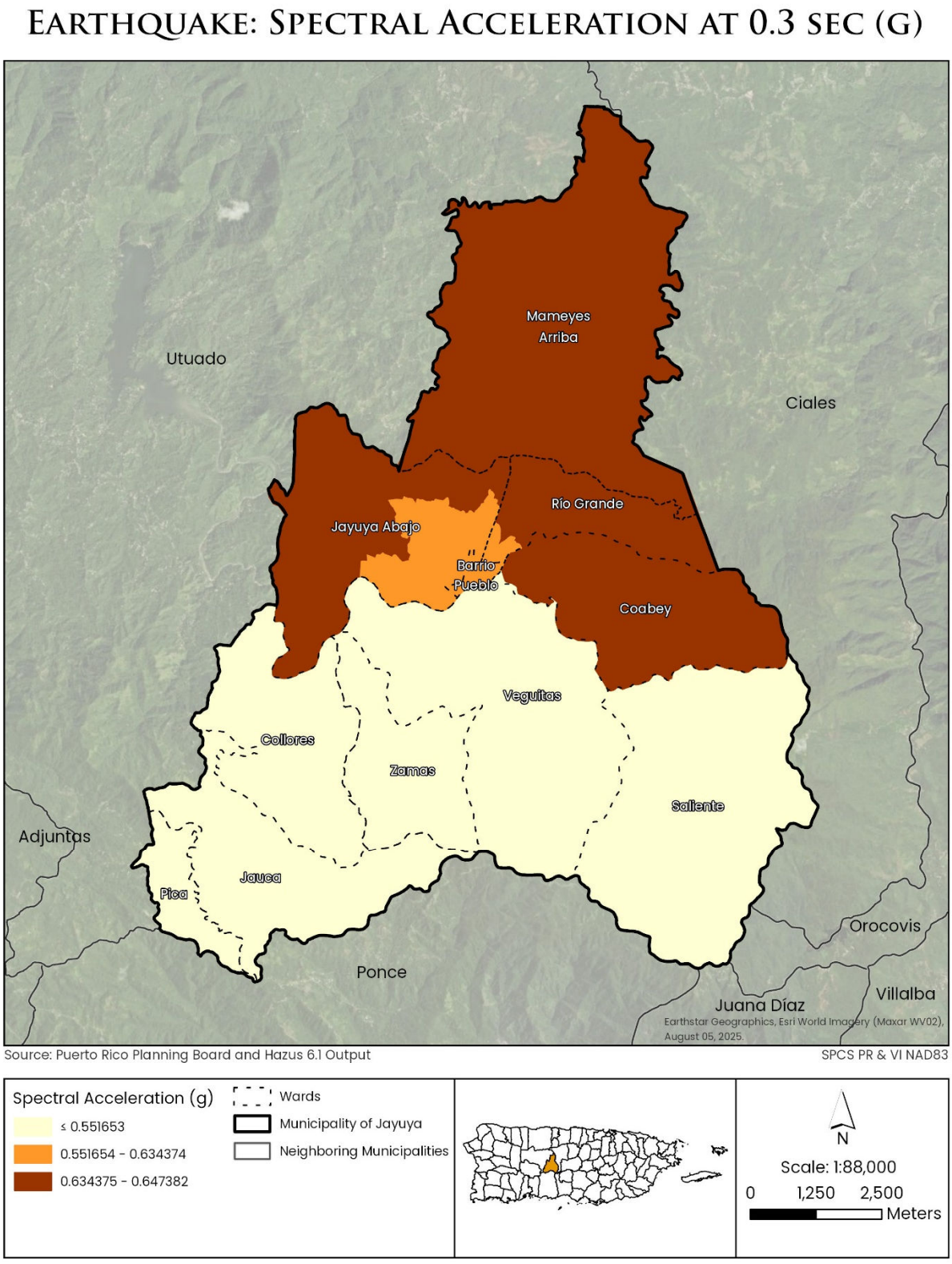
The lowest spectral acceleration values are mapped in the southern portion of the municipality, including the wards of Veguitas, Zamas, Collores, Jauca, and Saliente. Although these wards exhibit comparatively lower expected ground shaking, they remain vulnerable to earthquake effects and associated secondary hazards,

including rockfalls, landslides, slope failures, transportation disruptions, and utility outages due to Jayuya's mountainous terrain.

Map 12: Spectral Acceleration at 1.0 sec



Map 13: Jayuya Earthquake Spectral Acceleration at 0.3 sec



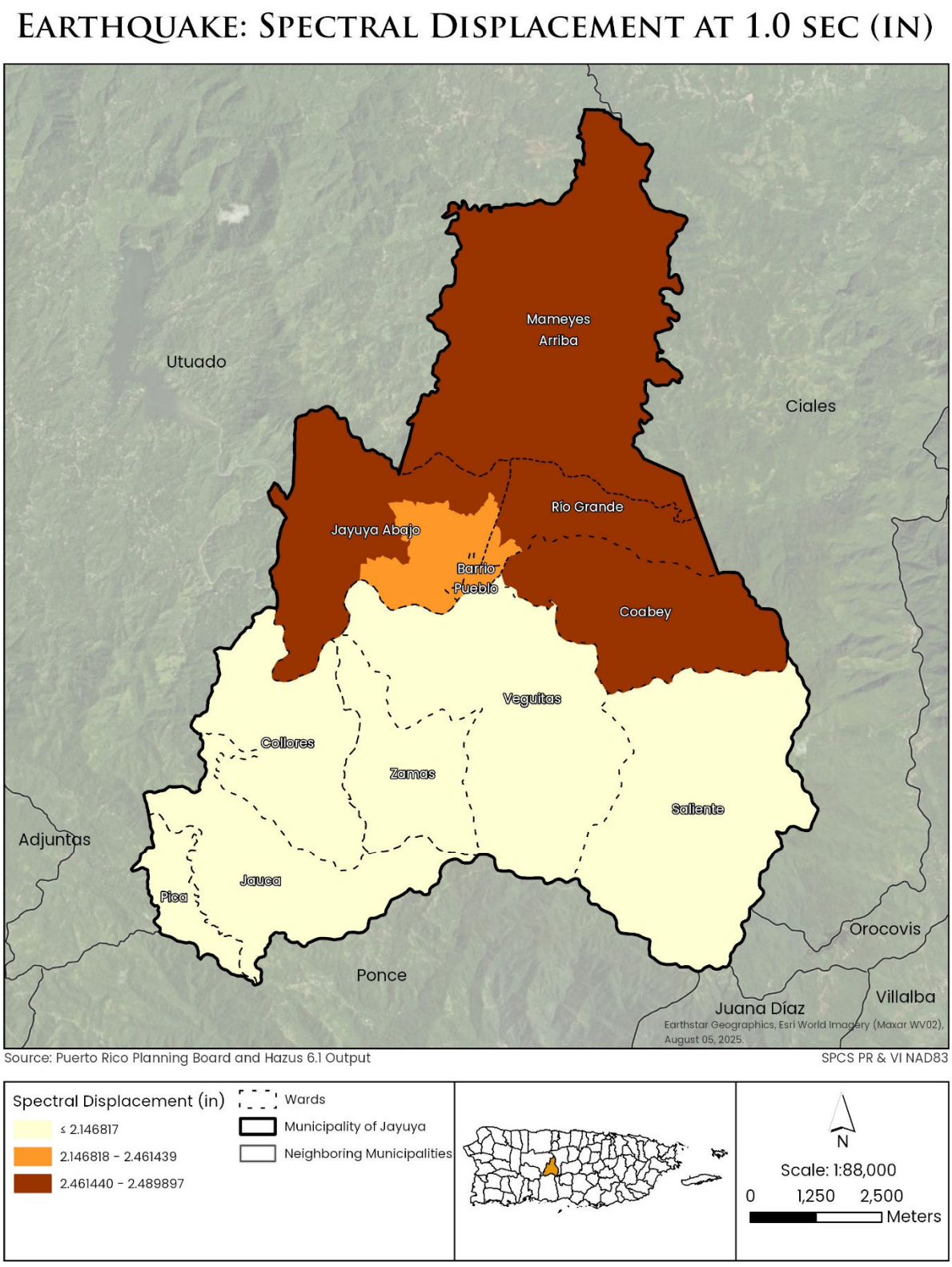
Overall, the spectral acceleration analyses indicate a north-to-south gradient in seismic hazard, with the highest ground-motion potential concentrated across approximately the northern half of the municipality. Nevertheless, because earthquake shaking can affect all wards simultaneously and trigger cascading impacts to transportation networks, utilities, communications infrastructure, public facilities, and emergency services, the entire municipal territory should be considered exposed to earthquake hazards for mitigation planning purposes.

These maps help identify areas where mitigation efforts may provide the greatest benefit. Potential mitigation considerations include seismic evaluation and retrofit of critical facilities, incorporation of earthquake-resistant design practices in public infrastructure projects, enforcement of up-to-date building codes, and prioritization of emergency response planning for areas where higher seismic demand overlaps with concentrations of population and essential services.

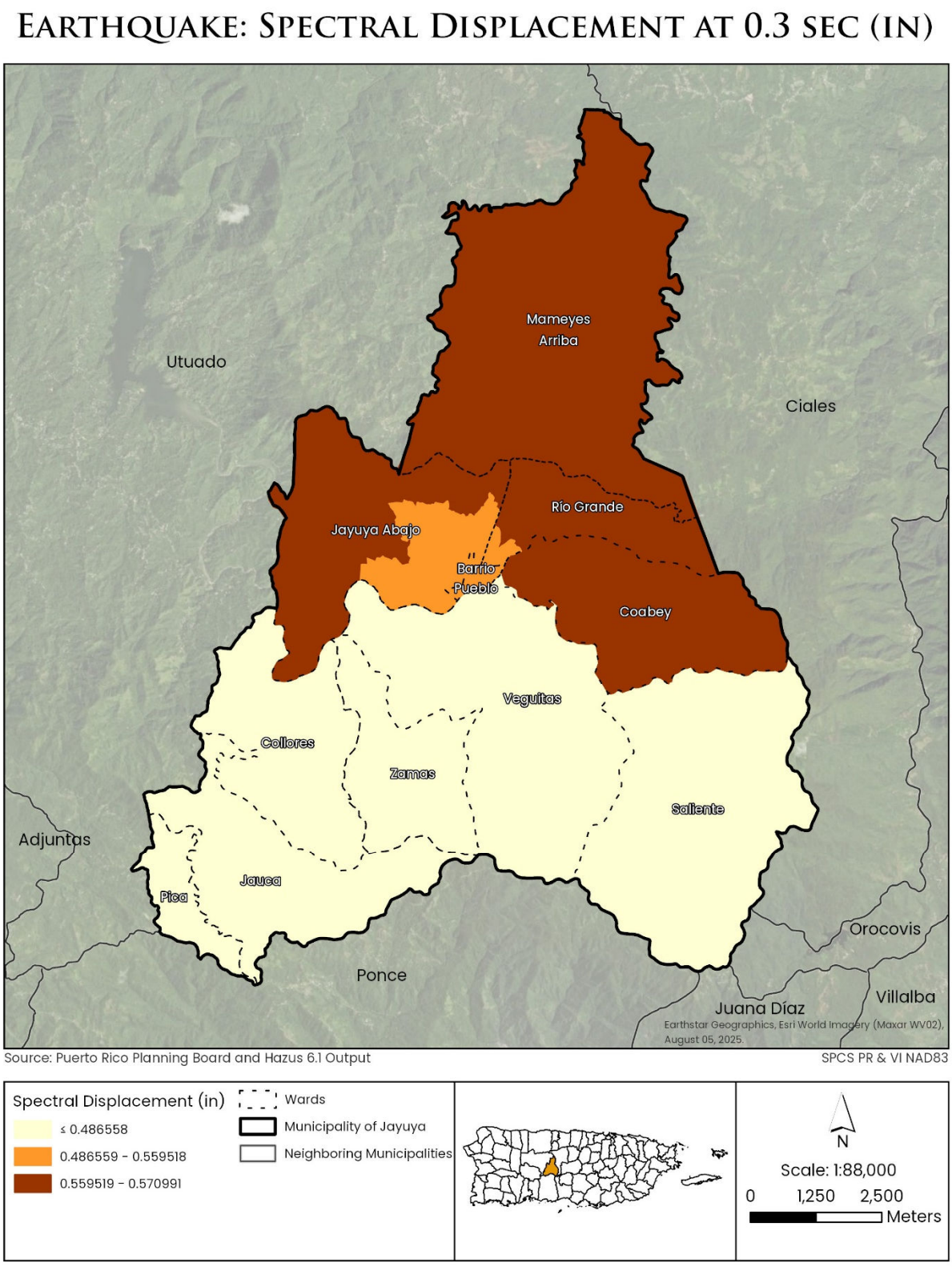
From a vulnerability perspective, the concentration of residential development, commercial activity, and critical facilities within the northern and central portions of Jayuya coincides with the areas exhibiting the highest modeled seismic demand. As a result, these sectors may experience comparatively greater potential for structural damage, disruption of essential services, and economic losses during a major earthquake. Future development and infrastructure investments, particularly within Barrio Pueblo, should continue to incorporate current seismic design standards and earthquake-resistant construction practices to reduce risk and improve community resilience.

Similarly, spectral displacement analyses for both the 0.3-second and 1.0-second response periods indicate a spatial pattern consistent with the spectral acceleration results, confirming that the highest earthquake impacts are expected in the northern and central portions of Jayuya (Maps 14 and 15). The greatest displacement values are concentrated within Mameyes Arriba, Río Grande, Coabey, and portions of Jayuya Abajo, while moderate displacement values occur in and around Barrio Pueblo and the surrounding urbanized areas. Lower displacement values are observed across the southern wards of Veguitas, Zamas, Collores, Jauca, and Saliente.

Map 14: Spectral Displacement at 1.0 sec



Map 15: Jayuya Spectral Displacement at 0.3 sec



Spectral displacement represents the maximum expected movement of structures subjected to earthquake ground motion. Higher displacement values indicate a greater potential for structural deformation, increased stress on building components, utility systems, bridges, retaining structures, and transportation infrastructure, particularly for structures with natural vibration periods similar to those represented by the model. Consequently, areas exhibiting the highest displacement values may be more susceptible to building damage, nonstructural failures, utility interruptions, roadway damage, and disruption of critical facilities during a significant seismic event.

The consistency between spectral acceleration and spectral displacement patterns suggests that the northern and central wards of Jayuya are exposed not only to the strongest ground shaking but also to the greatest potential structural movement during earthquakes. This concurrence reinforces the identification of these areas as having the highest relative earthquake hazard within the municipality.

Although lower displacement values are observed in the southern portion of the municipality, earthquake impacts remain possible throughout all wards. Given Jayuya's mountainous topography, seismic shaking may trigger secondary hazards such as landslides, rockfalls, slope failures, and transportation disruptions that extend beyond the areas of highest mapped displacement. Therefore, the entire municipality should be considered vulnerable to earthquake impacts for hazard mitigation and emergency management planning purposes.

4.6.1.2 Risk Magnitude (B1-C)

The size of an earthquake, commonly associated with the Richter Scale, is widely recognized but often misunderstood. The concept of a logarithmic magnitude scale was first introduced by Charles Richter in the 1930s to measure earthquakes in Southern California using high-frequency recordings from nearby seismograph stations. This original scale, designated as ML where “L” stands for “local” eventually became known as the Richter magnitude.

As global seismic monitoring networks expanded, it became evident that the Richter method was accurate only within specific frequency and distance ranges. To accommodate a broader range of seismic signals recorded worldwide, additional magnitude scales were developed as extensions of Richter’s original concept, including the body-wave magnitude (Mb) and the surface-wave magnitude (Ms). Each of these scales applies to a particular frequency range and type of seismic

waves, and within their respective valid ranges, they provide magnitudes equivalent to the Richter scale. (USGS, 2024)

Due to the limitations of the ML, Mb, and Ms scales, a more universally applicable scale moment magnitude (Mw) was developed. For large-magnitude earthquakes, Mw provides the most accurate and reliable estimate of earthquake size.

Moment is a physical quantity proportional to the amount of slip that occurs along a fault multiplied by the area of the fault surface that undergoes rupture. It reflects the total energy released by an earthquake. Moment can be derived from seismogram data and geodetic measurements and subsequently converted into a magnitude value using a standardized formula. The resulting measure, known as moment magnitude, provides a consistent and comparable estimate of earthquake size across the full range of magnitudes a capability that earlier scales do not offer (USGS, 2024). Table 11 below shows the Moment – Magnitude

Table 11: Moment - Magnitude Scale[8]

Range	Description
Mw < 3.0	Usually not felt by people.
Mw 3.0 – 4.9	Minor earthquakes, often felt but rarely cause damage.
Mw 5.0 – 5.9	Moderate can cause slight damage to poorly built structures.
Mw 6.0 – 6.9	Strong can cause significant damage in populated areas.
Mw 7.0-7.9	Major, serious damage over large areas.
Mw ≥ 8.0	Great earthquakes, catastrophic damage over very large regions.

4.6.1.3 Past Events (B1-d)

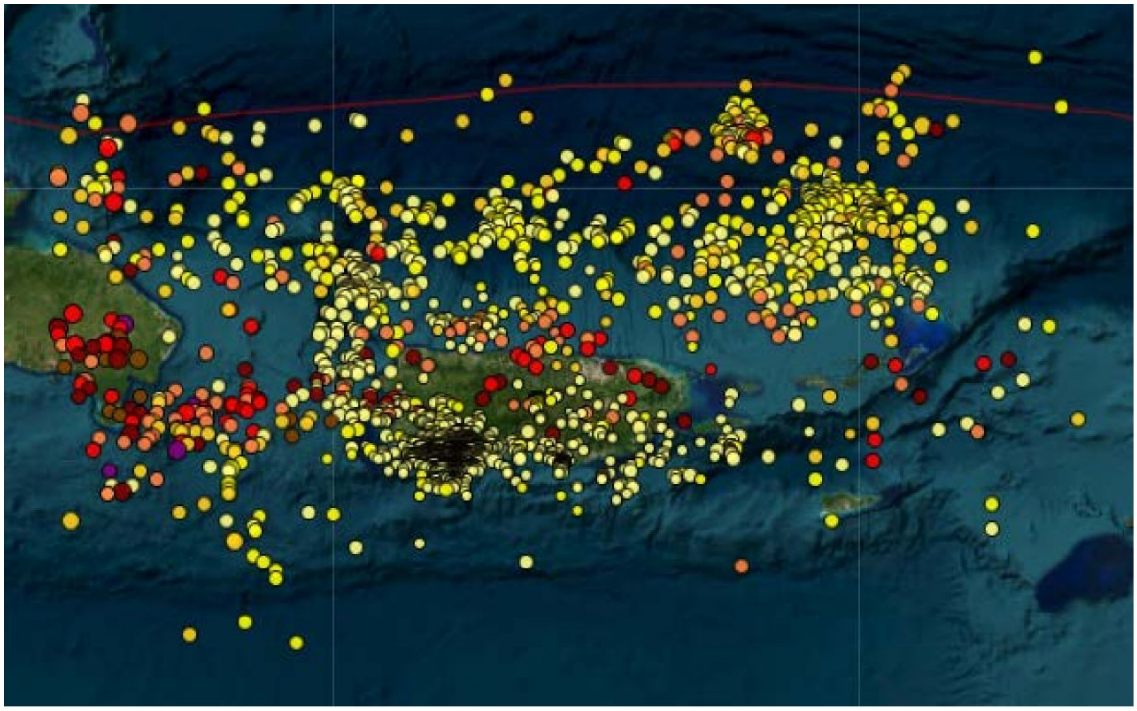
Earthquakes occur naturally daily, and their impacts increase significantly with greater magnitude. High-magnitude events can be particularly destructive, causing extensive property damage, loss of life, and severe disruption to affected regions. Puerto Rico is located near several active seismic zones including the Puerto Rico Trench, the Mona

[8] Source: USGS, 2025

Canyon, the Anegada Trough, the Muertos Trough, and the southern fault system placing the island at heightened risk for seismic events. Seismicity in the southeastern region of Puerto Rico is primarily associated with faults in the Virgin Islands and Anegada depressions. In the southwestern region, activity is influenced by the Punta Montalva fault (Roig Silva, 2010), an area that has experienced a notable increase in seismic activity in recent years (Weilert & Laó-Dávila, 2023).

Figure 13 is a screengrab sourced from a report published by the Puerto Rico Seismic Network (in Spanish). This report illustrates the epicenters of earthquakes recorded in the Puerto Rico and U.S. Virgin Islands region in 2024 (PRSN, 2025).

Figure 14: PRSN - 2024 Earthquakes Epicenter (PRSN, 2025)



Earthquake Chronology

Table 12 below shows the chronological list of the seismic activity in Puerto Rico for the period of 2012 to 2024 as reported by the PRSN (PRSN, n.d.).

Table 12: Puerto Rico Seismic Activity 2013-2024

Year	Description of seismic events
2024	The largest earthquake of 2024 occurred on May 14, 2024, at 8:30:11 p.m. (Puerto Rico local time). The magnitude 5.6 Ml earthquake was located 94.3 km north-northwest

Year	Description of seismic events
	of Aguadilla (PR) at a depth of 7 km. This moderate earthquake was widely felt throughout Puerto Rico, with a maximum intensity of V (Modified Mercalli Intensity Scale, MMI) in Aguadilla (PR). During 2024, aftershocks from the South-Southwest Puerto Rico seismic sequence continued. This sequence began on December 28, 2019, with a magnitude 4.7 Ml earthquake. The main event of this sequence occurred on January 7, 2020, in the southern region of Puerto Rico, 12.7 km south of Guayanilla, with a magnitude of 6.4 Mw. This strong earthquake, at a depth of 7 km, had a maximum intensity of VIII in Guánica, Puerto Rico, and caused major damage across the island. From the start of the South-Southwest Puerto Rico seismic sequence in 2019 through April 2024, 27,497 earthquakes associated with this sequence have been processed (Figure 2). More than 1,688 felt earthquakes and over 492 significant events with magnitudes greater than 3.5 have been recorded. Of these, 42 earthquakes had magnitudes greater than 4.5.
2023	The largest earthquake of 2023 occurred on December 9, 2023, at 10:27:22 a.m. (Puerto Rico local time). The magnitude 5.7 Ml earthquake was located 192.28 km east-northeast of San Juan, PR, at a depth of 7 km. This moderate earthquake was widely felt throughout Puerto Rico and the Virgin Islands, with a maximum intensity of V (Modified Mercalli Intensity Scale, MMI) in St. Thomas (USVI). During 2023, aftershocks from South-Southwest Puerto Rico seismic sequence continued. This sequence began on December 28, 2019, with a magnitude 4.7 Ml earthquake. The main event of this sequence occurred on January 7, 2020, in the southern region of Puerto Rico, 12.7 km south of Guayanilla, with a magnitude of 6.4 Mw. This strong earthquake, at a depth of 7 km, had a maximum intensity of VIII in Guánica, Puerto Rico, and caused major damage across the island.
2022	The seismic sequence in the South-Southwest region of Puerto Rico, which began on December 28, 2019, continues. From its onset until the March 2022 report by the Puerto Rico Seismic Network, a total of 19,436 earthquakes associated with this sequence had been recorded. In that report, 1,502 events were documented for 2022, of which 30 were reported as felt. The regions with the highest seismic activity during March 2022 were in the southern area of Puerto Rico.
2021	The largest earthquake of 2021 occurred on January 24, 2021, at 7:21:41 p.m. (Puerto Rico local time). The magnitude 5.4 Ml earthquake was located 44.82 km southeast of Virgin Gorda, BVI, at a depth of 94 km. This moderate earthquake was widely felt

Year	Description of seismic events
	throughout Puerto Rico and the Virgin Islands, with a maximum intensity of V (Modified Mercalli Intensity Scale, MMI) in Tortola, British Virgin Islands.
2020	The year 2020 was marked by significant seismic activity. An earthquake of magnitude 5.8 was recorded on January 6, 2020, followed by another of 6.4 on January 7, 2020, located 8 km from Indios, Puerto Rico. It is important to clarify that, starting from the 4.7 magnitude event recorded on December 28, 2019, up to October 22, 2020, approximately over 1,200 earthquakes of magnitude 2.0+ have been felt on the island. Tectonic activity in Puerto Rico is dominated by the convergence between the North American and Caribbean plates, with the island compressed between the two. To the north of Puerto Rico, the North American plate subducts beneath the Caribbean plate along the Puerto Rico Trench. To the south of the island, and south of the January 7 earthquake, the upper crust of the Caribbean plate subducts beneath Puerto Rico in the Muertos Trough. However, the January 6 earthquake and other recent events are occurring in the offshore deformation zone, connected by the Punta Montalva fault on land and the Guayanilla Canyon offshore. Between December 28, 2019, and January 23, 2020, southern Puerto Rico recorded 90 seismic events of magnitude 4.0 or greater, including the 6.5 magnitude earthquake on January 7, 2020, according to the USGS. These seismic movements led state authorities to request a disaster declaration from the President of the United States. This Disaster Declaration was issued on January 16, 2020, under number DR-4473. The Municipality of Jayuya was included among those designated to receive Individual and public Assistance funds from FEMA.
2019	During 2019, the Puerto Rico Seismic Network (PRSN) located a total of 6,510 earthquakes in the Puerto Rico and Virgin Islands region (our seismic responsibility area, between latitudes 17°N–20°N and longitudes 63.5°W–69°W). Compared to 2018 (3,974 earthquakes), the detected and located seismicity in 2019 increased. The year 2019 ended with 2,536 more earthquakes than the previous year. In 2019, the month with the highest activity was December with 1,291 earthquakes, while August had the lowest seismicity with 303 earthquakes. The region with the highest recorded seismicity during 2019 was the Mona Canyon with 1,288 seismic events, followed by the southern region of Puerto Rico with 885 earthquakes (Table 3). Earthquake depths ranged from 1 km to 191 km, and magnitudes varied from 0.34 Md to 6.0 Mw. Of the total earthquakes in 2019, 70 were reported as felt. On December 28, 2019, an active period of seismic activity began,

Year	Description of seismic events
	with a 4.7 magnitude earthquake, followed several hours later by another of 5.0 magnitude south of the island.
2018	During 2018, the Puerto Rico Seismic Network (PRSN) located a total of 3,974 earthquakes in the Puerto Rico and Virgin Islands region (our seismic responsibility area, between latitudes 17°N–20°N and longitudes 63.5°W–69°W). Compared to 2017 (3,129 earthquakes), the detected and located seismicity increased by 845 more earthquakes than the previous year. In 2018, the month with the highest activity was December with 549 earthquakes, while February had the lowest seismicity with 227 earthquakes. The region with the highest recorded seismicity during 2018 was the southern region of Puerto Rico with 412 seismic events, followed by the 19°N Fault Zone with 349 earthquakes. Earthquake depths ranged from 2 km to 185 km, and magnitudes varied from 0.63 Md to 4.67 Md. Of the total earthquakes in 2018, 29 were reported as felt within our area of responsibility.
2017	During 2017, the Puerto Rico Seismic Network (PRSN) located a total of 3,129 earthquakes in the Puerto Rico and Virgin Islands region (our seismic responsibility area, between latitudes 17°N–20°N and longitudes 63.5°W–69°W). Compared to 2016 (3,948 earthquakes), the detected and located seismicity decreased by 20%, which means 819 fewer earthquakes than the previous year. In 2017, the month with the highest activity was April with 518 earthquakes, while October had the lowest seismicity with 48 seismic events. The region with the highest recorded seismicity during 2017 was the Sombrero Seismic Zone with 856 seismic events, followed by the Virgin Islands Platform with 327 earthquakes. Earthquake depths ranged from 1 km to 180 km, and magnitudes varied from 0.85 Md to 4.8 Mb. Of the total earthquakes in 2017, 24 were reported as felt within our area of responsibility.
2016	During 2016, the Puerto Rico Seismic Network (PRSN) located a total of 3,947 earthquakes in the Puerto Rico and Virgin Islands region (our seismic responsibility area, between latitudes 17°N–20°N and longitudes 63.5°W–69°W). Compared to 2015 (3,235 earthquakes), the detected and located seismicity increased by 22.0%, or 712 more earthquakes than the previous year. In 2016, the month with the highest activity was September with 566 earthquakes, while March had the lowest seismicity with 169 earthquakes.

Year	Description of seismic events
	The region with the highest recorded seismicity during 2016 was the Sombrero Seismic Zone with 973 seismic events, followed by the Virgin Islands Platform with 497 earthquakes. Earthquake depths ranged from 1 km to 177 km, and magnitudes varied from 0.76 Md to 4.6 Ml. Of the total earthquakes in 2016, 28 were reported as felt within our area of responsibility.
2015	During 2015, the Puerto Rico Seismic Network (PRSN) located a total of 3,235 earthquakes in the Puerto Rico and Virgin Islands region (our seismic responsibility area, between latitudes 17°N–20°N and longitudes 63.5°W–69°W). Compared to 2014 (3,420 earthquakes), the detected and located seismicity decreased by 5.4%, or 185 fewer earthquakes than the previous year. In 2015, the month with the highest activity was July with 473 earthquakes, while April had the lowest seismicity with 157 earthquakes. The region with the highest recorded seismicity during 2015 was the Sombrero Seismic Zone with 588 seismic events, followed by the 19°N Fault Zone with 477 earthquakes. Earthquake depths ranged from 1 km to 211 km, and magnitudes varied from 0.80 Md to 4.80 Md (duration magnitude). Of the total earthquakes in 2015, 23 were reported as felt within the area of responsibility.
2014	During 2014, the Puerto Rico Seismic Network (PRSN) located a total of 3,420 earthquakes in the area of responsibility (AOR) known as the Puerto Rico and Virgin Islands Region (latitude 17.00˚ to 20.00˚N and longitude 63.50˚ to 69.00˚W). Compared to 2013 (2,293 earthquakes), the detected and located seismicity increased by 49%, which is 1,127 more earthquakes than the previous year. In this year, the month with the highest seismicity was January with 709 earthquakes, and the month with the lowest seismicity was November with 192 earthquakes. Of the total seismicity in 2014, 29 earthquakes (0.85%) were reported as felt, all located within our AOR. The magnitudes (Md) of the seismic events calculated for this year by PRSN ranged from 1.0 to 6.4, although for felt events they ranged from 2.53 Md to 6.4 Mwp. During 2014, depths varied between 1 km and 182 km, while for felt earthquakes they ranged from 6 km to 134 km. Earthquakes with depths of 0 to 25 km were the most frequent with 1,385 events, while those between 175 km and 200 km were the least frequent this year. The region with the highest recorded seismicity during 2014 was the 19°N Fault Zone with 905 seismic events, followed by the Sombrero Seismic Zone with 483 earthquakes.
2013	During 2013, the Puerto Rico Seismic Network (PRSN) located a total of 2,293 earthquakes in the Puerto Rico and Virgin Islands region (latitude 17.00˚ to 20.00˚N and longitude 63.50˚ to 69.00˚W). Compared to 2012 (2,852 earthquakes), the detected and located seismicity decreased by 20%, which is 559 fewer earthquakes

Year	Description of seismic events
	than the previous year. In this year, the month with the highest seismicity was September with 272 earthquakes, and the month with the lowest seismicity was February with 114 earthquakes. Of the total seismicity in 2013, 44 earthquakes (1.92%) were reported as felt, all located within the Puerto Rico and Virgin Islands region. The magnitudes of the seismic events calculated for this year by PRSN ranged from 1.0 to 5.12, although for felt events they ranged from 2.36 to 5.12. During 2013, depths varied between 1 km and 182 km, while for earthquakes they ranged from 4 km to 112 km. The region with the highest recorded seismicity during 2013 was the Sombrero Seismic Zone with 504 seismic events, followed by the Virgin Islands Platform with 246 earthquakes. Through its educational program, PRSN reached 14,099 people in Puerto Rico and the U.S. and British Virgin Islands during 2013.

2020 Seismic Sequence

In early January 2020, Puerto Rico experienced a significant seismic sequence that began with a series of foreshocks and culminated in a major earthquake on January 7. The main shock registered a magnitude of 6.4 Mw and struck along the island's southern coast, severely affecting the municipalities of Guayanilla, Ponce, and Yauco. This event was preceded by a magnitude 5.8 Mw earthquake on January 6, which had already caused widespread concern and notable structural damage (USGS, n.d.). The seismic activity was associated with the complex interaction between the Caribbean and North American tectonic plates, a region characterized by active subduction zones and fault systems. The resulting shaking was felt across the island, causing power outages, school closures, and the collapse of numerous structures, including residential and public buildings.

The aftermath of the earthquake resulted in extensive damage to homes and critical infrastructure, displacing thousands of residents and prompting a federal emergency declaration. The southern region experienced prolonged aftershocks—some exceeding magnitude 5.0, which continued for weeks, intensifying public concern and creating sustained disruption. This event underscored Puerto Rico's heightened vulnerability to seismic hazards and highlighted the importance of preparedness measures and resilient construction practices. The incident received a Presidential Disaster Declaration under the Stafford Act (DR-4473-PR)(FEMA, n.d.). The Municipality of Jayuya was included in the Disaster Declaration, recognizing that Puerto Rico's

location along active tectonic boundaries place all jurisdictions, even mountainous rural or remote, at risk of seismic events capable of causing millions of dollars in damages and significant disruptions to daily life.

According to the Puerto Rico Seismic Network (PRSN), from the onset of the South–Southwest Puerto Rico seismic sequence in 2019 through April 2024, a total of 27,497 earthquakes associated with this sequence were recorded and processed. Of these events, more than 1,688 were reported as felt, and over 492 registered magnitudes greater than 3.5. Additionally, 42 earthquakes reached magnitudes exceeding 4.5.

4.6.1.4 Future Event Probabilities (B1-e)

Unlike atmospheric hazards, earthquakes cannot be predicted with current scientific capabilities

For more comprehensive analyses, geologic maps of specific zones are examined to identify active faults and other relevant structural features. These datasets are then correlated with historical earthquake intensity distributions, seismic attenuation models, and statistical records. This integrated approach produces maps of seismically active areas that delineate regions with varying potential for strong earthquake activity. Identifying these high-risk zones is essential for informed land-use planning and effective emergency preparedness.

In the case of Puerto Rico, the PRSN cites a probabilistic seismic hazard study conducted in 1987 by Dr. William McCann, which estimated a 33–50% probability of a strong earthquake (Intensity VII or higher on the Modified Mercalli Scale) occurring in various parts of the island within a 50-year period (PRSN, 2025).

Further research conducted by the U.S. Geological Survey in 2003 identified an area west–southwest of Puerto Rico as the region most likely to experience strong earthquakes on the island (Figure 13). This probabilistic analysis does not account for secondary hazards such as tsunamis, liquefaction, or seismic wave amplification, which predominantly affect low-lying coastal areas and high-elevation zones susceptible to landslides. Please not that with the current methodologies this planning exercise can not detail the probability of an earthquake at the municipal scale.

4.6.2 Risk Analysis (B2-a, B2-b)

4.6.2.1 Estimated Losses

The Federal Emergency Management Agency's HAZUS Earthquake Analysis provides estimates of Annualized Earthquake Losses defined as the long-term average annual economic impact of earthquakes on the general building stock within a given geographic area as well as annualized estimates of population loss.

The Annualized Earthquake Loss is calculated using the Riemann Sums Method, which averages the annual losses associated with multiple return periods and then multiplies each average loss by its corresponding differential probability to produce a single loss estimate for each Census tract. (FEMA, National Risk Index Data - Technical Documentation, 2025)

Table 13 presents exposure to earthquake hazards. While no monetary measure can fully reflect the value of human life, FEMA's Benefit-Cost Analysis methodology uses a population equivalence approach based on the Value of a Statistical Life (VSL) to approximate the economic value of avoided fatalities and injuries. Under this approach, each avoided fatality, or the equivalent of ten injuries prevented, is assigned an economic value of $11.6 million in 2020 dollars, based on the Value of a Statistical Life (VSL) adopted by FEMA from the U.S. Department of Homeland Security's 2021 guidance. All historical loss figures are subsequently adjusted to December 2024 dollars to account for inflation.

HAZUS earthquake modelling data indicate that the total exposure of the Municipality of Jayuya to earthquake hazards is approximately $172.98 billion, including $1.54 billion in building value exposure and $171.44 billion in population-equivalent exposure. These estimates represent the value of structures and the economic equivalency associated with the exposed population located within the municipality

Table 13: Exposure to Earthquake Hazard

Exposure - Impacted Area (sq mi)	Exposure - Building Value	Exposure - Population	Exposure - Population Equivalence	Exposure – Total
44.98	$1,543,303,000	14,779	$171,436,400,000	$172,979,703,000

The expected annual loss for each Census tract or jurisdiction represents the average yearly economic impact, expressed in dollars, anticipated from natural hazard events.

Table 14 presents the expected annual earthquake-related losses for both buildings and population.

Table 14: Expected Annual Loss to Earthquake

Expected Annual Loss - Building Value	Expected Annual Loss - Population	Expected Annual Loss - Population Equivalence	Expected Annual Loss -Total
$1,090,285	0.08828	$1,024,048	$2,114,334

4.6.2.2 Lifelines and Critical Infrastructure

Earthquakes can affect a community's lifelines in the following ways:

- Safety and Security – An earthquake can cause the structural failure of critical facilities such as police stations and fire stations, generate increased demand for search-and-rescue operations, and result in population displacement requiring emergency sheltering. Such conditions may also create challenges in maintaining public order and ensuring community security.

- Food, Hydration, and Shelter – A seismic event can cause damage to water treatment plants and distribution systems, resulting in contamination or loss of potable water. Disruptions to transportation routes and storage facilities may also interrupt food supply chains. Widespread structural damage can increase the demand for temporary shelters. Additionally, the loss of refrigeration capacity may lead to significant spoilage of perishable goods.

- Health and Medicine - Hospitals and clinics may experience structural damage or a reduction in operational capacity during an earthquake. A surge in injuries requiring emergency medical attention can overwhelm existing healthcare facilities. Disruptions to pharmaceutical supply chains and medical logistics may also occur. Additionally, compromised sanitation conditions in emergency shelters can elevate the risk of disease outbreaks.

- Energy - Damage to power plants, substations, and transmission lines can result in widespread power outages. Ruptures in gas lines may create fire and explosion hazards. Interruptions in the fuel supply chain can also impede the operation of generators and emergency response vehicles.

- Communications - Damage to cell towers, fiber-optic cables, and communication hubs can result in significant loss of connectivity. Emergency call surges may overload telecommunications networks, further degrading service availability. These disruptions can impair coordination among emergency response agencies and hinder the timely dissemination of critical information.

- Transportation - Collapse or severe damage to roads, bridges, and tunnels can significantly restrict mobility. Airports and seaports may become inoperable due to damage to runways or docks. Rail systems, including the Tren Urbano, may also be disrupted because of track deformation or landslides.

- Hazardous Materials – An earthquake may cause spills from industrial facilities, chemical plants, or storage tanks, increasing the risk of environmental contamination affecting air, soil, and water resources. Additionally, damage to sites containing hazardous materials may result in fires or explosions.

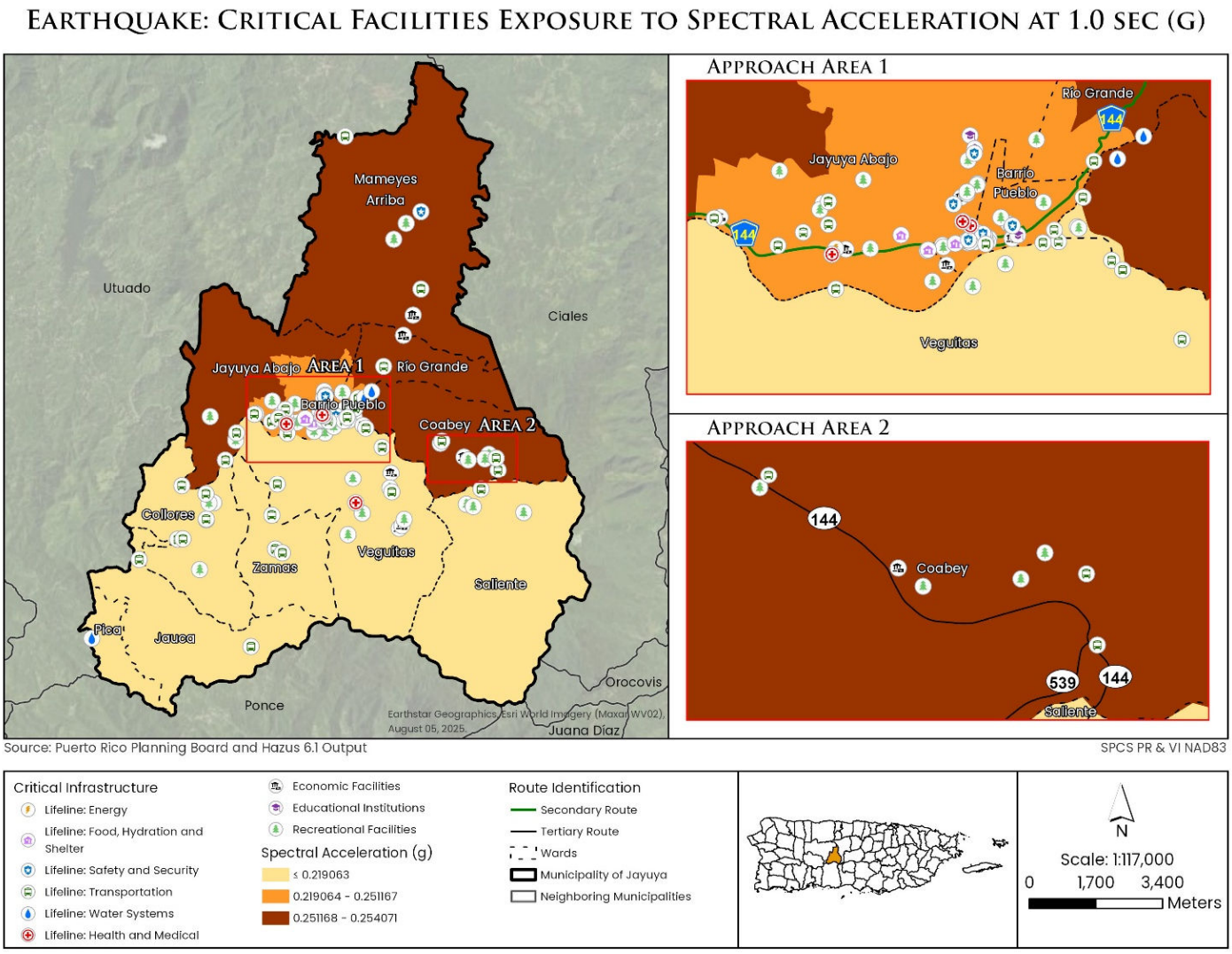
- Water Systems - Breakage of water mains and sewer lines can result in localized flooding and contamination. Such damage may also reduce firefighting capacity due to diminished water pressure and lead to long-term disruptions in wastewater collection and sanitation services.

Analysis of critical facility by lifelines exposure to earthquake spectral acceleration indicates that critical infrastructure throughout the Municipality of Jayuya is vulnerable to seismic impacts; however, the highest concentration of exposed facilities occurs within the northern and central sectors of the municipality. The areas exhibiting the highest spectral acceleration values for both the 0.3-second and 1.0-second response periods include the wards of Mameyes Arriba, Río Grande, Coabey, and portions of Jayuya Abajo, where numerous critical facilities and community lifeline assets are located (Maps 16 and 17).

Within these higher hazard zones, exposed facilities include elements of the Safety and Security, Health and Medical, Water Systems, Transportation, Food, Hydration and Shelter, Educational, Recreational, and Economic lifelines. Several facilities are concentrated within and around Barrio Pueblo, the municipality's primary population and service center, where critical governmental, emergency response, healthcare, educational, and commercial functions support residents throughout

Jayuya. Appendix F has a table that details the critical infrastructure exposure to earthquake in Jayuya.

Map 16: Earthquake Critical Facilities Exposure to Spectral Acceleration at 1.0 sec

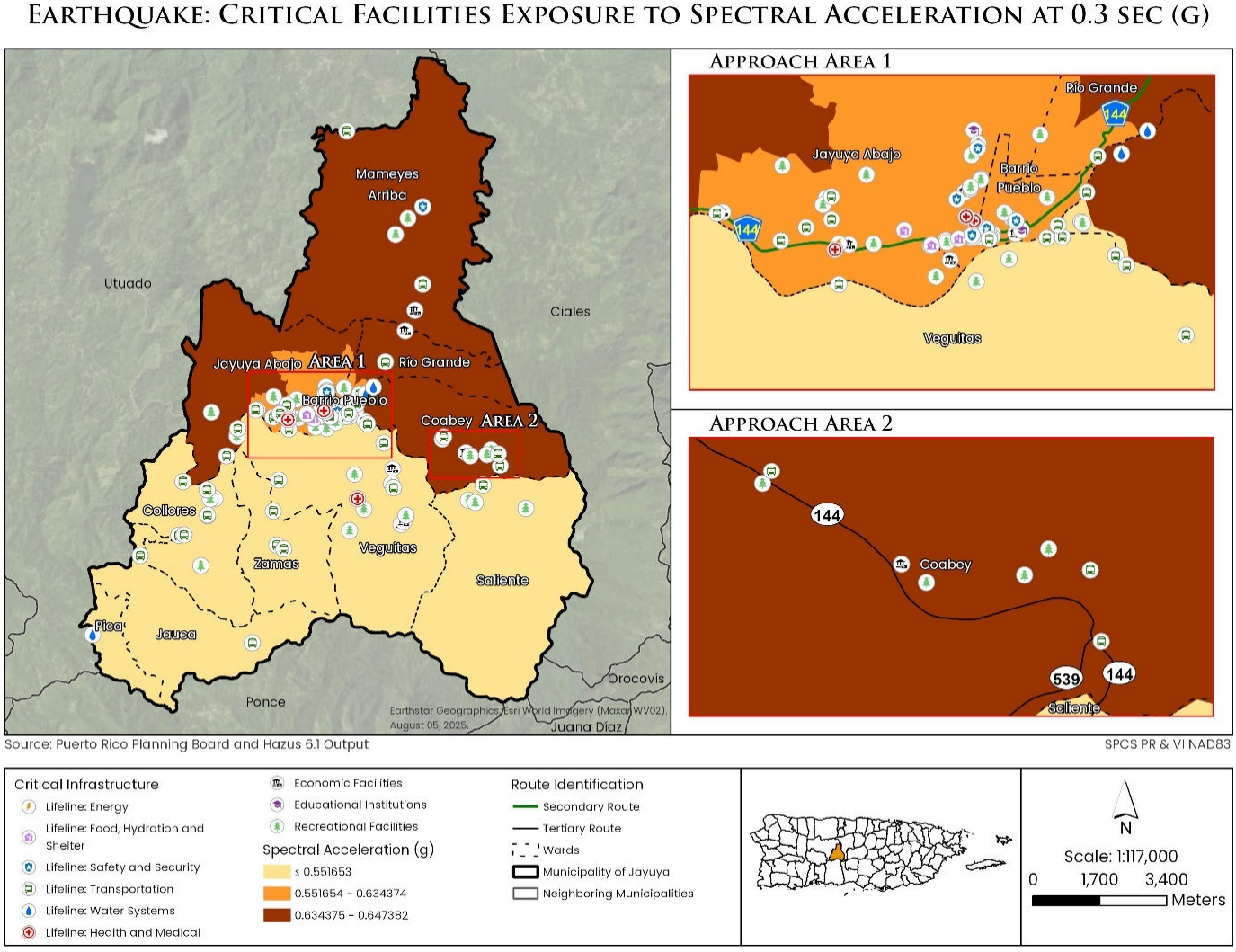


The maps identify two principal concentrations of exposed facilities. Approach Area 1, encompassing Barrio Pueblo and adjacent portions of Jayuya Abajo and Río Grande, contains the highest density of critical facilities and lifeline infrastructure. This area includes multiple healthcare, public safety, educational, transportation, water system, and community support facilities situated within moderate-to-high spectral acceleration zones. Damage or operational disruptions within this area could have

municipality-wide consequences due to the concentration of essential services and interconnected infrastructure.

A second cluster of exposed facilities is located in Approach Area 2, primarily within Coabey, where several transportations (PR-144 and PR-539), recreational, and economic facilities are situated within the highest mapped spectral acceleration zone. Although fewer in number than those in the urban center, disruption of these facilities could affect local access, mobility, and service delivery within eastern portions of the municipality.

Map 17: Critical Facilities exposure to spectral acceleration at 0.3 sec



The southern wards of Veguitas, Zamas, Collores, Jauca, and Saliente generally contain lower spectral acceleration values and a lower concentration of critical facilities. Nevertheless, facilities located within these wards remain susceptible to earthquake impacts and may experience service interruptions resulting from structural damage, utility failures, roadway closures, or secondary hazards such as landslides and slope failures.

4.6.2.3 Social Vulnerabilities

Social vulnerability to earthquakes in Puerto Rico is shaped by high levels of poverty, aging infrastructure, and limited access to essential resources, all of which disproportionately affect the ability of communities to withstand and recover from seismic events. Many residents face compounding disadvantages—such as disability, low educational attainment, and limited vehicle access—that reduce their capacity to evacuate, access information, or secure aid after a damaging earthquake. Research on disaster governance also shows that systemic governmental neglect and energy insecurity intensify the impacts of disasters, leaving communities with fewer resilience mechanisms in the aftermath of earthquakes.

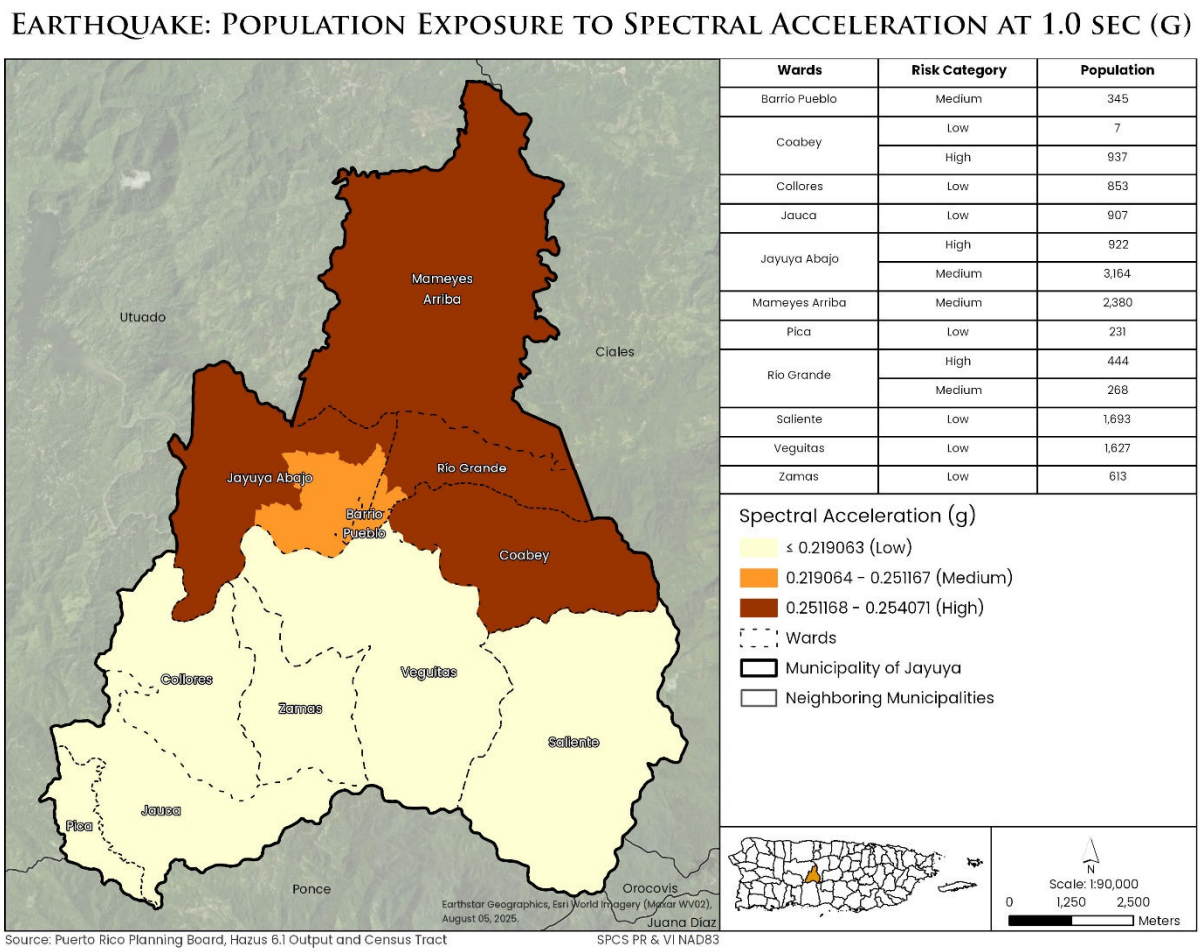
Puerto Rico's disaster research literature identifies long-standing structural inequities that heighten vulnerability, including political and economic marginalization that limit long-term recovery and exacerbate risk accumulation across hazard types. Federal assessments further find that many census tracts exhibit high social vulnerability scores (US Census Bureau, 2024), (US Census Bureau, 2025), meaning that an earthquake's impacts are likely to intersect with broader socio-economic fragility . Overall, these combined factors demonstrate that earthquakes in Puerto Rico pose not only a physical hazard but also a deep social challenge tied to historical, economic, and infrastructural conditions that shape uneven disaster outcomes. For more details about Social Vulnerabilities see section 3.4.4.

The population exposure maps (Maps 18 and 19) combine the earthquake spectral acceleration analysis with population distribution data to identify where residents are most likely to be exposed to varying levels of seismic ground shaking. Unlike the spectral acceleration maps, which illustrate the intensity of expected earthquake forces across the municipality, these maps evaluate the human exposure component of risk by identifying the number of people residing within each spectral acceleration risk category. This approach is consistent with FEMA's emphasis on assessing vulnerability by considering both hazard intensity and the population potentially affected by the hazard.

The population exposure analysis for spectral acceleration at both the 0.3-second and 1.0-second periods indicates a consistent spatial pattern of earthquake risk across the Municipality of Jayuya. The results identify the northern and central portions of the municipality as the areas where the largest concentrations of residents are exposed to higher levels of expected earthquake ground shaking. The concurrence between the two spectral acceleration models increases confidence in the identification of the municipality's most vulnerable population centers.

The highest population exposure occurs within the wards of Jayuya Abajo, Río Grande, and portions of Coabey, which are located within the highest spectral acceleration zone. Approximately 2,303 residents are located within areas classified as having high expected ground-shaking intensity, including approximately 922 residents in Jayuya Abajo, 444 residents in Río Grande, and 937 residents in Coabey. These residents may face an increased risk of injury, property damage, service interruptions, and displacement during a significant seismic event. A more detailed discussion of the municipality’s social vulnerability can be found in Section 3.4

Map 18: Earthquake: Population Exposed to Spectral Acceleration at 1.0 (g) sec



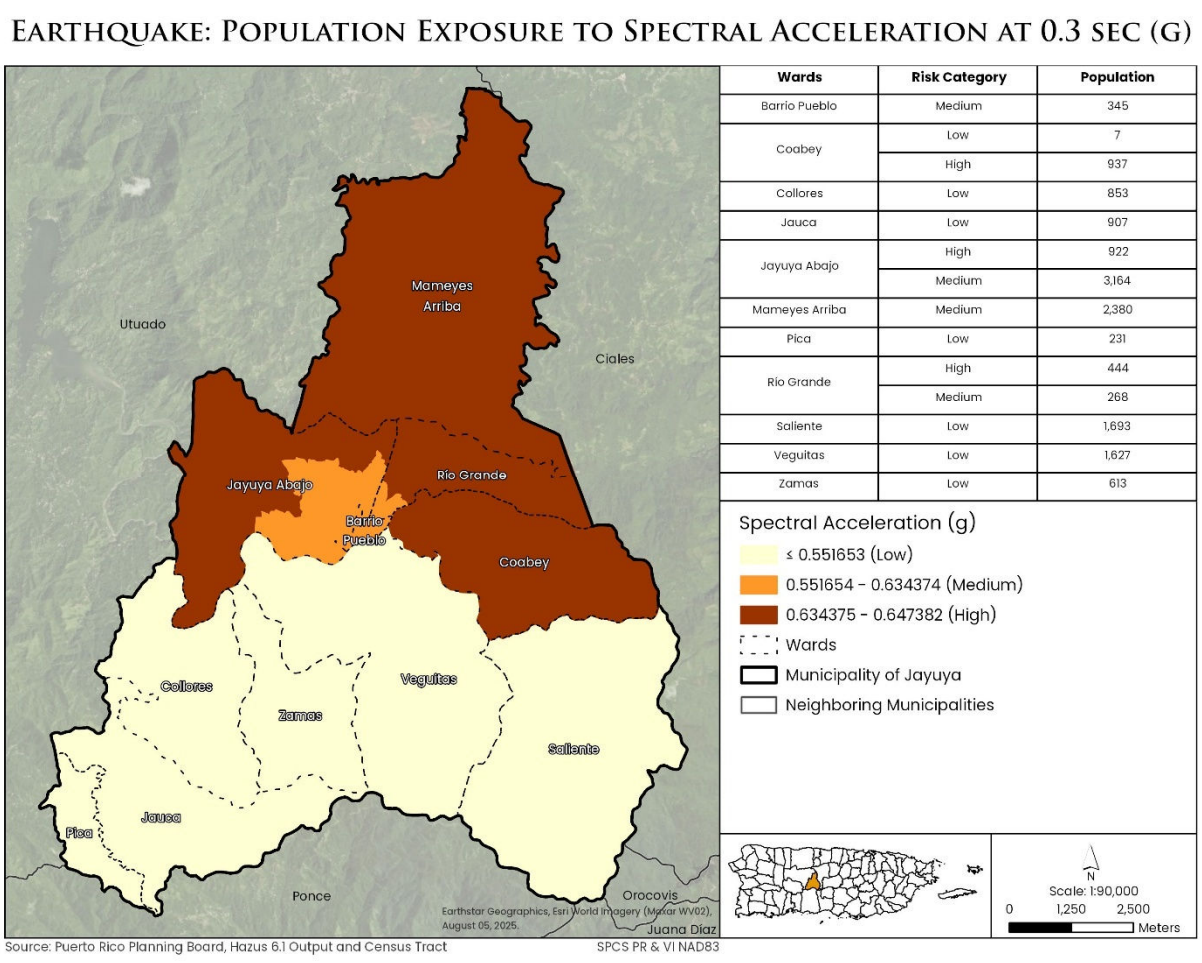
Wards	Risk Category	Population
Barrio Pueblo	Medium	345
Coabey	Low	7
	High	937
Collores	Low	853
Jauca	Low	907
Jayuya Abajo	High	922
	Medium	3,164
Mameyes Arriba	Medium	2,380
Pica	Low	231
Río Grande	High	444
	Medium	268
Saliente	Low	1,693
Veguitas	Low	1,627
Zamas	Low	613

A moderate exposure zone is concentrated around Barrio Pueblo, portions of Jayuya Abajo, Río Grande, and Mameyes Arriba, where approximately 6,157 residents are exposed to moderate levels of expected seismic shaking. This area includes Jayuya's principal population center and governmental service hub. Although the modeled shaking intensity is lower than in the high-risk areas, the concentration of residents, public services, commercial activities, and community facilities may increase the potential consequences of earthquake impacts.

The lowest relative exposure category encompasses the southern wards of Collores, Jauca, Pica, Saliente, Veguitas, and Zamas, where approximately 5,924 residents are located in areas characterized by lower spectral acceleration values. While these wards are expected to experience comparatively lower levels of ground shaking, earthquake impacts remain possible, particularly through secondary hazards such as landslides, rockfalls, roadway disruptions, utility failures, and restricted access resulting from the municipality's mountainous terrain.

Overall, the analysis demonstrates that population exposure generally follows the north-to-south gradient observed in the spectral acceleration mapping. Higher concentrations of exposed residents are located within the northern and central wards where modeled ground shaking intensity is greatest, while relatively lower exposure occurs across southern portions of the municipality. Nevertheless, because seismic events can affect the entire municipal territory and produce cascading impacts to infrastructure, utilities, transportation systems, and community lifelines, all residents of Jayuya should be considered exposed to earthquake hazards.

Map 19: : Earthquake: Population Exposure to Spectral Acceleration at 0.3 (g) sec



Wards	Risk Category	Population
Barrio Pueblo	Medium	345
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	High	937
Collores	Low	853
Jauca	Low	907
Jayuya Abajo	High	922
	Medium	3,164
Mameyes Arriba	Medium	2,380
Pica	Low	231
Río Grande	High	444
	Medium	268
Saliente	Low	1,693
Veguitas	Low	1,627
Zamas	Low	613

4.6.2.4 Natural and Cultural Resources

Earthquakes can produce a wide range of impacts on natural and cultural resources:

- Landslides and Soil Instability: Seismic activity can trigger landslides, rockfalls, and soil liquefaction, altering natural landforms and damaging ecological habitats.

- Water Quality and Hydrology: Ground shaking may modify river pathways, impair aquifers, and increase sedimentation in water bodies, which can degrade water quality and disrupt aquatic ecosystems.

- Vegetation and Wildlife: Ground deformation and related secondary hazards such as flooding or fires can lead to habitat loss, fragmentation, and adverse effects on biodiversity.

- Coastal and Marine Environments: Submarine earthquakes may generate tsunamis, resulting in coastal erosion, coral reef degradation, and the deterioration of marine and estuarine ecosystems.

While the following damage can happen to Cultural Resources:

- Seismic forces can cause significant structural damage or the complete collapse of heritage structures, archaeological sites, and monuments.
- Museums and Archives: Earthquakes may lead to the loss, damage, or deterioration of artifacts, archival materials, and collections due to structural failures or insufficient seismic protection.
- Community Identity and Tourism: Damage to culturally important sites can undermine community identity and reduce tourism activity, thereby affecting local economic stability.

4.6.2.5 Future Conditions (E1-a)

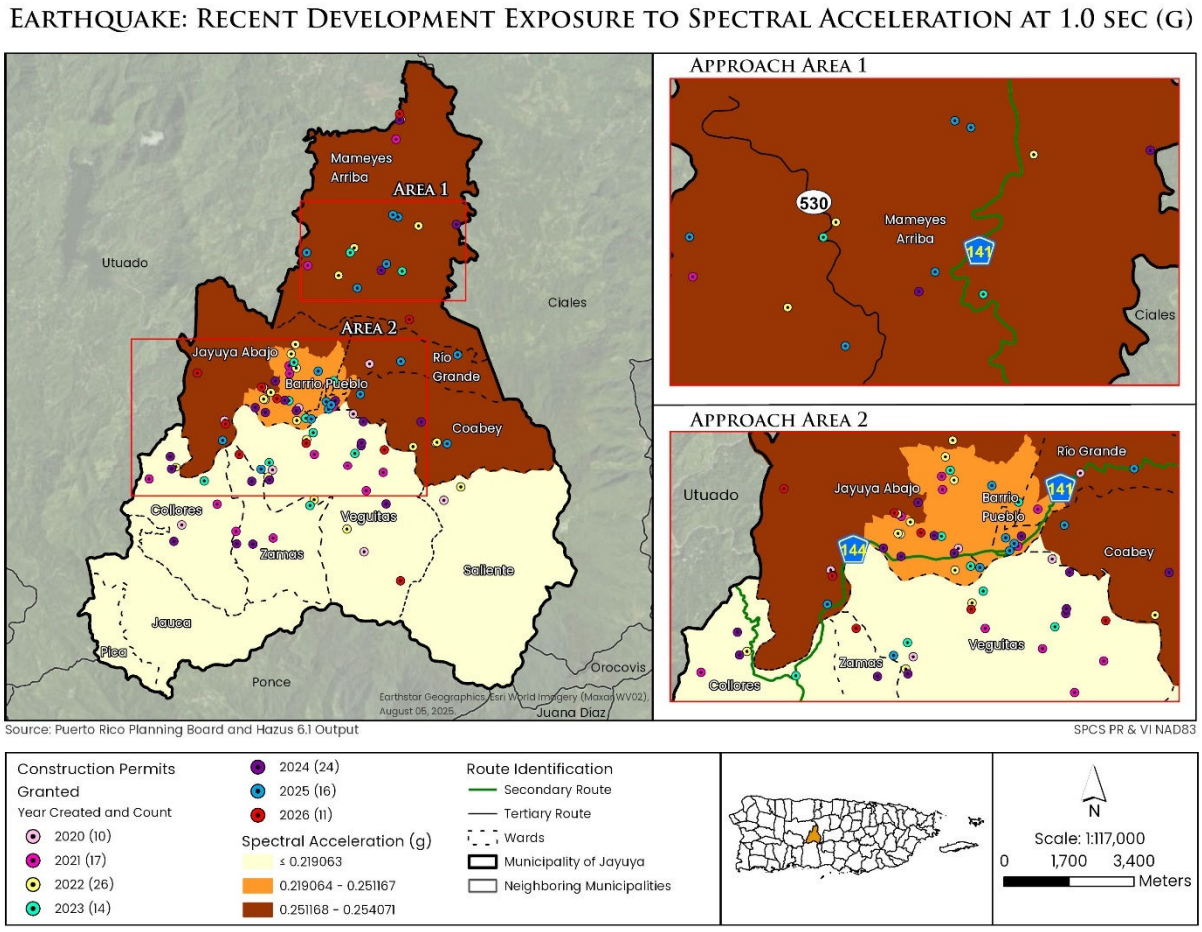
As discussed in Section 3.5, the elevated number of constructions permit issued by the Municipality reflects a sustained level of economic activity. To further support this analysis, Maps 20 and 21 highlight the areas with the highest spectral acceleration values at 0.3 and 1.0 seconds alongside the distribution of authorized construction permits. Taken together, these findings indicate that future exposure to earthquake hazards is unlikely to diminish in the near term, as development continues to expand within zones of elevated seismic vulnerability.

The analysis of recent development exposure to earthquake spectral acceleration indicates that new construction activity within the Municipality of Jayuya is occurring across areas with varying levels of seismic hazard; however, a substantial concentration of recent development is located within northern and central portions

of the municipality where the highest spectral acceleration values are present for both the 0.3-second and 1.0-second response periods.

The spatial distribution of construction permits issued between 2020 and 2026 demonstrates a concentration of development activity within and around Barrio Pueblo, Jayuya Abajo, Río Grande, Coabey, and Mameyes Arriba, areas that coincide with moderate to high spectral acceleration zones. The mapping identifies two primary clusters of recent development. The first cluster (Area 1) is located within Mameyes Arriba, where multiple recent development projects are situated entirely within the highest spectral acceleration zone. The second and more extensive cluster (Area 2) encompasses Barrio Pueblo, Jayuya Abajo, Río Grande, and Coabey, where a significant number of recent construction permits occur within moderate- and high-hazard seismic areas.

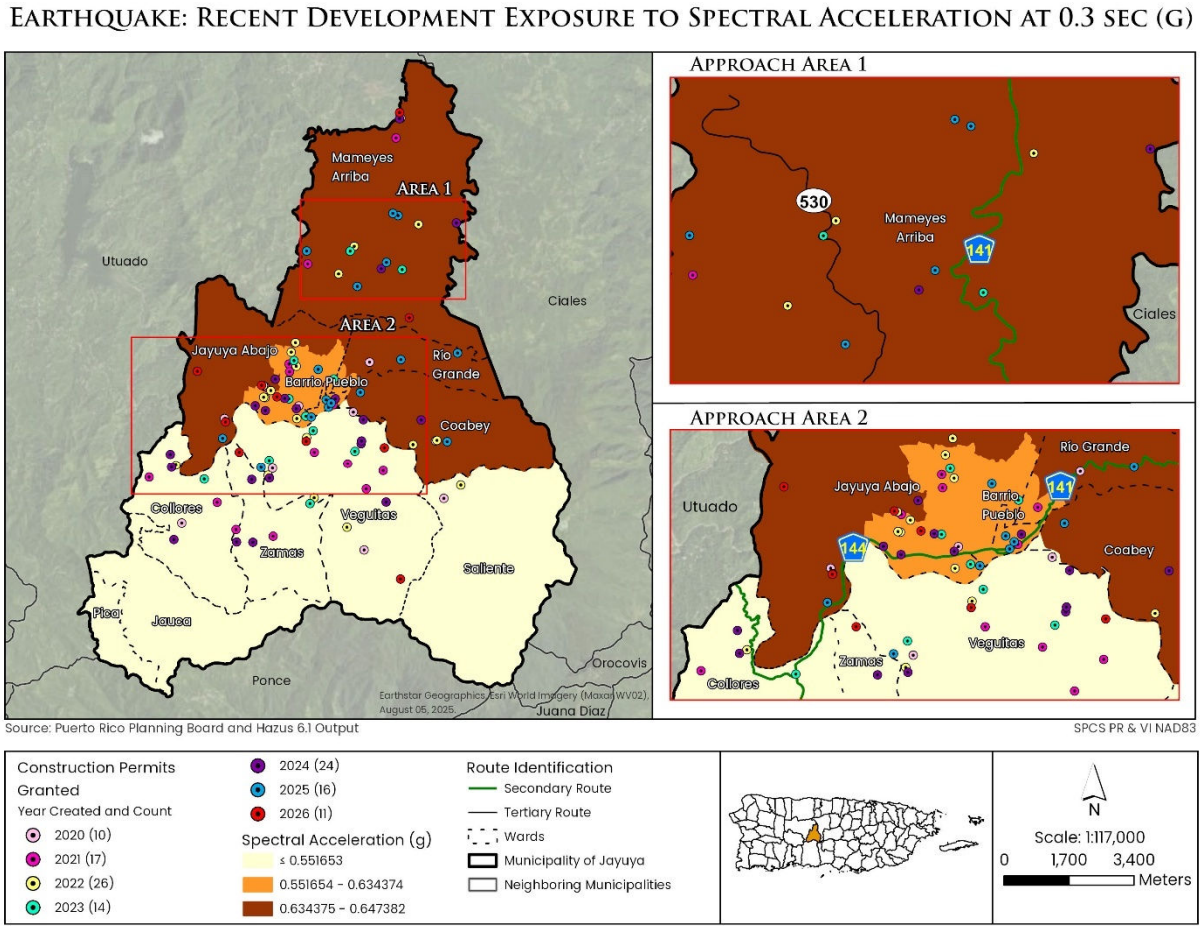
Map 20: Earthquake: Recent Development Exposure to Spectral Acceleration at 1.0 sec



The consistency of the 0.3-second and 1.0-second spectral acceleration analyses indicates that recent development patterns are expanding portions of the built environment within areas expected to experience the strongest earthquake ground motion. As new residential, commercial, institutional, and supporting infrastructure are added to these areas, the overall exposure of buildings, infrastructure, and population to earthquake hazards may increase unless appropriate seismic-resistant design and construction practices are implemented and maintained.

Although development activity is also occurring within southern wards such as Veguitas, Zamas, Collores, Jauca, and Saliente, these areas generally correspond to relatively lower spectral acceleration values. Nevertheless, future development in these locations remains vulnerable to earthquake effects, including ground shaking, utility interruptions, transportation disruptions, and secondary hazards such as landslides and slope failures associated with Jayuya's mountainous terrain.

Map 21: Earthquake: Recent Development Exposure to Spectral Acceleration at 0.3 sec



The spatial overlap between recent development activity and the municipality's highest spectral acceleration zones indicates that future earthquake exposure may increase within the northern and central portions of Jayuya. This trend is particularly evident in Mameyes Arriba, Jayuya Abajo, Río Grande, Coabey, and Barrio Pueblo, where ongoing development is occurring within areas of elevated seismic hazard. As a result, these areas should be considered priority locations for incorporating seismic resilience measures, enforcing earthquake-resistant construction standards, and evaluating future mitigation investments to reduce long-term risk.

Therefore, continued enforcement of seismic design standards, integration of earthquake hazard information into development review procedures, protection of critical infrastructure, and incorporation of hazard mitigation principles into future land use decisions will be important to limiting future losses and enhancing the long-term resilience of Jayuya. This analysis demonstrates that future growth patterns should remain an important consideration in the municipality's ongoing earthquake risk reduction and hazard mitigation efforts.

4.7 Landslides

4.7.1 Description (B1-a)

Landslides are a natural geomorphological process characterized by the downslope movement of soil, rock, or debris due to terrain instability. These events occur when environmental conditions align such that gravitational forces acting on surface materials exceed their natural resistance. The term landslide encompasses multiple types of ground displacement including rockfalls, slope failures, and debris flows, all of which pose significant risks to life and property. Such movements can obstruct transportation routes and carry with them vegetation, homes, bridges, vehicles, and other infrastructure, causing extensive disruption and damage (FEMA, 1997).

Prolonged and intense rainfall associated with meteorological systems such as tropical waves, troughs, and tropical cyclones is one of the primary triggers of landslide events. Additionally, population growth and the expansion of informal construction increase the municipality’s exposure to landslide hazards. Potable water supply and wastewater systems including sanitary pipes, septic tanks, and storm sewers whether properly authorized or informally installed, can further exacerbate slope instability. The likelihood of landslides rises significantly when these systems leak or are inadequately sited or constructed (USGS, n.d.).

Multiple factors contribute to the development of landslides, including soil type, terrain slope, degree of soil saturation, erosion processes, the presence of depressions or subsurface voids, human activities, and seismic events. The Building Performance Assessment Report (BPAR) prepared after Hurricane Georges warns that "landslides will become a major problem in the future as more houses are built and more development occurs in areas susceptible to these risks." This observation underscores the increasing vulnerability associated with continued development in high-risk zones (FEMA, 1997).

Many landslides in Puerto Rico fall into a specific subtype known as debris flows. These events typically occur in mountainous areas with steep slopes during periods of intense rainfall. As rainwater infiltrates the ground, the soil becomes saturated and the underlying subsurface layer loses its cohesion. This loss of stability causes the material to detach often at the interface where the subsurface meets the bedrock resulting in a rapid downslope flow of soil, rock, and water. There are many types of landslides; however, those associated with water saturation of the ground are as follows (PREMB, 2021):

- Slow landslide: Slow and sustained movement of earth or rock descending down the slope. Recognized by its content of tree trunks, pieces of twisted fences or retaining walls, and leaning posts or fences.
- Debris flow: A mass of rapid movement in which loose soils, rocks, organic matter combine with infiltrated air and water to form a viscous flow sliding down the hillside.
- Debris avalanche: A variety of very fast or extremely fast debris flow.
- Mudflow: A mass of rapid flow containing wet material of at least 50 percent sand, silt, and clay particles.

4.7.1.1 Affected Area (B1-B)

The Municipality of Jayuya exhibits a high degree of susceptibility to landslides due to its mountainous topography, steep slopes, dissected terrain, and susceptibility to intense rainfall events associated with tropical storms, hurricanes, and prolonged precipitation (Map 22). The landslide susceptibility analysis indicates that landslide risk is widespread throughout the municipality, with areas classified as High, Very High, and Extremely High susceptibility occurring in nearly all wards.

The mapping reveals that landslide-prone areas are concentrated along steep hillsides, ridgelines, drainage corridors, and mountainous slopes that characterize much of Jayuya's landscape. Areas of Very High and Extremely High susceptibility are particularly evident in portions of Jauca, Zamas, Veguitas, Saliente, Collores, Coabey, Río Grande, Jayuya Abajo, and Mameyes Arriba, where steep terrain and slope instability create favorable conditions for landslide occurrence. These areas may be susceptible to slope failures triggered by intense rainfall, prolonged soil saturation, seismic activity, erosion, and human-induced slope modifications.

Although areas of lower susceptibility are present, particularly along some valley bottoms and flatter portions surrounding Barrio Pueblo, landslide hazard remains a municipality-wide concern because unstable slopes are distributed throughout the jurisdiction. The central urban area generally exhibits lower susceptibility relative to surrounding mountainous terrain; however, roadway corridors, utility infrastructure, and residential development located adjacent to steep slopes remain vulnerable to landslide impacts.

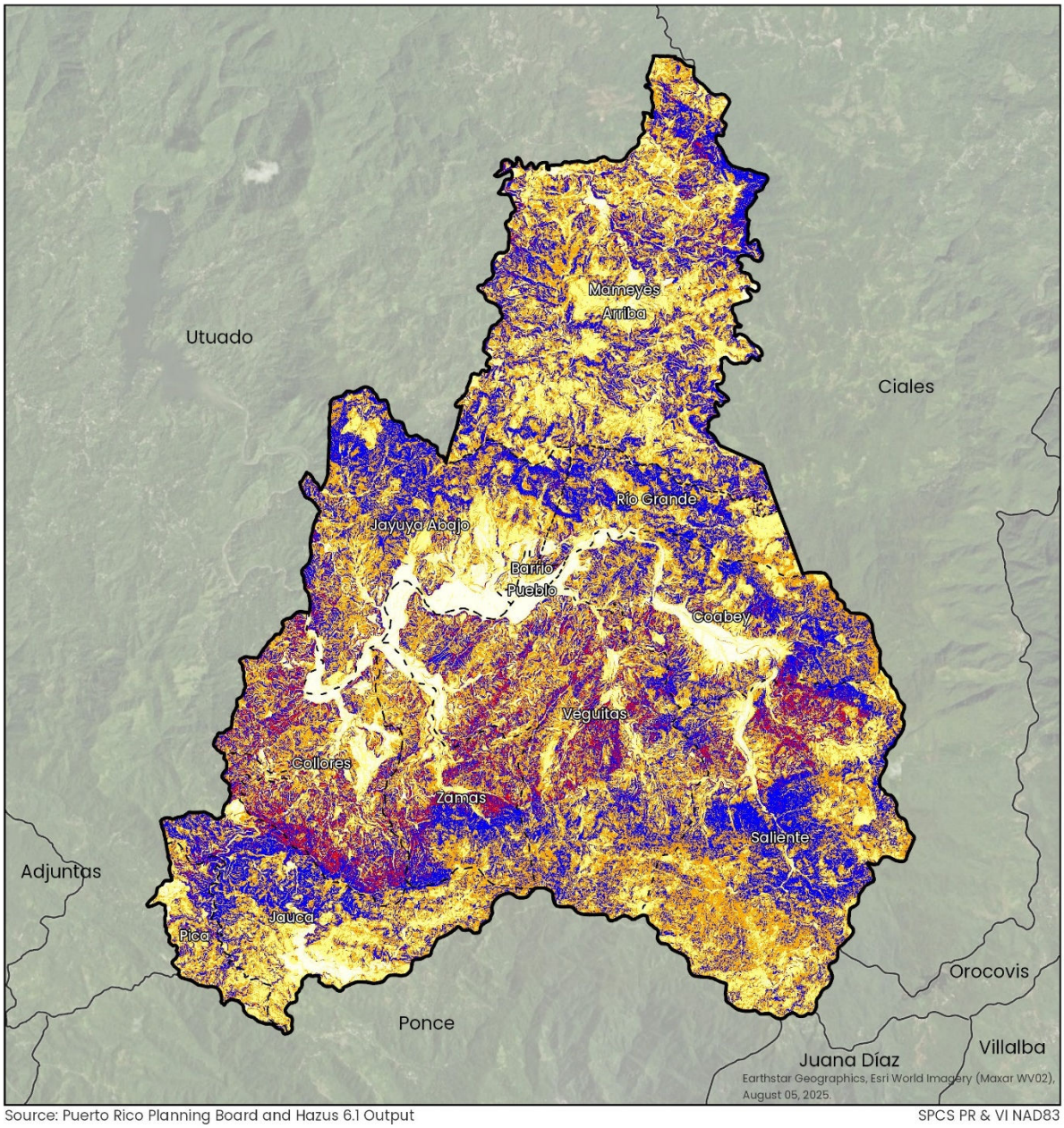
For planning purposes, the landslide hazard affects virtually all wards within Jayuya, with the highest concentrations of susceptibility occurring in the municipality's southern, eastern, and western mountainous sectors. Extensive areas classified as Very High and Extremely High susceptibility are observed within:

- Jauca
- Zamas
- Veguitas
- Saliente
- Collores
- Coabey
- Río Grande
- Portions of Jayuya Abajo
- Portions of Mameyes Arriba

Moderate and High susceptibility conditions also occur throughout much of the remaining municipal territory, indicating that slope instability is not confined to isolated locations but is broadly distributed across the landscape.

Map 22: Landslide Susceptibility

Landslide Susceptibility



Source: Puerto Rico Planning Board and Hazus 6.1 Output

SPCS PR & VI NAD83

Landslide Susceptibility
- Low
- Moderate
- High
- Very High
- Extremely High

- Wards
- Municipality of Jayuya
- Neighboring Municipalities



N

Scale: 1:88,000

0 1,250 2,500

Meters

4.7.1.2 Risk Magnitude (B1-C)

Landslides typically occur in steep, mountainous areas during periods of intense or prolonged rainfall. As water infiltrates the ground, the soil becomes saturated, weakening natural drainage systems and reducing the structural capacity of the terrain, which can ultimately lead to slope failure. Certain areas are inherently more susceptible to landslides than others, particularly those with greater slope gradients. Vegetation plays a critical role in maintaining soil cohesion and reducing surface erosion; therefore, slopes lacking vegetation are generally more prone to instability.

Slope stability is influenced by several factors, including elevation, steepness, vegetative cover, and underlying geology. In general, increases in slope height and inclination correlate with a greater likelihood of terrain instability. Below are key factors that contribute to the occurrence of landslides:

- The base of inclined slopes
- Areas near small depressions where drainage converges
- The lower portion of slopes is composed of fill - material
- The base or crest of a very steep slope
- Locations with a history of previous landslides
- Hillsides that have been developed and where septic systems are present
- Steep slopes underlain by clay-rich soils
- Hills or slopes with inclinations greater than 12 degrees and elevations exceeding 300 meters

The U.S. Geological Survey (USGS) Landslide Susceptibility Map depicts the relative likelihood of landslide initiation during or shortly after intense rainfall events. Susceptibility classes are derived from a statistical model based on topography, geology, soils, land cover, precipitation, soil moisture, and documented landslides triggered by Hurricane María. The categories represent relative susceptibility rather than probabilities of occurrence. The Extremely High class represents the most susceptible 1 percent of Puerto Rico, while Very High, High, Moderate, and Low susceptibility classes represent approximately 9, 20, 30, and 40 percent of the island, respectively (Hughes, K.S, 2020)

. Table 15 outlines these categories—low, moderate, high, very high, and extremely high—and describes the corresponding levels of hazard.

Table 15: Landslide Risk Categories

Category	Description
Low	Areas with minimal slopes and stable soil; landslides are unlikely except under extreme conditions.
Moderate	Areas with some susceptibility; landslides may occur during prolonged or intense rainfall.
High	Areas with significant susceptibility; landslides are likely during heavy rain or seismic activity.
Very High	Areas with a very high relative potential for landslide initiation during or immediately following intense rainfall events.
Extremely High	Areas with the highest relative potential for landslide initiation during or immediately following intense rainfall events. This category represents the most susceptible terrain in Puerto Rico and identifies locations where conditions are most favorable for rainfall-triggered landslides.

4.7.1.3 Past Events

As noted earlier, landslides are frequently associated with heavy rainfall events. Map 23 illustrates the landslides reported following Hurricane María in 2017, which align with the areas of greatest susceptibility shown in the map. Landslides are often connected to rain events and the prevalence of roadways (Larsen & Park, 1997) (Larsen & Torres-Sanchez, 1998). According to data from the U.S. Geological Survey (USGS), more than 200 individual landslides were identified following Hurricane María (Hughes, Bayouth García, Martínez Milian, Schulz, & Baum, 2019).

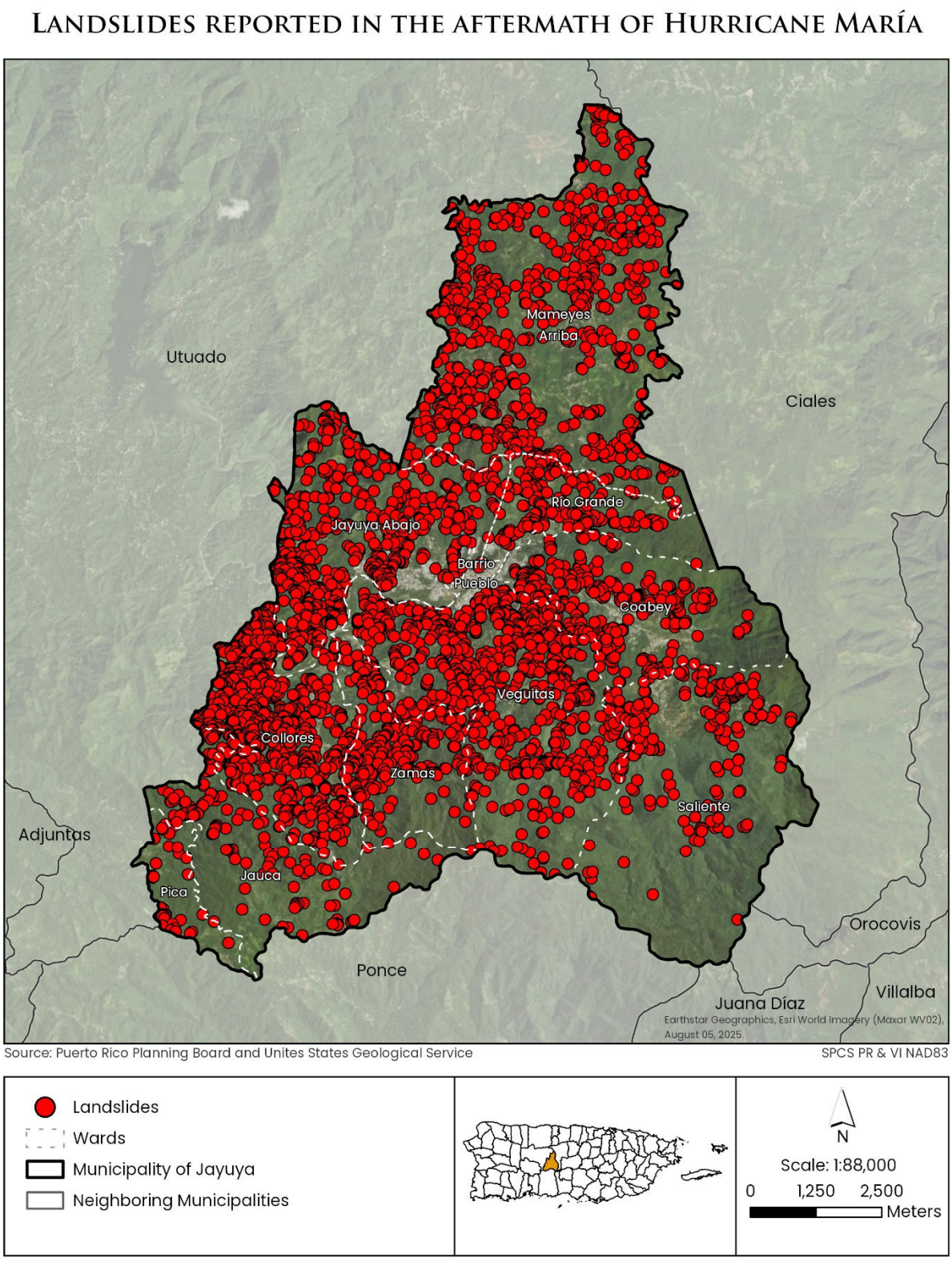
The impacts of Hurricane María (September 2017) provide the most significant documented example of landslide activity affecting the Municipality of Jayuya and serve as a critical indicator of the municipality's future landslide risk. The mapped inventory of landslides reported following Hurricane María demonstrates that slope failures occurred throughout virtually the entire municipal territory, confirming the widespread susceptibility identified in the landslide hazard analysis.

The distribution of reported landslides indicates that impacts were not confined to isolated locations but were instead observed across all wards of Jayuya, including Mameyes Arriba, Jayuya Abajo, Río Grande, Coabey, Barrio Pueblo, Veguitas, Collores, Zamas, Jauca, Pica, and Saliente. The highest concentrations of reported landslide occurrences appear throughout the central, western, southern, and north-central portions of the municipality, particularly along steep mountainous slopes, drainage

corridors, road embankments, and developed hillside areas.

The extensive geographic distribution of observed landslides demonstrates the sensitivity of Jayuya's terrain to intense and prolonged rainfall. Hurricane María produced exceptional precipitation amounts across Puerto Rico, saturating soils and triggering numerous slope failures ranging from shallow debris slides to larger hillside failures. The resulting impacts affected transportation networks, utility systems, residential areas, agricultural lands, and access routes connecting rural communities to essential services.

Map 23: Landslides related to Hurricane María



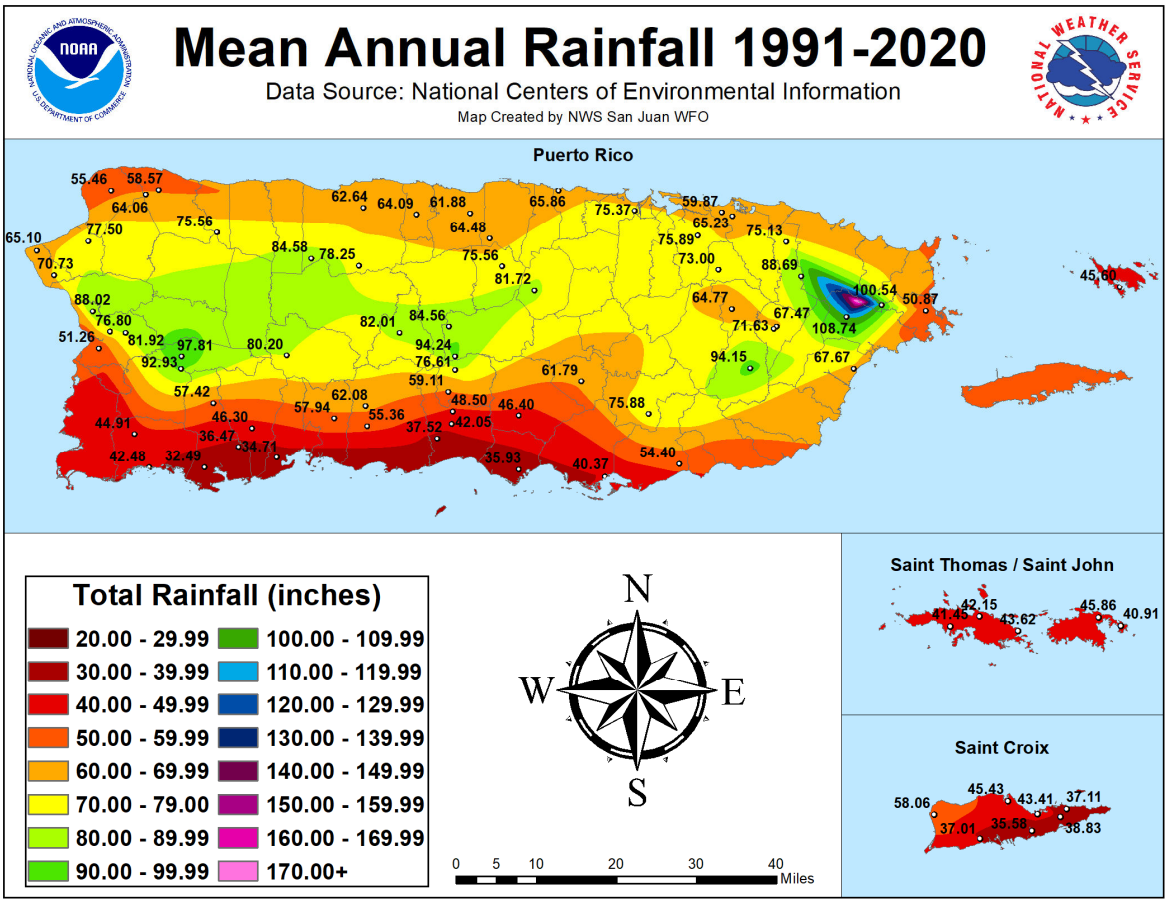
Particularly notable is the occurrence of landslides within and surrounding populated areas such as Jayuya Abajo, Río Grande, Barrio Pueblo, Veguitas, and Coabey, indicating that landslide hazards have the potential to directly affect residential settlements and critical infrastructure. The concentration of reported events throughout the municipality also highlights the potential for cascading impacts, including roadway blockages, restricted emergency access, utility disruptions, isolation of communities, and damage to public and private property.

The Hurricane María landslide inventory demonstrates that landslide impacts in Jayuya are not localized but municipality-wide in extent. The observed failures occurred across nearly every ward and coincide with areas currently classified as having High to Extremely High landslide susceptibility. This historical evidence confirms the municipality's vulnerability to rainfall-induced slope failures and supports the identification of landslides as a high-priority hazard for mitigation planning, infrastructure resilience, emergency access planning, and future land-use decision-making.

4.7.1.4 Future Event Probabilities

Although landslides can also result from earthquakes or human activities, most landslides in Puerto Rico are triggered by rainfall. As previously discussed, these events can occur during any type of rain event. Figure 14 presents the Mean Annual Rainfall for Puerto Rico and the U.S. Virgin Islands from 1991 to 2020. The Municipality of Jayuya lies entirely within a zone that receives between 65.86 and 75.37 inches of rainfall annually. Given these precipitation levels, landslides are expected to continue occurring in the municipality.

Figure 15: : Mean Annual Rainfall 1991-2020 (PR & USVI)



4.7.2 Risk Analysis

4.7.2.1 Estimated Losses

In the Municipality of Jayuya , as in many other parts of Puerto Rico, landslides most often occur during or immediately after major storms that produce intense, prolonged rainfall. Rainfall-induced landslides are closely linked to severe weather systems or consecutive rain events that saturate steep and vulnerable soils.

At present, no standardized models exist to quantify structural or content losses resulting from landslides or other mass-movement events. Consequently, USGS susceptibility indices were applied empirically using the best available data to estimate potential impacts from these hazards in Jayuya . These indices classify risk into four levels: low, moderate, high, and very high. Due to data limitations, it is not currently possible to calculate monetary losses associated with building damage.

4.7.2.2 Lifelines and Critical Infrastructure

Landslides can impact FEMA Lifelines in the following ways:

- Safety and Security: Landslides can trap and injure or kill individuals through rapidly moving debris, hinder rescue operations, and create life-safety risks when emergency services become isolated or damaged (Center for Disaster Resilient Communities, n.d.).

- Food, Hydration, and Shelter: Landslides can destroy homes and agricultural areas, resulting in displacement and increased food insecurity. They may also disrupt local water and sanitation systems, heightening contamination risks, especially within temporary shelter environments (IFRC, 2023).

- Health and Medicine: Landslides can cause direct injuries such as trauma or suffocation, while longer-term impacts may include outbreaks of waterborne and vector-borne diseases, as well as psychological distress and trauma among survivors (Center for Disaster Resilient Communities, n.d.).

- Energy: Landslides can severely damage power lines, electrical substations, and fuel supply infrastructure, resulting in widespread power outages that hinder both public services and emergency response operations.

- Communications: Damage to communication cables, fallen utility poles, and restricted access to telecommunications infrastructure can disrupt alert and warning systems, hinder coordination among emergency responders, and impair public information networks.

- Transportation: Landslides can render roads, railways, bridges, and tunnels impassable or destroy them entirely as debris obstructs critical routes, severely limiting mobility for the public and restricting access for emergency response services.

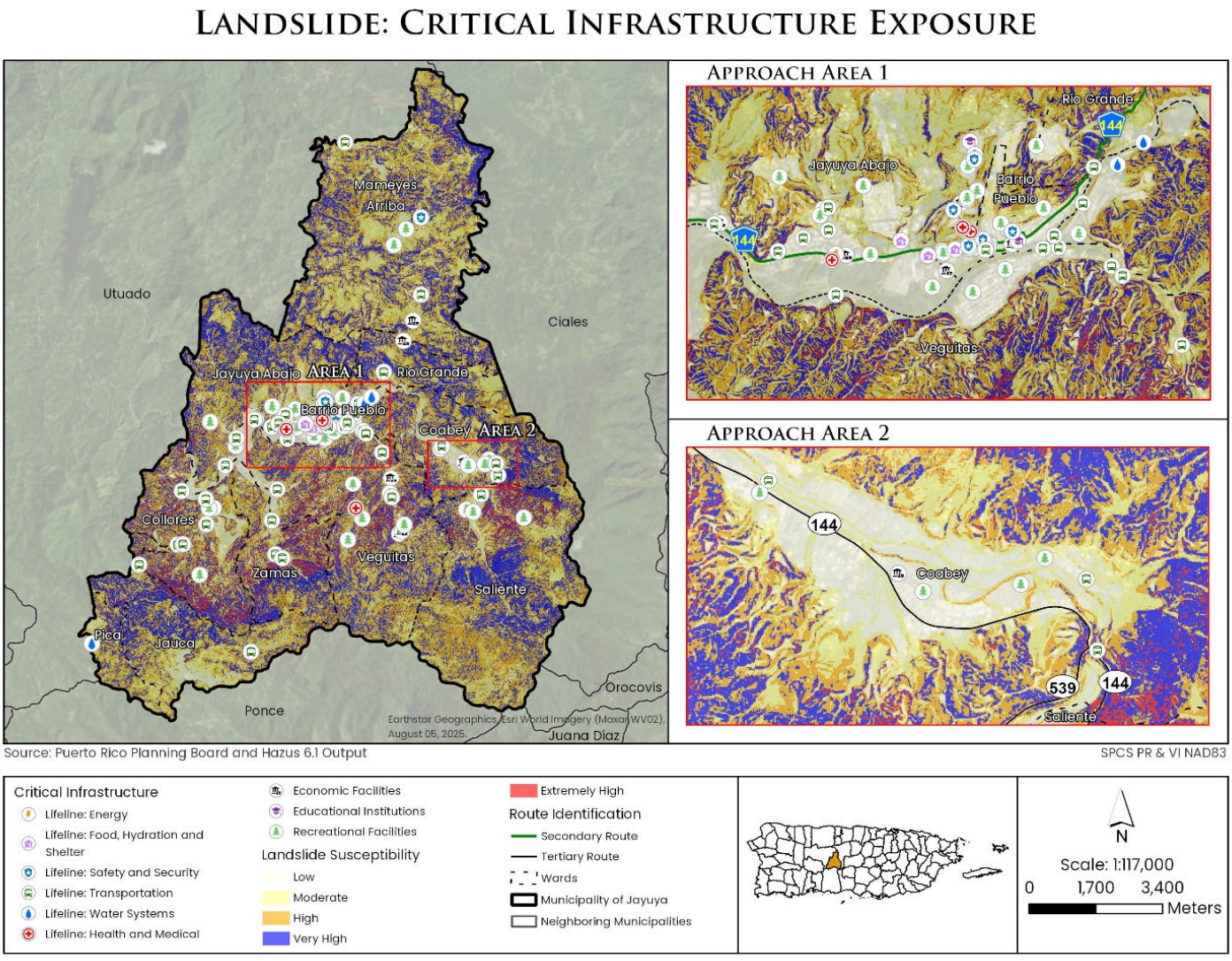
- Hazardous Materials: Landslides can rupture containment structures, pipelines, storage tanks, or industrial facilities, leading to the release of hazardous chemicals or pollutants and potentially triggering HAZMAT emergencies (FEMA, 2024).

- Water Systems: Landslides can damage water intakes, treatment plants, distribution lines, and wastewater collection and treatment facilities, leading to contamination, reduced water pressure, and significant service interruptions (IFRC, 2023).

The critical infrastructure exposure analysis indicates that many of Jayuya's essential facilities and community lifeline assets are located within or immediately adjacent to areas classified as High, Very High, and Extremely High landslide susceptibility (Map 24). Due to the municipality's mountainous terrain, steep slopes, and extensive drainage network, landslide hazards present a significant risk to the continuity of essential services, emergency response capabilities, transportation access, and infrastructure operations.

The analysis shows that critical facilities associated with FEMA's Community Lifelines, including Transportation, Water Systems, Health and Medical, Safety and Security, Food, Hydration and Shelter, Energy, Educational, Recreational, and Economic Facilities, are distributed throughout the municipality and frequently occur within areas exhibiting elevated landslide susceptibility. While several facilities are located within valley bottoms and lower-susceptibility areas, many remain dependent upon transportation corridors and utility systems that traverse highly susceptible slopes. Appendix F has a table that details the critical infrastructure exposure to landslide in Jayuya.

Map 24: Landslide: Critical Infrastructure Exposure



The map identifies two principal concentrations of exposed critical infrastructure.

Approach Area 1: Barrio Pueblo, Jayuya Abajo, and Río Grande

The highest concentration of critical facilities is located within and surrounding Barrio Pueblo, extending into portions of Jayuya Abajo and Río Grande. Although portions of the urban center occupy relatively lower susceptibility terrain, the surrounding hillsides

and access corridors are characterized by moderate to very high landslide susceptibility. This area contains a substantial concentration of:

- Health and medical facilities
- Public safety facilities
- Educational institutions
- Transportation assets
- Water system infrastructure
- Recreational and community facilities
- Economic and commercial facilities

Because many municipal services are concentrated in this area, landslides affecting surrounding slopes, roadways, and utility corridors could disrupt multiple community lifelines simultaneously, even if individual facilities experience little or no direct damage. Road blockages, utility interruptions, and restricted access may significantly impair emergency response and service delivery.

Approach Area 2: Coabey Corridor

A second concentration of exposed facilities occurs within Coabey, where several community facilities are situated along transportation corridors surrounded by areas of high and very high landslide susceptibility. Facilities in this area rely heavily on roadway access, particularly along PR-144 and connecting local routes. Slope failures in these mountainous corridors could isolate facilities, disrupt transportation networks, and delay response and recovery operations.

Beyond the two identified clusters, critical facilities are dispersed throughout Mameyes Arriba, Veguitas, Collores, Zamas, Jauca, Pica, and Saliente, where landslide susceptibility remains prevalent. The widespread distribution of susceptible slopes means that infrastructure supporting critical facilities, including roadways, bridges, water lines, telecommunications systems, and electric distribution networks, may be vulnerable even where the facilities themselves are located on more stable terrain.

The exposure analysis demonstrates that landslide risk in Jayuya is not limited to direct structural impacts. Secondary effects may include:

- Closure of primary and secondary transportation routes.
- Isolation of communities and critical service facilities.
- Disruption of potable water and wastewater systems.
- Damage to electrical and telecommunications infrastructure.

- Restricted emergency response and evacuation access.
- Increased recovery time due to limited access to affected areas.

The landslide exposure assessment indicates that the most significant risk to critical infrastructure in Jayuya is not only direct damage to facilities, but also the potential loss of access and interruption of community lifelines caused by slope failures affecting transportation and utility corridors. Because many essential services are concentrated within Barrio Pueblo and connected through mountainous terrain, landslides have the potential to generate cascading impacts across multiple sectors of the municipality. This finding supports prioritization of slope stabilization, roadway resilience, drainage improvements, and continuity-of-operations planning as key components of Jayuya's hazard mitigation strategy.

4.7.2.3 Social Vulnerabilities

Social vulnerability to landslides in Puerto Rico is the product of topography, poverty, aging populations, fragile infrastructure, and geographic isolation, all of which shape the severity of impacts after major storms or seismic events. Academic and federal analyses consistently show that landslides disproportionately burden communities that already struggle with access to transportation, healthcare, income stability, and emergency response. Addressing these vulnerabilities requires hazard mitigation strategies that integrate geospatial risk analysis, social vulnerability indicators, community-based planning, and infrastructure reinforcement tailored to rural and mountainous municipalities (West, Rodríguez Cruz, & Hughes, 2023).

Of particular concern, rural residents often depend on a single road that can be destroyed or blocked by slope failures, isolating entire communities. Focus groups on the municipality of Utuado highlighted that landslides cut off access to medical facilities, emergency response, and even water and food, sometimes for months. This situation can also happen in this municipality. This creates immediate life-threatening conditions for people with health conditions, mobility limitations, or emergency medical needs (West, Rodríguez Cruz, & Hughes, 2023).

The population exposure analysis indicates that landslide risk is distributed throughout the Municipality of Jayuya, with the greatest concentrations of potentially exposed residents occurring within and adjacent to populated areas located near steep slopes, unstable terrain, and drainage corridors. The analysis demonstrates that while most census tracts exhibit relatively low to moderate numbers of exposed residents, several areas contain substantially higher concentrations of population potentially affected by landslide hazards.

The highest concentrations of population exposure are located in and around Barrio Pueblo and adjacent portions of Jayuya Abajo, where the analysis identifies areas containing between approximately 170 and 811 persons at risk. These locations represent the most significant concentrations of potential landslide exposure within the municipality. Although parts of the urban center are situated within valley bottoms and relatively gentler terrain, surrounding hillsides exhibit documented landslide susceptibility, creating the potential for direct impacts to residential areas as well as indirect impacts associated with roadway closures, utility disruptions, and restricted access.

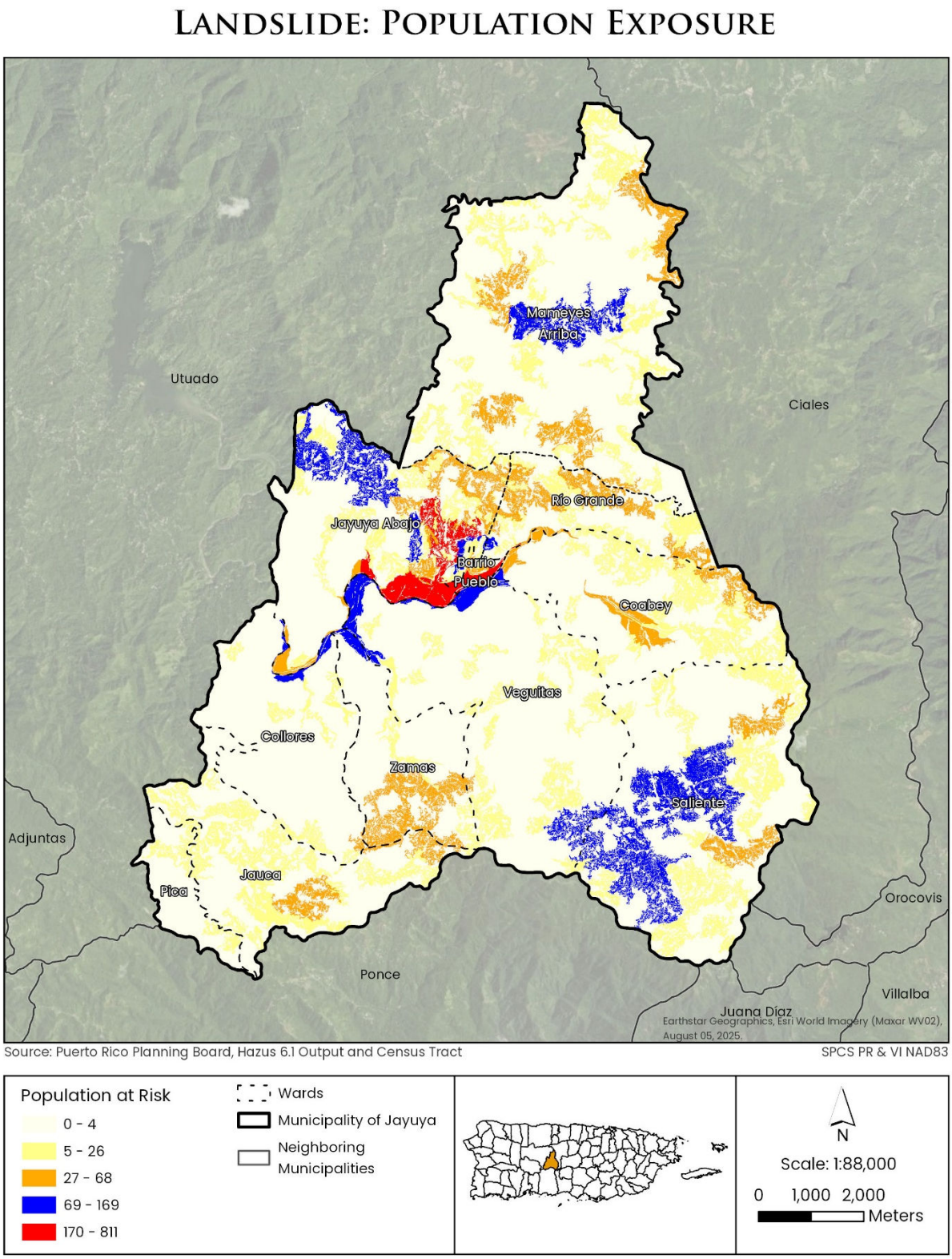
Areas exhibiting high population exposure are also present in portions of Mameyes Arriba, Saliente, and western sectors of Jayuya Abajo, where clusters of between approximately 69 and 169 persons at risk are identified. Additional areas of moderate exposure occur throughout Río Grande, Coabey, Veguitas, Zamas, Jauca, Collores, and Pica, reflecting the widespread distribution of residential development within a mountainous environment characterized by varying degrees of slope instability.

Landslides have the potential to affect populations through both direct and indirect impacts. Direct impacts may include damage to homes, injuries, displacement of residents, and loss of access to essential services. Indirect impacts may result from roadway failures, utility interruptions, water service disruptions, telecommunications outages, and restricted emergency response access.

The population exposure analysis is particularly significant when considered alongside the municipality's documented experience during Hurricane María, which triggered widespread landslides throughout Jayuya. The historical landslide inventory demonstrates that slope failures have occurred in proximity to developed and populated areas, validating the potential for future impacts to residents during major rainfall events.

Due to Jayuya's mountainous terrain and dispersed rural settlement pattern, landslides may disproportionately affect populations residing along steep hillsides, ridge communities, and roadway corridors where alternative access routes are limited. Landslide-related road closures can isolate residents from healthcare facilities, emergency services, schools, employment centers, and essential supply chains. This potential for community isolation represents one of the municipality's most significant landslide-related risks. A more detailed discussion of the municipality’s social vulnerability can be found in Section 3.4.

Map 25: Landslide: Population Exposure



4.7.2.4 Natural and Cultural Resources

Landslides are among the most destructive natural hazards, producing impacts that extend far beyond the immediate physical damage they cause (Eliot, Cloyd, & Philbin, 1994). Their effects on natural resources are profound and often irreversible. When a landslide occurs, vast areas of vegetation are uprooted or buried, leading to the loss of critical habitats and a decline in biodiversity. The displacement of soil not only strips away fertile layers essential for agriculture but also introduces large volumes of sediment into rivers and reservoirs. This sedimentation degrades water quality, disrupts aquatic ecosystems, and can compromise drinking water supplies. Furthermore, landslides frequently alter hydrological systems by blocking river channels, creating temporary dams that increase flood risk and modify groundwater recharge patterns.

The cultural dimension of landslide impacts is equally significant. Archaeological sites, historic monuments, and culturally significant landscapes are highly vulnerable to burial or destruction during such events. These losses are irreplaceable, erasing tangible links to the past and diminishing cultural heritage. In many regions, landslides have damaged centuries-old structures, including churches, colonial buildings, and sacred sites, resulting in costly restoration efforts or permanent loss. Beyond physical damage, the alteration of cultural landscapes such as terraced fields or ceremonial grounds undermines community identity and traditions deeply tied to the land. Economically, these impacts ripple through local economies dependent on cultural tourism, reducing visitor numbers and income for communities that rely on heritage-based activities.

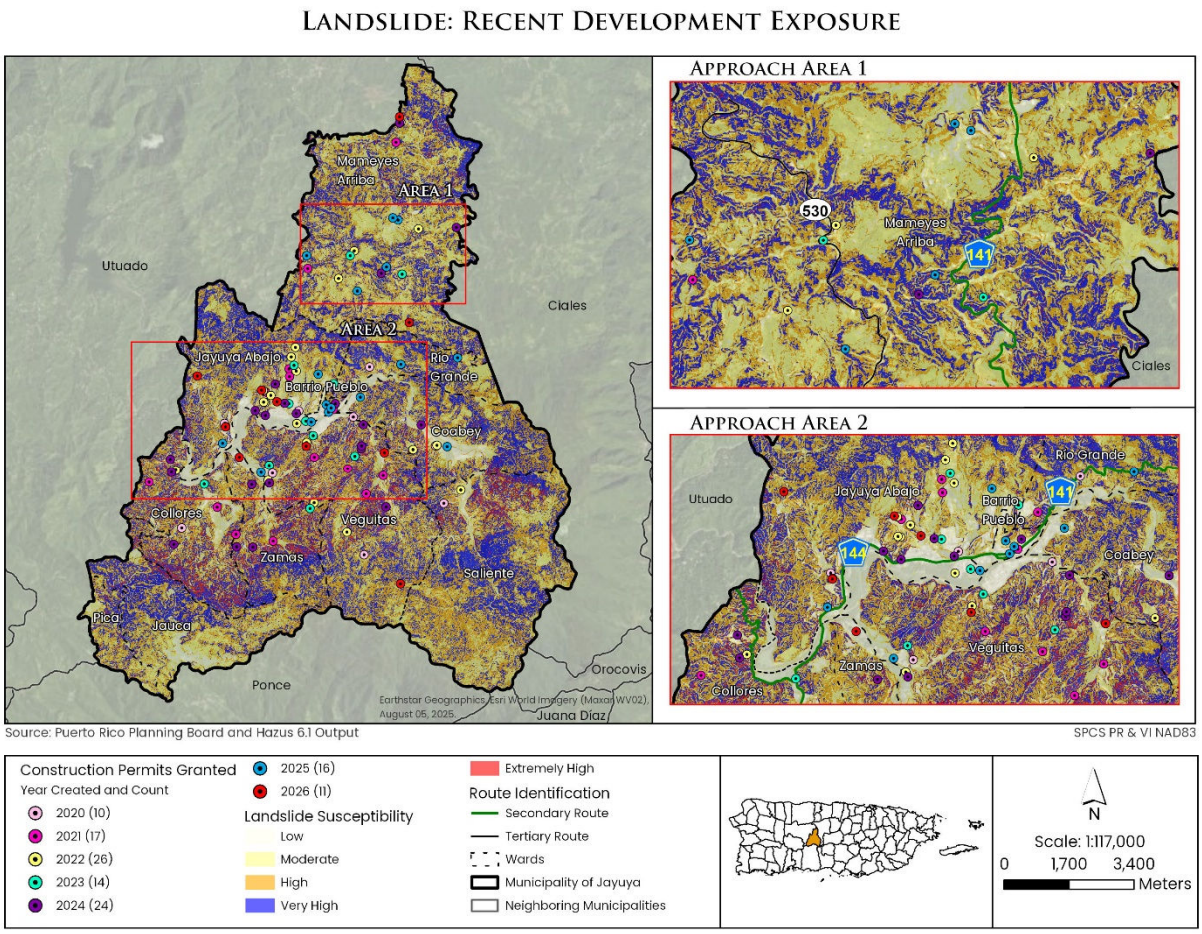
4.7.2.5 Future Conditions

The recent development exposure analysis indicates that new construction activity within the Municipality of Jayuya continues to occur in areas characterized by varying levels of landslide susceptibility, including locations classified as High, Very High, and Extremely High susceptibility**.** Given the municipality's mountainous terrain and extensive areas of unstable slopes, future development patterns will play an important role in determining landslide risk and vulnerability.

Construction permit data from 2020 through 2026 show that recent development is distributed throughout the municipality, with notable concentrations occurring within and around Barrio Pueblo, Jayuya Abajo, Río Grande, Veguitas, Coabey, and Mameyes Arriba**.** These areas coincide with portions of the municipality that contain moderate

to very high landslide susceptibility, indicating that some recent growth is occurring within areas exposed to slope instability hazards.

Map 26: Landslide: Recent Development Exposure



The analysis identifies two principal areas where recent development overlaps with elevated landslide susceptibility.

Area 1: Mameyes Arriba

The northern sector of the municipality, particularly Mameyes Arriba**,** contains multiple recently permitted developments located within areas classified as moderate to very high landslide susceptibility. Much of this ward is characterized by steep terrain, dissected slopes, and drainage features that may be susceptible to landslides during periods of intense rainfall or prolonged soil saturation.

Continued development within these areas may increase future exposure of residential structures, access roads, utility services, and supporting infrastructure

unless appropriate site-specific geotechnical evaluations, drainage controls, and slope stabilization measures are implemented.

Area 2: Barrio Pueblo, Jayuya Abajo, Río Grande, Veguitas, and Coabey
The highest concentration of recent development activity is observed within and surrounding the municipal urban center, extending through portions of Barrio Pueblo, Jayuya Abajo, Río Grande, Veguitas, and Coabey. While some development is located within relatively stable valley bottoms and gentler slopes, many projects occur adjacent to terrain mapped as high, very high, or extremely high susceptibility.

This development pattern is particularly important because these wards contain major transportation corridors, population centers, critical facilities, and community services. Future landslide events affecting surrounding slopes could increase the potential for property damage, roadway closures, utility disruptions, and restricted access to essential services.

The exposure analysis highlights the importance of integrating landslide risk considerations into future development decisions. Development occurring within susceptible terrain should continue to comply with applicable building codes, grading regulations, erosion and sediment control requirements, and geotechnical design standards. Site-specific engineering evaluations should be considered for development proposed on or adjacent to steep slopes, areas of documented instability, or locations affected by historical landslide activity.

4.8 Flooding

4.8.1 Description (B1-a)

Floods, generally caused by excessive rainfall (FEMA, 1997), are classified into two main categories: general floods and flash floods.

- General floods are long-duration events that can last several days and include riverine, coastal, and urban floods. Coastal floods are associated with storm surges, waves, and heavy rains generated by hurricanes and tropical storms, while urban floods result from the alteration of natural drainage due to urban development. Riverine floods occur when rivers overflow due to excessive water runoff though rainfall or structural failures, causing water to spill into surrounding land. Flash floods often stem from stationary storms, hurricanes, or dam failures, affecting both mountainous areas and urbanized zones.

- Flash floods happen when prolonged rainfall falls over a watershed (water basin). The latter result from intense precipitation over a short period in specific areas. The magnitude of flash floods events depends on factors such as basin topography and physiography, weather patterns, soil saturation, and surface impermeability. Flash floods mainly originate from slow-moving storms over specific areas or from intense rainfall associated with hurricanes and tropical storms (NMEAD, 2021). However, they can also occur after the collapse of dams or levees within minutes or hours, due to extreme rainfall or the sudden release of water from retention basins or other stormwater control facilities. Although more frequent in mountain streams, these events can occur in urban areas where impermeable surfaces limit infiltration.

The periodic flooding of land adjacent to rivers, streams, and coasts—known as floodplains—is a predictable natural phenomenon based on recurrence intervals. These intervals represent the average time, in years, between events of equal or greater magnitude. The longer the recurrence interval, the greater the magnitude of the event, which implies a significant increase in risk and the extent of the affected area. Floodplains flood periodically according to recurrence intervals, defined as the average time between events of equal magnitude. For example, a 100-year flood has a 1% annual probability, while a 500-year flood corresponds to 0.2%. These frequencies are calculated through statistical analysis of historical flow records and extreme events.

Table 27 shows the different flood zone classifications for Puerto Rico adopted by the PRPB (PRPB, 2021).

Table 27: Puerto Rico Flood Zones

Flood Zone	Description
Zone A	Special Flood Hazard Area with a recurring period of one hundred (100) years determined by using approximate methodologies with no base flood elevation or Floodway determined.
Zone AE	Special Flood Hazard Areas with a recurring period of one hundred (100) years determined by detailed methodologies with base flood elevations indicated. According to the scope of the study, may include the Floodway determination.
Zone AO/AH	Shallow Special Flood Hazard Areas with a recurring period of one hundred (100) years with a base flood depth fluctuating between 0.30

Flood Zone	Description
	meters (one (1) foot) and 0.91 meters (three (3) feet). The average flood depths are obtained from detailed hydraulic analysis.
Zone A99	Areas prone to flooding from a flooding event with a one percent (1%) annual chance of occurring. These special areas are within a flood protection or control system where enough progress has been made in its construction, even though it has not been completed, but specific statutory progress has been reached to complete it. This zone does not detail base flood elevations or flooding depths, so it is recommended to use, if required, the previous flood elevation for Zone 99. Mandatory flood insurance purchase requirements apply.
Zone D	Flooding area that is not determined but is possible.
Zone VE	Coastal high flood hazard area with a recurring period of one hundred (100) years with velocity and energy (storm surge) and a determined base flood elevation.
Zone X Shaded	flooding area with 0.2% chance of occurring each year or the one hundred (100) year flood with a water depth of less than 0.3 meters, with drainage areas of less than 2.6 square kilometers or areas protected by levees against the one hundred (100) year flood.
Zone X (unshaded)	Area determined to be outside the five hundred (500) year storm flood.

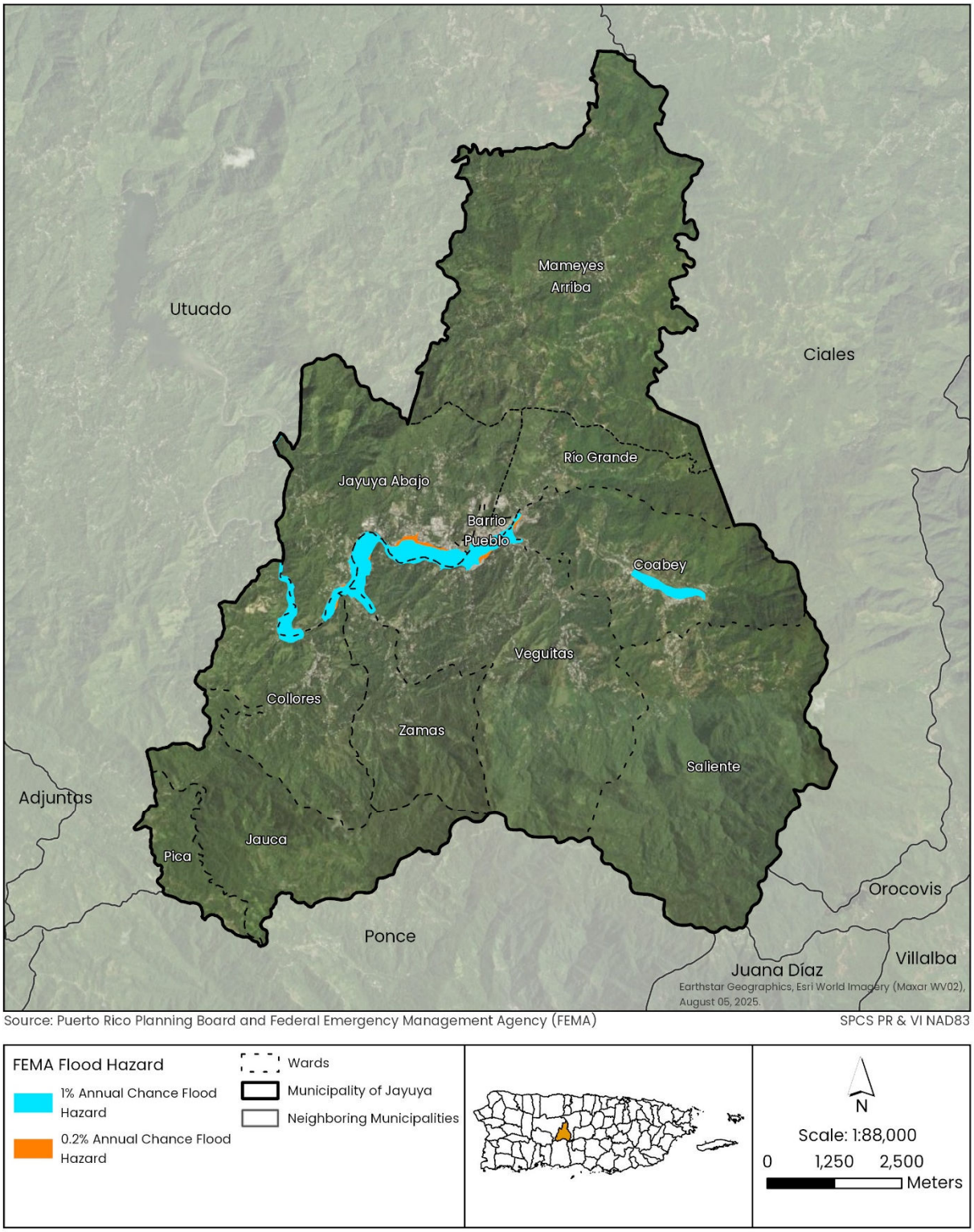
4.8.1.1 Affected Area

Flood Hazard Insurance Map

The flood hazard in the Municipality of Jayuya is concentrated primarily along the major river corridors and associated floodplains that traverse the central portion of the municipality. FEMA Flood Hazard Area mapping indicates that the most significant flood exposure is associated with the Río Grande de Jayuya and Río Saliente river systems, as well as their tributaries and adjacent low-lying valley areas visible in the municipal hydrographic network (Map 27).

Map 27: Jayuya Flood Hazard Zones (FIRM)

Flood Hazard Zones



FEMA flood hazard mapping shows that the majority of designated flood-prone areas are located within the floodplain of the Río Grande de Jayuya corridor, extending through portions of Jayuya Abajo, Barrio Pueblo, and nearby valley areas. These flood hazard areas are predominantly classified as the 1-percent annual chance flood hazard (100-year floodplain), with smaller areas designated as the 0.2-percent annual chance flood hazard (500-year floodplain). The mapped floodplain follows the river valley that traverses the municipality from west to east through the urban core.

An additional flood-prone area is identified within Coabey, where FEMA-mapped flood hazard zones are associated with local drainage features and tributary channels connected to the broader watershed system. Although smaller in geographic extent than the Río Grande de Jayuya floodplain, these areas remain susceptible to inundation during extreme rainfall events.

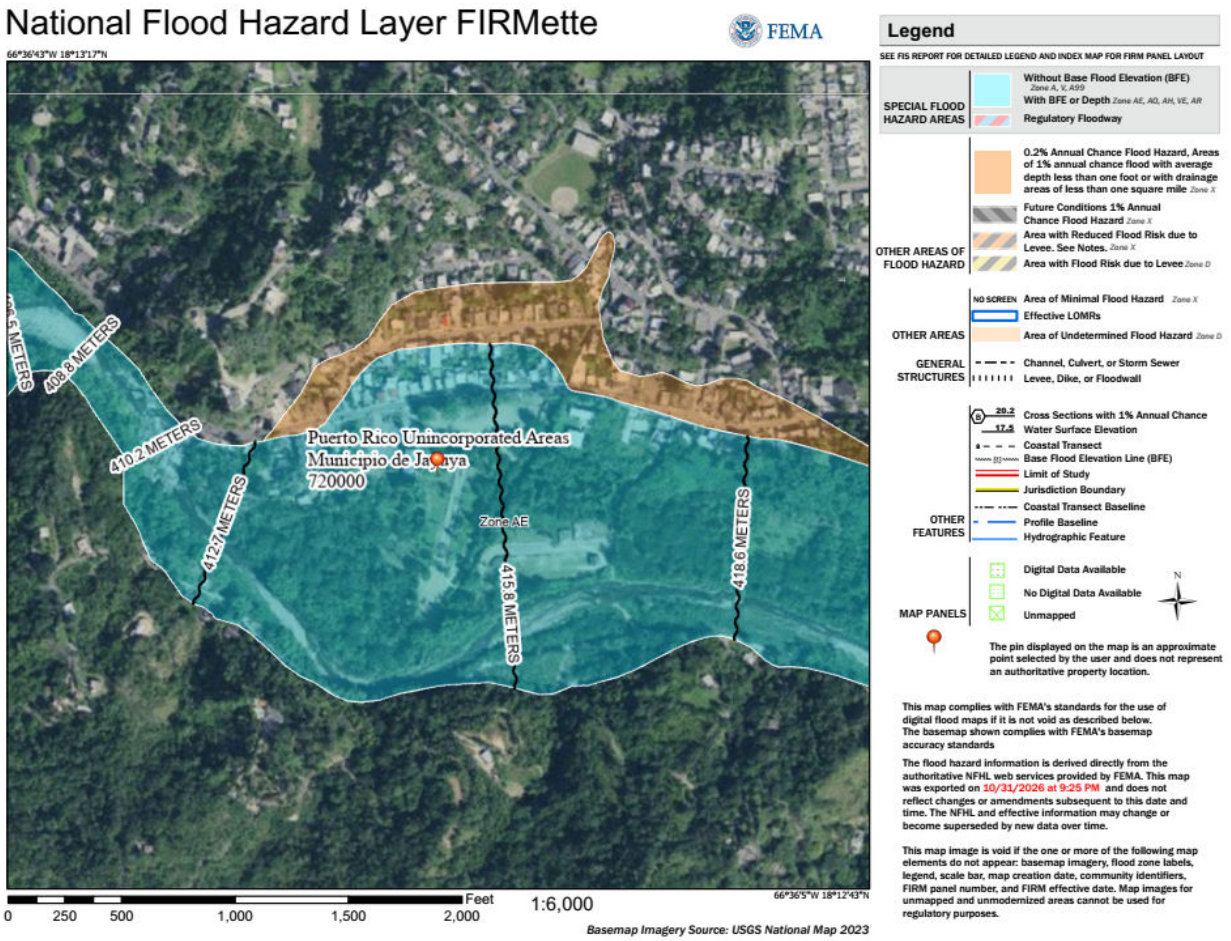
The principal flood-affected areas include:

- Barrio Pueblo, where flood hazard areas intersect the municipality's urban center.
- Jayuya Abajo, where extensive portions of the Río Grande de Jayuya floodplain occur.
- Coabey, where localized floodplain areas are associated with tributary systems.
- Portions of adjacent valley areas located along the Río Grande de Jayuya and Río Saliente corridors.
- Areas immediately adjacent to major streams, tributaries, and drainage channels throughout the municipality.

Although FEMA-mapped flood hazard areas occupy a relatively limited portion of the total municipal land area, the hydrographic analysis indicates that numerous smaller streams and steep drainage channels extend throughout all wards. Consequently, localized flooding, flash flooding, debris flows, and channel overbank flooding may occur outside of mapped FEMA Special Flood Hazard Areas, particularly during extreme precipitation events.

The reviewed FIRMettes corroborate local observations and historical flooding conditions documented by the Municipality (Figures 15 and 16). The areas identified in the FIRMettes are located within FEMA-designated Special Flood Hazard Areas (SFHAs), including flood-prone sectors along the Río Grande de Jayuya River. These areas are susceptible to riverine flooding, stormwater accumulation, and flooding associated with intense rainfall events and tropical cyclones.

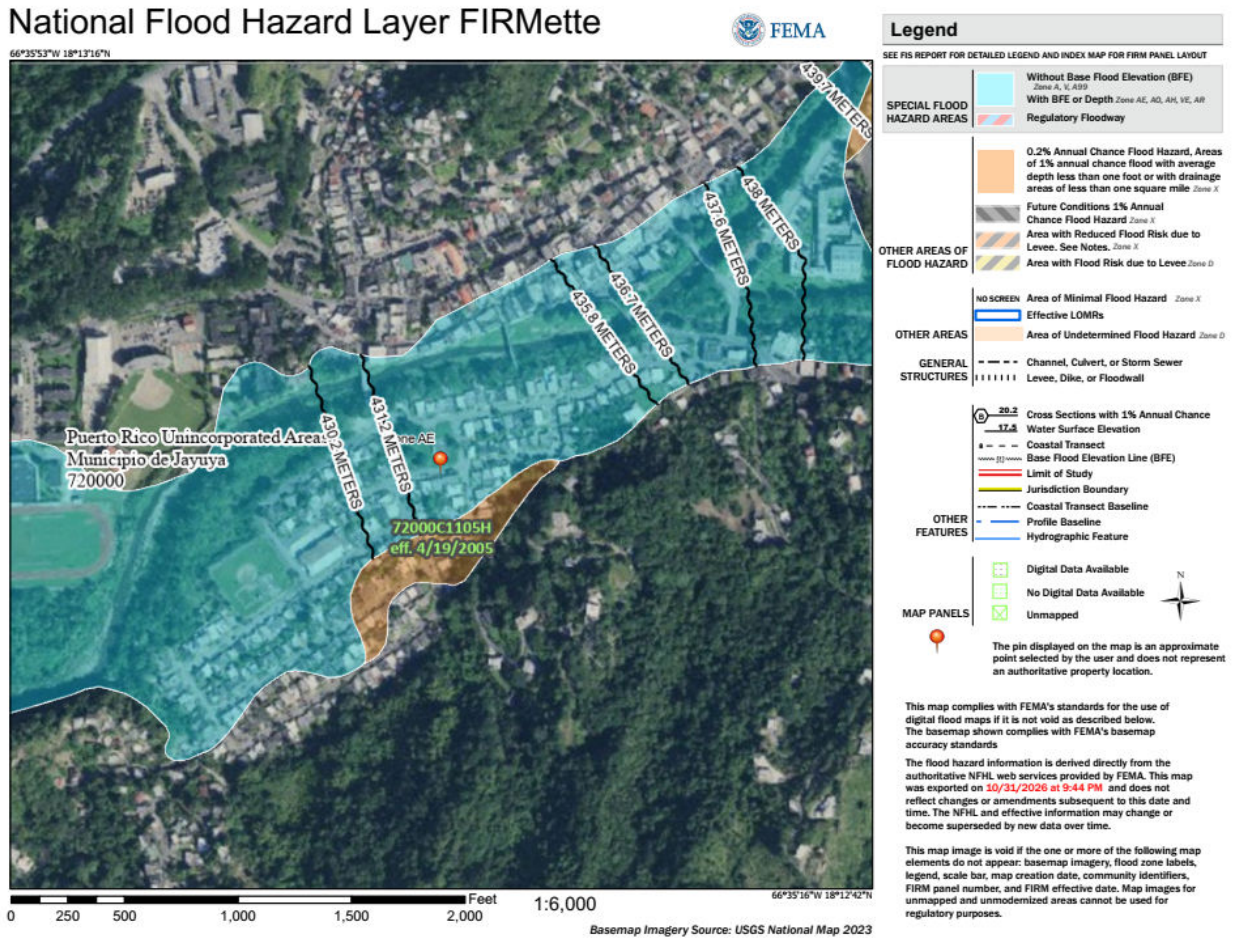
Figure 16: National Flood Hazard Layer FIRMette (Jayuya Abajo ward)



The FEMA Firmette (Figure 15) indicates that portions of the Santa Clara community are located within a Special Flood Hazard Area (SFHA). In particular, Kennedy Street and adjacent areas of the community are situated within the 0.2-percent annual chance flood hazard area (500-year floodplain).

The FEMA Firmette for Veguitas Ward (Figure 16) shows that portions of the communities of La Monserrate and Vega Linda are located within Special Flood Hazard Areas (SFHAs)Flood Zone Areas along Ramón Oquendo Street, Santos Morales Street, and Julio Grau Street are mapped within the 0.2-percent annual chance flood hazard area (500-year floodplain).

Figure 17: National Flood Hazard Layer FIRMette (Veguitas Ward, Jayuya)



Advisory Base Flood Elevation (ABFE)

Likewise, FEMA uses another type of map for the purpose of developing regulations and construction permits known as the Advisory Base Flood Elevation Maps (ABFE). ABFEs are developed after the occurrence of a high-impact atmospheric event, and several factors related to the latest engineering analysis are taken into consideration to determine whether an analysis is necessary. Some of the factors considered in the analysis include the age of the analysis, the territory covered by the analysis, and the engineering models/data used in the analysis. ABFEs have been produced for states such as Mississippi (Hurricane Katrina), New York, and New Jersey (Hurricane Sandy). Following Hurricane María's passage through Puerto Rico in 2017, and due to the availability of better data, FEMA developed ABFEs for Puerto Rico. It should be noted

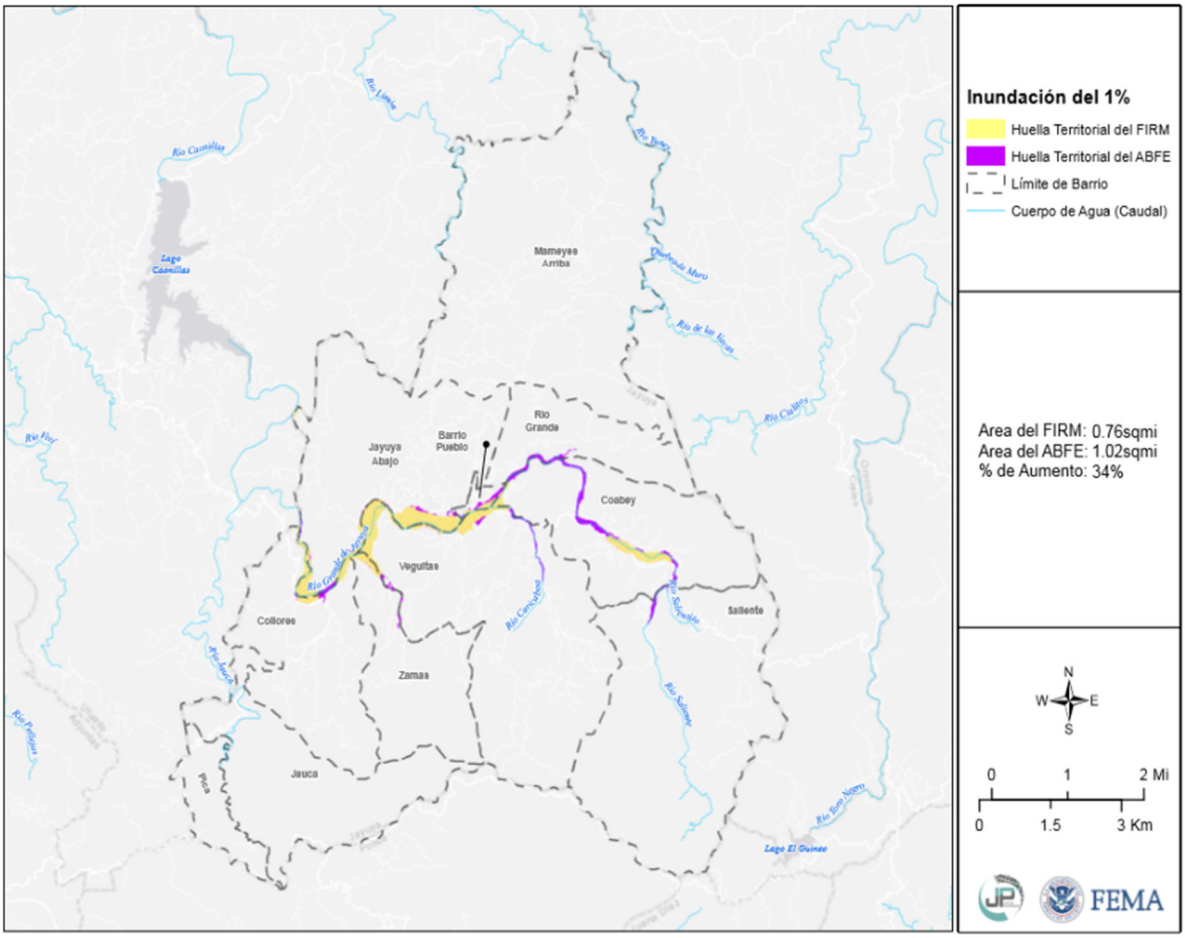
that the Puerto Rico Planning Board adopted the ABFEs on an emergency basis in March 2018. At present, Puerto Rico has two (2) types of flood maps: the FIRMs (2009), which are used solely for flood insurance rates, and the ABFEs (2018), which are used to regulate construction on the Island.

For comparison purposes, this subsection includes the difference in the extent of land affected by flooding based on the FIRMs prior to Hurricane María in September 2017 and the ABFEs developed by FEMA for Puerto Rico. After Hurricane María in 2017, the areas designated as flood-prone throughout the Island increased by 20%.

The next Figure (in Spanish) shows the difference between the extent of the FIRM maps before Hurricane María and the Advisory Base Flood Elevation (ABFE) for an event of 1% chance (100 years flood) maps after the hurricane. In the Municipality of Jayuya, the difference represents an increase of approximately 34%, from 0.76 square miles to 1.02 square miles, meaning that the areas exposed to flooding are more extensive than previously determined and greater than those highlighted in the municipality's previous Plan. The new area includes the expansion of previously identified areas, as well as new areas along several bodies of water in the Municipality, including the Río Grande de Jayuya River and tributaries.

Figure 18: ABFE vs FIRM 1% (100 years)

Comparación de los Niveles de Inundación: Jayuya
(FIRM vs ABFE)



HAZUS Modeling

Flooding source identification and hazard loss estimation were performed using Federal Emergency Management Agency's (FEMA) HAZUS platform, a nationally standardized tool for multi-hazard risk assessment. The HAZUS flood module was used to delineate streams in areas where no engineering studies have been developed and also used to estimate potential monetary losses associated with structural damage.

Input data included depth grids produced by a Base Level Engineering (BLE) study in 2018 post hurricanes Irma and María. This BLE study did not review all potential riverine flooding sources so additional modeling was developed with HAZUS hydrology and hydraulics to review other potential losses associated with streams with drainage areas of one square mile or more.

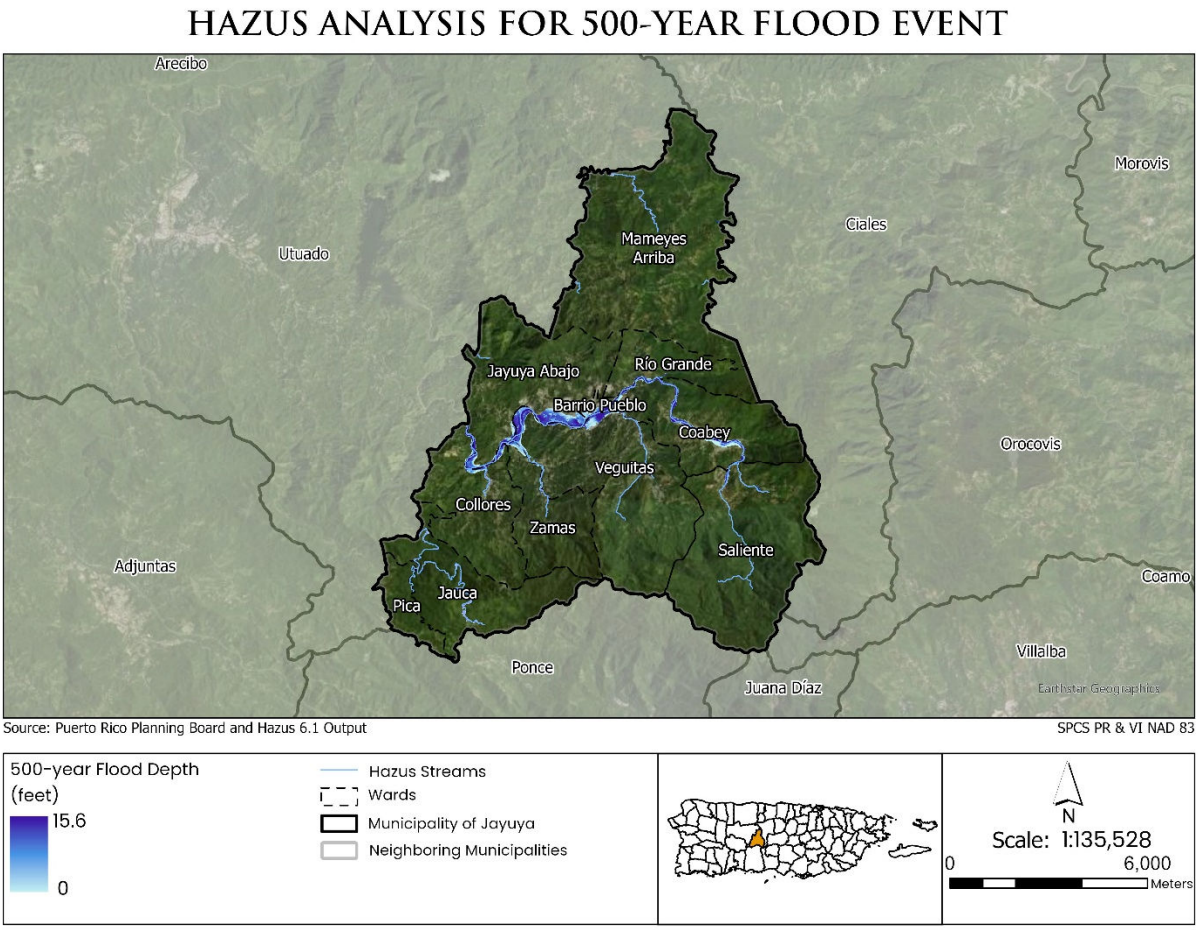
Topographic data used by Hazus for depth calculations and damage estimation was sourced from the USGS 3D Elevation Program (3DEP) seamless 1/3 arc-second Digital Elevation Model (DEM), at an approximate resolution of 10 feet. This dataset provides current coverage of Puerto Rico and its surrounding islands.

The 3DEP seamless DEM for Puerto Rico is derived from two lidar collection efforts: a 2016–2017 USGS lidar survey and a 2018 USGS post-Hurricane María lidar survey. The 2018 collection, conducted following the significant coastal geomorphic changes caused by Hurricane María, represents the most current available terrain data for the island and forms the primary basis of the 3DEP elevation layer used in this analysis.

The areas documented in the maps included within the LHMP may have streamlines represented but with no depth grids associated with them. Due to the inconsistency of available regression equations and other data necessary for computation of flood risk and losses with Hazus's hydrology and hydraulics models, some streams that were delineated were unable to be completed during modeling runs. These stream areas may need to be reviewed for future flood studies and potential flood risk identification but, due to the lack of data, they were unable to be included in the Hazus studies.

The HAZUS 500-year flood analysis indicates that the areas most susceptible to extreme flood inundation in the Municipality of Jayuya are concentrated along the Río Grande de Jayuya corridor and associated tributary systems traversing Jayuya Abajo, Barrio Pueblo, Río Grande, and Coabey (Map 28). The modeled flood extent generally corresponds with FEMA-mapped flood hazard areas and Advisory Base Flood Elevation (ABFE) analyses; however, the HAZUS results suggest that flooding associated with a 0.2-percent annual chance event may extend beyond regulatory floodplain boundaries in certain locations. Communities including Santa Clara, La Monserrate, and Vega Linda, as well as developed areas adjacent to the river corridor, may experience increased vulnerability during extreme flood events. Because these flood-prone areas coincide with important residential, transportation, commercial, and public-service corridors, a 500-year flood event has the potential to generate significant impacts to community lifelines, infrastructure, and municipal operations.

Map 28: HAZUS Analysis for 500 - Year Flood Event



4.8.1.2 Risk Magnitude (B1-C)

Flood events can represent one of the most severe atmospheric threats, as there is no other event worldwide that causes greater loss of life (FEMA, 1997). This is due to the high frequency of such events and the population's lack of awareness regarding the magnitude of the damage they can cause, whether physical harm or property damage. It should be noted that most disaster declarations in the U.S. are related to flood events. The majority of flood-related incidents involve people being swept away by fast-moving water, along with their vehicles (FEMA, 1997). Each year, the devastation caused by floods results in billions of dollars in asset losses. Highly urbanized areas with dense populations are particularly vulnerable to flash floods, as the construction of buildings, roads, and parking lots create impermeable surfaces, reducing the land's natural ability to absorb water (NSWL, n.d.).

Floods are the most common natural disaster, occurring when water overflows and submerges land that is typically dry. They are often triggered by heavy rainfall, rapid snowmelt, or storm surges from tropical cyclones or tsunamis in coastal regions.

Floods can cause extensive destruction, including loss of life and severe damage to homes, property, and critical public health infrastructure. Between 1998 and 2017, floods impacted more than 2 billion people worldwide. Those living in floodplains, in poorly constructed buildings, or without access to warning systems and hazard awareness are the most vulnerable (WHO, 2025).

Three common types of floods include:

- Flash floods: Result from sudden, intense rainfall that rapidly raises water levels, overwhelming rivers, streams, channels, or roads.
- River floods: Occur when prolonged rainfall or snowmelt causes rivers to exceed their capacity.
- Coastal floods: Caused by storm surges linked to tropical cyclones or tsunamis.

Regarding the impact on life, property, and operations, floods cause loss of life and property damage, including residences, buildings, infrastructure, agriculture, and sanitation and drainage systems. After a flooding event, the aftermath can increase the occurrence of various diseases, such as leptospirosis, and lead to rises in contaminated water (Malilay, 2000).

According to a Congressional Budget Office (CBO) report, "Over the past 10 years, damage from flooding in the United States has averaged $46 billion per year (in 2023 dollars)" (CBO, 2024). This estimate includes costs such as:

- The replacement of residential and commercial property;
- Repairs for or rebuilding of public infrastructure;
- Emergency response measures;
- Costs associated with the continued loss of property use (for example, the provision of temporary housing);
- Commercial losses resulting from business interruptions; and
- Damage to crops, livestock, and timber" (CBO, 2024).

Although the effectiveness of adaptation projects varies, estimates by the U.S. Army Corps of Engineers indicate that approximately two-thirds of its projects—excluding those in the highest and lowest sixth of benefit–cost ratios—are expected to reduce

flood damages by $2 to $6 for every dollar invested over a 50-year project lifespan(CBO, 2024).

4.8.1.3 Past Events (B1-D)

For the most part, flooding events in Puerto Rico are related to tropical systems (tropical waves, tropical depressions, tropical storms and hurricanes). Consequently, flooding hazards occur most frequently during Atlantic hurricane season, which extends from June 1 through November 30.

However, flooding events can occur outside this window as shown in the case of the April- May 2024 Floods, the February 2022 floods and the Three Kings' Flooding of 1992. The following table summarizes the major flooding events in the period of 2010 – 2025.

Table 16: Major flooding events in Puerto Rico 2010-2025

Event	Date	Disaster Declaration Number	Jayuya Included?	Description
Tropical Storm Ernesto	8/13/2025 to 8/16/2025	DR-4850- PR EM-3610-PR	Public Assistance – Yes (Categories A-G) Public Assistance Yes (Category B) Individual Assistance - NO	The storm's slow movement and moisture-rich environment contributed to prolonged precipitation, particularly in central and eastern municipalities. Parts of Central Puerto Rico recorded 12–14 inches of rainfall in localized areas. The municipality of Barranquitas measured 11.20 inches over a 48-hour period, while Villalba reported 10.20 inches. Eastern municipalities, including Vieques and Culebra, observed 8–10 inches of rain. Multiple rivers exceeded their banks, including the La Plata River, resulting in significant inundation of adjacent communities. Flash flooding occurred in urban and rural areas, rendering primary and secondary roads impassable. Floodwaters caused structural failures in bridges and washed-out

Event	Date	Disaster Declaration Number	Jayuya Included?	Description
				critical road segments, isolating several communities. Stormwater drainage systems in metropolitan areas, notably San Juan, were overwhelmed, leading to localized urban flooding. Emergency Response and Disruptions Evacuations were conducted in flood-prone areas such as Toa Baja to mitigate loss of life.
Puerto Rico Severe Storms, Flooding, Landslides, and Mudslides	4/29/2024 to 5/10/2024	DR-4805-PR	Public Assistance – No Individual Assistance - No	In April 2024, Puerto Rico was struck by a series of severe storms that delivered prolonged heavy rainfall—some areas received more than 10 inches—leading to widespread flooding and landslides. Central and western municipalities saw rivers overflow, with the Manatí and Cibuco rivers breaching their banks and inundating highways like PR-2. Urban areas, especially in the southwest (Cabo Rojo, Mayagüez, Ponce), faced flash flood warnings as heavy afternoon downpours overwhelmed drainage systems. Floodwater turned streets into torrents, trapping residents on rooftops and prompting emergency evacuations in over 20 municipalities.
Hurricane Fiona	9/17/2022 to 9/21/2022	DR-4671-PR	Public Assistance – Yes	Hurricane Fiona struck Puerto Rico in September 2022, unleashing torrential rains—up to 31.22 inches of rainfall over 72 hours in Ponce,

Event	Date	Disaster Declaration Number	Jayuya Included?	Description
			Individual Assistance - Yes	nearly matching the accumulation from Hurricane María. This deluge led to catastrophic flooding, with 7 to 20 inches common across most of the island and localized spots exceeding 30 inches.
Puerto Rico Severe Storm, Flooding and Landslide	2/4/2022 to 2/6/2022	DR-4649-PR	Public Assistance: No Individual Assistance: No	In February 2022, Puerto Rico experienced a severe storm that brought prolonged heavy rainfall, causing widespread flooding across the island. Rainfall totals ranged from 3 to 10 inches in many areas, with localized peaks reaching up to 16 inches in Toa Alta. The intense precipitation overwhelmed drainage systems, leading to urban flooding in San Juan, Guaynabo, and coastal towns such as Dorado and Vega Baja. Rivers swelled beyond their banks, inundating roads and isolating communities, while landslides compounded the damage in mountainous regions. Emergency responders issued flash flood warnings and conducted evacuations as homes and businesses were submerged.
Puerto Rico Severe Storm and Flooding	9/13/2020	DR-4571-PR	Public Assistance - No	Puerto Rico was battered by a severe storm and flooding on September 13, 2020, resulting in widespread flood damage and infrastructure disruption. Torrential rains overwhelmed drainage systems and caused rivers to

Event	Date	Disaster Declaration Number	Jayuya Included?	Description
			Individual Assistance - No	overtop in areas like Arecibo, where one home was destroyed, over 100 suffered major damage, and more than 20 experienced minor flooding. Roads and bridges were submerged or damaged, isolating communities and impeding emergency response efforts. Floodwaters inundated homes and public facilities, prompting evacuation orders and flash flood warnings across several municipalities.
Tropical Storm Isaías	7/29/2020 to 7/30/2020	DR-4560-PR	Public Assistance - No Individual Assistance - No	Although the center of Tropical Storm Isaías did not make landfall on the island, the system left a large amount of rain in its path, causing flooding throughout Puerto Rico. Rainfall accumulation of up to 10 inches was recorded around the island.
Hurricane María	9/20/2017	DR-4339-PR	Public Assistance – Yes Individual Assistance - Yes	Widespread flooding severely affected the whole Island. For example, in San Juan, water levels reached up to 6 feet in some areas and numerous structures losing their roofs. The coastal neighborhood of La Perla was largely destroyed, while Cataño suffered extensive damage, with the Juana Matos community estimated to be 80% destroyed. Strong winds, heavy rains, and flash floods near the La Plata Lake dam in Toa Baja impacted thousands of residents. Survivors reported that floodwater rose 6

Event	Date	Disaster Declaration Number	Jayuya Included?	Description
				feet in just 30 minutes, and some areas experienced depths of up to 15 feet (4.6 m).
Hurricane Irma	9/5/2017	DR-4336-PR	Public Assistance – Yes Individual Assistance - No	On September 5, 2017, Hurricane Irma impacted Puerto Rico; an Emergency Declaration was issued for the Island. On September 6, 2017, a Major Disaster Declaration was issued following Hurricane Irma's passage. Two people died due to torrential rains before the hurricane: a man died in Orocovis after falling from his ladder while repairing his roof; another man on the coast in Capitanejo died after being struck by lightning. Wave heights in Puerto Rico reached 9 meters, and sustained winds of 111 mph were recorded in Culebra.
Tropical Storm María[9]	9/8/2011 to 9/114/2011	DR-4040-PR	Public Assistance - No Individual Assistance - No	Tropical Storm (later Hurricane) María formed in early September 2011 and passed near Puerto Rico, bringing significant heavy rainfall and tropical storm conditions to the island. The storm caused widespread flooding that inundated numerous roadways and homes; floodwaters near Patillas destroyed several homes and bridges, and approximately

[9] Tropical Storm María was a tropical system that pass to the northeast of Puerto Rico in 2011 and that caused flooding in the Island. Not to be confused with the 2017 Hurricane María. The name "María" was retired from the official Atlantic hurricane season list of names after 2017.

Event	Date	Disaster Declaration Number	Jayuya Included?	Description
				150 houses in Yabucoa were flooded and damaged.
Hurricane Irene	8/22/2011	DR-4017-PR	Public Assistance - Yes Individual Assistance - Yes	Total rainfall reached 22 inches over three days, with the eastern region being the most affected—the same area that had already received over 6 inches earlier in August during the close passage of Tropical Storm Emily. The Río Grande de Manatí in Manatí recorded its third-highest level in history, surpassed only during Hurricane Hortense (1996) and Hurricane Georges (1998). The Puerto Nuevo River near Hato Rey reached its fourth-highest level on record. Flooding was severe enough to cause infrastructure stress and dangerous conditions across multiple municipalities. Tragically, there was one direct fatality attributed to Irene, due to drowning.
Puerto Rico Severe Storms, Flooding. Mudslides and Landslides	5/20/2021 to 6/8/2021	DR-4004-PR	Public Assistance - No Individual Assistance - No	In May 2021, Puerto Rico experienced a series of intense rainfall events that caused flash flooding, river overflows, mudslides, and landslides, particularly in mountainous and interior regions. Although May is normally one of the wettest months of the year, several storm systems produced short-duration but high-intensity rainfall, overwhelming local drainage systems and destabilizing steep terrain.

Event	Date	Disaster Declaration Number	Jayuya Included?	Description
Sub-Tropical Storm Otto	10/3/2010 to 10/8/2010	DR-1946-PR	Public Assistance - Yes Individual Assistance - No	An extensive rain band covered Puerto Rico while Otto moved as a distant tropical cyclone north of the Island (NOAA). This resulted in heavy and continuous rainfall that caused serious flooding. (Eco Exploratorio).
Puerto Rico Severe Storms and Flooding	5/26/2010 to 5/31/2010	DR-1919-PR	Public Assistance - No Individual Assistance - No	In May 2010, Puerto Rico was hit by a series of severe storms that produced torrential rainfall and widespread flooding across the island. Rainfall exceeded 12 inches in some areas, overwhelming drainage systems and causing rivers to overflow their banks. Low-lying communities and urban centers experienced significant inundation, with roads submerged and bridges damaged, isolating several municipalities. Flash floods swept through residential areas, forcing evacuations and leaving homes and businesses underwater. Landslides triggered by saturated soil compounded the crisis, blocking access routes and delaying emergency response efforts. The event resulted in extensive infrastructure damage and highlighted the island's vulnerability to prolonged heavy rain events during the wet season.

In summary, between 2010 and 2025 there were a total of 13 major disaster declarations caused by flooding or events that had flood related damage. Of those, the municipality of Jayuya was declared eligible for either Public Assistance or Individual Assistance in six instances.

4.8.1.4 Special Consideration: Floods by Stormwater Management Deficiencies

Urban drainage systems — whether natural or constructed — are designed to convey surface water runoff to receive water bodies. When storm drains, channels, or swales become obstructed, insufficient or overwhelmed by heavy rainfall and expanding urbanization, they can overflow and flood surrounding areas. As a result, floodwaters may spread beyond FEMA's mapped floodplains, even entering zones typically considered low or moderate risk (e.g., Zones B, C, or X) (FEMA, Reducing Damage from Localized Flooding, 2025).

Puerto Rico's stormwater runoff is conditioned by the island's climate, topography and land cover. Annual rainfall varies from less than 1,000 millimeters (mm) to over 4,000 mm (40 to 157 inches). The island's watersheds are largely mountainous, with steep slopes, and stream valleys are typically narrow and well-incised. Intense but short-duration storms are common, leading to rapid flooding with peak discharges that can be several orders of magnitude higher than base flows. All of Puerto Rico's watersheds have experienced significant alterations. It is estimated that more than 11% of the island is covered by developed surfaces, within areas reaching up to 40% in regions such as the San Juan Metropolitan Area. These changes have significantly modified stormwater drainage patterns and downstream floodwater levels (FEMA, 2024).

Paved surfaces severely limit the infiltration of rainwater, increasing both the volume and velocity of surface runoff. As a result, storm drains can easily become overwhelmed. In addition, runoff from paved surfaces reaches streams and rivers much faster, exceeding their capacity to convey water and causing higher and more frequent flood levels in adjacent areas. Moreover, contaminants from both point and non-point pollution sources are more likely to reach surface water bodies when transported by runoff over paved surfaces instead of being partially or totally degraded by vegetated soils. Higher flows also have a greater capacity to remove and transport soil and other loose materials from streambanks and riverbeds, facilitating erosion and scouring (FEMA, 2024).

Paradoxically, river flow between rain events tend to decrease after urbanization. Paved surfaces act as a barrier that isolates the soil, preventing the infiltration of

rainwater that otherwise would have gradually discharged from the ground and into streams days later, a process that is critical for maintaining base flows for riparian fish and wildlife species, but also to sustain public water supply. In response, various hard infrastructure measures (hard infrastructure measures such as flood-control pump stations, concrete trapezoidal channels, and curved side gutters have been widely implemented across Puerto Rico. While effective at quickly conveying runoff, these structures often neglect ecological, social, cultural, and aesthetic considerations. These practices often involve significant operation and maintenance costs and, in many instances, can exacerbate downstream erosion, scouring and water quality problems.

A more sustainable approach would be to take advantage of the ecological services that green areas and other nature-based solutions to manage runoff flows and improve water quality. Such strategies are increasingly critical to protect communities from the growing water-related impacts of climate change in Puerto Rico (FEMA, 2024).

4.8.1.5 Future Event Probabilities (B1-E)

A sustained increase in the frequency of extreme rainfall events has been identified in recent decades. As stated above, the Island of Puerto Rico has had 13 flood – related flood major disaster declaration in the last fifteen years. This means that the average frequency of a flooding event is approximately every 14 months.

Any mitigation action adopted to reduce the effects of flooding in the Municipality of Jayuya must consider, for example, that 100-year return events or those with a 1% annual probability could become 50-year return events or have a 2% annual probability in the future. This means that flood events of a certain magnitude and impact on the municipality may increase, particularly in high-risk areas. Though there are many floods control projects in Jayuya, the probability of future events is considered high.

4.8.2 Risk Analysis (B2-A, B2-B)

4.8.2.1 Estimated Losses

FEMA's National Risk Index data indicate that riverine flooding affects approximately 0.192 square miles within the Municipality of Jayuya, exposing an estimated $193.96

million in building value and approximately 1,031 residents. The total exposure value associated with riverine flooding is estimated at $12.15 billion, including population-equivalence exposure (Table 16). Expected annual losses from riverine flooding are estimated at approximately $8,792, consisting primarily of building-related losses and population-equivalence impacts (Table 17). Although the geographic extent of riverine flooding is relatively limited, exposed areas coincide with developed portions of the municipality's central river corridor, increasing the potential for impacts to housing, transportation infrastructure, businesses, utilities, and community lifelines. Consequently, riverine flooding remains a significant hazard requiring continued floodplain management, infrastructure resilience measures, and mitigation planning.

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Table 16: Flood Exposure

Exposure - Impacted Area (sq mi)	Exposure - Building Value	Exposure - Population	Exposure - Population Equivalence	Exposure - Total
0.191703	$193,955,110	1,031	$11,960,923,382	$12,154,878,493

Source: FEMA NRI

Table 17: Expected Annual Loss to Flood

Expected Annual Loss - Building Value	Expected Annual Loss - Population	Expected Annual Loss - Population Equivalence	Expected Annual Loss -Total
$7,112	0.000145	$1,680	$8,792

Source: FEMA NRI

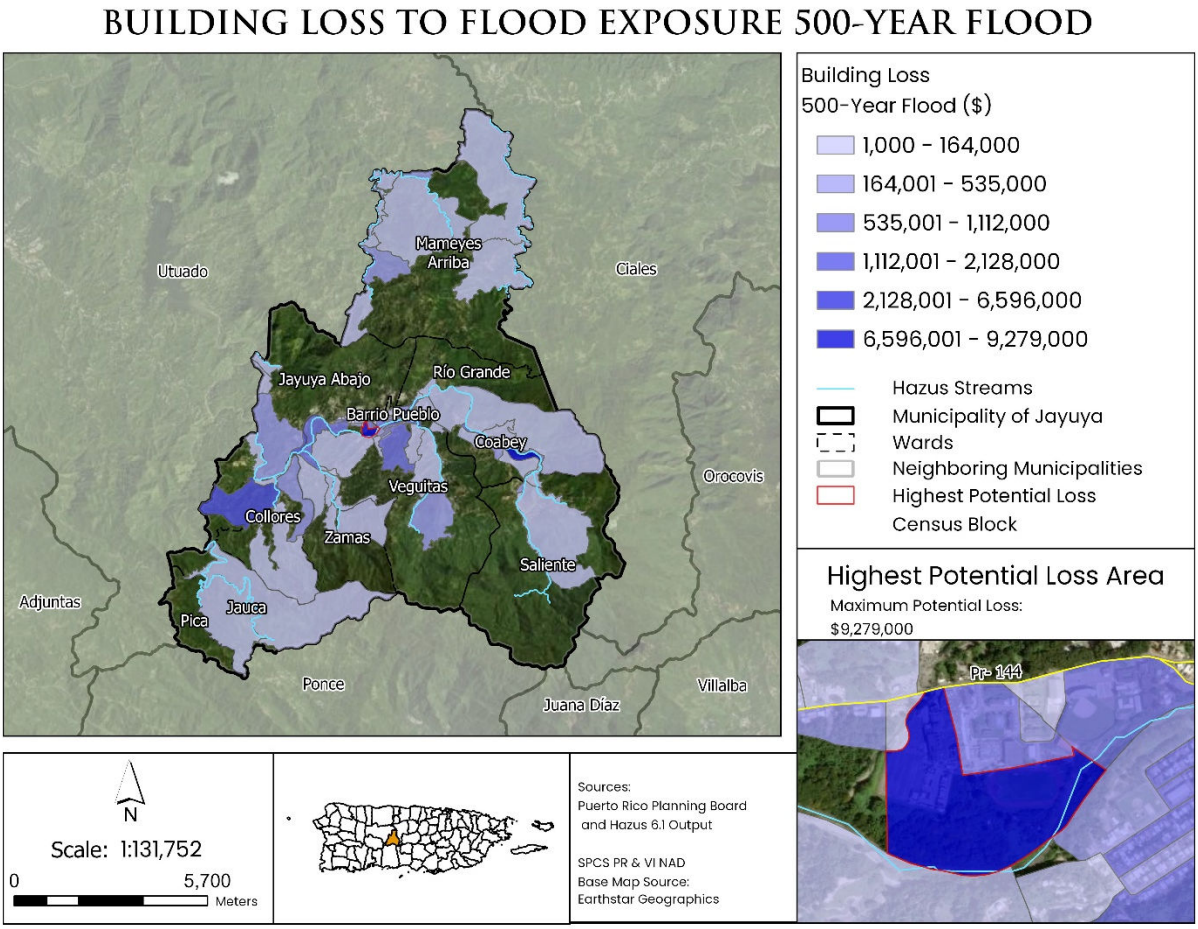
The NRI analysis demonstrates that flood risk in Jayuya is driven less by the overall size of the floodplain and more by the concentration of assets located within the Río Grande de Jayuya corridor. As a result, even localized flooding has the potential to affect critical community functions, transportation access, and residential areas within the municipality's principal development corridor.

The HAZUS building loss analyses for both the 100-year and 500-year flood events confirm that the highest concentrations of potential structural damage are located within the central floodplain corridor encompassing Barrio Pueblo, Jayuya Abajo, Coabey, and portions of Río Grande (Maps 29 and 30). These areas coincide with FEMA-mapped Special Flood Hazard Areas (SFHAs), Advisory Base Flood Elevation (ABFE) flood-prone areas, and previously identified vulnerable communities situated along the Río Grande de Jayuya. The maximum estimated building losses exceed approximately $9 million under both flood scenarios, indicating a substantial

concentration of economic exposure within the municipality's primary development corridor.

However, the HAZUS building loss results also reveal an important pattern that extends beyond the regulatory floodplain boundaries. Moderate to significant building losses are projected within portions of Mameyes Arriba, Collores, Veguitas, Zamas, Jauca, Pica, and Saliente, including areas not identified as FEMA Special Flood Hazard Areas. These losses generally correspond with tributary stream corridors, secondary drainage networks, and steep watersheds distributed throughout the municipality.

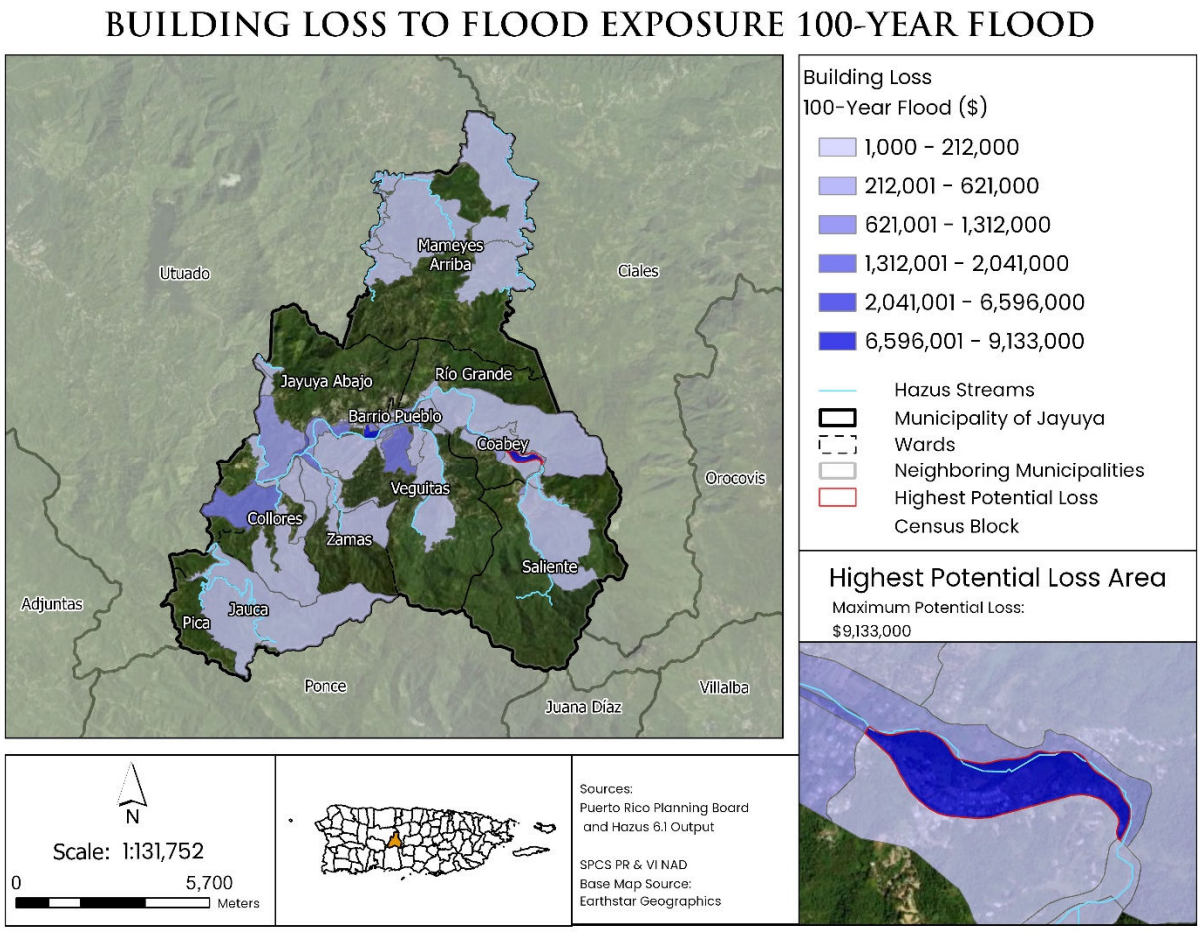
Map 29: Building Loss to Flood Exposure 500 – year flood



This finding supports previous observations derived from the hydrography analysis and HAZUS flood modeling, which demonstrated that the extensive stream network draining the mountainous terrain of Jayuya can generate localized riverine flooding, flash flooding, and overbank flooding beyond the main floodplain of the Río Grande de Jayuya. While FEMA flood mapping appropriately identifies the primary flood

hazard areas, the HAZUS loss assessment indicates that damaging flood conditions may also occur along smaller tributaries that are not fully represented within the mapped Special Flood Hazard Areas.

Map 30: building Loss to Flood Exposure 100-year



According to the HAZUS analysis, a total of 7,386 structures are potentially exposed to riverine flooding, including 7,364 residential structures and 22 non-residential structures (Table 18). The overwhelming predominance of residential structures reflects the municipality's residential development pattern and suggests that future flood events may result in significant impacts to housing and residents even when the geographic extent of flooding is relatively limited.

For the 1-percent annual chance flood event (100-year flood), estimated losses exceed $63.0 million, as shown on table 19. Residential losses account for approximately 73 percent of total projected flood damages, indicating that housing

stock represents the municipality's most vulnerable asset class during riverine flooding events.

Table 18: Total Structures at Risk

Structures	
Non-Residential	22
Residential	7,364
Total	**7,386**

Table 19: Aggregated Loss of dollars for 1% (100-year) and 0.2% (500 - year) events

Occupancy Type	Losses in Dollars. 1% Event	Losses in Dollars. 0.2% Event
Non-Residential	$17,288,000	$17,419,000
Residential	$45,738,000	$49,333,000
Total	**$63,026,000**	**$66,752,000**

Table 20: Detailed Loss for Non-Residential Buildings

Occupancy	Losses in Dollars, 1% Event	Losses in Dollars, 0.2% Event
Agriculture	$0	$0
Commercial	$8,907,000	$8,938,000
Education	$41,000	$47,000
Government	$8,298,000	$8,392,000
Industrial	$42,000	$42,000
Religious/Non-Profit	$0	$0
Total	**$17,288,000**	**$17,419,000**

Table 21: Detailed Loss for Residential Buildings

Residential, Detailed Losses	Losses in Dollars, 1% Event	Losses in Dollars, 0.2% Event
Structure	$14,920,000	$16,207,000
Contents	$8,202,000	$8,843,000
Relocation	$13,523,000	$14,540,000
Rental Income	$9,093,000	$9,743,000
Total	**$45,738,000**	**$49,333,000**

For the 0.2-percent annual chance flood event (500-year flood), total projected losses increase to approximately $66.75 million, representing an increase of nearly $3.7 million above the 100-year flood scenario (Table 19). Residential losses continue to dominate the loss estimate and increase by approximately 7.9 percent between the 100-year and 500-year events. Similarly, commercial and governmental facilities continue to account for the majority of non-residential losses, emphasizing the importance of protecting business functions and municipal operations located within flood-susceptible areas.

The total structure and loss assessment strengthens confidence in the municipality's flood vulnerability analysis by confirming that substantial damages can occur both within and outside FEMA-mapped floodplains. The projected losses provide quantitative evidence that flood risk in Jayuya is a watershed-wide issue influenced by the Río Grande de Jayuya corridor, its tributaries, and the municipality's mountainous drainage network. Consequently, mitigation efforts should address not only regulatory floodplain management but also tributary flood hazards, drainage improvements, bridge and culvert capacity, stream maintenance, and resilient development practices throughout the municipality.

4.8.2.2 Lifelines and Critical Infrastructure

Flooding is among the most disruptive natural hazards, affecting all eight FEMA Community Lifelines. These lifelines represent essential services that support public health, safety, and economic stability. Below is an analysis of some of the impacts that flooding can have on lifelines:

- Safety and Security - Flooding can damage emergency services infrastructure such as police stations, fire departments, and emergency operations centers. Blocked evacuation routes and submerged roads hinder rescue efforts, while prolonged outages increase vulnerability to crime and civil unrest.

- Food, Water, Shelter - Floodwaters can contaminate drinking water supplies and damage water treatment facilities. Food supply chains may be severely disrupted when warehouses and grocery stores are flooded. Damage to residential structures can result in displacement, creating urgent demand for temporary shelters.

- Health and Medical - Hospitals and clinics may become inaccessible or experience power outages during flood events. Flood conditions can contribute to increased incidence of waterborne diseases and mold-related illnesses

increase significantly. Disruptions to medical supply chains may delay both emergency care and routine treatments.

- Energy (Power and Fuel) - Flooding can submerge electrical substations and transformers, causing widespread outages. Fuel distribution networks may be disrupted due to impassable roads and damaged transportation routes. Prolonged power loss can significantly affect critical facilities such as hospitals and water treatment plants.

- Communications – Flooding can damage cell towers, fiber-optic cables, and emergency communication systems, reducing the capacity to coordinate rescue and recovery operations. This disruption can delay the dissemination of critical information.

- Transportation- Flooding can wash out or undermine roads, bridges, and rail lines, rendering them impassable. Airports and seaports may be forced to suspend operations, delay evacuation and the delivery of emergency supplies. Also, transportation disruptions amplify the overall impact of the disaster.

- Hazardous Materials - Floodwaters can mobilize and disperse hazardous substances from industrial sites, sewage systems, and fuel storage tanks, increasing the risk of environmental contamination. Cleanup efforts can become complex, costly and time-consuming, potentially resulting in long-term public and environmental impacts.

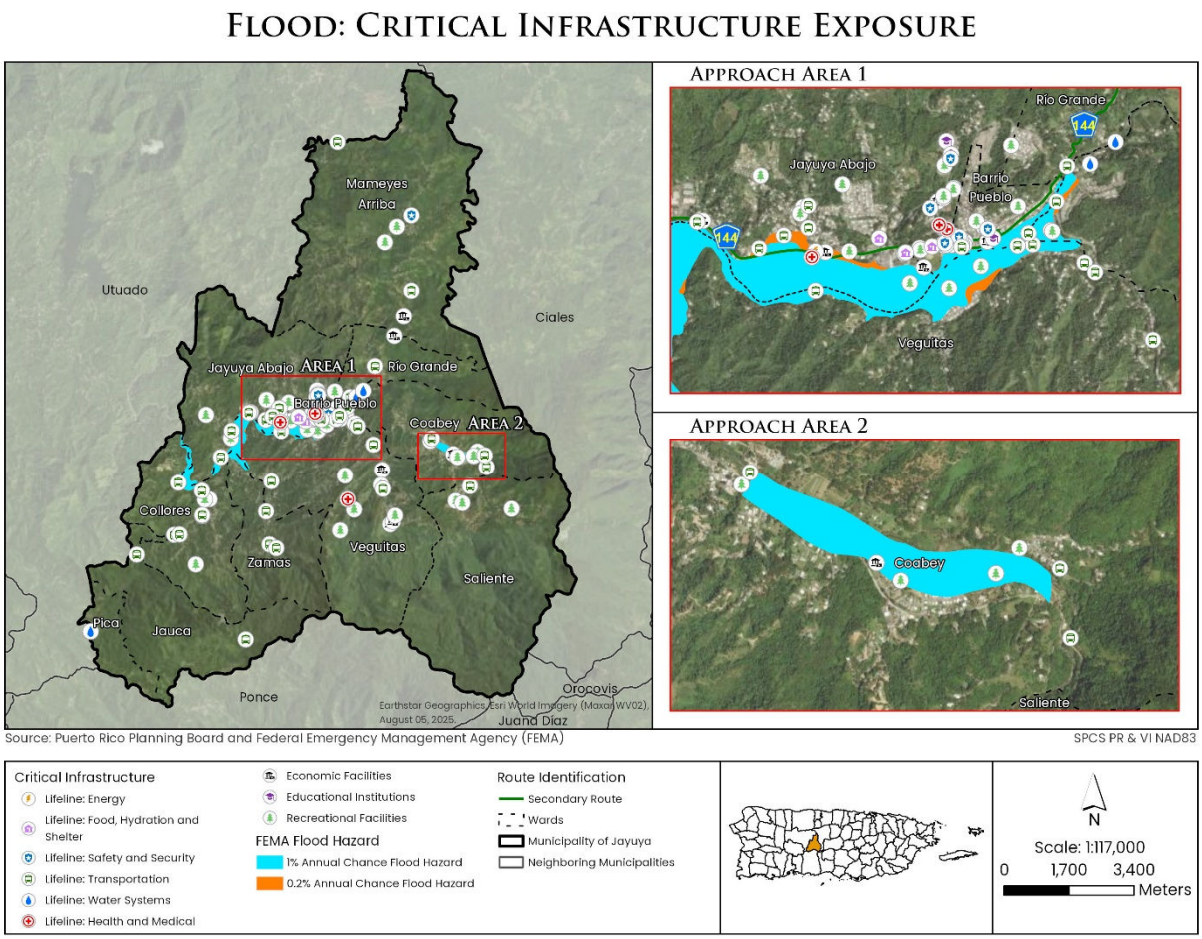
- Water Systems - Floodwaters can contaminate drinking water supplies and damage water treatment facilities. Excessive inflow from floodwaters may overwhelm sewer systems, causing untreated sewage to backflow into streets and homes. Flood conditions can exceed the design capacity of storm drains and retention basins, resulting in urban flooding and infrastructure damage. The accumulation of sediment and debris clog drainage systems, reducing effectiveness and increasing flood risk during subsequent storms events.

Map 31 shows the location of the critical facilities in relation to the flood zones.

The critical infrastructure exposure analysis indicates that flood risk in the Municipality of Jayuya is concentrated primarily along the Río Grande de Jayuya floodplain and adjacent tributary corridors that traverse Jayuya Abajo, Barrio Pueblo, and Coabey. These areas coincide with FEMA-designated Special Flood Hazard Areas (SFHAs), the HAZUS 100-year and 500-year flood inundation extents,

and the areas previously identified as having the highest potential building losses. The exposure of critical facilities within these corridors demonstrates the potential for flooding to disrupt multiple community lifelines simultaneously. Appendix F has a table that details the critical infrastructure exposure to flooding in Jayuya.

Map 31: Flood Critical Facilities Exposure 500 yrs flood



Approach Area 1 represents one of the municipality's most vulnerable flood exposure clusters. The highest concentration of exposed critical infrastructure occurs within and immediately adjacent to Barrio Pueblo and Jayuya Abajo, where the FEMA 1-percent annual chance and 0.2-percent annual chance flood hazard areas overlap with the municipality's principal governmental, public safety, health care, transportation, utility, and commercial service center. Based on the critical infrastructure inventory, facilities (Appendix F) potentially affected by flood events include:

Safety and Security Facilities

- Casa Alcaldía and Casa Alcaldía (Annex)
- Old Court
- Virtual Surveillance Center
- Municipal Police Barracks
- Fire Station
- Municipal Office of Emergency Management
- Municipal Public Works

Health and Medical Facilities

- CDT Dr. Mario Canales Torresola
- CDT Mario Canales Torresola
- Hayuya Pharmacy

Energy Infrastructure

- Gas Station (Gulf)
- Gas Station (Total Energies) facilities located in the urban area
- Electrical Substation

Food, Hydration and Shelter Facilities

- Residencial La Montaña
- Supermarket (Econo)
- Municipal Stadium "Marcos A. Massini""

Water Systems Facilities

- Jayuya Urbano Filter Plant
- Drinking Water Collection Point

Multiple transportation assets intersect the floodplain, including sections of PR-144, PR-372, PR-527, PR-5141, Kennedy Street, Sol Street, Vincent Street, and Puente Virao. Flooding affecting these corridors could restrict access to emergency services and critical facilities.

A second concentration of exposed infrastructure (Approach Area 2) is located within Coabey, where the flood hazard zone intersects developed areas adjacent to tributary channels. Although fewer facilities are present compared to the urban center, flooding in this area may affect:

- Transportation infrastructure serving eastern portions of the municipality.
- Community facilities and recreational assets located adjacent to the flood corridor.
- Local access routes connecting residents to the municipal urban center.

4.8.2.3 Social Vulnerabilities

The population exposure analysis indicates that flood risk in the Municipality of Jayuya is concentrated primarily along the Río Grande de Jayuya corridor and associated tributary systems that traverse the central portion of the municipality. Consistent with previous FEMA floodplain mapping, Firmette analyses, ABFE evaluations, HAZUS flood modeling, building loss assessments, and critical infrastructure exposure analyses, the areas exhibiting the highest concentrations of population exposure are located within portions of Barrio Pueblo, Jayuya Abajo, and Coabey.

The highest population exposure category identified in the analysis is concentrated within the central flood corridor surrounding Barrio Pueblo and adjacent areas of Jayuya Abajo. These areas contain census blocks with an estimated 249 to 488 persons at risk, representing the largest concentration of residents exposed to riverine flooding. The location of these population centers within or adjacent to FEMA-designated flood hazard areas significantly increases the potential for flood-related impacts to housing, transportation access, public services, and community lifelines.

Moderate population exposure is observed along the floodplain extending west of Barrio Pueblo into Jayuya Abajo and eastward toward Coabey, where multiple census blocks contain between 82 and 248 persons at risk. These areas correspond closely with the flood-prone development corridor previously identified through FEMA flood mapping and HAZUS building loss analyses.

The population exposure analysis strongly reinforces the findings developed throughout the flood risk assessment.

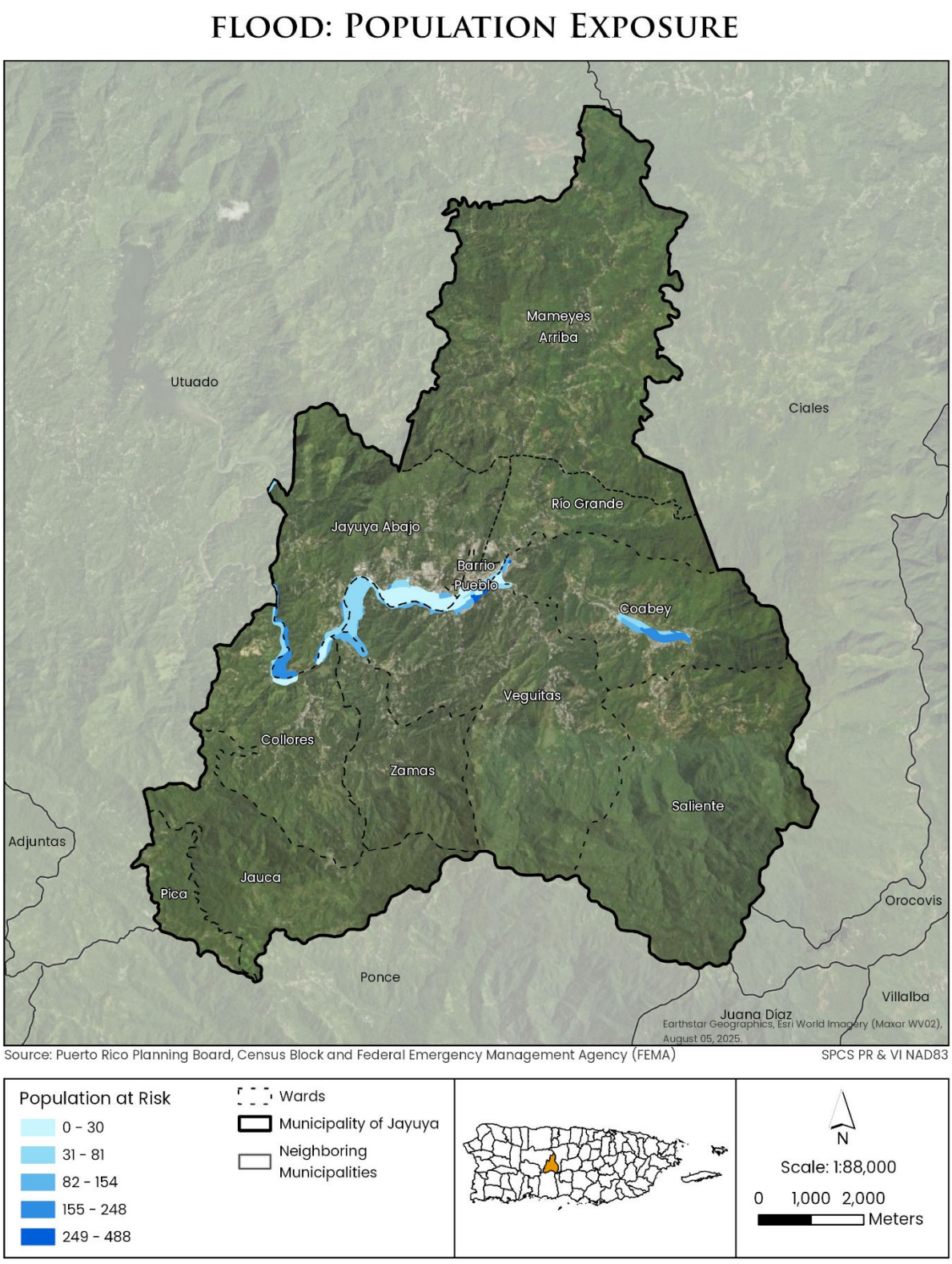
Several important observations emerge:

- The highest concentrations of exposed population occur within the same areas identified as having the greatest flood depths, highest building losses, and largest concentrations of critical infrastructure, particularly Barrio Pueblo, Jayuya Abajo, and Coabey.
- Communities previously identified through FEMA Firmette analyses, including Santa Clara, La Monserrate, and Vega Linda, are located within the broader flood-prone corridor where residential exposure is concentrated.
- Population exposure closely follows the development pattern of the municipality, with the greatest numbers of residents located within the central valley where flood hazards and critical infrastructure overlap.

- Exposure is not confined exclusively to FEMA Special Flood Hazard Areas; rather, residents located along tributary streams and secondary drainage systems may also experience flooding impacts during major rainfall events.

This latter finding is particularly important because it validates the conclusions reached through the hydrography analysis, HAZUS inundation mapping, and building-loss assessment, all of which demonstrated that riverine flood impacts in Jayuya extend beyond the regulatory floodplain associated with the Río Grande de Jayuya. A more detailed discussion of the municipality's social vulnerability can be found in Section 3.4

Map 32: Flood: Population Exposure 500 yrs event



4.8.2.4 Natural and Cultural Resources

In most flood events, water resources are exposed to high levels of contaminants associated with rising water, sewage accumulation, and other hazardous or toxic substances left behind by flooding (Malilay, 2000). This contamination can facilitate the spread of diseases in municipal water bodies and adversely affect local flora and fauna, including humans. For example, prolonged stagnant water after a flood can promote diseases such as dengue and leptospirosis. Following Hurricane María, stagnant water contributed to leptospirosis outbreaks and mosquito proliferation. Leptospirosis is a bacterial disease that affects both humans and animals and can spread through urine from infected animals. These contaminated residues often remain in stagnant water after flooding events.

Floods also lead to the accumulation of debris, including structural remnants, soil, sediments, organic waste, and personal belongings. If not properly managed, this debris can contaminate land and water when burned, abandoned, buried, or dumped into water bodies.

4.8.2.5 Special Consideration: Repetitive Losses and Severe Repetitive Losses

In Jayuya there are properties insured under the National Flood Insurance Program (NFIP). These properties participate in the NFIP covered by the PRPB. Section 6.5 provides further details on how the municipality can use the NFIP as a mechanism for mitigation planning.

The Municipality has included properties that have experienced repetitive losses and/or severe repetitive losses located in identified flood hazard areas. These properties currently lack descriptions of the type of structures (residential, commercial, institutional, among others). Including this information helps to understand the vulnerability of properties affected by flooding within the jurisdiction and increases the likelihood of qualifying for flood control or prevention grants through programs such as Flood Mitigation Assistance (FMA), Hazard Mitigation Grant Program (HMGP), Housing and Urban Development (HUD), CDBG-DR, and others.

As of May 29, 2026, the information regarding NFIP coverage for the Municipality of Jayuya are as follow:

Table 22: NFIP Policies in force and coverage

Amount of NFIP Policies	Total Disbursement for both RL and SRL Losses
8	$56,289

This information includes properties covered by the NFIP that have experienced repetitive losses (RL) and/or severe repetitive losses (SRL) located in identified flood hazard areas.

Table 23: NFIP Repetitive Losses

Structures with Repetitive Loses (RL)	Insured structures (RL)	Total Repetitive Losses (RL)
3	0	9

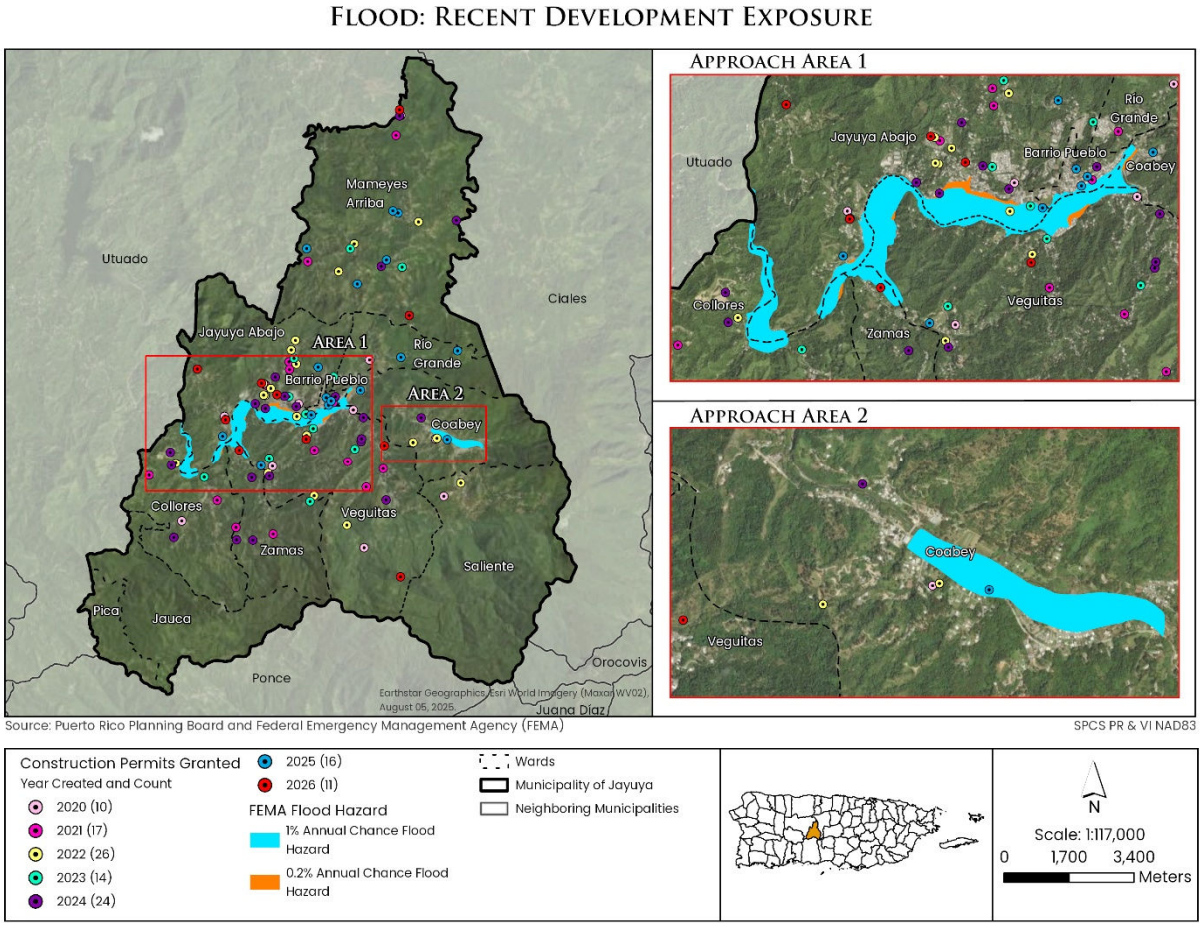
Table 24: NFIP Severe Repetitive Losses

Structures with Severe Repetitive Loses (SRL)	Insured structures S(RL)	Total Repetitive Losses (SRL)
0	0	0

4.8.2.6 Future Conditions (E1-A)

The recent development exposure analysis indicates that new construction in Jayuya is occurring within and adjacent to areas previously identified as vulnerable to riverine flooding, particularly within Barrio Pueblo, Jayuya Abajo, Río Grande, Veguitas, and Coabey. These areas correspond to locations exhibiting the highest flood exposure, greatest projected building losses, significant population exposure, and concentrations of critical infrastructure. Furthermore, development is occurring along tributary corridors and secondary drainage systems outside FEMA-designated Special Flood Hazard Areas, supporting previous findings that flood risk within the municipality extends beyond the primary floodplain of the Río Grande de Jayuya. As additional development occurs within these areas, the number and value of assets exposed to flooding may increase, potentially resulting in greater future damages and disruption to community lifelines.

Map 33: Recent Development and Flood Risks



The most significant concentration of recent development is located within and surrounding Barrio Pueblo and portions of Jayuya Abajo (Approach Area 1), where numerous construction permits have been issued immediately adjacent to FEMA-designated 1-percent annual chance and 0.2-percent annual chance flood hazard areas.

This development corridor coincides with:

- The primary floodplain of the Río Grande de Jayuya.
- Areas previously identified as having the highest population exposure to flooding.
- The municipality's highest concentration of critical facilities and community lifelines.
- The areas exhibiting the greatest estimated building losses under both the 100-year and 500-year flood scenarios.

The continued concentration of development within this corridor suggests that future flood exposure may increase as additional residential, commercial, institutional, and supporting infrastructure assets are placed within or near flood-prone areas.

4.9 Tropical Cyclones and other Extreme Wind Events

4.9.1 Description (B1-a)

Winds consist of air currents generated in the atmosphere due to variations in pressure. Although these currents are constantly present, when their intensity increases, they can become a high-level hazard. For the purposes of this Plan, we will focus on events severe wind events associated with tropical cyclones and their extreme force(Castro Rivera & López Marrero, Cartilla de los Ciclones, 2018).

This sub-chapter is titled Tropical Cyclones and other Extreme wind Events in order to include phenomena such as tropical storms and tropical depressions. However, hurricanes pose the greatest threat due to their high destructive potential, wide geographic impact, rapid development, and sometimes unpredictable paths. In addition, hurricanes are often accompanied by high tides, storm surges, and heavy rainfall, which may result in landslides and riverine flooding. Since these accompanying hazards are addressed in separate sections, this section will focus specifically on the impact of wind within the municipality.

Figure 18 shows the path of category 2 – 5 hurricanes that have affected Puerto Rico since 1989.[10]

[10] Hortense (1996) and Fiona (2022) are not shown since they were category 1 hurricanes when they hit Puerto Rico.

Figure 19: Hurricane Tracks 1989-2017 (only Cat 2-5)[11]

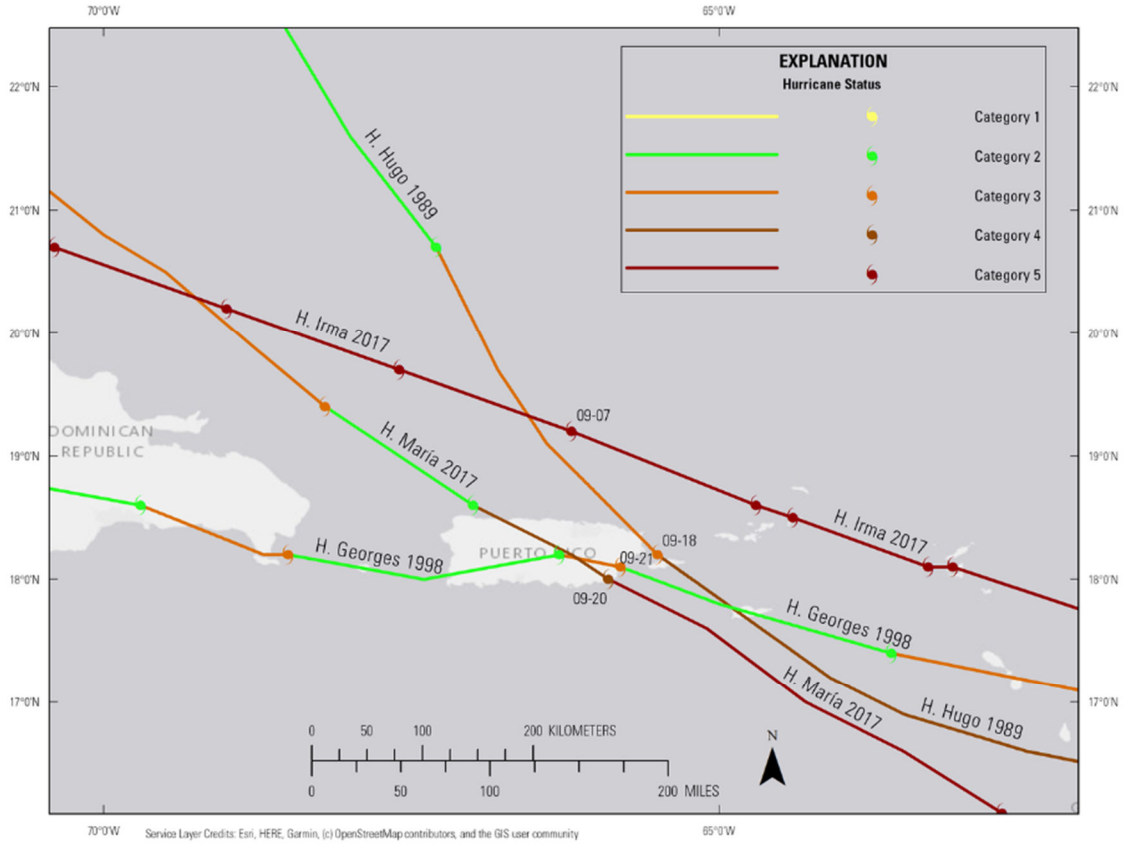


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Figure 1. *Hurricane tracks for Hugo (1898), Georges (1998), Irma (2017) and Maria (2017). Data provided by NOAA. Base image is intellectual property of Esri and is used herein under license. Copyright Esri and its creator.*

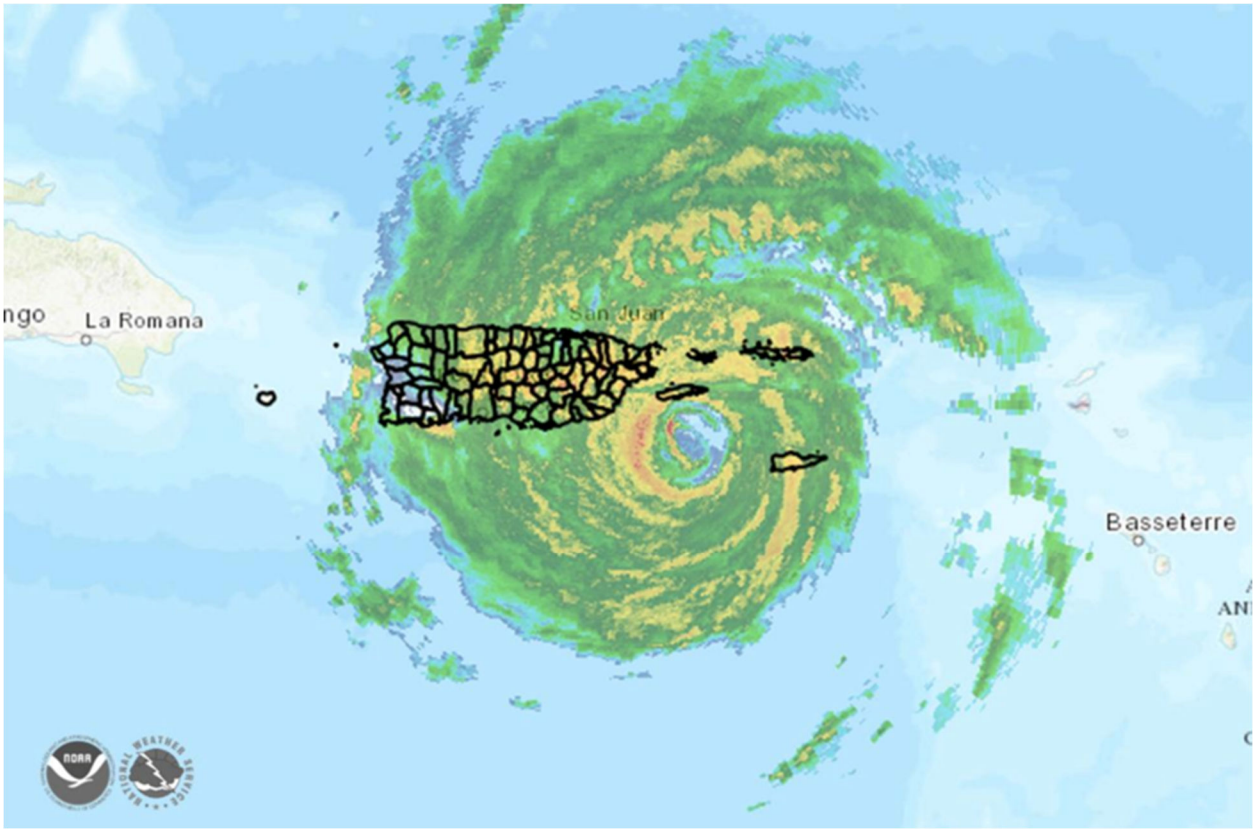
Figura 1: *Trayectorias de los huracanes Hugo (1989), Georges (1998), Irma (2017) y María (2017). Datos provistos por la NOAA. La imagen de base es propiedad intelectual de Esri y se usa aquí bajo licencia. Los derechos de autor y reproducción son propiedad de Esri y sus licenciatarios.*

4.9.1.1 AFFECTED AREA (B1-B)

Tropical Cyclones are atmospheric systems that can affect the whole island. For example, Figure 19 shows the size of hurricane María (2017) as it approached Puerto Rico.

[11] htt.s://www.usgs/gov/mission-areas/natural-hazards/science/Puerto-rico-natural-hazards-hurricanes-peligros-naturales-de

Figure 20: Hurricane María (2017) as it approaches Puerto Rico



4.9.1.2 Risk Magnitude (B1-C)

Tropical cyclones are the most frequent natural hazard in Puerto Rico, with hurricanes being the most dangerous. Hurricanes are tropical atmospheric systems characterized by sustained wind speeds exceeding seventy-four (74) miles per hour. They develop over warm ocean waters and result from instability caused by the interaction of warm and cool air masses. Tropical cyclones are classified according to sustained wind intensity as follows:

- Tropical Depression: An organized system of clouds with a defined circulation and maximum sustained winds below 39 mph. This represents the formative stage of a tropical cyclone.
- Tropical Storm: An organized system of clouds with a defined circulation and maximum sustained winds ranging from 39 to 73 mph.
- Hurricane: The most intense form of a tropical cyclone, with sustained winds of 74 mph or greater. Hurricanes have a well-defined center with very low

barometric pressure. They are categorized from one (I) to five (V), and the strongest can reach wind speeds exceeding 155 mph (Castro Rivera & López Marrero, 2018).

Table 25 shows the Saffir - Simpson Scale of hurricanes and gives historical examples of those passing through or near Puerto Rico.

Table 25: Saffir-Simpson Hurricane Scale

Category	Wind Speed	Description	Historical Example
Tropical Storm	39 – 73 mph	Strong enough to cause tree damage, power outages, and localized flooding, but generally less destructive than a hurricane.	Eloise (1975) Claudette (1979) Frederic (1979) Jeanne (2004) Irene (2011) Isaias (2020) Ernesto (2024)
1	74–95 mph	Winds can cause minor damage to roofs, siding, and trees, with potential for power outages.	Santa Clara[12] (1956) Hortense (1996) Fiona (2022)
2	96–110 mph	Strong winds can cause extensive damage to roofs and trees, leading to widespread power loss.	Marilyn (1995)
3	111–129 mph	Devastating winds can destroy roofs and walls of homes, uproot trees, and cause prolonged outages.	Hugo (1989) Georges (1998)
4	130–156 mph	Catastrophic winds can cause severe structural damage, most trees snapped or uprooted, and power outages lasting weeks.	San Ciriaco (1899) San Ciprian (1932) Donna (1960) David (1979) María (2017)
5	157 mph or higher	Catastrophic winds can result in total roof failure and building collapse, rendering areas uninhabitable for weeks or months.	San Felipe II (1928) Irma (2017)

[12] Officially known as Hurricane Betsy

To assess the vulnerability posed by hurricanes, this LHMP utilizes the 100 – year wind event and 500-year wind event as benchmark design standards. A 100-year wind event refers to a wind speed that has a 1% chance of being equaled or exceeded in any given year. Similarly, a 500-year wind event has a 0.2% annual probability of being equaled or exceeded. These terms describe statistical return periods and do not imply that such events occur only once every 100 or 500 years. Rather, they express the likelihood of occurrence in any single year. Wind returns period values are derived through statistical analysis of historical wind speed records using extreme value probability models. These analyses estimate wind intensities associated with specific recurrence intervals and are widely applied in engineering, insurance modeling, and hazard mitigation planning.

These values are critical for structural design standards like the American Society of Civil Engineers Standard 7 (ASCE 7), which specify wind loads for different risk categories, and for insurance companies assessing potential storm damage. For example, typical 3-second gust wind speeds at 33 ft above ground (Exposure Category C) are about 100 mph for a 100-year event and approximately 110–115 mph for a 500-year event. These design speeds ensure safety for buildings, bridges, and critical infrastructure, and help guide emergency planning and financial risk management.

4.9.1.3 Past Events (B1-d)

The following table shows the extreme wind events that received a disaster declaration since 2004. One column identifies whether the Municipality of Jayuya was designated for Public Assistance (PA), Individual Assistance (IA), or both under each declaration.

Table 26: Tropical Cyclone Disaster Declaration

Event	Date	Disaster Declaration Number	Jayuya Included?	Description
Tropical Storm Ernesto	8/13/2024 to 8/16/2024	DR-4850-PR EM-3610-PR	Public Assistance (Categories (A-G)– Yes Public Assistance Yes Individual Assistance (Category B)- No	The storm's slow movement and moisture-rich environment contributed to prolonged precipitation, particularly in central and eastern municipalities. Parts of Central Puerto Rico recorded 12–14 inches of rainfall in localized areas. Multiple rivers exceeded their banks, including the La Plata River, resulting in significant inundation of adjacent communities. Flash flooding occurred in urban and rural areas, rendering primary and secondary roads impassable. Floodwater caused structural failures in bridges and washed-out critical road segments, isolating several communities. Stormwater drainage systems in metropolitan areas, notably San Juan, were overwhelmed, leading to localized urban flooding. Emergency Response and Disruptions Evacuations were conducted in flood-prone areas such as Toa Baja to mitigate loss of life.

Event	Date	Disaster Declaration Number	Jayuya Included?	Description
Hurricane Fiona	9/17/2022 to 9/21/2022	DR-4671-PR	Public Assistance – Yes Individual Assistance - Yes	Hurricane Fiona struck Puerto Rico in September 2022, unleashing torrential rains—up to 31.22 inches of rainfall over 72 hours in Ponce, nearly matching the accumulation from Hurricane María. This deluge led to catastrophic flooding, with 7 to 20 inches common across most of the island and localized spots exceeding 30 inches.
Tropical Storm Isaías	9/29/2020 to 9/30/2020	DR-4560-PR	Public Assistance - No Individual Assistance - No	Although the center of Tropical Storm Isaías did not make landfall on the island, the system left a large amount of rain in its path, causing flooding throughout Puerto Rico. Rainfall accumulation of up to 10 inches was recorded around the island.

Event	Date	Disaster Declaration Number	Jayuya Included?	Description
Hurricane María	9/20/2017	DR-4339-PR	Public Assistance – Yes Individual Assistance - Yes	Widespread flooding severely affected the whole Island. For example, in San Juan, water levels reached up to 6 feet in some areas and numerous structures losing their roofs. The coastal neighborhood of La Perla was largely destroyed, while Cataño suffered extensive damage, with the Juana Matos community estimated to be 80% destroyed. Strong winds, heavy rains, and flash floods near the La Plata Lake dam in Toa Baja impacted thousands of residents. Survivors reported that floodwater rose 6 feet in just 30 minutes, and some areas experienced depths of up to 15 feet (4.6 m).
Hurricane Irma	9/5/2017	DR-4336-PR	Public Assistance – Yes Individual Assistance - No	On September 5, 2017, Hurricane Irma impacted Puerto Rico; an Emergency Declaration was issued for the Island. On September 6, 2017, a Major Disaster Declaration was issued following Hurricane Irma's passage. Two people died due to torrential rains before the hurricane: a man died in Orocovis after falling from his ladder while repairing his roof; another man on the coast in Capitanejo died after being struck by lightning. Wave heights in Puerto Rico reached 9 meters, and sustained winds of 111 mph were recorded in Culebra.

Event	Date	Disaster Declaration Number	Jayuya Included?	Description
Tropical Storm María[13]	9/8/2011 to 9/11/2011	DR-4040-PR	Public Assistance: No Individual Assistance: No	Tropical Storm (later Hurricane) María formed in early September 2011 and passed near Puerto Rico, bringing significant heavy rainfall and tropical storm conditions to the island. The storm caused widespread flooding that inundated numerous roadways and homes; floodwaters near Patillas destroyed several homes and bridges, and approximately 150 houses in Yabucoa were flooded and damaged
Hurricane Irene	8/22/2011	DR-4017-PR	Public Assistance: Yes Individual Assistance: Yes	Total rainfall reached 22 inches over three days, with the eastern region being the most affected—the same area that had already received over 6 inches earlier in August during the close passage of Tropical Storm Emily. The Río Grande de Manatí in Manatí recorded its third-highest level in history, surpassed only during Hurricane Hortense (1996) and Hurricane Georges (1998). The Puerto Nuevo River near Hato Rey reached its fourth-highest level on record. Flooding was severe enough to cause infrastructure stress and dangerous conditions across multiple municipalities. Tragically, there was one direct fatality attributed to Irene, due to drowning.

[13] Tropical Storm María was a tropical system that pass to the northeast of Puerto Rico in 2011 and that caused flooding in the Island. Not to be confused with the 2017 Hurricane María. The name "María" was retired from the official Atlantic hurricane season list of names after 2017.

Event	Date	Disaster Declaration Number	Jayuya Included?	Description
Tropical Storm Jeanne	9/14/2004 to 9/19/2004	DR-1552-PR	Public Assistance: Yes Individual Assistance No	Tropical Storm Jeanne crossed Puerto Rico on September 15, 2004, as a strong tropical storm with maximum sustained winds around 70 mph (110 km/h), producing gusts up to 72 mph (≈116 km/h). The winds caused widespread power and water outages, with numerous reports of structural damage to homes, uprooted trees, fallen utility poles, and significant impacts on infrastructure across the island. The storm resulted in eight fatalities in Puerto Rico—four direct and four indirect, including deaths during preparations and carbon monoxide poisoning. Damages were estimated at approximately $169.5 million (2004 USD), making Jeanne the most destructive tropical cyclone to impact Puerto Rico since Hurricane Georges in 1998.

4.9.1.4 Future event probabilities (B1-e)

According to the Colorado State University Tropical Cyclones, Radar, Atmospheric Modeling and Software Team, the following average annual probabilities apply for storms coming ashore or passing within 50 miles of Puerto Rico: (Colorado State University, 2026)

- Average probability of a named storm coming ashore or within 50 miles of Puerto Rico: **40%**
- Average probability of a hurricane coming ashore or within 50 miles of Puerto Rico: **24%**
- Average probability of a major hurricane coming ashore or within 50 miles of Puerto Rico: **9%**

4.9.2 Risk Analysis (B2-a, B2-b)

4.9.2.1 Estimated Losses

According to the National Risk Index (NRI) data, tropical cyclones, represented in the NRI as hurricanes, constitute one of the most significant natural hazards affecting the Municipality of Jayuya. Due to the municipality's location within the Caribbean hurricane basin and its historical exposure to hurricanes such as Hurricane María, the entire municipal territory is exposed to hurricane-related hazards, including high winds, intense rainfall, riverine flooding, flash flooding, landslides, utility outages, and transportation disruptions.

The National Risk Index indicates that tropical cyclone exposure encompasses the entirety of the municipality, affecting approximately 44.98 square miles, which corresponds essentially to the full municipal area of Jayuya. The analysis estimates a total exposed value of approximately $172.98 billion.

Table 27 presents the exposure to tropical cyclones as registered in FEMA National Risk Index.

Table 27: Tropical Cyclone Exposure

Exposure - Impacted Area (sq mi)	Exposure - Building Value	Exposure - Population	Exposure - Population Equivalence	Exposure – Total
44.984017	$1,543,280,136	14,779	$171,434,230,714	$172,977,510,849

Source FEMA NRI

The expected annual loss for each Census tract or jurisdiction represents the average yearly economic impact, expressed in dollars, anticipated from natural hazard events. Table 28 presents the expected annual hurricane-related losses for both buildings and population.

Table 28: Expected Annual Loss to Tropical Cyclones

Expected Annual Loss - Building Value	Expected Annual Loss - Population	Expected Annual Loss - Population Equivalence	Expected Annual Loss -Total
$17,107,371.90	0.0588	$681,590.11	$17,788,962.01

Source FEMA NRI

The HAZUS tropical cyclone analysis indicates that building damage resulting from

hurricane-force winds is a municipality-wide concern in Jayuya. Unlike riverine flooding, where impacts are concentrated along specific floodplains and drainage corridors, hurricane wind damage affects all wards of the municipality. However, the severity and concentration of expected building damage vary spatially, reflecting differences in building density, development patterns, topography, and exposure to wind forces.

The 100-year and 500-year tropical cyclone scenarios demonstrate a consistent pattern in which the southern and central portions of the municipality experience the greatest concentration of damaged buildings, while lower levels of damage are projected in portions of the northern wards (Maps 34 and 35).

Under the 100-year tropical cyclone scenario, the highest concentrations of damaged buildings are projected within:

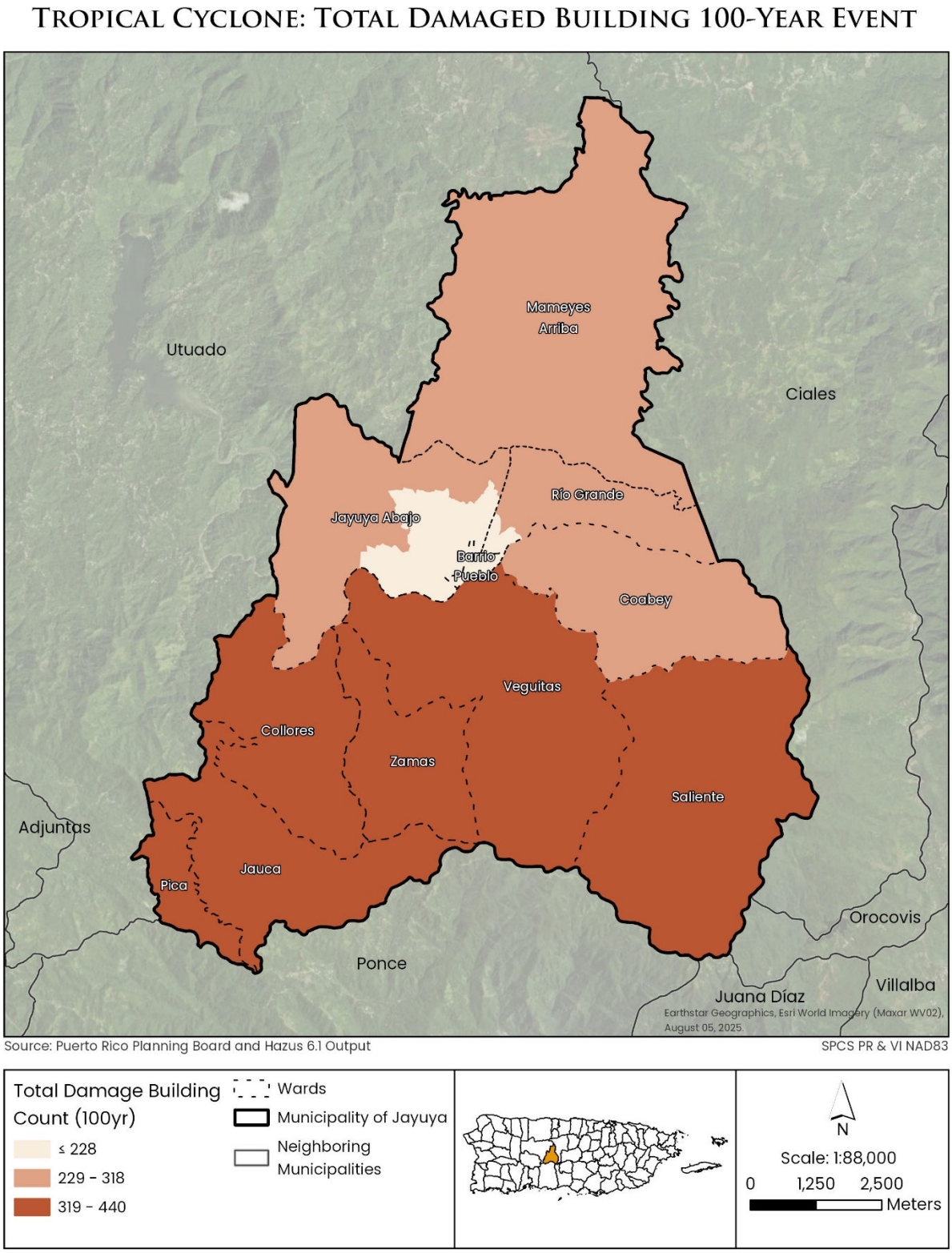
- Veguitas
- Zamas
- Saliente
- Collores
- Jauca
- Pica

These wards are estimated to experience between approximately 319 and 440 damaged buildings, representing the municipality's highest damage category. The concentration of damage across these wards reflects the widespread distribution of residential structures and community assets in the southern portion of the municipality.

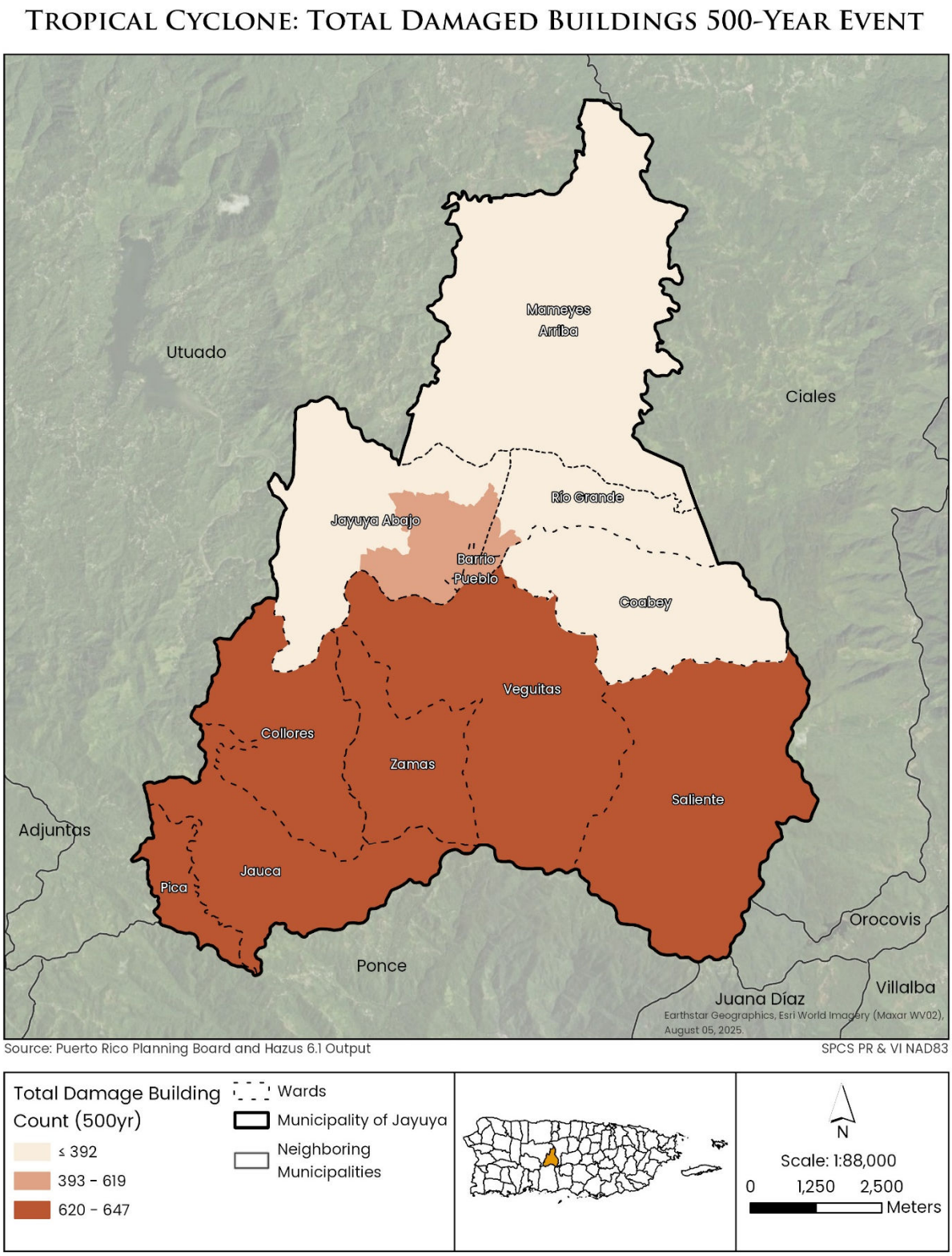
A second tier of damage is projected within Mameyes Arriba, Río Grande, and Coabey, where estimated building damages range from approximately 229 to 318 buildings.

The lowest projected building damage category is observed within portions of Barrio Pueblo, and Central Jayuya Abajo where estimated damaged structures are fewer than approximately 228 buildings. Although these areas exhibit lower relative damage counts, they remain vulnerable because they contain critical governmental, commercial, healthcare, and public service functions that support the entire municipality.

Map 34: Total Damaged Buildings 100 – Year Event



Map 35: Total Damaged Building 500 - Year Event



Under the more severe 500-year tropical cyclone scenario, damage intensifies throughout the municipality while maintaining a similar geographic pattern. The highest damaged-building category increases to approximately 620 to 647 damaged structures, affecting primarily (same as in 100-year scenario):

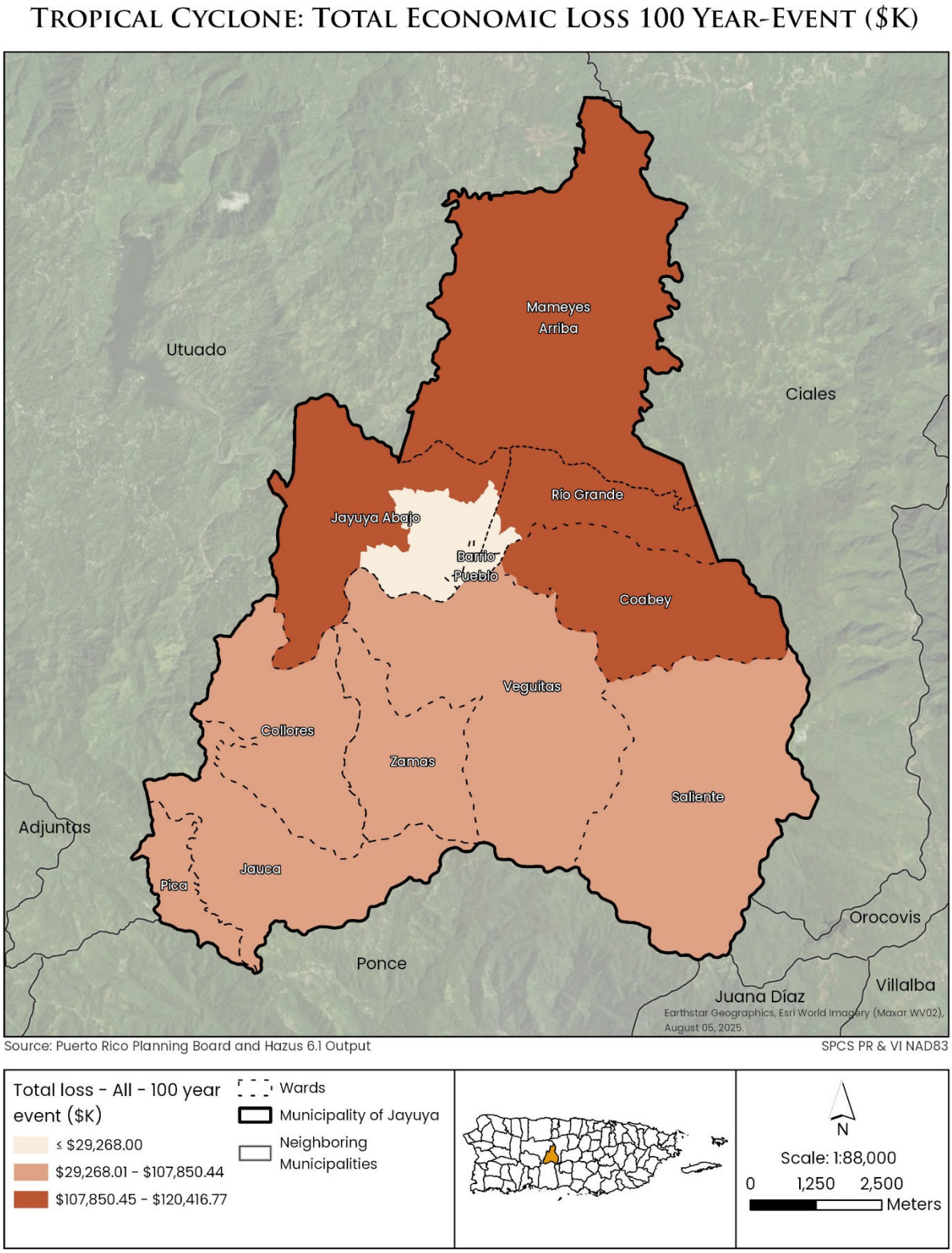
- Veguitas
- Zamas
- Saliente
- Collores
- Jauca
- Pica

These results indicate that the southern half of the municipality may experience the most significant concentration of structural damage during an extreme hurricane event. Moderate damage levels are projected within Jayuya Abajo, Barrio Pueblo, and portions of Mameyes Arriba where estimated damaged-building counts range from approximately 393 to 619 buildings.

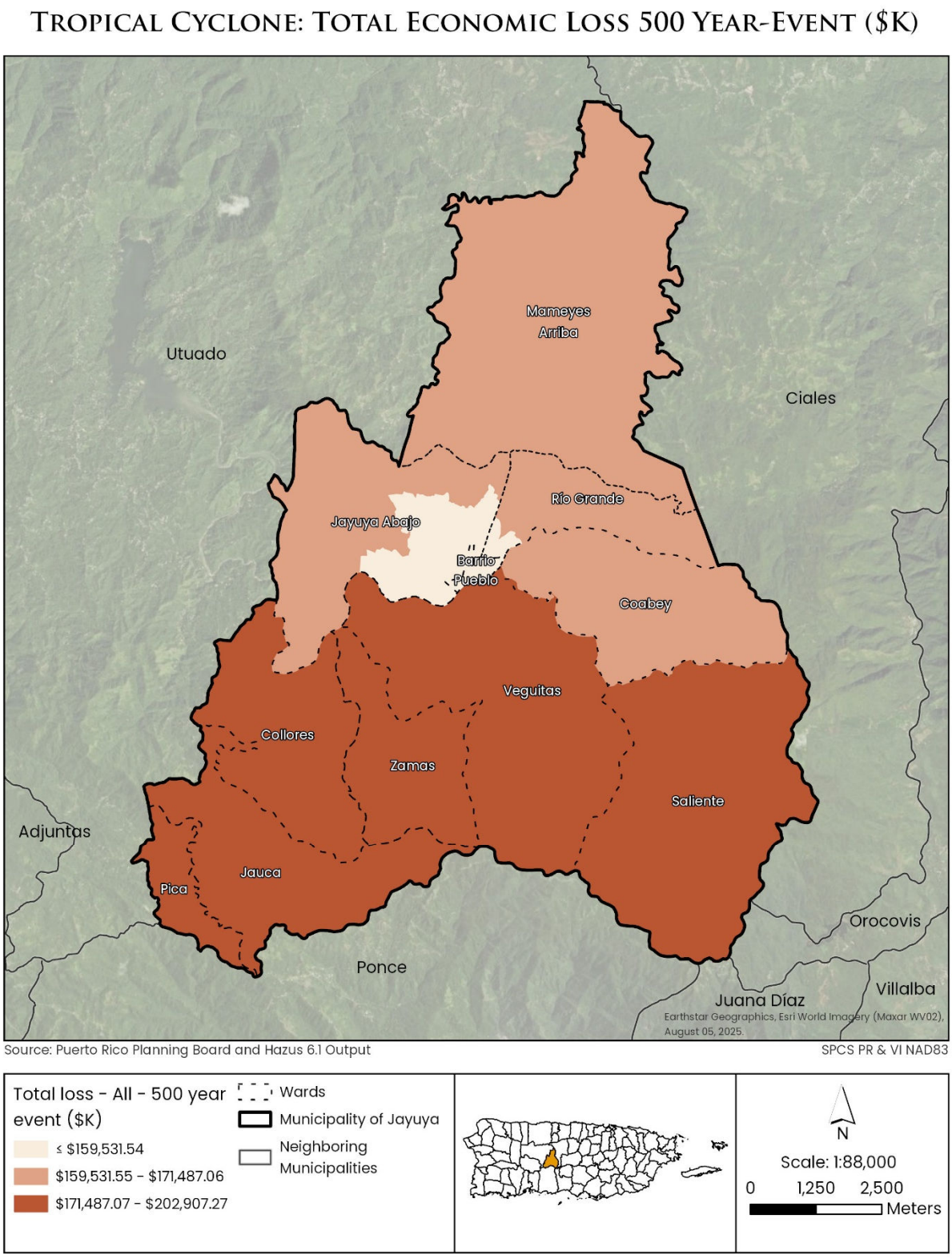
Lower but still substantial damage levels remain evident within Río Grande, Coabey, and portions of northern Mameyes Arriba with projected damaged-building counts of up to approximately 392 buildings.

The HAZUS tropical cyclone economic loss analysis indicates that hurricane events have the potential to generate significant economic impacts throughout the Municipality of Jayuya. Under the 100-year event scenario, the highest projected losses occur within Mameyes Arriba, Jayuya Abajo, Río Grande, and Coabey, where estimated losses range from approximately $107.9 million to $120.4 million. Under the more severe 500-year event scenario, the greatest projected losses occur within Veguitas, Zamas, Saliente, Collores, Jauca, and Pica, where losses increase to between approximately $171.5 million and $202.9 million. The widespread distribution of projected losses demonstrates that tropical cyclones are a municipality-wide hazard capable of affecting residential, commercial, governmental, and infrastructure assets throughout all wards of Jayuya. The substantial increase in economic losses between event scenarios further highlights the importance of implementing resilience measures that reduce structural vulnerability, strengthen critical infrastructure, and enhance the continuity of essential services during major hurricane events.

Map 36: Total Economic Loss 100 – Year Event



Map 37: Total Economic Loss 500 - Year Event



The economic loss assessment demonstrates that tropical cyclones represent one of the most consequential hazards affecting Jayuya. While previous flood and landslide analyses identified localized areas of elevated vulnerability, the tropical cyclone analysis shows that significant economic impacts can occur across all wards of the municipality. The projected increase in losses from the 100-year to the 500-year event scenario underscores the vulnerability of the municipality's housing stock, infrastructure systems, businesses, and public facilities to severe hurricane conditions. These findings support continued investment in wind-resistant construction, infrastructure hardening, hazard mitigation projects, continuity-of-operations planning, and community resilience initiatives as key components of the Jayuya Local Hazard Mitigation Plan.

4.9.2.2 Lifelines and Critical Infrastructure

Hurricane winds have profound effects on all eight FEMA Community Lifelines, disrupting essential services and infrastructure.

- Safety and Security systems are compromised when high winds damage police stations, fire departments, and emergency operations centers, while debris and fallen power lines obstruct emergency routes, delaying rescue efforts.
- Food, Hydration, and Shelter lifelines suffer as winds destroy agricultural fields, damage food storage facilities, and tear roofs off homes and shelters, leaving communities vulnerable and displacing thousands.
- In the Health and Medicine sector, hospitals and clinics experience roof failures and structural damage, forcing evacuations and interrupting critical care, while pharmacies and supply chains face severe disruptions.
- The Energy lifeline is particularly vulnerable, as hurricane winds topple transmission towers, snap utility poles, and damage substations, causing widespread power outages that cascade into other lifelines.
- Communications systems fail when telecommunication towers and antennas are blown down, severing cellular and internet connectivity and hindering emergency coordination.
- Transportation networks are crippled by blocked roads, damaged bridges, and wind-related destruction at airports and seaports, delaying relief efforts and supply deliveries.
- Facilities handling Hazardous Materials face increased risks when wind-driven debris ruptures tanks or pipelines, creating environmental hazards and complicating cleanup operations.
- Finally, Water Systems are disrupted as treatment plants and pumping stations sustain roof and equipment damage, while elevated storage tanks and

distribution infrastructure collapse, interrupting access to clean water for drinking and sanitation. These cascading failures underscore the critical need for wind-resistant design standards and proactive planning to protect lifelines and maintain community resilience during hurricane events.

For planning purposes this LHMP shall assume that all critical infrastructure is equally exposed to this hazard. Appendix F has a table that details the critical infrastructure in Jayuya which is all equally exposed to this hazard.

4.9.2.3 Social Vulnerabilities

As discussed before in Section 4.6.1.1 a tropical cyclone can impact the whole island. For this LHMP we are going to assume that all the population of Jayuya is vulnerable to this hazard. For further details on the Municipality's social vulnerability see section 3.4.4.

4.9.2.4 Natural and Cultural Resources

Hurricane winds caused extensive damage to both natural and cultural resources by exerting extreme mechanical forces on landscapes and built environments. In natural settings, strong winds uproot trees, strip foliage, and break branches, leading to deforestation and habitat loss. This disruption affects biodiversity and can alter ecosystem functions for years. Coastal vegetation such as mangroves is particularly vulnerable, as wind-driven forces weaken root systems and reduce their ability to protect shorelines. Agricultural areas also suffer severe losses, with crops flattened or destroyed, impacting food supply and local economies.

Cultural resources, including historic buildings, monuments, and archaeological sites, are equally at risk from hurricane winds. High wind speeds can dislodge roofing materials, collapse walls, and damage structural integrity, especially in older or unreinforced constructions. Museums, archives, and heritage sites may experience irreparable harm if protective measures are inadequate. The loss of these cultural assets not only affects community identity but also has economic implications for tourism and preservation efforts. Understanding wind speed thresholds and incorporating them into design standards and conservation planning is essential to mitigate these risks and safeguard both natural and cultural heritage.

4.9.2.5 Future Conditions (E1-a)

The risk of hurricane is a municipal – wide risk. Every part of the recent development approved by the municipality is equally in risk of being affected by a tropical cyclone.

4.10 Extreme Heat

4.10.1 Description (B1-a)

There is no universally accepted definition for extreme heat or heat waves. For the purposes of this Plan, the definition adopted by the Department of Homeland Security (DHS) is used. It is defined as a prolonged period of 48 to 72 hours of intense heat and humidity, with temperatures above 90 ºF. Under these conditions, evaporation is reduced and the body is forced to make a significant effort to maintain its normal temperature, which has caused the death of many people in attempts to stabilize physically. In general, extreme heat represents the highest rate of deaths among weather-related hazards.

A study titled Heat Risk Perception and Vulnerability in Puerto Rico: Insights for Climate Adaptation in the Caribbean, published in the academic journal International Journal of Environmental Research and Public Health, analyzes how Puerto Rico residents perceive health risks associated with extreme heat and how these perceptions relate to vulnerability and protective behaviors during extreme heat events that occurred in the summer of 2020 (Guzmán-Colon, Guido, Amaya-Ardilla, Cabrera-Rivera, & Méndez-Lázaro, 2025). The research was conducted through a cross-sectional telephone survey of 500 adults in metropolitan and non-metropolitan areas. This study defined the metropolitan area as the municipalities of Carolina, Cataño, Toa Baja, and Trujillo Alto. The non-metropolitan zone consists of the remaining municipalities of Puerto Rico.

The questionnaire included sociodemographic variables, health status, prior heat exposure, risk perception, and mitigation strategies. Statistical analysis employed chi-square tests and multinomial and logistic regression models.

The results reveal that, although most participants expressed concern about climate change and high temperatures, less than half perceived heat as a high health risk, and only one-fourth considered it likely to suffer a heat-related illness in the next five years. Risk perception was significantly higher among men, people aged 50 to 64, the unemployed, individuals with fair health, multiple chronic conditions, and those who had experienced heat-related symptoms. In contrast, older adults (65+) reported low levels of risk perception despite their high vulnerability.

Forty-four percent (44%) of respondents indicated having suffered heat-related symptoms during the summer, and 68% reported nighttime thermal discomfort, a factor closely linked to health problems. The most common strategies to mitigate heat were the use of fans (84%) and air conditioning (64%), although economic limitations and instability of the electrical system reduced their effectiveness. Regional differences were also notable: residents in non-metropolitan areas showed greater risk perception than those in metropolitan zones.

The study concludes that there is a significant gap between actual vulnerability and risk perception, especially among older adults. It recommends strengthening risk communication targeted at vulnerable groups, addressing nighttime heat exposure, and improving electrical infrastructure to ensure equitable access to cooling systems. Proposed solutions include decentralized energy systems, cooling centers with backup power, and passive designs that reduce electrical dependence, thus contributing to community resilience in the face of increasing extreme heat events.

4.10.1.1 Affected Area (B1-b)

Extreme heat events can impact the entire municipality, particularly in urbanized areas where the heat island effect may occur. Based on previously presented information, adverse climate effects have been observed, including severe droughts, increased frequency of strong wind events and flooding, higher heat index levels, among others. Nevertheless, the municipality's geography and mountainous location is less susceptible to extreme heat conditions.

Urban heat islands refer to urbanized areas where structures such as buildings, roads, and other infrastructure absorb and emit the sun's heat more than natural landscapes such as forests and water bodies. Daytime temperatures in urban areas are about 1–7 °F higher than temperatures in outlying areas; nighttime temperatures are about 2–5 °F higher (EPA, 2025).

Heat islands develop due to a combination of factors:

- Loss of Natural Landscapes – Urban areas often replace trees, vegetation, and water bodies—natural elements that cool the air through shade, transpiration, and evaporation—with hard, dry surfaces like roads, rooftops, and parking lots. These surfaces provide little shade or moisture, leading to higher temperatures.
- Properties of Urban Materials – Common construction materials such as asphalt and concrete absorb and retain more heat than natural surfaces. They reflect less solar energy and release heat slowly, causing temperatures to remain elevated, especially after sunset.

- Urban Design and Geometry – The layout of buildings affects airflow and heat retention. Dense developments with narrow streets and tall structures create "urban canyons" that trap heat and block cooling winds, turning buildings into thermal masses that release heat gradually.
- Human-Generated Heat – Activities such as transportation, industrial operations, and air conditioning add waste heat to the environment, intensifying the heat island effect.
- Weather and Geographic Conditions – Clear, calm weather amplifies heat islands by maximizing solar energy absorption and limiting heat dispersion. Conversely, wind and cloud cover help reduce the effect. Geographic features like mountains can also influence wind patterns, either blocking cooling breezes or channeling heat through urban areas (EPA, 2025).

The Integrated Revision of Jayuya's Territorial Ordainment Plan is currently undergoing final approval. Jayuya is predominantly rural in character, with Urban Land (Suelo Urbano) accounting for 2.51% of the municipality's total land area. Because urban heat island effects are typically associated with concentrated development, extensive impervious surfaces, and limited vegetation cover, the municipality's overall susceptibility to heat island conditions is relatively low. Nevertheless, localized heat accumulation may occur within the urban center and other developed areas where buildings, pavement, and transportation infrastructure are concentrated. Therefore, while heat island exposure is limited in geographic extent, vulnerable populations located within these developed areas may still experience elevated heat-related risks during extreme heat events.

4.10.1.2 Risk Magnitude (B1-C)

Local NWS offices often work with community agencies to decide when heat alerts should be issued. Because the United States is so geographically and culturally diverse, heat tolerance varies by region. For example, residents of Puerto Rico are generally more accustomed to temperatures above 90°F than those living in Alaska.

Nevertheless, the NWS uses the following standard alerts (NWS, n.d.):

- Excessive Heat Warning – Issued 12 hours before dangerous heat conditions are expected. This occurs when the heat index is forecast to reach 105°F or higher for more than three hours over two consecutive days, or 115°F or higher for any period of time.

- Excessive Heat Watch – Issued when an extreme heat event is possible within the next 24 to 72 hours.

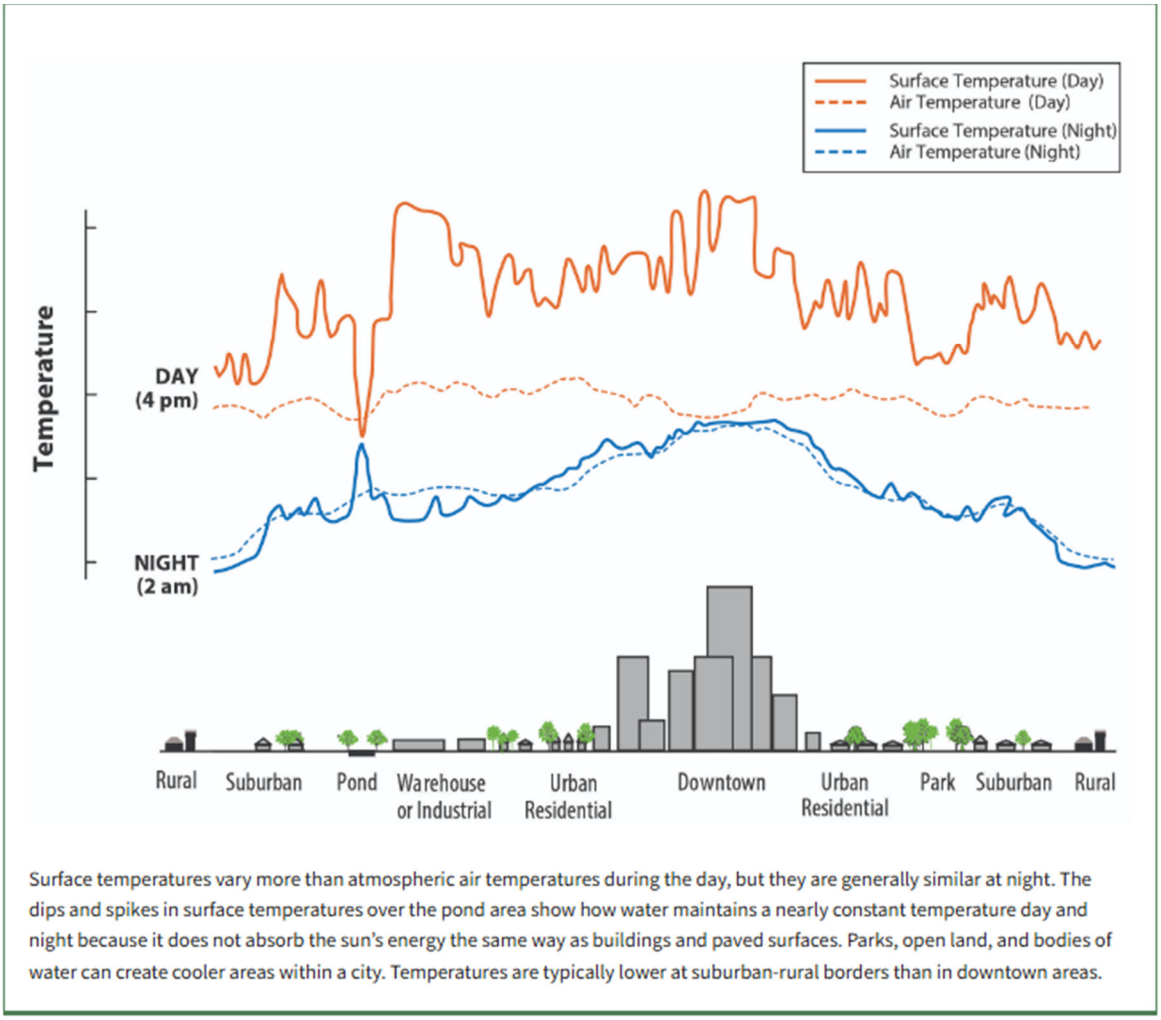
- Heat Advisory – Issued 12 hours before conditions where the heat index is at least 105°F but less than 115°F for three consecutive days.
- Extreme Heat Outlook – Issued when there is potential for extreme heat within the next three to seven days, providing advance notice for those who need extra time to prepare.

It must be emphasized that Urban Heat islands (UHI) phenomena can occur regardless of whether there is an extreme heat warning event. UHI is a relative temperature difference between urban and surrounding rural areas caused by factors like heat-absorbing surfaces, lack of vegetation, and human activities. It exists year-round, even during mild or cool weather, because cities consistently retain more heat than natural landscapes. Extreme heat events can amplify UHI, making UHI effects more dangerous, but UHI does not require extreme heat to form—it simply means urban areas are warmer than their surroundings under similar conditions.

UHIs are typically assessed by comparing temperatures in urban areas to those in surrounding regions. Even within a city, temperatures can vary significantly. Some neighborhoods are hotter due to dense concentrations of heat-absorbing surfaces like buildings and pavements, while areas with trees and greenery remain cooler. These variations create what are known as intra-urban heat islands. In diagrams illustrating this effect, urban parks, ponds, and residential zones generally appear cooler than central downtown districts.

The following diagram, taken from an EPA website, shows a diagram of how a heat island effect behaves in temperature.

Figure 21: Heat Island Effect Diagram (EPA, 2025)



4.10.1.3 Past Events (B1-D)

Méndez Lázaro et al. (2015) identified several years in which extreme heat temperatures were recorded in the San Juan metropolitan area. According to their findings, periods of extreme heat occurred in 1983, 1995, 2012, and 2013. Notably, the summer of 2012 was the hottest in a century, with 42 days of extreme temperature values. During June, July, and August, the maximum heat index reached 98.06° F, 98.96° F, and 102.02° F, respectively (Méndez Lázaro et al., 2015).

4.10.1.4 Future Event Probabilities (B1-E)

Official NOAA assessments in the 2018 Puerto Rico and U.S. Virgin Islands State Climate Summary report an increase in both average temperature (≈1.5°F since 1950) and the frequency of extreme heat events (NOAA, 2022). Additionally, climate projections from CMIP6 (via the World Bank's Climate Change Knowledge Portal) show steady rises in

summer and annual maximum temperatures for Puerto Rico, further indicating elevated future risk for heat waves (World Bank, n.d.).

4.10.2 Risk Analysis (B2-a, B2-b)

4.10.2.1 Estimated Losses

Extreme Heat primarily causes material and system stress rather than immediate structural failure. For example:

- Roads and Pavements: Asphalt can soften and deform under prolonged high temperatures, leading to rutting and surface damage (Highways Industry, n.d.) (EPA, 2012).
- Rail Systems: Steel tracks expand in extreme heat, which can cause buckling and derailment risks (USDOT - FRA, 2013).
- Power Infrastructure: Electrical grids experience higher loads from air conditioning demand, and transformers or cables can overheat, reducing efficiency or causing outages.
- Building Materials: Expansion and contraction of concrete, steel, and glass can lead to cracks or joint failures over time. Roofing materials may degrade faster under intense heat.
- Cooling Systems: HVAC systems work harder, increasing energy consumption and risk of failure, which can compromise indoor comfort and safety.

While heat waves rarely cause buildings to collapse, they accelerate wear and tear, increase maintenance costs, and can lead to system failures that disrupt essential services. As of now the municipality does not have a method to calculate losses from extreme heat events.

4.10.2.2 Lifelines and Critical Infrastructure

Extreme heat poses systemic risks across energy, transportation, and communications systems, creating compound failures precisely when demand for services peaks. In Energy Lifeline, high temperatures drive sharp increases in electricity demand for cooling while simultaneously decreasing generation and delivery efficiency. Thermoelectric plants may be forced to curtail output when cooling water is too warm, solar panels produce less electricity at elevated module temperatures, and transmission lines lose carrying capacity as conductors heat and sag—conditions that heighten the likelihood of voltage drops and blackouts during heat waves

(Jessen, 2025). The combination of record cooling loads and diminished supply underscores a growing "peak risk" problem for grids that were not designed for today's heat extremes (Jessen, 2025) (American Society of Civil Engineers, 2024).

Similarly, the Transportation Lifeline is similarly vulnerable. Prolonged high surface temperatures soften asphalt, accelerating rutting and deformation; steel rails thermally expand and can buckle, prompting heat-related slow orders that disrupt service; and catenary or other overhead lines can sag in the heat, further constraining operations. Airports face dual constraints: runway pavements can deform under extreme heat, and reduced air density on hot days impairs aircraft performance, affecting takeoff weight and scheduling. These effects are now commonly observed across U.S. systems during sustained heat events, requiring operational restrictions and emergency maintenance that ripple through supply chains and passenger mobility (American Society of Civil Engineers, 2024)

Communication Lifeline also faces mounting heat stress. Data centers, switching facilities, and network nodes rely on continuous cooling; overheating elevates outage risks and can degrade equipment lifespans. Heat-related disruptions to power supply and localized microclimate conditions compound these risks, with cascading impacts across other lifeline sectors that depend on connectivity for operations and emergency response. Federal assessments underscore that extreme weather—including extreme heat—can interrupt fiber networks, degrade wireless performance, and limit access to data centers, affecting each of the other critical infrastructure sectors and complicating disaster response coordination (Public-Private Analytic Exchange Program, 2025).

Overall, extreme heat acts as a stress multiplier: it pushes materials beyond design thresholds, reduces equipment efficiency, and narrows operational safety margins, all while increasing demand for services. The evidence from engineering organizations and energy market observers indicates that without targeted adaptation—such as heat-resilient design standards, strategic grid reinforcement, enhanced thermal management for digital infrastructure, and heat-aware operations—systems will face more frequent service disruptions and higher lifecycle costs as heat events intensify (American Society of Civil Engineers, 2024).

4.10.2.3 Social Vulnerabilities

A recent academic study examines the relationship between heat stress and mortality in Puerto Rico (Méndez - Lázaro, et al., 2025). Researchers analyzed hourly 2-meter air

temperature data from ERA5 reanalysis for 2015–2020 and derived daily minimum, maximum, and mean values to calculate two heat stress indices: the Heat Index (HI) and the Universal Thermal Climate Index (UTCI). Findings show that extreme heat conditions are common for eight months of the year, with August and September being the hottest months, and that urban heat island effects exacerbate exposure in metropolitan areas. (Méndez - Lázaro, et al., 2025) Mortality risk increased significantly on days with high heat stress: deaths were 23% higher in the highest HI tertile and 47% higher in the highest UTCI tertile compared to the lowest. Cardiovascular and cerebrovascular diseases, heart failure, and respiratory conditions were among the leading causes of death associated with heat stress. The study highlights Puerto Rico's socio-economic vulnerabilities, aging population, and limited infrastructure amplifying health risks during extreme heat events (Méndez - Lázaro, et al., 2025).

Further information about social vulnerabilities can be found in section 3.4

4.10.2.4 Natural and Cultural Resources

Extreme heat, specifically Urban Heat Islands can pose the following impacts on the natural resources:

- Increased Energy Consumption – Heat islands increase electricity demand for air conditioning and peak energy demand. Increased electricity demand for air conditioning ranges from 1–9% for each 2°F increase in temperature, with the highest increase in countries where most buildings have air conditioning, such as the United States[14].This increased demand contributes to higher electricity expenses. Peak demand generally occurs on exceptionally hot afternoons, when offices and homes are running air-conditioning systems, lights, and appliances. This increased demand can overload systems and require a utility to institute controlled brownouts or blackouts to avoid power outages.
- Elevated Emissions of Air Pollutants – To meet electricity needs, utility companies typically rely on fossil fuel power plants as a power source. Increased use of fossil fuels increases emissions of air-borne pollutants, such as carbon dioxide, which can have health concerns, especially in people living with respiratory diseases.
- Compromised Human Health and Comfort – Hot weather events contribute to heat-related deaths and heat-related illnesses. Areas experiencing heat islands further contribute to higher daytime temperatures and reduced

[14] United States Environmental Protection Agency, What are Heat Islands? What Are Heat Islands? | US EPA

nighttime cooling. Heat is of greatest concern for groups such as older adults, young children, populations with low-income, people who work outdoors, and people with chronic health conditions, disabilities, mobility constraints, or taking certain medications. From 2004 to 2018 the Centers for Disease Control and Prevention recorded an average of 702 heat deaths per year.

- Impaired Water Quality – High temperatures of pavement and rooftop surfaces can heat stormwater runoff, which drains into storm sewers. This runoff raises water temperatures as it is released into streams, rivers, ponds, and lakes. Water temperature affects the metabolism and reproduction of many aquatic species.

Rapid temperature changes can also be stressful, and even fatal, to aquatic life. One study found that urban streams have more frequent temperature surges than streams in forested areas. Temperature surges in urban streams were as much as 18°F higher due to heated runoff from urban areas, higher discharge volumes due to impervious surfaces, and warmer baseline stream temperatures (EPA, 2025).

4.10.2.5 Future Conditions

The approved construction permits map (Map 10) indicates that a substantial portion of recent development in the Municipality of Jayuya is occurring within or adjacent to existing developed areas, particularly around the urban center. Although Jayuya remains a predominantly rural municipality, continued infill development and the gradual expansion of impervious surfaces may increase localized urban heat island (UHI) effects over time. As a result, areas experiencing concentrated development may be subject to higher ambient temperatures than surrounding rural areas, particularly during periods of extreme heat.

4.11 Drought

4.11.1 Description (B1-a)

Drought is described as a temporary irregularity in rainfall or natural water flow, where a prolonged lack of precipitation leads to a significant hydrological imbalance. This condition may or may not result in interruptions to regular drinking water service, crop failures, and adverse effects on wildlife and vegetation. The severity of a drought is determined by the level of moisture deficiency, its duration, and the geographic extent of the affected area (Colón, 2009).

Drought represents one of the most complex climatological risks and one of the most severe events (DNER, 2016). Drought is the result of a natural reduction in the expected amount of precipitation over a prolonged period, usually a season or longer. High temperatures, strong winds, and low humidity levels can exacerbate the effects of drought in areas where they are already prevalent. Likewise, drought can lead to severe wildfires (FEMA, 1997). Human actions and the demands they place on water resources can accelerate drought-related impacts. Droughts occur in different forms across the island, meaning that some regions may experience greater impact while others remain normal.

According to FEMA there are four types of droughts (FEMA, 1997):

Table 33: Types of Droughts

Meteorological Drought	A period characterized by a significant deficiency in precipitation compared to normal conditions over a specific timeframe (e.g., monthly, seasonal, yearly)
Agricultural Drought	Occurs when soil moisture becomes insufficient to support crops or livestock needs, typically following meteorological drought.
Hydrological Drought	Defined by reduced water levels in streams, rivers, reservoirs, and groundwater systems, often lagging behind meteorological drought
Socioeconomic Drought	Reflects the impact on human systems and the economy, arising when water supply shortages—due to any form of drought—fail to meet societal demand for water and other resources

In 1999, the Federal Drought Monitor program was implemented. This program is a tool that publishes data and maps on drought conditions in the United States, including Puerto Rico and Hawaii. This system integrates information from various agencies, such as NOAA, the United States Department of Agriculture (USDA), and the National Drought Mitigation Center at the University of Nebraska-Lincoln. In addition, the monitor has developed standardized indicators that allow drought categories to be classified at the national level, providing a uniform reference for risk assessment and management.

The short-term drought indicator focuses on precipitation over 1–3 months. The long-term drought indicator focuses on a period of 6–60 months. Additional indices used, especially during the growing season, include the "USDA/NASS Topsoil Moisture," the

Keetch-Byram Drought Index (KBDI), and NOAA/NESDIS satellite vegetation health indices. Other indicators include groundwater levels, reservoir capacity, and pasture conditions.

In Puerto Rico, the Puerto Rico Aqueduct and Sewer Authority (PRASA), the Puerto Rico Electric Power Authority (PREPA), and the Department of Natural and Environmental Resources (DNER) are responsible for constantly monitoring the dams and reservoirs used for potable water supply. Once critical levels are reached, the first strategy adopted at the supply system level is reducing water pressure. If adequate levels are not restored, water rationing begins. This is implemented in phases lasting 12 hours and, in extreme cases, up to 48 hours. The affected area is divided into sectors, and the different rationing phases of a given duration are initially implemented locally, usually in municipalities with the highest consumption. In extreme circumstances, several municipalities and entire regions may be affected.

4.11.1.1 Affected Area

Jayuya's administrative boundary is uniquely influenced by its topography, as it largely coincides with the natural limits of the watersheds formed by the surrounding mountainous terrain. The municipality's steep ridges and enclosed valleys define drainage patterns in such a way that most surface water flow originates and remains within its own territory, rather than receiving significant inflows from external watersheds. While this configuration helps contain runoff during rainfall events, it also creates heightened vulnerability during periods of drought. Because Jayuya depends primarily on the precipitation that falls within its boundaries, prolonged dry conditions can significantly reduce water availability, with limited opportunity to offset shortages through inflows from neighboring regions. This makes localized droughts particularly critical, as water supply becomes directly tied to internal climatic conditions and the capacity of local watersheds to sustain demand.

4.11.1.2 Risk Magnitude (B1-C)

Drought is a slow-onset hazard, but over time, it can have highly detrimental effects on crops, municipal water supplies, recreational uses, and wildlife. If drought conditions persist for several years, the direct and indirect economic impact can be significant. Drought can also potentially provide favorable conditions for another hazard to occur, wildfire.

The National Drought Monitoring Center uses the following categories to describe the magnitude of drought conditions (US Drought Monitor, 2025).

Table 29: US Drought Monitor Categories

Category	Description	Typical Impacts
None	Normal/Wet Conditions	No drought impacts
D0 - Abnormally Dry	Early signs of dryness may slow planting, affect surface water	Short-term dryness; minor stress
D1 - Moderate Drought	Noticeable soil moisture depletion; low water; voluntary restrictions	Crop stress; reduced streamflow
D2 - Severe Drought	Common water shortages; likely crop/pasture losses	Mandatory restrictions possible
D3 - Extreme Drought	Major crop/pasture losses; widespread restrictions	Fire bans; severe water stress
D4 - Exceptional Drought	Exceptional and widespread losses; water emergencies	Emergency measures; critical impacts

4.11.1.3 Past Events (B1-D)

Puerto Rico has a humid tropical climate characterized by two well-defined seasons: a rainy season, which extends from May to November, and a dry season, which runs from December to April. The eastern and western interior regions record the highest annual rainfall, while the northern zone receives significantly more rain than the south.

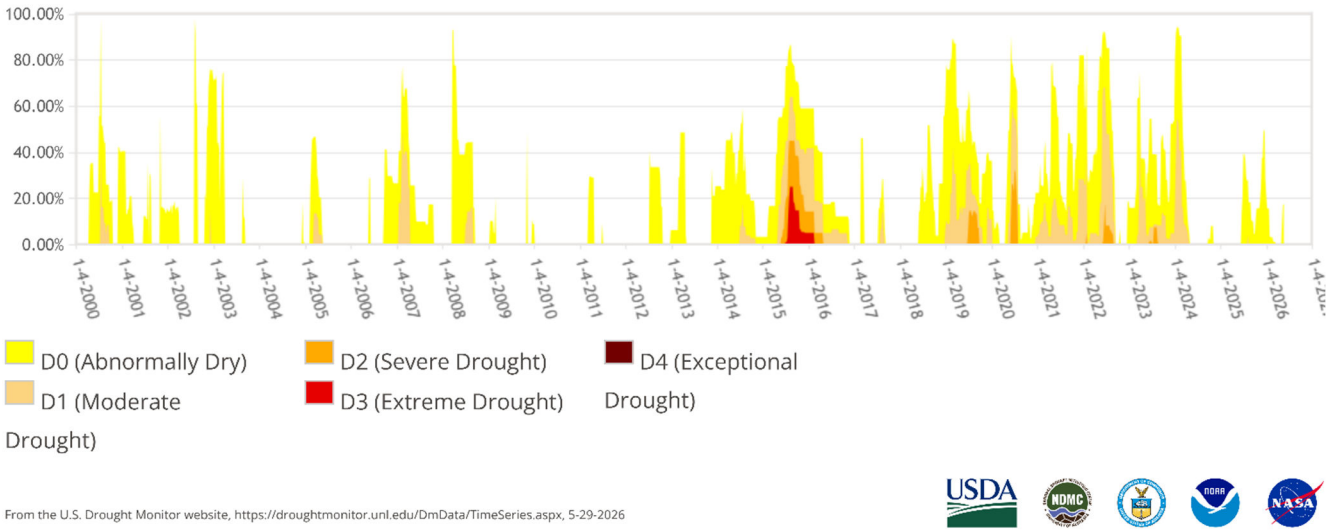
USGS identified that major drought conditions have occurred in 1967 – 1969, 1974, 1994, 1997, 2001-2002 and 2013 -2016 (USGS, 2014), (DNER, 2016). According to historical records the federal government has activated its resources to deal with drought conditions:

- Puerto Rico Extreme Drought Conditions (DR-170-PR) – Date of Declaration May 26, 1964
- Puerto Rico Impact of Drought (EM-3002-PR) - Date of Declaration August 29, 1974

During the rainy season, precipitation mainly comes from local convection processes, orographic effects, tropical waves, and cyclones. In contrast, rainfall during the dry season is mostly associated with the influence of cold fronts and troughs (CEACC, 2024).

Figure 21 shows the data captured by US Drought Monitor Categories for the period of January 2020 to January 2026 (US Drought Monitor, 2025) for Puerto Rico's entire territory. The graph measures the occurrence, duration, territorial extent and intensity of droughts in Puerto Rico. Intensity is measured with a color gradient ranging between yellow (D0 (abnormally Dry in the legend) as being the lowest intensity and the dark red (D4 Exceptional Drought) representing the highest level of drought. Duration is measured through the width of the data, expressed along the lower axis of the graph. Territorial extent is represented on the horizontal axis of the graph, the higher an event reaches the more Puerto Rico's territory it covers. Occurrence is measured by combining all of the other variables and locating them within the graph.

Figure 22: Puerto Rico's Percent Area in U.S. Drought Monitor Categories



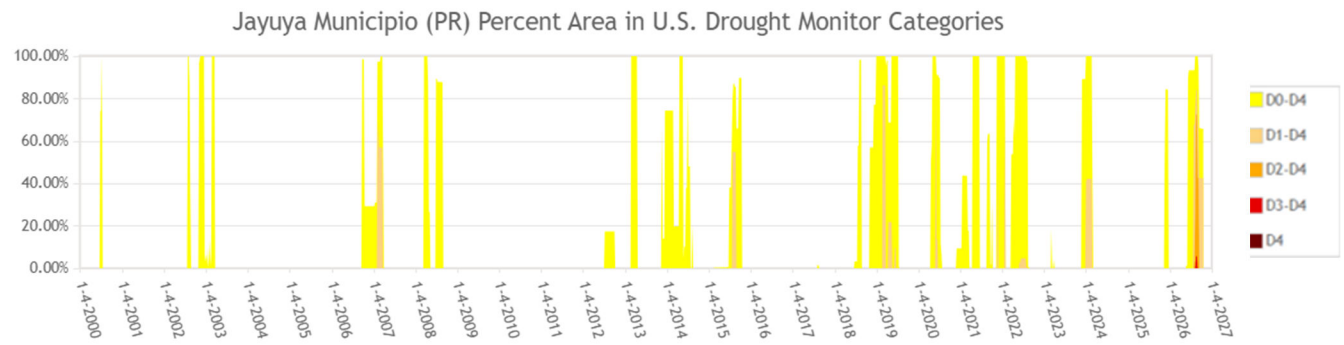
From the U.S. Drought Monitor website, https://droughtmonitor.unl.edu/DmData/TimeSeries.aspx, 5-29-2026

From the graph we may appreciate a sustained trend of increased occurrence, duration and intensity of droughts in Puerto Rico that began as early as 2010 and solidified by 2014. Between 2015-2017, Puerto Rico experienced the most intense period

of drought in recent years, with more than 80% of the Island's territory experiencing at least Abnormally Dry levels while at least 20% of the territory experienced Extreme Drought. The 2017 Hurricane season brough historic volume of precipitation, which explains the brief reduction in drought between 2017-2019. From 2019-2024, Puerto Rico experienced an extended period of drought in the vast majority of its territory.

Figure 22 shows the Municipality's Area in US Drought Monitor Categories for the period of January 2000 to January 2027 (US Drought Monitor, 2025). The series shows that in the most recent drought period for Jayuya was on August, 2026 when it experienced extreme drought.

Figure 23: Municipality's Percent Area in U.S. Drought Monitor Categories15



4.11.1.4 Future event probabilities (B1-e)

USGS reports that in Puerto Rico, drought has an occurrence of 15 of 18 years (USGS, 2016), (USGS, 2014). Recent scientific data shows that the Caribbean region faces increased vulnerability to drought hazards. (USGCRP, 2018). The probability of drought occurrence is difficult to forecast or foresee in a long-term perspective. Though as figures 21 and 22 show, moderate droughts periods have become more prevalent since 2019.

4.11.2 Risk Analysis (B2-a, B2-b)

If drought results in potable water rationing, the municipality could experience economic losses to the extent that services are immediately affected by the partial or total closure of schools, businesses, industrial areas, and public and private offices.

The potential economic impact of a prolonged drought would arise from the need to mobilize the municipality to meet the basic needs of its population during the

[15] Source US Drought Monitor

emergency period. This cost is associated with mobilizing resources such as personnel and equipment for the distribution of water to communities and municipal facilities. However, the municipality has not been able to quantify the economic impact of this expense, nor the impact on agriculture, due to a lack of information. Since drought is a hazard that does not directly affect structures, no dollar estimate of structural losses is generated.

Drought conditions in Jayuya can significantly impact on the agricultural industry by reducing water availability for irrigation and stressing crops during critical growing periods. Prolonged dry conditions can quickly lead to soil moisture deficits, lower crop yields, and in severe cases, total crop failure. In addition, reduced water supply can affect livestock and increase production costs, as farmers may need to rely on alternative water sources. These combined effects threaten the economic stability of agricultural operations and the overall food supply within the municipality.

4.11.2.1 Estimated Losses

Documenting the fiscal impact of a drought is a complex process due to the wide range of ways this climate event affects society (DNER, 2015). For example, during the 2015 drought (see Figure 21) a potable water rationing plan was implemented for the San Juan Metropolitan Area (SJMA).

Another way to document the losses caused by drought period is by looking at the impact on the agricultural sector. The Puerto Rico Department of Agriculture reported that the 2015 drought had a net cost of $14,000,000.00 impact on the agricultural sectors.

4.11.2.2 Critical Infrastructure and Lifelines

Drought can place significant strain on critical infrastructure by reducing water availability for municipal systems, often leading to rationing measures and service interruptions. Extended water shortages can disrupt essential operations in schools, hospitals, and businesses, resulting in economic losses and reduced access to public services. Energy infrastructure may also be affected, particularly where hydroelectric generation declines due to low reservoir levels, increasing reliance on more expensive or less sustainable energy sources. Transportation systems can experience indirect impacts, such as road damage caused by soil shrinkage and heightened wildfire risk along highways. Emergency response and communication services may face additional challenges when limited water supplies constrain cooling systems and

firefighting capabilities. Collectively, drought conditions can trigger cascading impacts across interconnected infrastructure systems, increasing vulnerabilities and underscoring the need for coordinated mitigation and response strategies.

As noted above, drought events that require potable water rationing can lead to economic losses for the municipality by disrupting normal government operations. Partial or complete closures of schools, businesses, industrial zones, and public or private offices may occur when water availability is reduced. These impacts primarily affect the day-to-day functioning of municipal assets, as the services they provide are directly limited by water shortages or service interruptions. As droughts become more frequent or prolonged, their cumulative effects on operations are likely to intensify. However, while drought significantly affects service delivery and operational capacity, it does not directly damage the municipality's critical facilities and physical assets.

4.11.2.3 Social Vulnerabilities

As mentioned in Section 3.4 the estimated vulnerable population of Jayuya is 42.19% of total population. If the pattern that began in 2019 continues, the vulnerable population of Jayuya will continue to face major challenges regarding access to potable water. Communities will experience a decrease in water availability, which is essential for industrial and agricultural production, as well as for personal use by residents. It can also affect public health. This results in a reduction in quality of life, mental and physical stress, and social discomfort, with potential risks of malnutrition, dehydration, and disease. Since the effects of a drought period can have effects on the whole population (even drought periods that do not directly affect the municipality's territory, it is recommendable for the municipal administration to consider the whole population of Jayuya as exposed to this hazard. A more detailed discussion of the municipality's social vulnerability can be found in Section 3.4

4.11.2.4 Natural and Cultural Resources

When a region experiences prolonged and cumulative periods of little or no rainfall, a drought begins. This natural hazard has adverse effects on biodiversity and water supplies. For instance, a precipitation deficit lowers water levels in bodies of water, impacting the region's flora and fauna. Damage to vegetation directly affects animal habitats, creating an imbalance in food availability for wildlife.

Agriculture in the area is also severely affected due to the lack of water. When rainfall is significantly below normal levels, it causes severe hydrological imbalances that negatively affect land productivity systems. Similarly, crop growth and harvests decline, along with the availability and quality of drinking water. Drought can also lead to ecosystem degradation, loss of biodiversity and species, wind erosion, and increased wildfire risk.

4.11.2.5 Future Conditions

Over the long term, drought-related challenges are expected to intensify as rainfall patterns continue to vary. These variations may result in droughts that are more severe, longer in duration, and wider in geographic extent than those experienced historically, thereby increasing vulnerability among affected populations.

Overall population trends in the Municipality of Jayuya indicate a general decreasing trend at the neighborhood level. However, the population aged 65 and older has increased (see Section 3.4) This demographic trend requires consideration in drought planning, as aged-related health and mobility challenges may exacerbate the effects of water shortages and service disruptions for some residents.

Future land development also plays a critical role in drought vulnerability. Approving projects near sinkholes or developments that rely on septic systems increases the risk of groundwater contamination, which becomes especially problematic during drought conditions when alternative water sources are limited. Additionally, soil surface impermeabilization and the obstruction or filling of sinkholes reduce natural aquifer recharge by increasing surface runoff. These factors further diminish groundwater availability, limiting its viability as a supplemental water source during drought events.

4.12 Wildfire (E1-a)

4.12.1 Description (B1-a)

Wildfires are uncontrolled fires that spread through vegetation, posing serious threats to structures, human health, and natural ecosystems. These events often begin unnoticed and can spread rapidly, producing dense smoke that affects nearby communities. While wildfires may occur at any time of year, they are most common during periods of low rainfall, when grasses, leaves, and other fine fuels become dry and highly combustible.

In 2021, the Puerto Rico Department of Natural and Environmental Resources published its Forest Action Plan (DNER, 2021). The Plan discusses overall trends, issues and objectives for the management of forest resources. Wildfires are among the challenges discussed in the document. The Plan argues that wildfire management is a pressing issue at both local and global levels due to the complex interactions among human activity, fire dynamics, and natural landscapes. While research has established that fire influences ecosystem structure and function, its effects on ecosystem services remain uncertain because of interrelated factors such as land cover changes, invasive species, and climate change (Gould, 2008).

A clear understanding of the ecological and social impacts of wildfire in Puerto Rico's natural ecosystems is essential for guiding effective conservation and management strategies. Prevention efforts must extend to private forest owners and the general public, as most fires on the island are human caused (Gould, 2008). Historically, fire monitoring and research in the region have received limited attention. Currently, fires occur predominantly in dry forest zones, where the risk is highest. However, climate change, prolonged droughts, and human-induced landscape fragmentation could expand fire-prone conditions into moist and wet tropical forests, as well as into areas traditionally unaffected by fire (Gould, 2008).

Increasing temperatures, more frequent droughts, and the spread of invasive species are making forests more susceptible to wildfires. This shift is already evident in Puerto Rico, where fires are becoming more frequent and occurring in areas with no prior history of such events (Robbins, Eckelmann, & Quiñones, 2009).

The United States Forest Service main classification for fire types (USFS, n.d.) are;

- **Ground Fire** - Fire that burns within the organic material below the litter layer, mostly by smoldering combustion. It typically occurs in duff, peat, dead moss and lichens, and punky wood are typically ground fire. Ground fires mainly grow vegetation such as grasslands, shrubs, and tree bases. Depending on environmental factors (vegetation composition and density, slope orientation and steepness, wind speed, among others), these fires can vary in intensity but generally release less thermal energy than fires that spread through tree canopies.

- **Crown Fires** – A fire that burnt in the crowns of trees and shrubs usually ignited by a surface fire. Crown fires are common in coniferous forests and chaparral-type shrublands. In these types of fires, flames climb through lower branches

until reaching the tree canopy. However, in some cases, its spread remains primarily surface-based, often because trees are sparse and their canopies are too far apart.

- **Surface Fire** – A fire that burnt through leaf litter and other live or dead fuels located at or just above the ground, mostly by flaming combustion.

While FEMA follows a four-classification typology (FEMA, 1997):

- **Wildfires** – Fueled almost exclusively by natural vegetation. They typically occur in forests and national parks, where federal agencies are responsible for fire management and suppression.

- **Interface or Intermixed Fires** – Fires that occur in urban and/or wildland areas where vegetation and integrated surroundings provide the fuel.

- **Firestorms** – Events of such extreme intensity that effective suppression is virtually impossible. Firestorms occur under severe weather conditions and generally burn until conditions change, or available fuel is exhausted.

- **Intentional and Prescribed Burns** – Fires caused by human intervention and natural fires intentionally allowed to burn vegetation for management purposes.

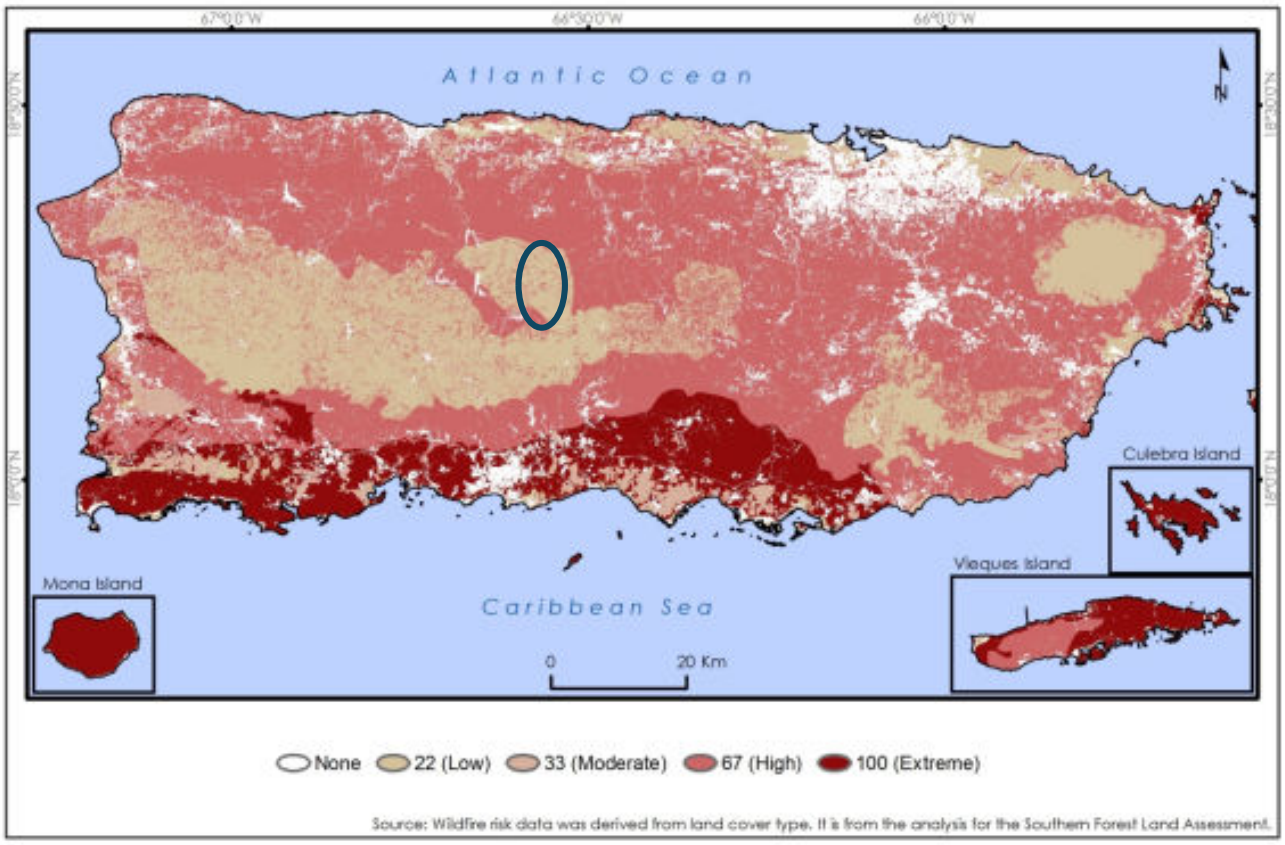
Another typology is the distinction between wildfires and wildland-urban interface (WUI) fires. Wildfires occur in areas with minimal development, except for infrastructure such as roads or power lines. WUI fires, on the other hand, involve situations when fire spreads into areas with structures or other human developments. In WUI fires, flames feed on both vegetation and structural elements of urban areas. The US Fire Administration defines WUI as the zone or area where human structures and developments meet or intermingle with wildland vegetation and fuels (US Fire Administation, 2025).

4.12.1.1 Affected Area (B1-b)

Figure 23 (DNER, 2021) illustrates the distribution of wildfire incidence across Puerto Rico, Vieques, and Culebra, as defined by the Southern Federal Land Assessment (SFLA). The figure reflects the current understanding of areas identified as fire-prone landscapes. Elevated wildfire occurrence in the southern coastal plains is largely attributed to the combined influence of human activity, the presence of dry and

combustible fuels, and prevailing climatic conditions. Jayuya's territory (blue circle) is characterized by High risk in the mountainous area and a moderate risk in the valleys to wildfires.

Figure 24: Levels of Wildfire incidence accounting to SFLA



4.12.1.2 Risk Magnitude (B1-c)

Wildfires tend to be associated with template climate areas, like California or Canada. However, the recent experience in the State of Hawai'i showed that rapid and deadly wildfire can occur even in tropical humid locations. The catastrophic Lahaina Fire of August 2023 sent swift, devastating flames through densely built neighborhoods, revealing severe vulnerabilities in early warning systems, evacuation planning, and community preparedness. Fueled by dry vegetation, strong winds, and record-setting drought conditions, the blaze rapidly ignited structures and overwhelmed emergency response efforts. Independent investigation by the Fire Safety Research Institute highlights that inadequate infrastructure resilience, insufficient communication

networks, and a lack of coordinated interagency planning significantly amplified the disaster's impact.

As Puerto Rico faces similar wildfire threats, especially in southern coastal plains, this tragedy underscores the need to strengthen detection systems, bolster community evacuation routes, and elevate public education about fire safety. Building codes that emphasize fire-resistant materials and defensible space strategies around homes and critical facilities can reduce structural losses under extreme wildfire conditions.

The importance of integrated land management also emerges, encouraging Puerto Rico to limit development in WUI zones and maintain vegetation buffers. The Lahaina lessons highlight that rapid, well-coordinated suppression and resilient communications systems are vital to curbing wildfire escalation. Investing in cross-agency collaboration and emergency training at the local level will help Puerto Rican municipalities respond more effectively. Ultimately, Lahaina serves as a stark wake-up call, emphasizing that proactive planning, robust infrastructure, and community resilience are essential to preventing a similar wildfire catastrophe in Puerto Rico

4.12.1.3 Past Events (B1-D)

Citing data from the Puerto Rico Firefighters Bureau (PRFB), The Puerto Rico Forest Action Plan states that a total of 7,099 wildland fires were reported across Puerto Rico between 2018 and 2020. The highest number of incidents occurred in 2020, with 5,077 recorded fires. The regions most affected were Ponce, Guayama, and Mayagüez (DNER, 2021).

Within the Department of Natural and Environmental Resources (DNER) Protected Natural Areas, fire incidence increased in 2019 compared to 2018. Notable affected sites included Guánica State Forest, Boquerón Wildlife Refuge, Punta Cuchara Natural Reserve, Caño Tiburones Natural Reserve, and Tortuguero Lagoon Natural Reserve. Most of these fires were linked to human activities, such as unattended campfires, discarded cigarettes, intentional burning, improper waste burning, and poorly managed prescribed burns in pasturelands (DNER, 2021).

The high frequency of wildfires in Puerto Rico highlights the urgent need for targeted education and public outreach efforts to raise awareness. When combined with active land management and a landscape-scale conservation approach, these initiatives can help reduce the occurrence of fires and mitigate additional pressures on forest ecosystems.

During 2024 a total of 14 wildfires were reported by the Puerto Rico Fire Bureau. The following table shows the details of the wildfires reported in that year.

Table 30: Registered Wildfires

#	Case Number	Discovery Date	Containment Date	Incident Coordinates[16]
1	BPR012024-689	2024-01-20 14:43:51.686000	2024-01-20 20:07:44.513000	-66.5924, 18.2126
2	BPR021924-336	2024-02-19 09:46:34.906000	2024-02-19 11:38:09.748000	-66.5924, 18.2126
3	BPR021924-736	2024-02-19 16:05:58.469000	2024-02-19 18:33:01.788000	-66.5924, 18.2126
4	BPR012224-778	2024-01-22 14:36:00.845000	2024-01-22 15:58:37.394000	-66.5924, 18.2126
5	BPR012224-785	2024-01-22 14:39:07.255000	2024-01-22 15:59:46.206000	-66.5924, 18.2126
6	BPR012324-353	2024-01-23 09:42:50.074000	2024-01-23 10:21:43.290000	-66.5924, 18.2126
7	BPR012324-705	2024-01-23 13:52:15.327000	2024-01-23 15:10:46.918000	-66.5924, 18.2126
8	BPR021924-451	2024-02-19 11:40:32.693000	2024-02-19 13:36:35.412000	-66.5924, 18.2126
9	BPR031224-368	2024-03-12 10:20:03.858000	2024-03-12 13:40:51.654000	-66.5924, 18.2126
10	BPR032824-969	2024-03-28 19:12:55.258000	2024-03-28 21:15:48.958000	-66.5924, 18.2126
11	BPR040324-346	2024-04-03 09:58:03.751000	2024-04-03 10:48:26.307000	-66.5924, 18.2126
12	BPR061724-627	2024-06-17 12:47:11.321000	2024-06-17 13:35:20.394000	-66.5924, 18.2126
13	BPR072124-1027	2024-07-21 23:14:36.704000	2024-07-21 23:45:42.992000	-66.5924, 18.2126
14	BPR081924-720	2024-08-19 13:58:52.022000	2024-08-19 15:19:42.838000	-66.5924, 18.2126

Source: Puerto Rico Fire Bureau

4.12.1.4 Future Event Probability (B1-E)

Long-term trends in rain patterns, such as those caused by fluctuations in the El Niño–Southern Oscillation (ENSO), may lead to extended dry periods (CCOF, 2026), reduced

[16] Coordinates are as per reported by PRFB

soil moisture, and increased vegetation stress. When combined with rising temperatures, these conditions accelerate evapotranspiration and further dry out fuels, significantly increasing the likelihood of ignition and fire spread. As a result, areas that have not historically been prone to wildfires may become increasingly susceptible under these changing climate conditions.

4.12.2 Risk Analysis (B2-a, B2-b)

4.12.2.1 Estimated Losses

Wildfires can result from both natural conditions, such as the presence of flammable vegetation, and human activities, including the intentional use of fire. These factors strongly influence the potential scale and intensity of wildfire events. The level of potential loss increases with higher population concentrations, greater numbers of structures, and sensitive ecosystems located within the affected area. Climatic conditions, combined with patterns of human activity, largely determine the extent and severity of wildfire impacts.

At present, there is insufficient information to quantify monetary losses related to building damage from this hazard. Additionally, at the time of this Plan update, no official damage estimates were available for the municipality. To address this gap, the municipality will take a proactive approach by incorporating updated damage information in Plan revisions as data become available

4.12.2.2 Critical Infrastructure

Wildfires pose a significant threat to critical infrastructure, creating cascading impacts across power systems, communications, water supply, transportation, and the built environment. The electric grid is particularly vulnerable. Research from Sandia National Laboratories (Sandia National Laboratories, n.d.) and other institutions shows that wildfires can both damage grid components and be ignited by them, as seen in the 2018 Camp Fire, which caused $9.3 billion in damages. To address this, the U.S. Department of Energy has invested $3.46 billion through its Grid Resilience and Innovation Partnerships program (DOE, 2023), funding projects that include undergrounding power lines, installing fire-resistant poles, and deploying advanced sensors.

Communications infrastructure faces similar risks. A study by University of Wisconsin – Madison faculty found that while cell towers often survive fires physically, power

outages lead to widespread service disruptions. (Anderson, Barford, & Barford, 2020) Water systems and watersheds are also heavily impacted. Post-fire conditions—such as vegetation loss and soil hydrophobicity—can trigger flooding and debris flows, introducing sediment, nutrients, and metals into water supplies.

Transportation networks suffer both direct and indirect damage. Roads, bridges, and drainage systems are often compromised by post-fire floods and debris flows buildings and other structures in the wildland–urban interface is increasingly at risk due to climate change and urban expansion.

In summary, wildfires create complex, interconnected risks for critical infrastructure, requiring a combination of engineering solutions, advanced modeling, policy reforms, and community engagement. Official and academic sources consistently call for proactive measures—such as infrastructure hardening, improved land management, and resilience planning—to reduce exposure and enhance recovery.

Wildfires occur regularly during periods of drought, primarily in the southern region of Puerto Rico. These events have significant social and economic impacts, mainly due to structural and property damage or loss caused by the fires. If the affected area served as an employment or industrial hub, many individuals could face unemployment. Additionally, insurance premiums tend to rise because of increased demand for coverage to mitigate economic losses associated with wildfire hazards. Collectively, these factors negatively affect the region's economy, wildlife, vegetation, and contribute to broader social decline.

4.12.2.3 Social Vulnerability

Social vulnerability plays a critical role in shaping how communities experience and recover from wildfire events. Research consistently shows that populations with higher levels of poverty, older adults, individuals with disabilities, limited English proficiency, and households without reliable transportation face greater challenges preparing for, evacuating from, and recovering after wildfires. The CDC/ATSDR Social Vulnerability Index (SVI) identifies these demographic and socioeconomic conditions as key factors that increase susceptibility to disaster impacts, including wildfires, by constraining a community's adaptive and coping capacity before, during, and after an event. National scale studies further demonstrate that U.S. communities experiencing wildfire occurrence or exposure tend to have systematically higher levels of social vulnerability, including higher unemployment, lower educational attainment, and greater concentrations of medically or socially dependent populations (Schumann, III, et al., 2024).

Wildfires also exacerbate existing inequalities through indirect impacts such as prolonged displacement, loss of livelihoods, and health effects from smoke exposure. Peer reviewed studies show that socially vulnerable populations experience disproportionate health burdens from wildfire smoke, including higher rates of respiratory and cardiovascular illness and increased mortality risk, due to preexisting health conditions and limited access to medical care. FEMA and the U.S. Fire Administration emphasize that older adults, low-income households, people living in mobile homes, and individuals without access to private vehicles face heightened risk of injury or death during wildfire evacuations, underscoring the importance of incorporating social vulnerability into wildfire mitigation, evacuation planning, and recovery strategies (Dennin, Nock, Muller, Akindele, & Adams, 2025). A significant portion of Jayuya's population is considered vulnerable (46.96%), and increased wildfire risk may disproportionately impact these residents by threatening homes, limiting access to essential services, and exacerbating health risks associated with heat and smoke exposure. A more detailed discussion of the municipality's social vulnerability can be found in Appendix F

4.12.2.4 Natural and Cultural Resources

The severity, scale, and consequences of wildfire can be grouped into the following categories:

- Impact on Landscape - The most visible effect after a wildfire is the loss of scenic quality caused by the destruction of vegetation cover and its regression to earlier ecological stages.
- Impact on Wildlife - Wildfires immediately affect fauna, killing animals unable to escape—such as invertebrates, small vertebrates, young animals with limited mobility, and even large herbivores and carnivores trapped by flames and fencing. Fires also lead to migration due to the loss of pastures, habitats, and endangered species.
- Impact on Soil - Wildfires alter soil structure and greatly increase its vulnerability to erosion. Organic matter is lost through combustion, destabilizing soil aggregates and causing progressive disintegration. Solid particles are then removed by rain or wind erosion. Hydrophobic layers often form, caused by water-repellent organic substances and changes in mineral composition, preventing water infiltration and accelerating erosion. Significant losses of soil and organic matter reduce nutrient levels, lowering fertility. Heat also kills many

organisms, reducing biological activity and disrupting biogeochemical cycles. However, not all effects are negative. Naturally occurring fires (now increasingly rare) can benefit forest health by mobilizing nutrients and controlling pests. Low-intensity fires help retain carbon in the soil, preventing its release as carbon dioxide.

- Alteration of the Water Cycle - Soil loss drastically changes the hydrological cycle. Reduced infiltration lowers groundwater reserves that feed aquifers essential for agriculture and urban use. Surface runoff increases, intensifying erosion and contributing to flooding after heavy rain.
- Increase in Carbon Emissions - Combustion during wildfires releases carbon dioxide (CO_2), methane (CH_4), and suspended particles. These emissions cause significant environmental damage and negatively affect people with respiratory illness (Asthma, COPD, etc.).

Wildfires can lead to numerous environmental consequences, including the destruction of vegetation cover, the death or displacement of wildlife, the loss of fertile soil, and an increase in erosion events. They can also cause significant loss of life and property, resulting in substantial economic costs associated with firefighting and recovery efforts.

The impact of wildfires on ecosystems is severe and varies depending on the magnitude and frequency of these events. They cause extensive damage to vegetation, disrupt ecosystems, and lead to the loss of wildlife in affected areas. Additionally, wildfires contribute to increased soil erosion, alterations in the hydrological cycle, and higher emissions of carbon dioxide into the atmosphere. These factors collectively accelerate environmental and soil degradation.

As for cultural resources, Wildfires pose a serious threat to cultural resources, including historic buildings, and archaeological sites. Intense heat and flames can destroy irreplaceable structures, artifacts, and archives, erasing centuries of heritage in a matter of hours. Smoke and water used in firefighting efforts can further damage delicate materials, while erosion and flooding after fires may expose or wash away archaeological remains. In addition, the loss of cultural landmarks disrupts community identity and traditions, impacting tourism and local economies. Protecting these resources requires proactive planning, fire-resistant measures, and collaboration between emergency agencies and cultural preservation experts.

4.12.2.5 Future Conditions (E1-a)

Puerto Rico already experiences a high annual probability of wildfire supporting conditions. According to the World Bank–supported ThinkHazard! platform, Puerto Rico's wildfire hazard is classified as High, meaning there is a greater than 50% probability in any given year of weather conditions capable of supporting a significant wildfire that could cause impacts to life or property. This assessment incorporates historical fire occurrence, climate variables, vegetation type, and drought conditions and is widely used in infrastructure and hazard mitigation planning worldwide (World Bank, n.d.).

Taken together, the best available scientific evidence indicates that Puerto Rico currently faces a probability exceeding 50% annually of wildfire supportive weather conditions, with future probability and severity expected to increase due to rising temperatures, expanded drylands, and longer seasonal droughts. While precise ignition probability percentages cannot be reliably projected at the municipal scale, confidence is high that wildfire occurrence, fire weather days, and burned area will increase by midcentury, particularly in southern, western, and interior regions of the island (World Bank, n.d.).

4.13 Pandemic/Epidemic

4.13.1 Description (B1-a)

An epidemic occurs when the incidence of a disease or health-related event rises suddenly and significantly above what is expected in a specific community or region. According to the CDC, an epidemic represents a sudden increase in cases over the normal baseline in a population, and outbreaks—often used interchangeably—refer to such events in more limited geographic areas. (CDC, 2012)

A pandemic is essentially an epidemic that has expanded to span multiple countries or continents, affecting a large portion of the global population. The CDC describes it as an epidemic with broad geographic spread, while the World Health Organization defines it as the worldwide transmission of a new disease to which people generally have little or no immunity. (CDC, 2012)

These terms emphasize both the magnitude of cases and their geographical distribution: an epidemic is localized, but a pandemic reaches across international borders and impacts global public health systems. Emergency responses must therefore be scaled from regional interventions during epidemics to coordinated global action in pandemics.

4.13.1.1 Affected Area (B1-b)

This LHMP considers that all areas of the municipality are equally vulnerable to the Epidemic/Pandemic Hazard

4.13.1.2 Risk Magnitude (B1-c)

Although all can cause loss of life and economic disruption it is important to clarify terms:

- Epidemic refers to a sudden increase in the number of disease cases beyond what is normally expected within a specific population and geographic area.
- Outbreak shares the same definition as epidemic but is typically used for a more localized area.
- Cluster describes a grouping of cases in a particular place and time that appears to exceed the expected number, even if that expected number is unknown.
- Pandemic refers to an epidemic that has spread across multiple countries or continents, usually affecting a large population (CDC, 2012).

4.13.1.3 Past Events (B1-d)

The following table listing epidemics and pandemics in Puerto Rico has been collected from various sources. This list does not intend to be exhaustive:

Table 31: Pandemics and Epidemics in Puerto Rico 1855 - 2020

Disease	Date	Classification	Description
Cholera Epidemic	1855 - 1856	Epidemic	Between 1855 and 1856, Puerto Rico suffered a major cholera outbreak that claimed over 25,820 lives, representing approximately 4–10% of the island's population at the time. (Vega Lugo, 2021)
Measles and Malnutrition	1917 - 1918	Epidemic	A severe measles outbreak occurred between 1917 and 1918, resulting in nearly 9,000 cases and approximately 2,000 deaths. High infant mortality—59% of deaths within six months were in children under two—was driven by

Disease	Date	Classification	Description
			malnutrition and poor living conditions (Rigau-Pérez & Vallejo - Calzada, 2020).
Spanish Flu (A/H1N1 influenza pandemic)	1918 - 1919	Pandemic	Puerto Rico was affected by the global A/H1N1 influenza pandemic, also known as the Spanish flu. Beginning around June 1918, community spread produced as many as 1,000 cases in four days in areas like Puerta de Tierra. Misdiagnosis as dengue initially obscured the true impact (Rosario Urrutia, 2021).
Poliomyelitis	1960	Epidemic	The 1960 polio epidemic in Puerto Rico was the most severe paralytic polio outbreak in the Western Hemisphere at the time. It impacted 68 of 76 municipalities, causing 495 cases of paralysis, predominantly among school-age children (Timothee, Morris, Filiberti, & Mainardi, 1963).
Dengue	2013, 2024	Outbreak	Dengue is endemic in Puerto Rico, with significant outbreaks occurring in 2013 and again in 2024. The 2024 outbreak triggered a public health emergency, with 6,291 confirmed cases, a 4.2% rate of severe dengue, and 11 deaths reported (Rodríguez, et al., 2024) (Ware-Gilmore, et al., 2025)
Chikungunya	2014	Epidemic	The first locally acquired chikungunya case in Puerto Rico was confirmed on May 5, 2014, triggering expanded surveillance efforts using Puerto Rico's dengue infrastructure. Between May 5 and

Disease	Date	Classification	Description
			August 12 of that year, 10,201 suspected cases (approximately 282 per 100,000 residents) were reported, of which 1,975 (68%) were laboratory-confirmed. During this period, four deaths were also recorded. (Sharp, et al., 2014)
Zika	2015 - 2016	Epidemic	The first locally transmitted Zika case in Puerto Rico was reported in December 2015. By April 2016, over 6,000 suspected cases had been evaluated, with 683 confirmed cases. Pregnant women and related neurological issues (e.g., Guillain-Barré syndrome) were of particular concern. (Thomas, et al., 2016) (Dirlikov, et al., 2016)
COVID - 19	2020 - 2022	Pandemic	See narrative below

COVID Pandemic

Puerto Rico confirmed its first COVID-19 case—a European tourist—on March 8, 2020, leading the governor to declare an emergency on March 12 and implement early measures including airport screening and mandatory isolation, as outlined in the Puerto Rico Department of Health's epidemic situation reports (PRDH, 2022), (COR3, n.d.). By April 6, 2022, official data reported 270,485 confirmed cases and 4,171 deaths due to COVID-19 in Puerto Rico, according to detailed government spreadsheets and dashboards maintained by the Puerto Rico Health Department (PRDH, 2022), (COR3, n.d.).

The territory experienced significant economic and social disruptions: a Bayesian analysis revealed a clear causal relationship between rising COVID-19 infections and increased unemployment, and engineering studies from the University of Puerto Rico–Mayagüez estimated that unemployment soared above 17%, also noting elevated

operating costs for businesses due to PPE and safety measures (Hernández - Padilla & Méndez-Piñero, 2020).

Subsequent public health research revealed widespread mental health consequences: one study found that 31% of healthcare workers scored in the range of depressive symptomatology following combined stress from prior disasters (e.g., hurricanes) and the pandemic; another identified high levels of anxiety (26.9%) and stress (69.9%) among physicians during the second COVID-19 wave (Hernández - Torres, et al., 2023), (Sánchez - Plazas, García - De Jesús, Martínez - González, Amaya - Ardila, & Almodóvar - Rivera, 2024).

4.13.1.4 Future Events Probability (B1-e)

Puerto Rico's susceptibility to future pandemics or epidemics is underscored by its subtropical climate, population distribution, and healthcare infrastructure. A university-developed emergency preparedness model—commissioned by Puerto Rico's Department of Health—simulated influenza pandemics and demonstrated how variations in disease transmissibility, healthcare capacity, and mitigation efforts can significantly influence outbreak trajectories and the likelihood of healthcare system overload. Furthermore, the U.S. Department of Health and Human Services' Hospital Preparedness Program (HPP) in Puerto Rico operates under the Assistant Secretary for Preparedness and Response, with coordinated health care coalitions and special pathogen systems explicitly designed to reduce pandemic risk by strengthening surge capacity and infection-control readiness. These combined efforts reflect a data-driven recognition that, without sustained investment in public health infrastructure and preparedness modeling, Puerto Rico remains at an elevated probability for experiencing another epidemic or pandemic (Hirsh & Centeno - Marín, 2015), (ASPR, n.d.)

4.13.2 Risk Assessment (B2-a, B2-b)

4.13.2.1 Estimated Losses

The COVID-19 pandemic resulted in significant mortality across Puerto Rico, underscoring the importance of public health hazards in local mitigation planning. Official data from the Puerto Rico Department of Health indicate that COVID-19 mortality is tracked through an epidemiological surveillance system that compiles death certificate data and case investigations and is made publicly available through government data portals. At the territorial level, thousands of deaths have been attributed to COVID-19 since 2020, as reported in official datasets and federal summaries. However, cumulative mortality totals for individual municipalities,

including Jayuya, revision are not consistently published as single static figures in official reports. Instead, municipality-level death counts must be obtained by querying downloadable datasets provided by the Puerto Rico Department of Health, which allow users to filter results by municipality.

These datasets are considered provisional and subject to due to reporting delays and ongoing validation of death records, as acknowledged by public health authorities. Consequently, while Jayuya-specific COVID-19 mortality was not recorded as fixed published figure. Based on the currently available data, the total number of COVID-19-related deaths in Jayuya cannot be reliably determined.

4.13.2.2 Critical Infrastructure and Lifelines

In the event of a pandemic or epidemic, the most significantly affected lifeline is typically the healthcare and medicine lifeline. During widespread disease outbreaks, hospitals, clinics, and other healthcare facilities often face overwhelming demand for services. Surges in patient volume can exceed system capacity, leading to shortages of personal protective equipment (PPE), critical medical devices (such as ventilators during COVID-19), hospital beds, and qualified medical personnel. As resources are redirected to address the immediate public health emergency, non-urgent and even some essential non-related medical services may be postponed or delayed. Additionally, mortality management systems—including morgues, funeral services, and vital records processing—may experience severe strain during periods of elevated death rates.

However other lifelines can be affected such as the Food, Hydration and Shelter Lifeline, due to increased food insecurity from unemployment and economic shutdowns ort closed or reduced shelters due to infection control requirements. The Safety and Security Lifelines can be affected by high absenteeism due to illness, quarantine or caregiving responsibilities and increase levels of stress and burnout among first responders and law enforcement officers.

Other lifelines and critical infrastructures can be affected by increased demand, like increased residential water demand) or the lack of trained personnel to maintain existing operations.

4.13.2.3 Social Vulnerability

For this hazard, the whole population of Jayuya is considered equally vulnerable. Nonetheless besides factors of age and poverty, the 2024 ACS shows that a total of

494 people in Jayuya did not have health insurance coverage (US Census Bureau, 2025). This means that 3.40% of the total population of Jayuya is uninsured.

Of those most of the uninsured group belonged to the 55 to 64-year cohort (164 persons) followed by the cohort of 26 to 34 years (112 persons).[17] The results given by the ACS shows that the productive ages between 26 to 64 years represents 91% of total persons uninsured making them the most vulnerable in terms of uninsured in the face of a pandemic or epidemic.

Table 32 shows the breakdown of uninsured people in Jayuya according to the 2024 ACS

Table 32: Number of People in Jayuya without Healthcare Coverage

Age Cohort	Number of people uninsured
Under 6 years	0
6 to 18 years	40
19 to 25 years	0
26 to 34 years	112
35 to 44 years	70
45 to 54 years	108
55 to 64 years	164
65 to 75 years	0
75 years or older	0
TOTAL	494

Source: US Census Bureau (ACS, 5 years estimates 2020-2024)

This would be considered population at risk in case of a pandemic or epidemic. Further information regarding social vulnerability can be found in Section 3.4.

[17] US Census 2023 ACS Table S2701

4.13.2.4 Natural and Cultural Resources

The scientific literature shows that the COVID-19 Pandemic was a mixed bag for the environment. On one hand the unprecedented pandemic-related lockdowns had negative effects on the physical environment. These impacts included increased pollution from the widespread use of personal protective equipment, deforestation, illegal poaching and logging, overfishing, and disruptions to conservation programs and projects. The findings also note that the spread of pandemics may be intensified by environmental pollution and rapid global population growth (Muche, Yemata, Molla, Muasya, & Tsegay, 2022), (Guo & Lee, 2021).

At the same time, despite these adverse impacts, the period of reduced human activity—often referred to as the *anthropause*—also produced several positive effects on natural resources. These included short-term reductions in indoor and outdoor air pollutants ($PM_{2.5}$, PM_{10}, NO_2, SO_2, CO, and CO_2) and decreases in noise pollution from ships, boats, vehicles, and aircraft. Collectively, these changes benefited aquatic ecosystems and water quality, influenced bird behavior, supported wildlife biodiversity, and contributed to temporary ecosystem recovery. (Muche, Yemata, Molla, Muasya, & Tsegay, 2022)

When it comes to cultural and heritage sites a report from UNESCO states that crisis has produced both negative and positive effects across different types of World Heritage properties (UNESCO, 2021). The sudden cessation of travel and tourism disrupted visitor flows and eliminated a critical source of revenue for many sites, where tourism income is essential to supporting conservation activities, routine maintenance, and staff salaries. Local communities surrounding these properties were similarly affected, with widespread loss of employment and income.

Conversely, in some cases the reduced level of human activity enabled rehabilitation and restoration efforts to proceed more efficiently, while anthropogenic pressures were temporarily reduced across many natural areas. This contrast highlights the diverse and uneven impacts of the crisis on World Heritage properties. At the same time, it presents an opportunity to build on the benefits associated with the easing of specific pressures at certain sites, while advancing targeted research and strategic recovery planning (Guo & Lee, 2021) (Guibert & Hyde, 2021), (UNESCO, 2021).

4.13.2.5 Future Conditions (E1-a)

Puerto Rico faces structural and environmental conditions that elevate its exposure and vulnerability to future pandemics relative to many mainland U.S. locations. As a

tropical island with high population density in urban corridors, frequent international travel, and climatic conditions favorable to vectors and pathogens, Puerto Rico is particularly susceptible to emerging and re-emerging infectious diseases, especially those with zoonotic or vector-borne origins. The CDC and peer-reviewed research document ongoing transmission of diseases such as dengue and previous outbreaks of Zika and Chikungunya, demonstrating the island's continued exposure to pathogens with outbreak and epidemic potential. This exposure holds regardless of the development pattern of the municipality.

4.14 Hazard Prioritization

After receiving feedback from the public and stakeholders (see Section 2.3) along with their own expertise the planning committee has determined that the following is the prioritization for the hazard discussed in this LHMP.

Table 33: Hazard Prioritization

Hazard	Priority
Earthquake	Mid Priority
Landslide	High Priority
Flooding	High Priority
Tropical Cyclones/Extreme Winds	Mid Priority
Extreme Heat	Low Priority
Drought	Mid Priority
Wildfire	Low Priority
Pandemics/Epidemic	Low Priority

4.15 Planning Mechanism

Understanding and recognizing regulatory and planning capacities enables more effective management of land use and economic growth. These capacities consist of the legal frameworks and public policy provisions that influence land use to guide sustainable development, while also supporting actions that mitigate the vulnerability of communities and their resources to natural hazards.

Besides the Public Policies already discussed in Section 1.1, what follows is a list in chronological order of the regulatory and planning mechanisms available to the municipality for the implementation of this LHMP.

4.15.1 Joint Regulation for the Evaluation and Issuance of Permits Related to Development, Land Use, and Business Operations (2023)

The Joint Regulation for the Evaluation and Issuance of Permits Related to Development, Land Use, and Business Operations (*Reglamento Conjunto* in Spanish) is a regulatory instrument created by the Planning Board in compliance with Law No. 161, as amended. Its main purpose is to regulate land use, territorial planning, and the granting of permits related to development, construction, and business operations within a uniform and centralized framework.



Figure 25: Joint Regulation Cover

The Joint Regulation aims to harmonize public policy on land use planning with the principles of sustainable development, seeking a balance between economic growth, environmental protection, and social well-being. This regulation establishes the rules to classify land, define zoning districts, regulate zoning, and determine the permitted uses in each category. Additionally, it sets the procedures to evaluate projects, issue permits, and monitor compliance with the applicable provisions. Its purpose is to provide a uniform regulatory framework for the evaluation and issuance of permits, ensure the proper use of land, protect natural resources, and facilitate economic development under criteria of competitiveness and sustainability, integrating planning with permit management.

Of particular importance in the Joint Regulation is the zoning district *Distrito de Riesgo para Espacios Abiertos* – Open Space (RE-A). The RE-A zoning district was established to identify lands designated as open space in accordance with federal regulations (44 CFR Part 80) or another federal program, due to the presence of a risk condition resulting from a natural event. These spaces may include, but are not limited to, severe flooding and landslides. There are conditions in these areas that are unfavorable or harmful to health, safety, or general welfare, and there may be a risk of loss of life and property. Land within this district may be susceptible to one or more of the identified hazards.

The purpose of the district is to preserve the open space condition established in perpetuity by federal regulation, which the government or the community must uphold, with the objective of protecting health, life, and property; preventing severe losses and repetitive use of affected properties; reducing the investment of public and federal funds in mitigation; and limiting rescue efforts, among other goals.

4.15.2 Special Flood Hazards Areas Regulation (2021)

The 2021 regulation was adopted by the Puerto Rico Planning Board under its authority from Public Law No. 75 of 1975 and Public Law No. 3 of 1961 to control development in flood prone zones. It aligns Puerto Rico's floodplain management requirements with the minimum standards of the National Flood Insurance Program (NFIP), administered by FEMA. The regulation establishes updated criteria for construction, land use, and development within Special Flood Hazard Areas (SFHAs), including requirements such as elevating structures above Base Flood Elevation and submitting technical certifications. It applies to new construction, substantial improvements, and land use changes across designated flood zones such as AE and VE, using FEMA Flood Insurance Rate Maps (FIRMs) and Flood Insurance Studies (FIS) for zone identification. The revision clarifies and expands regulatory provisions to enhance public safety and prevent harmful development in high-risk areas.

4.15.3 Puerto Rico 2023 Building Code

The Puerto Rico Building Code sets minimum requirements for the design, construction, modification, and upkeep of buildings to ensure the safety, health, and well-being of the public. It is derived from nationally and internationally recognized model codes and is updated periodically to incorporate improvements in construction practices and lessons learned from past hazard events. The code includes provisions addressing structural safety, fire protection, accessibility, energy conservation, and resistance to natural hazards such as earthquakes, hurricanes, floods, and strong winds. Adherence to the Building Code is mandatory for all new construction and substantial renovations throughout Puerto Rico. Enforcement is carried out through local permitting, planning review, and inspection processes to verify compliance with established standards. Overall, the Puerto Rico Building Code is a key instrument for advancing resilient, safe, and sustainable development across the island.

4.15.4 Regulation for the Design, Operation Criteria and Maintenance of Stormwater Systems in Puerto Rico



Figure 26: Regulation 40 (Cover)

Adopted in 2023 as Planning Regulation No. 40, this regulation updates and replaces the island's outdated 1975 standards to address current engineering practices, environmental considerations, and increased flood risk. The regulation is designed to provide developers, engineers, contractors, and municipalities with modern technical criteria for designing, operating, and maintaining public and private stormwater systems, incorporating updated scientific knowledge and methodologies necessary for managing stormwater infrastructure under present-day conditions. Its objectives include minimizing flood-related damage, improving the capture and management of runoff, reducing impacts to water resources and ecosystems, and supporting safer, more resilient community development. The regulation integrates risk management principles and aligns with Puerto Rico's climate adaptation policies, requiring consideration of urban flooding, karst hydrology, low impact development practices, and stormwater control structures such as retention and detention systems. It also establishes minimum design considerations for all land development projects and provides a comprehensive framework for planning, monitoring, and maintaining stormwater systems across the island.

4.15.5 Jayuya Territorial Plan (2026 - DRAFT)

As per the Municipal Code, the Municipality of Jayuya updated their Territorial Plan as its First Integral Revision still for approval. The Territorial Plan (PT, by its Spanish acronym) is a strategic and comprehensive tool for organizing land use within a municipality. This plan covers, at a minimum, the entire municipal area and aims to define the essential elements of such organization, as well as establish a program for its development and implementation, including its validity period.



Figure 27: Territorial Plan-DRAFT Cover Page

The integral revised version of Jayuya's PT will be updated to:

- Incorporate policies, strategies, and recommendations from land-use planning instruments approved by the Planning Board (JP) after the last review of the TP.
- Include provisions from recently approved or amended statutes.
- Review the municipal socioeconomic context based on recent population trends.
- Integrate information on policy and plan changes resulting from Hurricanes Irma and María in Puerto Rico.
- Include topics of mitigation, adaptation, and climate change resilience in public policy and state, sectoral, and municipal planning.
- Reflect the vision of the municipal administration and its citizens regarding the physical and socioeconomic development of Jayuya.
- Adjust local land uses according to current and future context and needs (Municipality of Jayuya, 2026).

4.15.6 Jayuya Emergency Operation Plan

This Emergency Operation Plan (EOP) describes how emergency operations are structured through the Incident Command System, enabling unified command and efficient allocation of resources. It details the activation levels of the Municipal Emergency Operations Center, which escalates from routine monitoring to full 24/7 multi agency disaster response. The municipality highlights the importance of interagency collaboration, including coordination with state and federal agencies when local capabilities are exceeded. Community involvement, public information, and support for vulnerable populations—such as individuals with disabilities, children, and the elderly—are essential components woven into all phases of emergency management. Additionally, the plan incorporates long term recovery strategies, emphasizing damage assessments, restoration of critical services, and alignment with federal assistance processes. Ultimately, it presents a structured, community-centered approach to ensure Jayuya can respond to, withstand, and recover from a wide range of emergencies.

4.15.7 National Flood Insurance Program

The National Flood Insurance Program falls within the category of planning mechanisms, as it imposes certain floodplain management requirements. FEMA provides flood insurance to communities that are following the NFIP criteria. This includes adopting and enforcing floodplain management practices that promote appropriate development in these flood-prone areas.

The National Flood Insurance Program of the Federal Emergency Management Agency allows homeowners, business owners, and renters in participating NFIP communities to purchase federally backed flood insurance. This insurance provides assistance to help cover the costs of repairing damage caused by flooding to buildings and their contents. This is an insurance program established to help property owners, renters, and businesses recover more easily and at a lower cost. Likewise, the program aims to reduce the impact of flooding on both public and private structures. These efforts help mitigate the effects of flooding on new and improved structures within each community.

The NFIP has several components, including:

- Floodplain management — for which the community must adopt and enforce measures for managing flood-prone lands in accordance with NFIP regulations;
- The preparation of Flood Insurance Rate Maps (FIRMs); and
- Flood insurance.

The Puerto Rico Planning Board has a collection of FIRM maps that can be consulted to determine whether your property is in a high-risk area or in a low- to moderate-risk zone. FIRMs refer to the official map developed and approved by FEMA and adopted by the Puerto Rico Planning Board to designate areas at risk of a 100-year flood (or a 1% annual chance of occurrence). In addition, these maps serve as a tool for managing special areas due to their susceptibility to flooding events.

While the Write Your Own Program (WYO) began in 1983 as a partnership between insurance companies and FEMA. This arrangement allows property and casualty insurance companies to underwrite and service federal flood insurance policies in their own company name. A key feature of this type of policy is that all companies

participating in the WYO program provide the same coverage, and their rates must comply with NFIP rules and regulations.

Communities, for their part, adopt and require compliance with the NFIP's minimum standards for construction and development in designated Special Flood Hazard Areas. However, many communities seek to achieve a higher level of safety and protection for their residents beyond the NFIP minimum standards. For this purpose, communities have the option of participating in the NFIP's Community Rating System (CRS), which allows them to obtain reductions in flood insurance premiums.

This is because the CRS recognizes additional community efforts to: 1) Reduce flood damage to insurable property; 2) strengthen and support NFIP insurance provisions; and 3) encourage a comprehensive approach to floodplain management. These additional efforts provide residents with greater safety, reduce property damage, enhance community resilience, and promote a better quality of life. The municipality's participation in the NFIP will be discussed in Section 6.6

4.15.8 National Pollutant Discharge Elimination System (NPDES)

The NPDES is a program authorized under the United States Clean Water Act and administered by the Environmental Protection Agency (EPA). This program requires Municipal Separate Storm Sewer Systems (MS4s) to obtain a permit for the discharge of stormwater into water bodies. In the case of Puerto Rico, the EPA issued a general permit in 2016, under which municipalities can obtain coverage by submitting a Notice of Intent (NOI) and adopting a Stormwater Management Program (SWMP). If any of the mitigation measures listed in Section 6.5 modify the NOI or the SWMP, they will be properly amended.

4.15.9 Operational Guidelines for Determining Damages and Substantial Improvements in Puerto Rico (2025)

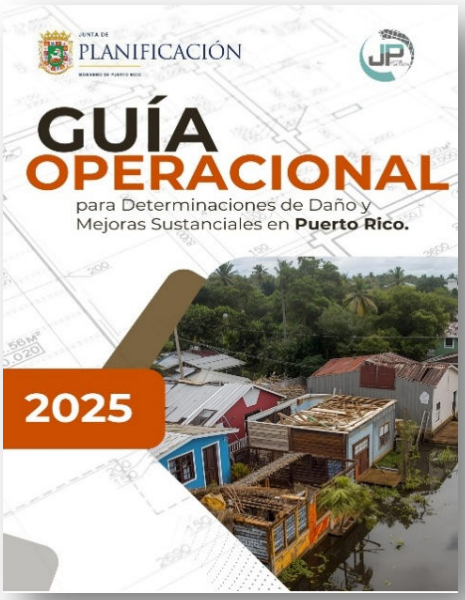


Figure 28: Operational Guidelines Cover

The Floodplain Administrator or the Participating Community may review, require, and audit permits in accordance with the provisions of Act No. 3 of September 27, 1961, known as the "Floodplain Building Control Act"; Act No. 75, the "Puerto Rico Planning Board Organic Act"; Act No. 161 of December 1, 2009, as amended, the "Puerto Rico Permit Process Reform Act"; and Act No. 38 of June 30, 2017, the "Uniform Administrative Procedure Act of the Government," as amended, and in compliance with the regulations of the National Flood Insurance Program (NFIP) of the Federal Emergency Management Agency (FEMA), Title 44 of the Code of Federal Regulations (CFR), Part 60.3 [d, e, and Subpart B], and its related sections.

As of the effective date of this guidance, an evaluation of substantial damage or substantial improvement will be required as part of the permitting requirements in Special Flood Hazard Areas. The Floodplain Administrator will require that both new structures and substantial improvements be constructed in a manner that minimizes or prevents damage during a regulatory flood.

4.15.10 Green Infrastructure and Nature Based Solutions

Section 502 of the United States Clean Water Act defines green infrastructure as the range of measures that use plant or soil systems, permeable pavement or other permeable surfaces or substrates, stormwater harvesting and reuse, or landscaping to store, infiltrate, or evapotranspiration stormwater and reduce flows to sewer systems or surface waters.

Green infrastructure is a cost-effective and resilient approach to managing wet weather impacts that provide many benefits to the community. While conventional single-purpose gray stormwater infrastructure (such as pipe drainage and water treatment systems) is designed to move urban stormwater away from the built

environment, green infrastructure reduces and treats stormwater at its source while providing environmental, social, and economic benefits.

Stormwater runoff is a major cause of water pollution in urban areas. When it rains on rooftops, streets, and parking lots in cities and suburbs, the water cannot soak into the ground as naturally would. Instead, stormwater drains through gutters, storm sewers, and other collection systems and is discharged into nearby water bodies. This runoff carries trash, bacteria, heavy metals, and other pollutants from the urban landscape. Higher flows resulting from heavy rainfall can also cause erosion and flooding in urban streams, damaging the environment, property, and infrastructure.

When rain falls in undeveloped natural areas, the water is absorbed and filtered by soil and vegetation. Stormwater runoff is cleaner and less problematic. Green infrastructure uses vegetation, soils, and other elements and practices to restore some of the natural processes needed to manage water and create healthier urban environments. At the municipal scale, green infrastructure is a network of natural areas that provide habitat, flood protection, cleaner air, and cleaner water. At the neighborhood, development, or sector scale, managing stormwater systems in a way that mimics natural processes help absorb and store runoff that can otherwise cause localized flooding (EPA, 2019).

Some green infrastructure measures that may be considered to mitigate flooding problems include:

- Rainwater harvesting
- Rain gardens (bio-retention/bio-infiltration)
- Urban rain gardens (“planter boxes”)
- Bioswales
- Porous pavements
- Green streets
- Green parking lots
- Green roofs
- Land conservation
- Creation or maintenance of urban tree canopy
- Wetland restoration
- Riparian area rehabilitation
-

The Municipality will consider green infrastructures measures when developing or championing flood control measures with the state or the federal government. In

addition to flood control, green infrastructure provides benefits such as improved water quality, enhanced water supply, reduced stormwater management costs (public and private), improved habitat quality, increased spaces for recreation and physical activity, job creation in the maintenance of natural areas, and increased property values (EPA, 2019).

4.15.11 Four – Year Investment Program

The Four-Year Investment Program 2025–2026 to 2028–2029 (hereinafter, the PICA) is a short- and medium-term planning instrument designed to guide, coordinate, and direct public investments during the period it covers. Through this instrument, the Planning Board integrates the efforts of various government entities aimed at improving the quality of life of the people of Puerto Rico, in line with established public policies.

The Framework of Reference for the Four-Year Investment Program for the period 2025–2026 to 2028–2029 guides agencies and public corporations in preparing their investment and capital improvement programs. The framework includes a demographic and socioeconomic profile of Puerto Rico as a whole and by regional organization, a diagnosis of the recent performance of the economy, and information on development patterns and priority projects for the competitive Puerto Rico to which all aspire.

The full PICA document for the 2025–2026 to 2028–2029 period incorporates all information on capital improvement projects to be carried out by government entities. It includes a detailed analysis of the distribution of recommended resources by program areas and the origin of those resources. This analysis is the result of an integration process designed to guide budget recommendations formulated by the Office of Management and Budget regarding the Annual Capital Improvements Program included in Puerto Rico's budget.

This program serves as a short- and medium-term planning tool to guide, coordinate, and direct public investments during its period of effectiveness. It uses Puerto Rico's demographic and socioeconomic profile, along with a regional analysis as established by the Planning Board (JP, 2026).

With respect to the municipality's Hazard Mitigation Plan, the PICA is used to integrate information on the current performance of Puerto Rico's economy, including data on public debt and development trends, as well as projects designated as priorities for implementation on the Island. Within this framework, the PICA provides municipalities

with information from government entities regarding funding allocations and investments in improvements they are responsible for implementing, which contribute to municipal efforts to mitigate natural hazards.

As part of the projects influencing all Functional Areas of Puerto Rico, the review of municipal Mitigation Plans is included. The Planning Board was designated by the Government Authorized Representative (GAR) as the agency responsible for reviewing and developing Hazard Mitigation Plans in coordination with the 78 municipalities.

5. Municipal Capacities

5.1 Regulatory and Planning Mechanism (C1-a)

These capabilities refer to the legal provisions that influence land use to manage economic growth and that could support the municipality in its efforts to mitigate the vulnerability of its communities and resources to natural hazards. The municipality identified existing regulations and planning documents that could support its actions, as well as opportunities to promote the development of studies or plans for the same purpose of advancing its mitigation goals. These regulatory and planning tools are described in Section 4.18

5.2 Technical and Administrative Capacities (C1-a)

The Municipality of Jayuya is staffed to implement this LHMP. The Municipality has a Municipal Emergency Management Office and Municipal Public works Office . Copy of this organigram can be found as part of Appendix E.

Table 34 shows the Municipality's Technical and Administrative Capacity

Table 34: Municipal Technical and Administrative Human Resources

Personnel Team / Resources	Yes	No	Future Positions	Department or Agency	Opportunities to Integrate into LHMP	Comments
Planners with experience in land use and mitigation		X	Internal resources	N/A	N/A	Currently the municipality does not have a planning office, it is contracted as professional service as needed.

Personnel Team / Resources	Yes	No	Future Positions	Department or Agency	Opportunities to Integrate into LHMP	Comments
Engineers or professionals trained in construction practices related to buildings and infrastructure		X	Through contract services if needed	N/A	N/A	Currently the municipality does not have this staff. If the need arises this position will be procured by external professional services.
Planners or engineers with a broad understanding of natural hazards		X	Through contract services if needed	N/A	N/A	Currently the municipality has limited staff. If the need arises this position will be procured by external professional services.
Emergency Manager	X		Director of the Municipal Emergency Management Office	Municipal Emergency Management Office, Department of Public Safety	The LHMP may be used to update the EOP	None
Scientist familiar with natural hazards		X	Through contract services if needed	University of Puerto Rico, Puerto Rico Seismic Network, other universities in Puerto Rico	N/A	Currently the municipality does not have this staff. If the need arises this position will be procured by external professional services.

Personnel Team / Resources	Yes	No	Future Positions	Department or Agency	Opportunities to Integrate into LHMP	Comments
Personnel with expertise or education regarding the vulnerabilities and natural hazards affecting the community	X		Disaster Recovery Office	N/A	N/A	Currently the municipality has limited staff. If additional need arises this position will be procured by external professional services.
Resource development staff or grant writers		X	Director of Municipal Federal Programs, and contracted	Municipal Federal Programs Office	This staff may write and administer grants to cover the mitigation strategies mentioned below.	N/A

5.3 Financial Capacity (C1-a)

The Municipality has track record administrating federal funds from various funding streams and has a dedicated office to administer and supervise the use of federal funds, and when any finding has been identified by grant – providers it has been addressed and corrected.

5.3.1 FEMA Funding Streams

For hazard mitigation projects the municipality has identified the following FEMA – administered possible funding streams which it could draw from.

Stafford Act - Section 404

Section 404 refers to Section 404 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, which authorizes the Hazard Mitigation Grant Program (HMGP), administered by FEMA. Its primary purpose is to reduce future disaster losses

by funding long-term mitigation projects after a major disaster is declared.

Under Section 404, funding is made available to states, territories, tribes, and local governments to implement mitigation measures that lessen the impacts of future hazards such as floods, earthquakes, hurricanes, wildfires, and droughts. Unlike Section 406, Section 404 projects do not have to be tied to facilities that were damaged by the declared disaster. This allows communities to take a proactive approach by investing in mitigation actions that address known risks before damage occurs.

Eligible projects under Section 404 may include activities such as elevation or acquisition of flood-prone structures, drainage improvements, seismic retrofits, safe rooms, wildfire mitigation measures, and hazard mitigation planning. Projects must be cost-effective, technically feasible, and consistent with an approved Hazard Mitigation Plan. The program typically provides up to 75 percent federal funding, with the remaining share provided by non-federal sources.

Under Section 404 is also the Hazard Mitigation Grant Program (HMGP) that can support plan development, data collection, risk assessments, and engagement activities required to maintain FEMA approval following a presidential disaster declaration.

Stafford Act – Section 406

Section 406 of the Stafford Act supports mitigation projects by allowing hazard-mitigation measures to be incorporated directly into the repair or replacement of public facilities damaged during a declared disaster. This provision enables communities to strengthen damaged infrastructure against future hazards, such as elevating flood-damaged buildings, reinforcing structures to withstand high winds, or improving drainage systems during repairs. Mitigation measures funded under Section 406 must be cost-effective and directly related to the damaged facility. By integrating mitigation into recovery activities, Section 406 helps reduce the likelihood of repetitive damage and future repair costs. Overall, it ensures that rebuilding efforts contribute to long-term resilience rather than simply restoring pre-disaster conditions.

Stafford Act - Section 428

Section 428 of the Stafford Act can support mitigation projects by allowing

communities to integrate hazard-resilient and risk-reduction measures directly into disaster recovery projects funded through FEMA's Public Assistance Program. Through its alternative procedures, Section 428 enables flexible project design, fixed-cost funding, and consolidation of damaged facilities, making it easier to incorporate mitigation improvements such as relocation, elevation, floodproofing, or structural hardening. Applicants may also reinvest cost savings from efficiently managed projects into additional mitigation features, as long as project objectives are met. By emphasizing outcomes rather than strict cost reimbursement, Section 428 encourages rebuilding that reduces future risk rather than simply restoring pre-disaster conditions. This approach allows mitigation to become an integral part of recovery, strengthening resilience and reducing the likelihood of repetitive losses.

Flood Mitigation Assistance Program

The Flood Mitigation Assistance (FMA) Program reduces flood hazards by providing funding to help communities identify and implement measures that lessen long-term flood risk to National Flood Insurance Program (NFIP)insured properties. The program focuses on projects such as elevating, acquiring, relocating, or floodproofing flood-prone structures, with particular priority given to repetitive loss and severe repetitive loss properties. By mitigating flood damage before disasters occur, FMA helps protect lives and property, reduces future flood insurance claims, and lowers the overall cost of disaster assistance. The program encourages proactive risk reduction by aligning mitigation investments with floodplain management and local hazard mitigation planning.

Stafford Act – Section 203 (BRIC)

The Building Resilient Infrastructure and Communities (BRIC) program supports mitigation projects by providing pre-disaster funding to help communities reduce risks from natural hazards before disasters occur. Administered by FEMA, BRIC focuses on long-term, cost-effective investments that enhance the resilience of critical infrastructure, lifelines, and communities. The program funds activities such as infrastructure retrofits, flood control projects, seismic upgrades, and nature-based solutions, as well as hazard mitigation planning and capacity building. BRIC emphasizes innovative, large-scale projects that address multiple hazards and provide measurable community benefits. By investing in mitigation prior to disasters, the BRIC program helps protect lives and property, reduce future disaster costs, and support more resilient and sustainable development.

5.3.2 Non-FEMA Federal Funding Streams

Non-FEMA federal Funding Streams can include:[18]

CDBG-DR

The Department of Housing and Urban Development's Community Development Block Grant–Disaster Recovery (CDBG-DR) program can fund hazard mitigation planning and projects by supporting activities that reduce long-term disaster risk and address unmet recovery needs following a major disaster. CDBG-DR funds may be used to develop or update hazard mitigation plans, conduct risk assessments, and support resilience and mitigation planning efforts that guide future investments. In addition, the program can finance mitigation projects such as drainage improvements, flood control infrastructure, elevation or acquisition of flood-prone properties, utility hardening, and other measures that reduce vulnerability to natural hazards. Unlike some recovery programs, CDBG-DR allows communities to target mitigation actions even if facilities were not damaged in the most recent disaster, as long as the activities address identified risks.

CDBG-MIT

The Department of Housing and Urban Development's Community Development Block Grant–Mitigation (CDBG-MIT) program supports hazard mitigation planning and projects by providing federal funding specifically dedicated to reducing future disaster risks in communities that have experienced major disasters. CDBG-MIT funds can be used for mitigation planning activities such as risk assessments, data analysis, and development of strategies that guide long-term resilience investments. The program also finances a wide range of mitigation projects, including flood risk reduction, stormwater management, wildfire mitigation, resilient infrastructure upgrades, and nature-based solutions. CDBG-MIT emphasizes addressing identified vulnerabilities and repetitive loss areas, even if they were not directly damaged in a recent disaster. By focusing on forward-looking risk reduction, the program helps communities proactively adapt to climate impacts and future hazards. Overall, CDBG-MIT integrates mitigation into long-term recovery and development efforts, strengthening community resilience and reducing future disaster losses.

It should be noted that CDBG-DR and CDBG-MIT differ primarily in their purpose and

[18] Please note that the following list is not intended to be exhaustive.

how they support hazard mitigation planning and projects. CDBG-DR focuses on post-disaster recovery, with mitigation activities integrated into rebuilding efforts to address unmet needs and reduce future risk as communities recover. Under CDBG-DR, mitigation planning and projects must be closely tied to disaster recovery goals and justified by disaster impacts or recovery assessments. In contrast, CDBG-MIT is specifically dedicated to hazard mitigation and long-term risk reduction, allowing communities to fund mitigation planning and projects even if areas or facilities were not damaged in the most recent disaster.

Resilience and Emergency Relief Programs

The Federal Highway Administration (FHWA) Resilience and Emergency Relief Programs support Hazard Mitigation Plans by promoting the identification and reduction of risks to transportation infrastructure from natural hazards. Through the Emergency Relief Program, FHWA allows mitigation and resilience measures—such as improved drainage, roadway elevation, and bridge reinforcement—to be incorporated into post-disaster repairs. FHWA resilience initiatives also encourage vulnerability assessments and risk-based planning that align with the risk assessment and mitigation strategy components of FEMA-approved HMPs. By integrating hazard mitigation and climate resilience into transportation planning, these programs help ensure that roads and bridges are addressed as critical lifelines. Overall, FHWA programs complement Hazard Mitigation Plans by supporting transportation-focused mitigation actions that reduce future disruption and repair costs.

National Resource Conservation Service

The Environmental Quality Incentives Program (EQIP) and the Watershed and Flood Prevention Operations (WFPO) program support hazard mitigation projects by addressing risks at the landscape and watershed scale through conservation and infrastructure improvements. EQIP, administered by the USDA Natural Resources Conservation Service (NRCS), provides financial and technical assistance to landowners to implement conservation practices that reduce erosion, manage runoff, improve soil health, and mitigate risks from flooding, drought, and wildfires. These practices—such as vegetation management, streambank stabilization, and water retention—help lessen downstream flood impacts and enhance resilience to climate variability. The Watershed and Flood Prevention Operations program support larger-scale mitigation through structural and non-structural measures, including small dams, floodwater retarding structures, channel improvements, and watershed planning. Together, these programs reduce hazard exposure upstream, protect

communities and infrastructure downstream, and integrating natural resource management into long-term flood and drought mitigation strategies.

5.3.3 Local Funds

The Municipality of Jayuya, like other municipalities in Puerto Rico, receives revenue from the Municipal Revenue Collection Center (MRCC). Other funding sources include revenue from the Sales and Use Tax (IVU, by its Spanish acronym), legislative funds that might be assigned from time to time and other sources. Depending on the state of municipal finances, the municipality might determine that there are some funds that can be used to pay for or cover local funds match for mitigation projects.

However, most major capital improvement projects depend on federal funds transfers. The use of federal funds varies widely from year to year. In some cases, these funds are used to cover costs associated with the creation and monitoring of specific programs (for example, Section 8 or housing programs). In other cases, the funds are used to finance major capital improvement projects.

5.4 Outreach and Communications Capacity (C1-a)

Building robust outreach and communication capacity is essential to the successful implementation of a Hazard Mitigation Plan, as effective risk communication enables residents to recognize their risks, actively participate in planning processes, and make informed decisions to reduce potential impacts. FEMA guidance underscores the importance of early and thoughtfully designed engagement strategies to ensure that key stakeholders exchange information at the right time, promoting shared awareness of hazards and broad support for mitigation actions. Communication is a fundamental preparedness capability because it provides timely, practical information that helps individuals and communities act to limit harm. Research further demonstrates that outreach efforts are most successful when messages are clearly defined, customized for specific audiences, and conveyed through trusted sources. Communities that prioritize outreach—by collaborating with local leaders, leveraging a variety of communication channels, and tailoring messages to different population groups—tend to achieve higher public involvement and more effectively incorporate community feedback into hazard mitigation planning. These practices ultimately contribute to more effective plans and more resilient communities (FEMA, 2025).

The Municipality demonstrates adequate capacity to conduct effective outreach and

communication activities. The Municipal Emergency Management Office is responsible for coordinating these efforts, and an organizational chart for this office is provided in Appendix E. The Municipality utilizes both social media platforms for real-time communication and traditional methods to disseminate information to the public..

Table 35 details the communication tools available to the municipality.

Table 35: Outreach and Communications Tools

Tool or resource	Present or not present	Description	Agency in Charge
Municipal Social Media	X	Facebook Page	Mayor's Office
Planning Board Print Material	X	Print Material regarding hazard mitigation, focused on flood hazard	Puerto Rico Planning Board
Community Meetings	X	Community Outreach Meeting to reach people that do not have access to social media	Various

5.5 Capacity Development (C1-b)

Strengthening institutional and technical capacity is vital to the successful implementation of a Hazard Mitigation Plan, as communities must have the expertise, resources, and organizational frameworks needed to move from planning to sustained risk-reduction actions. FEMA guidance stresses that effective mitigation planning relies on well-coordinated teams, access to reliable technical data, and the ability to collaborate across agencies and stakeholders—all of which directly affect the execution of mitigation strategies. National evaluations have shown that local and state governments often face challenges in implementing mitigation projects not due to a lack of commitment, but because of limited technical assistance, constrained administrative capacity, and insufficient engagement with federal support programs. Studies focused on low-capacity communities further demonstrate that gaps in technical knowledge, training, and leadership involvement can significantly hinder mitigation outcomes. These findings highlight the importance of strengthening workforce skills, enhancing guidance and tools, and reinforcing institutional support to achieve long-term resilience.

The Municipality continues to enhance its mitigation capacity by retaining qualified professionals as staff or contractors as needs arise. It also actively participates in training and continuing education opportunities offered through Commonwealth agencies and academic institutions to build and maintain the technical and institutional expertise necessary to support hazard mitigation efforts.

6. Mitigation Action Plan

The goals, objectives, and mitigation actions outlined in this Plan are based on discussions held by the designated Mitigation Plan Committee, as well as the public-participation activities conducted to date.

6.1 Mitigation Strategies Requirements

Federal regulation 44 C.F.R. § 201.6(c)(3) establishes the requirements related to the mitigation strategy for local mitigation plans.
The Plan must include the following:

- A mitigation strategy that provides the jurisdiction with a framework to reduce potential losses identified in the risk assessment, based on existing authorities, policies, programs, and resources, along with its capacity to expand and improve existing tools.

This section must include:

- A description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.
- A section identifying and analyzing a comprehensive range of specific mitigation actions and projects is being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings, as well as infrastructure.
- A description of the jurisdiction's participation in the NFIP (National Flood Insurance Program) and compliance with NFIP requirements, as appropriate; and finally,
- An action plan describing how the identified actions will be prioritized, implemented, and administered by the local jurisdiction. The prioritization must include a special emphasis on how benefits are maximized, based on a cost-benefit review of the proposed projects, along with their associated costs.

6.2 Mitigation Goals and Objectives(C3-a)

6.2.1 Municipal Goals and Objectives

The Municipality of Jayuya adopts the following goals and objectives as part of their mitigation efforts. These Mitigation goals and objectives express the Municipality of Jayuya's commitment to protecting its residents and infrastructure, reducing response and recovery costs in the event of a disaster, and minimizing disruptions to normal daily activities afterward.

Goal 1: Protect Life, Health, and Public Safety

Protect the lives, health, and safety of Jayuya's residents by reducing vulnerability to natural hazards through proactive mitigation, preparedness, response, and recovery measures.

Objectives:

1. Reduce risks to life and public safety by implementing mitigation measures that address flooding, landslides, tropical cyclones, earthquakes, extreme heat, and other natural hazards affecting the municipality.

2. Strengthen public awareness and preparedness through community education, training programs, emergency exercises, and outreach initiatives focused on hazard mitigation and disaster resilience.

3. Enhance coordination among municipal, Commonwealth, and federal agencies to support effective disaster preparedness, response, and recovery efforts.

4. Improve the municipality's ability to protect vulnerable populations before, during, and after hazard events.

Goal 2: Reduce Damage to Property and Infrastructure

Minimize damage to public and private property, critical facilities, infrastructure systems, and community assets from identified natural hazards.

Objectives:

1. Reduce damage to residential, commercial, industrial, agricultural, and public-sector properties through structural and non-structural mitigation projects.
2. Protect critical facilities and infrastructure from hazard-related damage through risk-informed investments and mitigation measures.
3. Reduce disruptions to transportation networks, utilities, water systems, and public services caused by natural hazards.
4. Prioritize and implement projects that reduce economic losses associated with identified hazards.

Goal 3: Strengthen Community Resilience

Promote a resilient, informed, and prepared community through public education, outreach, training, and stakeholder engagement.

Objectives:

1. Expand community participation in hazard mitigation planning and preparedness activities.
2. Increase collaboration among businesses, nonprofit organizations, educational institutions, community groups, and residents to improve local resilience.
3. Promote community-based preparedness initiatives that strengthen self-sufficiency during disasters.
4. Foster awareness of hazard risks and mitigation opportunities among residents and stakeholders.

Goal 4: Support Resilient Future Development

Incorporate hazard mitigation principles into land use planning, development decisions, capital improvements, and infrastructure investments to reduce future risk.

Objectives:

1. Integrate hazard mitigation considerations into land use planning, permitting, zoning, and development review processes.

2. Reduce the vulnerability of future public and private investments by promoting compliance with current building codes, engineering standards, and resilient construction practices.

3. Encourage development patterns that minimize exposure to flooding, landslides, extreme heat, and other identified hazards.

4. Incorporate risk reduction and resilience principles into municipal capital improvement planning.

Goal 5: Protect Natural and Environmental Resources

Preserve and enhance natural systems and environmental resources that contribute to hazard mitigation, ecosystem protection, and long-term community sustainability.

Objectives:

1. Protect watersheds, floodplains, forests, slopes, and environmentally sensitive areas that provide natural hazard mitigation benefits.

2. Reduce environmental degradation that may increase vulnerability to flooding, landslides, erosion, and extreme heat.

3. Promote sustainable land management practices that enhance community resilience and environmental stewardship.

4. Incorporate nature-based solutions into future mitigation projects whenever feasible.

Goal 6: Strengthen Community Lifelines and Continuity of Operations

Enhance the resilience and continuity of essential services, critical infrastructure, and municipal operations before, during, and after hazard events.

Objectives:

1. Protect and strengthen FEMA Community Lifelines, including Safety and Security, Food, Hydration and Shelter, Health and Medical, Energy, Water Systems, Communications, and Transportation.

2. Improve continuity-of-operations planning for municipal facilities and essential services.

3. Develop, update, and maintain policies, procedures, and interagency agreements that support rapid service restoration following disasters.

4. Improve post-disaster recovery capabilities and reduce downtime of essential facilities and infrastructure.

6.2.2 National Mitigation Investment Strategy

The Municipality also adopts the National Mitigation Investment Strategy and the following goals.

- Goal 1: Show How Mitigation Investments Reduce Risk - The whole community will build a shared understanding of mitigation investment and its value. Specifically, the whole community will understand how effective mitigation investments can protect people, homes, neighborhoods, cultural and historic resources, ecosystems and lifelines (for example, communications, energy, transportation and water). The federal government and its non-federal partners will create a shared vocabulary and common measures to communicate information about risk and find opportunities to educate, hire, train and develop a base of qualified mitigation professionals.
- Goal 2: Coordinate Mitigation Investments to Reduce Risk - The whole community will coordinate mitigation investments through shared risk information, reinforced strategies for risk reduction, and easier access to existing funding. Such coordination will help the whole community justify mitigation investments and choose the most cost-effective and reasonable actions.
- Goal 3: Make Mitigation Investment Standard Practice The whole community will factor mitigation into investment decisions, especially for buildings and infrastructure. The federal government and its non-federal partners will use and expand financial products and approaches for mitigation investment, including funding, incentives and financial risk transfer opportunities. The federal government and its non-federal partners also will make mitigation standard professional practice critical to safeguarding lifelines, services, and national safety and security.

6.3 Mitigation Strategy Selection Criteria

The following methodologies were used to select the mitigation actions:

- The Planning Committee reviewed mitigation actions from the previous Mitigation Plan.
- The Committee evaluated those actions and determined which ones were appropriate to include in the current Plan. Actions were excluded if:
    - The measure had already been implemented during the previous plan's period and was not a recurring or ongoing action.
    - The measure was no longer necessary or useful based on new information. This applies to mitigation actions linked to identified hazards, risks, and vulnerabilities.
- The Committee considered the Letters of Intent (LOIs) submitted by the municipality to COR3 in 2019 to participate in the Hazard Mitigation Grant Program. These projects were incorporated into the current Plan, ensuring no duplication of projects included in the previous Plan.
- The Planning Committee revised the Puerto Rico 2026 State Hazard Mitigation Plan during the preparation of this LHMP update. Risk profiles, state capabilities, mitigation goals, and relevant state actions were considered during the risk assessment, capacity assessment, and development of the municipal mitigation strategy.
- Committee members evaluated and added new measures. These new actions were proposed based on the Committee members' professional experience and suggestions received from community members.

The mitigation strategies of the Municipality of Jayuya were evaluated by the Committee using the STAPLEE tool. This tool provides the selection criteria used to assess the projects included in the preceding section. The technique applies to seven evaluation criteria:

- S – Social: The proposed action must be socially acceptable.
- T – Technical: The proposed action must be technically feasible.
- A – Administrative: The community must have the capacity to implement the action (for example, determining whether the responsible agency is capable of supervising the mitigation project).
- P – Political: Mitigation actions must be politically acceptable.
- L – Legal: The community must have the authority to implement the proposed action.

- E – Economic: Economic considerations must include the current economic base, projected growth, and opportunity costs.
- E – Environmental: The environmental impact must be considered, given statutory requirements and the public's interest in maintaining sustainable and environmentally healthy communities.

6.4 Mitigation Strategy Categorization

The 2025 Local Hazard Mitigation Planning Handbook established the following categorization:

- Local Planning and Regulations (LP)– These activities aim to keep hazards from creating or worsening problems. These actions are typically carried out through government programs or regulatory measures that guide land-use development and building practices. Prevention is especially effective for reducing future vulnerability in areas that have not yet been developed. Examples include:
  - Planning and zoning
  - Building codes
  - Open-space preservation
  - Floodplain regulations
  - Stormwater management regulations
  - Maintenance of drainage systems
  - Capital improvement programming
  - Riverbank realignment
  - Projects addressing fault zones

  In the tables below. This category will be identified with the code LP

- Structure and Infrastructure Projects – These actions involve modifying existing structures and infrastructures to protect them from a hazard or remove them from a hazard area. This could also apply to public or private structures as well as critical facilities and infrastructure. Since these are the bulk of the strategies presented in this LHMP, the municipality has made the decision to subdivide these types of projects into two subcategories:

- Property Protection – Those that will harden and strengthen existing facilities. In the tables below. This category will be identified with the code PP.

- Structural Improvements – Those that entail new construction efforts. In the tables below. This category will be identified with the code SI.

- Natural resource protection – activities reduce the impact of natural disasters by preserving or restoring natural areas that offer protective benefits. These areas include flood plains, wetlands, steep slopes, and sand dunes. Parks, recreational agencies, and conservation organizations commonly implement measures such as:

  - Flood protection
  - Watershed management
  - Riparian buffers
  - Forest and vegetation management (including wildfire and fuel-load control)
  - Erosion and sediment control
  - Wetland preservation and restoration
  - Habitat preservation
  - Slope stabilization

  In the tables below. This category will be identified with the code NR

- Education and awareness programs- Efforts to help inform residents, elected officials, business owners, homebuyers, and visitors about hazard-prone areas and mitigation techniques they can use to protect themselves and their property. Examples include:

  - Outreach projects
  - Demonstration events and guest presentations
  - Hazard information materials
  - Property-specific risk information
  - Library materials
  - Educational programs for children
  - Exposure to risk-related information

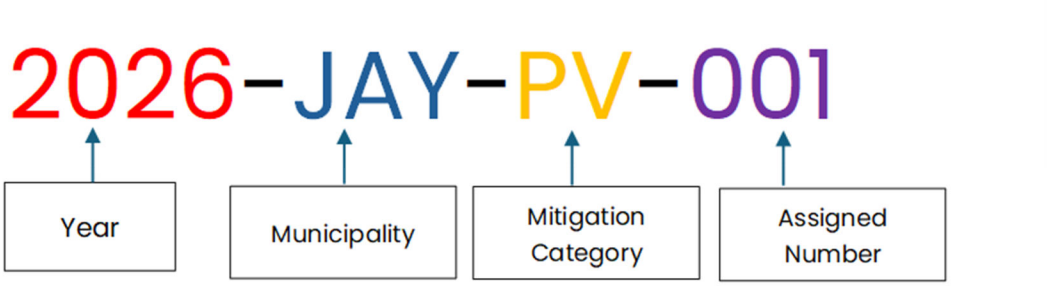
In the tables below. This category will be identified with the code EA

Though not hazard mitigation actions per se, the municipality deems it necessary to also record those projects that are related to emergency services in this LHMP. These will be identified with the code ES. In this sense the interaction between the LHMP and the yearly updated EOP can be streamlined and cross-referenced.

6.5 Mitigation Strategies (C4-a, C4-b, C5-a, C5-b, E2.b)

To improve tracking and updating each mitigation strategy has been given a unique id. The following figure shows the meaning of the nomenclature.

Figure 29: Unique ID Nomenclature



Each identified mitigation strategy shall include:

- New 2026 Mitigation ID
- Old 2020 ID if applicable
- Description
- Mitigated hazard(s): If a mitigation action is applicable to all hazards it will be identified by the word "all"
- Priority of the strategy according to the planning committee
- Assigned FEMA Lifelines
- Municipal Office in charge of execution
- Possible funding sources
- Estimated budget
- Implementation Horizon: For this LHMP horizon time frames are as follows:

    - Immediate: Any action that will be executed in a period of one year or less.
    - Short – Term: Any action that will be executed in a period of two to three

years.
    - Mid – Term: Any action that will be executed in a period of four to five years.
    - Long – Term: Any action that will be executed in a period beyond five years.
    - Note: Should funding for a specific strategy become available, the municipality may execute it even if it is not in the assigned time horizon.

- Current status and expected benefits

Strategies from the 2020 LHMP that are no longer needed will be identified by in order to flag them to be not included in the 2031 LHMP update.

Table 36: Mitigation Strategies-Prevention

2026 ID	2020 ID	Description	Hazard	Priority	Lifeline	Municipal Office in Charge	Possible Sources of Funds	Implementation term	Status
2026-JAY-LP-001	1	Review, analysis and implementation of ordinance (Law) to restrict development in risk areas or zones.	Landslide and Flood	Medium	All	Leader: Edilberto Santiago Support: Adrián A. Bennett Planning Office	Municipality of Jayuya Operational Funds, Federal and State Funds.	Short Term	Current Status: In Continuous Execution –. The municipality of Jayuya has just completed the public hearings to complete the Comprehensive Review of the Land Use Plan for the municipality where this aspect and the restrictive use in risk areas are addressed. Benefits: Within these benefits, the delimitation of the urban area changes by adding additional areas, this results in benefits for any improvement in said area (repair of sidewalks, curbing, among others. In addition: Reduces the exposure of people and structures to natural hazards; Promotes orderly and resilient development; Facilitates compliance with state and federal regulations.
2026-JAY-LP-002	2	Creation of the position of permanent Mitigation Officer which will ensure compliance, analysis, orientation and review of the developments to be carried out in the Municipality.	All	Medium	All	Leader: Edilberto Santiago Negrón Support: Planning Office	Operational Funds, Federal and State Funds.	Immediate	Current Status: In Execution The municipality continues to evaluate alternatives to formalize the functions of Mitigation Officer and strengthen the coordination of mitigation initiatives. Benefits: This results in the supervision and execution of compliance with the land use plan and its uses; Strengthens compliance with the Mitigation Plan; Improves interagency coordination; Facilitates the identification of financing opportunities.

2026 ID	2020 ID	Description	Hazard	Priority	Lifeline	Municipal Office in Charge	Possible Sources of Funds	Implementation term	Status
2026-JAY-LP-003	3	Inter-agency coordination for the programmatic creation of a plan for maintenance of identification of causes of damage in the Municipality (state jurisdiction).	All	Medium	All	Leader Edilberto Santiago Negrón	Operational Funds, Federal and State Funds.	Short Term	Current Status: In Continuous Execution – The Municipality maintains efforts to continue to develop the strategies and activities included in the Mitigation Plan through coordination efforts with state and federal agencies to identify conditions that increase vulnerability to natural hazards. Benefits: These processes avoid duplication of efforts; maximize existing resources; improve municipal response capacity.
2026-JAY-LP-004	4	Identification of Federal and State funds and resources for mitigation projects related to the control and management of waters within the jurisdiction (rainwater and natural runoff, reservoirs and others).	Floods, Tropical Cyclones and Landslides	High	Water Systems	Leader Edilberto Santiago Negrón	Municipality of Jayuya Operational Funds, Federal and State Funds.	Immediate	Current Status: In Continuous Execution – The municipality continues to develop and manage projects aimed at flood control, storm drainage, and infrastructure stabilization. Various mitigation projects and 428 are being carried out to impact these situations. About 90% of projects in progress through reconstruction and mitigation funds About $378 million in projects are under development to mitigate stormwater and other transportation infrastructure. Benefits: This results in continuity and improvements of our accesses benefiting our highways and roads, as well as benefits to our population; protects critical infrastructure; improves mobility and community connectivity.

2026 ID	2020 ID	Description	Hazard	Priority	Lifeline	Municipal Office in Charge	Possible Sources of Funds	Implementation term	Status
2026-JAY-LP-005	5	Implementation and application of public policy through the Territorial Planning Plan.	Flooding	High	Water Systems	Leader Edilberto Santiago Negrón	Operational Funds, Federal and State Funds.	Immediate	Current Status: In Continuous Execution – The municipality completed the public hearings of the Comprehensive Review of the Land Use Plan to strengthen land use management and risk reduction. Benefit: This guarantees the good use of our resources, as well as the protection of our environment, thus protecting our existing forests and bodies of water; reduces occupation of vulnerable areas; strengthens municipal planning.
2026-JAY-LP-006	6	The City and its agencies will actively participate in the effort to implement land use controls to prohibit the development of illegal structures in flood-prone areas pursuant to the Special Flood Risk Areas Regulation, better known as Planning Regulation #13, as amended and Joint Regulation (ZR)	Flooding	High	Water Systems	Leader Edilberto Santiago Negrón Support: Municipal Planning/Public Works Office	Municipality of Jayuya/ Operational Funds, Federal and State Funds.	Immediate	Current Status: In Continuous Execution – The City maintains the application of development controls in accordance with Planning Regulation No. 13 and the Joint Regulations and close coordination with state agencies empowered to implement these controls. Benefit: Provide safe areas to prevent any damage and flooding; Reduces damage to future structures; Protects life and property; Strengthens compliance with the NFIP.

Table 37: Mitigation Strategies-Property Protection

2026 ID	2020 ID	Description	Hazard	Priority	Lifeline	Municipal Office in Charge	Possible Sources of Funds	Implementation term	Status
2026-JAY-PP-001	7	Identification of any structure that can be mitigated while maintaining cost-effective mitigation (improvements to the structure from wood to concrete and others). Census of vulnerability of housing infrastructure to identify public needs and obstacles. Annex 1	All	High	Food, Hydration and Shelter	Office of Planning/Office of Municipal Emergency Management, Rebuilding Project Manager	Operational Funds, Federal and State Funds.	Short Term	Current Status: In Continuous Execution – The municipality of Jayuya submitted proposals for some measures, but the funds were not approved. The municipality completed efforts to identify vulnerable structures through censuses and inspections carried out by Emergency Management personnel to prioritize mitigation measures and attention to public nuisances. Qualitative benefits: Identify vulnerabilities that improve the lives and property of residents who are in structures with unsafe conditions; The information collected based on the census gives us the space to act and be able to help our citizens in a more agile and faster way by providing security and stability to them.

2026 ID	2020 ID	Description	Hazard	Priority	Lifeline	Municipal Office in Charge	Possible Sources of Funds	Implementation term	Status
2026-JAY-PP-002	8	Implement the IBC Building Codes for compliance in future projects to be developed by the Municipality.	Flood and Earthquakes	High	Food, Hydration and Shelter	Leader: Edilberto Santiago Negrón Support: Adrián A. Bennett Office of Planning, Office of Recovery Projects	Operational Funds, Federal and State Funds.	Immediate	Current Status: In Continuous Execution The municipality requires the application of current building codes in projects financed with municipal, state and federal funds. All projects with federal, state or municipal funds are required to comply with building codes, an essential part of the endorsements made by municipalities. Benefits: Improves structural resilience; Reduces damage from earthquakes and floods; Strengthens regulatory compliance.
2026-JAY-PP-003	9	Improvements to wood, concrete and other structures in accordance with current building codes so that they are earthquake-resistant and withstand the onslaught of strong winds.	Earthquakes and Tropical Cyclones	High	Security	Leader Edilberto Santiago Negrón Support Planning Office	Operational Funds, Federal and State Funds.	Medium Term	Current Status: In Continuous Execution – Both federal, state and non-profit foundation funds are used. Structural improvements, roof replacement, and construction reinforcements were made in residences identified as vulnerable. More than 90 residences were identified that have been made pertinent improvements in the restoration of roofs and structures, as well as anchoring in compliance with building codes. Benefits: This strategy will provide safety, well-being to these structures and reduce the risk of loss of life and property to these residents in the face of natural hazards.

2026 ID	2020 ID	Description	Hazard	Priority	Lifeline	Municipal Office in Charge	Possible Sources of Funds	Implementation term	Status
2026-JAY-PP-004	10	Development of terraces to prevent landslides in areas of the municipality susceptible to this natural hazard. For example: Bo. Coabey, Coabey River Sector.	Landslide	High	Food, Hydration and Shelter	Leader: Adrian A. Bennett Rodriguez Support: Office of Reconstruction and Recovery	Operational Funds, Federal and State Funds.	Short Term	Current Status: In Execution – Projects were developed aimed at slope stabilization and landslide control in sectors identified after the disaster events. As part of the response efforts to the Maria emergency, susceptible areas were identified and slope and terrace stabilization projects were carried out at main residences. PW: 3666 Bo. Coabey Dulcería Sector; Obligated amount: $1,988,283.00 Desastre:4339; PW:0824 Los Candelarios Sector Obligated amount: $1,090,761.27 Disaster:4671 Benefits: Reduces landslide risks; Protects homes and infrastructure; Improves community safety.
2026-JAY-PP-005	11	Anchoring and/or reinforcement of homes in the municipality so that they are earthquake-resistant and resist the onslaught of strong winds. The municipality will give priority, but not limited to housing. Sites in the Bo. Mameyes Sector Hacienda Rodríguez, Sector El Hueco, Sector Vega Grande, Sector Las Casitas, Sector La Vega Calle #4 and Calle Libertad, Bo. Pueblo Urb. Monserrate Calle 5, Sector Zama, Sector Vega Linda Bo. Outgoing Sector Miguelón, Bo. Jayuya Abajo, Sector Río Grande de Jayuya, Bo. Coabey Sector Río Coabey	Earthquakes and Tropical Cyclones	High	Security	Leader Edilberto Santiago Negrón Support: Municipal Office of Emergency Management	Operational Funds, Federal and State Funds.	Short Term	Current Status: In Continuous Execution – The municipality continues to identify residences eligible for structural reinforcement and anchoring in accordance with current codes. We continue to execute this strategy as a strategy to stabilize and facilitate resilient residences in our town. Benefits: Reduces damage from high winds; Increases seismic resistance; Protects lives and property.

2026 ID	2020 ID	Description	Hazard	Priority	Lifeline	Municipal Office in Charge	Possible Sources of Funds	Implementation term	Status
2026-JAY-PP-006	12	Relocation of "buyout" housing in areas susceptible to natural hazards, especially in the. Bo. Mameyes Sector Vega Grande Bo. Pueblo Urb. Monserrate, Bo. Outgoing Sector Miguelón Los Nazario, Barrio Hoyo Frío. Carr. 141	Tropical Cyclones and Earthquakes	High	Food, Hydration and Shelter	Department of Housing, FEMA	Municipality of Jayuya/Operational Funds, Federal and State Funds.	Short Term	Current Status: In Continuous Execution – The municipality continues to manage relocation alternatives for residences located in areas highly vulnerable to natural hazards. Reconstruction projects carried out guarantee mitigation in these sectors. The Municipality submitted proposals for some measures, but the funds were not approved. The municipality continues to apply for funds under different initiatives. Only Urbanización Monserrate is pending. The others were completed. Benefits: Eliminates exposure to recurring hazards; Reduces future losses; Promotes safer communities.

2026 ID	2020 ID	Description	Hazard	Priority	Lifeline	Municipal Office in Charge	Possible Sources of Funds	Implementation term	Status
2026-JAY-PP-007	13	Reconstruction Houses made of wood and zinc so that they comply with current building codes. The municipality will give priority to the Bo. Pueblo, Sector La Vega Linda, Bo. Jayuya Abajo, Sector Río Grande de Jayuya.	Tropical Cyclones and Earthquakes	Medium	Food, Hydration and Shelter	Leader: Edilberto Santiago Negrón Support: Department of Housing	Operational Funds, Federal and State Funds.	Medium Term	Current Status: In Execution – Reconstructions and rehabilitations of homes are being carried out to comply with current building codes. Projects carried out with non-profit groups: Giselle Marie Foundation, Roofs for My People, Municipal Funds, Recovery Funds, District Senate Funds. The Municipality is currently working in collaboration with the central government under the ODSEC program roofs are rehabilitated to eight (8) main residences (Blue Roof Program) through funds approved for the period of 2026 under the Blue Roof program is for the amount of $370,650.00. Benefits: Improves residential security. Reduces structural vulnerability. Increases community resilience.
2026-JAY-PP-008	14	Improvement of rainwater collection channels to reduce the occurrence of floods in the municipality.	Flooding	High	Water Systems	Leader: Edilberto Santiago Negrón; Emergency Management	Municipality of Jayuya/Operational Funds, Federal and State Funds.	Medium Term	Current Status: In Execution – Storm drainage, curbing, and hydraulic infrastructure reconstruction projects are being developed in multiple neighborhoods and sectors: San Felipe, Coabey, Santa Clara, Mameyes, Collores, and the Vega Linda Urbanization, among others. Benefits: Reduces urban flooding. Protects public infrastructure. Improves mobility during extreme events.

2026 ID	2020 ID	Description	Hazard	Priority	Lifeline	Municipal Office in Charge	Possible Sources of Funds	Implementation term	Status
2026-JAY-PP-009	15	Create interagency agreements to repair the roads that give access to the communities to travel to receive services or to evacuate in case of emergency. The municipality will give priority to the repair of highway 141, km 1.1Identify areas of the municipality that need access to build. The municipality will give priority to the construction of access to Bo. Santa Clara- Carr. 141, Km 1.1	Flooding	High	Water Systems	State Government Municipality of Jayuya	Operational Funds, Federal and State Funds.	Long Term	Current Status: Funding – The City and state agencies continue to develop projects to improve critical access and evacuation routes in the event of flood hazards. Pending Allocation of Funds. This project is being undertaken by DTOP as an emergency project. Project was initiated by an emergency order under the state government beginning in October 2026. Benefits: Maintains accessibility during emergencies. Facilitates evacuations. Improves continuity of essential services.
2026-JAY-PP-010	16	Identify areas of the municipality that need access to proceed with their construction. The municipality will give priority to the construction of the access to the Bo. Santa Clara- Carr. 144, La Monserrate, Las Arenas, Puerto Plata	Flooding	High	Water System	Municipal Emergency Management Office	Operational Funds, Federal and State Funds.	Medium term	Current Status: Continuous Execution. The design process of the Joe Delgado Road on Carr 144 has begun. Benefits: Benefits: Maintains accessibility during emergencies. Facilitates evacuations. Improves continuity of essential services.

Table 38: Mitigation Strategies-Natural Resources Protection

2026 ID	2020 ID	Description	Hazard	Priority	Lifeline	Municipal Office in Charge	Possible Sources of Funds	Implementation term	Status
2026-JAY-RN-001	17	The municipality will identify, through experts and in accordance with visual inspections and geotechnical studies, the areas susceptible to landslides, erosion and areas with slopes greater than 35 degrees, in order to define, design and implement the necessary mitigation strategies for the given place. After identifying the areas, the municipality will proceed to stabilize the land by planting vegetation, installing mesh, nets, safety fences, slopes or other mechanisms that assist with the retention of land susceptible to landslides.	Landslides	High	Food, Hydration and Shelter	Leader Adrian A. Bennett Rodriguez Support: Project Management and Recovery	Operational Funds, Federal and State Funds.	Short Term	Current Status: In Continuous Execution – The municipality continues to implement land stabilization, erosion control, and landslide mitigation projects in critical areas identified through studies and inspections. This is part of the projects that are under development and the 428 projects that are included in this Plan. This entails land stabilization and erosion control in areas of greater than 35 degrees of inclination. Projects in progress: PW-2979-Puerto Plata, Calazán Sector Obligated Amount: $908,417.28Disaster:4339; PW-6744-Zamas/Los Ortiz Sector Obligated Amount-$7,028,886.3 Disaster: 4339; PW-0575-Caricaboa, Sepulveda Sector Obligated Amount-$496,713.97 Disaster:4671 Benefits: Reduces landslide risks. Protects critical infrastructure. Decreases land and property losses.
2026-JAY-RN-002	18	Implement measures within the Territorial Plan of the municipality and grant interagency agreements aimed at protecting water supplies such as aquifers, watersheds, geological micro-basins, among others.	Drought	Low	Water Systems	Leader: Edilberto Santiago Negron Support: Office of Planning/Emergency Management/Office of Public Works	Operational Funds, Federal and State Funds.	Immediate	Current Status: In Execution – The municipality is in an advanced phase of the Comprehensive Review of the Land Use Plan. We are in the evaluation and execution of the protection of our lands. We are on the way to the protection of our resources. Benefits: Protects water sources. Conserves sensitive ecosystems. Reduces drought impacts. With the implementation of the measures, our flora and fauna will be protected within the municipality's properties.

2026 ID	2020 ID	Description	Hazard	Priority	Lifeline	Municipal Office in Charge	Possible Sources of Funds	Implementation term	Status
2026-JAY-RN-003	Nueva	Old Camp La Pica (NEW)	All	Medium	Health	Leader Ivonne Rosa Miranda	Operational funds		Status- NEW In Execution- The municipality proposes initiatives for reforestation, conservation of natural resources and protection of environmentally sensitive areas. Pending allocation of funds Benefits: Conserves flora and fauna. Protect water resources. Reduces soil erosion.

Table 39: Mitigation Strategies – Structural Improvements

2026 ID	2020 ID	Description	Hazard	Priority	Lifeline	Municipal Office in Charge	Possible Sources of Funds	Implementation term	Status
2026-JAY-SI-001	19	Effectively channel the waters within the jurisdiction (rainwater and natural runoff, reservoirs and others)	Flooding	High	Water Systems	Leader Edilberto Santiago Negrón Support: Municipal Office for Emergency Management Municipal Public Works	Operational Funds, Federal and State Funds.	Medium Term	Current Status: In Continuous Execution – The municipality maintains reconstruction projects, rainwater improvements, and preventive cleaning of drainage systems in various sectors. The Municipal Public Works and the Municipal Office for Emergency Management are in constant maintenance and cleaning of the areas. Benefits: Reduces flooding. Protects road infrastructure. Improves stormwater management.

2026 ID	2020 ID	Description	Hazard	Priority	Lifeline	Municipal Office in Charge	Possible Sources of Funds	Implementation term	Status
2026-JAY-SI-002	20	Replacement or reconstruction of bridges that are in areas susceptible to high winds or flooding	Flooding	Medium	Transportation	Leader: Adrian A. Bennett Rodriguez Support: Office of Reconstruction and Recovery	Operational Funds, Federal and State Funds.	Medium Term	Current Status: In Continuous Execution – Reconstruction and replacement projects of vulnerable bridges are being developed to improve municipal connectivity and resilience. These projects carried out with recovery funds and pending development: El Hueco Sector, Coabey (Mattei Line Sector (pedestrian bridge) Slope under construction bridge in Las Arenas Sector. Bridge in Los Bibilonis sector. Benefits: Guarantees safe access. Reduces transportation interruptions. Facilitates emergency response.
2026-JAY-SI-003	21	Build sewerage that collects sewage from the state highway. Especially the state highway that is located in Bo. Mameyes, Las Casitas sector, Coabey neighborhood.	Flooding	High	Water Systems	State Government	Operational Funds, Federal and State Funds.	Short Term	Current Status: Under Execution – The infrastructure in Coabey has been completed and design activities continue for interventions in the Las Casitas sector. Benefits: Reduces water accumulation. Protects public health. Improves sanitary infrastructure.
2026-JAY-SI-004	22	Construction of a bridge. Bo. Mameyes Sector El Hueco.	Flooding	High	Transportation	Leader Adrian A. Bennett Rodriguez Support: Office of Reconstruction and Recovery	Operational Funds, Federal and State Funds.	Short Term	Current Status: Completed – Construction of the bridge in the El Hueco Sector was completed according to the scheduled scope. Benefits: Restores safe access. Increases road resilience. Facilitates emergency services. This strategy will not be included in the next update of the 2031 Plan.

2026 ID	2020 ID	Description	Hazard	Priority	Lifeline	Municipal Office in Charge	Possible Sources of Funds	Implementation term	Status
2026-JAY-SI-005	23	Reconstruction and Elevation of Bridge. Bo. Mameyes Sector Vega Grande, Bo. Saliente Miguelón Sector, Los Nazario Bo. Pueblo Urb. Vega Linda Bo. Caricaboa Sector Los Padua, Bo. Coabey Sector Rio Coabey.	Flooding	High	Transportation	Leader Adrian A. Bennett Rodriguez Support: Office of Reconstruction	Operational Funds, Federal and State Funds.	Medium Term	Current Status: In Execution – The municipality continues to develop reconstruction and elevation projects for bridges located in areas vulnerable to flooding to improve community connectivity. Benefits: Reduces flood disruptions. Protects critical infrastructure. Improves access and evacuation routes.
2026-JAY-Si-006	24	Bridge elevation. Bo. Zamas Sector Calle #4 (Los Álvarez), Bo. Caricaboa, Lomas Los Gotay, Highway 528.	Flooding	High	Transportation	Leader Adrian A. Bennett Rodriguez Support: Office of Reconstruction	Operational Funds, Federal and State Funds.	Short Term	Current Status: In Continuous Execution- The municipality continues the execution of bridge elevation and reconstruction projects to reduce vulnerability to flood events. Reconstruction projects on street #4 completed, Los Gotay Project in PW processes. Benefits: Reduces flood damage. Maintains road connectivity. Facilitates emergency response.
2026-JAY-Si-007	25	Channel ravines with gabion walls 100 meters on both sides. Bo. Pueblo Sector Vega Linda-Calle Ramón Frade.	Flooding	High	Transportation	Leader Adrian A. Bennett Rodriguez Support: Office of Reconstruction	Operational Funds, Federal and State Funds.	Short Term	Current Status: Completed – Installation of channeling and protection measures completed through reclamation-funded reconstruction projects. Benefits: Reduces erosion. Protects adjacent properties. Improves water capacity. This strategy will not be included in the next update of the 2031 Plan
2026-JAY-Si-008	26	Channeling of rivers with concrete walls. Bo. Pueblo Urb. Monserrate Calle 5, Bo. Jayuya Abajo Sector Gildo Torres and Bo. Coabey, Sector Río Coabey.	Flooding	High	Transportation	Leader Adrian A. Bennett Rodriguez Support: Office of Reconstruction	Operational Funds, Federal and State Funds.	Long Term	Current Status: Funding – The municipality continues to manage resources to implement channeling and flood control projects in prioritized sectors Pending funds due to the disaster. Benefits: Reduces

2026 ID	2020 ID	Description	Hazard	Priority	Lifeline	Municipal Office in Charge	Possible Sources of Funds	Implementation term	Status
									overflows. Protects public infrastructure. Reduces property damage.
2026-JAY-SI-009	27	Construction of Retaining Walls. Bo. Mameyes Sector Hacienda Rodríguez and Bo. Pueblo Sector Vega Linda,	All	High	Security	Leader Adrian A. Bennett Rodriguez Support: Office of Reconstruction	Operational Funds, Federal and State Funds.	Short Term	Current Status: Completed – Construction of retaining walls has been completed to reduce flood and erosion risks in identified areas. Benefits: Protects homes. Controls erosion. Maintains road accessibility.
2026-JAY-Si-010	28	Development of electrical micro-grid for critical installations.	Flooding	High	Energy	Leader Adrian A. Bennett Rodriguez Support: Office of Reconstruction	Operational Funds, Federal and State Funds.	Medium Term	Current Status: In Design – The municipality began the development of an electrical microgrid to strengthen the energy resilience of critical facilities and essential services. It began with the First Phase through PW-0275 Micro-Grid. Benefits: Maintains essential services. Reduces electrical interruptions. Strengthens community resilience.
2026-JAY-Si-011	29	Restoration of slopes in the Rio Grande de Jayuya basin	Landslides	High	Transportation	Leader Adrian A. Bennett Rodriguez Support: Office of Reconstruction	Operational Funds, Federal and State Funds.	Short Term	Current Status: Funding – The municipality presented the project for slope restoration and land stabilization in the Rio Grande de Jayuya basin. (PW: 4339-1759). Pending Allocation of Funds Benefits: Reduces landslides. Protects public infrastructure. Reduces erosion of riverbeds.

Table 40: Mitigation Strategies-Emergency Services

2026 ID	2020 ID	Description	Hazard	Priority	Lifeline	Municipal Office in Charge	Possible Sources of Funds	Implementation term	Status
2026-JAY-ES-001	New	Communications systems projects (Claro, and Liberty) Install Municipal Network Cellular Network Communications Tower	Tropical Cyclone	High	Communication	Leader Edilberto Santiago	ARPA	Short Term	Current Status: NEW In Continuous Execution – The municipality continues to develop a municipal communications network to strengthen interoperability between municipal agencies, response agencies, and telecommunications providers during emergencies and disasters. A communications tower will be installed to facilitate coordination with the telecommunications systems of two communications companies using ARPA funds to strengthen municipal communication capabilities. Benefits: Maintains communications during emergencies. Streamlines interagency coordination. Improves disaster response and recovery by integrating services and sharing data between government and municipal agencies, streamlining services.

Table 41: Mitigation Strategies-Education and Awareness

2026 ID	2020 ID	Description	Hazard	Priority	Lifeline	Municipal Office in Charge	Possible Sources of Funds	Implementation term	Status
2026-JAY-EA-001	30	Establish effective and direct coordination with the private sector, business, government agencies, religious institutions, and the community on the development of mitigation projects.	All	High	All	Leader Edilberto Santiago Negrón Support: Office of Emergency Management	Operational Funds, Federal and State Funds	Short Term	Current Status: In Continuous Execution- The municipality holds meetings, orientations, and outreach activities with communities, businesses, non-profit organizations, religious institutions, and government agencies to inform about mitigation initiatives and projects as well as constant presentations of high-impact projects to citizens. Approximate budget: $15,000.00. Benefits: Promotes citizen participation. Strengthens community partnerships. Increases support for mitigation initiatives.
2026-JAY-EA-002	31	Create a system of education and training for residents in the communities	Earthquake	High	Food, Hydration and Shelter	Leader Edilberto Santiago Negrón Support: Office of Emergency Management	Operational Funds, Federal and State Funds	Short Term	Current Status: In Execution – The Municipal Office for Emergency Management develops educational activities and community orientations on preparedness, response and mitigation to earthquakes, hurricanes, floods and other natural hazards. This strategy will provide the following qualitative benefits: Increases community preparedness. Reduces losses during emergencies. Strengthens citizen response capacity. Carrying out this education will set off a course appropriate to the existing resources in our municipality.

2026 ID	2020 ID	Description	Hazard	Priority	Lifeline	Municipal Office in Charge	Possible Sources of Funds	Implementation term	Status
2026-JAY-EA-003	32	Develop an awareness and education program, through workshops, talks and/or publications aimed at merchants, stakeholders and the general public about the importance of water conservation and alternatives for its storage and protection.	Drought	Medium	Food, Hydration and Shelter	Leader Edilberto Santiago Negrón Support: Office of Emergency Management	Operational Funds, Federal and State Funds	Short Term	Current Status: In Execution – The municipality promotes public education on conservation, storage, and efficient use of water through orientations aimed at residents, merchants, and community organizations. Approximate Budget: $7,500.00Benefits: Good use and management of existing supplies and resources. Reduces vulnerability to droughts. Promotes responsible use of water. Protects water resources.
2026-JAY-EA-004	33	Inform the public, through workshops, talks and/or publications, about the importance and benefits of participating in the National Flood Insurance Program (NFIP)	Flooding	Medium	Food, Hydration and Shelter	Leader Edilberto Santiago Negrón Support: Office of Emergency Management	Operational Funds, Federal and State Funds	Medium Term	Current Status: Ongoing Execution – The City continues to guide residents and property owners located in flood-susceptible areas on the benefits and requirements associated with the National Flood Insurance Program (NFIP). Benefits: This will provide stability to residents and families who may be affected by any stress by providing stability to their personal infrastructure. Increases insurance coverage. Reduces post-disaster economic losses. Strengthens family recovery.
2026-JAY-EA-005	34	Educate merchants, stakeholders and the general public, through workshops, talks and/or publications and external resources on the importance of avoiding fires due to spontaneous combustion of pastures in the municipality.	Wildfire	High	Food, Hydration and Shelter	Leader Edilberto Santiago Negrón Support: Puerto Rico Firefighter	Operational Funds, Federal and State Funds	Medium Term	Current Status: In Continuous Execution – The municipality maintains educational activities and coordination with the Puerto Rico Fire Department Bureau to promote safe practices and reduce the incidence of wildfires and vegetative fires. Approximate budget: $7,500.00. Benefits: Reduces wildfire risks. Protects natural resources. Protects lives and property.

6.6 Participation in NFIP (C2-a)

Covered under the PRPB, the Municipality maintains continuous participation in the National Flood Insurance Program (NFIP) and remains committed to meeting all program requirements to reduce flood risk and protect life and property. Ongoing participation in the NFIP enables residents and businesses to access federally backed flood insurance while promoting sound floodplain management practices. The PRPB, on the municipality's behalf, enforces floodplain management regulations consistent with FEMA requirements, including the adoption and use of Flood Insurance Rate Maps (FIRMs) and Flood Insurance Studies (FIS) for development decisions. Local permitting, inspection, and enforcement activities help ensure that new construction and substantial improvements in Special Flood Hazard Areas comply with applicable elevation and floodproofing standards. The Municipality also supports public awareness and education activities related to flood risk, insurance requirements, and mitigation measures. Continued compliance with the NFIP strengthens eligibility for federal hazard mitigation funding and supports the long-term reduction of flood-related damages.

7. Plan Maintenance

This chapter outlines the actions required to ensure that the Plan's activities are effectively implemented, kept up to date, and aligned with the mitigation goals and objectives. In some cases, updating the Plan may involve amending proposed activities due to changes in on-site conditions that could increase or decrease the level of risk to which certain areas are exposed.

According to federal requirements the review process of LHMPs must include:[19]

- A section describing the method and schedule for monitoring, evaluating, and updating the Mitigation Plan within a five-year period.
- A process for integrating the Mitigation Plan's requirements into other local planning mechanisms, such as comprehensive plans or capital improvement plans, when appropriate.
- A discussion of how the community will continue to participate in the Plan's review process.

7.1 Point of Contact

The designated point of contact responsible for the monitoring, revision, and update of the LHMP is as follows:

Name	Edilberto Santiago Negrón
Position	Director
Office	Emergency Management Municipal Office
Telephone Number	787.374.8051
Email	esantiago@jayuya.puertorico.pr

[19] 44 C.F.R. § 201.6(c)(4)

7.2 Public Participation Continuation (D1-a)

The Municipality of Jayuya will ensure continuous public participation by promoting the following:

- Public education and awareness initiatives
- Surveys
- Workshops and meetings with communities throughout the municipality

Accordingly, the municipality commits to fostering public participation and community education. This commitment is reflected in several mitigation strategies described in this Plan. The public is encouraged to provide comments and take part in the LHMP's updates at any time, including requesting a copy of the LHMP—both during its development and throughout its monitoring and maintenance phases.

Additionally, each time a progress report is completed for this Plan, a copy will be made available for public review. Progress will also be periodically discussed in public meetings and shared through various social media and communication channels. The municipality will ensure that public participation notices are disseminated throughout the Plan's monitoring and oversight stages.

The municipality will also provide regular presentations to community groups regarding the LHMP's content and the progress of mitigation strategy implementation. These groups may include elected officials, schools, and other community organizations. Furthermore, the municipality will continue to promote civic engagement and community education by offering courses and workshops—such as CERT—focused on preparedness and response to hazardous events, as well as informing residents about components of the NFIP and other relevant programs.

These natural hazard-mitigation efforts must be adapted to the specific vulnerabilities and needs of each community. This approach will help build a more prepared and resilient population. This principle underpins the municipality's commitment to ensuring that the community remains engaged throughout the Plan's update cycle, its effective period, and subsequent processes following the Plan's adoption

7.3 LHMP Oversight (D2-a)

The municipality's review strategy for implementation, monitoring, and evaluation provides a framework that encourages collaboration, information-sharing, and innovation. Through multiple implementation methods, the municipality—acting through its Planning Committee, which is composed of representatives from various

municipal agencies and departments—will work with its partners and residents to apply a localized approach to loss reduction while addressing community needs through coordinated efforts. This strategy aims to break the cycle of disasters and strengthen the municipality's ability to withstand future events.

The Plan will be monitored for several related purposes:

- To maintain accurate information regarding hazards and risks
- To ensure that mitigation strategies reflect the priorities of participating communities and stakeholders
- To comply with federal and Puerto Rico government requirements for LHMP review
- To maintain eligibility for mitigation funding
- To ensure that the Plan remains aligned with other planning efforts

To ensure efficient and effective implementation, the municipality will make use of its existing capabilities and infrastructure planning processes. The municipality intends to carry out the mitigation strategies identified as immediate or short – term in the LHMP over the next five (5) years, or for as long as funding and resources allow.

7.4 LHMP Evaluation and Monitoring (D2-b)

The evaluation of the LHMP will be continuous. In addition to the five-year review required by FEMA, the municipality will conduct an annual review of the LHMP, or more frequently if circumstances require it. A meeting of the Planning Committee will be held after each annual review to approve a yearly progress report. Each year, a progress report will be prepared and submitted to the Office of the Mayor, documenting any updates to its information as well as any progress made toward achieving the mitigation goals and objectives. This report will be available to the public

A preliminary schedule to hold the Planning Committee meeting is outlined below:

Table 43: Preliminary Planning Committee Meeting Schedule

Time Period	Participants	Purpose of the Meeting
Annual Meeting (2027)	Planning Committee (Can be open to the public if deemed necessary)	The Committee members will hold the first annual meeting to identify the funding needed to implement the mitigation measures included in this LHMP, reassess the municipality's priorities regarding natural hazards or risk areas, and develop a strategy for submitting proposals to various state and federal programs. In addition, site visits will be conducted to review at-risk areas, monitor project progress, and establish direct communication with the communities.
Annual Meeting (2028)	Planning Committee (Can be open to the public if deemed necessary)	The Committee will hold the annual meeting during the second year of the LHMP's approval to review the status of mitigation strategy implementation, identify emerging risks, and assess community needs. Site visits to at-risk areas will also be conducted, as needed, to track project progress and maintain direct engagement with the communities.
Annual Meeting (2029)	Planning Committee (Can be open to the public if deemed necessary)	The Committee will meet to confirm the status of mitigation action implementation and determine whether additional funding is required to continue progress.
Annual Meeting (2030)	Planning Committee (Can be open to the public if deemed necessary)	The Committee will hold its final meeting before the next LHMP review/update to verify the implementation status of mitigation actions, which will be documented in the upcoming Plan revision.

7.5 LHMP Update and Revision (D2-c, D3-a)

7.5.1 Revision after a major disaster declaration

If a major emergency or disaster declaration affecting the Municipality occurs during the Plan's five-year term, the Planning Committee—along with stakeholders, community representatives, and nonprofit organizations—will convene to identify newly affected areas, revise mitigation priorities, and incorporate lessons learned. This meeting will replace the annual review scheduled for that year.

7.5.2 Five – year comprehensive update

In accordance with federal guidance, the LHMP will be comprehensively updated five (5) years after approval and submitted to the State Hazard Mitigation Officer and FEMA for review and approval. Approximately eighteen (18) months prior to the Plan's expiration, the review process will begin, including a full evaluation of the municipal profile, risk assessment, and mitigation strategies, with attention to updated guidance and requirements.

7.6 Integration with Other Planning Mechanisms (D3-a)

The following public policies and planning documents were considered in the development of this LHMP:

Commonwealth Level:

- Puerto Rico Land Use Plan (PUT-PR)
- Jayuya Territorial Plan (PT)
- Joint Regulation for the Evaluation and Issuance of Permits
- Special Flood Hazard Areas Regulation (2021)
- Stormwater System Design, Operation, and Maintenance Regulation
- Jayuya Emergency Operations Plan

Following adoption, the LHMP will guide updates to the Territorial Plan, special area plans, and urban expansion plans, and will inform municipal budget priorities. Once FEMA approval is received, a digital copy of the Plan will be submitted to the Puerto

Rico Planning Board to support updates to the PUT-PR and other relevant Commonwealth planning documents.

8. Adoption and Approval (F1-a, F1-b)

8.1 LHMP Adoption

Federal policy establishes LHMPs must include "Documentation that the LHMP has been formally adopted by the governing body of the jurisdiction requesting approval of the Plan. The municipality has one (1) year to adopt the Plan once it receives an *Approval Pending Adoption (APA)."*[20]

This LHMP was adopted by the Municipality of Jayuya on **XXXXXX**. A copy of **Resolution**, titled *"To Adopt the 2026 Natural Hazard Mitigation Plan of the Municipality of Jayuya and for Other Related Purposes,"* is included as part of **Appendix A**.

8.2 LHMP Approval

This LHMP was approved by FEMA and the SHMO on **XXXXX**. A copy of the Approval Letter, titled *"Approval of the Local Hazard Mitigation Plan, Municipality of Jayuya,"* is included in **Appendix A**. FEMA's approval of the Plan is valid for a period of **five (5) years**, through **XXXXXX**

[20] 44 C.F.R. §201.6(c)(5)

Selected References

American Society of Civil Engineers. (2024, August 20). *Civil Engineering Source.* Retrieved December 17, 2025, from Rising heat is scorching Americans - and our infrastructure: https://www.asce.org/publications-and-news/civil-engineering-source/article/2024/08/20/rising-heat-is-scorching-americans-and-our-infrastructure

Anderson, S., Barford, C., & Barford, P. (2020). *Five Alarms: Assessing the Vulnerabilities of US Cellular Communication Infrastructure to Wildfires.* Association for Computing Machinery.

ASDSO. (2022). *Dam Safety Performance Report 2022.* Lexington, KY. Retrieved January 4, 2026, from https://damsafety-dev.s3.amazonaws.com/s3fs-public/files/Puerto%20Rico%20Dam%20Safety%20Performance%20Report%202022.pdf

ASPR. (n.d.). *ASPR Health Care Readiness State Highlights*. Retrieved January 5, 2026, from https://aspr.hhs.gov/HealthCareReadiness/HealthCareReadinessNearYou/Pages/Puerto-Rico.aspx

AtkinsRéalis. (2024). *Hazard Mitigation Plan: Dam Annex Template for Puerto Rico.*

Autonomous Municipality of Jayuya. (2020). *Plan de Mitigación contra Peligros Naturales (Local Hazard Mitigation Plan.* Jayuya, PR: Oficina de Planificación y Ordenamiento Territorial.

Autonomous Municipality of Jayuya. (2026). *Plan de Ordenación Territorial Municipio de Jayuya, Primera Revisión Integral (Borrador).* Oficina de Planificación.

Autonomous Municipality of Jayuya. (2025). *Emergency Operation Plan.* Jayuya PR: Municipal Agency for Emergency Mangement and Disaster Administration.

Caricoos. (n.d.). *Marejada Ciclónica*. Retrieved Noviembre 18, 2025, from http://www.caricoos.org/mao/strorm-surge

Castro Rivera, A. (n.d.). *Proyecto 1867*. Retrieved December 27, 2025, from La triple condena de 1867: https://www.proyecto1867.com/la-triple-condena-de-1867.html

Castro Rivera, A., & López Marrero, T. (2018). *Cartilla de los Ciclones.* Mayagüez, PR: Sea Grant - Universidad de Puerto Rico, Mayagüez.

CBO. (2024). *Federal Spending for Flood Adaptations.* Retrieved from www.cbo.gov/publication/59971

CDC. (2012, May 18). *CDC Archive*. Retrieved December 29, 2025, from https://archive.cdc.gov/www_cdc_gov/csels/dsepd/ss1978/lesson1/section11.html

CDC. (2014, December 5). *Morbidity and Mortality Weekly Report*. Retrieved December 29, 2025, from Chikungunya Cases Identified Through Passie Surveillance and Household Investigations - Puerto Rico, May 5 - August 12, 2014: https://www.cdc.gov/mmwr/preview/mmwrhtml/mm6348a1.htm

CDC. (2024, Junio 25). *Heat Health*. Retrieved Noviembre 12, 2025, from Heat and Older Adults (Aged 65+): https://www.cdc.gov/heat-health/risk-factors/heat-and-older-adults-aged-65.html

CEACC. (2024). *Borrador del plan de mitigación, adaptación y resiliencia al cambio climático en Puerto Rico.* San Juan, PR: Gobierno de Puerto Rico.

Center for Disaster Resilient Communities. (n.d.). *The Health Effects of Landslides*. Retrieved December 28, 2025, from https://edge.deohs.washington.edu/sites/edge/files/2025-07/Landslides%20Fact%20Sheet.pdf

Colón, J. A. (2009). *Climatología.* San Juan, PR: La Editorial Universidad de Puerto Rico.

Columbia University/Mailman School of Public Health. (2021, February 19). *Epidemic, Endemic, Pandemic: What are the Differences?* Retrieved from https://www.publichealth.columbia.edu/news/epidemic-endemic-pandemic-what-are-differences

COR3. (n.d.). *Coronavirus (COVID-19*. Retrieved January 4, 2026, from https://recovery.pr.gov/en/coronavirus

DHS. (n.d.). *Ready.gov*. Retrieved enero 16, 2020, from https://www.ready.gov/heat

Dirlikov, E., Ryff, K. R., Torres -Aponte, J., Thomas, D. L., Pérez - Padilla, J., Muñoz-Jordán, J., . . . Rivera - García, B. (2016, May 6). Update: Ongoing Zika Virus Transmission - Puerto Rico, November 1, 2015 - April 14, 2016. *Morbidity and Mortality Weekly*

Report, 65(17), 451-455. Retrieved December 29, 2025, from https://www.cdc.gov/mmwr/volumes/65/wr/pdfs/mm6517.pdf

DNER. (2006, Marzo). Incendios Forestales en Puerto Rico. *Hojas de Nuesto Ambiente*, pp. 1 - 2.

DNER. (2015). *Informe sobre la sequía de 2014-2016 en Puerto Rico.* San Juan, PR: División de Monitoreo del Plan de Aguas.

DNER. (2016). *Informe sobre la sequía 2014 - 16 en Puerto Rico.* San Juan, PR: Departamento de Recursos Naturales y Ambientales.

DNER. (2021). *Puerto Rico Forest Action Plan, 2021.* San Juan, PR: DNER.

DOE. (2023, October 25). *Protecting our Electric Grid from Wildfire*. Retrieved December 16, 2025, from https://www.energy.gov/gdo/articles/protecting-our-electric-grid-wildfire

Ecoexploratorio. (2000). *¿Qué son las inundaciones?*

Eliot, J. W., Cloyd, T. E., & Philbin, M. (1994). Impacts of Landslides on an Ecosystem. *ASAE International Winter Meeting.* Atlanta, GA.

EPA. (2012). Cool Pavements. In *Reducing Urban Heat Islands: Compendium of Strategies.*

EPA. (2025, September 2). *Heat Island*. Retrieved December 17, 2025, from What are Heat Islands?: https://www.epa.gov/heatislands/what-are-heat-islands

FBI & DHS. (2023). *Strategic Intelligences Assessment and Data on Domestic Terrorism.*

FEMA. (1997). *Multi - Hazard Identification and Risk Assessment: A Cornerstone of the National Mitigation Strategy.* Federal Emergency Management Administration.

FEMA. (1997). *Multi- Hazard Identification and Risk Assessment: A Cornerstone of the National Mitigation Strategy.*

FEMA. (1997). *Multi-Hazard Identification and Risk Assessment: A Cornerstone of the National Mitigation Strategy.*

FEMA. (2018). *Threat and Hazard Identification and Risk Assessment (THIRA) and Stakeholder Preparedness Review (SPR) Guide.*

FEMA. (2023, July). *fema.gov*. Retrieved November 24, 2025, from Community Lifelines Implementation Toolkit: https://www.fema.gov/sites/default/files/documents/fema_lifelines-toolkit-v2.1_2023.pdf

FEMA. (2024, February 20). *2.7 Community Lifelines: The HAZMAT Lifeline*. Retrieved December 28, 2025, from https://www.fema.gov/oet-tools/chemical-incident-consequence-management/2/7

FEMA. (2024). *Federal Guidelines for Dam Safety.* DHS.

FEMA. (2024). *Hazus Earthquake Model User Guidance.*

FEMA. (2024). *Natural and Nature-based Solutions Job Aid for Stormwater Management in Puerto Rico.*

FEMA. (2025). *Local Mitigation Planning Handbook.*

FEMA. (2025). *Local Mitigation Planning Policy Guide.*

FEMA. (2025). *Reducing Damage from Localized Flooding.*

FEMA. (n.d.). *Puerto Rico Earthquakes DR-4473-PR*. Retrieved December 15, 2025, from https://www.fema.gov/disaster/4473

Gill, J. C., & Malamud, B. D. (2017). Anthropogenic processes, natural hazards, and interactions in a multi-hazard framework. *Earth-Science Reviews*, 246 - 269.

Giusti, E.V. (1978). *Hydrogeology of the Karst of Puerto Rico*. U.S. Geological Survey Professional Paper 1012.

Guzmán-Colon, B., Guido, Z., Amaya-Ardilla, C. P., Cabrera-Rivera, L. T., & Méndez-Lázaro, P. A. (2025). Heat Risk Perception and Vulnerability in Puerto Rico: Insights for Climate Adaptation in the Caribbean. *International Journal of Environmental Research and Public Health, 22*(1197). doi:https://doi.org/10.3390/ijerph22081197

Hernández - Padilla, J. A., & Méndez-Piñero, M. I. (2020). Economic Impact of the COVID-19 Pandemic in Puerto Rico. *Proceedings of the 9th Annual World Conference of the Society for Industrial and Systems Engineering 2020 SISE Virtual Conference*, (pp. 90-95). Retrieved January 5, 2026, from https://ieworldconference.org/content/SISE2020/Papers/Hernandez-Padilla.pdf

Hernández - Torres, R., Martínez - Lozano, M., Torres, I., Rosario - Hernández, E., Ramos - Pibernus, A., Soto, A., . . . Rivera - Segarra, E. (2023). The impact of the Covid-19 pandemic and previous natural disasters on the mental health of healthcare workers in Puerto Rico. *PLOS Global Public Health, 3*(5). Retrieved January 5, 2026, from file:///C:/Users/PITR4955/Downloads/journal.pgph.0001784.pdf

Highland, L. M., & Bobrowsky, P. (2008). *The Landslide Handbook - A Guide to Understanding Landslides.* Reston, VA: USGS.

Highways Industry. (n.d.). *Highways Industry.com*. Retrieved January 2, 2026, from https://www.highwaysindustry.com/impact-extreme-heat-roads/

Hirsh, G. B., & Centeno - Marín, H. (2015). The Puerto Rico Emergency Preparedness Model. *Proceedings of the System Dynamics Society.* Retrieved January 4, 2026, from https://proceedings.systemdynamics.org/2015/papers/P1186.pdf

Hughes, K. S., & Schulz, W. H. (2020). *Map Depicting Susceptibility to Landslides Triggered by Intense Rainfall, Puerto Rico* (U.S. Geological Survey Open-File Report 2020-1022). U.S. Geological Survey. https://doi.org/10.3133/ofr20201022

IFRC. (2023, August 8). *Landslides*. Retrieved December 28, 2025, from https://epidemics.ifrc.org/manager/disaster/landslides

Jessen, J. (2025, June 30). *Energy Digital.* Retrieved December 17, 2025, from https://energydigital.com/news/climate-change-how-heatwaves-are-affecting-power-grids

Kerber, S., & Alkoins, D. (2024). *Lahaina Fire Incident Analysis Report.* Columbia, MD: Fire Safety Research Institute.

Lander, J. F., Whiteside, L. S., & Lockridge, P. A. (2002). A Brief History of Tsunamis in the Caribbean Sea. *Science of Tsunami Hazards, 20*(1). Retrieved December 27, 2025, from https://www.proyecto1867.com/uploads/8/6/3/9/86396506/lander_et_al.__2002_.pdf

Lugo, A. E., Miranda Castro, L., Abel, V., López, T., Hernández Prieto, E., García Martinó, A., . . . Helmer, E. (2021). *Puerto Rican Karst - A Vital Resource.* Forest Service, United States Department of Agriculture. USFS.

Méndez - Lázaro, P. A., Di Napoli, C., Rivas - Tumanyan, S., Pérez Ríos, N., González Sepulveda, L., Rodríguez, E., . . . Milán, L. (2025). Too hot and too humid in the Caribbean: Impacts of extreme heat events and non-accidental mortality in the tropical island of Puerto Rico. *The Journal of Climate and Healt*.

Monroe, W.H., 1963, Geology of the Jayuya quadrangle, Puerto Rico: U.S. Geological Survey Geologic Quadrangle 191, 1 map., https://doi.org/10.3133/gq191.

National Integrated Heat Health Information System. (n.d.). *Heat.gov*. Retrieved November 12, 2025, from Urban Heat Islands: https://heat.gov/urban-heat-islands/

NIST. (n.d.). Retrieved November 26, 2024, from Infrastructure: https://www.nist.gov/infrastructure

NMEAD. (2021). *Plan Estatal de Mitigación de Peligros Naturales de Puerto Rico.* San Juan, PR: Negociado de Manejo de Emergencias y Administración de Desastres.

NOAA. (2022). *Centers for Environmental Information*. Retrieved January 2, 2026, from State Climate Summaries: Puerto Rico and the US Virgin Islands: https://statesummaries.ncics.org/chapter/pr/

NOAA. (2025). *National Centers for Environmental Information*. Retrieved December 28, 2025, from https://www.ncei.noaa.gov/stormevents/choosedates.jsp?statefips=99%2CPUERTO+RICO

National Weather Service. *Mean Annual Rainfall 1991-2020*. National Centers for Environmental Information. PR and USVI Normals

Okamura, K., Fujisawa, A., Kondo, Y., Fujimoto, Y., Uozu, T., Kaner, S., & Mizoguchi, K. (2013). The Great East Japan Earthquake and cultural heritage: towards an archeology of disaster. *Antiquity, 87*, 258-269.

PRDH. (2022). *Resumen ejecutivo: Situación de la epidemia del COVID-19 en Puerto Rico año 2021.* Retrieved January 5, 2026, from https://www.salud.pr.gov/CMS/DOWNLOAD/8708

PRDOH. (2025). *Puerto Rico Mitigation Action Plan, CDBG-MIT.* San Juan, PR: Puerto Rico Department of Housing.

PREMB. (2021). *2021 Puerto Rico State Natural Hazards Mitigation Plan.*

PRPB. (2014). *Plan de Manejo del Area de Planificación Especial del Carso.*

PRPB. (2015). *Plan de Uso de Terrenos, Guías de Ordenación del Territorio.* San Juan, PR: Junta de Planificación.

PRPB. (2021). *Special Flood Hazard Areas Regulation.*

PRPB. (2023). *Reglamento para la evaluación y expedición de permisos relacionados al desarrollo, uso de terrenos y operación de permisos.* San Juan, PR: Junta de Planificación.

PRSN. (n.d.). Retrieved December 27, 2025, from http://www.prsn.uprm.edu/Spanish/tsunami/historia.php

PRSN. (2019). *Red Sísmica de Puerto Rico*. Retrieved enero 13, 2020, from http://redsismica.uprm.edu/Spanish/educacion/terremotos/

PRSN. (2025). *Puerto Rico Seismic Network*. Retrieved December 15, 2025, from https://redsismica.uprm.edu/english/education/prediction.php

PRSN. (2025). *Red Sísmica de Puerto Rico.* Retrieved December 15, 2025, from Resumen Preliminar de actividad sísmica anual para el 2024: https://redsismica.uprm.edu/spanish/sismicidad/reportes/anuales/Informe_Anual_2024.pdf

PRSN. (2025). *Seismic Information*. Retrieved December 26, 2025, from Earthquake of 1918: http://www.prsn.uprm.edu/English/information/quake1918.php

PRSN. (n.d.). *Red Sísmica de Puerto Rico*. Retrieved December 15, 2025, from Reporte de Sismicidad: https://redsismica.uprm.edu/spanish/sismicidad/reportes/

Public-Private Analytic Exchange Program. (2025). *Implications of Extreme Weather Events on U.S. Telecommunications Infrastructure.* DHS.

Rigau-Pérez, J., & Vallejo - Calzada, E. D. (2020, march). Measles, Malnutrition and Mortality. *Puerto Rico Health Science Journal, 39*(1), 20 - 27. Retrieved December 29, 2025, from https://issuu.com/coleccionpuertorriquena/docs/rigau__vallejo_measles_in_pr_1917-1918_prhsj_2020

Rodríguez, D. M., Madwell, Z. J., Torres, J. M., Rivera, A., Wong, J. M., Santiago, G. A., . . . Adams, L. E. (2024, December 12). Epidemiology of Dengue - Puerto Rico, 2010 -

2024. *Morbidity and Mortality Weekly Report*. Retrieved December 29, 2025, from https://www.cdc.gov/mmwr/volumes/73/wr/pdfs/mm7349a1-H.pdf

Rosario Urrutia, M. (2021, February 12). *Puerto Rican Endowment for the Humanities - Encyclopedia of Puerto Rico*. Retrieved December 29, 2025, from From the forgotten Flu Pandemic in Puerto Rico, 1918-1919, to the beginning of Covid-19 in 2020: https://en.enciclopediapr.org/content/from-flu-pandemic-1918-to-covid19-puerto-rico/

Sánchez - Plazas, L. C., García - De Jesús, R., Martínez - González, K. G., Amaya - Ardila, C. P., & Almodóvar - Rivera, I. A. (2024). The psychological impact of the COVID-19 pandemic on physicians in Puerto Rico: a cross-sectional study after the second wave in 2021. *Psychiatry, 14*. Retrieved January 5, 2026

Sandia National Laboratories. (n.d.). *Wildfire Electric Grid Resilience*. Retrieved December 16, 2025, from https://energy.sandia.gov/programs/electric-grid/wildfire-electric-grid-resilience/

Sharp, T. M., Roth, N. M., Torres, J., Ryff, K., Pérez Rodríguez, N., Mercado, C., . . . Rivera García, B. (2014, December 5). Chikungunya Cases Identified Through Passive Surveillance and Household. *Morbidity and Mortality Weekly Report*. Retrieved December 29, 2025, from https://www.cdc.gov/mmwr/pdf/wk/mm6348.pdf

Stein, S. M., Comas, S. J., Menakis, J. P., Carr, M. A., Steward, S. I., Cleveland, H., . . . Radeloff, V. (2013). *Wildfire, Wildlands and People: Undertaking and preparing for Wildfire in the Wildland-Urban Interface - a Forest on the Edge Report.* Fort Collins, CO: US Department of Agriculture - Forest Service, Rocky Mountain Research Station.

Thomas, D. L., Sharp, T. M., Torres, J., Armstrong, P. A., Muñoz-Jordán, J., Ryff, K. R., . . . Rivera - García, B. (2016, February 19). Local Transmission of Zika Virus — Puerto Rico,. *Morbidity and Mortality Weekly Report, 65*(6). Retrieved December 29, 2025, from https://www.cdc.gov/mmwr/volumes/65/wr/pdfs/mm6506e2.pdf

Timothee, R. A., Morris, L., Filiberti, M., & Mainardi, L. E. (1963). Epidemic of Poliomyelitis in Puerto Rico, 1960. *Public Health Reports, 78*(1), 65 - 76.

US Census Bureau. (2025). *Census Data*. Retrieved November 21, 2025, from https://data.census.gov/table/ACSST5Y2023.S1701?g=050XX00US72021

US Census Bureau. (2025). *Census Data*. Retrieved November 21, 2025, from https://data.census.gov/table/ACSST5Y2023.S0101?g=050XX00US72021

US Census Bureau. (2025). *Census Data*. Retrieved November 30 30, 2025, from S1810 Disability Characteristics: https://data.census.gov/table/ACSST5Y2023.S1810?g=050XX00US72021

US Census Bureau. (2025). *Data Census*. Retrieved November 21, 2025, from https://data.census.gov/table?g=050XX00US72021

US Census Bureau. (2025). *Data Census*. Retrieved November 30, 2025, from S1810 Disability Characteristics: https://data.census.gov/table/ACSST5Y2018.S1810?g=050XX00US72021

US Census Bureau. (2025). *Data. Census*. Retrieved November 30, 2025, from S2201: Food Stamps/Supplemental Nutrition Assistance Program: https://data.census.gov/table/ACSST5Y2023.S2201?g=050XX00US72021

US Drought Monitor. (2025). *Data*. Retrieved December 16, 2025, from Time Series: https://droughtmonitor.unl.edu/DmData/TimeSeries.aspx

US Fire Administration. (2025, December 16). *What is the WUI?* Retrieved from https://www.usfa.fema.gov/wui/what-is-the-wui/

USACE. (n.d.). *Value to the Nation*. Retrieved December 22, 2025, from Flood Risk Mgmt: Economic Impaxct: https://www.iwr.usace.army.mil/Missions/Value-to-the-Nation/Flood-Risk-Mgmt/Flood-Risk-Economic-Impact/

USDOT - FRA. (2013). *Track Buckling Prevention: Theory, Safety Concepts, and Applications.* Washington DC: Office of Research and Development.

USFS. (n.d.). *Fire Effects Information System*. Retrieved December 16, 2025, from https://www.fs.usda.gov/database/feis/glossary.html#SCATTER-HOARD:

USGS. (2014). *Puerto Rico's Rainfall Deficit Indicates Drought*. Retrieved December 23, 2025, from https://www.usgs.gov/news/state-news-release/puerto-ricos-rainfall-deficit-indicates-drought

USGS. (2016). *Caribbean - Florida Water Science Center*. Retrieved December 23, 2025, from Drought Conditions in Puerto Rico: https://www.usgs.gov/centers/caribbean-florida-water-science-center-%28cfwsc%29/science/drought-conditions-puerto-rico

USGS. (2020). *La duración potencial de las réplicas del terremoto 2020 del suroeste de Puerto Rico.* Reston Virginia: Servicio Geológico de EE. UU.

USGS. (2024, September 10). Retrieved December 15, 2025, from Moment magnitude, Richter scale- what are the different magnitudes scales, and why are there so many?: https://www.usgs.gov/faqs/moment-magnitude-richter-scale-what-are-different-magnitude-scales-and-why-are-there-so-many

USGS. (n.d.). *Earthquake Hazard Program*. Retrieved December 15, 2025, from Earthquake Hazards Program 6.4 - 4 km SSE of Indios, Puerto Rico: https://earthquake.usgs.gov/earthquakes/eventpage/us70006vll/executive#d

USGS. (n.d.). *Topoview*. Retrieved Noviembre 12, 2025, from http://ngmdb.usgs.gov/topoview/#13/18.3925/-661240

Vega Lugo, R. (2021, February 21). *Enciclopedia de Puerto Rico*. Retrieved December 29, 2025, from El cólera morno en Puerto Rico, 1855 a 1856: https://enciclopediapr.org/content/el-colera-morbo-en-puerto-rico-1855-a-1856/

Ware-Gilmore, F., Rodríguez, D. M., Ryff, K., Torres, J. M., Pérez Vélez, M., Torres - Toro, C. T., . . . Marzán-Rodríguez, M. (2025, February 20). Dengue Outbreak and Response — Puerto Rico, 2024. *Morbidity and Mortality Weekly Report, 74*(5). Retrieved December 29, 2025, from https://www.cdc.gov/mmwr/volumes/74/wr/pdfs/mm7405-H.pdf

Weilert, L., & Laó-Dávila, D. (2023, August). Fault structure and segmentation of the Punta Montalva Fault in sourhwestern Puerto Rico using high-resolution digital elevation models. *Tectonophysics*.

WHO. (2025). *Floods*. Retrieved December 22, 2025, from https://www.who.int/health-topics/floods/#tab=tab_1

World Bank. (n.d.). *Climate Knowledge Portal*.

Appendix A: Adoption and Approval

Adoption

This shall be included in the Final version of this LHMP

Approval by FEMA

This shall be included in the Final version of this LHMP

Approved Pending Adoption

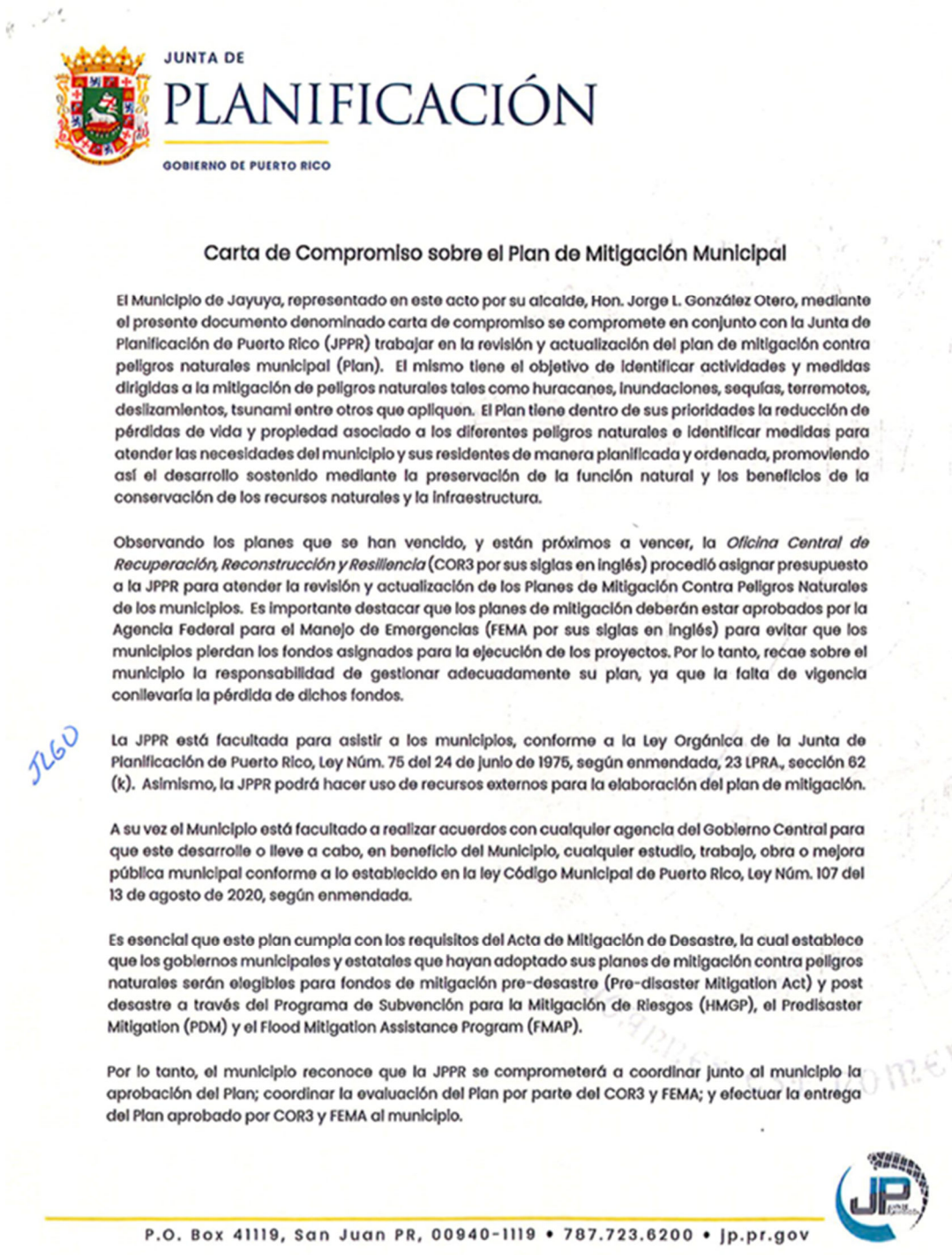
This shall be included in the Final version of this LHMP

FEMA Review Tool

This shall be included in the Final version of this LHMP

Appendix B: Planning Committee

Agreement Letter between the Municipality and the Planning Board



JUNTA DE
PLANIFICACIÓN
GOBIERNO DE PUERTO RICO

Carta de Compromiso sobre el Plan de Mitigación Municipal

El Municipio de Jayuya, representado en este acto por su alcalde, Hon. Jorge L. González Otero, mediante el presente documento denominado carta de compromiso se compromete en conjunto con la Junta de Planificación de Puerto Rico (JPPR) trabajar en la revisión y actualización del plan de mitigación contra peligros naturales municipal (Plan). El mismo tiene el objetivo de identificar actividades y medidas dirigidas a la mitigación de peligros naturales tales como huracanes, inundaciones, sequías, terremotos, deslizamientos, tsunami entre otros que apliquen. El Plan tiene dentro de sus prioridades la reducción de pérdidas de vida y propiedad asociado a los diferentes peligros naturales e identificar medidas para atender las necesidades del municipio y sus residentes de manera planificada y ordenada, promoviendo así el desarrollo sostenido mediante la preservación de la función natural y los beneficios de la conservación de los recursos naturales y la infraestructura.

Observando los planes que se han vencido, y están próximos a vencer, la *Oficina Central de Recuperación, Reconstrucción y Resiliencia* (COR3 por sus siglas en inglés) procedió asignar presupuesto a la JPPR para atender la revisión y actualización de los Planes de Mitigación Contra Peligros Naturales de los municipios. Es importante destacar que los planes de mitigación deberán estar aprobados por la Agencia Federal para el Manejo de Emergencias (FEMA por sus siglas en inglés) para evitar que los municipios pierdan los fondos asignados para la ejecución de los proyectos. Por lo tanto, recae sobre el municipio la responsabilidad de gestionar adecuadamente su plan, ya que la falta de vigencia conllevaría la pérdida de dichos fondos.

JLGO

La JPPR está facultada para asistir a los municipios, conforme a la Ley Orgánica de la Junta de Planificación de Puerto Rico, Ley Núm. 75 del 24 de junio de 1975, según enmendada, 23 LPRA., sección 62 (k). Asimismo, la JPPR podrá hacer uso de recursos externos para la elaboración del plan de mitigación.

A su vez el Municipio está facultado a realizar acuerdos con cualquier agencia del Gobierno Central para que este desarrolle o lleve a cabo, en beneficio del Municipio, cualquier estudio, trabajo, obra o mejora pública municipal conforme a lo establecido en la ley Código Municipal de Puerto Rico, Ley Núm. 107 del 13 de agosto de 2020, según enmendada.

Es esencial que este plan cumpla con los requisitos del Acta de Mitigación de Desastre, la cual establece que los gobiernos municipales y estatales que hayan adoptado sus planes de mitigación contra peligros naturales serán elegibles para fondos de mitigación pre-desastre (Pre-disaster Mitigation Act) y post desastre a través del Programa de Subvención para la Mitigación de Riesgos (HMGP), el Predisaster Mitigation (PDM) y el Flood Mitigation Assistance Program (FMAP).

Por lo tanto, el municipio reconoce que la JPPR se comprometerá a coordinar junto al municipio la aprobación del Plan; coordinar la evaluación del Plan por parte del COR3 y FEMA; y efectuar la entrega del Plan aprobado por COR3 y FEMA al municipio.

P.O. Box 41119, San Juan PR, 00940-1119 • 787.723.6200 • jp.pr.gov

El Municipio asignará una persona contacto o empleado municipal designado por el alcalde que será el contacto oficial (POC) del municipio para la coordinación, ejecución y la elaboración de la actualización del plan de mitigación. Esta persona trabajará directamente con el personal designado por la Junta de Planificación en este proyecto.

Asimismo, el Municipio agilizará y tramitará la adopción del plan mediante Orden Ejecutiva o a través de la Legislatura Municipal mediante Ordenanza Municipal. También coordinará en conjunto con la JPPR o el personal autorizado, el proceso de participación ciudadana.

Se coordinará por parte del municipio la recopilación de información necesaria que sea requerida, incluyendo:

- Identificación de todos los Riesgos locales – Descripción de los diferentes eventos ocurridos en el Municipio y los impactos que han tenido en la comunidad.
- Identificación de inventario de activos del Municipio, de considerarse el activo como uno crítico favor de identificar el mismo como activo-crítico.
- Información necesaria para complementar la Tabla de análisis de capacidad.
- Identificación e Implantación de las Medidas / actividades de Mitigación: Lista de proyectos y Plan de Acción describiendo cómo los proyectos serán implantados por prioridades, cómo serán administrados, si son costo-beneficiosos.
- Evaluación del Plan Preliminar.
- Evaluación del Borrador del Plan.
- Evaluación del Borrador Final del Plan.
- Implementación del Plan de Mitigación - Monitoreo, Evaluación y Actualización.
- Realizar los esfuerzos educativos y comunicación necesarios a los diferentes sectores de la ciudadanía de este proceso de actualización del plan.
- La JPPR coordinará con el municipio respecto a cualquier otra información que se requiera.

JLGO

Este compromiso no implica la erogación de fondos públicos por parte del municipio ni de la JPPR. A su vez, podrá ser terminado por la JPPR o por el Municipio, mediante comunicación escrita dirigida al presidente de la JPPR o al alcalde, según corresponda.

Por lo que, de acuerdo con este compromiso, yo, Jorge L. González Otero lo firmo conforme a los mejores intereses del pueblo de Jayuya.

En San Juan, Puerto Rico, hoy 16 de diciembre de 2025.

Alcalde

Planning Committee Appointment

NOTIFICACIÓN DE DESIGNACIÓN
Comité de Planificación del Municipio de Jayuya

Yo, Hon. Jorge L. González Otero alcalde del Municipio de Jayuya designo a los siguientes funcionarios y representantes como integrantes del *Comité de Planificación para la actualización del Plan de Mitigación contra Peligros Naturales del Municipio de Jayuya*, con el deber de apoyar, asesorar, coordinar y evaluar los trabajos de revisión, actualización, implementación y monitoreo del Plan mencionado.

Nombre	Puesto y Oficina	Correo electrónico	Teléfono (Ext.)
Edilberto Santiago Negrón	Dir. Manejo de Emergencia	esantiago@jayuya.puertorico.pr	(787)374-8051
Jeniffer Rivera Vélez	Asistente Administrativo	je.rivera@jayuya.puertorico.pr	(787)304-1976 ext. 1408
Adrián A. Bennette Rodríguez	Coordinador Proyectos	abennett@jayuya.puertorico.pr	(787)304-1976 ext. 1101
Miguel J. Figueroa Cancel	Sup. Obras Públicas	m.figueroa@jayuya.puertorico.pr	(787)304-1976 ext 2001
Lissette De Hoyos Gómez	Dir. Programas Federales	ldehoyos@jayuya.puertorico.pr	(787)304-1976 ext 1901
Delimar Rivera González	Dir. Finanzas	drivera@jayuya.puertorico.pr	(787)304-1976 ext. 1201
Idalia Pérez Abruña	Dir. Vivienda	iperez@jayuya.puertorico.pr	(787)304-1976 ext. 1901
Gaudy Vázquez Colón	Secretaría Municipal	g.vazquez@jayuya.puertorico.pr	(787)304-1976 ext. 1801
Karina I. Soto Martínez	Dir. Actividades	k.soto@jayuya.puertorico.pr	(787)304-1976 ext. 1420
Giomary Olivera Medina	Turismo, Promotora Actividades turísticas	golivera@jayuya.puertorico.pr	(787)304-1976 ext. 2503

Funciones principales del Comité:

- Coordinar con los trabajos relacionados con la actualización del Plan de Mitigación.
- Participar de talleres, presentaciones y reuniones sobre la actualización del Plan de Mitigación de Riesgos
- Proporcionar información, y datos sobre la evaluación de los riesgos y vulnerabilidades del municipio, así como las capacidades y los proyectos prioritarios de mitigación.
- Asegurar el cumplimiento con los requisitos estatales y federales para la elegibilidad de fondos de mitigación.
- Ayudar a diseñar y proponer acciones y proyectos de mitigación al municipio para fortalecer la resiliencia y reducir los riesgos de desastres.

- Mantener comunicación con la ciudadanía y promover la participación comunitaria en el proceso de mitigación.
- Apoyar la adopción e implantación del Plan de Mitigación.

Esta designación tendrá vigencia inmediata y se mantendrá en efecto hasta que se notifique lo contrario.

Firmada hoy, 26 de enero de 2026

Jorge L. González Otero
Nombre

Firma_____
Alcalde Municipio de Jayuya

JUNTA DE
PLANIFICACIÓN
GOBIERNO DE PUERTO RICO

FORMULARIO PARA DESIGNAR PERSONA(S) CONTACTO(S)
PLAN DE MITIGACIÓN CONTRA PELIGROS NATURALES

Municipio: Jayuya

	Nombre	Teléfono	Correo electrónico
Personal Designado	Edilberto Santiago Negrón	787-374-8051	esantiago@jayuya.puertorico.pr
Personal Alterno	Nayra Vazquez Colón	787-304-1976 ext. 3402	n.vazquez@jayuya.puertorico.pr
	Jenitffer Rivera Vélez	787-304-1976 ext. 1408	je.rivera@jayuya.puertorico.pr

Jorge L. González Otero
Nombre (letra de molde)
Alcalde

Firma
Alcalde

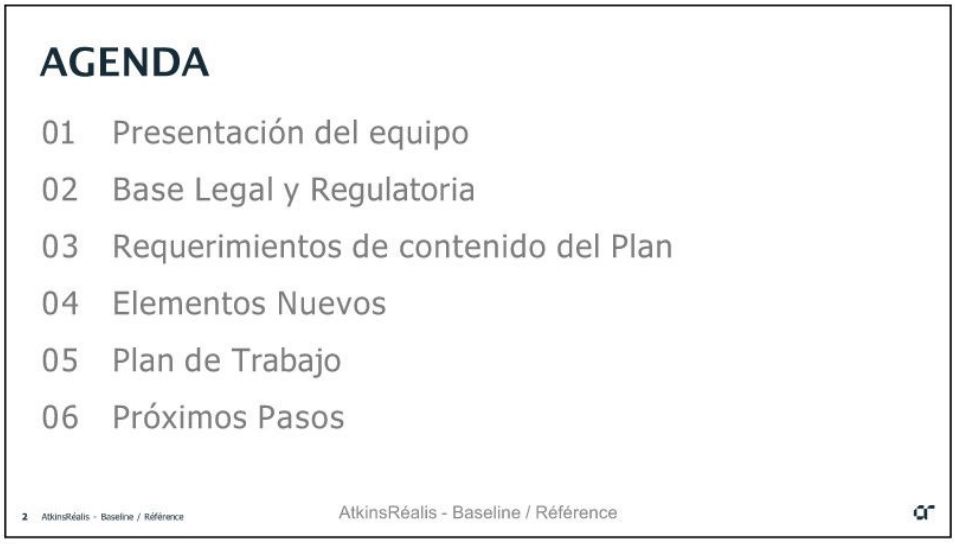
Fecha: 2 de diciembre de 2025

First Planning Committee Meeting

Presentation

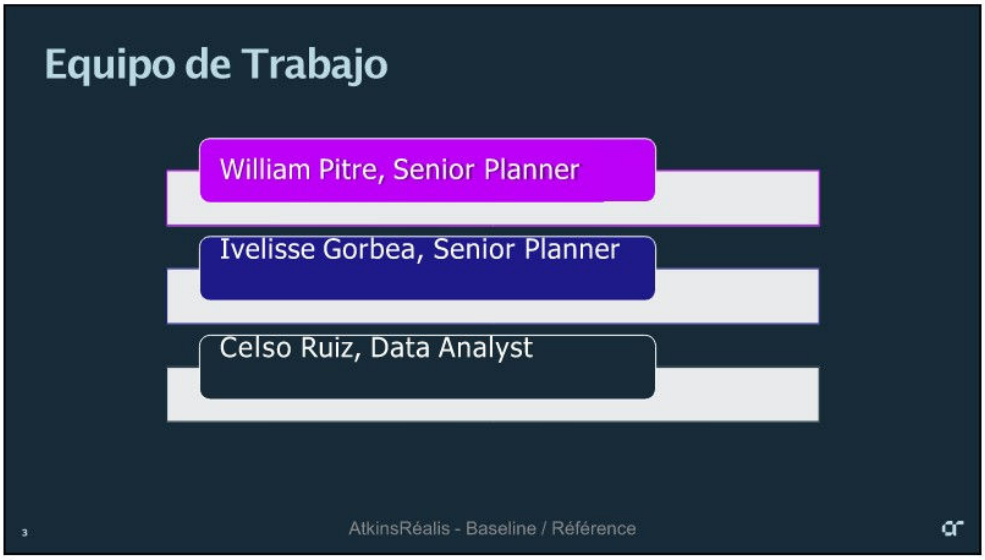


1

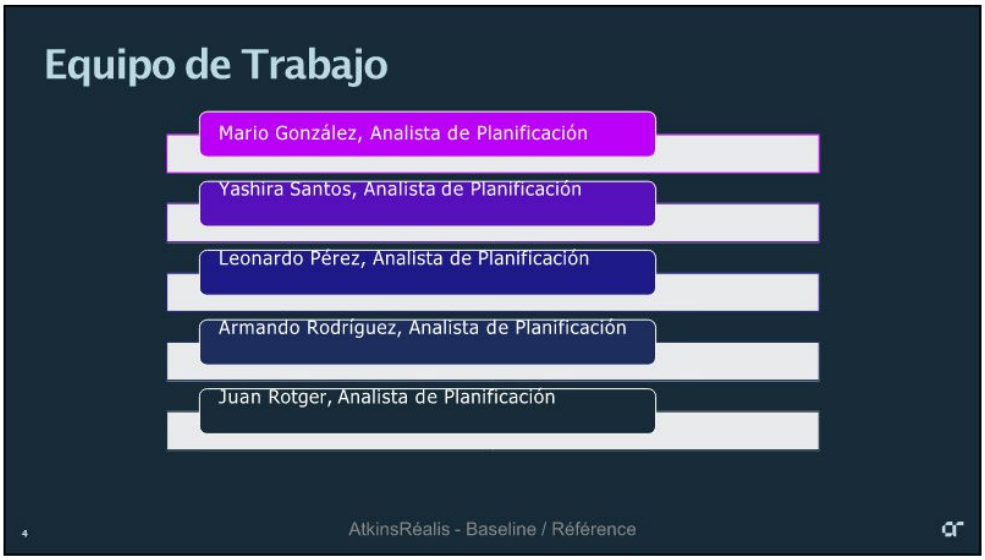


2

1


Equipo de Trabajo
William Pitre, Senior Planner
Ivelisse Gorbea, Senior Planner
Celso Ruiz, Data Analyst
3
AtkinsRéalis - Baseline / Référence

3


Equipo de Trabajo
Mario González, Analista de Planificación
Yashira Santos, Analista de Planificación
Leonardo Pérez, Analista de Planificación
Armando Rodríguez, Analista de Planificación
Juan Rotger, Analista de Planificación
4
AtkinsRéalis - Baseline / Référence

4

2

Base Legal y Regulatoria

- **Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act), as amended**

- PL 100-707, signed into law November 23, 1988; amended the Disaster Relief Act of 1974, PL 93-288.
- National Flood Insurance Act of 1968, as amended.
- National Dam Safety Program Act (Pub. L. 92-367), as amended.
- Regulation: 44 CFR Part 201 Mitigation Planning.

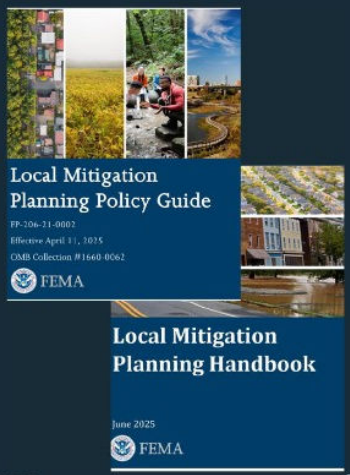


AtkinsRéalis - Baseline / Référence

9

Requerimientos del Plfn de Mitigfción

- Elemento A: Proceso de Planificación
- Elemento B: Identificación de Peligros y Evaluación de riesgos
- Elemento C: Estrategias de Mitigación
- Elemento D: Plan de Seguimiento e Implementación
- Elemento E: Actualización del Plan
- Elemento F: Adopción del Plan
- Elemento G: Peligros Potenciales ante fallos en Represas (opcional)
- Elemento H: Requisitos Estatales Adicionales



10 AtkinsRéalis - Baseline / Référence

AtkinsRéalis - Baseline / Référence

10

5

Elementos nuevos del Plan

1. **Identificación y evaluación de riesgos**
   - Se clasifica la infraestructura crítica por servicio vital o línea de vida
   - Se analiza su exposición y vulnerabilidad
   - Se prioriza por línea de vida
2. **Evaluación de capacidades**
   - Se evalúa la capacidad local para proteger servicios vitales
   - Se identifican brechas y se proponen acciones
3. **Estrategia de Mitigación**
   - Se incluyen acciones específicas para proteger, estabilizar y restaurar servicios vitales
4. **Participación de Partes Interesadas**
   - Se invita a agencias responsables o representantes de servicios vitales y se documenta su participación
   - Se comunica al público y recopila retroalimentación sobre los servicios vitales



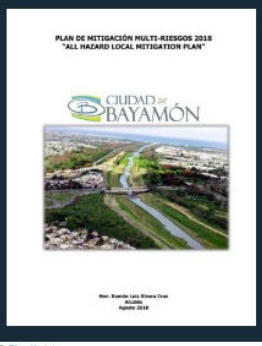
11 AtkinsRéalis - Baseline / Référence

AtkinsRéalis - Baseline / Référence

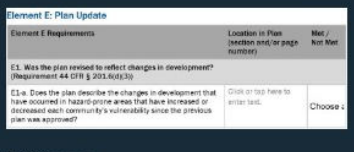
11

Elementos nuevos del Plan

- **Actualización del Plan:**
  "Review Tool" especifica los elementos que se deben documentar para reflejar los cambios
  - El Plan describe los cambios en las áreas propensas a peligros (ha incrementado o disminuido la vulnerabilidad o peligro)
  - Deberá reflejar los cambios en prioridades y progreso de los esfuerzos locales de mitigación.


PLAN DE MITIGACIÓN MULTI-RIESGOS 2018
"ALL HAZARD LOCAL MITIGATION PLAN"

CIUDAD DE BAYAMÓN


Element E: Plan Update

Element E Requirements	Location in Plan (section and/or page number)	Met / Not Met
E1. Was the plan revised to reflect changes in development? (Requirement 44 CFR § 201.6(d)(3))		
E1a. Does the plan describe the changes in development that have occurred in hazard-prone areas that have increased or decreased each community's vulnerability since the previous plan was approved?	Click or tap here to enter text.	Choose a

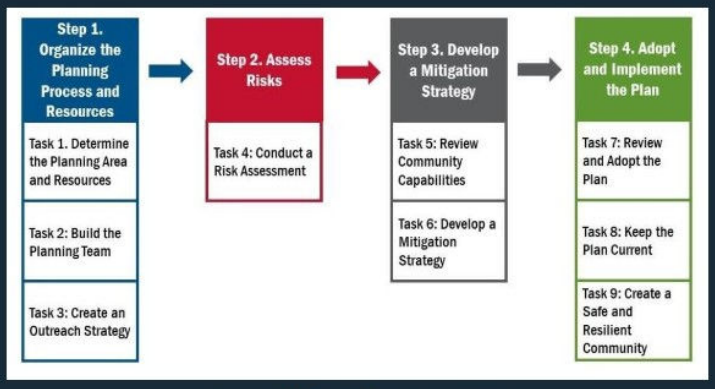
12 AtkinsRéalis - Baseline / Référence

AtkinsRéalis - Baseline / Référence

12

6

Proceso del Plfn de Mitigfción



13 AtkinsRéalis - Baseline / Référence

AtkinsRéalis - Baseline / Référence

13

Peligros a considerer para los cinco municipios

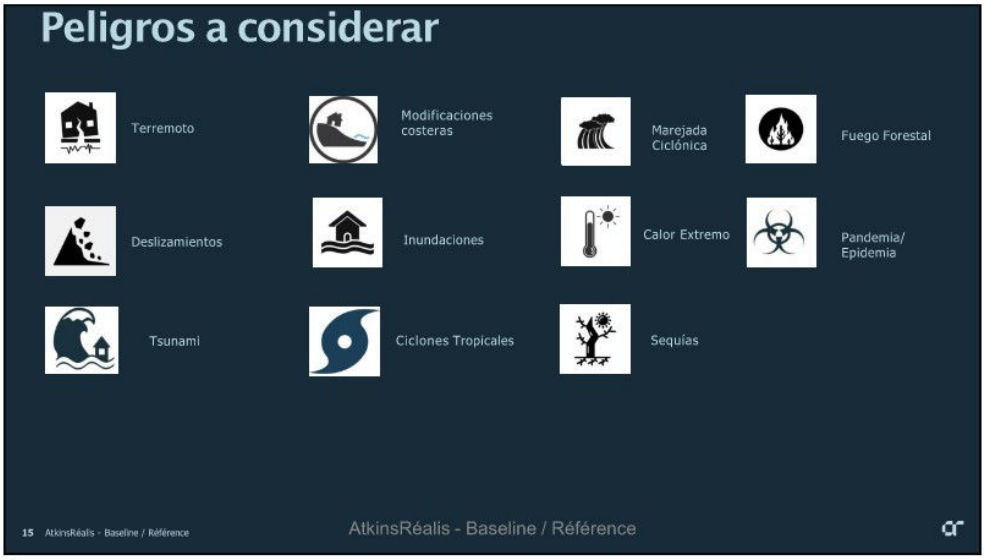


7

14 AtkinsRéalis - Baseline / Référence

AtkinsRéalis - Baseline / Référence

14

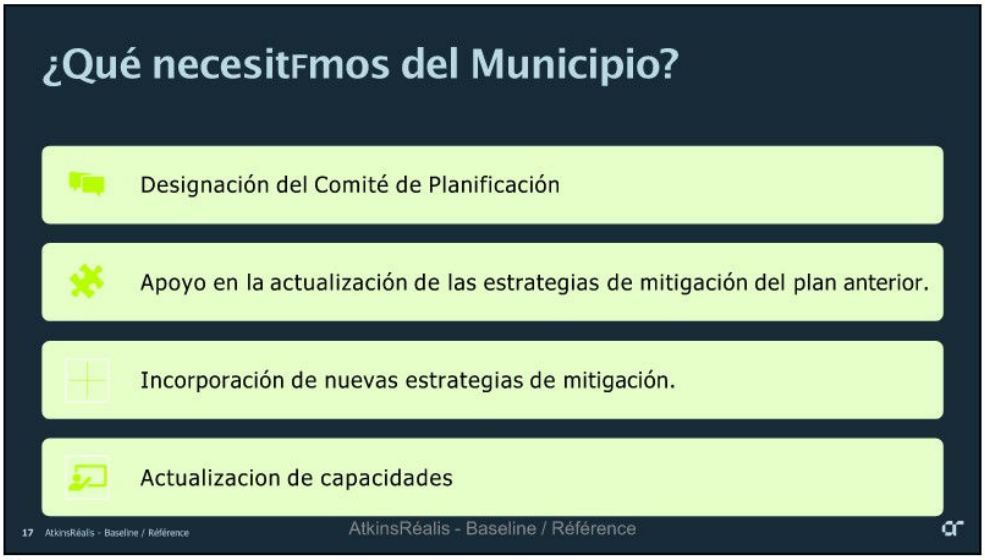

Peligros a considerar
Terremoto
Modificaciones costeras
Marejada Ciclónica
Fuego Forestal
Deslizamientos
Inundaciones
Calor Extremo
Pandemia/ Epidemia
Tsunami
Ciclones Tropicales
Sequías
15 AtkinsRéalis - Baseline / Référence
AtkinsRéalis - Baseline / Référence

15

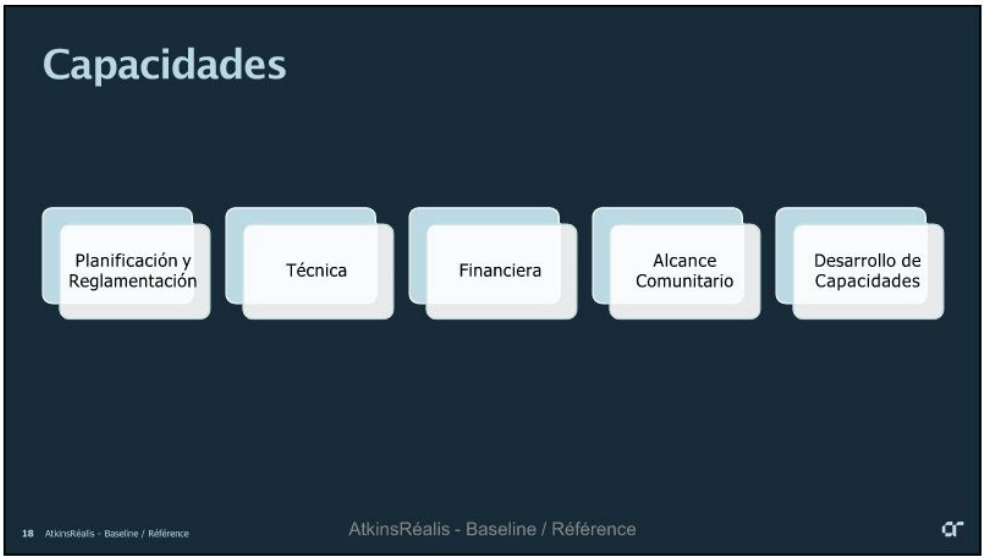

PeÉuelfs
Modificaciones costeras
Marejada Ciclónica
Tsunami
EN DIOS CONFIAMOS
16 AtkinsRéalis - Baseline / Référence
AtkinsRéalis - Baseline / Référence

16

8


¿Qué necesitFmos del Municipio?
Designación del Comité de Planificación
Apoyo en la actualización de las estrategias de mitigación del plan anterior.
Incorporación de nuevas estrategias de mitigación.
Actualizacion de capacidades
17 AtkinsRéalis - Baseline / Référence
AtkinsRéalis - Baseline / Référence

17


Capacidades
Planificación y Reglamentación
Técnica
Financiera
Alcance Comunitario
Desarrollo de Capacidades
18 AtkinsRéalis - Baseline / Référence
AtkinsRéalis - Baseline / Référence

9

18

PFrticipFCión Ciudadana

- Dos reuniones de participación ciudadana.
- Notificación sera publicada por Junta de Planificación.
- Publicar 15 días antes de la reunión
- Se otorga 15 días para comentarios
- Para la Segunda reunion se discute el primer borrador.
- El primer borrador sera comentado por el publico, el municipio y la Junta de Planificación

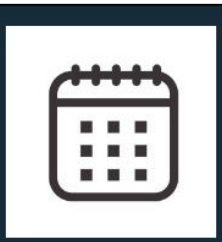


19 AtkinsRéalis - Baseline / Référence

AtkinsRéalis - Baseline / Référence

19

Ventana para la primera actividad de participacion ciudadana



26 de febrero al 6 de marzo.

Debe informar su fecha de reunion en o antes del lunes 9.

De varias fechas para que su analista de Planificación pueda estar.

Si no da sus posibles fechas en o antes del miércoles, no puedo asegurar que pueda atenderlo hasta que hayan pasado los demás municipios

20 AtkinsRéalis - Baseline / Référence

AtkinsRéalis - Baseline / Référence

20

10


JUNTA DE
PLANIFICACIÓN
Información de Contacto
Programa
Plan. Ivette Colón
Plan. William Pitre
Junta de Planificación
Junta de Planificación
AtkinsRéalsi Caribe
prpb.lhmp@atkinsrealis.com
colon_i@jp.pr.gov
William.Pitre@atkinsrealis.com
/+19392051336
Pedimos que el titulo de todo correo debe comience con el nombre del municipio unicamente.
e.j.: "San Germán – Tablas de Mitigación Actualizadas"
Solicitamos que en todo correo electrónico sobre el programa siempre copie al correo del programa:
"prpb.lhmp@atkinsrealis.com"
hayan pasado los demás municipios
AtkinsRéalis - Baseline / Référence

21


Grupos de Trabajo
AtkinsRéalis - Baseline / Référence

22

11

Sign-In sheets

JUNTA DE PLANIFICACIÓN
GOBIERNO DE PUERTO RICO

HOJA DE ASISTENCIA

Fecha: 2 de febrero de 2026 Hora: 1:30pm Asunto: 1era Reunión -Revisión Plan de Mitigación contra Peligros Naturales

Nombre y dos apellidos	Teléfono	Municipio	Firma	Correo Electrónico
Jorliffer Rivera Vélez	PII Protected			
Edilbert Santos Mejía				

MINUTA

PROYECTO:	PRPB 25 LHMP Update		
TITULO:	Primera Reunión con Comité de Planificación – Municipio de Jayuya		
LUGAR DE LA REUNIÓN:	Centro de Gobierno Roberto Sánchez Vilella, Sala de Prensa A y B, 300 Avenida José de Diego, San Juan, 00911, Puerto Rico	**# REUNIÓN:**	1
FECHA Y HORA:	02/02/2026 1:00pm – 04:00pm	**MINUTA POR:**	Mario González

Lista de Asistencia:

NOMBRE	COMPAÑÍA
Edilberto Santiago Negrón	Municipio de Jayuya
Jeniffer Rivera Vélez	Municipio de Jayuya
William Pitre	AtkinsRéalis Caribe (ARC)
Ivette Colón	Junta de Planificación de Puerto Rico (JPPR)
Mario González	AtkinsRéalis Caribe (ARC)

Asuntos Discutidos:

ID	ASUNTOS DISCUTIDOS
AD-1	Presentación e Introducción al Programa: • La reunión inició con una presentación a cargo de I. Colón y W. Pitre, en la cual se ofreció el trasfondo del Programa y se delinearon sus próximos pasos. Tras concluir la exposición, el equipo de ARC se distribuyó entre los municipios participantes para dar comienzo a los talleres iniciales.

NOTA A LOS DESTINATARIOS:
Estas notas de la reunión reflejan la interpretación de AtkinsRéalis sobre la reunión y las acciones previstas que se derivan de la misma. Se asumirá su conformidad en que estas notas constituyen un registro fiel de lo discutido, a menos que se reciban comentarios adversos por escrito dentro de los cinco (5) días posteriores a su recepción.

PLANIFICACIÓN AtkinsRéalis 1

ID	ASUNTOS DISCUTIDOS
	• E. Santiago comentó que el Municipio de Jayuya ya comenzó a actualizar el Plan de Mitigación del Municipio, al igual que las Tablas de Estrategias de Mitigación y la identificación de estrategias nuevas.
AD-2	Ejercicio de Actualización de Priorización de Riesgos: • El ejercicio comenzó con un repaso de la priorización de riesgos en la versión previa del Plan de Mitigación del Municipio de Jayuya. M. González solicitó al municipio repasar la priorización de riesgos definida en el plan anterior y discutir si el comportamiento de estos riesgos ha sufrido algún cambio. E. Santiago comentó que los riesgos es que más impactan al municipio son los vientos fuertes (incluyendo tornados) e inundaciones ribereñas. El impacto de los vientos fuertes se manifiesta en el municipio en la destrucción de cosechas e infraestructura. Otro impacto de los vientos en el municipio es el acarreo de salitre. E. Santiago comentó que, debido a la confluencia de vientos costeros a la altura del municipio, estas concentran una gran cantidad de salitre que impacta la infraestructura crítica del municipio. Sobre las inundaciones, E. Santiago comentó que el problema principal es el acarreo de sedimento arenoso a lo largo del río. E.Santiago argumentó que el depósito de este sedimento altera el comportamiento del río, en ocasiones provocando inundaciones temporeras localizadas en el Casco Urbano. E. Santiago comentó que entre los riesgos a los que reducirán en prioridad son los deslizamientos. Explicó que la mayoría de los proyectos de deslizamientos ya se han completado o están en proceso y que, en ausencia de un evento mayor como los huracanes de la temporada 2017, el municipio no ha sufrido un volumen comparable de deslizamientos en su territorio.
AD-3	Actualización de Tablas de las Estrategias de Mitigación: • El ejercicio de Actualización de Tablas de las Estrategias de Mitigación comenzó con M. González explicando que FEMA ha establecido este ejercicio como un requisito para la aprobación de los Planes de Mitigación. Explicó que la narrativa utilizada para presentar una actualización debe reflejar con precisión el estado actual del proyecto. Además, indicó que, si se propone eliminar o incorporar alguna estrategia, esta debe incluirse en la tabla revisada y acompañarse de una justificación en la narrativa que sustente la adición o eliminación de la acción. E. Santiago recalcó que el municipio ya comenzó a actualizar las tablas de las estrategias de mitigación y entienden poderlo entregar a la brevedad posible.
AD-4	Ejercicio de Identificación de Necesidades Nuevas • El ejercicio para identificar necesidades nuevas ocurrió paralelo a la discusión sobre la priorización de riesgos y la actualización de las tablas de estrategias de mitigación. Entre las estrategias nuevas que le interesa al municipio la ampliación y estandarización de rutas de acceso a la infraestructura crítica del municipio, la planificación, diseño y construcción de reservas estratégicas de agua en las comunidades, el estudio y rediseño de los sistemas de drenaje pluvial en barrios como el casco urbano, Mameyes y otros. E. Santiago comentó que para atender los problemas de sedimentación, el municipio intenciona desarrollar una Fábrica de Asfalto para aprovechar el sedimento existente y procesar material como viruta, escombros, vidrio y neumáticos. Finalmente, E. Santiago comentó que es

NOTA A LOS DESTINATARIOS:
Estas notas de la reunión reflejan la interpretación de AtkinsRéalis sobre la reunión y las acciones previstas que se derivan de la misma. Se asumirá su conformidad en que estas notas constituyen un registro fiel de lo discutido, a menos que se reciban comentarios adversos por escrito dentro de los cinco (5) días posteriores a su recepción.

ID	ASUNTOS DISCUTIDOS
	prioridad para el municipio establecer un sistema de comunicación y almacenamiento de datos con redundancia que pueda ser operacional antes durante y luego de un evento mayor.
AD-5	Discusión de Acciones por Tomar • M. González recalcó la importancia de que el municipio priorice la entrega de las Tablas de Estrategias de Mitigación. E. Santiago recalcó que el equipo municipal estará entregando las tablas actualizadas a la brevedad posible.
AD-6	Coordinación de Primera Reunión Comunitaria • M. González comentó que el municipio debe proveer dos fechas para la primera reunión con la comunidad, al igual que la localización de la misma. E. Santiago comentó que proveerá una respuesta a la JPPR atendiendo esta petición, lo más pronto posible.

Acciones Por Tomar:

ID	ACCIONES POR TOMAR	FECHA LÍMITE	ENTIDAD RESPONSABLE
AT-1	Entrega de Tablas de Estrategias de Mitigación actualizada.	Lo más pronto posible.	Municipio de Jayuya
AT-2	Confirmar fecha, lugar y hora para la primera reunión comunitaria.	Lo más pronto posible.	Municipio de Jayuya

Acuerdos/Aclaraciones:

ID	DESCRIPCIÓN
AC-1	N/A

Anejos:

ID	DESCRIPCIÓN ANEJO	NÚMERO DE PÁGINAS
AN-1	N/A	N/A

PRÓXIMA REUNIÓN:	Por definir.

NOTA A LOS DESTINATARIOS:
Estas notas de la reunión reflejan la interpretación de AtkinsRéalis sobre la reunión y las acciones previstas que se derivan de la misma. Se asumirá su conformidad en que estas notas constituyen un registro fiel de lo discutido, a menos que se reciban comentarios adversos por escrito dentro de los cinco (5) días posteriores a su recepción.

MEDIO DE DISTRIBUCIÓN:	Correo Electrónico.		
FECHA DISTRIBUCIÓN:	02/12/2026	**ARCHIVO DE REFERENCIA:**	First Planning Committee Meeting

NOTA A LOS DESTINATARIOS:
Estas notas de la reunión reflejan la interpretación de AtkinsRéalis sobre la reunión y las acciones previstas que se derivan de la misma. Se asumirá su conformidad en que estas notas constituyen un registro fiel de lo discutido, a menos que se reciban comentarios adversos por escrito dentro de los cinco (5) días posteriores a su recepción.

Appendix C – Public Participation and Outreach

First Community Meeting: February 25th, 2026





PRIMERA HORA Viernes, 13 de febrero de 2026 23



pressreader


Municipio de Jayuya
1:09
5G 80
AVISO PÚBLICO | PRIMERA REUNIÓN DE PLANIFICACIÓN CON LA COMUNIDAD
La Junta de Planificación del Gobierno de Puerto Rico, en conjunto con el Municipio de Jayuya, invita a organismos gubernamentales, entidades privadas, comerciantes, líderes comunitarios y ciudadanía en general a participar de la Primera Reunión de Planificación con la Comunidad, como parte de la revisión del Plan de Mitigación contra Peligros Naturales.
La mitigación de riesgos es una herramienta clave para reducir el impacto de eventos como inundaciones, huracanes, sequías, deslizamientos y terremotos, protegiendo vidas y propiedad en nuestro municipio.
Fecha: 25 de febrero de 2026
Hora: 10:00 a.m.
Lugar: Salón de la Legislatura Municipal (2do piso, Alcaldía) PR-532, Jayuya, PR
La participación ciudadana es fundamental para fortalecer la planificación y protección de nuestra comunidad.
Para más información, puede acceder a: jp.pr.gov
PLANIFICACIÓN
AVISO PÚBLICO
PRIMERA REUNIÓN DE PLANIFICACIÓN CON LA COMUNIDAD
La Junta de Planificación, junto al Municipio de Jayuya, invitan a los organismos gubernamentales, entidades privados, dueños de negocios, líderes comunitarios y ciudadanía en general a participar de la 1ra reunión de Planificación con la Comunidad para la revisión del Plan de Mitigación contra Peligros Naturales.
Los peligros naturales pueden causar la pérdida de vida y propiedad y tener consecuencias nefastas. La mitigación de riesgos es el esfuerzo de nuestra comunidad por reducir los daños o riesgos ocasionados por peligros naturales mediante el diseño de medidas que reduzcan su impacto.
El Plan de Mitigación contra Peligros Naturales para el Municipio de Jayuya tiene el propósito de guiar al gobierno municipal en el desarrollo y adopción de estrategias dirigidas al manejo de peligros, tales como inundaciones, huracanes, sequías, deslizamientos, terremotos y otros.
FECHA: 25 DE FEBRERO DE 2026
HORA: 10:00 AM
LUGAR: SALÓN DE LA LEGISLATURA MUNICIPAL
2DO PISO, ALCALDÍA
PR-532, JAYUYA, PR
JAYUYA
PLANES DE MITIGACIÓN
CONTRA PELIGROS NATURALES
Planificar para proteger

Aviso Participación Ciudadana
Plan de Mitigación
Tercera Revisión



Cumpliendo con la reglamentación Federal del Municipio Autónomo de Jayuya se encuentra en revisión del Plan de Mitigación Multirriesgo

- El Plan de Mitigación consiste en la evaluación de una entidad identificando áreas de alto riesgo y que acción se realizara para prevenir, reducir o eliminar a largo plazo daños y/o perdidas de vida y propiedad ocasionadas por la naturaleza o por el hombre.

- El plan de Mitigación garantiza el compromiso de la entidad en llevar a cabo estos objetivos. Este plan consiste en varias partes, a saber. Evaluación de peligros, análisis de vulnerabilidad, estrategias de mitigación, procesos de mantenimiento del plan, monitoria, ejecución de proyectos y actualización del plan.

- El Plan se revisa cada cinto (5) años, luego de ser aprobado por FEMA o se puede enmendar cuando el solicitante lo requiera.

¿Cuáles son los beneficios de tener un Plan de Mitigación aprobado?

- Al tener un Plan de Mitigación aprobado el municipio podrá solicitar fondos para realizar proyectos en los programas de mitigación.

- Reduce los daños por cada riesgo que afecte el municipio.

- Presenta la acción y los recursos disponibles para realizar los proyectos en áreas identificadas.

- Establece las acciones en orden de prioridades, según las necesidades de las familias afectadas en cada comunidad.

La Junta de Planificación, junto al Municipio de Jayuya, invitan a los organismos gubernamentales, entidades privadas, dueños de negocios, líderes comunitarios y ciudadanía en general a participar de las vistas informativas para la revisión del plan de Mitigación conta Peligros Naturales.

Fecha: miércoles, 25 de febrero de 2026
Hora: 10:00 am
Lugar: Legislatura Municipal, 2do Piso

Presentation



Estrategias de Mitigación

- Describir las metas y objetivos específicos para minimizar el impacto en el municipio.
- Identificar acciones de mitigación específicas y proyectos.
- Estas pueden incluir:
  - **Prevención-** actividades tales como planificación usos terrenos, regulaciones, mantenimientos, etc.
  - **Protección de propiedades-** mejoras de diseños, relocalización, adquisición, etc.
  - **Proyectos de estructura-** ej. Diques, muros de contención, alcantarillado pluvial, etc.
  - **Servicios de emergencia-** alertas, sistemas de advertencias, manejo y planes de desalojo, ejercicios de respuesta a emergencias, etc.
  - **Educación y concientización pública.**

Mantenimiento y Documentación del Plan

- **Monitoreo:** Identificar frecuencia para verificar el progreso de las acciones en el plan.
- **Evaluación:** Determinar si el plan sigue siendo viable, si las acciones aún tienen sentido, etc.
- **Actualización:** Si se determina que algo debe cambiarse en el proceso de evaluación, identificar persona a cargo (comité de planificación) para la actualización cada 5 años.
- **Adopción del Plan por el municipio:** ordenanza de la legislatura municipal u orden ejecutiva del alcalde.
- **Revisión, certificación y aprobación de FEMA.**

Proyecto Actualización de los Planes de Mitigación



Alcance del Trabajo

1. Revisar y actualizar los planes de mitigación contra peligros naturales de acuerdo con las nuevas guías y regulaciones.
2. Coordinar las actividades y trabajos en conjunto con el municipio y la Junta de Planificación.
3. Promover la participación ciudadana.
   - Reuniones de planificación con la comunidad
   - Página cibernética JP (www.jp.pr.gov)



plandemitigación@jp.pr.gov

Actividades del Proyecto



Encuesta de la Comunidad

Identificar Áreas de Riesgo



¡Gracias!

Información de Contacto

Lcdo. Héctor Morales Martínez
Presidente

Plan. Rebecca Rivera Torres
Directora Ejecutiva Auxiliar Interina
Miembro Alterno
Rivera_rt@jp.pr.gov

Plan. Ivette Colón Meléndez
Planificadora de Ordenación Territorial Senior
colon_ig@jp.pr.gov

Plan. Erika Rivera Felicié
Planificadora de Ordenación Territorial Senior
rivera_el@jp.pr.gov

Plan. Vanessa I. Marrero Santiago
Planificadora de Ordenación Territorial
marrero_v@jp.pr.gov

Plan. Onix Concepción Rodríguez
Planificador de Ordenación Territorial
Concepcion_o@jp.pr.gov

plandemitigacion@jp.pr.gov
*Incluir nombre del municipio en el asunto.

787-723-6200 ext. 16623 y 16681

Municipio Autónomo de Jayuya
Apartado 488
Jayuya, Puerto Rico 00664
(787)304-1976 ext. 1402,1403

MINUTA DE REUNIÓN

3.ª Revisión del Plan de Mitigación Municipal

(Reunión comunitaria de orientación)

Fecha: 25 de febrero de 2026

Hora: 10:30 a. m.

Hora culmina: 11:28 a. m.

Lugar: Municipio de Jayuya / Manejo de Emergencias / Salón de Actividades

1. Participantes

Comité de Mitigación (10 integrantes):

- Edilberto Santiago Negrón, Director Manejo de Emergencias
- Adrián Alexis Bennett Rodríguez, Coordinador Proyectos Reconstrucción
- Idalia Pérez Abruña, Directora Vivienda
- Wilmer Rivera Guzmán, Director Recreación y Deportes
- Giomary Olivera Medina, Promotora Turística
- Delimar Rivera González – Directora de Finanzas
- Lissette De Hoyos Gómez – Directora Programas Federales
- Gaudy Vázquez Colón-Secretaria Municipal
- Karina I. Soto Martínez-Directora Actividades
- Jeniffer Rivera Vélez-Asistente Administrativo

Invitados / Apoyo institucional:

- Hon. Jorge L. González Otero, Alcalde (presente)
- Hon. José A, González Gilbes, Presidente Legislatura Muncipal (presente)
- Ivette Colón Meléndez– Junta de Planificación (San Juan), presentadora y orientadora del proceso (presente)

1

- Equipo de la Junta de Planificación: Héctor Morales (Presidente JP), Rebeca Rivera, Vanessa Marrero, Onix Concepción.

  Participación ciudadana: Vecinos, líderes comunitarios y público general (presencial y Facebook Live).

2. Propósito de la reunión

Orientar a la comunidad sobre el proceso de revisión del Plan de Mitigación (actualización requerida cada 5 años), explicar su importancia para acceso a fondos federales y abrir espacios para participación comunitaria mediante borrador, comentarios, encuesta y ejercicios con mapas.

3. Agenda / Temas atendidos

1. Bienvenida e introducción: importancia del Plan de Mitigación y enfoque estratégico municipal.
2. Explicación del proceso de revisión (cada 5 años) y rol del comité.
3. Participación ciudadana: borrador próximamente disponible, mecanismo de comentarios y cuestionario.
4. Presentación de la Junta de Planificación: trasfondo legal y conceptos básicos.
5. Pasos del proceso y cronograma estimado (4 meses para Jayuya).
6. Riesgos y peligros naturales aplicables (deslizamientos, calor extremo, sequía, entre otros).
7. Estrategias de mitigación: infraestructura, uso de terrenos, educación y servicios de emergencia.
8. Próximas acciones: encuesta digital, ejercicio de mapas y canales de comunicación.

4. Desarrollo (Resumen Narrativo)

Apertura (Edilberto Santiago Negrón)

Se dio la bienvenida a la 3.ª revisión del Plan de Mitigación y se explicó que el plan permite planificar estratégicamente, convertir necesidades en proyectos con costo y tiempo definido, y fortalecer la posición del municipio al momento de solicitar fondos.

Se indicó que la revisión se realiza cada cinco años mediante un comité de siete personas. Se anunció que el borrador estará disponible en Manejo de Emergencias y que se distribuirá un cuestionario comunitario.

Se mencionaron ejemplos de proyectos incluidos en el plan, como la canalización del río, destacando la importancia de que estén documentados para poder solicitar financiamiento.

Presentación (Ivette Colón – Junta de Planificación)

Se explicó que la Junta de Planificación recibió asignación para atender 25 municipios con planes vencidos o por vencer. Se enfatizó la importancia del plan actualizado para oportunidades de financiamiento.

Se detalló que el proceso surge de FEMA y la Ley de Mitigación de Desastres del 2000, incluyendo evaluación de riesgos, capacidades municipales, estrategias de mitigación y mantenimiento del plan.

Se explicó el proceso de aprobación: radicación ante COR3/FEMA, aprobación pendiente de adopción (APA) y adopción municipal mediante orden ejecutiva u ordenanza.

Cierre y Participación Comunitaria

Se realizó una encuesta digital para recopilar datos comunitarios y se invitó a participar en un ejercicio de mapas para identificar situaciones particulares.

Se ofreció el correo electrónico plandemitigacion@jp.pr.gov como canal oficial de comunicación.

5. Acuerdos y determinaciones

- Continuar el proceso con participación comunitaria activa.
- Mantener el borrador accesible en Manejo de Emergencias.
- Realizar una segunda reunión comunitaria cuando el borrador esté disponible.
- Integrar comentarios recibidos al documento final.
- Incluir proyectos comunitarios para futura elegibilidad de fondos.

6. Tareas asignadas

Responsable	Tarea	Fecha límite / Observación
Junta de Planificación	Preparar borrador del plan	Próximos 4 meses
Municipio / Comité	Divulgar convocatorias y avisos	Durante el proceso
Manejo de Emergencias	Mantener borrador disponible	Al estar disponible
Comunidad	Completar encuesta y ejercicio de mapas	Periodo de participación
JP + Municipio	Coordinar reunión #2	Al entregar borrador
Municipio	Adoptar plan tras aprobación APA	Luego de aprobación FEMA/CO3

7. Próxima reunión

Reunión #2: Presentación del borrador del Plan de Mitigación a la comunidad (fecha por determinar).

8. Notas adicionales

Se reiteró la importancia de incluir proyectos en el plan para solicitar fondos cuando existan asignaciones.

Se destacó la integración del gobierno, la comunidad, el sector privado y organizaciones sin fines de lucro.

CERTIFICACIÓN

Yo, Edilberto Santiago Negrón, certifico que esta minuta recoge fielmente los asuntos discutidos en la reunión celebrada el 25 de febrero de 2026 relacionada a la 3.ª Revisión del Plan de Mitigación Municipal del Municipio de Jayuya.

Edilberto Santiago Negrón
Director Manejo de Emergencias
Municipio Autónomo de Jayuya

9. ANEJOS

- Evidencia fotográfica
- Encuesta digital
- Capturas de transmisión en redes sociales
- Copia del cuestionario
- Lista de asistencia

EVIDENCIA FOTOGRAFICA ·





6



ENCUESTA DIGITAL



7


Municipio de Jayuya
1:09
5G 80
AVISO PÚBLICO | PRIMERA REUNIÓN DE PLANIFICACIÓN CON LA COMUNIDAD
La Junta de Planificación del Gobierno de Puerto Rico, en conjunto con el Municipio de Jayuya, invita a organismos gubernamentales, entidades privadas, comerciantes, líderes comunitarios y ciudadanía en general a participar de la Primera Reunión de Planificación con la Comunidad, como parte de la revisión del Plan de Mitigación contra Peligros Naturales.
La mitigación de riesgos es una herramienta clave para reducir el impacto de eventos como inundaciones, huracanes, sequías, deslizamientos y terremotos, protegiendo vidas y propiedad en nuestro municipio.
Fecha: 25 de febrero de 2026
Hora: 10:00 a.m.
Lugar: Salón de la Legislatura Municipal (2do piso, Alcaldía) PR-532, Jayuya, PR
La participación ciudadana es fundamental para fortalecer la planificación y protección de nuestra comunidad.
Para más información, puede acceder a: jp.pr.gov
Junta de PLANIFICACIÓN
AVISO PÚBLICO
PRIMERA REUNIÓN DE PLANIFICACIÓN CON LA COMUNIDAD
La Junta de Planificación, junto al Municipio de Jayuya, invitan a los organismos gubernamentales, entidades privadas, dueños de negocios, líderes comunitarios y ciudadanía en general a participar de la 1ra reunión de Planificación con la Comunidad para la revisión del Plan de Mitigación contra Peligros Naturales.
Los peligros naturales pueden causar la pérdida de vida y propiedad y tener consecuencias nefastas. La mitigación de riesgos es el esfuerzo de nuestra comunidad por reducir los daños o riesgos ocasionados por peligros naturales mediante el diseño de medidas que reduzcan su impacto.
El Plan de Mitigación contra Peligros Naturales para el Municipio de Jayuya tiene el propósito de guiar al gobierno municipal en el desarrollo y adopción de estrategias dirigidas al manejo de peligros, tales como inundaciones, huracanes, sequías, deslizamientos, terremotos y otros.
FECHA: 25 DE FEBRERO DE 2026
HORA: 10:00 AM
LUGAR: SALÓN DE LA LEGISLATURA MUNICIPAL
2DO PISO, ALCALDÍA
PR-532, JAYUYA, PR
JAYUYA
PLANES DE MITIGACIÓN CONTRA PELIGROS NATURALES
Planificar para proteger

8

CAPTURAS TRANSMISIÓN EN REDES SOCIALES (FACEBOOK)







9

JUNTA DE PLANIFICACIÓN
GOBIERNO DE PUERTO RICO

PLANES DE MITIGACIÓN CONTRA PELIGROS NATURALES
Planificar para proteger

HOJA DE ASISTENCIA

Asunto: 1era Reunión de Planificación con la Comunidad- Municipio de Jayuya
Fecha: 25 de febrero de 2026
Lugar: Salón de la Legislatura Municipal, 2do Piso Alcaldía de Jayuya
Hora: 10:00 am

Nombre completo (en letra de molde)	Municipio/Barrio/ Comunidad	Teléfono	Correo electrónico	Firma
Edilberto Santiago Negrón	Municipio Jayuya			
Ingrid Y. Colón Pagán	Mun. Jayuya Comunidad Zamas			
Zaida N. Soto Struble	Comunidad Zamas			
Ruby Casimir Molina	Comunidad Sta Clara			
Asa Miguel A Rodriguez - Sindico	DTTO Jayuya			
Dalilma Rivera Guzmán	Mun. Jayuya Planificadora			
Noel A. Román Torres	Santa Clara			
Jeremías Morales Torres	Salcoto			
Lcdo. M. delValle	Jayuya - Sria Pesidora			
Dalila Rivera González	Municipio Jayuya - Plan Fed			

PII Protected

JUNTA DE PLANIFICACIÓN
GOBIERNO DE PUERTO RICO

PLANES DE MITIGACIÓN CONTRA PELIGROS NATURALES
Planificar para proteger

HOJA DE ASISTENCIA

Asunto: 1era Reunión de Planificación con la Comunidad- Municipio de Jayuya
Fecha: 25 de febrero de 2026
Lugar: Salón de la Legislatura Municipal, 2do Piso Alcaldía de Jayuya
Hora: 10:00 am

Nombre completo (en letra de molde)	Municipio/Barrio/ Comunidad	Teléfono	Correo electrónico	Firma
Luis A. Silvestrini Ruiz	Coricabos			
Carmen M. Pagán Cruz	Vegueta Zamas			
Delimar Rivera González	Bo Zamas			
Jacklie Rodríguez Cruz	Rio Grande			
Carmen A. Burgos Torres	Vegueta Zamas			
Jeremías Morales Torres	Salcoto			
Noel A. Román Torres	Santa Clara/La Meseta			
Benedicto Martínez Nuñez	Bo. Collores - Sta Rosa			
Adrian A. Barrett Rodriguez	Bo. Mameyes			
Giomary Oliveras Medina	Santa Clara			

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JUNTA DE PLANIFICACIÓN
GOBIERNO DE PUERTO RICO

PLANES DE MITIGACIÓN CONTRA PELIGROS NATURALES
Planificar para proteger

HOJA DE ASISTENCIA

Asunto: 1era Reunión de Planificación con la Comunidad- Municipio de Jayuya
Fecha: 25 de febrero de 2026
Lugar: Salón de la Legislatura Municipal, 2do Piso Alcaldía de Jayuya
Hora: 10:00 am

Nombre completo (en letra de molde)	Municipio/Barrio/ Comunidad	Teléfono	Correo electrónico	Firma
Jeniffer Rivera Vélez	Jayuya			
Gaudy J. Vázquez Ortiz	Jayuya			
Jorge L. González	Jayuya			
Linnay González Torres	Jayuya			
Mario Hernández Bianchi	Jayuya			
Ivette Colón Meléndez	Junta de Planificación			

PII Protected

Appendix D: Stakeholder Involvement



JUNTA DE
PLANIFICACIÓN
GOBIERNO DE PUERTO RICO

18 de mayo de 2026

Hon. Waldemar Quiles Pérez
Secretario
Departamento de Recursos Naturales y Ambientales
San José Industrial Park 1375
Avenida Ponce de León
San Juan, PR 00926

Vía correo electrónico:
waldemar.quiles@drna.pr.gov; brendaliz.gonzalez@drna.pr.gov

RE: SOLICITUD DE INFORMACIÓN PARA LA ACTUALIZACIÓN DE LOS PLANES DE MITIGACIÓN CONTRA PELIGROS NATURALES MUNICIPALES

Estimado señor secretario:

¡Reciba un cordial saludo! La Junta de Planificación (JP) se encuentra en proceso de apoyar a veinticinco municipios en el proceso de actualización de los planes locales de mitigación ante peligros naturales (LHMP, por sus siglas en inglés). Los municipios que son parte de esta iniciativa son; 1) Adjuntas, 2) Aguada, 3) Aguas Buenas, 4) Añasco, 5) Arecibo, 6) Arroyo, 7) Barranquitas, 8) Cataño, 9) Ceiba, 10) Comerío, 11) Dorado, 12) Hatillo, 13) Isabela, 14) Jayuya, 15) Las Marías, 16) Patillas, 17) Peñuelas, 18) Rincón, 19) Salinas, 20) San Germán, 21) Santa Isabel, 22) Utuado, 23) Vega Alta, 24) Vieques y 25) Yabucoa. Estos planes son de gran importancia para los municipios, ya que brindan la oportunidad de fortalecer estrategias de mitigación ante los eventos naturales a los cuales sus residentes son vulnerables. Además de tener estos planes actualizados es un requisito federal para que el municipio sea elegible para recibir fondos para proyectos de mitigación de parte de Agencia Federal para el Manejo de Desastre (FEMA, por sus siglas en ingles).

Por tal razón, solicitamos su colaboración dentro del ámbito pericial de su agencia para poder contar con la información más reciente para la actualización de estos planes. Dentro de la información que necesitamos está:

P.O. Box 41119, San Juan PR, 00940-1119 • 787.723.6200 • jp.pr.gov

- Capas de información geográfica actualizadas relacionadas a estos municipios, incluyendo la localización de las instalaciones que opere o áreas que administre en estos municipios. Ejemplos: casas bombas, represas, etc.
- Datos sobre las instalaciones que considere críticas localizadas en estos municipios.
- Planes de continuidad de operación (si alguno) para las instalaciones que su agencia administra en estos municipios.
- Planes operacionales de emergencia (si alguno) para las instalaciones que administre en estos municipios. Ejemplo: casas bombas, represas, etc.
- Lista y descripción de proyectos subvencionados por fondos de FEMA que incluyan componentes de mitigación bajo las secciones 404, 406 o 428 de la *Stafford Act*.
- Lista y descripción de proyectos subvencionados por fondos CDBG-DR o CDBG-MIT propuestos o gerenciados por su agencia, si alguno.

Agradecemos su cooperación en este esfuerzo de planificar las mejores estrategias para salvaguardar vida y propiedad en estos municipios. Toda información que tenga disponible favor tramitarla a través del correo electrónico plandemitigacion@jp.pr.gov. De tener cualquier duda puede comunicarse con la planificadora Ivette Colón Meléndez al correo electrónico colon_i@jp.pr.gov o al teléfono 787-723-6200 ext. 16681.

Cordialmente,

Lcdo. Héctor Morales Martínez
Presidente

Cc: Edwin.malavet@drna.pr.gov; mdmartes@drna.pr.gov;

JUNTA DE
PLANIFICACIÓN
GOBIERNO DE PUERTO RICO

18 de mayo de 2026

Vía correo electrónico:
ivrodriguez@agricultura.pr.gov

Hon. Irving Y. Rodríguez Torres
Secretario
Departamento de Agricultura
Box 10163
San Juan, PR 00908-1163

RE: SOLICITUD DE INFORMACIÓN PARA LA ACTUALIZACIÓN DE LOS PLANES DE MITIGACIÓN CONTRA PELIGROS NATURALES MUNICIPALES

Estimado señor secretario:

¡Reciba un cordial saludo! La Junta de Planificación (JP) se encuentra en proceso de apoyar a veinticinco municipios en el proceso de actualización de los planes locales de mitigación ante peligros naturales (LHMP, por sus siglas en inglés). Los municipios que son parte de esta iniciativa son; 1) Adjuntas, 2) Aguada, 3) Aguas Buenas, 4) Añasco, 5) Arecibo, 6) Arroyo, 7) Barranquitas, 8) Cataño, 9) Ceiba, 10) Comerío, 11) Dorado, 12) Hatillo, 13) Isabela, 14) Jayuya, 15) Las Marías, 16) Patillas, 17) Peñuelas, 18) Rincón, 19) Salinas, 20) San Germán, 21) Santa Isabel, 22) Utuado, 23) Vega Alta, 24) Vieques y 25) Yabucoa. Estos planes son de gran importancia para los municipios, ya que brindan la oportunidad de fortalecer estrategias de mitigación ante los eventos naturales a los cuales sus residentes son vulnerables. Además de tener estos planes actualizados es un requisito federal para que el municipio sea elegible para recibir fondos para proyectos de mitigación de parte de Agencia Federal para el Manejo de Desastre (FEMA, por sus siglas en ingles).

Por tal razón, solicitamos su colaboración dentro del ámbito pericial de su agencia para poder contar con la información más reciente para la actualización de estos planes. Dentro de la información que necesitamos está:

- Capas de información geográfica actualizadas relacionadas a estos municipios, incluyendo la localización de las instalaciones que opere o áreas que administre en estos municipios.
- Datos sobre las instalaciones que considere críticas localizadas en estos municipios.
- Planes de continuidad de operación (si alguno) para las instalaciones que su agencia administra en estos municipios.
- Planes operacionales de emergencia (si alguno) para las instalaciones que administre en estos municipios.
- Lista y descripción de proyectos subvencionados por fondos de FEMA que incluyan componentes de mitigación bajo las secciones 404, 406 o 428 de la *Stafford Act*.
- Lista y descripción de proyectos subvencionados por fondos CDBG-DR o CDBG-MIT propuestos o gerenciados por su agencia, si alguno.
- Inventarios de fincas agrícolas activas e inactivas.

Agradecemos su cooperación en este esfuerzo de planificar las mejores estrategias para salvaguardar vida y propiedad en estos municipios. Toda información que tenga disponible favor tramitarla a través del correo electrónico plandemitigacion@jp.pr.gov. De tener cualquier duda puede comunicarse con la planificadora Ivette Colón Meléndez al correo electrónico colon_i@jp.pr.gov o al teléfono 787-723-6200 ext. 16681.

Cordialmente,

Lcdo. Héctor Morales Martínez
Presidente

Cc: hmendez@agricultura.pr.gov
yflores@agricultura.pr.gov

JUNTA DE
PLANIFICACIÓN
GOBIERNO DE PUERTO RICO

21 de mayo de 2026

Ing. Luis González Delgado, P.E
Presidente Ejecutivo
Autoridad de Acueductos y Alcantarillados
P.O. Box 7066
San Juan, PR 00916-7066

Actualización de Veinticinco (25) Plan Locales de Mitigación Contra Peligros Naturales

Estimado ingeniero González:

Reciba un cordial saludo. La Junta de Planificación (JP) está apoyando a veinticinco municipios en el proceso de actualización de sus planes locales de mitigación ante peligros naturales (LHMP, por sus siglas en inglés). Los municipios que son parte de esta iniciativa son; 1) Adjuntas, 2) Aguada, 3) Aguas Buenas, 4) Añasco, 5) Arecibo, 6) Arroyo, 7) Barranquitas, 8) Cataño, 9) Ceiba, 10) Comerío, 11) Dorado, 12) Hatillo, 13) Isabela, 14) Jayuya, 15) Las Marías, 16) Patillas, 17) Peñuelas, 18) Rincón, 19) Salinas, 20) San Germán, 21) Santa Isabel, 22) Utuado, 23) Vega Alta, 24) Vieques y, 25) Yabucoa. Estos planes son de gran importancia para los municipios, ya que brindan la oportunidad de fortalecer estrategias de mitigación ante los eventos naturales a los cuales sus residentes son vulnerables. Además, tener estos planes actualizados es un requisito federal para que el municipio sea elegible para recibir fondos para proyectos de mitigación de parte de Agencia Federal para el Manejo de Desastre (FEMA, por sus siglas en ingles).

Por tal razón, solicitamos su colaboración dentro del ámbito pericial de la Autoridad para poder contar con la información más reciente para la actualización de estos planes. Dentro de la información que necesitamos está:

- Capas de información geográfica actualizadas relacionadas a estos municipios, incluyendo la localización de las facilidades que la Autoridad opere o áreas que administre en estos municipios.

P.O. Box 41119, San Juan PR, 00940-1119 • 787.723.6200 • jp.pr.gov

- Datos sobre las facilidades que la Autoridad considere criticas localizadas en estos municipios.
- Planes de continuidad de operación (si alguno) para las facilidades que la Autoridad administre en estos municipios
- Planes operacionales de emergencia (si alguno) para las facilidades que la Autoridad administre en estos municipios.
- Lista y descripción de proyectos subvencionados por fondos de FEMA que incluyan componentes de mitigación bajo las secciones 404, 406 o 428 de la *Stafford Act* propuestos o gerenciados por la Autoridad
- Lista y descripción de proyectos subvencionados por fondos CDBG-DR o CDBG-MIT propuestos o gerenciados por la Autoridad.
- De particular importancia para nosotros es cualquier información que pueda brindar relacionada a las siguientes represas administradas por la Autoridad.
  - Cidra
  - La Plata

Para las represas estamos solicitando copia del Plan Operacional de Emergencias, así como documentación de los esfuerzos de alcance comunitario y diseminación que haya hecho la Autoridad en los pasados cinco años.

Agradecemos su cooperación en este esfuerzo de planificar las mejores formas de salvar vida y propiedad en estos municipios. Por favor preferimos que toda información sea enviada a través del correo electrónico plandemitigacion@jp.pr.gov. De tener cualquier duda puede comunicarse con la planificadora Ivette Colón Meléndez al correo electrónico colon_i@jp.pr.gov o al teléfono 787-723-6200 ext. 16681.

Cordialmente,

Lcdo. Héctor Morales Martínez
Presidente

Cc: rogelio.gonzalez@acueductospr.com

GOBIERNO DE
PUERTO RICO

PRESIDENCIA I AUTORIDAD DE ACUEDUCTOS Y ALCANTARILLADOS
Ing. Luis R. González Delgado I Presidente Ejecutivo I luis.gonzalez@acueductospr.com

26 de mayo de 2026

Lcdo. Héctor Morales Martínez
Presidente
Junta de Planificación
Gobierno de Puerto Rico
P.O. Box 41119
San Juan, PR 00940-1119

Estimado licenciado Morales:

En respuesta a su solicitud de información a la Autoridad de Acueductos y Alcantarillados en referencia al proceso de ***Actualización de Veinticinco (25) Planes Locales de Mitigación Contra Peligros Naturales***, por este medio remitimos la información correspondiente a nuestra agencia respecto a la infraestructura de agua potable y alcantarillado sanitario conforme a lo requerido, por lo que se adjunta:

- Base de Datos Infraestructura Sanitaria y Potable en formato *shapefile* (GDB)
  - Capas Junta Planificacion 2026
- Enlace a mapa interactivo de los proyectos de la AAA
  - Mapa Interactivo Proyectos AAA (acueductos.pr.gov)

Certificamos que la información suministrada es correcta y está actualizada a la fecha de esta comunicación. Debido a la naturaleza de los datos contenidos en esta solicitud para la cual estamos proveyendo la información, es nuestro interés que los mismos se utilicen estrictamente para fines de su análisis y no sean publicados, esto en virtud de la Ley de la Infraestructura de Agua de los Estados Unidos (AWIA, siglas en inglés), la Directriz de Política Presidencial 21 (PPD-21) bajo el Departamento de Seguridad Nacional (DHS, siglas en inglés) y la Ley de Agua Potable Segura (SDWA).

Quedamos a su disposición para cualquier información adicional que estime necesaria.

Cordialmente,

Ing. Luis R. González Delgado
Presidente Ejecutivo

PRESIDENCIA / #604 Ave. Barbosa, San Juan, PR 00916
PO Box 7066, San Juan, P.R 00916-7066 • 787 620-2277 Ext. 2604 / 2653 • acueductos.pr.gov

AUTORIDAD DE ENERGÍA ELÉCTRICA

AEE

GOBIERNO DE PUERTO RICO

23 de junio de 2026

VÍA CORREO ELECTRÓNICO (colon_i@jp.pr.gov)

Lcdo. Héctor Morales Martínez
Presidente
Junta de Planificación
PO Box 41119
Guayama, PR 00940-1119

Estimado señor Presidente:

Re: Actualización de Veinticinco (25) Plan Locales de Mitigación Ante Peligros Naturales

La Autoridad de Energía Eléctrica (AEE) recibió su carta con fecha del 5 de junio de 2026, donde solicita información para la actualización de veinticinco (25) plan de local de mitigación ante peligros naturales.

Nuestra agencia administra las hidroeléctrica y canales de riego en Puerto Rico. Acompañamos la información concerniente a los sistemas que administra la Autoridad de Energía Eléctrica: Datos de las Hidroeléctricas y Canales de Riego (Anejo 1) y Planes de Emergencia (Anejo 2).

Los activos de transmisión y distribución están bajo la responsabilidad de LUMA Energy, y Genera PR administra el sistema de generación. Recomendamos para solicitud de información, que incluya a LUMA Energy y Genera PR, favor de solicitarla a las personas contactos:

Sr. Alejandro Figueroa Ramírez
(E-mail: Alejandro.Figueroa@lumapr.com)
Principal Oficial Regulatorio de LUMA
LUMA Energy, LLC
PO Box 363508
San Juan, PR 00936-3508

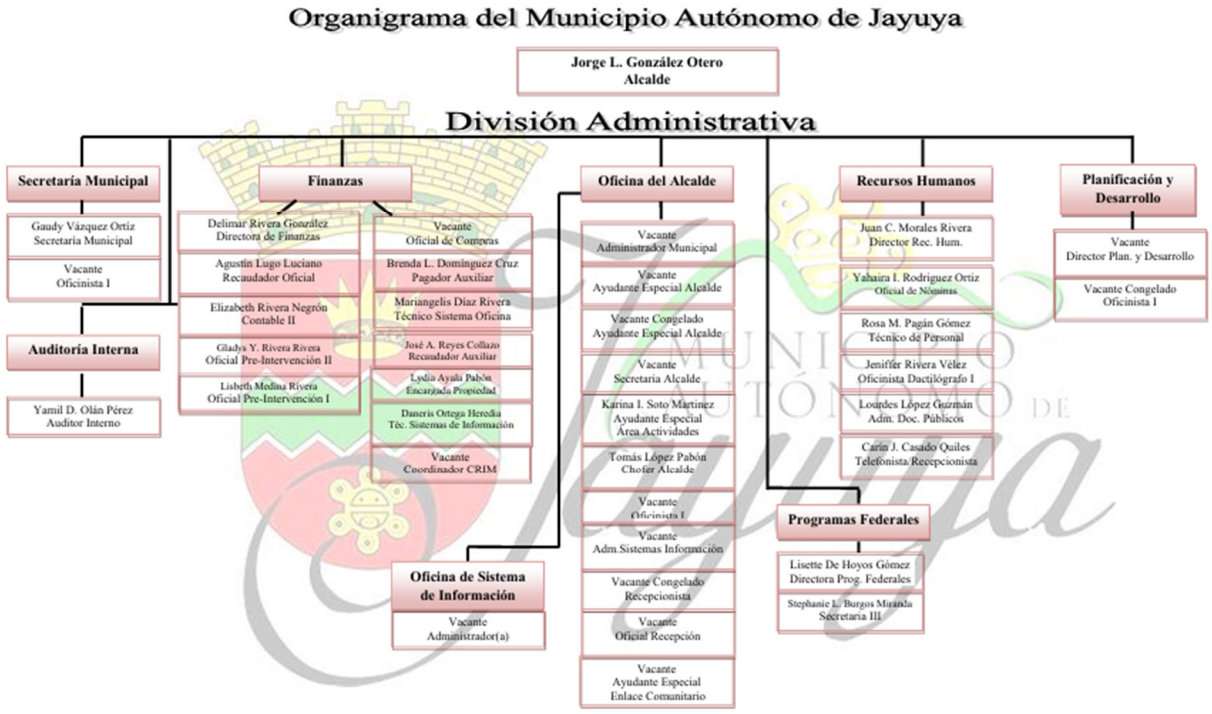
Sr. Winnie Irizarry Velázquez
(Email:winnie@genera-pr.com)
Presidente y CEO
Genera PR, LLC
954 Avenida Ponce de León, Suite 400
San Juan, PR 00907

Agradeceremos la atención prestada a este asunto. Para información adicional, puede comunicarse con el Sra. Yaritza Acevedo Correa (yaritza.acevedo@prepa.pr.gov), Oficial de Programa, División de Protección Ambiental y Confiabilidad de Calidad por el 787-521-4565.

Cordialmente,

Ruth Dones Ramos, Jefa
División de Protección Ambiental y
Confiabilidad de Calidad
(Email: ruth.dones@prepa.pr.gov)

Appendix E: Municipal Organizational Chart



Rev.: 03/2025

Organigrama del Municipio Autónomo de Jayuya

Jorge L. González Otero
Alcalde

División Servicios

Obras Públicas

Vacante Director Obras Publicas	Miguel A. Torres Díaz Operador Equipo Pesado	Angel A. Reyes Cruz Trabajador I
Raúl Casiano Ramos Supervisor de Proyectos	Enrique Morales Díaz Conductor Veh Motor Pes	
Vacante Supervisor de Proyectos	Joniel A, Rivera Reyes Conductor Veh Motor Pes	
Vacante Coordinador Servicios	Agustín Santiago Vargas Conductor Veh Motor Pes	
Vacante Encargado Almacén	Vacante Congelado Conductor Veh Motor Pes	
Vacante Enc. Garaje Municipal	Vacante Sup. Taller Mec. Automotriz	
Elba E. Morales Cruz Oficinista Dactilógrafo	Vacante Mecánico	
Manuel Agosto González Trabajador I	Rafaela Collazo Santiago Trabajador I	
Saul Bennett Pérez Operador Equipo Pesado	Antonio De León Colón Trabajador I	
Wilfredo Pérez Soto Operador Equipo Pesado	Luis M. López Santiago Trabajador I	
Vacante Operador Equipo Pesado	Vacante Perito Electricista	
Fernando Andújar Hernández Operador Equipo Pesado	Christopher Morales Castillo Trabajador I	

Centro de Arte y Cultura

Magaly Gordillo Vargas Dir. Centro de Arte y Cultura
Puesto Derecho Reinstalación Auxiliar Relacionista Público
Giomary Oliveras Medina Promotora Act Turísticas
Katiria Santiago Rodriguez Coord Act Culturales
Vacante Congelado Conserje
Vacante Congelado Conserje

Recreación y Deportes

Wilmer Rivera Guzmán Dir. Recreación y Deportes
Wanda Pons Orama Oficinista Dactilógrafo II
Vacante Técnico de Gimnasio
Vacante Congelado Líder Recreativo
Vacante Congelado Líder Recreativo
Vacante Líder Recreativo
Vacante Líder Recreativo
Vacante Auxiliar Recreativo
Vacante Auxiliar Recreativo
Vacante Congelado Auxiliar Recreativo
Vacante Congelado Trabajador I
Saúl Díaz Ayala Conserje

Control Ambiental

Vacante Director Control Ambiental	Héctor L. Cruz Vargas Trabajador I
Vacante Supervisor Saneamiento	Carmelo Machado Díaz Trabajador I
Américo Santiago Rodríguez Celador Vertedero Mun.	Javier Machado Díaz Trabajador I
Vacante Coordinador Reciclaje	Rafael A. Machado Díaz Trabajador I
Vacante Congelado Oficinista Dactilógrafo II	Doel Pérez Huertas Trabajador I
Alexis Morales Cruz Conductor Veh Motor Pes	Luis A. Texeira Rodriguez Trabajador I
Sergio A. Morales Matías Conductor Veh Motor Pes	Jesús Alvarez Rivera Trabajador I
Carlos M. Torres Rábago Conductor Veh Motor Pes	
Alexis L. Costales Ramos Conductor Veh Motor Pes	Vacante Congelado Trabajador I
Alex De Jesús Cortés Conductor Veh Motor Pes	
Joel A. Meléndez Arroyo Conductor Veh Motor Pes	
Pedro Correa Ortiz Trabajador I	

Manejo Emergencias

Edilberto Santiago Negrón Director Manejo Emerg.
Vacante Auxiliar Sist. Oficina
Rubén Colón Soto Chofer Guagua Escolar

Organigrama del Municipio Autónomo de Jayuya

Jorge L. González Otero
Alcalde

División Servicios

Oficina Vivienda Municipal

Idalia Pérez Abruña Director Plan. y Desarrollo
Verónica Ortiz Quiles Sup. De Alimento
Aida Acevedo Acevedo Asist.Aux.Distr.Alim.
Sandra Andújar Marín Asist.Aux.Distr.Alim.
Andrea Montero Santiago Aux. Dist. de Alimento
Katiria Ortíz Marrero Asist.Aux.Distr.Alim
Yeimilys Vélez de Jesús Asist.Aux.Distr.Alim.

Centro de Envejecientes

Lourdes González Batista Directora	Ariel González Vélez Auxiliar de chofer
Dimaris de Jesús Montero Secretaria	Eduardo Román Alvarez Conserje
Basilisa Heredia Miranda Auxiliar de Oficina	Irelis López Avilés Asistente de Servicio
Nancy Escobales Rivera Enfermera	
Wanda I. Negrón Vélez Téc. de Orientación y Referimiento	
Suheil M. Rivera Pabón Coord. De Actividades	
Lissette Hernández López Aux. del Hogar	
Miriam Morales Rosado Aux. del Hogar	
Miguel Dátil Gordillo Chofer	
Vacante Chofer	

Servicios al Ciudadano

Vacante Dir. Servicios al Ciudadano
Vacante Telefonista Recepcionista
Héctor L. Sánchez Vélez Conserje

Oficina de Reconstrucción y Desastres Municipales

Adrián A. Bennett Gerente de Oficina de Recuperación Municipal

Policia Municipal

Vacante Com. Policía Municipal	Vacante Congelado Policía Municipal
Vacante Congelado Policía Municipal	Vacante Congelado Policía Municipal
Vacante Congelado Policía Municipal	Vacante Congelado Secretaria I
Vacante Policía Municipal	
Mario Hernández Bianchi Policía Municipal	
Vacante Congelado Policía Municipal	

Rev.: 03/2025

Appendix F: Critical Infrastructure by Lifeline

#	FACILITY NAME	COORD Y	COORD X	TYPE
1	Antiguo Tribunal	18.21848	-66.59434	Lifeline: Safety and Security
2	Casa Alcaldía	18.218618	-66.59475	Lifeline: Safety and Security
3	Casa Alcaldía (Anexo)	18.218562	-66.59443	Lifeline: Safety and Security
4	CDT Dr. Mario Canales Torresola	18.21906	-66.59525	Lifeline: Health and Medical
5	CDT Mario Canales Torresola	18.219328	-66.59577	Lifeline: Health and Medical
6	Centro de Vigilancia Virtual	18.21907	-66.59248	Lifeline: Safety and Security
7	Concilio de Salud Integral	18.198917	-66.58764	Lifeline: Health and Medical
8	Cuartel de la Policía Municipal	18.21805	-66.59531	Lifeline: Safety and Security
9	Cuartel de la Policía Municipal	18.198917	-66.58764	Lifeline: Safety and Security
10	Estación de Bomberos	18.22361	-66.59501	Lifeline: Safety and Security
11	Estación de Bomberos - Mameyes	18.26616	-66.57195	Lifeline: Safety and Security
12	Estadio Municipal "Marcos A. Massini"	18.21795	-66.59626	Lifeline: Food, Hydration and Shelter
13	Farmacia Hayuya	18.217253	-66.60439	Lifeline: Health and Medical
14	Gasolinera (Gulf)	18.21826	-66.59403	Lifeline: Energy
15	Gasolinera (Total Energies)	18.218064	-66.59408	Lifeline: Energy
16	Gasolinera (Total Energies)	18.21806	-66.59423	Lifeline: Energy
17	Infraestructura AAA El Nudo	18.167665	-66.65132	Lifeline: Water Systems
18	Kennedy Street	18.2178	-66.60796	Lifeline: Transportation

#	FACILITY NAME	COORD Y	COORD X	TYPE
19	Local Road	18.213342	-66.56692	Lifeline: Transportation
20	Local Road	18.203214	-66.60661	Lifeline: Transportation
21	Manejo de Emergencia	18.198917	-66.58764	Lifeline: Safety and Security
22	Obras Públicas Municipal	18.22042	-66.59639	Lifeline: Safety and Security
23	Oficina Municipal Manejo de Emergencias	18.21816	-66.59539	Lifeline: Safety and Security
24	Planta Filtros Jayuya Urbano	18.223296	-66.58555	Lifeline: Water Systems
25	PR 140	18.20285	-66.62964	Lifeline: Transportation
26	PR 140 Km. 5.2	18.185778	-66.63989	Lifeline: Transportation
27	PR 140 Km. 7.15	18.190442	-66.6306	Lifeline: Transportation
28	PR 140 Km. 7.3	18.194989	-66.62374	Lifeline: Transportation
29	PR 140 Km. 8.1	18.195097	-66.62373	Lifeline: Transportation
30	PR 140 Km. 8.68	18.190525	-66.62936	Lifeline: Transportation
31	PR 140 Km. 8.9	18.200917	-66.62383	Lifeline: Transportation
32	PR 141	18.248369	-66.57196	Lifeline: Transportation
33	PR 141 Km. 1.7	18.230481	-66.58093	Lifeline: Transportation
34	PR 141 R Km. 0.1	18.22085	-66.58784	Lifeline: Transportation
35	PR 144	18.218056	-66.58944	Lifeline: Transportation
36	PR 144	18.206642	-66.55335	Lifeline: Transportation
37	PR 144 Km. 0.8	18.208911	-66.61911	Lifeline: Transportation
38	PR 144 Km. 1.5	18.209453	-66.55381	Lifeline: Transportation
39	PR 144 Km. 1.90	18.215178	-66.61648	Lifeline: Transportation
40	PR 144 Km. 3.6	18.219506	-66.61217	Lifeline: Transportation

#	FACILITY NAME	COORD Y	COORD X	TYPE
41	PR 144 Km. 3.6	18.219139	-66.60463	Lifeline: Transportation
42	PR 144 Km. 5.0	18.218	-66.59047	Lifeline: Transportation
43	PR 144 Km. 6	18.216886	-66.58594	Lifeline: Transportation
44	PR 372	18.216281	-66.58521	Lifeline: Transportation
45	PR 505	18.165778	-66.61289	Lifeline: Transportation
46	PR 5141 Km. 0.10	18.223144	-66.58711	Lifeline: Transportation
47	PR 527 Km. 0.05	18.217914	-66.59424	Lifeline: Transportation
48	PR 527 Km. 0.4	18.211911	-66.5813	Lifeline: Transportation
49	PR 528	18.196078	-66.60792	Lifeline: Transportation
50	PR 528 Km. 3.4	18.188267	-66.60707	Lifeline: Transportation
51	PR 528 Km. 3.5	18.187372	-66.60535	Lifeline: Transportation
52	PR 539 Km. 0.7	18.20205	-66.55738	Lifeline: Transportation
53	PR 5527 Km. 0.15	18.201408	-66.57897	Lifeline: Transportation
54	PR 613	18.283525	-66.5903	Lifeline: Transportation
55	Puente Virao	18.218809	-66.58973	Lifeline: Transportation
56	Punto Recolección Agua Potable	18.22471	-66.58384	Lifeline: Water Systems
57	Residencial La Montaña	18.217552	-66.59804	Lifeline: Food, Hydration and Shelter
58	Sol St Km. 0.3	18.220581	-66.60464	Lifeline: Transportation
59	Sol Street Km. 0.3	18.218636	-66.60629	Lifeline: Transportation
60	Subestación Eléctrica	18.217622	-66.60415	Lifeline: Energy
61	Supermercado (Econo)	18.218477	-66.59984	Lifeline: Food, Hydration and Shelter
62	Vincent Street	18.215067	-66.60413	Lifeline: Transportation

Table 42 Critical Infrastructure Affected by Natural Hazard

Critical Infrastructrure affefected by Spectral Acceleration at 0.3 sec				
Name	**Type**	**Category**	**Spectral Acceleration Value**	**Category**
Área Recreativa "Aníbal Oyola"	Other Facilities	Recreational Facilities	0.551653	Low
Área recreativa La Monserrate	Other Facilities	Recreational Facilities	0.551653	Low
Cabañas Hacienda Gripiñas	Other Facilities	Economic Facilities	0.551653	Low
Cancha Bajo Techo Gripiñas	Other Facilities	Recreational Facilities	0.551653	Low
Cancha Bajo Techo Saliente	Other Facilities	Recreational Facilities	0.551653	Low
Cancha Bajo Techo y Centro Comunal Salientito	Other Facilities	Recreational Facilities	0.551653	Low
Cancha Baloncesto Alturas Pizá	Other Facilities	Recreational Facilities	0.551653	Low
Cancha Esc. Antonio Romero, Collores	Other Facilities	Recreational Facilities	0.551653	Low
Cancha Esc. Miguel A. Sastre, Gripiñas	Other Facilities	Recreational Facilities	0.551653	Low
Cancha Esc. Superior Josefina León Zayas	Other Facilities	Recreational Facilities	0.551653	Low
Cancha Los Pinos	Other Facilities	Recreational Facilities	0.551653	Low
Cancha Vega Linda	Other Facilities	Recreational Facilities	0.551653	Low
Centro Comunal Puerto Plata	Other Facilities	Recreational Facilities	0.551653	Low
Centro Comunal Veguita Zamas	Other Facilities	Recreational Facilities	0.551653	Low
Community Assets de Pelota "Venancio Tejedor"-Collores	Other Facilities	Recreational Facilities	0.551653	Low
Concilio de Salud Integral	Lifeline: Health and Medical	Medical Care	0.551653	Low
Cuartel de la Policía Municipal	Lifeline: Safety and Security	Law Enforcement	0.551653	Low
Cuido "Dulzura Infantil"	Other Facilities	educational institutions	0.551653	Low
Esc. Superior Josefina León Zayas	Other facilities	Educational Institutions	0.551653	Low
Hacienda Parador Gripiñas	Other Facilities	Economic Facilities	0.551653	Low
Infraestructura AAA El Nudo	Lifeline: Water Systems	Water Supply	0.551653	Low
Local Road	Lifeline: Transportation	Transportation Systems	0.551653	Low
Manejo de Emergencia	Lifeline: Safety and Security	Government Service	0.551653	Low
PR 140	Lifeline: Transportation	Transportation Systems	0.551653	Low
PR 140 Km. 5.2	Lifeline: Transportation	Transportation Systems	0.551653	Low
PR 140 Km. 7.15	Lifeline: Transportation	Transportation Systems	0.551653	Low
PR 140 Km. 7.3	Lifeline: Transportation	Transportation Systems	0.551653	Low
PR 140 Km. 8.1	Lifeline: Transportation	Transportation Systems	0.551653	Low
PR 140 Km. 8.68	Lifeline: Transportation	Transportation Systems	0.551653	Low
PR 140 Km. 8.9	Lifeline: Transportation	Transportation Systems	0.551653	Low
PR 144	Lifeline: Transportation	Transportation Systems	0.551653	Low
PR 144 Km. 0.8	Lifeline: Transportation	Transportation Systems	0.551653	Low
PR 144 Km. 5.0	Lifeline: Transportation	Transportation Systems	0.551653	Low
PR 144 Km. 6	Lifeline: Transportation	Transportation Systems	0.551653	Low
PR 372	Lifeline: Transportation	Transportation Systems	0.551653	Low

PR 505	Lifeline: Transportation	Transportation Systems	0.551653	Low
PR 527 Km. 0.4	Lifeline: Transportation	Transportation Systems	0.551653	Low
PR 528	Lifeline: Transportation	Transportation Systems	0.551653	Low
PR 528 Km. 3.4	Lifeline: Transportation	Transportation Systems	0.551653	Low
PR 528 Km. 3.5	Lifeline: Transportation	Transportation Systems	0.551653	Low
PR 539 Km. 0.7	Lifeline: Transportation	Transportation Systems	0.551653	Low
PR 5527 Km. 0.15	Lifeline: Transportation	Transportation Systems	0.551653	Low
Puente Virao	Lifeline: Transportation	Transportation Systems	0.551653	Low
Teatro "Homero Aulet"	Other Facilities	Economic Facilities	0.551653	Low
Vertedero Municipal	Other facilities	Solid Waste Disposal Facilities	0.551653	Low
Vincent Street	Lifeline: Transportation	Transportation Systems	0.551653	Low
Antigua Esc. Agustin Ortiz	Other facilities	Educational Institutions	0.634374	Medium
Antiguo FSE	Other Facilities	Recreational Facilities	0.634374	Medium
Antiguo Tribunal	Lifeline: Safety and Security	Government Service	0.634374	Medium
Biblioteca Electrónica	Other facilities	Educational Institutions	0.634374	Medium
Bolera	Other Facilities	Economic Facilities	0.634374	Medium
Cancha Bajo techo Calle Hermenelinda Rivera	Other Facilities	Recreational Facilities	0.634374	Medium
Cancha Bajo Techo Estadio Municipal	Other Facilities	Recreational Facilities	0.634374	Medium
Cancha Bajo Techo Hoyo Frío	Other Facilities	Recreational Facilities	0.634374	Medium
Cancha Bajo Techo Santa Clara	Other Facilities	Recreational Facilities	0.634374	Medium
Cancha Bajo Techo Santos "Titito" Rivera	Other Facilities	Recreational Facilities	0.634374	Medium
Cancha Bajo Techo Urb. Alturas de Jayuya	Other Facilities	Recreational Facilities	0.634374	Medium
Cancha Esc. Angelica Torro	Other Facilities	Recreational Facilities	0.634374	Medium
Casa Alcaldía	Lifeline: Safety and Security	Government Service	0.634374	Medium
Casa Alcaldía (Anexo)	Lifeline: Safety and Security	Government Service	0.634374	Medium
CDT Dr. Mario Canales Torresola	Lifeline: Health and Medical	Medical Care	0.634374	Medium
CDT Mario Canales Torresola	Lifeline: Health and Medical	Medical Care	0.634374	Medium
Cementerio Municipal	Other Facilities	Community Assets/ Hazardous Materials	0.634374	Medium
Centro Cultural (Antiguo Hospital)	Other Facilities	Recreational Facilities	0.634374	Medium
Centro de Actividades "Juan B. Oliver"	Other Facilities	Recreational Facilities	0.634374	Medium
Centro de Vigilancia Virtual	Lifeline: Safety and Security	Law Enforcement	0.634374	Medium
Community Assets de Pelota Santa Clara	Other Facilities	Recreational Facilities	0.634374	Medium
Community Assets Pasivo Urb. Jardines de Jayuya	Other Facilities	Recreational Facilities	0.634374	Medium
Community Assets Pasivo Urb. Valle Verde	Other Facilities	Recreational Facilities	0.634374	Medium
Cuartel de la Policía Municipal	Lifeline: Safety and Security	Law Enforcement	0.634374	Medium
Esc. Adrián Torres Torres	Other facilities	Educational Institutions	0.634374	Medium
Esc. Adrián Torres Torres	Other facilities	Educational Institutions	0.634374	Medium
Esc. Agustín Ortiz Rivera	Other facilities	Educational Institutions	0.634374	Medium
Esc. Angélica Toro Rodríguez	Other facilities	Educational Institutions	0.634374	Medium

Esc. Carmen Salas de Torrado	Other facilities	Educational Institutions	0.634374	Medium
Escalinatas Busto "El Indio"	Other Facilities	Economic Facilities	0.634374	Medium
Estación de Bomberos	Lifeline: Safety and Security	Fire Station Facilities	0.634374	Medium
Estadio Municipal "Marcos A. Massini"	Lifeline: Food, Hydration and Shelter	Shelters	0.634374	Medium
Farmacia Hayuya	Lifeline: Health and Medical	Medical Care	0.634374	Medium
Gasolinera (Gulf)	Lifeline: Energy	Fuel distribution	0.634374	Medium
Gasolinera (Total Energies)	Lifeline: Energy	Fuel distribution	0.634374	Medium
Gasolinera (Total Energies)	Lifeline: Energy	Fuel distribution	0.634374	Medium
Kennedy Street	Lifeline: Transportation	Transportation Systems	0.634374	Medium
Multifabril	Other Facilities	Recreational Facilities	0.634374	Medium
Museo "Nelson Rafael Collazo Grau"	Other Facilities	Economic Facilities	0.634374	Medium
Obras Públicas Municipal	Lifeline: Safety and Security	Government Service	0.634374	Medium
Oficina Municipal Manejo de Emergencias	Lifeline: Safety and Security	Government Service	0.634374	Medium
Paliques Café	Other Facilities	Economic Facilities	0.634374	Medium
Panadería Santa Clara	Other Facilities	Economic Facilities	0.634374	Medium
Picadero Javier "Chory" Rodríguez	Other Facilities	Economic Facilities	0.634374	Medium
Pista Atlética Jesús "Kiki" Rivera	Other Facilities	Recreational Facilities	0.634374	Medium
Pitorrico	Other Facilities	Recreational Facilities	0.634374	Medium
Plaza de la Música	Other facilities	Recreational Facilities	0.634374	Medium
Plaza del Mercado	Other Facilities	Economic Facilities	0.634374	Medium
PR 144 Km. 3.6	Lifeline: Transportation	Transportation Systems	0.634374	Medium
PR 144 Km. 3.6	Lifeline: Transportation	Transportation Systems	0.634374	Medium
PR 5141 Km. 0.10	Lifeline: Transportation	Transportation Systems	0.634374	Medium
PR 527 Km. 0.05	Lifeline: Transportation	Transportation Systems	0.634374	Medium
Residencial La Montaña	Lifeline: Food, Hydration and Shelter	Public Housing	0.634374	Medium
Restaurante La Piedra Escrita (El Asao)	Other Facilities	Economic Facilities	0.634374	Medium
Sol St Km. 0.3	Lifeline: Transportation	Transportation Systems	0.634374	Medium
Sol Street Km. 0.3	Lifeline: Transportation	Transportation Systems	0.634374	Medium
Subestación Eléctrica	Lifeline: Energy	Energy Generation And Distribution	0.634374	Medium
Supermercado (Econo)	Lifeline: Food, Hydration and Shelter	Food Supply	0.634374	Medium
UAGM	Other Facilities	Educational Institutions	0.634374	Medium
Cancha Bajo Techo El Salto	Other Facilities	Recreational Facilities	0.647382	High
Cancha Bajo Techo Hoyos Planes	Other Facilities	Recreational Facilities	0.647382	High
Cancha Bajo Techo Las Casitas-Calle 4	Other Facilities	Recreational Facilities	0.647382	High
Cancha Esc. Antonia Serrano	Other Facilities	Recreational Facilities	0.647382	High
Cancha Esc. Nemesio R. Canales, Coabey	Other Facilities	Recreational Facilities	0.647382	High
CEDRETA (Salón de Actividades)	Other Facilities	Recreational Facilities	0.647382	High
Community Assets de Pelota (Coby)	Other Facilities	Recreational Facilities	0.647382	High
Community Assets Infantil "Adrián Padua Sánchez"	Other Facilities	Recreational Facilities	0.647382	High

Estación de Bomberos - Mameyes	Lifeline: Safety and Security	Fire Station Facilities	0.647382	High
Globo Aerostático	Other Facilities	Economic Facilities	0.647382	High
Hacienda Santa Marina	Other Facilities	Economic Facilities	0.647382	High
Local Road	Lifeline: Transportation	Transportation Systems	0.647382	High
Museo El Cemí	Other Facilities	Economic Facilities	0.647382	High
Planta Filtros Jayuya Urbano	Lifeline: Water Systems	Water Supply	0.647382	High
PR 141	Lifeline: Transportation	Transportation Systems	0.647382	High
PR 141 Km. 1.7	Lifeline: Transportation	Transportation Systems	0.647382	High
PR 141 R Km. 0.1	Lifeline: Transportation	Transportation Systems	0.647382	High
PR 144	Lifeline: Transportation	Transportation Systems	0.647382	High
PR 144 Km. 1.5	Lifeline: Transportation	Transportation Systems	0.647382	High
PR 144 Km. 1.90	Lifeline: Transportation	Transportation Systems	0.647382	High
PR 613	Lifeline: Transportation	Transportation Systems	0.647382	High
Punto Recolección Agua Potable	Lifeline: Water Systems	Water Supply	0.647382	High
Terreno (Estacionamiento de los Dinosaurios)	Other Facilities	Economic Facilities	0.647382	High

Critical Infrastructrure affefected by Spectral Acceleration at 1.0 sec

Área Recreativa "Aníbal Oyola"	Other Facilities	Recreational Facilities	0.219063	Low
Área recreativa La Monserrate	Other Facilities	Recreational Facilities	0.219063	Low
Cabañas Hacienda Gripiñas	Other Facilities	Economic Facilities	0.219063	Low
Cancha Bajo Techo Gripiñas	Other Facilities	Recreational Facilities	0.219063	Low
Cancha Bajo Techo Saliente	Other Facilities	Recreational Facilities	0.219063	Low
Cancha Bajo Techo y Centro Comunal Salientito	Other Facilities	Recreational Facilities	0.219063	Low
Cancha Baloncesto Alturas Pizá	Other Facilities	Recreational Facilities	0.219063	Low
Cancha Esc. Antonio Romero, Collores	Other Facilities	Recreational Facilities	0.219063	Low
Cancha Esc. Miguel A. Sastre, Gripiñas	Other Facilities	Recreational Facilities	0.219063	Low
Cancha Esc. Superior Josefina León Zayas	Other Facilities	Recreational Facilities	0.219063	Low
Cancha Los Pinos	Other Facilities	Recreational Facilities	0.219063	Low
Cancha Vega Linda	Other Facilities	Recreational Facilities	0.219063	Low
Centro Comunal Puerto Plata	Other Facilities	Recreational Facilities	0.219063	Low
Centro Comunal Veguita Zamas	Other Facilities	Recreational Facilities	0.219063	Low
Community Assets de Pelota "Venancio Tejedor"-Collores	Other Facilities	Recreational Facilities	0.219063	Low
Concilio de Salud Integral	Lifeline: Health and Medical	Medical Care	0.219063	Low
Cuartel de la Policía Municipal	Lifeline: Safety and Security	Law Enforcement	0.219063	Low
Cuido "Dulzura Infantil"	Other Facilities	educational institutions	0.219063	Low
Esc. Superior Josefina León Zayas	Other facilities	Educational Institutions	0.219063	Low
Hacienda Parador Gripiñas	Other Facilities	Economic Facilities	0.219063	Low
Infraestructura AAA El Nudo	Lifeline: Water Systems	Water Supply	0.219063	Low
Local Road	Lifeline: Transportation	Transportation Systems	0.219063	Low

Manejo de Emergencia	Lifeline: Safety and Security	Government Service	0.219063 Low
PR 140	Lifeline: Transportation	Transportation Systems	0.219063 Low
PR 140 Km. 5.2	Lifeline: Transportation	Transportation Systems	0.219063 Low
PR 140 Km. 7.15	Lifeline: Transportation	Transportation Systems	0.219063 Low
PR 140 Km. 7.3	Lifeline: Transportation	Transportation Systems	0.219063 Low
PR 140 Km. 8.1	Lifeline: Transportation	Transportation Systems	0.219063 Low
PR 140 Km. 8.68	Lifeline: Transportation	Transportation Systems	0.219063 Low
PR 140 Km. 8.9	Lifeline: Transportation	Transportation Systems	0.219063 Low
PR 144	Lifeline: Transportation	Transportation Systems	0.219063 Low
PR 144 Km. 0.8	Lifeline: Transportation	Transportation Systems	0.219063 Low
PR 144 Km. 5.0	Lifeline: Transportation	Transportation Systems	0.219063 Low
PR 144 Km. 6	Lifeline: Transportation	Transportation Systems	0.219063 Low
PR 372	Lifeline: Transportation	Transportation Systems	0.219063 Low
PR 505	Lifeline: Transportation	Transportation Systems	0.219063 Low
PR 527 Km. 0.4	Lifeline: Transportation	Transportation Systems	0.219063 Low
PR 528	Lifeline: Transportation	Transportation Systems	0.219063 Low
PR 528 Km. 3.4	Lifeline: Transportation	Transportation Systems	0.219063 Low
PR 528 Km. 3.5	Lifeline: Transportation	Transportation Systems	0.219063 Low
PR 539 Km. 0.7	Lifeline: Transportation	Transportation Systems	0.219063 Low
PR 5527 Km. 0.15	Lifeline: Transportation	Transportation Systems	0.219063 Low
Puente Virao	Lifeline: Transportation	Transportation Systems	0.219063 Low
Teatro "Homero Aulet"	Other Facilities	Economic Facilities	0.219063 Low
Vertedero Municipal	Other facilities	Solid Waste Disposal Facilities	0.219063 Low
Vincent Street	Lifeline: Transportation	Transportation Systems	0.219063 Low
Antigua Esc. Agustin Ortiz	Other facilities	Educational Institutions	0.251167 Medium
Antiguo FSE	Other Facilities	Recreational Facilities	0.251167 Medium
Antiguo Tribunal	Lifeline: Safety and Security	Government Service	0.251167 Medium
Biblioteca Electrónica	Other facilities	Educational Institutions	0.251167 Medium
Bolera	Other Facilities	Economic Facilities	0.251167 Medium
Cancha Bajo techo Calle Hermenelinda Rivera	Other Facilities	Recreational Facilities	0.251167 Medium
Cancha Bajo Techo Estadio Municipal	Other Facilities	Recreational Facilities	0.251167 Medium
Cancha Bajo Techo Hoyo Frío	Other Facilities	Recreational Facilities	0.251167 Medium
Cancha Bajo Techo Santa Clara	Other Facilities	Recreational Facilities	0.251167 Medium
Cancha Bajo Techo Santos "Titito" Rivera	Other Facilities	Recreational Facilities	0.251167 Medium
Cancha Bajo Techo Urb. Alturas de Jayuya	Other Facilities	Recreational Facilities	0.251167 Medium
Cancha Esc. Angelica Torro	Other Facilities	Recreational Facilities	0.251167 Medium
Casa Alcaldía	Lifeline: Safety and Security	Government Service	0.251167 Medium
Casa Alcaldía (Anexo)	Lifeline: Safety and Security	Government Service	0.251167 Medium
CDT Dr. Mario Canales Torresola	Lifeline: Health and Medical	Medical Care	0.251167 Medium

CDT Mario Canales Torresola	Lifeline: Health and Medical	Medical Care	0.251167	Medium
Cementerio Municipal	Other Facilities	Community Assets/ Hazardous Materials	0.251167	Medium
Centro Cultural (Antiguo Hospital)	Other Facilities	Recreational Facilities	0.251167	Medium
Centro de Actividades "Juan B. Oliver"	Other Facilities	Recreational Facilities	0.251167	Medium
Centro de Vigilancia Virtual	Lifeline: Safety and Security	Law Enforcement	0.251167	Medium
Community Assets de Pelota Santa Clara	Other Facilities	Recreational Facilities	0.251167	Medium
Community Assets Pasivo Urb. Jardines de Jayuya	Other Facilities	Recreational Facilities	0.251167	Medium
Community Assets Pasivo Urb. Valle Verde	Other Facilities	Recreational Facilities	0.251167	Medium
Cuartel de la Policía Municipal	Lifeline: Safety and Security	Law Enforcement	0.251167	Medium
Esc. Adrián Torres Torres	Other facilities	Educational Institutions	0.251167	Medium
Esc. Adrián Torres Torres	Other facilities	Educational Institutions	0.251167	Medium
Esc. Agustín Ortiz Rivera	Other facilities	Educational Institutions	0.251167	Medium
Esc. Angélica Toro Rodríguez	Other facilities	Educational Institutions	0.251167	Medium
Esc. Carmen Salas de Torrado	Other facilities	Educational Institutions	0.251167	Medium
Escalinatas Busto "El Indio"	Other Facilities	Economic Facilities	0.251167	Medium
Estación de Bomberos	Lifeline: Safety and Security	Fire Station Facilities	0.251167	Medium
Estadio Municipal "Marcos A. Massini"	Lifeline: Food, Hydration and Shelter	Shelters	0.251167	Medium
Farmacia Hayuya	Lifeline: Health and Medical	Medical Care	0.251167	Medium
Gasolinera (Gulf)	Lifeline: Energy	Fuel distribution	0.251167	Medium
Gasolinera (Total Energies)	Lifeline: Energy	Fuel distribution	0.251167	Medium
Kennedy Street	Lifeline: Transportation	Transportation Systems	0.251167	Medium
Multifabril	Other Facilities	Recreational Facilities	0.251167	Medium
Museo "Nelson Rafael Collazo Grau"	Other Facilities	Economic Facilities	0.251167	Medium
Obras Públicas Municipal	Lifeline: Safety and Security	Government Service	0.251167	Medium
Oficina Municipal Manejo de Emergencias	Lifeline: Safety and Security	Government Service	0.251167	Medium
Paliques Café	Other Facilities	Economic Facilities	0.251167	Medium
Panadería Santa Clara	Other Facilities	Economic Facilities	0.251167	Medium
Picadero Javier "Chory" Rodríguez	Other Facilities	Economic Facilities	0.251167	Medium
Pista Atlética Jesús "Kiki" Rivera	Other Facilities	Recreational Facilities	0.251167	Medium
Pitorrico	Other Facilities	Recreational Facilities	0.251167	Medium
Plaza de la Música	Other facilities	Recreational Facilities	0.251167	Medium
Plaza del Mercado	Other Facilities	Economic Facilities	0.251167	Medium
PR 144 Km. 3.6	Lifeline: Transportation	Transportation Systems	0.251167	Medium
PR 144 Km. 3.6	Lifeline: Transportation	Transportation Systems	0.251167	Medium
PR 5141 Km. 0.10	Lifeline: Transportation	Transportation Systems	0.251167	Medium
PR 527 Km. 0.05	Lifeline: Transportation	Transportation Systems	0.251167	Medium
Residencial La Montaña	Lifeline: Food, Hydration and Shelter	Public Housing	0.251167	Medium
Restaurante La Piedra Escrita (El Asao)	Other Facilities	Economic Facilities	0.251167	Medium

Sol St Km. 0.3	Lifeline: Transportation	Transportation Systems	0.251167	Medium
Sol Street Km. 0.3	Lifeline: Transportation	Transportation Systems	0.251167	Medium
Subestación Eléctrica	Lifeline: Energy	Energy Generation And Distribution	0.251167	Medium
Supermercado (Econo)	Lifeline: Food, Hydration and Shelter	Food Supply	0.251167	Medium
UAGM	Other Facilities	Educational Institutions	0.251167	Medium
Cancha Bajo Techo El Salto	Other Facilities	Recreational Facilities	0.254071	High
Cancha Bajo Techo Hoyos Planes	Other Facilities	Recreational Facilities	0.254071	High
Cancha Bajo Techo Las Casitas-Calle 4	Other Facilities	Recreational Facilities	0.254071	High
Cancha Esc. Antonia Serrano	Other Facilities	Recreational Facilities	0.254071	High
Cancha Esc. Nemesio R. Canales, Coabey	Other Facilities	Recreational Facilities	0.254071	High
CEDRETA (Salón de Actividades)	Other Facilities	Recreational Facilities	0.254071	High
Community Assets de Pelota (Coby)	Other Facilities	Recreational Facilities	0.254071	High
Community Assets Infantil "Adrián Padua Sánchez"	Other Facilities	Recreational Facilities	0.254071	High
Estación de Bomberos - Mameyes	Lifeline: Safety and Security	Fire Station Facilities	0.254071	High
Globo Aerostático	Other Facilities	Economic Facilities	0.254071	High
Hacienda Santa Marina	Other Facilities	Economic Facilities	0.254071	High
Local Road	Lifeline: Transportation	Transportation Systems	0.254071	High
Museo El Cemí	Other Facilities	Economic Facilities	0.254071	High
Planta Filtros Jayuya Urbano	Lifeline: Water Systems	Water Supply	0.254071	High
PR 141	Lifeline: Transportation	Transportation Systems	0.254071	High
PR 141 Km. 1.7	Lifeline: Transportation	Transportation Systems	0.254071	High
PR 141 R Km. 0.1	Lifeline: Transportation	Transportation Systems	0.254071	High
PR 144	Lifeline: Transportation	Transportation Systems	0.254071	High
PR 144 Km. 1.5	Lifeline: Transportation	Transportation Systems	0.254071	High
PR 144 Km. 1.90	Lifeline: Transportation	Transportation Systems	0.254071	High
PR 613	Lifeline: Transportation	Transportation Systems	0.254071	High
Punto Recolección Agua Potable	Lifeline: Water Systems	Water Supply	0.254071	High
Terreno (Estacionamiento de los Dinosaurios)	Other Facilities	Economic Facilities	0.254071	High

Critical Infrastructure affected by Landslide

Área Recreativa "Aníbal Oyola"	Other Facilities	Recreational Facilities	High
Cabañas Hacienda Gripiñas	Other Facilities	Economic Facilities	High
Concilio de Salud Integral	Lifeline: Health and Medical	Medical Care	High
Cuartel de la Policía Municipal	Lifeline: Safety and Security	Law Enforcement	High
Manejo de Emergencia	Lifeline: Safety and Security	Government Service	High
PR 140 Km. 7.15	Lifeline: Transportation	Transportation Systems	High
PR 141	Lifeline: Transportation	Transportation Systems	High
PR 141 Km. 1.7	Lifeline: Transportation	Transportation Systems	High
PR 141 R Km. 0.1	Lifeline: Transportation	Transportation Systems	High

PR 5141 Km. 0.10	Lifeline: Transportation	Transportation Systems	High
PR 527 Km. 0.4	Lifeline: Transportation	Transportation Systems	High
Antigua Esc. Agustin Ortiz	Other facilities	Educational Institutions	Low
Antiguo FSE	Other Facilities	Recreational Facilities	Low
Antiguo Tribunal	Lifeline: Safety and Security	Government Service	Low
Área recreativa La Monserrate	Other Facilities	Recreational Facilities	Low
Biblioteca Electrónica	Other facilities	Educational Institutions	Low
Bolera	Other Facilities	Economic Facilities	Low
Cancha Bajo Techo El Salto	Other Facilities	Recreational Facilities	Low
Cancha Bajo Techo Estadio Municipal	Other Facilities	Recreational Facilities	Low
Cancha Bajo Techo Hoyo Frío	Other Facilities	Recreational Facilities	Low
Cancha Bajo Techo Hoyos Planes	Other Facilities	Recreational Facilities	Low
Cancha Bajo Techo Las Casitas-Calle 4	Other Facilities	Recreational Facilities	Low
Cancha Bajo Techo Saliente	Other Facilities	Recreational Facilities	Low
Cancha Bajo Techo Santa Clara	Other Facilities	Recreational Facilities	Low
Cancha Bajo Techo Santos "Titito" Rivera	Other Facilities	Recreational Facilities	Low
Cancha Bajo Techo Urb. Alturas de Jayuya	Other Facilities	Recreational Facilities	Low
Cancha Bajo Techo y Centro Comunal Salientito	Other Facilities	Recreational Facilities	Low
Cancha Baloncesto Alturas Pizá	Other Facilities	Recreational Facilities	Low
Cancha Esc. Angelica Torro	Other Facilities	Recreational Facilities	Low
Cancha Esc. Antonia Serrano	Other Facilities	Recreational Facilities	Low
Cancha Esc. Antonio Romero, Collores	Other Facilities	Recreational Facilities	Low
Cancha Esc. Miguel A. Sastre, Gripiñas	Other Facilities	Recreational Facilities	Low
Cancha Esc. Nemesio R. Canales, Coabey	Other Facilities	Recreational Facilities	Low
Cancha Esc. Superior Josefina León Zayas	Other Facilities	Recreational Facilities	Low
Cancha Los Pinos	Other Facilities	Recreational Facilities	Low
Cancha Vega Linda	Other Facilities	Recreational Facilities	Low
Casa Alcaldía	Lifeline: Safety and Security	Government Service	Low
Casa Alcaldía (Anexo)	Lifeline: Safety and Security	Government Service	Low
CDT Dr. Mario Canales Torresola	Lifeline: Health and Medical	Medical Care	Low
CDT Mario Canales Torresola	Lifeline: Health and Medical	Medical Care	Low
CEDRETA (Salón de Actividades)	Other Facilities	Recreational Facilities	Low
Cementerio Municipal	Other Facilities	Community Assets/ Hazardous Materials	Low
Centro de Actividades "Juan B. Oliver"	Other Facilities	Recreational Facilities	Low
Centro de Vigilancia Virtual	Lifeline: Safety and Security	Law Enforcement	Low
Community Assets de Pelota "Venancio Tejedor"-Collores	Other Facilities	Recreational Facilities	Low
Community Assets de Pelota (Coby)	Other Facilities	Recreational Facilities	Low
Community Assets de Pelota Santa Clara	Other Facilities	Recreational Facilities	Low
Community Assets Infantil "Adrián Padua Sánchez"	Other Facilities	Recreational Facilities	Low

Community Assets Pasivo Urb. Jardines de Jayuya	Other Facilities	Recreational Facilities	Low
Community Assets Pasivo Urb. Valle Verde	Other Facilities	Recreational Facilities	Low
Cuartel de la Policía Municipal	Lifeline: Safety and Security	Law Enforcement	Low
Cuido "Dulzura Infantil"	Other Facilities	educational institutions	Low
Esc. Adrián Torres Torres	Other facilities	Educational Institutions	Low
Esc. Adrián Torres Torres	Other facilities	Educational Institutions	Low
Esc. Agustín Ortiz Rivera	Other facilities	Educational Institutions	Low
Esc. Angélica Toro Rodríguez	Other facilities	Educational Institutions	Low
Esc. Carmen Salas de Torrado	Other facilities	Educational Institutions	Low
Esc. Superior Josefina León Zayas	Other facilities	Educational Institutions	Low
Escalinatas Busto "El Indio"	Other Facilities	Economic Facilities	Low
Estación de Bomberos	Lifeline: Safety and Security	Fire Station Facilities	Low
Estadio Municipal "Marcos A. Massini"	Lifeline: Food, Hydration and Shelter	Shelters	Low
Farmacia Hayuya	Lifeline: Health and Medical	Medical Care	Low
Gasolinera (Gulf)	Lifeline: Energy	Fuel distribution	Low
Gasolinera (Total Energies)	Lifeline: Energy	Fuel distribution	Low
Gasolinera (Total Energies)	Lifeline: Energy	Fuel distribution	Low
Kennedy Street	Lifeline: Transportation	Transportation Systems	Low
Local Road	Lifeline: Transportation	Transportation Systems	Low
Multifabril	Other Facilities	Recreational Facilities	Low
Museo "Nelson Rafael Collazo Grau"	Other Facilities	Economic Facilities	Low
Museo El Cemí	Other Facilities	Economic Facilities	Low
Obras Públicas Municipal	Lifeline: Safety and Security	Government Service	Low
Oficina Municipal Manejo de Emergencias	Lifeline: Safety and Security	Government Service	Low
Paliques Café	Other Facilities	Economic Facilities	Low
Panadería Santa Clara	Other Facilities	Economic Facilities	Low
Picadero Javier "Chory" Rodríguez	Other Facilities	Economic Facilities	Low
Pista Atlética Jesús "Kiki" Rivera	Other Facilities	Recreational Facilities	Low
Pitorrico	Other Facilities	Recreational Facilities	Low
Planta Filtros Jayuya Urbano	Lifeline: Water Systems	Water Supply	Low
Plaza del Mercado	Other Facilities	Economic Facilities	Low
PR 140 Km. 5.2	Lifeline: Transportation	Transportation Systems	Low
PR 140 Km. 7.3	Lifeline: Transportation	Transportation Systems	Low
PR 140 Km. 8.68	Lifeline: Transportation	Transportation Systems	Low
PR 144	Lifeline: Transportation	Transportation Systems	Low
PR 144 Km. 0.8	Lifeline: Transportation	Transportation Systems	Low
PR 144 Km. 1.5	Lifeline: Transportation	Transportation Systems	Low
PR 144 Km. 1.90	Lifeline: Transportation	Transportation Systems	Low
PR 144 Km. 3.6	Lifeline: Transportation	Transportation Systems	Low

PR 144 Km. 3.6	Lifeline: Transportation	Transportation Systems	Low
PR 144 Km. 5.0	Lifeline: Transportation	Transportation Systems	Low
PR 144 Km. 6	Lifeline: Transportation	Transportation Systems	Low
PR 372	Lifeline: Transportation	Transportation Systems	Low
PR 527 Km. 0.05	Lifeline: Transportation	Transportation Systems	Low
Puente Virao	Lifeline: Transportation	Transportation Systems	Low
Punto Recolección Agua Potable	Lifeline: Water Systems	Water Supply	Low
Residencial La Montaña	Lifeline: Food, Hydration and Shelter	Public Housing	Low
Restaurante La Piedra Escrita (El Asao)	Other Facilities	Economic Facilities	Low
Sol Street Km. 0.3	Lifeline: Transportation	Transportation Systems	Low
Subestación Eléctrica	Lifeline: Energy	Energy Generation And Distribution	Low
Supermercado (Econo)	Lifeline: Food, Hydration and Shelter	Food Supply	Low
Terreno (Estacionamiento de los Dinosaurios)	Other Facilities	Economic Facilities	Low
UAGM	Other Facilities	Educational Institutions	Low
Vertedero Municipal	Other facilities	Solid Waste Disposal Facilities	Low
Vincent Street	Lifeline: Transportation	Transportation Systems	Low
Cancha Bajo techo Calle Hermenelinda Rivera	Other Facilities	Recreational Facilities	Moderate
Cancha Bajo Techo Gripiñas	Other Facilities	Recreational Facilities	Moderate
Centro Comunal Puerto Plata	Other Facilities	Recreational Facilities	Moderate
Centro Comunal Veguita Zamas	Other Facilities	Recreational Facilities	Moderate
Centro Cultural (Antiguo Hospital)	Other Facilities	Recreational Facilities	Moderate
Estación de Bomberos - Mameyes	Lifeline: Safety and Security	Fire Station Facilities	Moderate
Hacienda Parador Gripiñas	Other Facilities	Economic Facilities	Moderate
Hacienda Santa Marina	Other Facilities	Economic Facilities	Moderate
Infraestructura AAA El Nudo	Lifeline: Water Systems	Water Supply	Moderate
Local Road	Lifeline: Transportation	Transportation Systems	Moderate
Plaza de la Música	Other facilities	Recreational Facilities	Moderate
PR 140	Lifeline: Transportation	Transportation Systems	Moderate
PR 140 Km. 8.1	Lifeline: Transportation	Transportation Systems	Moderate
PR 140 Km. 8.9	Lifeline: Transportation	Transportation Systems	Moderate
PR 505	Lifeline: Transportation	Transportation Systems	Moderate
PR 528	Lifeline: Transportation	Transportation Systems	Moderate
PR 528 Km. 3.4	Lifeline: Transportation	Transportation Systems	Moderate
PR 528 Km. 3.5	Lifeline: Transportation	Transportation Systems	Moderate
PR 539 Km. 0.7	Lifeline: Transportation	Transportation Systems	Moderate
PR 5527 Km. 0.15	Lifeline: Transportation	Transportation Systems	Moderate
Sol St Km. 0.3	Lifeline: Transportation	Transportation Systems	Moderate
Teatro "Homero Aulet"	Other Facilities	Economic Facilities	Moderate
Globo Aerostático	Other Facilities	Economic Facilities	Very High

PR 144	Lifeline: Transportation	Transportation Systems	Very High

Critical Infrastructure affected by 100% Flood		
Área recreativa La Monserrate	Other Facilities	Recreational Facilities
Biblioteca Electrónica	Other facilities	Educational Institutions
Cancha Esc. Superior Josefina León Zayas	Other Facilities	Recreational Facilities
Cancha Vega Linda	Other Facilities	Recreational Facilities
CEDRETA (Salón de Actividades)	Other Facilities	Recreational Facilities
Community Assets de Pelota (Coby)	Other Facilities	Recreational Facilities
Cuido "Dulzura Infantil"	Other Facilities	educational institutions
Esc. Superior Josefina León Zayas	Other facilities	Educational Institutions
Farmacia Hayuya	Lifeline: Health and Medical	Medical Care
Museo El Cemí	Other Facilities	Economic Facilities
Pista Atlética Jesús "Kiki" Rivera	Other Facilities	Recreational Facilities
Plaza del Mercado	Other Facilities	Economic Facilities
PR 141 R Km. 0.1	Lifeline: Transportation	Transportation Systems
PR 144	Lifeline: Transportation	Transportation Systems
PR 144 Km. 0.8	Lifeline: Transportation	Transportation Systems
PR 144 Km. 1.90	Lifeline: Transportation	Transportation Systems
PR 144 Km. 5.0	Lifeline: Transportation	Transportation Systems
Puente Virao	Lifeline: Transportation	Transportation Systems
Vincent Street	Lifeline: Transportation	Transportation Systems

Critical Infrastructure affected by 500% Flood		
Kennedy Street	Lifeline: Transportation	Transportation Systems
Panadería Santa Clara	Other Facilities	Economic Facilities
PR 144 Km. 3.6	Lifeline: Transportation	Transportation Systems
Sol Street Km. 0.3	Lifeline: Transportation	Transportation Systems
Subestación Eléctrica	Lifeline: Energy	Energy Generation And Distribution