

**PLANES DE MITIGACIÓN CONTRA PELIGROS NATURALES**

Resiliencia Planificada



**J U N T A   D E   P L A N I F I C A C I Ó N**

**2020**

# Municipality of Barranquitas

Local Hazard Mitigation Plan

**Executive Summary**



# 1 Introduction

The Municipality of Barranquitas has revised its Local Hazard Mitigation Plan (LHMP).<sup>1</sup> This complies with the Federal Disaster Mitigation Act of 2000 (DMA2K), which was signed into law to amend the Robert T. Stafford Disaster Relief and Emergency Assistance Act of 1988. One of the requirements that this legislation establishes is that in order for the municipality to receive federal mitigation funds, it must elaborate and adopt a Federal Emergency Management Administration (FEMA) approved LHMP.<sup>2</sup> The DMA2K promotes that the local government, together with the State, work on pre-disaster planning and encourages the development of sustainable hazard mitigation activities.

These LHMPs must be revised and updated every five (5) years to remain in compliance with regulations and Federal Mitigation Grant conditions. Updating requirements offer the municipality an opportunity to reevaluate recommendations, monitor the implementation of mitigation strategies included in the previous Plan, monitor the impact of mitigation actions that have been implemented, and determine if any changes and updates need to be incorporated to the Plan. This Plan complies with said regulations.

## **Hazard Mitigation Planning Process**



The strategies and projects enumerated in the LHMP have the goal of reducing the loss of life and property that can result from a natural disaster. Hence, the mitigation strategies included in this LHMP involve planning efforts, capital projects, and other activities that reduce the impact of natural hazards included in Barranquitas’ 2020 LHMP.

The municipality has also revised the LHMP under the authority of Act 81-1991, known as the Autonomous Municipalities Act of 1991, as amended. As stated in Section 2.004 of said Act 81-1991, the municipality can carry out any activity that establishes programs or adopt convenient and useful measures to

prevent and fight fires, offer assistance to the community in cases of emergency or natural disasters, catastrophic fire accidents and for civil protection in general, pursuant to Act No. 211-1999, as amended, known as the Commonwealth of Puerto Rico Emergency Management and Disaster Administration Agency Act.<sup>3</sup>

This Executive Summary will provide an overview on:

- Barranquitas’ social characteristics;

<sup>1</sup> Please note that the 2020 Revised LHMP was written in Spanish as per agreement between the Municipality of Barranquitas, the Planning Board, the Governor’s Authorized Representative (GAR) and FEMA.

<sup>2</sup> 42 U.S.C 5165; 44 C.F.R. § 201.6.

<sup>3</sup> 21 L.P.R.A § 4054

- Public engagement, participation and outreach efforts with the community during the LHMP planning process;
- A risk assessment for Barranquitas,
- A review of the mitigation strategies, goals and LHMPs action plan, and
- Plan maintenance and how to keep the Plan current.

## 2 Barranquitas: Main Characteristics and Profile



Figure 1: Barranquitas and its wards

The Municipality of Barranquitas is in the central region known as Cordillera Central of Puerto Rico and is currently organized in eight (8) wards: (1) Palo Hincado; (2) Cañabón; (3) Barrancas; (4) Quebradillas; (5) Quebrada Grande; (6) Honduras; and (7) Helechal; (8) Pueblo. Its territory extends across 34.28 square miles. Barranquitas is bordered by the municipalities of Corozal, Naranjito, Comerío, Aibonito, Coamo and Orocovis.

Barranquitas has a hydrographic system which is composed of the following bodies of water: Río Piñonas, Río Usabón, Río La Plata and Río Grande de Manatí. Also, the municipality has several creeks including: Quebrada Helechal y Quebrada Grande, and the Quebrada Padilla. In terms of its topography, the municipality is mainly mountainous due to its location in the Central Mountain area of the island. Thus, the region has the Mount Torrecilla, which height is 943 meters and Mount Farrallón with a height of 787 meter.

According to the official 2010 Census, the Municipality of Barranquitas had 30,318 inhabitants. On the other hand, the 2017 American Community Survey (ACS) estimates a population decrease of 3.57%, thus, it is estimated that by 2017, the municipality had 29,237 inhabitants. Based on the 2010 Census, the ward with the most population is Barrancas with 5,234 inhabitants. On the other hand, the ward with less population, as stated by 2010 Census, is Honduras with 1,823 inhabitants. It should be noted that, in 2017, the island of Puerto Rico suffered the devastating effects of two (2) Hurricanes Irma and Maria, which drastically affected all of Puerto Rico’s municipalities, therefore, many residents of Puerto Rico chose to emigrate to other states of the United States of America (USA). When we see the changes between the years 2010 and the trend reflected on 2017 data by age, we can perceive that although the total population decreased by 3.57%, the population over 65 increased by 23.35%. Further details, regarding the profile of the municipality, can be found in Chapter 3, Section 3.2 of the updated 2020 LHMP.

Table 1: Barranquitas Population Change

| Population            | 2010 Census | 2017 ACS Estimates | % Percentage change |
|-----------------------|-------------|--------------------|---------------------|
| 5 years of age or <   | 2,054       | 1,804              | -12.17%             |
| 5 to 19 years of age  | 7,425       | 6,208              | -16.39%             |
| 20 to 64 years of age | 17,584      | 17,210             | -2.13%              |

| Population           | 2010 Census | 2017 ACS Estimates | % Percentage change |
|----------------------|-------------|--------------------|---------------------|
| 65 years of age or > | 3,255       | 4,015              | 23.35%              |
| Total                | 30,318      | 29,237             | -3.57%              |

Source: US Census Bureau, Census 2010; American Community Survey 2013-2017 Estimates

This profile highlights the population that could be potentially vulnerable to natural hazards in the municipality, particularly individuals whose age ranges from 65 or more reflecting an increase of 23.35% during the seven-year period (2010 to 2017).

### 3 Outreach and Public Participation

In order to guide the development of this Plan, the Municipality of Barranquitas appointed the following officials to constitute the Mitigation Planning Committee. This Committee represents various instrumentalities of the municipal government.

Table 2: Hazard Mitigation Planning Committee

| Name                      | Position                   | Agency                                  | Email   |
|---------------------------|----------------------------|---|---|
| Ing. Edwin Torres Jiménez | Engineering Director       | Municipality of Barranquitas            | etorres@barranquitas.pr.gov<br>etjimenez1@hotmail.com |
| Ángel I. Marrero Ortiz    | Director                   | Federal Funds Program                   | amarero@barranquitas.pr.gov                           |
| Yamilet Guzmán Cartagena  | Director                   | Finance Department                      | yguzman@barranquitas.pr.gov                           |
| Héctor R. Rivera          | Consultor/Planificador     | GIS Consulting Group, Inc.              | hector.rivera@giscg.com                               |
| Raúl I. Rivera Zayas      | Director de Obras Publicas | Interim director of Public Works Office | rrivera@barranquitas.pr.gov                           |
| Arelis Díaz Rivera        | Director                   | Municipal Emergency Management Office   | adiaz@barranquitas.pr.gov                             |
| Armado Zayas Rivera       | Commissoner                | Municipal Police Department             | azayas@barranquitas.pr.gov                            |

The Planning Committee activities included: (1) updating the list of the municipality assets and local critical facilities; (2) updating the status of the previous LHMP mitigation strategies; (3) determine possible new mitigation strategies for the 2020 LHMP; (4) development and implementation of public engagement, participation and outreach efforts for stakeholders at large such as the community, neighboring municipalities, governmental agencies; (5) announce the municipality's LHMP efforts to agencies, stakeholders, receive public feedback on Barranquitas 2020 LHMP draft version and incorporate such comments on the Plan. Accordingly, from February 22, 2018 to August 3, 2019, the Planning Committee reviewed and provided comments on the 2020 LHMP preliminary and draft versions.

On November 26, 2018, a public notice was published at the local newspaper Primera Hora informing the public about the first Community Planning Meeting to be held at Barranquitas. On May 25, 2019, a second notice was published, on this same newspaper, informing about a second Community Planning Meeting to be held on June 4, 2019. Furthermore, a third public notice was published, notifying a third meeting with the community. This third community meeting was held at the Centro de Recepciones y

Bellas Artes of Barranquitas on July 23, 2019. Besides informing all readers about the publication of the 2020 LHMP draft version, the document was available for review and a 20-day term to submit comments was provided. A digital copy of the draft version of the 2020 LHMP was made available through the Puerto Rico Planning Board's (PRPB) website (jp.pr.gov), while a hard copy was made available for review at the Permit Office of Barranquitas from Monday through Friday from 8:00 a.m. to 12:00 p.m. and from 1:00 p.m. to 4:00 p.m.

## 4 Barranquitas' Risk Assessment

After reviewing the natural hazards identified as priorities on the previous Barranquitas 2012 LHMP, Land Use Plan of 2010, the municipality's disaster history, and other literature related to potential future hazards, the Planning Committee identified the following hazards in the 2020 LHMP; (1) Climate change/extreme heat; (2) high winds; (3) Flooding; (4) Landslides; (5) Earthquakes; (6) Drought; and (7) wildfires. Discussion of these natural hazards are included in the 2020 LHMP's Chapter 4. Furthermore, the 2020 LHMP includes a quantitative vulnerability analysis, based on the best available data, for Barranquitas and Puerto Rico accounting for future development to assess mitigation strategies in order to prevent repetitive and severe repetitive property loss caused by a natural disaster.

This assessment served as a key tool for the Planning Committee and the public to identify and prioritize potential mitigation strategies by focusing attention on areas that present the greatest risk of damages to people, critical facilities, and normal municipality operations. The analysis for earthquake, flood, landslides and high winds was performed by assessing the potential impacts from each hazard using geographic information system data (GIS).

By ranking each section, the municipality was in the position to determine an overall risk classification. It is important to mention that this classification exercise resulted from the municipality's 2020 LHMP technical risk assessment along with a capability gap analysis and the local community input, which is based on previous natural events experienced by the Committee and the residents and business owners of Barranquitas.

The following table shows the conclusion of the Planning Committee based on the risk assessment.

*Table 3: Natural Hazard Ranking*

| Natural hazard              | Risk to individuals | Risk to facilities | Risk to operations | Classification |
|-----------------------------|---------------------|--------------------|--------------------|----------------|
| Climate change/Extreme heat | Moderate            | Low                | low                | Low            |
| High winds                  | High                | High               | High               | High           |
| Flooding                    | Moderate            | Low                | Low                | Low            |
| Landslides                  | High                | Moderate           | High               | High           |
| Earthquake                  | High                | High               | Moderate           | High           |
| Drought                     | Moderate            | Low                | Moderate           | Moderate       |

| Natural hazard | Risk to individuals | Risk to facilities | Risk to operations | Classification |
|----------------|---------------------|--------------------|--------------------|----------------|
| Wildfires      | Low                 | Low                | Low                | Low            |

The risks with the highest classification for the municipality are high winds, landslides and earthquakes. Please note that natural events, associated with high winds, such as hurricanes or tropical storms exacerbate the occurrence of landslides across Barranquitas. Also, an earthquake will most likely cause several landslides in the municipality. These natural hazards, together with the dangers associated with the presence of numerous structures that does not meet the minimum construction standards, exacerbate the probability of loss of life and property. Thus, these natural hazards pose a great risk for the population, buildings, stock, critical facilities and infrastructure. For example, during the hurricane María, on September 20, 2017, which brought around 37 inches of rain in a 48-time period, around 950 landslides affected several communities around Barranquitas. Consequently, the communities experienced roadblocks, destruction of railway lines and disruption of essential emergency services and communication.

The natural hazard with a moderate risk classification is drought. This does not mean that this hazard poses less risks than those mentioned above, but the impact they may have on the municipality represents a lower degree of severity.

Finally, extreme heat, due to climate change, and wildfires are considered the lowest risk to the municipality. Nonetheless, a future risk benchmark can provide a basis for understanding how future development can increase the impact and vulnerability of the population, structures, critical facilities and natural resources cause by these natural events.

This ranking methodology was adopted, in accordance with the risk assessment and the communities and planning committee own experiences during a natural event, to develop the mitigation strategies. The mitigation strategies, included in Chapter 6, are divided into the following categories: (1) Prevention; (2) Property protection; (3) Natural Resources Protection; (4) Emergency Services; and (5) Education and Public Outreach.

## 5 Mitigation Strategies, Goals, and Action Plan

The municipal capabilities, together with the risk assessment, serve as a foundation for the design, development and implementation of mitigation strategies. The mitigation strategies consist of a broad local goals and strategies. Moreover, the local mitigation actions were gathered from the 2012 LHMP and were incorporated into the 2020 LHMP. The chapter also provides information about the assigned implementation mechanisms and target completion dates. The sections on Chapter 6 are designed to make the Plan strategic by identifying long-term goals, but functional, by identifying short term and immediate actions that will guide the daily local decision-making process and project implementation.

Likewise, the mitigation goals consist of general guidelines that explain what the Municipality of Barranquitas wants to achieve in terms of hazards and loss mitigation. Accordingly, the goals included in the 2020 LHMP, offer the Planning Committee and the communities a framework for identifying, prioritizing and implementing actions to reduce the risks associated to natural hazards in Barranquitas.

On the other hand, the mitigation strategies are the activities, projects, measures, or processes that Barranquitas will adopt to reduce or eliminate the risk to people and property from hazards. Consequently, the Municipality of Barranquitas reviewed and revised the criteria adopted in the 2012 LHMP to analyze and prioritize potential mitigation strategies for the municipality. In order to develop the actions, the Planning Committee used the following criteria: (1) the potential of the strategy to reduce expected future damages and/or losses; (2) the municipality's capacity to implement the action within the 5-year cycle of the Plan; (3) support from the public, agencies, municipal departments, amongst others; and (4) the potential of the actions to increase the resiliency of the municipality and its residents. Hence, the Planning Committee adopted these criteria, the results from the risk assessment, and the feedback from local and neighboring communities to prioritize each mitigation strategy that was contained in this 2020 LHMP.

Most of the strategies and projects in the action plan target mostly flooding, but also include actions targeting coastal erosion and storm surge. The following summarize some of the strategies intended to mitigate these hazards:

- High wind projects including, but not limited to, require that new constructions are developed based on the current construction standards, such as International Building Code (IBS), International Residential Code (IRC) and the current construction Code of Puerto Rico, adopted in 2018;
- Earthquake projects including, but not limited to, incorporate construction regulations in high seismic risk areas into the Municipality's Land Use Plan;
- Landslides projects including, but not limited to, perform an inventory of structures located on high landslide risk areas and perform structural projects in areas affected by landslides in Barranquitas.

## 6 Maintenance to Keep the Plan Current

Chapter 7, of the revised 2020 LHMP, details the revision and monitoring process in great extent. The formal maintenance process, designed by the Planning Committee of Barranquitas, aims to keep the document viable and current, as it is a living document that shall reflect the hazards and realities affecting the communities. In addition, the plan maintenance process provides the procedures for evaluation and review every third quarter of each fiscal year during its 5-year life cycle. This periodical evaluation will include a review of the mitigation action plan implementation, continued public involvement through the Plan's life cycle, as required by federal legislation. In the event of a major natural disaster, affecting the island and/or municipality, an emergency meeting must be scheduled. As a result of the emergency, the municipality might choose to update or amend the 2020 LHMP if the Planning Committee determines that it is needed. The Office of Federal Programs will coordinate with other municipal dependencies, as needed, to achieve the goals and objectives stated in this LHMP.

Finally, the municipality will promote continued public participation during the plan maintenance by;

- Advising local communities about their strengths and weaknesses to deal with natural hazards and how to mitigate the associated risks;
- Advising local communities about what resources are available before, during, and after a natural disaster;



- Creating and maintaining a database of individuals that are interested in hazard mitigation in order to keep them up to date on any information that may increase their capabilities in the subject matter;
- The Local Hazard Mitigation Planning Committee shall represent the community; and
- Holding public meetings to discuss LHMP monitoring and supervision at the beginning of the last quarter of each fiscal year and/or after the occurrence of any natural disaster in the municipality.

In brief, the Planning Committee (hereinafter referred to as CPM) will be responsible for the preparation of the HMP Annual Progress Report. These annual reports will provide data for the five-year upgrade of this HMP and help identify deployment issues. By monitoring the implementation of the Plan annually, the CPM will be able to evaluate which projects have been completed, which are no longer feasible, and which projects require additional funds. During the annual meeting of the CPM, planning members will set a timetable for project development, review, comment, modify and submit the HMP PREMA Annual Progress Report (Negotiated for Emergency Management). The Plan will also be evaluated and reviewed after major disasters to determine whether the recommended actions remain relevant and appropriate. The risk assessment will also be reviewed to see if changes are necessary, based on the pattern of disaster damage, or whether the data in Section 4.5 (Identified Hazard Profiles) of this Plan have been collected to facilitate risk assessment. This is an opportunity to increase community resilience according to disasters and build a better and stronger community.

## 7 Plan Approval and Adoption

The Federal Emergency Management Agency (FEMA) completed review of the Hazard Mitigation Plan for the Municipality of Barranquitas, based on the standards pursuant to title 44 C.F.R. Section 201, as authorized by the Disaster Mitigation Act of 2000 (DMA2k). The Plan received a satisfactory rating for all required criteria and was approved as approvable pending adoption (APA). Accordingly, the Municipality of Barranquitas, adopted said Plan on August 5, 2020 via Resolution No. 01, Series 2020-21.

Upon receiving the record of adoption from the municipality, FEMA issued an Official Approval Letter that dates from August 10, 2020, stating the jurisdiction has adopted said Plan, thus, approved and eligible for FEMA Hazard Mitigation Assistance programs. The Plan was formally approved by FEMA the same day the said letter was notified. This approval letter establishes the expiration date five (5) years from the date of approval, or until August 9, 2025.