

PLANES DE MITIGACIÓN CONTRA PELIGROS NATURALES

Resiliencia Planificada



JUNTA DE PLANIFICACIÓN

2020

# Municipality of Mayagüez

Natural Hazard Mitigation Plan

Executive Summary

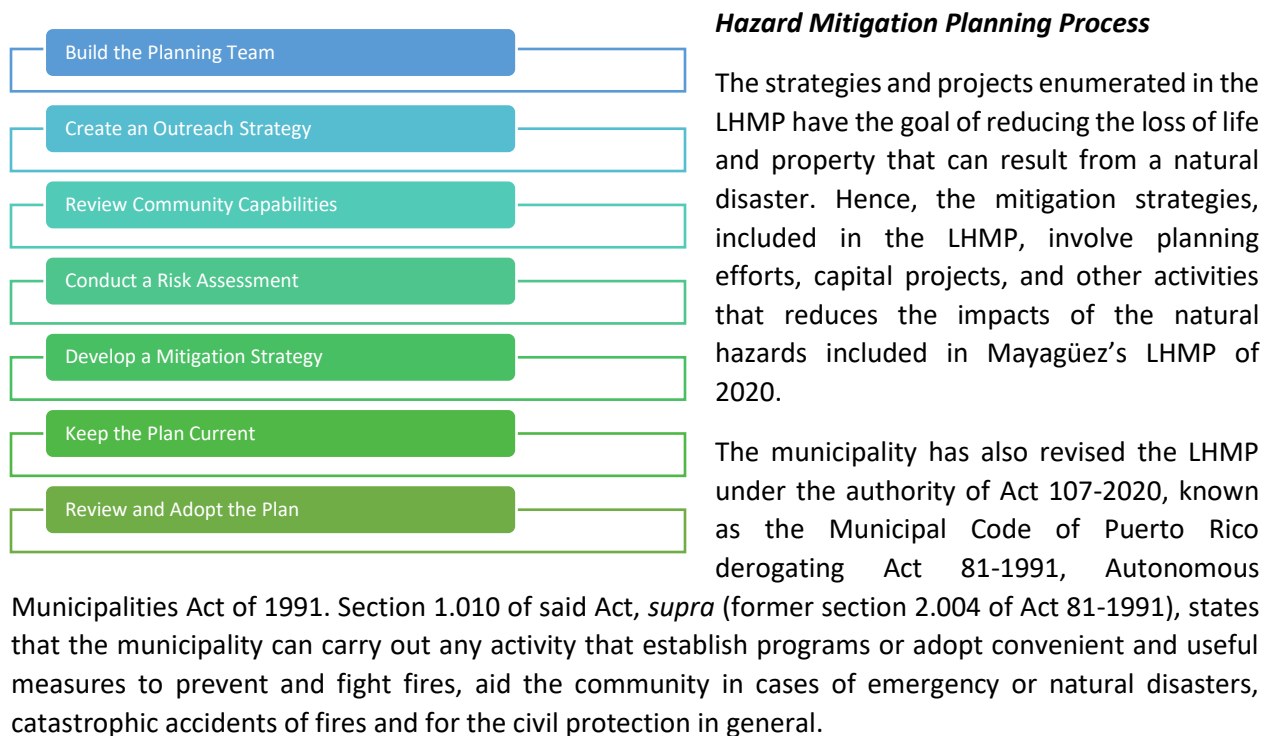


# 1 Introduction

The Municipality of Mayagüez has revised its Local Hazard Mitigation Plan (LHMP)<sup>1</sup> in accordance 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> Also, 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. This updating requirement offers 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 to the Plan need to be incorporated. This Plan complies with said regulations.

Figure 1: Hazard Mitigation Planning Process



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

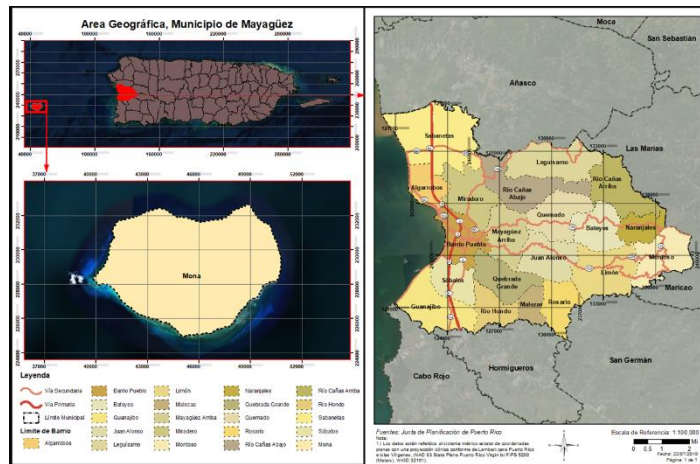
<sup>2</sup> 42 U.S.C 5165; 44 C.F.R. § 201.6.

This Executive Summary will provide an overview on:

- Mayagüez's population characteristics;
- The public participation and outreach efforts with the community during the LHMP planning process;
- Mayagüez's risk assessment;
- A review of the mitigation strategies, goals and LHMPs action plan; and
- Plan maintenance, and how to keep the Plan current.

## 2 Mayagüez's Profile: Main Population Characteristics

Figure 2: Mayagüez and its wards



The Municipality of Mayagüez is located on the western coast of Puerto Rico. Its northern border is the Municipality of Añasco, to the south are the municipalities of Cabo Rojo, Hormigueros and San Germán, to the west is the Mona Passage, and to the east are the municipalities of Maricao and Las Marías. The Municipality of Mayagüez has a territorial area of approximately 77.65 square miles (201.06 square kilometers).

The Puerto Rico Planning Board, according to the most recent area delimitation, divides the island into eleven areas, grouping the

different municipalities by their demographic trends and human settlements, infrastructure endowment, socioeconomic variables, sociodemographic characteristics, internal cohesion, and the resources and development potential of each. The Functional Area of Mayagüez, to which the Municipality of Mayagüez belongs, is composed of the municipalities of Añasco, Cabo Rojo, Hormigueros, Lajas, Las Marías, Maricao, Mayagüez, Rincón, Sabana Grande and San Germán.

The Municipality has twenty one (21) official *barrios* or wards: Algarrobo, Bateyes, Guanajibo, Isla de Mona and Islote Monito, Juan Alonso, Leguisamo, Limón, Malezas, Mayagüez Pueblo, Mayagüez Arriba, Miradero, Montoso, Naranjales, Quebrada Grande, Quemado, Río Cañas Abajo, Río Cañas Arriba, Río Hondo, Rosario, Sábalo and Sabanetas.

In hydrographic terms, its most important features are the Grande de Añasco, Guanajibo and Yagüez rivers. All of these flow into the Mona Passage.

Mayagüez has the most extreme weather patterns on the island of Puerto Rico, with a high frequency of severe storms during the summer capable of producing tornados, waterspouts, strong winds and flooding and hail. It's mean annual temperature is 75 F (24 C).

Table 1: Population by age group: 2010 and 2017

Population	2010 Census	2017 ACS estimate	% Rate of Change
Younger than 5 years age	4,626	3,475	-24.88%
5 to 19 years of age	17,639	14,711	-16.60%
20 to 64 years of age	51,056	44,220	-13.39%
65 years of age and older	15,759	17,209	9.20%
<b>Total</b>	<b>89,080</b>	<b>79,615</b>	<b>-10.63%</b>

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

According to the 2010 Census, Mayagüez has a population of 89,080. The American Community Survey (ACS) of 2017 estimated that the population of Mayagüez had decreased by 9,465 inhabitants. This represents a reduction of 10.63%. Fifteen (15) of the Municipality's barrios or wards experienced a population decrease,

with the largest in percentage terms being Rosario, which decreased by 52.67% (1,403 to 664 inhabitants). Of the six (6) wards that experienced an increase in population, the largest in percentage terms was Algarrobos, which increased by 22.06% (4,383 to 5,350 inhabitants). Further details, regarding the profile of the municipality can be found in Chapter 3, Section 3.2, of the updated 2020 LHMP.

### 3 Outreach and Public Participation

In order to guide the development of this Plan, Hon. José Guillermo Rodríguez, Mayor of Mayagüez, appointed the following officials to constitute the Mitigation Planning Committee (henceforth, the Planning Committee). The Planning Committee is comprised by representatives from several departments and citizen involvement with key roles and experience in community planning, public works, and emergency management to serve as key components in the planning process. Please refer to Section 2.5 on the LHMP for more information.

Table 2: Hazard Mitigation Planning Committee

Name	Position	Agency	Email
Lcdo. Samuel González	Manager	Economic Development Office	sgonzalez@mayaguezpr.gov
Ing. Jorge L. Ramos	Manager	Urban Development Office	joramos@mayaguezpr.gov
Ing. Jorge L. Ramos <sup>3</sup>	Representative	Public Works Department	joramos@mayaguezpr.gov

<sup>3</sup> Before, Mr. Sergio Marrero.

Name	Position	Agency	Email
Sr. Israel Martínez	Director	Municipal Emergency Management and Disaster Administration Office	omme@mayaguezpr.gov
Sr. Alfred Keneth Soto	Manager	Housing Office	alsoto@mayaguezpr.gov
Sr. Javier Rivera	Commissioner	Municipal Police	jarivera@mayaguez.onmicrosoft.com
Sra. Sandra Rojas	Chief of Firefighters and Medical Emergencies	Municipal Firefighters	srojas@mayaguezpr.gov
Sr. Ramon Díaz	Representative	Economic Development Office	pot@mayaguezpr.gov
Sr. Fernando Espinosa	Specialist in Hazard Mitigation and GIS systems	Urban Development Office	fespinosa@mayaguezpr.gov
Sr. Harold Ortiz	Community Representative	Community Affairs Office	hortiz@mayaguezpr.gov
Ing. Ariel F. Conde	Consultant	AGP Group	a1.conde@acppr.com
Marisol Rodríguez-Rivera, PPL, GISP	Consultant	AGP Group	m.rodriguez@acppr.com
Ing. Humberto Marrero	Consultant	HMR Engineering	hmr.engineering@gmail.com
Sr. William Sarriera	Consultant	ACE Environmental Group	wsarriera.ace@gmail.com
Sra. Olga López de Krumhamsi	Interim Manager	Municipal Press and Communications Office	olopez@mayaguezpr.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 participation and outreach activities and stakeholders at large such as neighboring municipalities, governmental agencies; (5) announce the municipality's LHMP efforts to agencies, stakeholders and public feedback for Mayagüez's LHMP 2020 draft version and incorporate such comments on the Plan.

An initial notice was published in a local newspaper (Primera Hora). Said notice informed the public about the first Public Participation meeting to be held in Mayagüez on April 24, 2019. A second notice was published regarding the publication of the 2020 LHMP draft version for review providing 20 days period for review, submit comments, and the opportunity to participate in a second community meeting held on July 10, 2019. A draft version of the 2020 LHMP was made available on the Puerto Rico Planning Board's (PRPB) website (jp.pr.gov).

## 4 Mayagüez's Risk Assessment

After reviewing the natural hazards identified as priorities on the previous Mayagüez's 2014 LHMP, the Municipal Emergency Response Plan, 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) Sea Level Rise, (2) Drought, (3) Earthquakes, (4) Flooding, (5) Landslides, (6) Strong Winds (Tropical Cyclones), (7) Tsunami, (8) Storm Surge, (9) Coastal Erosion, and (10) Wildfire. Discussion of these natural hazards are included in the 2020 LHMP's Chapter 4. In addition, the 2020 LHMP includes a quantitative vulnerability analysis based on the best available data for Mayagüez and Puerto Rico accounting for future development to assess mitigation strategies to prevent repetitive and severe property loss.

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 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 Planning Committee and the residents and business owners of Mayagüez.

Table 3 provides a summary of the risk classification for each identified hazard. Part of the process of completing the following appraisal required input from the community as well as from the Committee. Beyond the risk analysis, this table presents the municipality's prioritization analysis.

*Table 3: Natural Hazard Ranking*

Natural Hazard	Risk to people	Risk to facilities	Risk to operations	Classification
Sea Level Rise	2	2	1	Moderate

Natural Hazard	Risk to people	Risk to facilities	Risk to operations	Classification
Drought	2	1	2	Low
Earthquake/Liquefaction	3	3	3	High
Flooding	3	3	3	High
Landslide	3	2	3	High
Strong Winds/Tropical Cyclones	3	3	3	High
Tsunami	2	2	3	High
Storm Surge	2	1	1	Low
Coastal Erosion	1	1	1	Low
Wildfire	1	1	2	Low

Source: Planning Committee 2019-2020

High=3, Moderate=2, Low=1

Currently, the potential risks with the highest classification or greater impact identified for the municipality are: (1) earthquake/liquefaction, (2) flooding, (3) landslide, (4) strong winds/tropical cyclone and (5) tsunami.

A ranking methodology was adopted to develop the mitigation strategies based on these risks as discussed on Chapter 6 and are divided into the following categories: (1) Prevention, (2) Property Protection, (3) Natural Resources Protection, (4) Structural Projects, (5) Emergency Services, and (6) Education and Public Awareness. The strategy category with most mitigation actions is “Structural Projects” with a total of 90 mitigation projects. Flooding is the natural hazards that is most addressed within the mitigation actions.

## 5 Mitigation Strategies, Goals, and Action Plan

The municipal capabilities, along with the risk assessment, serve as a foundation for the design, development and implementation of mitigation strategies. Mitigation strategies, found in Chapter 6, consist of a broad amount of local goals and strategies. The local mitigation actions were gathered from the 2014 LHMP and were incorporated into the current LHMP. This chapter provides information about the assigned implementation mechanisms and target completion dates. The sections in this chapter are designed to make the Plan strategic by identifying long-term goals, and functional, by identifying short term and immediate actions that will guide the daily local decision-making process and project implementation.

Mitigation goals consist of general guidelines that explain what the Municipality of Mayagüez wants to achieve in terms of hazards and mitigation. Thus, 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 Mayagüez.

Mitigation strategies are activities, projects, measures, or processes that Mayagüez will adopt in order to reduce or eliminate risk to people and property from hazards. Consequently, Mayagüez reviewed and revised the criteria adopted in the 2013 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 capacity of the municipality 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 action to increase resiliency of Mayagüez and its residents. Accordingly, 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 LHMP.

The following summarizes some of the strategies intended to mitigate these hazards:

- Use GIS to establish an inventory of critical infrastructure that needs to be rehabilitated, as well as housing that needs to be reinforced or removed for mitigation purposes.
- Construction of new water drainage to control flooding in different areas of the municipality.
- Remove obsolete concrete and metal structures located on the coast that could worsen the risk of coastal erosion.
- Build retaining walls and other structural elements to protect communities at risk of landslides.
- Cleaning and maintenance of existing drainage systems to prevent these from backing up during heavy rains and contributing to flooding.
- Rebuild/refit bridges to allow access to communities in case of hazard events such as flooding/landslide/earthquake.

## 6 Maintenance to Keep the Plan Current

Chapter 7 details the revision and monitoring process in great extent. The formal maintenance process, identified by the Planning Committee, aims to keep the document viable and current, as it is a living document that shall reflect the hazards and realities affecting its community, and how to plan and prepare ahead in the event of a natural disaster. The plan maintenance process provides the procedures for evaluation and review every third quarter of each fiscal year during its 5-year life cycle. 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. As part of the review process, the members of the Planning Committee. In the event of a major natural disaster affecting the island and/or municipality, an emergency meeting must be scheduled, and the Plan should be updated or amended, as necessary, bypassing the 5-year term. The Committee 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, including, but not limited to (Refer to Section 7.4 of the LHMP):

- Making sure to coordinate meetings between those involved in the Plan maintenance process, which will take place at the beginning of each year and after each natural disaster occurring in the jurisdiction of Mayagüez.
- Prepare the Reports of the Plan Progress Analysis, which will be presented and discussed in meetings with the people involved in the Plan maintenance process.
- Review whether there were changes in the Act, regulatory agency regulations, which affect the Plan in one way or another, as well as budget allocations that may affect the development of projects programmed for communities.
- Ensure that applications for funds for the development of the activities described in the Plan to be made by the municipality are included in the budget of the relevant fiscal year.



- Identify opportunities to access funds.
- Establish the program-specific Work Plan, based on the schedule and goals set out in the Plan.

## 7 Plan Approval and Adoption

The Federal Emergency Management Agency (FEMA) completed review of the Municipality of Mayagüez's Hazard Mitigation Plan, 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) on November 16, 2020. Accordingly, the Municipality of Mayagüez, adopted said Plan on December 28, 2020 via Resolution No. 53, Series 2020-2021.

Upon receiving the record of adoption from the municipality, FEMA approved Plan by January 8, 2021 and issued an official approval letter to municipality stating the jurisdiction has adopted said Plan thus approved and eligible for FEMA Hazard Mitigation Assistance programs. The approval letter establishes the expiration date 5 years from the date of approval, or until January 7, 2026.