

PLANES DE MITIGACIÓN CONTRA PELIGROS NATURALES

Resiliencia Planificada



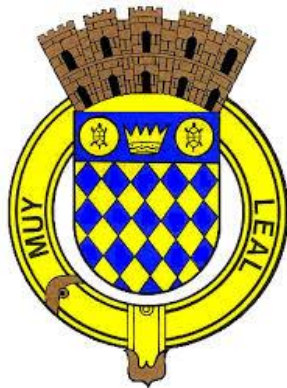
J U N T A D E P L A N I F I C A C I Ó N

2020

Municipality of Arecibo

Local Hazard Mitigation Plan

Executive Summary

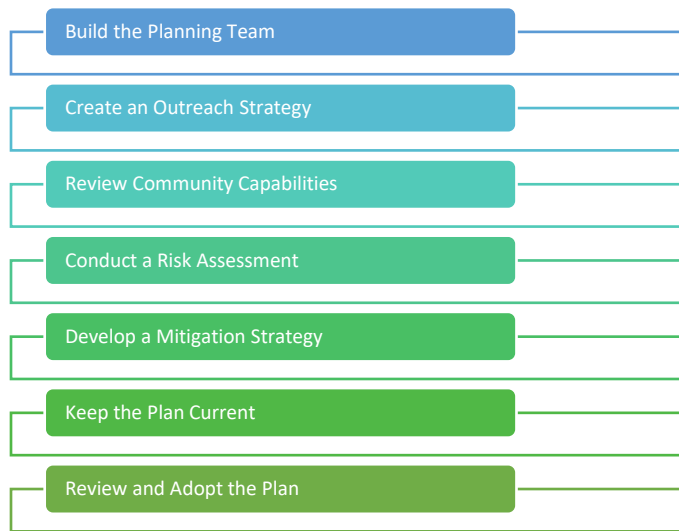


1 Introduction

The Municipality of Arecibo has revised its Local Hazard Mitigation Plan (LHMP).¹ 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.² 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 ultimate 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 Arecibo’s 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. Section 2.004 of said Act 81-1991, states that the municipality can carry out any activity that establishes programs or can adopt convenient and useful measures to

prevent and fight fires, aid the community in cases of emergency or natural disasters, catastrophic fire accidents and for civil protection in general.³

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

² 42 U.S.C 5165; 44 C.F.R. § 201.6.

³ 21 L.P.R.A § 4054

This Executive Summary will provide an overview on:

- Arecibo's social characteristics,
- Public engagement, participation and outreach efforts with the community during the LHMP planning process,
- Arecibo's risk assessment,
- A review of the mitigation strategies, goals and LHMPs action plan, and
- Plan maintenance, continuity of public participation and how to keep the Plan current.

2 Arecibo: Main Characteristics and Profile



Figure 1 Arecibo and its wards

Municipality located in the region and north coast of the island. Its name comes from an indigenous village whose chief, or chief, was called Arasibo or Arecibo.

The Municipality is located at latitude 18-28'81"N and longitude 66'42'56.60"W. Arecibo is the largest municipality in Puerto Rico, with an area of 128.1277 square miles (mi²) of territorial extension. It adjoins the Atlantic Ocean to the north, to the south with Utuado and Ciales, to the west with Hatillo, and to the east with Barceloneta and Florida.

The Municipality of Arecibo has three (3) main physiographic area: mountains (the least extensive in the municipality), the coastal plains and the plains susceptible to flooding along the Río Grande de Arecibo. These forms of terrain consist of rocks and sediments that originated mostly in tertiary and quaternary times. The Municipality of Arecibo has a relatively flat relief. The mountainous area is located at

the southern region of the municipality. Loma Correa is located at Sabana Hoyos and is approximately 270 meters above sea level. The territory is located in the region of the northern coastal plain which is adjacent to the karst area in its southern portion. The karst area is characterized by caves, sinks and *mogotes* (Refer to section 4.5.1.1: Sinkholes).

The average height of the municipality of Arecibo is between 200 and 350 meters above sea level, being the highest point marked by a giant sinkhole at Esperanza at a height of approximately 380 meters above sea level, specifically where the Radiotelescope of Arecibo is located at. Arecibo is also rich in forest resources, caves, as well as bodies of water.

According to the 2010 U.S. Census, the city has a population of 96,440, spread over 19 *barrios* or wards. The 2017 American Community Survey (ACS) estimates the population of Arecibo decreasing by 7.14% (89,550 inhabitants). The population of Arecibo accounted for 2.59% of the island's total population by 2010 and 2.40% for 2017. 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 PR municipalities, and many residents of Puerto Rico chose to emigrate to other states of the United States United States of America (USA). Because of the devastating effects of these hurricanes, affecting the economy, infrastructure, coasts, mountains and housing in Arecibo, although this trend of population decline began

to be observed in the 2017 Census for the whole island. 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. Carlos Molina Rodríguez, Mayor of Arecibo, including himself as part of the team, appointed the following officials to constitute the Mitigation Planning Committee. This Committee represents various instrumentalities of the government, municipal leaders and other key actors identified to serve as key components in the planning process.

Table 1 Hazard Mitigation Planning Committee

Name	Position	Agency	E-mail
Hon. Carlos Molina	Mayor	Municipality of Arecibo	fjmercado@rincon.gov.pr
Héctor Torres Calderón	Consultant	Professional Advice Group	jmvalle@rincon.gov.pr
Capitán Efrén Vélez	Director	Municipal Emergency Management	korsini@rincon.gov.pr
Carmen Paniagua	Director	Finance Department, Municipality of Arecibo	mgodoy@rincon.gov.pr
Nelly Ann Crespo	Director	Municipal Development	ommerincon@gmail.com
Lcdo. Jesús González	City Administrator	Municipality of Arecibo	ccolon@rincon.gov.pr
Víctor Raíces	MS4	MS4	vmraices@gmail.com
Lcda. Iris González	Legal Director	Municipality of Arecibo	lcda.gonzalez.arecibo@gmail.com

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 Arecibo’s 2020 LHMP draft version and incorporate such comments on the Plan.

On April 25, 2019, a public notice was published at the local newspaper Primera Hora informing the public about the first Community Planning Meeting to be held at Arecibo on April 30, 2019. On June 14, 2019, a second notice was published, on this same newspaper, informing about a second Community Planning Meeting to be held on June 24, 2019, besides informing the public about the publication of the 2020 LHMP draft version available for review while providing a 20-day term to submit comments. A digital copy of the draft version of the 2020 LHMP was made available through the Puerto Rico Planning Boards (PRPB) website (jp.pr.gov), while a hard copy was made available for review at the Municipal Emergency Management Office from Monday through Friday from 9:00 a.m. to 2:00 p.m.

4 Arecibo’s Risk Assessment

After reviewing the natural hazards identified as priorities on the previous Arecibo’s 2012 LHMP, 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 (Sea level rise); (2)

Drought; (3) Earthquakes; (4) Flooding; (5) Landslides; (6) High winds (tropical storm); (7) Tsunamis; (8) Coastal erosion; (9) Storm surge and (10) Wildfires/ Forest fires. Discussion of these natural hazards are included as part of the 2020 LHMP's Chapter 4. In addition, the 2020 LHMP includes a quantitative vulnerability analysis based on the best available data for Arecibo and Puerto Rico accounting for future development to assess mitigation strategies in order to prevent repetitive and severe repetitive 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, tsunamis, flood, landslides, storm surge, high winds, sea level rise, and coastal erosion 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 Arecibo.

As part of the process of updating the Plan, the hazard identification and risk assessment was reviewed accounting for changes derived from the latest (2012) Plan (refer to section 4.6.5), as well as the status of the strategies aligned to assess these hazards. The risk analysis for all the hazards of the municipality was updated, and new identified hazards that poses a risk to the municipality during this update, were added and assessed. In addition, they were prioritized in accordance with the new realities of the municipality, particularly after Hurricanes Irma and Maria, both factors that affected this change, as well as population changes (decrease), possible changes in development, the exacerbation of climate change and its impact on rising sea levels, causing erosion on the coast and coast of the municipality and the increase in incidences of forest fires/wildfires that have been reflected in the Arecibo-Zone in recent years (2018-2019).

The following table provides a summary of the risk classification for each identified hazard. Part of the process of completing the next 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 2 Natural Hazard Ranking

Natural hazard	Risk to individuals	Risk to facilities	Risk to operations	Classification
Climate change/Sea level rise	Moderate	Moderate	Low	Moderate
Drought	Low	Low	Low	Low
Earthquakes/Liquefaction	Moderate	Moderate	Low	Moderate
Flooding	High	Moderate	High	High
Landslides	Low	Low	Low	Low

Natural hazard	Risk to individuals	Risk to facilities	Risk to operations	Classification
High winds/Tropical storms	High	High	High	High
Tsunamis	Low	Low	Low	Low
Coastal erosion	High	Low	Moderate	Moderate
Storm surge	Low	Low	Low	Low
Wildfires/ Forest fires	Low	Low	Low	Low

Source: *Planning Committee 2019*

Currently, the potential risks with the highest classification or greater impact identified for the municipality are: (1) sea level rise due to climate change; (2) earthquakes; (3) flooding; (4) high winds and (5) erosion, as discussed on Section 4.6.2. A future risk benchmark can provide a basis for understanding how future development can increase vulnerability to every hazard.

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, and (4) Emergency Services.

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 2012 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 Arecibo wants to achieve in terms of hazards and loss 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 at Arecibo.

Mitigation strategies are the activities, projects, measures, or processes that Arecibo will adopt in order to reduce or eliminate the risk to loss of life and property. Consequently, Arecibo 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 its resiliency. 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.

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:

- Erosion and sea level rise: Strengthen the slope and base of the coastal coastline in front of the Atlantic Avenue residences at Radioville that are threatened by the impact of the high degree of existing erosion and potential total slippage that this represents to this community.
- Flood control projects including: Breakwater systems and beach nourishment, storm drainage and flood control systems.
- Improvement to flood control canals and stormwater system on individual communities; study to evaluate water and drainage system to mitigate the impacts of flooding during heavy rain at Costas del Atlántico and implement an office designated to monitor and investigate the pluvial drainage system to address flood problems in different communities.
- Bridge repair and reconstruction and flood control projects for communities.
- High winds, flooding, sea level rise: Relocate communities and eliminate residences that remain uncommunicated after heavy rains.
- Earthquakes and others: Disaster education and training programs for organizations and the general population: Training (public outreach) to provide citizens and communities with the knowledge tools needed to deal with the natural disasters to which they are exposed. The proposed activities are: CERT training in communities, provide guidance to schools, communities and stakeholders on the natural hazards that may affect the municipality and training in the incident command system. Also, drills: Proper evacuation in the tsunami-eviction area/route (TsunamiReady) for earthquake preparedness.
- Equip “Safe rooms” and “Emergency Operations Center or ECC/EOC” in response to disaster planning, response and recovery.

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 Office of Federal Programs will coordinate with other municipal dependencies, as needed, to achieve the goals and objectives stated in this LHMP.

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.

Continuity of public participation⁴

The Municipality of Arecibo is committed to the continuous participation of the public and to educate the public on the issue of mitigation in the process of updating and after the approval of this Plan. That is why it will be maintained and made available for public review on its website: www.ciudaddearecibo.com, as well as a physical copy of the Plan at the Municipal Office for Emergency Management (OMME-AD).

After completing the review of the Plan, implementation and ongoing oversight, it will become a role of the Planning Committee to ensure the continuity of public participation. The Planning Committee will meet once a year to assess the progress of the proposed actions. The Committee will review the Plan and accept public feedback as part of the annual review process and mitigation plan updates every five (5) years. The annual review process and the availability of copies of the document will be made public annually and published on the municipality's webpage.

The public will have the opportunity to comment on the Plan as part of the annual mitigation assessment process for planning and updating the Mitigation Plan every five years. The HMP POC is responsible for coordinating Plan evaluation, requesting feedback, gathering and reviewing feedback, and incorporating them into the Plan update while Committee members will attend the HMP POC.

7 Plan Approval and Adoption

The Federal Emergency Management Agency (FEMA) completed review of the Hazard Mitigation Plan for the Municipality of Arecibo, 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 March 23, 2020. Accordingly, the Municipality of Arecibo, adopted said Plan on April 21, 2020 via Ordenance No. 31, Series 2019-2020.

Upon receiving the record of adoption from the municipality, FEMA issued an Official Approval Letter that dates from May 1, 2020, stating the jurisdiction has adopted said Plan, thus approved and eligible for FEMA Hazard Mitigation Assistance programs, having approved the Plan formally on April 24, 2020. This approval letter establishes the expiration date five (5) years from the date of approval, or until April 23, 2025.

⁴ Refer to section 7.7.