1. INTRODUCTION

The City and County of Honolulu ("the City") has developed this Local Hazard Mitigation Plan (LHMP) to reduce risk from disasters to the people, property, economy, and environment of O'ahu. This LHMP update is the result of a collaborative effort between the City and its partners to review the 2020 LHMP and integrate updated data and information from the past 5 years. The planning process was led by the Department of Emergency Management (DEM) and the Office of Climate Change, Sustainability, and Resiliency (CCSR). The updated 2025 LHMP includes citywide analyses and assessments of hazards, risks, and capabilities.

1.1 OVERVIEW OF HAZARD MITIGATION PLANNING

1.1.1 WHAT IS HAZARD MITIGATION?

Hazard mitigation is any sustained action to reduce or eliminate long-term risk and effects that can result from hazards. Hazard mitigation measures can encompass a range of activities, from significant infrastructure projects such installing drainage systems to decreasing roadway flooding, to individual initiatives such as the installation of rain barrels to collect graywater and alleviate flooding. Hazard mitigation can address risk posed by natural hazards or human-caused hazards. A natural hazard is defined as a source of harm or difficulty created by a meteorological, environmental, or geological event (FEMA n.d.). A human-caused hazard is the result of human intent or error or failed systems.

Hazard mitigation planning is the process of identifying disaster risks and vulnerabilities and subsequently developing measures and strategies to reduce or eliminate loss of life and/or property damage that can result from hazard events. FEMA defines an LHMP as documentation of a local government's evaluation of natural hazards and strategies to mitigate them.

Effective mitigation planning helps people, organizations, and government agencies better prepare for and respond to disasters by reducing disaster impacts and the time it takes for a community to recover from hazard impacts. An LHMP approved by FEMA also allows local governments to remain eligible for FEMA grant funding for mitigation projects that will reduce the effects of future disaster events. Long-term benefits of mitigation planning and implementation include the following:

The National Institute of Building Sciences estimates that for every dollar spent on damage prevention (mitigation), six times that amount is saved by not having to perform post-disaster repairs.

- Increased understanding of hazards faced by local communities
- A more sustainable and disaster-resistant community
- Financial savings through partnerships that support planning and mitigation efforts

- Focused use of limited resources to address hazards that affect the community most significantly
- Reduced long-term effects on human health and structures
- Reduced costs associated with response and recovery efforts, including repairs

1.1.2 HISTORY OF HAZARD MITIGATION PLANNING IN THE CITY AND COUNTY OF HONOLULU

Unique geographic and community characteristics of the City increase risks posed by natural and human-caused hazards. The City has been included in 21 federal hazard-related declarations (major disaster, fire management, and emergency) since 1954 (FEMA 2025). Given these local vulnerabilities and its disaster history, the City has prioritized integrating the principles of hazard mitigation, resilience, and adaptation into its policies, programs, and plans.

Following federal adoption of the Disaster Mitigation Act of 2000 and the national focus on mitigating hazards through advance planning, the City prepared and adopted its first LHMP in 2012. Since then, updates to the plan have occurred regularly, with adoption of the most recent version in 2020, followed by amendments to that in 2021. The amended 2020 LHMP identified the following as the greatest hazards of concern for the City:

- Climate Change Effects
- Coastal Erosion
- Dams
- Drought
- Earthquakes
- Floods
- Hazardous Materials
- Landslides
- Strong Winds
- Tropical Cyclones
- Tsunamis
- Volcanic Gases (VOG) Hazard
- Wildfire

Key Terms

Resilience—Defined within the O'ahu Resilience Strategy as, "the ability to survive, adapt and thrive regardless of what shocks or stresses come…."

Climate Adaptation—Actions taken at the individual, local, regional, and national levels to reduce risks from today's changed climate conditions and prepare for effects of changes projected for the future.

Social Vulnerability—The potential for loss within an individual or social group, as affected by traits that influence an individual's or group's resilience, which is their ability to prepare, respond to, cope with, or recover from an event (FEMA 2023).

Underserved Community—A community with limited or no access to essential resources, leading to disenfranchisement. This may include individuals who are socioeconomically disadvantaged, who have limited English proficiency, or who are geographically isolated.

In addition to efforts to develop LHMPs over the years, the City has also invested in climate adaptation efforts to support risk reduction. A selection of these efforts is provided below.

- ***One Climate One O'ahu***—The City's climate action plan establishes a roadmap for the City to combat climate change and eliminate fossil fuel emissions from 2020 to 2025 (CCSR 2020). In the summer of 2024, the City initiated the process of updating its 2020–2025 climate action plan to extend through 2030. The City has taken dedicated steps to build out 44 specific actions needed to address the effects of the climate crisis in the O'ahu Resilience Strategy, and the City issues an annual Sustainability Report highlighting the City's and community's progress toward meeting objectives and goals established within these different plans and programs (CCSR 2019).
- ***Climate Ready O'ahu***—The City's climate adaptation strategy was adopted by the City Council in 2024. The strategy prioritizes the identification of adaptation opportunities to prepare the City for the effects of increasing temperature, rising sea levels, and increasing precipitation, drought, wildfire, and hurricanes (CCSR 2024).

These resilience and adaptation initiatives complement hazard mitigation planning efforts, as they all contribute toward the goal of reducing long-term risks for individuals and enhancing community safety. Incorporation of these initiatives into the LHMP is crucial to ensure that mitigation measures consider long-term climate projections that could influence frequency, intensity, and magnitude of hazards. By integrating these elements, the LHMP outlines actions that address both current and future vulnerabilities.

1.1.3 SCOPE AND VISION OF THE 2025 LHMP UPDATE

For the 2025 LHMP update, the City has prioritized the enhancement of stakeholder and community engagement as well as efforts to expand representation of hazards that affect the community. These focus areas will provide the City with essential information to make informed decisions regarding resource allocation and prioritization of mitigation and emergency management activities.

The mitigation planning process serves not only as a means to gather the best-available data and insights for updating the LHMP, but also as a way to raise risk awareness among stakeholders and community members. Hazards impact all individuals in the areas where they occur, but those with heightened social vulnerability or in underserved communities are affected at a disproportionately higher rate than others. A priority during the plan update process was to target outreach to diverse stakeholder groups to ensure the final product was shaped by the whole community. The whole community must be equipped with the resources and knowledge to prepare for, respond to, recover from, and mitigate against hazardous events.

In partnership with its stakeholders, the City reviewed the hazards identified in the previous LHMP and the Hawai'i State Hazard Mitigation Plan (SHMP), discussed recent hazard impacts, and reviewed new studies and data sources to revise the list of hazards of concern for the 2025 update. The City aims to integrate human-caused hazards into the LHMP and align it more closely with the SHMP through this update.

1.1.4 KEY CHANGES IN THE CURRENT UPDATE

A comprehensive review and update of the 2020 LHMP led to the following significant changes between that plan and the 2025 update:

- The 2025 LHMP update includes human-caused hazards in the City's risk assessment to ensure the LHMP provides a comprehensive analysis of all hazards that could affect the City. Mitigation strategies and actions outlined in this document remain focused on effects from natural hazards. The updated LHMP includes the following hazards not included in the 2020 LHMP: deliberate hazards (mass violence and cyber attacks), health risks, infrastructure failure, and invasive species. The Hazard Mitigation Working Group (HMWG) re-evaluated each hazard and changed the naming convention of four hazards: Climate Change Effects became Climate Change and Sea Level Rise, Strong Winds became Windstorm, Wildfire became Wildland Fire, and Tropical Cyclone became Hurricane.
- Individual focus groups were convened to discuss the importance of hazard mitigation for older adults, historic and cultural resources, the business sector, Federally Qualified Health Centers (FQHCs), and faith-based congregations. This engagement included representatives of the Pacific Islander community of Melanesian, Micronesian, or Polynesian descent through intentional outreach to the Micronesian Ministers and Leaders Uut and the Pacific Islander Liaison of the Honolulu Office of Economic Revitalization.
- Mitigation actions from the 2020 LHMP were thoroughly reviewed and revised as necessary to eliminate redundancies and enhance the City's initiatives. Several recommended actions for the 2025 LHMP update addressed topics and activities previously identified in the 2020 LHMP. Consequently, the actions outlined in the 2020 LHMP were updated to align with the current risks, capabilities, and priorities of the City.

1.2 GENERAL MITIGATION PLANNING APPROACH

FEMA provides hazard mitigation planning support to local communities through guidance, resources, and plan reviews. Preparation of this LHMP accorded with the following regulations and guidance:

- Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards (FEMA, January 2013)
- Integrating Hazard Mitigation into Local Planning (FEMA, March 1, 2013)
- Plan Integration: Linking Local Planning Efforts (FEMA, July 2015)
- Local Mitigation Planning Policy Guide (FEMA, April 2025)
- Local Mitigation Planning Handbook (FEMA, May 2023)
- Disaster Mitigation Act (DMA) 2000 (Public Law 106-390, October 30, 2000)
- 44 *Code of Federal Regulations* (CFR) 201 and 206 (including Feb. 26, 2002; Oct. 1, 2002; Oct. 28, 2003; and Sept. 13, 2004, Interim Final Rules)

In addition to the above-listed regulations and guidance, the LHMP update was informed by the 2023 State of Hawai'i HMP and 2020 City and County of Honolulu Multi-Hazard Pre-Disaster Mitigation Plan.

1.3 REGULATORY FRAMEWORK

The Disaster Mitigation Act of 2000 (DMA 2000) amended the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act) to encourage states, tribes, and local governments to take a new and revitalized approach to mitigation planning. DMA 2000 repealed the previous law's mitigation planning provisions (Section 409) and replaced them with a new set of requirements (Section 322). Under the new Section 322, communities seeking certain hazard-related federal funding must have a plan that identifies actions to mitigate hazards, risks, and vulnerabilities and establish a strategy to implement those actions. Regulations implementing the intent and requirements of DMA 2000 are included in Title 44 CFR, Section 201 (44 CFR 201).

The federal regulations require that states and local governmental agencies update their hazard mitigation plans on a 5-year basis to prepare for and reduce the potential effects of natural hazards. Each local jurisdiction must identify potential natural hazards that could affect the health, safety, and well-being of its residents and identify and prioritize actions by the community to mitigate those hazards before disaster strikes. To be eligible for hazard mitigation assistance from the federal government, communities must prepare, maintain, and update a hazard mitigation plan.

One goal of the federal regulations is to facilitate cooperation between state and local authorities, prompting them to work together. This enhanced planning process enables state and local governments to better articulate accurate needs for mitigation, resulting in faster allocation of funding and more effective risk reduction projects.

Table 1-1 summarizes the 44 CFR 201 requirements and where each is addressed in this LHMP.

Table 1-1. FEMA Local Mitigation Plan Review Crosswalk

Plan Criteria	Primary Location in Plan
Prerequisites	
Adoption by the Local Governing Body: §201.6(c)(5)	Section 2.7; Appendix E
Planning Process	
Documentation of the Planning Process: §201.6(b) and §201.6(c)(1)	Chapter 2
Risk Assessment	
Identifying Hazards: §201.6(c)(2)(i)	Chapter 5
Profiling Hazards: §201.6(c)(2)(i)	Chapters 6 – 20
Assessing Vulnerability: Overview: §201.6(c)(2)(ii)	Chapter 4
Assessing Vulnerability: Identifying Structures: §201.6(c)(2)(ii)(A)	Chapters 6 – 20
Assessing Vulnerability: Estimating Potential Losses: §201.6(c)(2)(ii)(B)	Chapters 6 – 20
Assessing Vulnerability: Analyzing Development Trends: §201.6(c)(2)(ii)(C)	Chapters 6 – 20

Plan Criteria	Primary Location in Plan
Mitigation Strategy	
Local Hazard Mitigation Goals: §201.6(c)(3)(i)	Chapter 23
Identification and Analysis of Mitigation Actions: §201.6(c)(3)(ii)	Chapter 23
Implementation of Mitigation Actions: §201.6(c)(3)(iii)	Chapter 23
Plan Maintenance Process	
Monitoring, Evaluating, and Updating the Plan: §201.6(c)(4)(i)	Chapter 24
Incorporation into Existing Planning Mechanisms: §201.6(c)(4)(ii)	Chapter 24
Continued Public Involvement: §201.6(c)(4)(iii)	Chapter 24

1.4 PLAN ORGANIZATION

The LHMP includes a detailed review and analysis of each hazard of concern, resources (capabilities), and relevant statistical information. The LHMP is a resource for ongoing mitigation analysis, as it describes the City and conveys information on mitigation planning and how the risk assessment and capability assessment were performed. The LHMP includes the following chapters:

- Part 1—The Planning Process and Planning Area
  - Chapter 1, Introduction
  - Chapter 2, Planning Process—Description of the plan methodology and development process, committee and stakeholder roles and activities, and how the plan will be incorporated into existing programs. Information regarding the City's adoption of the plan
  - Chapter 3, City Profile—Overview of the City, including general information and physical conditions, land use patterns and trends, population and demographics, economy, general building stock inventory, community lifelines, and natural, historic, and cultural resources
- Part 2—Risk Assessment
  - Chapter 4, Risk Assessment Methodology and Tools—Description of the methodology used to assess hazard risk and the status of local data.
  - Chapter 5, Identification of Hazards of Concern—Documentation of the process of identifying the natural hazards of concern for further profiling and evaluation
  - Chapters 6–20,—Hazard profiles and findings of the risk assessment (estimates of effects of hazard events on life, safety, and health; general building stock; critical facilities; the economy; and natural, historic, and cultural resources)
  - Chapter 21, Hazard Ranking—Description and summary of the hazard ranking process
- Part 3—Capability Assessment
  - Chapter 22, Capability Assessment—Summary and description of existing plans, programs, and regulatory mechanisms at all levels of government (federal, state, local) that support hazard mitigation within the City

- Part 4—Mitigation Strategy
    - Chapter 23, Mitigation Strategy—Information regarding mitigation goals and objectives identified by the HMWG in response to priority hazards of concern and the process by which local mitigation strategies have been developed or updated
- Part 5—Plan Maintenance
    - Chapter 24, Plan Maintenance Procedures—System to continue to monitor, evaluate, maintain, and update the plan

Appendices include the following:

- **Appendix A**, **References**
- **Appendix B**, **Acronyms and Glossary**
- **Appendix C**, **Meeting Documentation—**Agendas, attendance sheets, minutes, and other documentation (as available and applicable) of planning meetings convened during development of the LHMP
- **Appendix D**, **Public and Stakeholder Outreach Documentation—**Documentation of the public and stakeholder outreach effort, including web pages, informational materials, public and stakeholder meetings and presentations, surveys, and other methods applied to receive and incorporate public and stakeholder comment and input to the LHMP update process
- **Appendix E**, **Resolution of Plan Adoption—**Documentation that supports approval of the LHMP
- **Appendix F**, **Future Recommendations—**Summary of observations, lessons learned, and best practices for future engagement efforts for LHMP updates
- **Appendix G**, **Building Resilient Infrastructure and Communities (BRIC) Direct Technical Assistance (DTA) Early Stakeholder Engagement Summary Report**
- **Appendix H, O'ahu Potential Flood Area Maps—** Detailed maps of areas with a history of flooding to supplement FEMA mapped floodplain areas

1.5 SPECIALIZED TERMS AND CONCEPTS

Like any technical field, hazard mitigation has its own set of terms and concepts with particular meanings within the hazard mitigation practice. A full glossary and list of acronyms is provided in Appendix B. Listed below are quick references to specialized terms prominent in this LHMP (FEMA 2023, FEMA 2022):

- **Adaptive capacity**—ability of a human or natural system to adjust to climate change by moderating potential damage, taking advantage of opportunities, or coping with the consequences
- **Asset**—anything important to the character and function of a community (e.g., people, structures, community lifelines, the economy, and natural, historic, and cultural resources)
- **Capability assessment**—an evaluation of authorities, policies, programs, funding, and resources available to a participant attempting to accomplish hazard mitigation

- **Climate change**—changes in average weather conditions that persist over multiple decades or longer; climate change encompasses both increases and decreases in temperature, as well as shifts in precipitation, changing risk of certain types of severe weather events, and changes to other features of the climate system
- **Community lifelines**—the most fundamental services in a community that, when stabilized, enable all other aspects of society to function
- **Extent**—the range of anticipated intensities of identified hazards within a community, most commonly expressed by use of various scientific scales
- **Hazard profile**—a description of a hazard's location, extent, previous occurrences, and probability of future events within a community
- **Hazard ranking**—the process of identifying hazards that pose greatest risk to a community, based on how likely the hazard is to occur, potential consequences if the hazard does occur, and other relevant local factors
- **Impact**—consequences of a hazard on a community's assets identified in the vulnerability assessment
- **Integration**—inclusion of hazard mitigation principles, vulnerability information, and mitigation actions into other existing community planning to leverage activities that have co-benefits, reduce risk, and increase resilience
- **Mitigation action**—measures, projects, plans, or activities proposed to reduce current and future vulnerabilities identified in the risk assessment
- **Mitigation strategy**—long-term blueprint for reducing potential hazard-related losses identified in the risk assessment; the strategy consists of mitigation goals, mitigation actions, and a plan for implementing the actions
- **Natural hazard**—a source of harm or difficulty created by a meteorological, environmental, or geological event
- **Plan maintenance**—monitoring and updating an LHMP as warranted by changing conditions, availability of new information, and progress on proposed mitigation actions
- **Planning process**—procedures implemented to develop an LHMP with broad acceptance across the community
- **Risk**—potential for damage or loss when hazards interact with people or assets
- **Risk assessment**—a data-driven analysis to find where a local jurisdiction is vulnerable to hazards
- **Social vulnerability**—susceptibility of social groups to adverse effects of natural hazards, including disproportionate death, injury, loss, or disruption of livelihood
- **Stakeholder**—individuals or groups that a mitigation action or policy affects, including businesses, private organizations, and residents
- **Vulnerability**—a description of assets within locations identified to be hazard-prone that are at risk from effects of a hazard